National Surgical, Obstetrics, Anaesthesia & Nursing Plan (NSOANP) for Nigeria

Strategic Priorities for Surgical Care (StraPS)

Planning for a Future of Surgical Equity, Safety & Progress

2019 - 2023

Federal Ministry of Health

National Surgical, Obstetrics, Anaesthesia & Nursing Plan (NSOANP) for Nigeria

Strategic Priorities for Surgical Care (StraPS)
Planning for a Future of Equity, Safety & Progress

In Collaboration with

National Postgraduate Medical College of Nigeria
Established by Law in 1979, now CAP N59, LFN 2004

West African College of Surgeons
(KNOWLEDGE, HEALTH AND UNITY)
Collège Ouest Africain des Chirurgiens
(SAVOIR, SANTE ET UNITE)

UNFPA

UCDAVIS HEALTH

PROGRAM IN GLOBAL SURGERY AND SOCIAL CHANGE
Harvard Medical School

GRID3
GEO-REFERENCED INFRASTRUCTURE AND DEMOGRAPHIC DATA FOR DEVELOPMENT

2019 - 2023

Table of Contents

ABBREVIATIONS 1
DEFINITIONS 3
FOREWORD 4
ACKNOWLEDGEMENTS 6
EXECUTIVE SUMMARY 10
VISION AND MISSION 12
Vision 12
Mission 12
POLICY BRIEFS 13
INFRASTRUCTURE AND EQUIPMENT 13
SERVICE DELIVERY 13
HUMAN RESOURCES 15
HEALTHCARE INFORMATION AND RESEARCH 15
FINANCING OF SURGICAL CARE 16
HEALTHCARE GOVERNANCE AND LEADERSHIP 16
STRATEGIC OBJECTIVES 17
BACKGROUND 21
BURDEN OF SURGICAL DISEASES IN NIGERIA 23
Emergency surgery 23
Obstetrics 24
Trauma and Injuries 24
Cancer 25
Children's Surgical Diseases 26
Congenital anomalies (birth defects) 26
Trauma and Injuries 26
Cancer 27
Infection 27
SITUATIONAL ANALYSIS AND BASELINE ASSESSMENT 28
BASELINE ASSESSMENT 33
Findings 34
CHILDREN'S SURGICAL CARE 46
LIMITATIONS OF THE BASELINE ASSESSMENT 53
RECOMMENDATIONS 55
Infrastructure and Service Delivery 55
Infrastructure and Service Delivery for Children's Surgery 62
Human Resources, Training and Education 70

Healthcare Information, Metrics and Research 74
Financing of Surgical Care 76
IMPLEMENTATION 81
Duration of Plan 82
Implementation road map 83
Infrastructure 83
Service Delivery 87
Human Resources, Training and Education (SCAT-Hands1) 92
Healthcare Information, Metrics and Research 95
Financing Surgical Care 100
Healthcare Governance and Leadership 104
MONITORING, EVALUATION AND FEEDBACK 106
Key Players 106
Specifics of Monitoring and Evaluation 112
Infrastructure 112
Service Delivery 122
Human resources for health, training and education 130
Healthcare information, metrics and research 132
Financing surgical care 135
COSTING OF THE PLAN 141
REFERENCES 142
APPENDICES 151
Appendix 1: Nigeria NSOANP Hospital Assessment Tool 151
Appendix 2: Children's Surgical Assessment Tool 157

ABBREVIATIONS

ABUTH: Ahmadu Bello University Teaching Hospital

ASA: American Society of Anesthesiologists

ASD: Atrial Septal Defect

CCU: Critical Care Unit

CME: Continuing Medical Education

CPR: Cardio-pulmonary Resuscitation

CSR: Corporate Social Responsibility

DALYs: Disability Adjusted Life Years

DCP3: Disease Control Priorities, 3rd edition

DHS: Director of Health Service

EHR: Electronic Health Record

EmOC: Emergency Obstetric Care

FCT: Federal Capital Territory

FG: Federal Government

FMC: Federal Medical Centre

FMoH: Federal Ministry of Health

G4 Alliance: Global Alliance for Surgical, Obstetric, Trauma and Anaesthesia Care

GBD: Global Burden of Disease

GCS: Glasgow Coma Scale

GDP: Gross Domestic Product

GICS: Global Initiative for Children's Surgery

GLOBOCAN: Global Cancer Incidence, Mortality and Prevalence

GSM: Global System for Mobile communication

HDCU: High Dependency Care Unit

ICU: Intensive Care Unit

IPAN: Institute of Public Analysts of Nigeria

JSC: Joint Surgical Congress

LCoGS: Lancet Commission on Global Surgery

LG: Local Government

LGA: Local Government Area

LMIC: Low- and Middle-Income Countries

MDCN: Medical and Dental Council of Nigeria

M&M: Morbidity and Mortality

NAFDAC: National Agency for Food and Drugs Administration and Control

NAUTH: Nnamdi Azikiwe University Teaching Hospital

NBS: National Bureau of Statistics

NCHP: National Child Health Policy/Plan

NDHS: Nigeria Demographic and Health Survey

NGO: Non-Governmental Organisations

NHIS: National Health Insurance Scheme

NHL: Non-Hodgkin's Lymphoma

NMCN: Nursing and Midwifery Council of Nigeria

NPHCDA: National Primary Health Care Development Agency

NPMCN: National Postgraduate Medical College of Nigeria

NSIA: Nigeria Sovereign Investment Authority

NSOANP: National Surgical, Obstetrics, Anaesthesia and Nursing Plan

NSOAP: National Surgical, Obstetrics and Anaesthesia Plan

NSHP: National Strategic Health Plan

NUC: National Universities Commission

NYSC: National Youth Service Corp

OReCS: Optimal Resources for Children's Optimal Care

PGSSC: Program in Global Surgery and Social Change

PHC: Primary Health Care

RTC: Road Traffic Crashes

SAO: Surgeons, Anaesthetists and Obstetricians

SOAN: Surgeons, Obstetricians, Anaesthetists and Nurses

SG: State Government

SMoH: State Ministry of Health

SOP: Standard Operating Procedure

SSCL: Surgical Safety Checklist

StraPS: Strategic Priorities for Surgical Care

TBSA: Total Body Surface Area

TOF: Tetralogy of Fallot

UCES: Universal Coverage of Essential Surgery

UHC: Universal Health Coverage

UNFPA: United Nations Population Fund

USAID: United States Agency for International Development

VSD: Ventricular Septal Defect

WACS: West African College of Surgeons

WHA: World Health Assembly

WHO: World Health Organisation

DEFINITIONS

Surgeon: Specialist surgeon with postgraduate training and fellowship qualification.

Obstetrician: Specialist obstetrician with postgraduate training and fellowship qualification.

Anaesthetist: Specialist anaesthetist with postgraduate training and fellowship qualification.

Impoverishing expenditure: Is defined as being pushed into poverty or being pushed further into poverty by out_of_pocket payments.

Catastrophic expenditure: is defined as direct out_of_pocket payments of greater than 40% of household income net of subsistence needs.

Financial risk protection: Financial risk protection is a key component of universal health coverage (UHC), which is defined as access to all needed quality health services without financial hardship

Medical Officer (General Duty Doctor): Medical graduate with undergraduate medical qualification of MBBS, MBBCh, MD.

Bellwether Procedures: 3 procedures used as a proxy for performing essential surgery. These are laparotomy, caesarean delivery and treatment of open fractures.

Perioperative mortality rate: death on the day of surgery and death before discharge from hospital or within 30 days of the procedure, whichever is sooner.

Surgical volume: Number of surgical procedures per 100,000 people

2-hour access: The proportion of the population that can access, within 2 hours, a health facility with capacity to perform caesarean delivery, laparotomy and treatment of open fracture (the bellwether procedures).

Disability adjusted life years: The disability-adjusted life year (DALY) is a measure of overall disease burden, expressed as the number of years lost due to ill-health, disability or early death.

FOREWORD

It gives me great pleasure to bring to reality the publication of this important document. Until now, surgical, obstetrics and anaesthesia care has not received the desired attention commensurate with the burden and magnitude of surgical diseases in the country.

Surgical conditions are presently and important component of non-communicable diseases that are ravaging our population. Obstetric complications, trauma and injuries, and cancer have continued to cause significant morbidity and mortality, as well as long-term and lifelong disability amongst our population. Children and adolescents, who constitute nearly 50% of our population bear a large part of this burden.

In May 2015, the World Health Assembly (WHA) passed resolution 68:15 mandating countries to include emergency and essential surgical, obstetrics and anaesthesia care as integral component of Universal Health Coverage (UHC). This resolution and mandate have been a wakeup call for the Federal Ministry of Health (FMoH) to take action to develop and implement the National Surgical, Obstetrics, Anaesthesia and Nursing Plan (NSOANP).

This 5-year national surgical, obstetrics, anaesthesia and nursing plan (NSOANP), the Strategic Priorities for Surgical Care (StraPS) provides a realistic assessment and situational analysis of the state of surgical care in Nigeria. The plan also provides a clear road map for implementation, as well as ongoing monitoring and evaluation with feedback mechanism. An important consideration is expanding access to emergency and essential surgical, obstetrics and anaesthesia care, with financial risk protection. Children and adolescents have, for the first time been given a deliberate consideration and Nigeria is the very first country to specifically including children and adolescents in the surgical plan.

Going forward, this NSOANP will be integrated into the National Strategic Health Development Plan and National Child Health Policy, to ensure that emergency and essential surgical, obstetrics, anaesthesia and nursing care continue to be strengthened within the existing healthcare system. This investment in surgical care has important benefits and gains and will strengthen the entire healthcare system.

I, therefore, call on all stakeholders including the private sector and our development partners to work with us as we implement this plan towards achieving UHC for Nigeria.

Professor Isaac F. Adewole, FAS, FSPSP, FRCOG, DSc.(Hons)

Honorable Minister of Health

May 2019

ACKNOWLEDGEMENTS

Several individuals, professional societies and associations, governmental and non-governmental organisations and agencies, and international partners were involved in the development of this plan at various levels and stages of the work. The contributions and efforts of the following are specifically acknowledged and appreciated:

NSOANP COMMITTEE

Dr. Omale Joseph Amedu, mni: Committee Chair

Professor Emmanuel A. Ameh: Committee Co-Chair

Professor Stanley N. C. Anyanwu

Professor Zakari Ilyasu

Dr. Bisola Onajin-Obembe

Comrade Olubunmi Lawal

De. Justina Seyi-Olajide: Facilitator

Dr. Jamie Anderson: Facilitator (Program in Global Surgery and Social Change, Harvard Medical School, Boston, MA, USA)

NSOANP WRITING COMMITTEE

Dr. Joseph O. Amedu: Committee Chair

Professor Emmanuel A. Ameh: Committee Co-Chair

Professor Stanley N. C. Anyanwu

Professor O. da Lilly-Tariah

Professor Owoidoho Udofia

Professor Ikenna Onwuegbuna

Dr. Bisola Onajin-Obembe

Comrade Olubunmi Lawal

Dr. Omolara M. Williams

Dr. Justina Seyi-Olajide

Dr. Omolara Faboya

Dr. Abraham Bethel-Kasimu

Mrs. Elizabeth Akpabio

BASELINE ASSESSMENT DATA COLLECTION

Dr. Hyginus Ekwunife, Anambra State assessment

Dr. Faruk, Gombe State assessment

Dr. Sani Adamu, Gombe State assessment

Dr. Jerry G. Makama, Kaduna State assessment

Dr. Stephen Kache, Kaduna State assessment

Dr. Omolara M. Williams, Lagos State assessment

Dr. Justina Seyi-Olajide, Lagos State assessment

Dr. Omolara Faboya, Lagos State assessment

Dr. Jamie Anderson, FCT assessment

Dr. Susuti Aaron Nuhu

Comrade Olubunmi Lawal, FCT assessment

Dr. Aliyu B. Ndajiwo, FCT assessment

Professor Emmanuel A. Ameh, FCT assessment

BASELINE ASSESSMENT DATA ANALYSIS

Dr. Diana L. Farmer, University of California, Davis, CA, USA

Dr. Jamie Anderson, University of California, Davis, CA, USA

Erica Tutuwan, University of California, Davis, CA, USA

Dr. Sabrina Juran, United Nations Population Fund (UNFPA)

Prof. Andy J. Tatem, University of Southampton, Worldpop Project

PROFESSIONAL SOCIETIES AND ASSOCIATIONS

Association of Surgeons of Nigeria

American College of Surgeons, Nigeria Chapter

Society of Obstetricians & Gynaecologists of Nigeria

Nigeria Society of Anaesthetists

National Orthopaedic Association

Nigeria Association of Plastic & Reconstructive Surgeons

Nigeria Society of Neurological Surgeons

Nigeria Association of Cardiothoracic Surgeons

Nigeria Association of Urologic Surgeons

Association of Paediatric Surgeons of Nigeria

National Association of Nigeria Nurses & Midwives

Paediatric Nurses Association of Nigeria

Nigeria Association of Nurse Anaesthetists

GOVERNMENTAL AGNECIES AND DEPEARTMENTS

Federal Ministry of Finance

Ministry of Health, Anambra State

Ministry of Health, Gombe State

Ministry of Health, Kaduna State

Ministry of Health, Lagos State

Department of Health and Human Services, Federal Capital Territory

Trauma Desk/Programme, Federal Ministry of Health

National Health Research Committee, Federal Ministry of Health

National Postgraduate Medical College of Nigeria

Medical & Dental Council of Nigeria

Nursing Council of Nigeria

National Health Insurance Scheme

Federal Ministry of Finance

Office of Special Assistant to President on Sustainable Development Goals

National Hospital, Abuja

NON-GOVERNMENTAL ORGANISATIONS

Pro Health International

INTERNATIONAL PARTNERS

West African College of Surgeons

Program in Global Surgery and Social Change, Harvard Medical School, Boston, MA, USA

Department of Surgery, University of California, Davis, CA, USA

United Nations Population Fund (UNFPA)

German Global Surgery Association

G4 Alliance

While we appreciate the support of the National Post Graduate Medical College of Nigeria (NPMCN) for funding the activities of the stakeholders' and the Writing team meetings, I wish to specifically thank the co-Chair, Professor Emmanuel A. Ameh for his relentless efforts in seeing this Plan come through.

Dr. Omale Joseph Amedu, MD, PhD, mni

Director Hospital Services & Chair NSOANP Committee

EXECUTIVE SUMMARY

Five billion of the world's 7.5 billion people do not have access to safe and affordable surgical, obstetrics, trauma and anaesthesia care when needed. Similarly, 1.7 billion children below age 15 years worldwide have no access to safe and affordable surgical care. Most of these people and children live in low- and middle-income countries, including Nigeria.

Available evidence indicates that there is a severe shortage of all the professionals required to provide surgical, obstetrics, anaesthesia and nursing care. For instance, there are only one surgeon, obstetrician, anaesthetist/100,000 population against the recommended 20/100,000 population. The density of paediatric surgeons is even worse, at 0.14/100,000 children below 15 years against the recommended density of 1/100,000 children. At the moment, Nigeria requires an additional 702 paediatric surgeons to address the deficits.

Only 166/100,000 surgeries are performed each year in the country against the recommended volume of 5,000/100,000. This means that most people with a surgical disease do not receive the needed surgery.

It's estimated that 65% or more of Nigerians are impoverished every year due to surgical care and 66% incur catastrophic expenditure due to surgical care. Although health insurance exists, it covers only about 5% of the population and there's no financial risk protection against surgical care for majority of Nigerians.

Although most Nigerians can reach a healthcare facility within 2 hours, majority of these public healthcare centres (aside from the tertiary hospitals) do not have the human resources and infrastructure to provide emergency and essential surgical care when needed. Furthermore, lack of adequately equipped and fully functional children's hospital limits the delivery of emergency and essential surgical care for children.

A deliberate national surgical, obstetrics, anaesthesia and nursing plan, the Strategic Priorities for Surgical Care (StraPS) has been created to address emergency and

essential surgical care for Nigerians. Over the next 5 years, it is planned to expand surgical care to ensure 75% coverage of the population and 50% coverage for children below 15 years, with the following targets:

1. Increase SAO to 5/100,000 population
2. Increase density of paediatric surgeons to 0.25/100,000 children below age 15 years
3. Increase surgical volume by 100%
4. Train family physicians and general duty doctors to provide Bellwether procedures and essential children's surgery package
5. Train general duty doctors and diplomates to provide anaesthesia at secondary and primary level hospitals. Strengthen, mentor and supervise nurse anaesthetists to provide and support anaesthesia services as needed

   The implementation of the policy will be carefully and transparently monitored and evaluated with feedback provided, to track impact and progress. Deliberate advocacy will be deployed to ensure and facilitate buy-in from all stakeholders, including local and state governments, federal government agencies and departments, non-governmental and funding agencies.

The estimated cost of the entire plan is ₦6.04 trillion (US$16.77 billion) over the next 5 years. This cost should be included in the budgets of governments, government agencies and departments to ensure adequate implementation.

The NSOANP will be incorporated and integrated into the existing national strategic health plan and child healthcare policy.

Dr. Omale Joseph Amedu, mni
NSOANP Committee Chair

Professor Emmanuel A. Ameh, FWACS, FACS
NSOANP Committee Co-Chair

VISION AND MISSION

Vision

To have a national healthcare system that is responsive to the surgical needs of all citizens, at all times.

Mission

To integrate surgical, obstetrics, anaesthesia and nursing care into the national healthcare system so that appropriate surgical care is provided for all adults and children at all levels of care.

To enable all persons, have access to safe and quality surgical care with financial ease when needed.

POLICY BRIEFS

INFRASTRUCTURE AND EQUIPMENT

Most Nigerians have no access to a healthcare facility that can provide safe and affordable emergency and essential surgical, obstetrics and anaesthesia care.

Existing children's hospitals do not have the equipment and human resource to provide the required support for children's surgical care.

Healthcare infrastructures need to be scaled up urgently to provide appropriate emergency and essential surgical, obstetrics and anesthesia care within 2 hours access.

A federal children's hospital needs to be created urgently to support the surgical care of children

Infrastructure for surgical, obstetrics and anaesthesia care provides significant gains by strengthening the entire healthcare system.

SERVICE DELIVERY

Only 166 surgical procedures per 100,000 population are performed in the country.

Perioperative mortality from surgery is not routinely reported.

Number of surgical procedures performed must be scaled urgently within the next 5years.

Quality and safety of surgery should be strengthened.

There must be mandatory reporting of perioperative mortality, including maternal and perinatal death surveillance and response, to ensure safety and quality are continuously improved.

An efficient integrated ambulance and referral system must be established to ensure

HUMAN RESOURCES

The recommended surgical workforce density is 20 per 100,000 population. Nigeria has only 1.65 per 100,000 population indicating a surgical workforce crisis.

An increase the surgical workforce density from 1.65 per 100,000 to 5 per 1000,000 by the year 2025 is the aim.

Training more physicians (specialists and non-specialists) and nurses from 2019 to 2025 is required.

Attraction and retention strategies are required through SCAT-hands (Surgical care for all by trained hands).

Targets are to increase residency training positions to 1000 per year and increase number of trained nurses by 50%.

The result will be significant improvement in surgery and overall health for everyone.

HEALTHCARE INFORMATION AND RESEARCH

Health information management is still paper based in practically all public hospitals making access to patient records across multiple visits and across multispecialty visits difficult.

The goals are to have fully functional electronic medical record services in all hospitals in 5 years; and, and include surgical, obstetrics, anaesthesia and nursing data in Nigeria demographic and health survey (NDHS).

To achieve this, relevant staff training and retraining is essential with investment in electronic health information management.

Enforcing timely and comprehensive submission of relevant and accurate to supervising ministries and relevant agencies is also vital.

FINANCING OF SURGICAL CARE

65% of Nigerians are impoverished due to surgical care and 65% face catastrophic expenditure from out of pocket expenditure due to surgical care.

The NSOAN Plan hopes to change this narrative in five (5) years. The Plan among other things looks at addressing the financing of surgical care needs without impoverishing the user. It targets Out of Pocket spending rate of sub 35% and health insurance coverage rate of 50% by 2023.

Budgetary allocation to health should be progressively increased to achieve 15% allocation by 2023 to strengthen the healthcare system through investment in surgical care.

Investing in surgical, obstetrics, anaesthesia and nursing care offers significant gains by increasing economic productivity.

HEALTHCARE GOVERNANCE AND LEADERSHIP

Efficient governance and leadership are crucial to strong, resilient and responsive healthcare system for the provision of safe, affordable and timely surgical care.

However, the desirable and achievable aim of NSOANP, within a period of five years, is to get 80% of the States in Nigeria to buy into the project. With NSOANP completely integrated and disseminated through a 50% increase of its personnel, in five years brain drain in surgical care delivery would have been reduced by 50% in Nigeria.

The foregoing is achievable when leadership and governance create and foster adequate will to drive implementation of NSOANP within the existing National health plan, and ensure effective governance, supervision, monitoring, and evaluation at all levels. To realise this, an NSOANP desk and national coordinator with formal oversight for NSOANP should be created at the FMoH.

STRATEGIC OBJECTIVES

1. Workforce 1: Increase SAO density from 1.65/100,000 population to 5/100,000 population by 2023
2. Workforce 2: Train and supervise middle level workforce (including supervised task sharing) to provide surgical care where there is no SAO
3. Infrastructure 1: strengthen existing healthcare facilities at all levels to provide emergency and essential surgical care
4. Infrastructure 2: Establish one federal children's hospital by 2023
5. Service delivery 1: Achieve 75% access to surgical care by 2023
6. Service delivery 2: Achieve 50% access to surgical care for children by 2023
7. Health information, research and metrics 1: Comprehensive integrated national electronic medical records database for effective continuity of care and generation of data on disease prevalence to enable appropriate planning and research for disease prevention and treatment

   Health information, research and metrics 2: Create and disseminate a nationwide policy document on data collection and management in all levels of healthcare
8. Finance: Achieve financial risk protection for 50% of population by 2023
9. Governance and Leadership: Strengthen healthcare governance and leadership led by the Director, Department of Hospital Services, FMoH.

These strategic objectives are best achieved through careful planning for universal delivery of emergency and essential surgical, obstetrics, anaesthesia and nursing care (Box 1).

Box 1: Components of NSOANP planning (Lancet Commission on Global Surgery)[1]		
Infrastructure		
Components	Recommendations	Assessment Methods
Surgical facilities Facility readiness Blood supply Access and referral systems	• Track number and distribution of surgical facilities • Negotiate centralised framework purchase agreements with decentralised ordering • Equip first-level surgical facilities to be able to perform laparotomy, caesarean delivery and treatment of open fracture (the Bellwether Procedures) • Develop national blood plan • Reduce barriers to access through enhanced connectivity across entire care delivery chain from community to tertiary care • Establish referral systems with community integration, transfer criteria, referral logistics, protections for first-responders and helpful members of the public	• Proportion of population with 2-hour access to first-level facility WHO Hospital Assessment Tool (e.g., assessment of structure, electricity, water, oxygen, surgical equipment and supplies, computers and internet) • Proportion of hospitals fulfilling safe surgery criteria • Blood bank distribution, donation rate
Workforce		
Components	Recommendations	Assessment Methods
Surgical, anaesthetic and obstetric providers Allied health providers (nursing; operational managers;	• Establish training and education strategy based on population and needs of state in Nigeria country (Require rural component of surgical and anaesthetic training programmes) • Develop a context-appropriate licensing and credentialing requirement for all surgical workforce • Training and education strategy of ancillary staff based on peculiar need of each state	• Density and distribution of specialist surgical, anaesthetic, and obstetric providers • Number of surgical, anaesthetic and obstetric graduates and retirees • Proportion of surgical workforce training programmes accredited Presence of task sharing or nursing

biomedical engineers; radiology, pathology and laboratory technician officers)	• Invest in professional health-care manager training • Establish biomedical equipment training programme	accredited programmes and number of providers • Presence of attraction and retention strategies • Density and distribution of nurses, ancillary staff including operational managers, biomedical engineers, and radiology, pathology and laboratory technicians
Service Delivery		
Components	Recommendations	Assessment Methods
Surgical volume System coordination Quality and safety	• All first-level hospitals should provide laparotomy, caesarean delivery and treatment of open fracture (the Bellwether Procedures) and establish referral networks • Integrate public, private, NGO providers into common national delivery framework; promote demand-driven partnerships with NGOs to build surgical capacity • Prioritise healthcare management training • Prioritise quality improvement processes and outcomes monitoring • Promote telemedicine to build system-wide connectivity • Promote system-wide connectivity for telemedicine applications, clinical support and education	• Proportion of surgical facilities offering the Bellwether Procedures • Number of surgical procedures done per year • Surgical and anaesthetic related morbidity and mortality (perioperative) □ Availability of system-wide communication
Financing		

Components	Recommendations	Assessment Methods
Health financing and accounting Budget allocation	• Cover basic surgical packages within universal health coverage • Risk pool with a single pool; minimise user fees at the point of care • Track financial flows for surgery through national health accounts (Use value-based purchasing with risk-pooled funds)	• Surgical expenditure as a proportion of gross domestic product • Surgical expenditure as a proportion of total national health-care budget • Out-of-pocket expenditures on surgery • Catastrophic and impoverishing expenditures on surgery
Information Management		
Component	Recommendations	Assessment Methods
Information systems Research agenda	• Develop robust information systems to monitor clinical processes, cost, outcomes and identify deficits • Identify, regulate, and fund surgical research priorities of local relevance	• Presence of data systems that promote monitoring and accountability related to surgical and anaesthesia care • Proportion of hospital facilities with high speed internet connections
Healthcare Governance and Leadership		
Components	Recommendations	Assessment Methods
Healthcare Governance Leadership	• Create a governance structure that is effective and efficient • Develop strong and effective leaders to drive policies and performance	• Availability of appropriate policies and protocols • Availability of supplies

BACKGROUND

There have been recent global efforts to improve access and quality of health care around the world. These efforts have led to the conceptualization of the Universal Health Coverage, transitioning from the Millennium Development Goals (MDGs) to the 2030 agenda with its Sustainable Development Goals (SDGs), and the publication of Disease Control Priorities (DCP3): Global burden of surgical diseases[2] and World Health Assembly resolution 68.15 on strengthening emergency and essential surgical care and anaesthesia. [3]

Surgical conditions account for approximately 30% of the global burden of diseases (GBD) and surgical cuts across the entire spectrum of GBDs.[4,5] Surgical operatives would avert approximately 17 million deaths per year (32.9% of all avertable deaths),[4] majority in low- and middle-income countries. It has also been shown that essential surgical procedures were among the most cost-effective of all health intervention. However, substantial disparities were seen in the safety of surgical care in LMICs. Surgery is an "indivisible, indispensable part of health care" in LMICs and the SDGs are noted as unachievable without the provision of surgical care.

The large burden of surgical conditions, the cost effectiveness of essential surgery and the strong public demand for surgical services suggest that universal coverage of essential surgery (UCES) should be financed early on the path to universal health coverage. Universal health coverage is defined by the WHO "as ensuring that all people have access to needed health services (including prevention, promotion, treatment, rehabilitation and palliation) of sufficient quality to be effective while also ensuring that the use of these services does not expose the user the financial hardship". The public health impact of scaling up surgical care in LMICs is further demonstrated by the fact that the number of preventable deaths per annum is greater than the population of some countries. Nigeria signed on to UHC and had a presidential summit on this in 2014.

In 2015, the Lancet Commission on Global Surgery (LCoGS) recommended six surgical metrics to enable countries measure their surgical and anaesthesia delivery.

These indicators, namely specialist surgical workforce density, access to timely surgery, surgical volume, perioperative mortality, protection against impoverishing expenditure and protection against catastrophic expenditure, have subsequently been accepted by the world bank for inclusion in the World Development Indicators.

The Nigeria National Health Plan essential package of care focuses on infectious diseases, nutrition and obstetric care (mainly antenatal and supervised delivery). The only surgical procedure included is male circumcision. The new National Health Policy approved by the Government did not include Surgical, Obstetric, Trauma and Anaesthesia care.

In response to this situation, the association of Surgeons of Nigeria (ASON), The Nigeria Surgical Research Society (NSRS) and the Nigerian chapter of the American College of Surgeons (ACS), during the 2016 Joint Surgical Congress (JSC) made a collective decision to develop a National Surgical Plan for Nigeria. First, a National Surgical Obstetrics and Anaesthesia Plan committee was created by the Joint Surgical Congress. This led to strategic conversations with professional societies, collaboration with the West African College of Surgeons and Harvard Program in Global Surgery and Social Change and engagement with the Ministry of Health to lead the process.

The 1st NSOAP working meeting took place on 7th of July 2017 culminating in the setting up of committees on Infrastructure, Workforce, Education and Training, Service delivery, Finance and Economics, Leadership and Governance, Research, Metrics and Information Management. The highlights of the meeting were: a comprehensive inclusion of Children's Surgical Care, country-wide survey of the entire surgical system and a 1-year timeline for completion of the project. Due to the lack of a readily available database of all current components of the country's surgical system, it was essential to carry out on-site hospital evaluations in order to establish the current state of the surgical system.

BURDEN OF SURGICAL DISEASES IN NIGERIA

Accurate estimation of the global burden of surgical diseases is hampered by various complexities and inherent challenges as confusion still persist about what constitutes surgical care (encompassing pre-, intra- and post-operative care and non-operative surgical care) especially in resource constrained settings and due to the fact that surgical care cuts across the entire spectrum of GBD 2010 cause categories.[2] In Nigeria, the challenges in estimation of surgical burden of disease are further worsened and increased by the lack of comprehensive and accurate record keeping. A review of available published data will provide some much-needed insight into the nation's burden of surgical diseases.

Emergency surgery

In low- and middle-income countries (LMICs), at least 60 percent of the surgical operations performed are emergencies.[1] A review of surgical admissions for 10 different years at ABUTH, Zaria showed a progressive rise in incidence of emergency surgical admissions and operations over time with a change in ratio of emergency : elective from 1:1.6 to 1.4:1.[6] Non trauma conditions accounted for 29% of adult surgical emergencies presenting at a tertiary hospital in Lagos with the commonest diagnosis being acute abdomen(31.9%).[7] The commonest emergency operation performed at a NAUTH was acute appendicitis, 15.4% followed closely by trauma, 15.2%. [8] Surgical emergencies accounted for 56.8% of all surgical admissions and 27.2% of all emergency hospital admissions at FMC Makurdi. The commonest non trauma case was acute abdomen.[9] Crude surgical mortality rate at FMC Makurdi was reported as 6.6% with the highest mortality from acute abdomen (24,5%), followed by traumatic brain injury (21.2%) – both emergency surgical conditions and malignancy (18.5%)[10] An assessment of emergency surgical services in a tertiary hospital in the country, revealed that 57% of the patients presented on account of non-trauma surgical conditions of which 42% had delayed surgical intervention from laboratory and radiological services, prolonged resuscitation times, lack of theatre space, problems related to provision of blood and other specific requirements for surgery and out of

pocket payments at some point of service delivery.[11] Forty percent (40%) experienced some form of service failure.

Obstetrics

Obstetrics is a major component of comprehensive emergency obstetrics and neonatal care (EmONC) used to avert maternal and neonatal mortalities. The 2015 maternal mortality rate for Nigeria was reported as 814 deaths per 100, 000 live births - a 40% increase from year 2013.[12] This is still extremely high. Reported barriers in obstetric care relate to transport and referral, health workers, availability of services and organizational factors.[13] Clandestine induced abortions, lack of prenatal care, delays in seeking care and use of spiritual homes for obstetric care also contribute to adverse obstetric outcomes.[14] A 2012 survey of emergency obstetric care(EmOC) in Bauchi state revealed that only 10.2% of its 59 facilities met the UN requirements for EmOC centres and 83.6% of maternal deaths were attributable to major direct obstetric complications.[15] There was an increase in EmOC facilities meeting UN requirements to 35.6% in a 2019 report with a decrease in total maternal deaths from direct obstetric complications to a still very high 70.9%.[16] A survey of healthcare providers (doctors and nurses/midwives) at referral centres in Northern Nigeria revealed an average score of less than 46% in a composite EmOC knowledge score.[17]

The National Strategic Framework for the Elimination of Obstetric Fistula in Nigeria (2019-2023) estimated that about 150,000 women are affected with between 15,000 to 20,000 new cases each year accounting for nearly half of worldwide fistula cases.[18] A report from the National Obstetric Fistula Centre in Katsina revealed that 83.9% of the fistulas were obstetric in origin while 16.1% were iatrogenic.[19] Of the iatrogenic fistulas, 64.5% had a previous history of caesarean section 87.5% of which were carried out at secondary health centres.

Trauma and Injuries

Various reports have documented road traffic crashes (RTC) as the leading cause of trauma and injury among patient presenting at various facilities accounting for between 41.2% to 72% of the injuries. [20-22] Only 12.2% of patients at a trauma centre had received any form of pre-hospital care.[23] A Lagos study, documented that 68.1% of

patients presenting at the surgical emergency room had trauma, 35% from road traffic crashes of which those that had formal pre-hospital care were only 2.3%.[24] RTC is also reported as the leading cause of fatal injuries (76.5%) with traumatic brain injury as the highest cause of mortality- 71.4% of deaths.[25,26] Trauma-related deaths accounted for 31.8% to 41.8% of all deaths among surgical patients in other reports.[10,27,28]

Cancer

A 2013 publication documented that about 102,000 new cases of cancer occur annually with 75,000 deaths per year from cancer.[29] The first 5 common cancers in the country are breast, cervical, liver, prostate and colorectal cancers.[30] There is a continued rise in the incidence of breast cancer in Nigeria with a projected incidence of 84.2 per 100,000 women by 2030 from an incidence of 13.7 per 100,000 in the 1960s.[31] The age-standardized rate of breast cancer in the country published by GLOBOCAN in 2012 was 50.5 per 100,000, the 2nd highest in Africa.[32] Disturbingly, the country had the highest age standardized mortality ratio in the continent (25.9 per 100,000). HPV attributable cancers also constitute a substantial cancer burden in Nigerian women.[33] Overall, the most frequent cancers from the Kano cancer registry records were breast cancer (14.1%), cervical cancer (11.1%), prostate (10.9%), nonmelanoma skin cancers (7.3%) and colorectal cancer (7.2%).[34] Comorbidities also occur in at least 1 in 4 Nigerian cancer patients the most common of which were hypertension, diabetes and peptic ulcer disease in a southwestern study.[35]

Oral cancer and maxillofacial trauma constitute the major burden for oral and maxillofacial care In Nigeria. The incidence of oral cancer in the country is estimated to about 1146 new cases/year, with an estimated mortality of 764 cases in 2012. [36,37] As yet, there is not a valid data preferably from a multi-center study to determine the incidence of maxillofacial trauma in Nigeria. However, a systematic review of the literature described changes in trends and characteristics of maxillofacial injuries with varying aetiological pattern prevailing in different geographical regions. However, the prevalence is huge occurring either as isolated injuries or component of polytrauma from RTC or Assaults including gunshots and animal attacks.[38] Unfortunately, the number and distribution of oral and maxillofacial surgeons in the country as well as

training facilities to meet up the high level reconstructive and rehabilitative care is still grossly inadequate.[39] While the functional, aesthetic and psychologic effect of facial trauma and ablative facial surgery is very immense, there appears to be very little attention from government in terms of enabling policies and funding to develop this important area of need.

Children's Surgical Diseases

In 2017, an estimated 1.7 billion children and adolescents worldwide did not have access to surgical care and about 453million children under 5years did not have access to basic life-saving surgical care. These figures are overwhelmingly higher in low and middle-income countries.[40] The surgical burden among children is high. The large burden of pediatric surgical conditions in Nigeria requires a large scale-up of services for children, which is an essential component to improve pediatric health. Many pediatric conditions requiring surgery can lead to disability and increased mortality.[41 - 43] Children make up 43% of the Nigerian population and they represent a population with unique surgical needs, including anesthetic, perioperative, and postoperative requirements.

Congenital anomalies (birth defects)

Surgically correctable congenital anomalies cause a substantial burden of global morbidity and mortality.[44] Congenital anomalies account for 25.3-38.8 million disability-adjusted life-years (DALYs) worldwide.[45,46] Hospital based studies have revealed incidence of congenital anomalies ranging from 2.2 per 1000 in Anambra, 6.3/1000 in Ogbomosho, 6.5 per 1000 in Enugu, 11.5 per 1000 births in Lagos, to 111 per 1000 in Bida.[47-51]

Trauma and Injuries

Nearly 1 million paediatric trauma deaths occur each year and about 95% of these are in low and middle income countries.[52] The greatest number of childhood injuries from hospital based studies in Nigeria resulted from road traffic crashes accounting for about 50% of all injuries.[53,54] A community based survey however revealed falls as the commonest cause of childhood injury.[55] In another study, non-accidental injuries accounted for 21.3% of all injuries.[56]

Cancer

In LMICs, at least 60% of children with cancers die of the disease.[57] The 4 foremost childhood malignancies from a hospital based study in south-south Nigeria were Burkitt's lymphoma 68.8%, Nephroblastoma 14.3%, rhabdomyosarcoma 7.1%, and Hodgkin's and NHL 6.0% each.[57] According to another report, the most frequent childhood cancer cases from Jos were rhabdomyosarcoma 31%, NHL 19.5%, retinoblastoma 8%, Nephroblastoma 5% and Hodgkin's lymphoma 3.5% while from Zaria, the commonest cases were Burkitt's Lymphoma, Retinoblastoma 14.2%, rhabdomyosarcoma, NHL 9.5% and nephroblastoma 9.5%.[58]

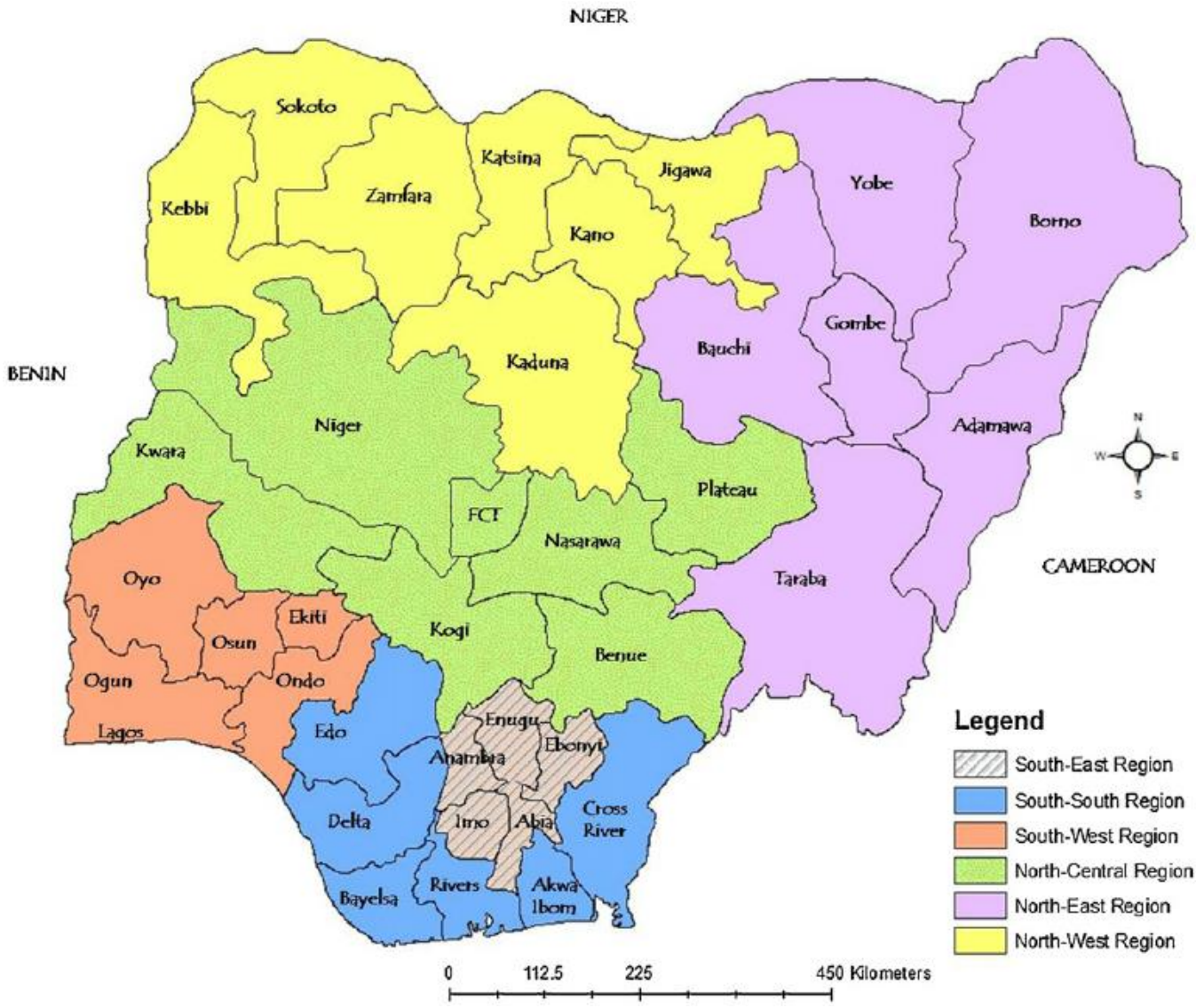
Infection

Infections and their complication requiring surgical intervention are a common presentation in African children.[59] Many paediatric infection-related conditions can lead to disability and increased mortality. Surgical site infection rates as high as 23.6% have been reported in the country following surgery in children and mortalities have been reported as direct outcomes of SSI.[60,61] Typhoid fever is frequently accompanied by complications that require surgical intervention and intestinal perforation remains the commonest and most problematic affecting children almost as equally as adults. Overall mortality rate as high as 22.2% following typhoid ileal perforation has been reported in the country while a paediatric mortality rate ranging from 10.9% to 39% have also been documented. [62-64] Appendicitis has been reported to account for up to 9.6% of pediatric abdominal emergencies.[64]

SITUATIONAL ANALYSIS AND BASELINE ASSESSMENT

The Federal Republic of Nigeria (Figure 1) is a Lower Middle-income country with an estimated 2019 total population of 199,370,289 (March 2019, World Population Review). About 50% of the population are children and adolescents.

Figure 1: Federal Republic of Nigeria



The country has 36 states and FCT and is divided into 6 geopolitical zones. Nearly half of the population lived in cities and with continued rural-urban migration, this figure continues to rise. It was estimated that about 29% of the population die from non-communicable disease, of which surgical conditions formed a significant part)

and 8% by injuries (www.who.int/nmh/countries/nga). There are 500 hospital beds for every 1 million people living in the country (www.who.int/workforcealliance/countries/Nigeria). There is also significant inequality in the distribution of healthcare workers and facilities, favouring urban and the higher income quintile. Prior to the baseline assessment, the available surgical information for Nigeria based on estimates is as indicated in Figures 2- 4.

Figure 2: Snapshot of Nigeria healthcare details

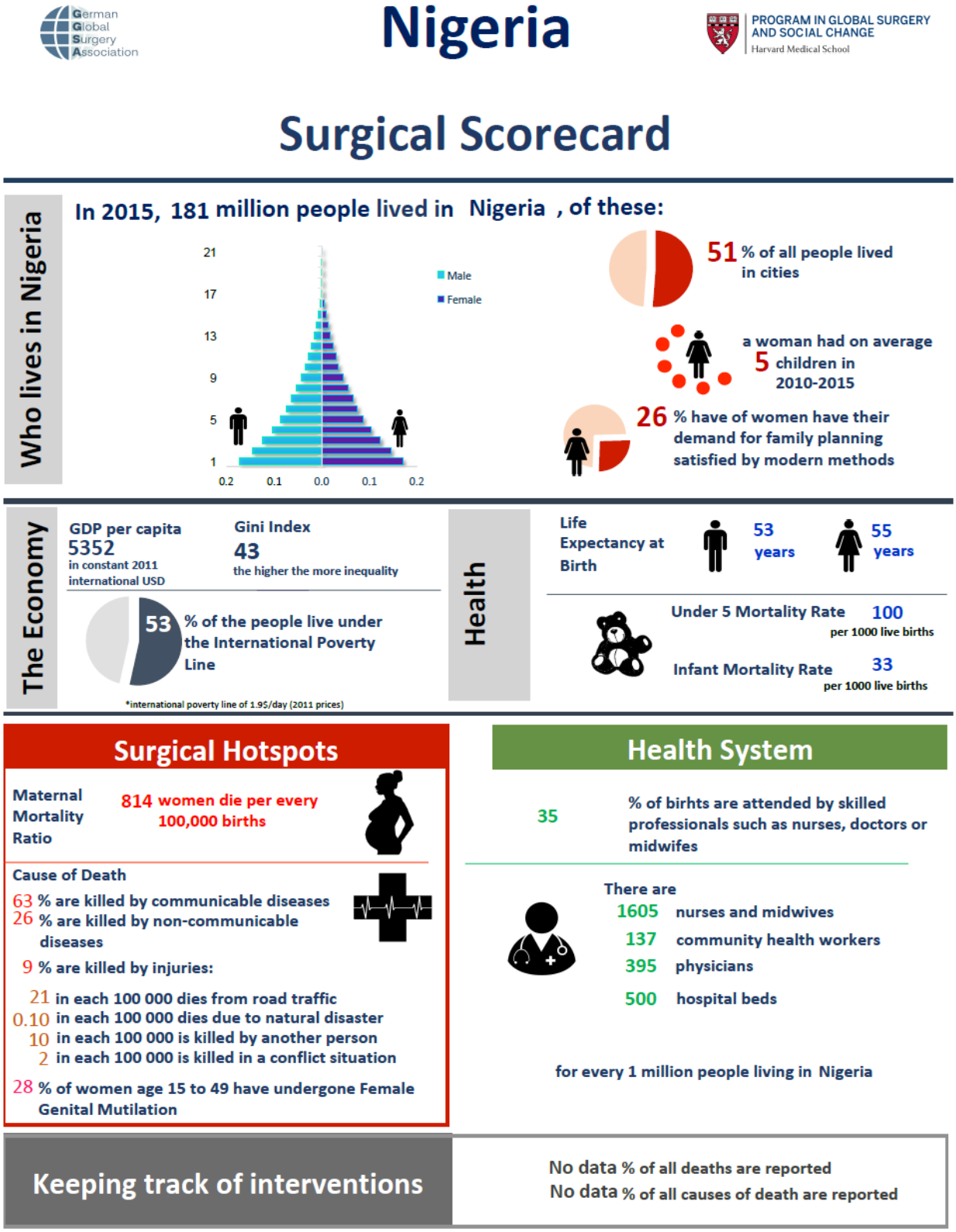
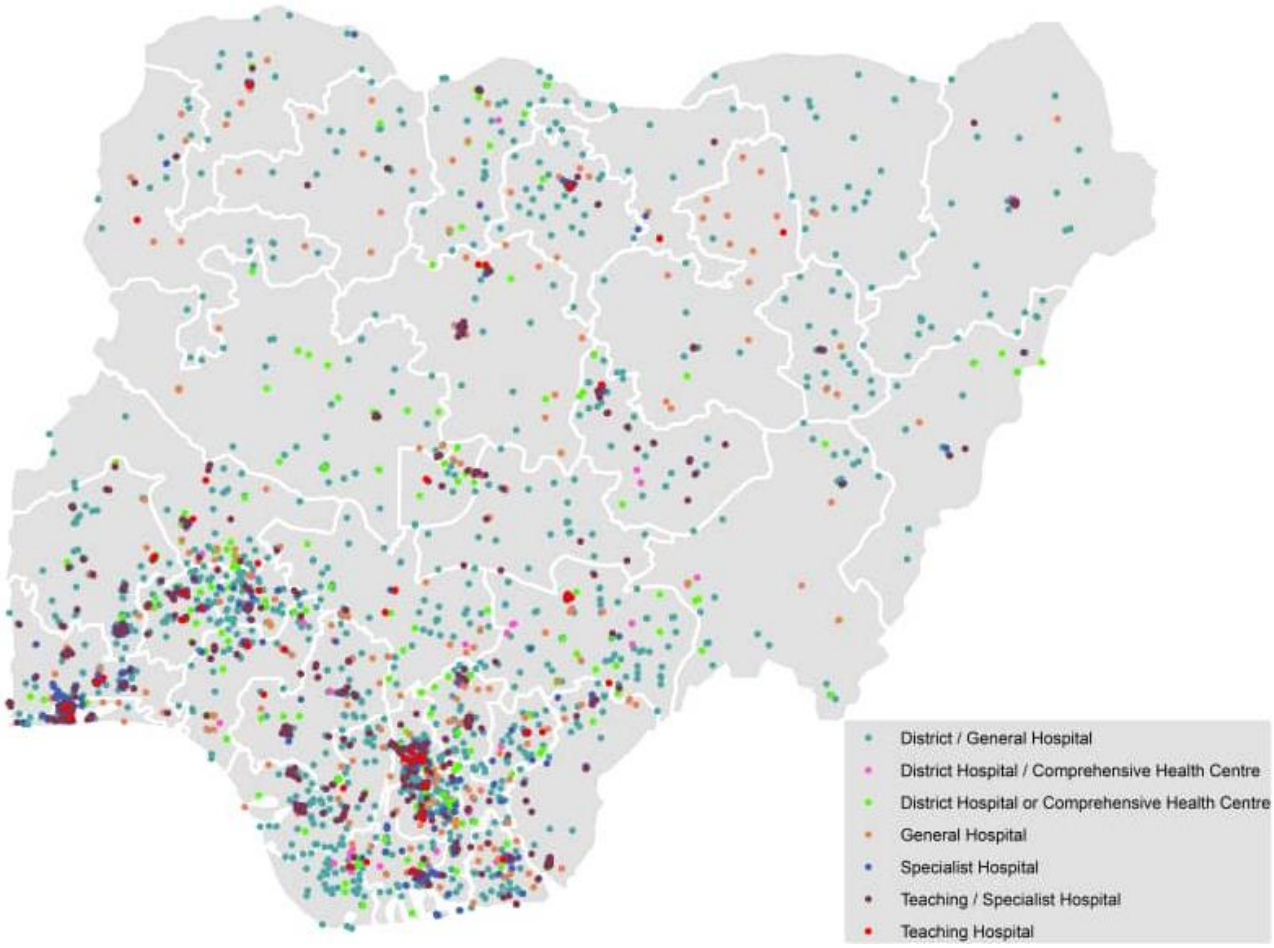
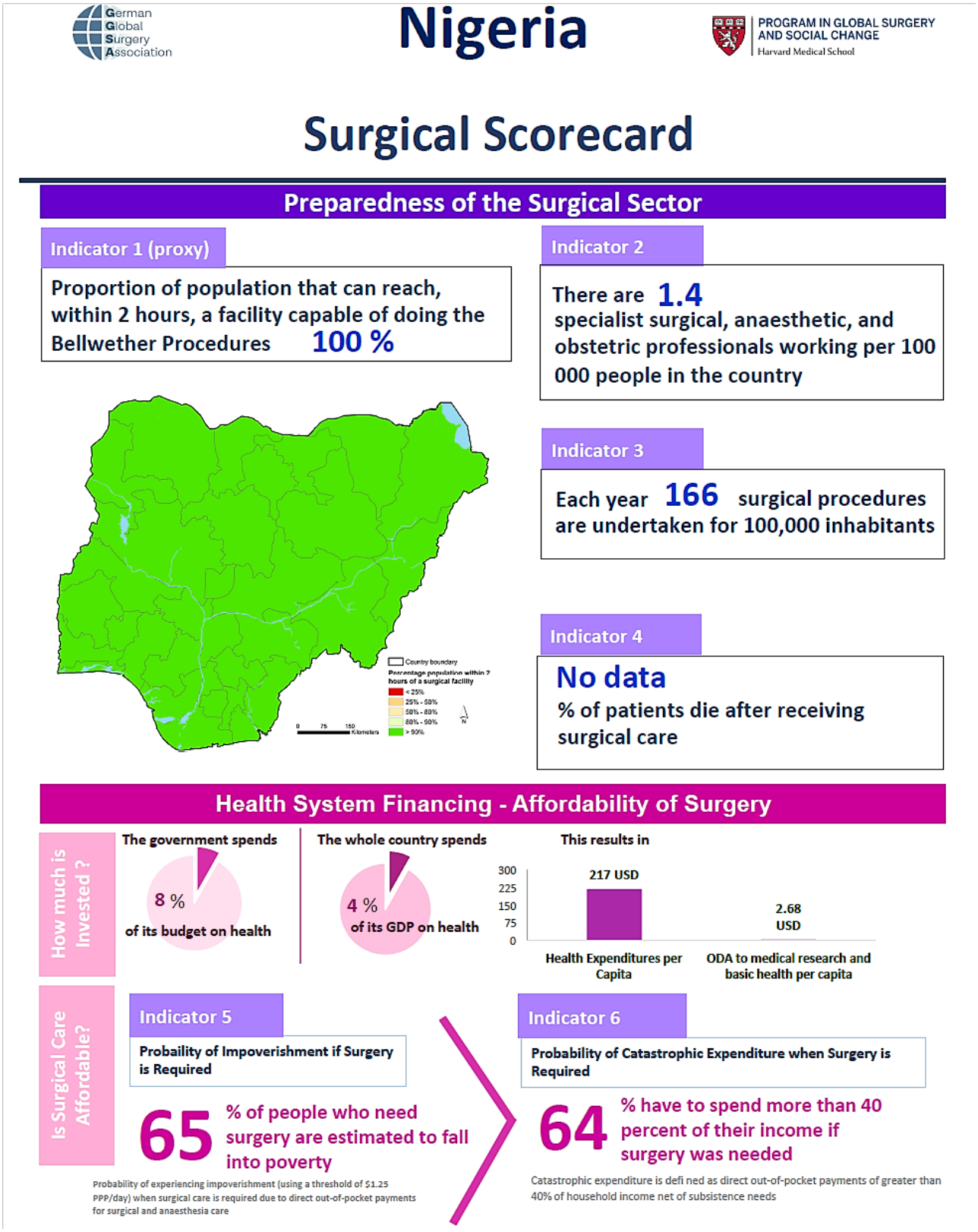


Figure 3: Distribution of healthcare facilities in Nigeria



These figures were based on estimates. Using the Lancet Commission on Global Surgery surgical indicators, it was estimated that 100% of the population can reach a facility within 2 hours but it's not clear if all these facilities are capable of carrying out the bellwether procedures. However, the availability of healthcare facilities within 2hour access for the entire population is an indication that the physical infrastructure may already exists for the delivery of surgical care. The SAO density was determined to be 1 per 100,000 population with a surgical volume of 166 procedures for every 100,000 population. Health system financing analysis revealed that the country spends 4% of its GDP on health. Impoverishing expenditure was estimated to be 65% and catastrophic expenditure 64%. The country remains far short of the recommended targets for surgical, obstetrics and anaesthesia care by 2030 (Table 1).

Figure 4: Nigeria surgical indicators



Although indicator 1 in figure 4 shows that 100% of Nigeria's population are within 2-hour access to a healthcare facility capable of delivering the Bellwether procedures, this information is only about geographic access. The actual capacity and readiness of these facilities to provide surgical care is unknown and can only be ascertained by facility level assessments.

Table 1: Nigeria surgical performance against recommended indicators by 2030

Surgical Indicator	Recommended Target By 2030	Nigeria
2-hour access[a]	80%	??
Specialist surgical workforce (SAO) density	20 per 100,000 population	1.65 per 100,000 population
Surgical volume	5,000 per 100,000 population	166 per 100,000 population
Perioperative mortality rate (POMR)	100% reporting	??
Protection against impoverishing expenditure[b]	100%	35%
Protection against catastrophic expenditure[c]	100%	36%

[a]Proportion of the population that can access, within 2 hours, a facility that can do caesarean section, laparotomy and treatment of open fracture (the Bellwether procedures)
[b]Impoverishing expenditure is defined as being pushed into poverty or being pushed further into poverty by out-of-pocket payments
[c]Catastrophic expenditure is defined as direct out-of-pocket payments of greater than 40% of household income net of subsistence needs

BASELINE ASSESSMENT

The Nigeria NSOAP baseline assessment was carried out in 2017/2018. Following approval and permission from the Federal Ministry of Health, a country wide baseline assessment was planned. However due to logistic challenges and lack of funding, six states and the Federal Capital Territory (Abuja) were selected based on convenience and availability of volunteers willing to commit personal resources to the project. The states were Anambra, Benue, Cross River, Gombe, Kaduna, and Lagos, each representing one of the six geopolitical zones in the country. Technical challenges eventually hampered assessment of the surgical systems in Benue and Cross River states.

The assessment tools used were the Nigeria National Surgical, Obstetric and Anaesthesia Plan hospital assessment tool, NSOAP semi-structured hospital interview tool and the WHO-PGSSC-GICS children's surgical assessment tool. The tools were administered and completed by NSOAP facilitators, survey assistants and in-hospital

staff. The results were collated and analyzed by a collaborating team at University of California, Davis, Sacramento.

Findings

Although the plan was to assess all the second level hospitals in the surveyed states, this was not possible. In all, 62 hospitals were surveyed: 26 in Lagos, 11 in Kaduna state, 10 in the FCT, 9 in Anambra state and 6 in Gombe state.

Workforce

The current workforce data reveals a gross inadequacy. There was a total of 521 SAO providers (Table 2) revealing a density of 1.76 per 100,000 population based on the 2016 projected country population. There were 94 general duty doctors (medical officers) providing surgery and obstetrics/Gynaecology care and 31 general duty doctors (medical officers) providing anaesthesia. 52 general doctors provided anaesthesia. A nationwide SAO workforce survey revealed an SAO density of 1.65/100,00 population (Table 3).

Table 2: Surgical workforce in 4 states and FCT

Number of providers - mean (range)	Anambra (n=9)	FCT (n=10)	Gombe (n=6)	Kaduna (n=12)	Lagos (n=26)	All (n=63)
Surgeons - consultants	1.7 (0-5)	1.6 (0-6)	0 (0-0)	3.2 (0-20)	1.9 (0-11)	1.9 (0-20)
Pediatric surgeons - consultants	1.3 (0-6)		0 (0-0)	0.4 (0-2)	0.5 (0-6)	0.5 (0-6)
Obstetrician/Gynecologist - consultants	0.8 (0-3)	1.9 (1-3)	0 (0-0)	3.3 (0-21)	2.7 (0-12)	2.2 (0-21)
Anesthetists - consultants	0.25 (0-1)	0.5 (0-2)	0 (0-0)	0.7 (0-5)	1.1 (0-3)	0.7 (0-5)
Paediatric anesthetists - consultants	1.5 (0-6)		0 (0-0)	0 (0-0)	0.4 (0-3)	0.3 (0-6)
Surgeons - other physicians	3.9 (0-10)	7.1 (0-15)	2 (0-3)	5.1 (2-26)	4.8 (0-33)	4.8 (0-33)
Anesthetists - other physicians	0.8 (0-2)	0.1 (0-1)	0 (0-0)	1.9 (0-10)	1.9 (0-5)	1.3 (0-10)
Surgeons - medical officers	3.3 (0-10)	1 (0-4)	0.2 (0-1)	1.4 (0-4)	1.2 (0-8)	1.3 (0-10)
Anesthetists - medical officers	1.2 (0-3)	2.1 (0-7)	0.4 (0-2)	3.1 (0-16)	1.5 (0-3)	1.7 (0-16)
Surgeons - nurses			0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)
Anesthetist - nurses			0.2 (0-1)	0.2 (0-1)	0 (0-0)	0.2 (0-1)
Midwives	2.3 (0-5)		0 (0-0)	0 (0-0)	1.8 (0-22)	1 (0-22)
Midwives - labor and delivery	8.3 (0-21)		4.6 (0-10)	10.8 (3-15)	24.5 (0-89)	15.5 (0-89)
Radiologists	0.5 (0-1)	0.6 (0-2)	0 (0-0)	1.5 (0-8)	0.9 (0-6)	0.8 (0-8)
Pathologists	0.2 (0-1)	0 (0-0)	0 (0-0)	1.5 (0-10)	1.5 (0-11)	0.9 (0-11)
Pharmacists	2.1 (0-7)	8 (0-19)	1.2 (1-2)	3.5 (0-8)	11 (2-20)	6.7 (0-20)
Laboratory technicians	2 (0-5)		0 (0-0)	1.5 (0-7)	2.8 (0-8)	2 (0-8)
Nursing staff - ward, day						
1 nurse to <7 patients	3 (50%)	1 (14.3%)	1 (20%)	3 (27.27%)	4 (17.4%)	12 (23.1%)
1 nurse to 7-10 patients	1 (16.7%)	4 (57.1%)	2 (40%)	6 (54.6%)	7 (30.4%)	20 (38.5%)
1 nurse to >10 patients	2 (33.3%)	2 (28.6%)	2 (40%)	2 (18.2%)	12 (52.2%)	20 (38.5%)
Nursing staff - ward, night						
1 nurse to <7 patients	4 (66.7%)	0 (0%)	2 (40%)	2 (20%)	5 (22.7%)	13 (26%)
1 nurse to 7-10 patients	1 (16.7%)	4 (57.1%)	1 (20%)	2 (20%)	4 (18.2%)	12 (24%)
1 nurse to >10 patients	1 (16.7%)	3 (42.9%)	2 (40%)	6 (60%)	13 (59.1%)	25 (50%)
Nursing staff - labor and delivery, day						
1 nurse to <7 patients	4 (57.1%)	4 (80%)	3 (50%)	6 (54.6%)	10 (47.6%)	27 (54%)
1 nurse to 7-10 patients	1 (14.3%)	1 (20%)	1 (16.7%)	4 (36.4%)	6 (28.6%)	13 (26%)
1 nurse to >10 patients	2 (28.6%)	0 (0%)	2 (33.3%)	1 (9.1%)	5 (23.8%)	10 (20%)
Nursing staff - labor and delivery, night						
1 nurse to <7 patients	4 (57.1%)	2 (40%)	4 (66.7%)	6 (54.6%)	8 (40%)	24 (49.0%)
1 nurse to 7-10 patients	1 (14.3%)	3 (60%)	0 (0%)	3 (27.3%)	5 (25%)	12 (24.5%)
1 nurse to >10 patients	2 (28.6%)	0 (0%)	2 (33.3%)	2 (18.2%)	7 (35%)	13 (26.5%)

Table 3: Nigeria SAO density by practicing license registration (Medical and Dental Council of Nigeria)

SAO	No.	/100,000 population (2019)
General surgery[a]	1578	0.79
Obstetrics and Gynaecology	733	0.37
Ophthalmology	343	0.17
Orthopaedics	165	0.08
Otorhinolaryngology	101	0.05
Plastic and Reconstructive surgery	30	0.02
Neurosurgery	29	0.01
Urology	54	0.03
Anaesthesia	254	0.13
Total	3287	1.65

[a]Includes general surgery, paediatric surgery, cardiothoracic surgery

The total number of Surgeons, Anaesthetists and Obstetricians registered to practice by the Medical and Dental Council of Nigeria (MDCN) as of December 2018 in the country were 2,386 Specialists with Fellowships employed or eligible to work as consultants, 359 with Memberships eligible to practice in their specialty or to complete the Fellowship programme, 244 with Masters (MSc or Diploma) and one PhD. Based on this, the total SAO was found to be 3,287 with a density of 1.65 per 100,000 population.

Generally, the number of trained staff are not adequate for the country. There are 41 medical schools which graduated 2,888 new doctors in 2018 (MDCN). There are 2 colleges responsible for the training and certification of Surgeons, Anaesthetists and Obstetricians and Gynecologists. These are the National Postgraduate Medical College of Nigeria (NPMCN) and West African College of Surgeons (WACS). There are 52 centres accredited for postgraduate training by the NPMCN with either complete or partial accreditation for specialist training out of which 39 centers are accredited for training various levels of anaesthetists.

The tables below (Table 4 and 5) shows the number of surgical care providers that have been produced and how much are needed by 2030 if the country's population remains static.

Table 4: SAO and nursing workforce projection for Nigeria based on SAO density of 5 per 100,000 and 10 Nurses per 100,000 population as a 5-year target

Specialty	Present No. (2019)	Needed by 2023
Surgeons (2300) & Obstetricians (733)	3,033	8,793
Anaesthetists	254	1,794
Nursing	13,739	18,960
Total	17,026	29,547

The ideal workforce based on the Lancet commission of global surgery (2015) is SAO density 20 per 100,000 out of which the minimum number of anaesthetists (A) required is 4 per 100,000. [66] Assuming the number of physician anaesthesia providers (PAP) for low- and middle-income countries is 4 per 100,000 population, this implies that 16 out of the 20 SAO's would be surgeons (S) and obstetricians (O) together (table 5). The exact proportion of surgeons to physicians have not been estimated. It has been shown that 20 nurses per 100,000 population is required to reduce morbidity and mortality (World Bank, 1993).[67] Given the current density and desired future density, the gap can be calculated.

Gap = Desired workforce density – Current workforce density.
Number of specific workforces = (density × population in 2019) ÷ 100,000
Where 2019 population = 199,370,289

Table 5: Ideal Number and gap of SAO and Nursing workforce in Nigeria

Specialty	Present No (2019)	Density /100,000	Recommended Density (Future)	Gap	Needed by 2023	Needed by 2030
Surgeons & Obstetricians	3033	1.52	16	14.48	14,574	31899
Anaesthetists	254	0.13	4	3.87	4,107	7975
Nursing	13,739	6.89	20	13.11	24,184	39874
Total	17,026	8.54	40	31.46	42,865	79748

There is also a shortage of nursing staff. The Schools of Nursing and a few Universities train a significant number of nurses registering and licensing nurses and midwifes

yearly. Eleven Thousand four hundred and seventy-seven (11,477 qualified nurses were registered in 2018 by the Nursing and Midwifery Council of Nigeria (NMCN) onto the new online database. Current specialization of nursing workforce is provided in Tables 6 and 7. There are a total of 1461 registered nurse anaesthetists giving an RNA density of 0.77 per 100,000. This cohort of anaesthesia staff contribute significantly to meeting the anaesthesia need within the country.

Other relevant health workers such as Radiographers, Pathology and Laboratory Technicians and Technologists have training institutions. These include stand-alone institutions, Polytechnics and Universities.

Table 6: Nursing workforce in Nigeria

Categories	**Registered (January December 2018)**	**–Total No. (31 December 2018)**
General nurses	4,922	180710
Midwives	4,351	120871
Accident and emergency	99	2003
Nurse anaesthetists	78	1461
Burns and plastics	20	383
Cardiothoracic	25	337
Critical care	47	582
Ophthalmic	90	1559
Orthopaedic	70	1600
Otorhinolaryngology	68	521
Paediatric	109	1317
Perioperative	191	3976
Mental health	209	8337
Occupational health nurses	0	172
Nurse administrators	11	1316
Public health nurses	893	9126
Nurse educators	216	3979
Midwife educators	73	1129
Public health nurse educators	5	191
Total	11,477	339,570

Table 7: Distribution of nurse anaesthetists in Nigeria (Nigeria Association of Nurse Anaesthetists)

State	No.
Abia	30
Adamawa	38
Akwa Ibom	59
Anambra	60
Bauchi	17
Bayelsa	17
Benue	50
Borno	22
Cross River	26
Delta	51
Ebonyi	28
Edo	25
Ekiti	22
Enugu	84
Gombe	26
Imo	54
Jigawa	14
Kaduna	46
Kano	69
Katsina	19
Kebbi	12
Kogi	27
Kwara	15
Lagos	59
Nasarawa	40
Niger	35
Ogun	27
Ondo	27
Osun	29
Oyo	15
Plateau	75
Rivers	25
Sokoto	25
Taraba	22
Yobe	15
Zamfara	12
Abuja (FCT)	80
Total	1297

Infrastructure

Currently available infrastructure falls very short of required surgical infrastructure to meet the needs of the population. The current bed/population ratio from the baseline assessment is 2.0/10,000 population and a surgical bed/population ratio of 0.5/10,000 population (Table 8). Several hospitals lack adequate provision of basic infrastructure necessary for meeting surgical need (Table 9).

Table 8: Bed capacity in 4 states and FCT

Total admissions	**202,120**	**Density**
Total beds	6,077	2.0/10, 000 population
Surgical beds	1,484	0.5/10,000 population

Less than half of the hospitals assessed had electricity supply for more than 75% of the time while only two thirds had water for the same duration. Hospital internet services were rarely available, and staff nearly always relied on personal internet. More than one third of the hospitals lacked pulse oximetry despite convincing evidence on its importance in delivery of safe surgery. Blood was always available within 2 hours of request in 56% of the facilities and 24-hour radiology service was available in only 22% of the hospitals.

Table 9: Key surgical infrastructure and equipment in 4 states and FCT

Infrastructure	**Never/rarely available (0-25%)**	**Sometimes/often available (26-75%)**	**Almost always/always available (76-100%)**
Electricity	9 (15.3%)	23 (39.0%)	27 (45.7%)
Water	4 (6.7%)	16 (26.7%)	40 (66.7%)
Internet	37 (63.8%)	11 (19.0%)	10 (17.2%)
Pulse Oximetry	16 (28.1%)	4 (7.0%)	37 (64.9%)
Oxygen	13 (22.4%)	4 (6.9%)	41 (70.7%)
Electricity (OR)	4 (8.5%)	7 (14.9%)	36 (76.6%)
Blood within hours	211 (18.6%)	15 (24.5%)	33 (55.9%)
24 hours radiology	31 (53.5%)	14 (24.1%)	13 (22.4%)

Service delivery

Part of the characteristics used to assess service delivery were 24-hour availability of surgical care, surgeons, anaesthetists and obstetricians. These were available in only about two thirds of the hospitals for more than 75% of the time (Table 10).

Table 10: Availability of surgical care and SAO in 4 states and FCT

	Never/Rarely available (0-25%)	**Sometimes/often available (26-75%)**	**Almost always/always available (76-100%)**
Surgical care	11 (21.6%)	7 (13.7%)	33 (64.7%)
Surgeon	10 (21.7%)	8 (17.4%)	28 (60.9%)
Obstetrician	12 (26.7%)	4 (8.9%)	29 (64.4%)
Anaesthesia	11 (25%)	4 (9.1%)	29 (65.9%)

The surgical volume was found to be about 59 per 100,000 population (Table 10). Although previous findings suggested that 2hour access to hospitals able to offer bellwether services in Nigeria is between 90 and 100% (Figures 5, 6 and 7),[68] during the assessment, only two thirds of the hospitals said their patients could access their facility within 2hours (Table 11).

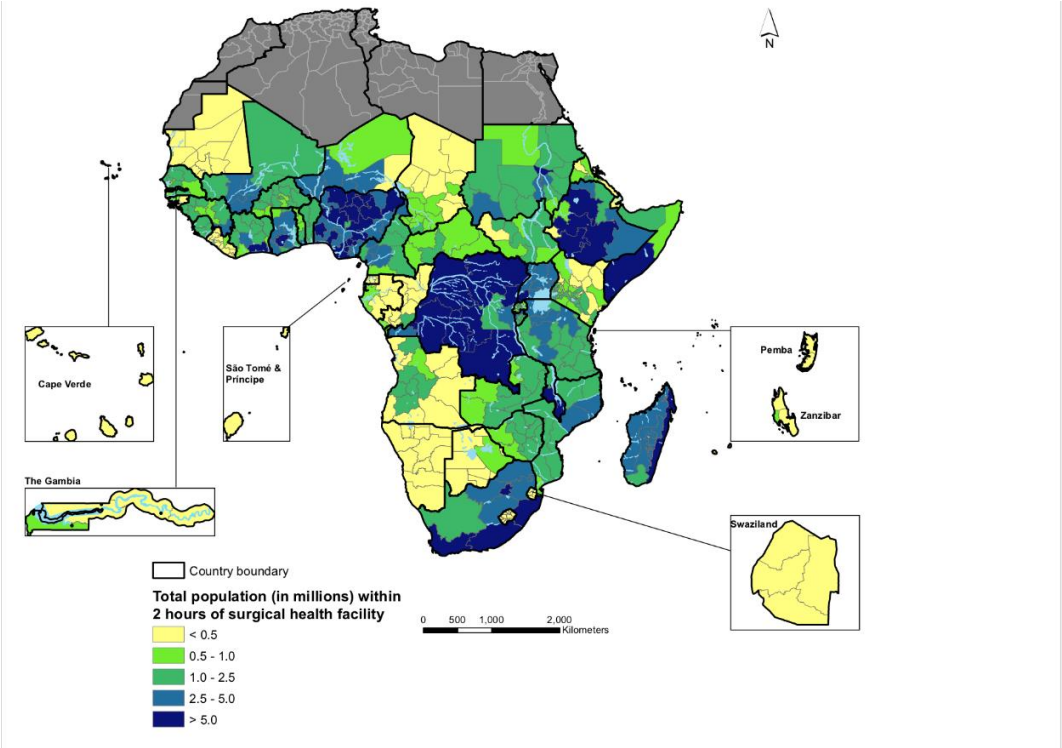
Table 11: Two-hour access to surgical care in 4 states and FCT

Proportion with 2-hour access	No. (%)
Few (1-25%)	2 (3.9%)
Some (26-50%)	2 (3.9%)
Most (51-75%)	18 (34.6%)
Almost (76-99%)	22 (42.3%)
All (100%)	8 (15.4%)

Table 12: Surgical volumes in 4 states and FCT

Type of surgery	No.
Minor	13, 856
Major	19,943
Total	33,799
Surgical volume: 58.62/100 000 population	
POMR	129 (0.38)

Figure 5: Total population within 2 hours of surgical facility in Africa



Major district and regional hospitals were assumed to have capability to perform bellwether procedures. Geographical locations of hospitals in relation to the population in the 47 sub-Saharan countries were combined with spatial ancillary data on roads, elevation, land use or land cover to estimate travel-time metrics of 30 min, 1 hour and 2 hours. Hospital catchment was defined as population residing in areas less than 2 hours of travel time to the next major hospital. Travel-time metrics were combined with fine-scale population maps to define burden of surgery at hospital catchment level.

Figure 6: Percentage of population within 2 hours of surgical facility in Africa

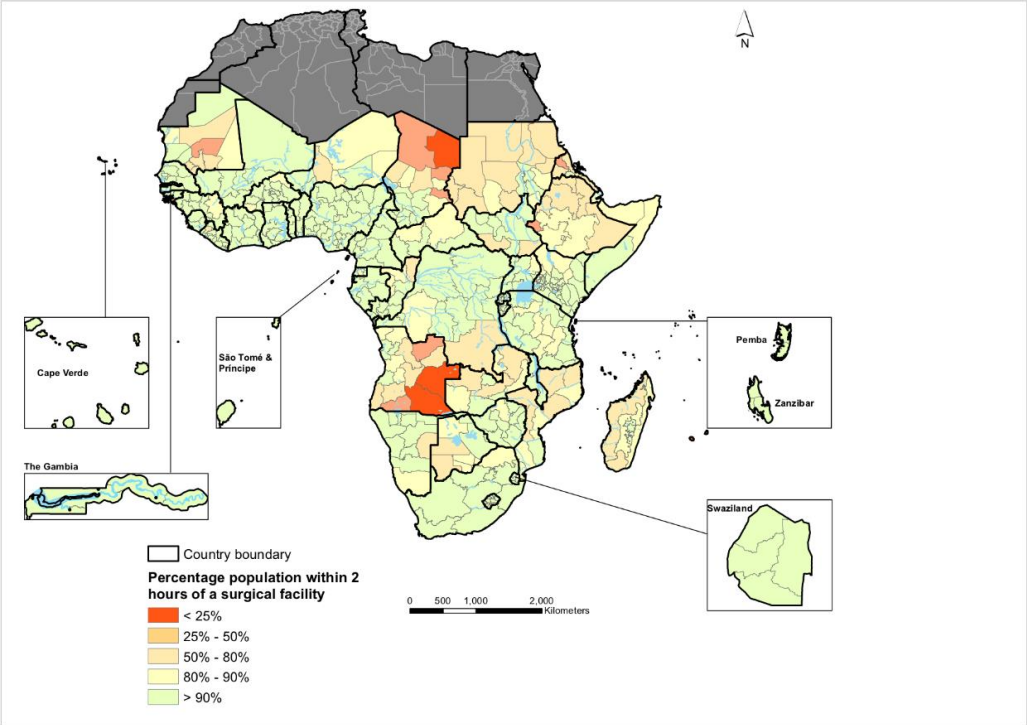
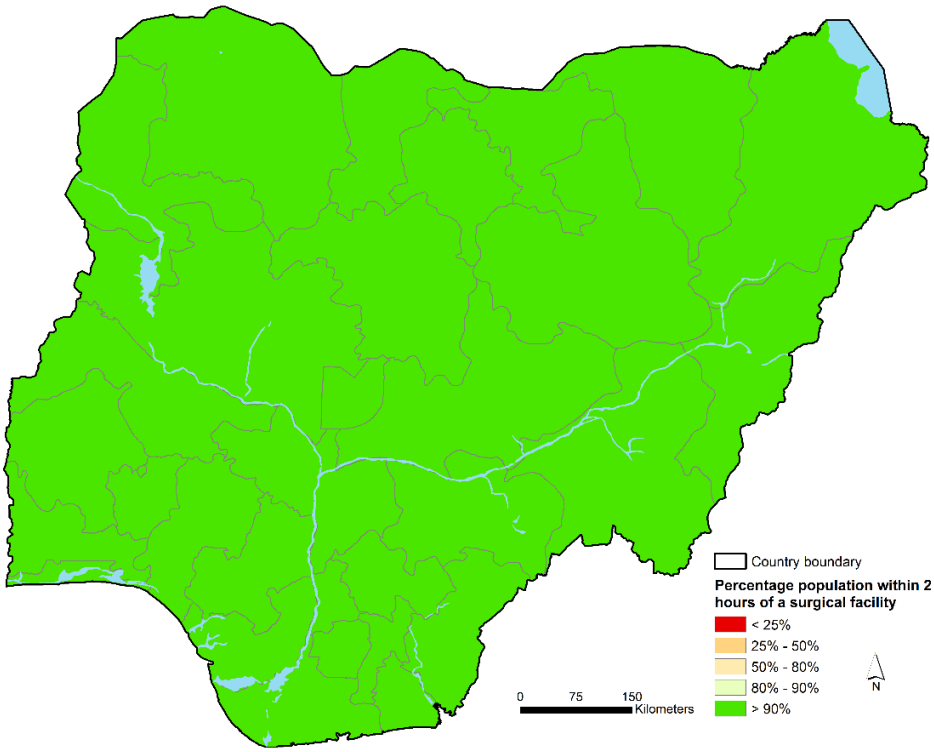


Figure 7: Percentage of Nigeria population within 2 hours of surgical facility



The burden for surgery, based solely on travel time estimation, in Nigeria was estimated 98% in the 2-hour health facility catchments; highest in densely populated countries like Nigeria.

The study provides an assessment of accessibility and burden of surgical disease in sub-Saharan Africa. Yet given the optimistic assumption of adequate surgical capability of major hospitals, the true burden of surgical disease is expected to be much greater. In-depth health facility assessments are needed to define infrastructure, personnel and medicine supply for delivering timely and safe affordable surgery to further inform the analysis.

About 62.2% of the hospitals utilized 25% of their budget for provision of surgical services (Table 13). Although accurate data is available on insurance, nearly half of the hospitals said they had no patients on insurance (Table 14).

Table 13: Percentage of annual budget spent on surgical care in 4 states and FCT

% of budget spent on surgical care	No. of hospitals (%)
0%	8 (1.6)
25%	23 (62.2)
50%	5 (13.5)
75%	1 (2.7)

Table 14: Proportion of patients with health insurance in 4 states and FCT

Proportion	No. of hospitals (%)
None	21 (48.9)
Few (1-25%)	17 (39.5)
Some (26-50%)	2 (4.7)

Although catastrophic and impoverishing expenditure could not be evaluated during the baseline assessment, the average cost of bellwether procedures was approximately ₦50,000 - ₦85,000 per procedure (Table 15). Considering that in 2018, it was estimated that about 90 million Nigerians were living in extreme poverty, and an estimated 86.9 million lived on less than $1.25 dollar a day, the financial impact of treatment of a surgical condition can be enormous.

Table 15: Average cost of Bellwether procedures in 4 states and FCT

Bellwether procedure	Average cost (₦)
Caesarean section	48, 685.9
Laparotomy	82, 201.7
Open fracture	84, 521.8

One-third of the facilities had monthly continuing medical educational activities, and all had morbidity and mortality meetings at varying frequencies during the year (Table 16).

Table 16: Continuing medical education and mortality meetings in healthcare facilities in 4 states and FCT

Activity	Never	Weekly	2 weekly	Monthly	Quarterly	Yearly
CME		12 (26.7%)		17 (37.8%)	7 (15.6%)	3 (6.7%)
M & M	11 (26.2%)	1 (2.4%)	3 (7.1%)	22 (52.4%)	3 (7.1%)	2 (4.8%)

CME: Continuing medical education; M & M: Morbidity and mortality

Inefficient record keeping was seen in nearly all the facilities, making data collection difficult. Two thirds of the hospitals had only paper-based records while one third had both paper and electronic records. Previous patient records could not be accessed on subsequent visits in 33.3% of the hospitals evaluated (Table 17).

Table 17: Medical record keeping in healthcare facilities in 4 states and FCT

Record	No. of hospitals (%)
Paper record only	40 (67.8)
Paper and electronic records	19 (32.2)
Record not available after first (single visits)	14 (33.3)
Record available for multiple visits	28 (66.7)

Although 3 hospitals said they used telemedicine, this was in form of WhatsApp only. Only 6.4% of the hospitals had funding available for research (Table 18).

Table 18: Availability of telemedicine and research funding healthcare facilities in 4 states and FCT

Availability	Yes (%)	No (%)
Telemedicine	3 (6.3%)	45 (93.8%)
Research funding	3 (6.4%)	44 (93.6%)

Healthcare Governance and Leadership

Although it was required that all hospitals reported to the state or federal ministry of health, 33.3% of the hospitals did not comply (Table 19).

Table 19: Reporting to governing agency by healthcare facilities in 4 states and FCT

Reporting	No. of hospitals reporting (%)					
	Never	Weekly	2 weekly	Monthly	Quarterly	Yearly
Ministry or agency report	16 (33.3)	-	-	25(52.1)	6 (12.5)	1 (2.1)

CHILDREN'S SURGICAL CARE

Children under 15years of age constitute about 43% of Nigeria's population (Figures 8 and 9). The annual growth rate is estimated to be 2.54% with a birth rate of 35.2 births/1,000 population, neonatal mortality rate of 32.9 per 1000 live births and under five mortality rate of 100.2 per 1,000 live births.

Figure 8: Population pyramid for Nigeria in 2019

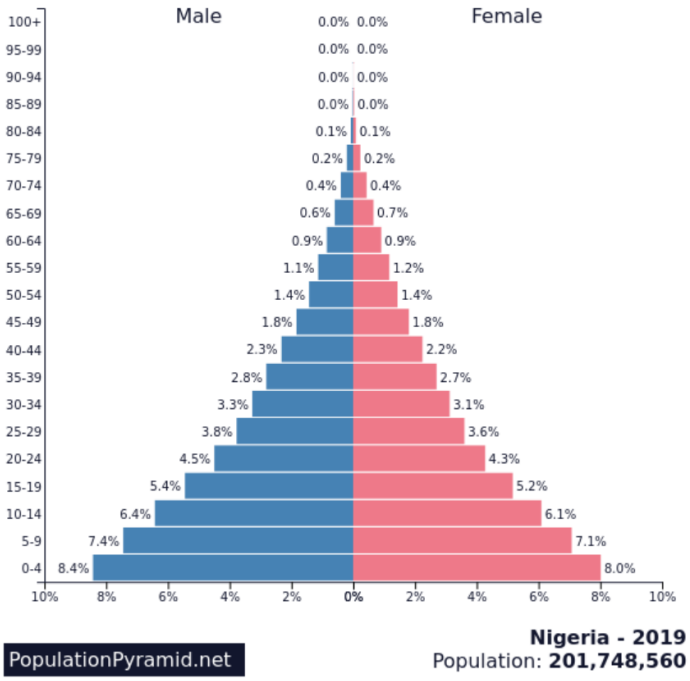
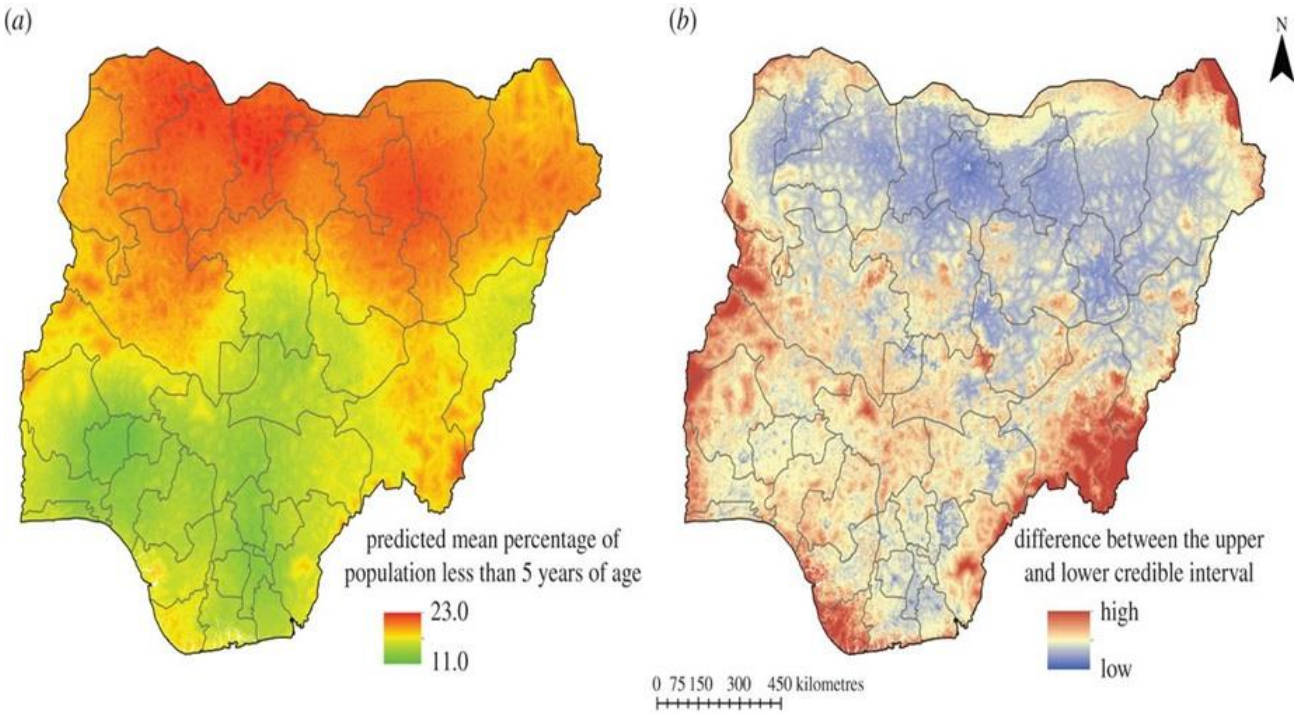


Figure 9: Distribution of under 5 population in Nigeria



In 2015, congenital anomalies ranked 5th among the leading causes of global under-5 mortality (Figure 10), including in Nigeria. Most of these anomalies are amenable to

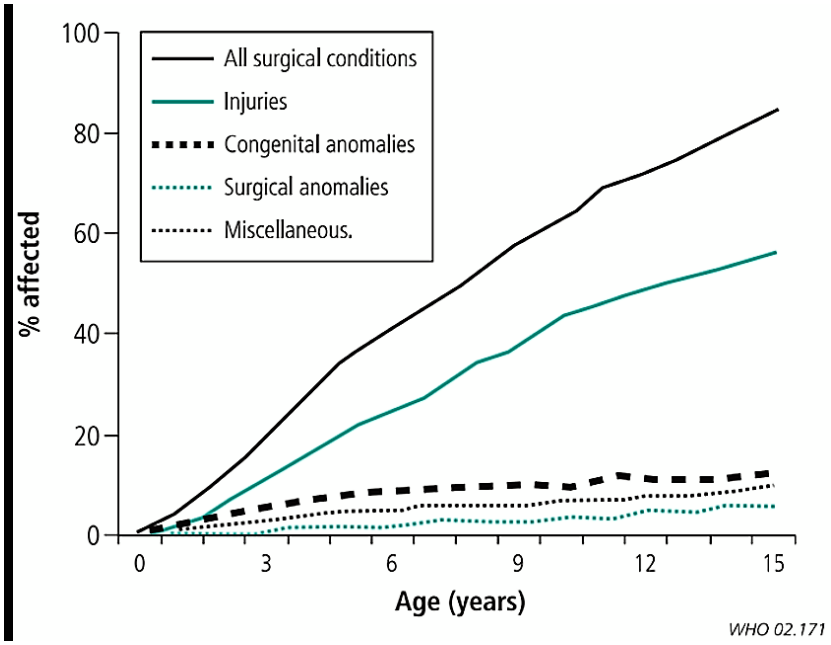
surgical treatment and access to appropriate children's surgical care may have prevented some of the mortalities.

Figure 10: Leading causes of global under-5 deaths[69]

Leading causes 2005	% change number of deaths 1990–2005	% change death rate 1990–2005	Leading causes 2015	% change number of deaths 2005–15	% change death rate 2005–15
1 Lower respiratory infections	−47·5%	−46·2%	1 Neonatal preterm birth	−25·9%	−31·4%
2 Neonatal preterm birth	−39·4%	−37·8%	2 Neonatal encephalopathy	−16·1%	−22·3%
3 Neonatal encephalopathy	−3·6%	−1·0%	3 Lower respiratory infections	−36·9%	−41·5%
4 Malaria	18·2%	21·3%	4 Diarrhoeal diseases	−34·3%	−39·2%
5 Diarrhoeal diseases	−45·3%	−43·8%	5 Congenital anomalies	−3·2%	−10·4%
6 Congenital anomalies	−20·7%	−18·6%	6 Malaria	−42·8%	−47·0%
7 Neonatal sepsis	7·0%	9·8%	7 Neonatal sepsis	−0·2%	−7·5%
8 Other neonatal disorders	−25·4%	−23·4%	8 Other neonatal disorders	−16·0%	−22·1%
9 Measles	−65·5%	−64·6%	9 Protein-energy malnutrition	−25·3%	−30·8%
10 Protein-energy malnutrition	−41·9%	−40·4%	10 Meningitis	−17·6%	−23·7%
11 Meningitis	−34·1%	−32·3%	11 STDs	−21·1%	−26·9%
12 HIV/AIDS	419·5%	433·2%	12 HIV/AIDS	−51·9%	−55·5%
13 STDs	−36·4%	−34·7%	13 Haemoglobinopathies	−4·1%	−11·1%

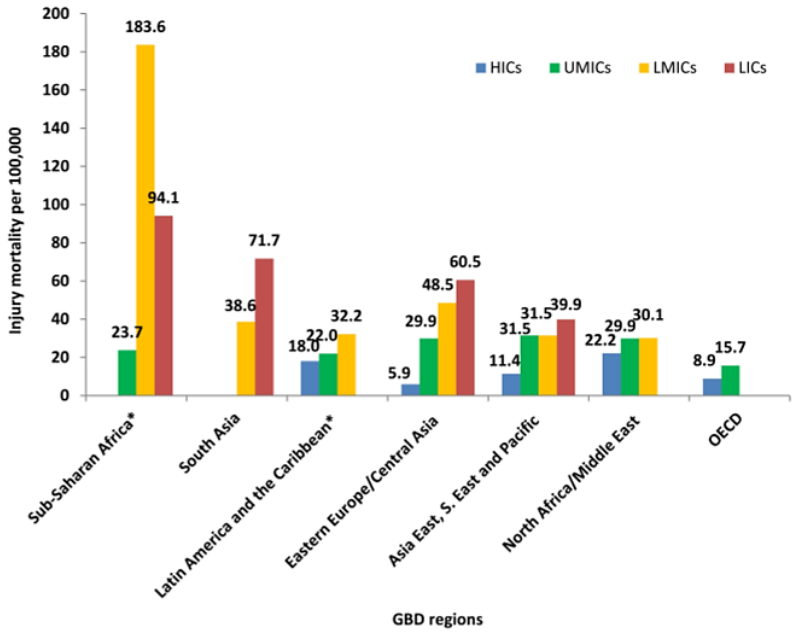
Surgical conditions account for 6-15% of paediatric admissions in sub-Saharan Africa. A survey of 4 LMICs showed that 11-28% had a surgical need, at least 42-70% of them had at least one unmet need and 85% of children may require surgical care by the age of 15years (Figure 11). This situation is similar for Nigeria.

Figure 11: Estimated risk of requiring surgical care in children[70]



A review of the burden, progress and challenges of neonatal surgical care in sub-Saharan Africa, including Nigeria, revealed that some patients travelled a median distance of 183 km to access neonatal surgical care.[71] Mortality from injury is also high (Figure 12) and overall, pediatric conditions requiring surgery carry the risk of life-long disability and higher risk of mortality as the conditions arise during the years of critical development.

Figure 12: Injury mortality rates for children 1–4 years by GBD region and country income groups[72]



Overall in Nigeria, there is little, or no children's surgery provided outside tertiary hospitals. Even basic surgical procedures end up in tertiary hospitals, despite the fact that cost of surgical procedures are much higher at tertiary hospitals. It would be more cost effective if appropriate surgical care for children is provided at lower level hospitals.

The Nigeria NSOAP is the first plan to incorporate children's surgery. For the baseline assessment, a children's surgical assessment tool was used. This tool was developed by GICS and Program in Global Surgery and Social Change (PGSSC) by modifying the WHO hospital assessment tool. The tool was administered at every evaluated hospital.

Findings

Infrastructure

The Global Initiative for Children's Surgery (GICS) developed the Optimal Resources for Children's Surgical Care (OReCS)[73] which describes the human resources, infrastructure and surgical procedures required for children surgical care for various levels of hospitals. The OReCS recommends at least one functional children's hospital per country. Currently there is no public children's hospital offering surgical care in the country. While there are some designated children's hospital in several states, these hospitals lack the resources and capacity to provide surgical care. However, availability of such hospitals offers an opportunity for scale up for the provision of children's surgical care.

Service delivery

The current paediatric surgeon density of 0.14/100,000 falls gravely short of what is required to deliver the needed paediatric surgical care in the country. Many secondary and some tertiary hospitals do not have a paediatric surgery, paediatric anaesthesia and paediatric nursing services. The median distance travelled by patients to access neonatal surgical care in one tertiary hospital was 183km,[71] highlighting the severe limitations in the availability of surgical services for children in the country. Workforce (include data from various agencies and organizations)

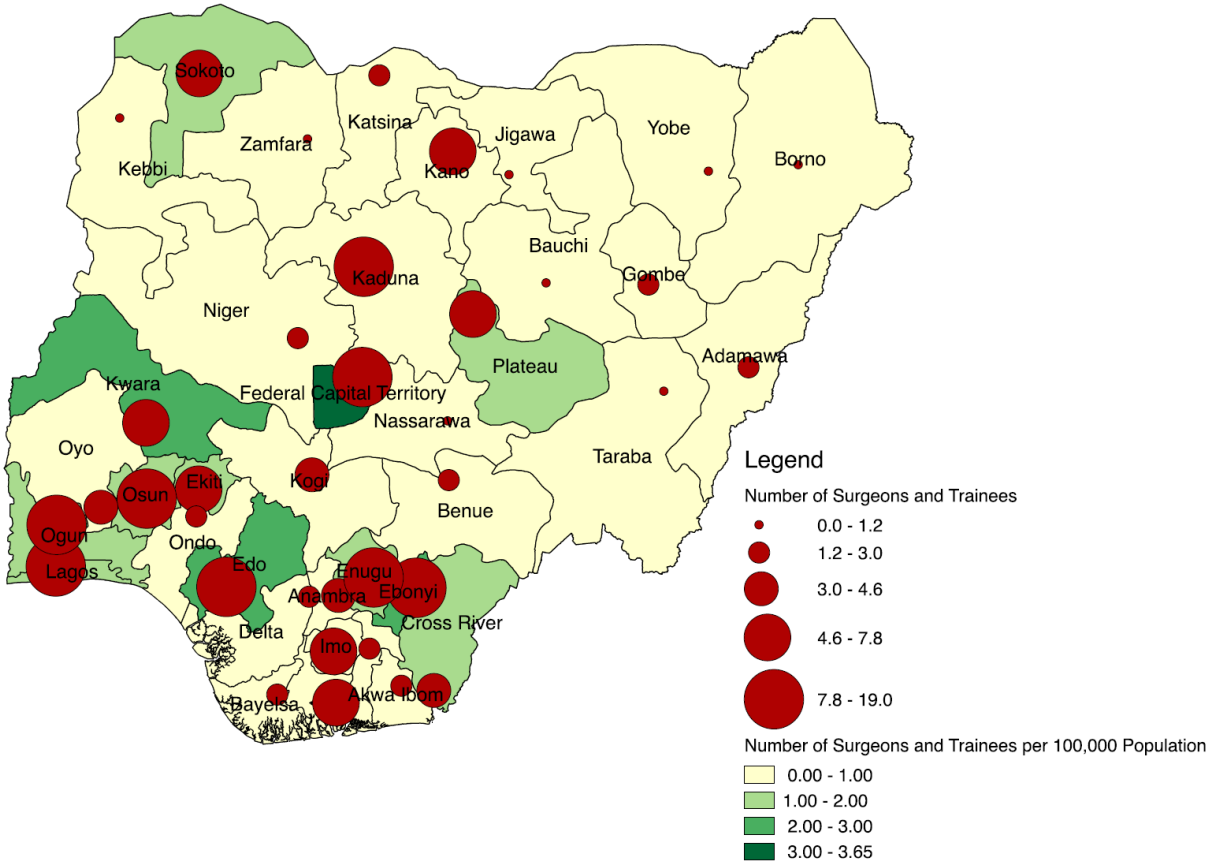
The recommended paediatric surgeon's density to ensure adequate access to surgical care for children is 1 per 100,000 population of children.[74] The current density in Nigeria is 110/81,224,857 population <15years. This results in 0.14/100,000 population below 15years. To meet surgical the needs of children in Nigeria, 812 paediatric surgeons are required. The deficit of 702 paediatric surgeons can only be met by 2030 only if 70 new paediatric surgeons per annum complete their training, assuming the population remains static. At current rates of training of 5-6 paediatric surgeons per year, this deficit cannot be met for several decades. Furthermore, there is much inequity in the distribution of available paediatric surgeons in the country (Figure 13), leaving large parts of the country without access to a specialist paediatric surgeon.

In addition, getting anaesthetists with an interest in paediatric anaesthesia and dedicated to work alongside the paediatric surgeon is at the moment a tall order. This is because the 254 specialist anaesthetists in Nigeria (Table 20) provide services for all surgical specialties including paediatric surgery as well as for obstetrics, trauma care, resuscitation and critical care of patients. Anaesthetists also provide acute and chronic pain management especially for cancer patients.[75] The density of anaesthetists is extremely low (0.13 per 100,000 population) and the number of paediatric anaesthetists is insignificant (Figure 14). With the current anaesthesia workforce crisis, [76,77] and a very low output of anaesthesia specialists, it will require a proactive strategy to responsibly train the minimum number of physician anaesthesia providers. Increasing anaesthesia training and output will serve as a supply pipeline for producing the desired subspecialists in anaesthesia, including paediatric anaesthetists. [66,78]

Table 20: Registration of additional qualifications in anaesthesia by medical and dental council of Nigeria

Period	**No. of Anaesthesia Additional Qualification Registered**
1960-1964	1
1965-1969	2
1970-1974	2
1975-1979	0
1980-1984	2
1985-1989	2
1990-1994	27
1995-1999	44
2000-2004	18
2005-2009	41
2010-2014	58
2015-2018	57
Total	254

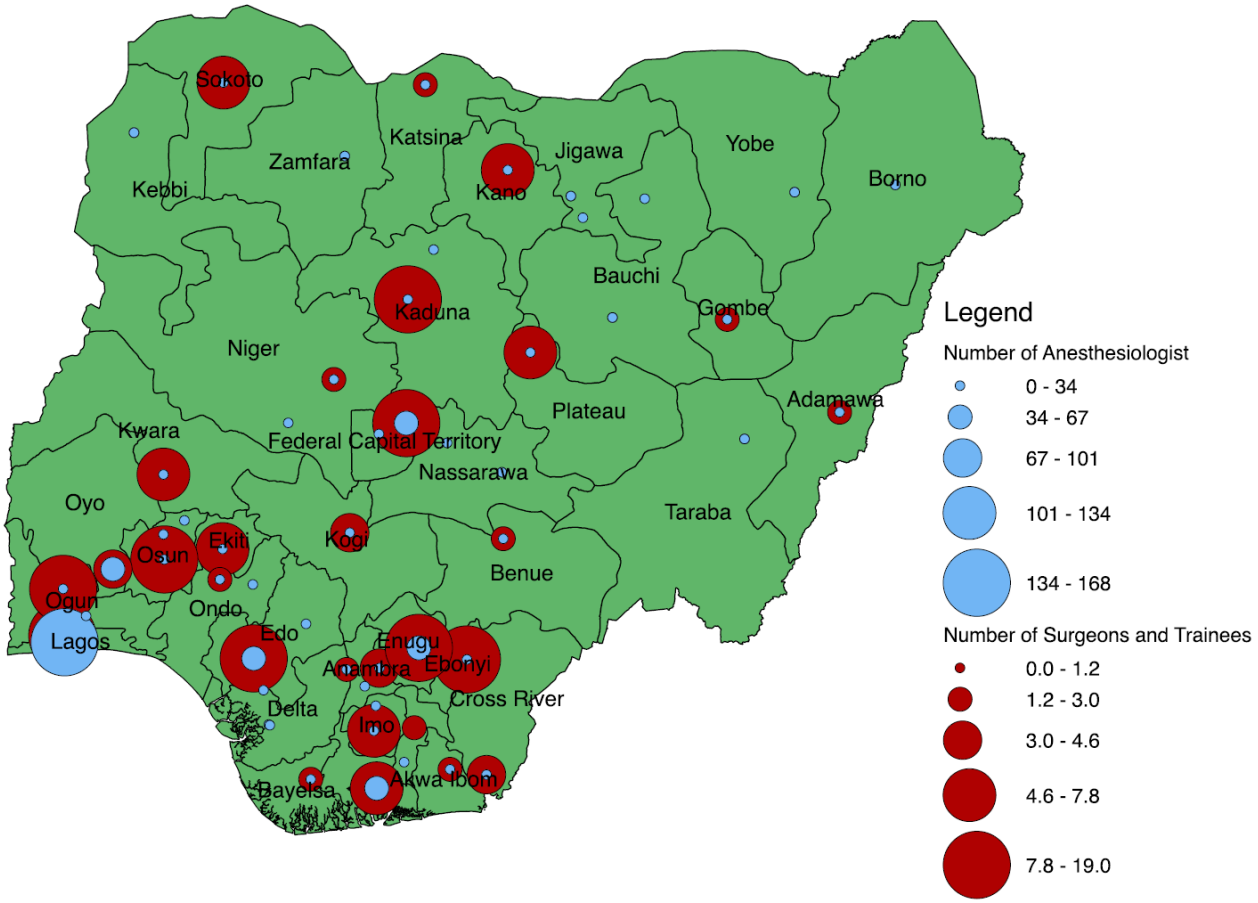
Figure 13: Density and distribution of specialist paediatric surgeons and trainees in Nigeria in 2018



Descriptives

- Location and number of Surgeons (and Trainees) in relation to state population
- Location and number of Anesthesiologist (and Consultants) in relation to state population
- Location and number of Surgeons (and Trainees) and Anesthesiologist (and Consultants) in relation to state population
- Location and number of Surgeons (and Trainees) overlaid on Ratio of Surgeons (and Trainees) per 100.000 Population
- Location and number of Anesthesiologist (and Consultants) overlaid on Ratio of Anesthesiologist (and Consultants) per 100.000 Population

Figure 14: Distribution of specialist paediatric surgeons and trainees, compared to anaesthetists in Nigeria in 2018



Financing of children's surgical care

Up to now, children's surgical care has not been given any attention in existing child healthcare policies. Hence, specific funding does not exist for this service. The result is that, even in tertiary hospitals, equipment and supplies for children's surgical care are limited and do not exist.

LIMITATIONS OF THE BASELINE ASSESSMENT

1. Funding:

   Due to lack of funding the following challenges were encountered:

   a. Inability to carry out a countrywide survey of the surgical system

   b. Inability to survey all hospitals within a state

   Regarding (a) and (b): Health facility-level data on infrastructure, workforce and medicine are essential to providing true indicator 1 as defined by the

LCoGS. They can also be useful for strategic planning and increase service provision.

c. Inability to use a standard sampling technique to choose states to be surveyed. States were chosen based on convenience (availability of volunteers willing to commit personal resource and time to the project)

2. Poor record keeping

   All the information required at each facility could not be obtained due to inadequate record keeping.

3. Lack of accurate population estimates at all levels

RECOMMENDATIONS

Following the country surgical situational analysis, baseline assessment and stakeholder engagements and consultations, key recommendations have been developed to address the strategic objectives for the plan.

Infrastructure and Service Delivery

The ability of the health care system to meet the surgical needs of the population depends on the availability of appropriate infrastructure to support the human resources for health to deliver efficient health care and surgical services.

The Nigerian healthcare system is structured in a tiered manner from primary to the tertiary level (Figure 15), designed to ensure proper referral as well as planning and distribution of healthcare resources and personnel. The public healthcare infrastructure is complemented by private, faith-based (mission) and other charitable healthcare facilities (Figure 15). The recommendations for infrastructure and service delivery are summarised in Table 21.

Figure 15: Structure and organisation of Nigeria's healthcare infrastructure

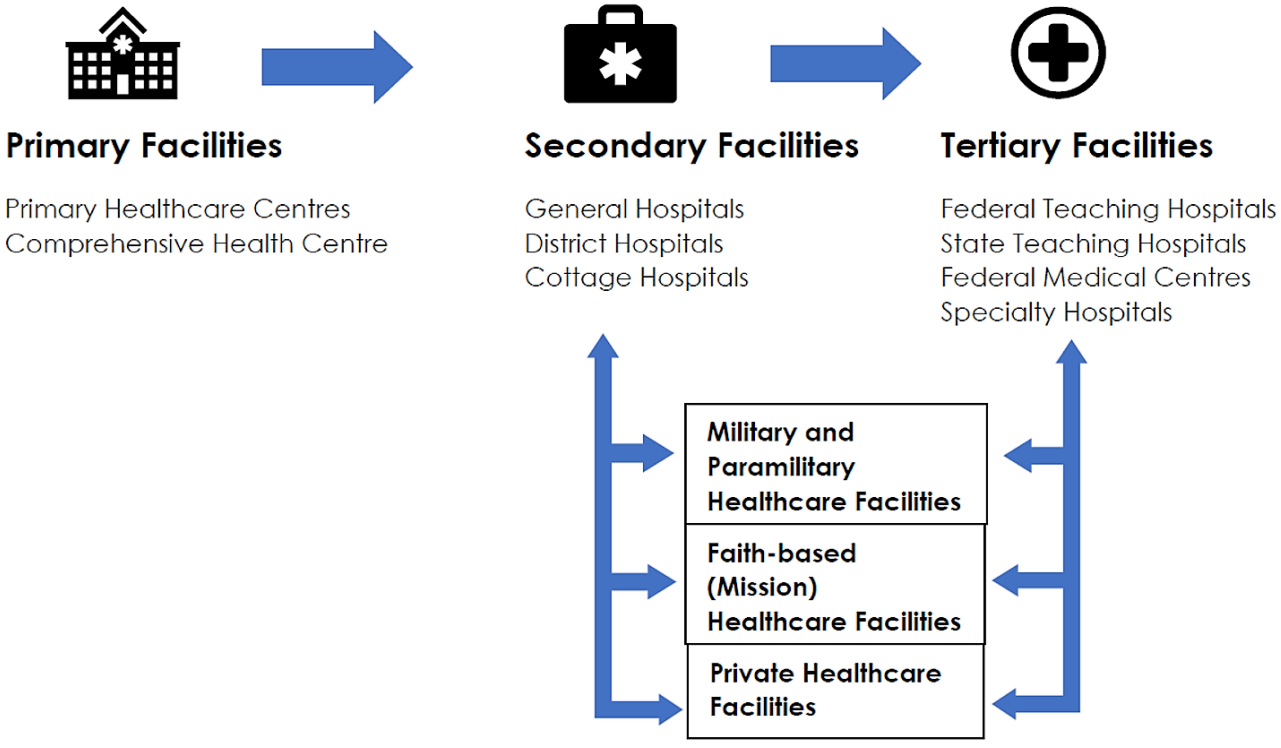


Table 21: Infrastructure and service delivery recommendations

Strategic goal	Recommendation	Metrics
Scale up for surgical care	i) Upgrade, expand and equip existing healthcare facilities to provide surgical care ii) Achieve 100 surgical beds/100,000 population iii) Leverage existing military hospitals to expand access iv) Integrate private healthcare facilities into the surgical ecosystem	Number of beds/100,000
Efficient blood banking and supply	i) Strengthen existing blood transfusion service ii) Create functional and efficient blood banking and supply system where there is none	2-hour availability of blood
Efficient and organised referral system	i) Reorganized current referral structure to make it efficient ii) Develop standard operating protocols for all facility levels	Percentage referral
Efficient pre-hospital emergency response	i) Implement existing national ambulance policy by 2020 ii) Provide ongoing training in emergency response for all staff and all facility levels	
High quality, affordable and effective medicines	i) Encourage local production of medicines ii) Provide efficient distribution network for medicines	Percentage out-of-stock
Readily available surgical supplies and consumables	i) Support and encourage local production of consumables and supplies ii) Create efficient procurement system for consumables and supplies	Percentage out-of-stock

Affordable, high quality and durable equipment	i) Support and encourage local manufacturing of medical equipment ii) Ensure sustainable equipment maintenance system	Rate of faulty equipment
Efficient system for critical care	i) Post anaesthesia recovery beds with electronic monitoring ii) Adequately equipped intensive care units in each secondary and tertiary healthcare facility, including appropriate critical care workforce	Recovery bed: hospital bed ratio ICU: hospital bed ratio
Scale up workforce for surgical care	i) Achieve 5 SAO/100,000 population by 2025 ii) Train an appropriate middle level workforce to provide needed surgical care where there is no SAO	SAO/100,000
Efficient medical record system	i) Establish and maintain a sustainable and integrated national medical records system by 2023 ii) Integrate surgical, obstetrics, anaesthesia and nursing information into the NDHS by 2020	Number of hospitals/states that have integrated EHR

Recommendation 1:

Strategic Goal: Scaling up for surgical care

Upgrade, expand and equip existing health facilities and create new ones to provide essential and advanced surgical services appropriate for the level of care according to the structural blueprint of the target capacity. All military and paramilitary healthcare facilities should be taken into account and upgraded for the appropriate level of care. All private hospitals providing surgical care should be integrated into the surgical ecosystem and should meet the requirement for the provision of surgical care appropriate for the level of care provided.

There should be at least one (1) secondary health facility per Local Government Area (LGA) and one (1) primary facility per 5 wards, and an annual expansion by 10 beds to attain 100 beds per 100,000 population. All services and support departments should be equipped to sufficiently cater for the volume of beds and the expected surgical volume.

[Target to be achieved by the Federal, State and Local Government. Annual audit using the hospital assessment tool with minimum accepted score of 75% (almost always and always available)]

Recommendation 2:

Strategic Goal: Efficient blood banking and supply

Establish an efficient and functional blood banking and supply system where there is none and strengthen the existing national blood transfusion service. This is necessary for the provision of safe, timely, accessible, affordable and efficient blood transfusion service with real-time monitoring and evaluation of availability and consumption of blood and blood products.

Maintain an integrated and central registry of donors capturing all blood types, rare blood types and blood component donors and an integrated network of blood transfusion services between all health facilities across all levels of healthcare and local, state and federal government.

Recommendation 3:

Strategic Goal: Efficient and organised referral system

Establish an organized referral system in which all routine cases should be seen at primary level facilities and referred using guidelines for triage of the flow of patients

to different levels of hospitals. This should be coordinated by the FMoH and SMoH and should be achieved by 2023.

Standard operating protocols should be created for procedures to be carried out at the different facility levels to achieve a bottom-up system of patient flow for treatment and vice-versa for monitoring and follow-up. The referral system should be well integrated including an efficient ambulance service. Continuous audit and evolution of the referral system to adequately respond to the health system is paramount.

Recommendation 4:

Strategic Goal: Efficient pre-hospital emergency response

Establish an efficient, reliable and responsive pre-hospital emergency response and ambulance system that covers all the levels of hospitals and in tandem with the emergency referral system. There must be an integrated pre-hospital emergency response communication system, an integrated emergency response workforce training system and continuous capacity development and maintenance.

A good road network is necessary adequate coverage. The ambulance system must cover remote areas with narrower roads using adapted smaller vehicle ambulances and air ambulances for rapid response. There must be coverage of highways across state lines.

All healthcare workers must maintain a minimum level of training in emergency response and all health facilities must have up-to-date emergency care resources appropriate for the level of care.

Recommendation 5:

Strategic Goal: High quality, affordable and effective medicines

Provision of high quality, affordable and effective medicines through efficient and sustainable local production, storage and distribution network for all tiers of healthcare facilities. Rational use of medicines to prevent wastage and drug resistance.

There should be routine medicine audit for compliance with standards and maintenance of adequate stock through an integrated monitoring system that ensures efficient distribution and maintenance of appropriate shelf lives of medicines. Pharmacovigilance for adverse effects and reporting of adverse event must be instituted.

Recommendation 6:

Strategic Goal: Readily available surgical supplies and consumables

Establish an efficient and effective procurement and logistics management systems to ensure availability of medical and surgical supplies and consumables at all levels of care.

All facilities must have adequate stock of materials required for the provision of surgical care appropriate for the level of care. Occurrence of stock out of essential supplies must be minimised.

Recommendation 7:

Strategic Goal: Affordable, high quality and durable equipment

Provision of functional, up-to-date and durable equipment through an efficient import system and sustainable local production of all or part of equipment. There must be regular maintenance and calibration of equipment to ensure compliance with accepted standards.

An up-to-date procurement or access to spare parts through maintenance and supply contracts with manufacturers and adequate training of biomedical engineers and

technicians must be ensured. Services should include planned regular scheduled maintenance services of equipment, periodic audit of available and functional equipment and provision of back-up mechanisms.

Recommendation 8:

Strategic Goal: Efficient system for critical care

Provision of infrastructure and resources for critical care appropriate for each level of care. Provision of facility for parenteral nutrition.

Each facility must have an adequate number of post anaesthesia recovery beds relative to their number of operating rooms and surgical volume. Each secondary and tertiary facility must have an adequate number of HDCU, ICU and CCU relative to their number of operating rooms and surgical volume. Each unit must have a computerised monitoring system with a central monitoring unit. There should be an integrated monitoring of critical care services and available beds to ensure provision of adequate local and regional coverage of critical care needs.

All critical care units must be adequately staffed with critical care medical and nursing professionals.

Recommendation 9:

Strategic Goal: Scale up workforce for surgical care

Maintain an adequate human resource for health density across different categories and cadre of workforce. Ensure the minimum recommended SAO density for the population and health facility requirements to ensure optimal service delivery, workforce training and surgical outcomes.

There must be established workforce training programme and planned recruitments to ensure regular and adequate supply of HRH to meets surgical needs and which negates

losses through emigration, retirement and death. There must be continuous capacity development to provide international standard of care and advanced surgical services to minimise the need for medical tourism. SAO workforce service capacity must be maintained and improved through skill acquisition and development to provide new, improved and advanced surgical services.

Recommendation 10:

Strategic Goal: Efficient medical record system

Establish an integrated electronic medical record that ensures continuity of care and efficient collection of data on surgical services by 2023. This should be coordinated by the FMoH and SMoH.

Provide computers and internet access and intranet system for all health facilities. Each facility must have a central electronic registration system. An electronic central monitoring system must be established at the state and federal MoH for real time monitoring of health records.

Infrastructure and Service Delivery for Children's Surgery

To ensure adequate delivery of children's surgical services, the following recommendations are made Table 22:

Table 22: Infrastructure and service delivery recommendations for children's surgical care

Strategic goal	Recommendation	Metrics
Scale up infrastructure for children's surgical care	i) Create one federal children's hospital by 2023 ii) Ensure children-friendly infrastructure for children's surgical	Availability of at least one national children's hospital Percentage of primary and secondary facilities

	care is available at all levels of healthcare iii) Deliver essential children's surgical package at all healthcare facility levels (Table 23)	providing essential children's surgery package
Ensure SOP for care and referral of children with surgical conditions	i) Develop SOPs for management of children's surgical diseases at levels of healthcare ii) Create efficient referral system for children's surgery based on OReCS	Percentage referrals to next level of care
Efficient children's pre-hospital care	Integrate care of children into existing and planned prehospital and ambulance systems	
Availability of critical care for children	i) Paediatric intensive care unit (appropriately equipped and staffed) at every tertiary hospital by 2023 ii) Neonatal intensive care unit (appropriately equipped and staffed) at every tertiary hospital by 2023	PICU bed: hospital children's bed ratio NICU bed: hospital children's bed ratio
Availability of children-specific consumables and supplies	Ensure appropriate children's sizes are available for all consumables and supplies at all levels of healthcare	Percentage out-of-stock

Availability of children-specific equipment	Ensure appropriate children's modes and sizes are available for all equipment and instruments at all levels of healthcare	Percentage availability when needed

Table 23: Essential children's surgical package for various hospital levels (adapted from OReCS)

BASIC SURGICAL CARE (Primary health care level)		
SCOPE OF PRACTICE		
Function	Screening for surgical disease Resuscitation and Triage Training of health care workers Referral to higher levels of care Community Health Education	
Age of patients	All ages	
Anesthesia	Local anesthesia for minor procedures.	
Examples care provided (See Appendix 1 and 2 for a more detailed list)	**Injuries**	Resuscitation with basic life support measures, suturing and dressing of simple wounds, splinting of closed, non-displaced fractures 1st degree burns < 10% TBSA and not including face, hands, GCS Score
	Congenital anomalies	Screening for congenital anomalies (e.g., abdominal wall defects, hernias, anorectal and urogenital abnormalities, limb deformities, hip dysplasia, cardiac anomalies, neural tube defects and craniofacial anomalies (cleft lip/palate)
	Infections	Screening for surgical site infections, intra-abdominal infection, bone and joint infections. Treatment of superficial abscess with incision and drainage
	Tumors	Screening for tumors
	Others	Circumcision using a Plastibel Removal of visible foreign bodies in the ear and nose Hearing screening Vision screening

INTERMEDIATE SURGICAL CARE (District hospitals and secondary level)		
SCOPE OF PRACTICE		
Function	24/7 emergency surgical care Diagnosis and treatment of the most common pediatric surgical conditions Training of health care workers Referral to next level of care for complex procedures	
Age of patients	All ages[a]	
Anesthesia	General anesthesia (ASA I+II) Referral ASA >2	
Examples of care provided (see Appendix 1 and 2 for a more detailed list)	**Injuries**	Resuscitation with advanced life support measures including fluid management and nutrition Trauma laparotomy Closed and open fractures Diagnosis and stabilization of neurological trauma (e.g., epidural hematoma, includes emergency burr hole if transfer not possible) Treatment of burns (<10% not involving face, hands and perineum)
	Congenital anomalies	Inguinal hernia repair in older children
	Infections	Incision and drainage of abscesses, pyomyositis and septic arthritis Appendicitis, intestinal perforation Thoracostomy tube for empyema Drainage and debridement of osteomyelitis
	Tumors	Excision of benign tumors
	Others	Intestinal obstruction (e.g., intussusception, enterolysis for adhesions) Foreign body removal from ear, nose, airway and esophagus

COMPLEX/ADVANCED SURGICAL (Tertiary level)		
SCOPE OF PRACTICE		
Function	Advanced diagnostic services and multidisciplinary specialized care Receive referrals from other hospital levels Training of health care workers Research and Advocacy Develop standards of care	
Age of patients	All ages	
Anesthesia	All types of anesthesia including neonatal, cardiac and neuro anesthesia	
Examples of care provided **(See Appendix 1 and 2 for a more detailed list)**	**Injuries**	All traumatic injuries referred from lower levels of care, including neurovascular injuries
	Congenital anomalies	All congenital anomalies referred from lower levels of care, including repair of anorectal malformations, urogenital anomalies, congenital heart disease and meningomyelocele, hydrocephalus
	Infections	All surgical infections referred from lower levels of care, including complex soft tissue infections, osteomyelitis, intracranial infections
	Tumors	All benign and malignant tumors, including abdominal and urological malignancies
	Others	

[a]All babies < 1 year old should be referred to higher levels of care due to increased anesthetic risk. Only exception is life-threatening emergency when transportation is not possible.

Recommendation 1:

Strategic Goal: Scale up infrastructure for children's surgical care

Provide infrastructure for the provision of children's surgical care in all health facilities appropriate for the level of care. Establish one Federal Children's hospital for the provision of advanced and super specialty surgical care for children by 2023.

Expand the infrastructure for the provision of children's surgery within primary and secondary levels of care through provision of structure and equipment, and skilled human resources for health for the provision of essential children's surgical package (Table 23). Increase the capacity of the tertiary levels of care to provide advanced surgical care for children. Establish regional children's hospitals to provide specialised and advanced care for children's medical and surgical care. All existing state level designated children's hospitals should be equipped to provide appropriate surgical care.

Recommendation 2:

Strategic Goal: Ensure SOP for care and referral of children with surgical conditions

Establish a clear SOP for management and referral of children's surgical diseases within an efficient referral system.

Ensure a clear outline of children's surgery management by physician non specialist and specialist non-specific children's surgical providers of essential and emergency surgery and prompt referral to specialist paediatric surgical providers in local and regional secondary and tertiary facilities for best outcomes.

Recommendation 3:

Strategic Goal: Efficient children's pre-hospital care

Provide resources and infrastructure for emergency transport of children within an efficient pre-hospital emergency response and ambulance system.

Ensure that ambulances are appropriately equipped and maintained to provide care for neonates and children. Ensure that all emergency response staff are adequately trained to resuscitate and provide emergency care for neonates and children

Recommandation 4:

Strategic Goal: Availability of critical care for children

Provide infrastructure and resources for the critical care of neonates and children.

Ensure that all PACUs are equipped with facility for paediatric support. All secondary facilities must have at least HDCU and ICU beds equipped for children or dedicated ICU for children appropriate for the volume and type of children's surgery provided. All tertiary facilities must have neonatal and paediatric ICU within an integrated network ensuring local and regional availability of critical care services. All critical care units must be adequately and appropriately staffed with critical care neonatal and paediatric medical and nursing professionals.

Recommandation 5:

Strategic Goal: Availability of children-specific consumables and supplies

Ensure adequate and regular supply of medical and surgical materials specific for neonates and children in all sizes appropriate for all age groups and body sizes within an efficient procurement and logistics management system.

Ensure regular audit and efficient monitoring of quantity and shelf life of supplies within an integrated distribution network.

Recommendation 6:

Strategic Goal: Availability of children-specific equipment

Establish facilities for local manufacturing of parenteral nutrition for neonates and children.

Ensure capacity development in the manufacturing and usage of parenteral nutrition of neonates and children as an integral part on critical care in children.

Well planned and adequate infrastructural provision contributes significantly to surgical service delivery. A well-motivated workforce within an efficient, comprehensive and strong health system will produce optimal outcomes of surgical care and services.

Human Resources, Training and Education

To a large extent, there are established centres for training surgical care providers in Nigeria. The Medical and Dental Council of Nigeria (MDCN) is the agency responsible for the registration and licensure of newly qualified medical and dental graduates as well as the annual registration of all medical and dental professionals in Nigeria. There are presently 17 Federal Medical Schools, 16 State Medical Universities and 8 Private Medical Schools making up a total of 41 medical schools in Nigeria. In 2018, the MDCN registered and licensed 2,888 newly qualified doctors. Thus, the output of newly qualified doctors in 2018 is 1.62 per 100,000 population. Even if all of them gets into the residency training for SAO's, this clearly falls short of the need.

For to postgraduate training, there are 2 colleges responsible for the training and certification of Surgeons, Anaesthetists and Obstetricians and Gynecologists. These are the West African College of Surgeons (WACS) and National Postgraduate Medical College of Nigeria (NPMCN). There are about 52 accredited training centres in Nigeria with either complete or partial accreditation for training of surgical and anaesthesia specialists, out of which 39 centers are accredited for training various levels of anaesthetists. The total number of Surgeons, Anaesthetists and Obstetricians registered to practice by the MDCN as of December 2018 in the country are as follows: 2386 Specialists with Fellowships employed or eligible to work in the Tertiary hospitals as Consultants; 359 with Memberships eligible to practice in their specialty or to complete the Fellowship programme if they desire to work in a tertiary hospital; 244 with Masters (MSc or Diploma) and 1 PhD holder. The total SAO is 3,287 with a density of 1.65 per 100,000 population. While this excludes significant providers of

surgical care vis General practitioners and medical officers. This reflects a huge gap (18.35) to be filled to meet the internationally recommended target of 20 SAO's per 100,000 population by the year 2030 (Figures 16 - 18).

The Schools of Nursing and a few Universities train a significant number of nurses registering and licensing nurses and midwifes yearly. Eleven Thousand (11,000) newly qualified nurses were registered in 2018 by the Nursing and Midwifery Council of Nigeria (NMCN). on to receive post-basic nursing training in anaesthesia, peri-operative care and care of surgical specialties patients such as cardiothoracic surgery, orthopaedics, ophthalmology, otorhinolaryngology and accident and emergency nursing.

Figure 16: Realistic growth trends to reduce the gap and increase SAON density to 5 SAO per 100,000 and 10 N per 100,000 population by 2023

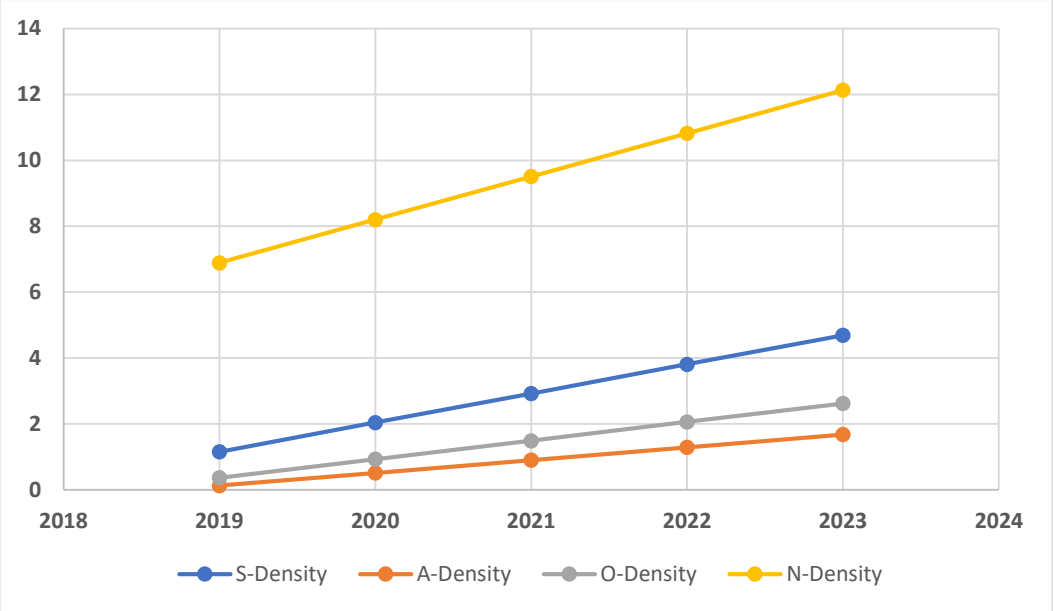


Figure 17: Desired Increase in SAON Workforce Density to meet the 2030 Target of 20 SAO per 100,000 population and 20 N per 100,000 population

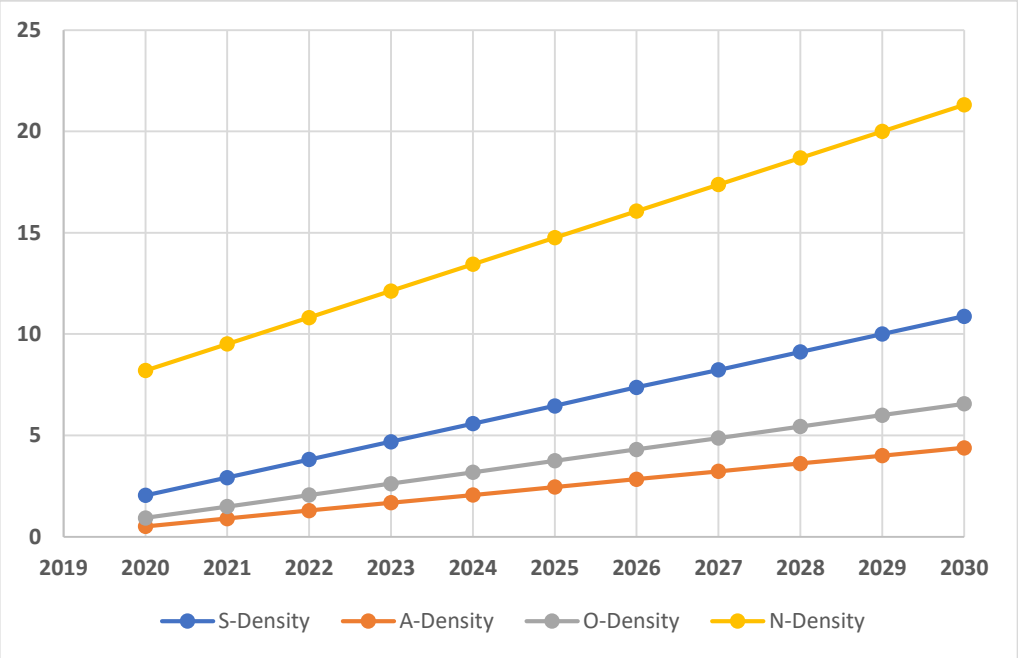


Figure 18: Desired Increase in SAON Workforce Numbers equivalent to 20 SAO per 100,000 population and 20 N per 100,000 population.

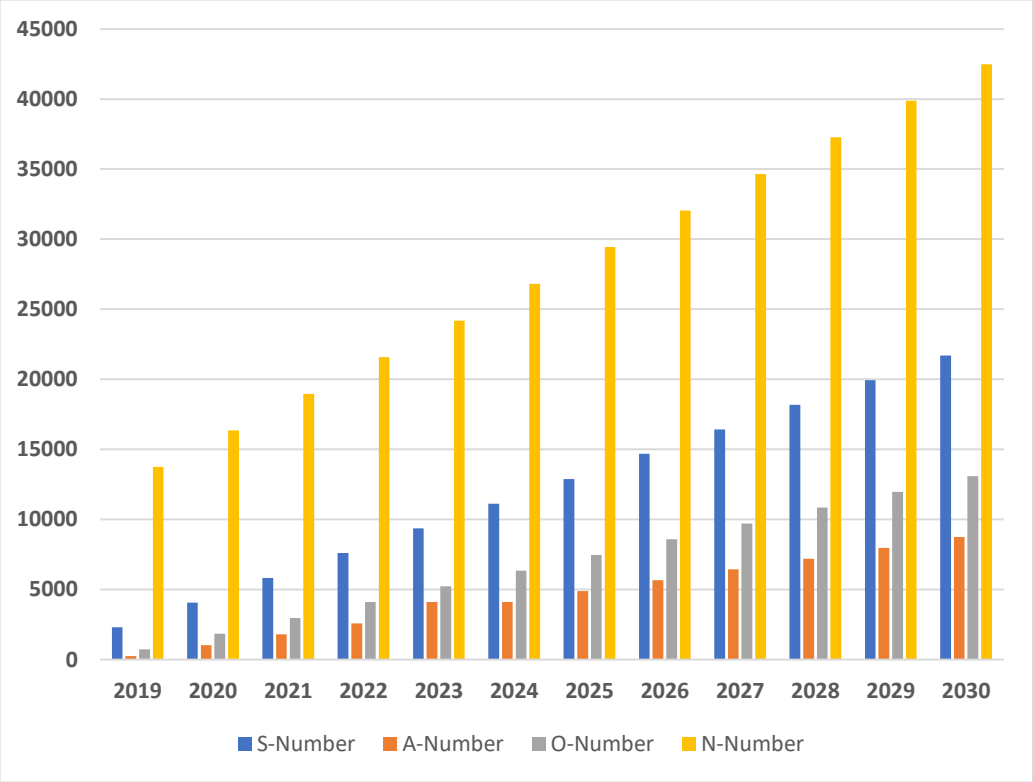


Table 24: Breakdown of the current and future SAO and nursing need

Specialty	No. (2019)	No. needed by 2023	No. needed by 2025	No. needed by 2030
Surgeons	2,300	9,350	12,879	19,937
Anaesthetists	254	4,107	4,885	7,975
Obstetricians	733	5,224	7,476	11,962
Nursing	13,739	24,184	29,427	39,874
Total	17,026	42,865	54,667	79,748

Table 24 shows the current numbers of SAO and nurses and the future needs for each specialty. The key limitations in SAO identified were:

1. Low number of SAO providers trained per year to the need of the population. This is in addition to reducing capacity to train.
2. Unequal geographical distribution of doctors in general and worse still specialist SAO providers. Most specialists are employed by the federal government and are located in urban areas.

The following recommendations are made for human resources, training and education (Table 25):

Table 25: Recommendation for human resources, training and education

Strategic goal	Recommendation	Metrics
Increase the number of SAO providers in secondary level hospitals across the country	State governments to invest in recruitment of SAO for their hospitals	SAO/100,000
Scale up training of SAO and nurses	i) Expand the capacity of accredited training centres to train ii) Increase the number of accredited training centres for SAO and nurses. This involves increasing the number of institutions gaining required	Number of accredited training institutions

	accreditation for the first time or converting from partial accreditation. This will increase the number of specialists that can be trained and number of institutions that can offer training of surgical skills at various levels. iii) Involve the private sector in the postgraduate training of surgeons for fellowship because a good number of specialist surgeries are performed in private hospitals. This must be done in affiliation with accredited institutions. This will provide the surgical volume needed for training, as well as the experience.	
Enhance undergraduate surgical knowledge and skills	More specific surgical training and exposure in medical school and internship. This enable national youth corps members to perform safe surgery wherever they are posted to for the 1-year compulsory service.	Percentage of medical and nursing schools providing more specific surgical exposure/training
Fill current SAO gap	Have pathways of training medical officers in different communities to safely perform surgery. This can be in the form of short duration certified training programmes for medical officers by NPMCN and/or WACS.	Percentage of MOs trained to provide surgery, obstetrics and anaesthesia care at primary and secondary facilities

Healthcare Information, Metrics and Research

The NSOANP is a conceptualized health-care strategy aimed at bridging the identified gaps in accessing timely, affordable, quality and safe surgical care. Surgical care has been identified as an essential component of Universal Health Coverage and is integral in the achievement of Sustainable Development Goals.

The Federal Ministry of Health carried out a facility assessment for surgical care was done and a great need for surgical plan was recommended. This plan provides a clear guide for the delivery of surgical care in Nigeria both at the Government and Private healthcare providers, including the roles of Development partners and all relevant stakeholders. The ultimate aim is to develop a strong health system that ensures timely and universal surgical coverage, good society buy that is effective and economic to run.

Recommendations

1. Plan and Carry out advocacy activities with relevant stakeholders to ensure implementation of health-related budget and also promote political will for NSOANP
2. Set up and inaugurate an NSOANP technical working group by September 2019 for effective budgeting, tools, training modules and publications. The working group would also set up an efficient and effective Monitoring, Evaluation and Audit plans to document and track accountability for budget and service implementation at all level of governance.
3. Provide conducive environment to promote, support and drive commitment of personnel for positive service outcome and retention.
4. Institutionalize and implement effective organogram and service protocols to promote efficient job delegation for smooth running of duties
5. Create awareness and public sensitization on the important of facility-based interventions using all media network
6. Provide appropriate intervention and policies to strengthen ability to diagnose ailments, perform surgery and maintain appropriate data of surgeries performed at PHC and District hospital levels.
7. Ensure institution of effective emergency ambulance and medical referral systems strengthened by the planned Emergency Medical Treatment Initiative (EMTC) being established at Federal Ministry of Health.

Financing of Surgical Care

The financing of surgical care in Nigeria expectantly follows the trend in the financing of healthcare costs in the country. The difference however lies in the unfortunate outcome of financing surgical care in a country where some 80% of the population live under $2 (US) per day. Families and households may treat malaria and other outpatient conditions with expenditure within what they could spare for savings. The same cannot be said for household expenditure to cover surgical care where catastrophic expenditure is more often than not the experience of families.

Surgical care input involves teams of highly trained doctors in specialized fields, nurses and other para-medicals with the deployment of expensive equipment in very controlled environment for patient surgeries and post-op monitoring and care. Expertise and equipment for these surgical procedures involve huge capital outlay and running costs that cascade down to prices of surgical procedures which the patient in need may not be able to afford.

Out of pocket expenditure in Nigeria is shown to be around 73%. Other means of financing healthcare costs in Nigeria includes public spending on healthcare (12%), health insurance at <3% with the rest being donor funding.

Health insurance is majorly by the National Health Insurance Scheme that has so far covered over 3 million lives and remains the most viable option for financing a plan that incorporates surgical care into universal health coverage efforts for the expansive population of Nigeria. Recommendations are summarized in Table 26.

Table 26: Recommendations for the financing of surgical care

Strategic goal	Recommendation	Metrics
Increase financial risk protection	Expand health insurance coverage in population terms by: 1. Strengthening the legal framework establishing the National Health Insurance Scheme (NHIS) with a view towards making health insurance mandatory.	Impoverishing expenditure rate Catastrophic expenditure rate

	2. Working assiduously towards establishing mandatory health schemes in all the 36 states of the federation and the FCT. 3. Strengthening the capacity of States with mandatory health schemes to utilize earmarked funds released for the provision of basic health care under the National Health Act. 4. Designing a model that allows for pensioners under the contributory pension scheme (holders of Retirement Saving Accounts) to be included and covered under a vulnerable programme of the NHIS with zero co-payment. 5. Deepen the National Health Insurance Fund by mandating the deduction at source of 1.75% of consolidated salary of all employees of the Federal Government covered by the NHIS.	
Reduce out-of-pocket expenditure	Expand health insurance coverage in terms of benefit package that covers surgical services inclusive of the treatment of congenital anomalies requiring advanced surgical procedures. This should be done by the national health insurance scheme, state health insurance schemes, community health insurance schemes and private health insurance schemes, in coordination with FMoH and SMoH.	Percentage of out-of-pocket expenditure for healthcare
Innovative funding for healthcare	There needs to be an increase in revenue mobilization for health by: 1. Introducing a Global System for Mobile (GSM) communication tax of one kobo per second on all mobile telephony calls. 2. Implementing the proposed sin tax on tobacco and alcohol with the resultant proceeds earmarked for investing in the healthcare system. 3. Making concerted efforts in line with the established federal government policy on Public Private Partnership for Health, by shopping for supply side financing of	Percentage of health budget mobilized from private sector

	expensive health equipment and infrastructure at single digit interest rates. 4. Integrating parallel activities of donor bodies and corporate social responsibility (CSR) of businesses into a singular effort to boost demand side financing for health.	
Increase efficiency gains in healthcare	There needs to be a look in as to how government can achieve more with less using the available funds at its disposal through: 1. Cost-cutting collaborations by government to reduce duplication of effort in the healthcare system e.g. National Agency for Food and Drugs Administration and Control (NAFDAC) and Institute of Public Analyst of Nigeria (IPAN) share similar objectives that should be jointly out by one of them. and State Governments and Local Councils may harmonize budgetary allocation for the provisioning of clean water by siting water projects for communities in and around public healthcare facilities. 2. Reduction of activities with limited impact on health targets such as 'free' health programmes that do not have policy and legal backing, and channel funds usually allocated to such into health insurance pools for a more sustainable venture. 3. Entrenching fiscal discipline in the system to ensure that budgetary allocation and release of funds are matched with periodic monitoring of the utilization of same. 4. Performance based budgeting for public healthcare facilities, where allocations and some allowances are tied to performance with the aim of reducing frequency of industrial actions and increasing productivity. 5. Employ Strategic Purchasing as an allocation tool as is obtainable under health insurance systems where services	Cost effectiveness of interventions

	rather than line items or commodities are budgeted for to address the challenge of skewed budgeting.	
Make healthcare an investment priority	In order to give the health sector an edge over other competing national needs like housing, power and manufacturing for the limited funds available to government, the Nigerian healthcare system requires a paradigm shift in policy making that would make funding of healthcare an investment with quantifiable returns in terms of human capital preservation and revenue generation with a view towards making Nigeria a medical tourism hub as obtainable in India and Israel.	Percentage budgetary allocation to health

Recommendations

1. Innovatively improve revenue mobilization for health by introducing a Global System for Mobile (GSM) communication tax of one kobo per second on all mobile phone-calls on the telecommunication networks in Nigeria.
2. There needs to be a consideration of Sin tax on tobacco and alcohol with the resultant proceeds earmarked for healthcare spending.
3. There needs to be cost-cutting collaborations by government parastatals to reduce duplication of efforts in the healthcare system e.g. National Agency for Food and Drugs Administration and Control (NAFDAC) and Institute of Public Analyst of Nigeria (IPAN) activities with similar objectives could be jointly carried out by both.
4. There should be an active plan to discourage 'free' health programmes that do not have policy and legal backing and the funds usually expended on such may be put into health insurance pools for a more sustainable venture.
5. In budgeting for public owned healthcare facilities and design of welfare packages for health workers, there should be allocations and allowances

respectively that are tied to performance to reduce frequency of strike actions on one hand and encourage productivity by the workers on the other.

6. Fiscal discipline should be entrenched in the system to ensure budgetary allocation and release are matched with attendant monitoring of the expenditure by government on healthcare.
7. Skewed budgeting where higher allocation is appropriated to areas with lesser disease burden may be addressed with the use of the tool of Strategic Purchasing as is obtainable under health insurance where services rather than line items or commodities are paid for.

IMPLEMENTATION

Nigeria's large population with the inadequacies in infrastructure, medical technology, equipment and surgical workforce provides the perfect combination, required to roll out a strategic plan for the national surgical, obstetric, anaesthesia and nursing plan (NSOANP). The country operates a pluralistic health care delivery system with the orthodox and traditional systems independent of one another. Both the public and private sectors provide the orthodox health care services. Key Players in Implementation

The key players in the implementation include the Federal Government of Nigeria and all the 36 State Governments, as well as the Federal City Territory, in addition, the Federal Ministry of Health (FMoH) and the State Ministries of Health (SMoH) should be the main drivers of the plan. FMoH and SMoHs should create surgical desk in the ministry and formally appoint a national and state coordinator for NSOANP. Stakeholders essential to the plan include regulatory agencies namely the Medical and Dental Council of Nigeria (MDCN) and the Nursing and Midwifery Council of Nigeria (NMCN). The two postgraduate colleges in Nigeria, the National Postgraduate Medical College of Nigeria (NPMCN) and the West African College of Surgeons (WACS) with the responsibility for training and validating the surgical workforce are important to the implementation of the plan. The Nursing and Midwifery Council of Nigeria (NMCN) is responsible for the registration of all nurses and midwives and it carries out accreditation of all nursing training schools in Nigeria with the aim of maintaining quality of care and professional standards.

All the healthcare facilities and training schools are key to the success of the NSOANP. Alongside the public and private healthcare systems are the other healthcare providers in the country including non-governments organizations (NGOs). The various professional societies, missions, and international bodies have played important roles in healthcare and specifically surgical care through surgical outreaches. Other stakeholders relevant to the plan are the National Youth Corp Service (NYCS), the Ministry of Education and the Ministry of Finance.

Duration of Plan

The duration of the NSAONP is 5 years (2019 to 2023). This allows it to be integrated with the National Strategic Health Plan and National Child Health Policy/Programmes.

The implementation process can be described as the beginning of the realization of the goals of the NSOAP. In the absence of the actualization of this key segment, the NSOAP remains "just another document'. The phase of implementation and monitoring and evaluation run together to ensure that the goals of the plan are being realized as well as determine the rate at which they are being realized using indicators set for M & E. The implementation roadmap is summarized in Table 27.

Implementation road map

Table 27: Implementation roadmap for Nigeria NSAONP

Infrastructure 1. Strengthen existing healthcare facilities at all levels to provide emergency and essential surgical care 2. Infrastructure 2: Establish one federal children's hospital by 2025			
NSOANP Year	Strategic Target	Activities	Responsibility
Year 1	One secondary health facility per LG providing emergency and essential surgical care One primary health facility per ward providing emergency and essential surgical care	Scale up: Structural upgrade, equipping, restructuring and staffing of Primary and secondary facilities to provide emergency and essential surgical care for their level	FG SG LG Private sector Development partners
	Access to blood and blood products within 2 hours of need	Strengthening of existing blood transfusion services and establishment of new ones to meet the target	FMoH SMoH
	Integrated ambulance system	Establishment of efficient ambulance system to facilitate referral	FMoH SMoH

			Private sector
	Efficient and high-quality equipment and supplies	Streamline and strengthen procurement system/chain Establish national benchmark for quality of equipment and supplies Leverage appropriate technology to ensure high quality and efficient equipment and supplies	FMoH SMoH Hospitals Equipment and product manufacturers/Industries/Suppliers
	Improved equipment maintenance	Institutionalize regular equipment surveillance and maintenance Ensure appropriate and favourable maintenance agreements at time of equipment purchase Ensure regular availability of spare parts	FMoH SMoH Hospitals Equipment and product manufacturers/Industries/Suppliers Biomedical engineers
Year 2	Increase surgical bed capacity by 50% at all levels	Create more bed spaces by scaling up and build new hospital wards	FG/SG/LG FMoH/SMoH Hospitals (public, private, faith-based) Private sector

	Increase blood transfusion coverage by 25% over baseline at all levels		FMoH SMoH
	One Federal Children's Hospital[a]	Establishment of at least one children's hospital	FG FMoH Development partners/NGOs Private sector
Year 3	Increase surgical bed capacity by 60% at all levels	Create more bed spaces by scaling up and build new hospital wards	FG/SG/LG FMoH/SMoH Hospitals (public, private, faith-based) Private sector
	Increase blood transfusion coverage by 60% over baseline at all levels	Strengthen existing blood transfusion services and create new ones	FMoH SMoH
	One Federal Children's Hospital	Provide staffing, equipment and supplies	FG FMoH Development partners/NGOs Private sector

Year 4	Increase surgical bed capacity by 80% at all levels	Create more bed spaces by scaling up and build new hospital wards	FG/SG/LG FMoH/SMoH Hospitals (public, private, faith-based) Private sector
	Increase blood transfusion coverage by 80% over baseline at all levels		FMoH SMoH
	One Federal Children's Hospital	Functioning of children's hospital	FG FMoH Development partners/NGOs Private sector
Year 5	Achieve 100 surgical beds/100,000 population	Create more bed spaces by scaling up and build new hospital wards	FG/SG/LG FMoH/SMoH Hospitals (public, private, faith-based) Private sector
	Increase blood transfusion coverage by 100% over baseline at all levels	Strengthen existing blood transfusion services and create new ones	FMoH SMoH

	One Federal Children's Hospital	Ongoing staffing, equipment, supplies and running of children's hospital	FG FMoH Development partners/NGOs Private sector

[a]Details of infrastructure, equipment, supplies and human resource requirements for children's hospital is provided in the Optimal Resources for Children's Surgical Care[73]
Surgical beds density to take into account private hospital surgical beds
Expansion at all levels to take into account demand and usage with attention to local population density

Service Delivery 1. Achieve 75% access to surgical care by 2025 2. Service delivery 2: Achieve 50% access to surgical care for children by 2025			
NSOANP Year	Strategic Target	Activities	Responsibility
Year 1	Increase 2-hour access by 10% over the pre-plan baseline	Improve infrastructure and workforce	FG/SG FMoH/SMoH
	Increase surgical volume by 20% of current baseline	Improve infrastructure and workforce	FG/SG FMoH/SMoH
	50% usage of SSCL at Federal hospitals	Nationwide baseline assessment of use of SSCL Advocacy and awareness on use of SSCL	FG/SG FMoH/SMoH Hospitals

	10% compliance with referral protocol	Referral protocol development, implementation and periodic reviews	FG/SG FMoH/SMoH Hospitals
	5% of population expected to be proficient in CPR	Training	FG/SG FMoH/SMoH Hospitals Regulating bodies/Schools Professional bodies Development partners/NGOs
Year 2	Increase 2-hour access by 20% over the pre-plan baseline	Improve infrastructure and workforce	FG/SG
	Increase surgical volume by 40% of current baseline	Improve infrastructure and workforce	FMoH/SMoH
	100% usage at Fed hospitals 50% usage at state hospitals	Continued advocacy for use of SSCL, regulation and periodic reviews	FG/SG FMoH/SMoH Hospitals
	15% compliance with referral protocol	Implementation and periodic reviews	FG/SG

			FMoH/SMoH Hospitals
	10% of population expected to be proficient in CPR	Training	FG/SG FMoH/SMoH Hospitals Regulating bodies/Schools Professional bodies Development partners/NGOs
Year 3	Increase 2-hour access by 30% over the pre-plan baseline	Improve infrastructure and workforce	FG/SG
	Increase surgical volume by 60% of current baseline	Improve infrastructure and workforce	FMoH/SMoH
	100% usage at State hospitals 50% usage at LG levels	Continued advocacy for use of SSCL, regulation and periodic reviews	FG/SG FMoH/SMoH Hospitals
	30% compliance with referral protocol	Implementation and periodic reviews	FG/SG FMoH/SMoH

			Hospitals
	15% of population expected to be proficient in CPR	Training	FG/SG FMoH/SMoH Hospitals Regulating bodies/Schools Professional bodies Development partners/NGOs
Year 4	Increase 2-hour access by 40% over the pre-plan baseline	Improve infrastructure and workforce	FG/SG
	Increase surgical volume by 80% of current baseline	Improve infrastructure and workforce	FMoH/SMoH
	100% usage at LG levels and 50% usage at Private and Military hospitals	Continued advocacy for use of SSCL, regulation and periodic reviews	FG/SG FMoH/SMoH Hospitals
	40% compliance with referral protocol	Implementation and periodic reviews	FG/SG FMoH/SMoH Hospitals

	20% of population expected to be proficient in CPR	Training	FG/SG FMoH/SMoH Hospitals Regulating bodies/Schools Professional bodies Development partners/NGOs
Year 5	Post-plan assessment of 2-hour access	Improve infrastructure and workforce	
	Increase surgical volume by 100% of current baseline	Improve infrastructure and workforce	
	100% usage at Private Hospitals, military and paramilitary hospitals and mission hospitals and Review	Continued advocacy for use of SSCL, regulation and overall review	FG/SG FMoH/SMoH Hospitals
	55% compliance with referral protocol and review	Implementation and periodic reviews	FG/SG FMoH/SMoH Hospitals
	25% of population expected to be proficient in CPR	Training	FG/SG FMoH/SMoH

			Hospitals Regulating bodies/Schools Professional bodies Development partners/NGOs

Human Resources, Training and Education (SCAT-Hands1)			
NSOANP Year	Strategic Target	Activities	Responsibility
Year 1	Increase SAO provider workforce by density of 1 per 100,000 (to achieve 2.65/100,000) Increase nursing workforce by 1.9 per 100,000 Increase in number of biomedical engineers, radiologists, pathologists, and other allied health workforce by 2.5/100,000	Increase number of training institutions Increase number of trainees per level of training Increase training spaces Increase number of trainers through visiting faculties, sabbatical positions, sharing of resource persons More in-depth and detailed consultations with training institutions, relevant colleges and ministries to	MDCN, tertiary hospitals, professional bodies, medical directors, NMCN, NUC, WACS, NPMCN, Ministries of health, education and finance, FG, SG

		chart realistic and workable strategies	
Year 2	Annual increase of SAO provider by 2 per 100,000 Annual nursing workforce increase by 4 per 100,000 Allied increase in other health workers by 20%	Increase number of training institutions Increase number of trainees per level of training Increase training spaces Increase number of trainers (e.g. visiting consultants/faculties) Phased implementation of plans, strategies and resolutions of Year 1 and review of same to overcome challenges and increase effectiveness	MDCN, professional bodies, medical directors, NMCN, NUC, WACS, NPMCN, Ministries of health, education and finance, FG, SG
Year 3	Annual increase of SAO provider by 2 per 100,000 Annual nursing workforce increase by 4 per 100,000 Allied increase in other health workers by 20%	Increase number of training institutions Increase number of trainees per level of training Increase training spaces	MDCN, professional bodies, medical directors, NMCN, NUC, WACS, NPMCN, Ministries of health, education and finance, FG, SG

		Increase number of trainers (e.g. visiting consultants/faculties) Phased implementation of plans, strategies and resolutions of Year 1 & 2 and review of same to overcome challenges and increase effectiveness	
Year 4	Annual increase of SAO provider by 2 per 100,000 Annual nursing workforce increase by 4 per 100,000 Allied increase in other health workers by 20%	Increase number of training institutions Increase number of trainees per level of training Increase training spaces Increase number of trainers Phased implementation of plans, strategies and resolutions of Year 1, 2 & 3 and review of same to overcome challenges and increase effectiveness	MDCN, professional bodies, medical directors, NMCN, NUC, WACS, NPMCN, Ministries of health, education and finance, FG, SG
Year 5	Overall review	Overall review	MDCN, professional bodies, medical directors, NMCN, NUC, WACS, NPMCN, Ministries of

	Annual nursing workforce increase by 4 per 100,000 Allied increase in other health workers by 20%		health, education and finance, FG, SG

[1]SCAT-Hands: Surgical Care for All by Trained Hands

Healthcare Information, Metrics and Research 1. Comprehensive integrated national electronic medical records database for effective continuity of care and generation of data on disease prevalence to enable appropriate planning and research for disease prevention and treatment 2. Create and disseminate a nationwide policy document on data collection and management at all levels of healthcare			
NSOANP Year	Strategic Target	Activities	Responsibility
Year 1	Establishment of national dashboard for data collection, collation and analysis	Engage expert to create and maintain NSOANP dashboard Harmonize tool for national use Conduct training /orientation meeting	FMoH/SMoH Hospitals

Year 2	Creation of an integrated national and state level electronic health records (EHR)	Pilot EHR in selected institutions and states	FG, SG FMoH/SMoH Public and private hospitals
	Collection of surgical, obstetrics, anaesthesia and nursing data	Include surgical, obstetrics, anaesthesia and nursing data and indicators in Nigeria Demographic and Health Survey (NDHS)	FMoH/SMoH National population commission National bureau of statistics USAID
	Create funding for research	Provision of specific and dedicated budgeting for surgical, obstetrics, anaesthesia and nursing research at all levels of healthcare	FG, SG National Assembly, State Houses of Assembly FMoH, SMoH Donor agencies, Development partners Hospitals

Year 3	Creation of an integrated national and state level electronic health records (HER)	Expand EHR to cover 50% of institutions and states	FG, SG FMoH/SMoH FMoH/SMoH Public and private hospitals
	Collection of surgical, obstetrics, anaesthesia and nursing data	Ongoing inclusion of surgical, obstetrics, anaesthesia and nursing data and indicators in Nigeria Demographic and Health Survey (NDHS)	National population commission National bureau of statistics
	Increase funding for research to 5% of total health budget	Increase budgeting for surgical, obstetrics, anaesthesia and nursing research at all levels of healthcare	USAID FG, SG National Assembly, State Houses of Assembly FMoH, SMoH Donor agencies, Development partners, Industry, Private sector Hospitals

Year 4	Creation of an integrated national and state level electronic health records (EHR)	Expand EHR to cover 75% of institutions and states	FG, SG FMoH/SMoH FMoH/SMoH Public and private hospitals
	Collection of surgical, obstetrics, anaesthesia and nursing data	Ongoing inclusion of surgical, obstetrics, anaesthesia and nursing data and indicators in Nigeria Demographic and Health Survey (NDHS)	National population commission National bureau of statistics
	Increase funding for research to 7.5% of total health budget	Increase budgeting for surgical, obstetrics, anaesthesia and nursing research at all levels of healthcare	USAID FG, SG National Assembly, State Houses of Assembly FMoH, SMoH Donor agencies, Development partners, Industry, Private sector Hospitals

Year 5	Creation of an integrated national and state level electronic health records (EHR)	Expand EHR to cover 100% of institutions and states	FG, SG FMoH/SMoH
	Collection of surgical, obstetrics, anaesthesia and nursing data	Ongoing inclusion of surgical, obstetrics, anaesthesia and nursing data and indicators in Nigeria Demographic and Health Survey (NDHS)	FMoH/SMoH Public and private hospitals National population commission National bureau of statistics USAID
	Increase funding for research to 7.5% of total health budget	Increase budgeting for surgical, obstetrics, anaesthesia and nursing research at all levels of healthcare	FG, SG National Assembly, State Houses of Assembly FMoH, SMoH

	Publish first NSOANP implementation analysis document	Review StraPS/NSOANP implementation data for 2019 – 2023	Donor agencies, Development partners, Industry, Private sector Hospitals FMoH, SMoH National and state NSOANP Coordinators National and state NSOANP Committees

Financing Surgical Care Achieve financial risk protection for 50% of population by 2023			
NSOANP Year	Strategic Target	Activities	Responsibility
Year 1	Towards achieving Abuja declaration on healthcare expenditure	Advocacy	FMoH SMoH
Year 2	Increase health budgetary allocation to 5.5%	Advocacy to government and policy makers	FG SG FMoH

		Create necessary policy	SMoH National Assembly State houses of assembly
	Reduce out of pocket expenditure for health to 55% Increase health insurance coverage rate to 10%	Encourage establishment of State health insurance schemes Increase technical support to already operational state health insurance schemes.	National Assembly NHIS NPHCDA SG National Orientation Agency State Health Insurance Agencies
Year 3	Increase health budgetary allocation to 7.5%	Advocacy Create necessary policy	FMoH SMoH FG SG National Assembly State houses of assembly

	Reduce out of pocket expenditure for health to 45% Increase health insurance coverage rate to 20%	Expand state health insurance schemes to 50% of states Implement NHIS PLUS package	National Assembly NHIS NPHCDA SG National Orientation Agency State Health Insurance Agencies
	Achieve 60% implementation rate for capital expenditure on health	Advocacy	National assembly State houses of assembly FMoH SMoH Hospitals/Parastatals
Year 4	Increase health budgetary allocation to 9%	Advocacy Create necessary policy	FMoH SMoH FG SG National Assembly

			State houses of assembly
	Reduce out of pocket expenditure for health to 35% Increase health insurance coverage rate to 30%	Expand state health insurance schemes to 75% of states	National Assembly NHIS NPHCDA SG National Orientation Agency State Health Insurance Agencies
	Achieve 75% implementation rate for capital expenditure on health		National assembly State houses of assembly FMoH SMoH Hospitals/Parastatals
Year 5	Increase health budgetary allocation to 10%	Advocacy Create necessary policy	FMoH SMoH FG SG National Assembly

			State houses of assembly
	Reduce out of pocket expenditure for health to 25% Increase health insurance coverage rate to 40%	Expand state health insurance schemes to 100% of states (All states)	National Assembly NHIS NPHCDA SG National Orientation Agency State Health Insurance Agencies
	Achieve 80% implementation rate for capital expenditure on health		National assembly State houses of assembly FMoH SMoH Hospitals/Parastatals

Healthcare Governance and Leadership			
NSOANP Year	Strategic Target	Activities	Responsibility
Year 1	Government buy in and commitment to NSOAP at all levels	Creation of NSOANP desk at FMoH and SMoHs	FMoH, SMoH National Assembly, State Houses of Assembly

	Commencement of implementation	Appointment of national NSOANP coordinator Appointment of NSOANP coordinator in each state Inauguration of NSOANP implementation committees Constitution of advocacy team High level advocacy to executive and legislative arms of government Dissemination of NSOAP to relevant stakeholders	
Year 2	NSOANP as component of existing national strategic health plan Children's surgery into national child health plan/policy	Integration of NSOANP into national strategic health plan to begin Integration of children's surgery into national child health plan/policy to begin	FMoH, SMoH Professional associations and societies Funding, donor and development partners WHO, UNICEF
Year 3	NSOANP as component of existing national strategic health plan	Ongoing integration of NSOANP into national strategic health plan	FMoH, SMoH Professional associations and societies Funding, donor and development partners

	Children's surgery into national child health plan/policy	Ongoing integration of children's surgery into national child health plan/policy	WHO, UNICEF
Year 4	NSOANP as component of existing national strategic health plan Children's surgery into national child health plan/policy	Ongoing integration of NSOANP into national strategic health plan Ongoing integration of children's surgery into national child health plan/policy	FMoH, SMoH Professional associations and societies Funding, donor and development partners WHO, UNICEF
Year 5	Develop new 5-year plan NSOANP as component of existing national strategic health plan Children's surgery as component of national child health plan/policy	Review StraPS 2019 – 2023 and develop a new 5-year plan Integration of NSOANP into national strategic health plan completed Integration of children's surgery into national child health plan/policy completed	FMoH, SMoH Professional associations and societies Funding, donor and development partners WHO, UNICEF

MONITORING, EVALUATION AND FEEDBACK

A robust monitoring and evaluation (M & E) of the NSOANP at facility and national level to help measure its impact is compulsory through appropriate existing and new systems, procedures and mechanisms. There are indicators which have been recommended for monitoring by the LCoGS, G4 alliance and WHO. These data would help with the effective implementation of the NSOAP and monitoring of its impact. Goals and targets must be tracked consistently through periodic indicator and facility assessment to ensure that the plan is effective in increasing quality surgical care for all patients and that the overall health and economic prosperity of the population is improving. To effectively do this, a framework must be developed.

Ongoing M & E would help identify areas that need review, deficiencies in implementation, existing challenges in the plan and implementation process, develop working solutions and help set milestones and determine next steps.

Key Players

The MoH will be responsible for coordinating monitoring and reviews in partnership with the individual sector partners and the stakeholders. Set performance indicators will be used as the basis for monitoring and joint reviews. The indicators set by the LCoGS, G4 alliance and WHO which include surgical volume, peri op mortality, 2 hour access to emergency surgical services, SAO density, catastrophic and impoverishing expenditure, proportion of seriously injured patients transported by ambulance and additional facility level indicators to target for quality improvement (for monitoring impact), set sector performance standards and alarms for sector budget support and output and operation indicators to assess quality and efficiency of and access to service delivery.

Stakeholders and the MoH will carry out annual evaluation retreats to assess the progress made towards the achieving the goals of the plan at agreed times.

A committee for quality improvement and quality assurance set up by the FMoH and including key members of the NSOANP committee will be responsible for

coordinating the ongoing monitoring and evaluation. The targets and indicators for M & E are summarized in Tables 28 and 29.

The importance of monitoring and evaluation cannot be overemphasized. This should go along with feedback to appropriate implementing bodies, agencies, organisations and governments. Without this all-important process, the implementation of the NSOAP will be jeopardized with goals and targets unmet. Properly and efficiently done, this process will ensure that the goals of universal health coverage are more realistically set out by timelines in an achievable manner and eventually realized.

Table 28: Summary of NSOANP monitoring and evaluation (Adapted from Global Surgery 2030)[1]

Strategic Target	Indicator	Definition	Rationale	Data Sources	Responsibility	Remarks
***Category* 1: Preparedness *facilities* for surgical, *obstetrics,* anaesthesia *and nursing* care**						
A minimum of 80% coverage of emergency and essential surgical, obstetrics and anaesthesia services by 2023	Access to timely essential surgery	Proportion of the population that can access, within 2 hours, a facility that can do caesarean delivery, laparotomy and treatment of open fracture (the Bellwether procedures)	All people should have timely access to emergency surgical services. Bellwether procedure performance predicts accomplishment of many other essential surgical procedures; 2 hours is a threshold of death from complications of childbirth	Facility records and population demographics	Ministry of Health	Informs policy and planning regarding location of services in relation to population density, transport systems and facility service delivery
At least 5 surgical, obstetric and anaesthetic, physicians per 100 000	Specialist surgical workforce density	Number of specialist surgical, anaesthetic and obstetric	The availability and accessibility of human resources for health is a crucial	Facility records, data from training	Ministry of Health, Ministry of Education	Informs workforce, training and

population by 2023		physicians who are working, per 100 000 population	component of surgical and anaesthesia care delivery	and licensing bodies		retention strategies
***Category 2: Delivery of* surgical*, obstetrics,* anaesthesia *and nursing* care**						
100% of healthcare facilities (public, private, faith-based, NGO) tracking surgical volume by 2023: 1,000 procedures per 100 000 population by 2023	Surgical volume	Procedures done in an operating theatre, per 100 000 population per year	The number of surgical procedures done per year is an indicator of met need	Facility records	Facility, Ministry of Health	Informs policy and planning regarding met and unmet need for surgical care
100% of healthcare facilities (public, private, faith-based, NGO) tracking perioperative	Perioperative mortality rate (POM by 2023)	All-cause death rate prior to discharge among patients who have undergone a procedure in an operating theatre, divided	Surgical and anaesthesia safety is an integral component of care delivery; perioperative morality encompasses	Facility records and death registries	Facility, Ministry of Health	Informs policy and planning regarding surgical and anaesthesia safety, as well as surgical

mortality by 2023		by the total number of procedures, presented as a percentage	deaths in the operating theatre and in the hospital after the procedure			volume when number of procedures is the denominator
***Category 3: Impact of* surgical, *obstetrics,* anaesthesia *and nursing* care**						
75% protection against impoverishment from out-of-pocket payments for surgical, obstetric and anaesthesia care by 2023	Protection against impoverishing expenditure*	Proportion of households protected against impoverishment from direct out-of-pocket payments for surgical and anaesthesia care	Billions of people each year are at risk of financial ruin from accessing surgical services; this is a surgery-specific version of a World Bank universal health coverage target	Household surveys, facility records	Ministry of Finance, World Bank, WHO, USAID	Informs policy about payment systems, insurance coverage, and balance of public and private services
75% protection against catastrophic expenditure from out-of-pocket payments for surgical and anaesthesia care by 2023	Protection against catastrophic expenditure†	Proportion of households protected against catastrophic expenditure from direct out-of-pocket payments	Billions of people each year are at risk of financial ruin from accessing surgical services; this is a surgery-specific version of a	Household surveys, facility records	Ministry of Finance, World Bank, WHO, USAID	Informs policy about payment systems, insurance coverage, and balance of public and

		for surgical and anaesthesia care	World Bank universal health coverage target			private services

Access, workforce, volume, and perioperative mortality indicators should be reported annually. Financial protection indicators should be reported alongside the World Bank and WHO measures of financial risk protection for universal health coverage.

These indicators provide the most information when used and interpreted together; no single indicator provides an adequate representation of surgical and anaesthesia care when analysed independently. USAID=US Agency for International Development.

Table 29: Specific NSOANP monitoring and evaluation road map with feedback

Infrastructure					
NSOANP Year	Strategic Target	Indicator	How to Measure	Responsibility	Feedback
YEAR 1	One secondary health facility per LG providing emergency and essential surgical care (EESC) One primary health facility per ward providing emergency and essential surgical care.	Number of adequately equipped and staffed health facility providing EESC. Surgical volume per 100,000 population.	Baseline and biannual audit of facilities using the hospital assessment tool with minimum accepted score of 75% (almost always and always available).	StraPS Committee of the Departments / Ministries of Health at all levels of government will administer the Hospital Assessment Tool (HAT) to measure adequacy of infrastructure, equipment and workforce for surgical services.	Feedback to the health facilities and the Departments /Ministries of Health of the three levels of government on the percentage attainment of the target relative to their population.
	Access to blood and blood products within 2 hours of need – 70% coverage	Availability of mini blood banks within each PHC facility and full blood bank facility within all higher facility in an integrated supply system.	Number of health facilities with functional blood banks able to meet requests for blood and blood products within 2 hours of need. Response of local, regional and national	Hospitals reporting electronic records of number and type of blood and blood products requests made and met to Blood Services Unit.	Feedback to blood transfusion service units of hospitals, LGA, SG, FG on percentage requests met and 2-hour access to

		Number of met and unmet requests for screened blood and blood products. ? Number of expired and discarded blood and blood products relative to unmet requests.	integrated blood services platform. Electronic donor tracking database	Blood Services Unit of the Ministry of Health matching the availability of blood products within the locality with demand.	blood and blood products.
	Integrated ambulance system	Number of functional ambulances and trained paramedics for prehospital emergency services and patient transfer	Number of emergency patients transferred by ambulance services. Number of serviced, adequately equipped ambulances and up-to-date trained paramedics.	Emergency Services Unit records the number of patients and indication for transfer. Also records the number of paramedics who received up to date provided standard training.	Feedback to the local Emergency Services Units
	Improved equipment maintenance	Availability of functional equipment for the provision of safe and timely EESC including all investigations and surgical equipment.	Frequency of equipment downtime. Number of up-to-date fully serviced equipment by trained biomedical engineers or service contract with manufacturer.	Health facilities reporting equipment downtime and service records. Use of HAT to annually audit available functional equipment by the StraPS Committee	Feedback to the health facilities on rate of performance on equipment performance.

YEAR 2	One secondary health facility per LG providing emergency and essential surgical care. One primary health facility per ward providing emergency and essential surgical care. 50 surgical beds per 100,000 population including private, mission, military and paramilitary hospitals.	Number of adequately equipped and staffed health facility providing EESC and acute trauma care Increase in available functional surgical beds per population Increase in surgical volume per 100,000 population.	Annual audit using the hospital assessment tool with minimum accepted score of 75% (almost always and always available) Number of functional surgical beds effectively in use taking demand and usage into account.	StraPS Committee of the Departments / Ministries of Health at all levels of government will administer the Hospital Assessment Tool (HAT) to measure adequacy of infrastructure, equipment and workforce for surgical services.	Feedback to the health facilities and the Departments /Ministries of Health of the three levels of government on the percentage attainment of the target relative to their population.
	Access to blood and blood products within 2 hours of need – 80% coverage	Availability of mini blood banks within each PHC facility and full blood bank facility within all higher facility in an integrated supply system.	Number of health facilities with functional blood banks able to meet requests for blood and blood products within 2 hours of need. Response of local, regional and national	Hospitals reporting electronic records of number and type of blood and blood products requests made and met to Blood Services Unit.	Feedback to blood transfusion service units of hospitals, LGA, SG, FG on percentage requests met and 2-hour access to

		Number of met and unmet requests for screened blood and blood products. ? Number of expired and discarded blood and blood products relative to unmet requests.	integrated blood services platform to requests for blood and blood products. Electronic donor tracking database with records of volunteer rare blood type donors	Blood Services Unit of the Ministry of Health matching the availability of blood products within the locality with demand.	blood and blood products
	Integrated ambulance system - 70% coverage	Number of functional ambulances and trained paramedics for prehospital emergency services and patient transfer.	Number of emergency patients transferred by ambulance services. Number of serviced, adequately equipped ambulances and up-to-date trained paramedics.	Emergency Services Unit records the number of patients and indication for transfer. Also records the number of paramedics who received up to date provided standard training.	Feedback to the local Emergency Services Units
	Improved equipment maintenance – at least 75% of the time	Availability of functional equipment for the provision of safe and timely EESC including all investigations and surgical equipment.	Frequency of equipment downtime. Number of up-to-date fully serviced equipment by trained biomedical engineers or service contract with manufacturer.	Health facilities reporting equipment downtime and service records. Use of HAT to annually audit available functional equipment by the StraPS Committee	Feedback to the health facilities on rate of performance on equipment performance.

YEAR 3	One secondary health facility per LG providing emergency and essential surgical care. Upgrade of one secondary facility per division to a trauma centre. One primary health facility per ward providing emergency and essential surgical care. 80 surgical beds per 100,000 population including private, mission, military and paramilitary hospitals.	Number of adequately equipped and staffed health facility providing EESC, acute trauma care and intensive and critical care. Increase in available functional surgical beds per population Increase in surgical volume per 100,000 population.	Annual audit using the hospital assessment tool with minimum accepted score of 75% (almost always and always available) Number of functional surgical beds effectively in use taking demand and usage into account.	StraPS Committee of the Departments / Ministries of Health at all levels of government will administer the Hospital Assessment Tool (HAT) to measure adequacy of infrastructure, equipment and workforce for surgical services.	Feedback to the health facilities and the Departments /Ministries of Health of the three levels of government on the percentage attainment of the target relative to their population.
	Access to blood and blood products within 2 hours of need – 80% coverage	Availability of mini blood banks within each PHC facility and full blood bank facility within all	Number of health facilities with functional blood banks able to meet requests for blood and	Hospitals reporting electronic records of number and type of blood and blood products	Feedback to blood transfusion service units of hospitals, LGA, SG, FG on

		higher facility in an integrated supply system. Number of met and unmet requests for screened blood and blood products. ? Number of expired and discarded blood and blood products relative to unmet requests.	blood products within 2 hours of need. Response of local, regional and national integrated blood services platform. Electronic donor tracking database	requests made and met to Blood Services Unit. Blood Services Unit of the Ministry of Health matching the availability of blood products within the locality with demand.	percentage requests met and 2-hour access to blood and blood products
	Integrated ambulance system – 80% coverage	Number of functional ambulances and trained paramedics for prehospital emergency services and patient transfer	Number of emergency patients transferred by ambulance services. Number of serviced, adequately equipped ambulances and up-to-date trained paramedics.	Emergency Services Unit records the number of patients and indication for transfer. Also records the number of paramedics who received up to date provided standard training.	Feedback to the local Emergency Services Units
	Improved equipment maintenance – at least 90% of the time	Availability of functional equipment for the provision of safe and timely EESC including all investigations and surgical equipment.	Frequency of equipment downtime. Number of up-to-date fully serviced equipment by trained biomedical engineers or service	Health facilities reporting equipment downtime and service records. Use of HAT to annually audit available functional equipment by the StraPS Committee	Feedback to the health facilities on rate of performance on equipment performance.

			contract with manufacturer.		
YEAR 4	One secondary health facility per LG providing emergency and essential surgical care and trauma centre per division. One primary health facility per ward providing emergency and essential surgical care. 70 surgical beds per 100,000 population including private, mission, military and paramilitary hospitals.	Number of adequately equipped and staffed health facility providing EESC, acute trauma care and intensive and critical care. Increase in available functional surgical beds per population Increase in surgical volume per 100,000 population.	Annual audit using the hospital assessment tool with minimum accepted score of 75% (almost always and always available) Number of functional surgical beds effectively in use taking demand and usage into account.	StraPS Committee of the Departments / Ministries of Health at all levels of government will administer the Hospital Assessment Tool (HAT) to measure adequacy of infrastructure, equipment and workforce for surgical services.	Feedback to the health facilities and the Departments /Ministries of Health of the three levels of government on the percentage attainment of the target relative to their population.
	Access to blood and blood products within 2 hours of need – 90% coverage	Availability of mini blood banks within each PHC facility and full blood bank facility within all	Number of health facilities with functional blood banks able to meet requests for blood and	Hospitals reporting electronic records of number and type of blood and blood products	Feedback to blood transfusion service units of hospitals, LGA, SG, FG on

		higher facility in an integrated supply system. Number of met and unmet requests for screened blood and blood products. ? Number of expired and discarded blood and blood products relative to unmet requests.	blood products within 2 hours of need. Response of local, regional and national integrated blood services platform. Electronic donor tracking database	requests made and met to Blood Services Unit. Blood Services Unit of the Ministry of Health matching the availability of blood products within the locality with demand.	percentage requests met and 2-hour access to blood and blood products
	Integrated ambulance system – 90% coverage	Number of functional ambulances and trained paramedics for prehospital emergency services and patient transfer	Number of emergency patients transferred by ambulance services. Number of serviced, adequately equipped ambulances and up-to-date trained paramedics.	Emergency Services Unit records the number of patients and indication for transfer. Also records the number of paramedics who received up to date provided standard training.	Feedback to the local Emergency Services Units
	Improved equipment maintenance – at least 100% of the time	Availability of functional equipment for the provision of safe and timely EESC including all investigations and surgical equipment.	Frequency of equipment downtime. Number of up-to-date fully serviced equipment by trained biomedical engineers or service	Health facilities reporting equipment downtime and service records. Use of HAT to annually audit available functional equipment by the StraPS Committee	Feedback to the health facilities on rate of performance on equipment performance.

			contract with manufacturer.		
YEAR 5	One secondary health facility per LG providing emergency and essential surgical care and a trauma centre per division. One primary health facility per ward providing emergency and essential surgical care. 70 surgical beds per 100,000 population including private, mission, military and paramilitary hospitals.	Number of adequately equipped and staffed health facility providing EESC, acute trauma care and intensive and critical care. Increase in available functional surgical beds per population Increase in surgical volume per 100,000 population.	Annual audit using the hospital assessment tool with minimum accepted score of 75% (almost always and always available) Number of functional surgical beds effectively in use taking demand and usage into account.	StraPS Committee of the Departments / Ministries of Health at all levels of government will administer the Hospital Assessment Tool (HAT) to measure adequacy of infrastructure, equipment and workforce for surgical services.	Feedback to the health facilities and the Departments /Ministries of Health of the three levels of government on the percentage attainment of the target relative to their population.
	Access to blood and blood products within 2 hours of need – 100% coverage	Availability of mini blood banks within each PHC facility and full blood bank facility within all higher facility in an	Number of health facilities with functional blood banks able to meet requests for blood and blood products within 2 hours of need.	Hospitals reporting electronic records of number and type of blood and blood products requests made and met to Blood Services Unit.	Feedback to blood transfusion service units of hospitals, LGA, SG, FG on percentage

		integrated supply system. Number of met and unmet requests for screened blood and blood products. Number of expired and discarded blood and blood products relative to unmet requests.	Response of local, regional and national integrated blood services platform. Electronic donor tracking database	Blood Services Unit of the Ministry of Health matching the availability of blood products within the locality with demand.	requests met and 2-hour access to blood and blood products
	Integrated ambulance system – 100% coverage	Number of functional ambulances and trained paramedics for prehospital emergency services and patient transfer	Number of emergency patients transferred by ambulance services. Number of serviced, adequately equipped ambulances and up-to-date trained paramedics.	Emergency Services Unit records the number of patients and indication for transfer. Also records the number of paramedics who received up to date provided standard training.	Feedback to the local Emergency Services Units
	Improved equipment maintenance – 100% of the time	Availability of functional equipment for the provision of safe and timely EESC including all investigation and surgical equipment.	Frequency of equipment downtime. Number of up-to-date fully serviced equipment by trained biomedical engineers or service contract with manufacturer.	Health facilities reporting equipment downtime and service records. Use of HAT to annually audit available functional equipment by the StraPS Committee	Feedback to the health facilities on rate of performance on equipment performance.

Service Delivery

2- hour access

NSOANP Year	Strategic Target	Indicator	How to Measure	Responsibility	Feedback
YEAR 1	Improve infrastructure and workforce	10% increase in 2-hour access over the pre-plan baseline	Percentage population able to access facility offering bellwether procedure in 2 hours	FMoH, SMoH: To ensure record keeping and periodic reviews Hospitals: To ensure record keeping	FG, SG, FMoH, SMoH
YEAR 2	Improve infrastructure and workforce	20% increase in 2-hour access over the pre-plan baseline	Percentage population able to access facility offering bellwether procedure in 2 hours	FMoH, SMoH: To ensure record keeping and periodic reviews Hospitals: To ensure record keeping	FG, SG, FMoH, SMoH
YEAR 3	Improve infrastructure and workforce	30% increase in 2-hour access over the pre-plan baseline	Percentage population able to access facility offering bellwether procedure in 2 hours	FMoH, SMoH: To ensure record keeping and periodic reviews Hospitals: To ensure record keeping	FG, SG, FMoH, SMoH
YEAR 4	Improve infrastructure and workforce	40% increase in 2-hour access over the pre-plan baseline	Percentage population able to access facility	FMoH, SMoH: To ensure record keeping and periodic reviews	FG, SG, FMoH, SMoH

			offering bellwether procedure in 2 hours	Hospitals: To ensure record keeping	
YEAR 5	Improve infrastructure and workforce	Total percentage increase in 2-hour access over the pre-plan baseline	Percentage population able to access facility offering bellwether procedure in 2 hours	FMoH, SMoH: To ensure record keeping and periodic reviews Hospitals: To ensure record keeping	FG, SG, FMoH, SMoH

Surgical volume

NSOANP Year	Strategic Target	Indicator	How to Measure	Responsibility	Feedback
YEAR 1	Improve infrastructure and workforce	20% increase in surgical volume	Annual increase in surgical volume all hospitals (federal, state, PHC, private, mission, military, paramilitary)	FMoH, SMoH: To ensure accurate data collection	FG, SG, FMoH, SMoH, Hospitals
YEAR 2	Improve infrastructure and workforce	40% increase in surgical volume	Annual increase in surgical volume all hospitals (federal, state, PHC, private, mission, military, paramilitary)	FMoH, SMoH: To ensure accurate data collection	FG, SG, FMoH, SMoH, Hospitals
YEAR 3	Improve infrastructure and workforce	60% increase in surgical volume	Annual increase in surgical volume all hospitals (federal, state, PHC, private, mission, military, paramilitary)	FMoH, SMoH: To ensure accurate data collection	FG, SG, FMoH, SMoH, Hospitals

YEAR 4	Improve infrastructure and workforce	80% increase in surgical volume	Annual increase in surgical volume all hospitals (federal, state, PHC, private, mission, military, paramilitary)	FMoH, SMoH: To ensure accurate data collection	FG, SG, FMoH, SMoH, Hospitals
YEAR 5	Improve infrastructure and workforce	100% increase in surgical volume	Annual increase in surgical volume all hospitals (federal, state, PHC, private, mission, military, paramilitary)	FMoH, SMoH: To ensure accurate data collection	FG, SG, FMoH, SMoH, Hospitals

Surgical safety checklist

NSOANP Year	Strategic Target	Indicator	How to Measure	Responsibility	Feedback
YEAR 1	Nationwide awareness of the availability and importance of SSCL	Completed nationwide baseline usage 50% usage of SSCL always in Federal Hospitals	Percentage coverage of baseline assessment Percentage compliance with usage of SSCL	FG and SG: Policy reviews, supervision FMoH and SMoH: Annual review of implementation	Hospitals FMoH SMoH
YEAR 2	Increased compliance with usage of SSCL always	100% usage of SSCL always in Federal Hospitals 50% usage always at state hospitals	Percentage compliance with usage of SSCL	FG and SG: Policy reviews, supervision	Hospitals FMoH SMoH

				FMoH and SMoH: Annual review of implementation	
YEAR 3	Increased compliance with usage of SSCL always	100% usage of SSCL always at state hospitals 50% usage always at primary health centres	Percentage compliance with usage of SSCL	FG and SG: Policy reviews, supervision FMoH and SMoH: Annual review of implementation	Hospitals FMoH SMoH
YEAR 4	Increased compliance with usage of SSCL always	100% usage always at primary health centres, and 50% usage always at Private, military, paramilitary and mission hospitals	Percentage compliance with usage of SSCL	FG and SG: Policy reviews, supervision FMoH and SMoH: Annual review of implementation	Hospitals FMoH SMoH
YEAR 5	Total compliance with usage of SSCL in all hospitals	100% usage always at Private, military, paramilitary and mission hospitals Overall review report completion	Overall compliance with usage of SSCL Availability of review report hard copy	FG and SG: Supervision FMoH and SMoH: Overall review of implementation	Hospitals FMoH SMoH

NSOANP Year	Strategic Target	Indicator	How to Measure	Responsibility	Feedback
YEAR 1	Increased percentage national proficiency in CPR	5% of population expected to be proficient in CPR	Percentage of population trained in CPR	FG, SG: Policy reviews FMoH, SMoH: Training reviews	FG, SG, FMoH, SMoH, Hospitals, Professional bodies, Development partners and private sector
YEAR 2	Increased percentage national proficiency in CPR	10% of population expected to be proficient in CPR	Percentage of population trained in CPR	FG, SG: Policy reviews FMoH, SMoH: Training reviews	FG, SG, FMoH, SMoH, Hospitals, Professional bodies, Development partners and private sector
YEAR 3	Increased percentage national proficiency in CPR	15% of population expected to be proficient in CPR	Percentage of population trained in CPR	FG, SG: Policy reviews FMoH, SMoH: Training reviews	FG, SG, FMoH, SMoH, Hospitals, Professional bodies, Development partners and private sector
YEAR 4	Increased percentage national proficiency in CPR	20% of population expected to be proficient in CPR	Percentage of population trained in CPR	FG, SG: Policy reviews FMoH, SMoH: Training reviews	FG, SG, FMoH, SMoH, Hospitals, Professional bodies, Development partners and private sector
YEAR 5	Increased percentage national proficiency in CPR	25% of population expected to be proficient in CPR	Percentage of population trained in CPR	FG, SG: Policy reviews	FG, SG, FMoH, SMoH, Hospitals, Professional bodies,

				FMoH, SMoH: Training reviews	Development partners and private sector

Mandatory use of referral protocols

NSOANP Year	Strategic Target	Indicator	How to Measure	Responsibility	Feedback
YEAR 1	Commencement of compliance with referral protocol	10% compliance with referral protocol	Number of hospitals where referral protocol is available Percentage appropriate referral Percentage timely referral of patients	FG and SG: Periodic reviews FMoH and SMoH: Supervision, data collection and review Hospitals: Periodic reviews	FG, SG, FMoH, SMoH, Hospitals
YEAR 2	Increased compliance with referral protocol	15% compliance with referral protocol	Number of hospitals where referral protocol is available	FG and SG: Periodic reviews FMoH and SMoH:	FG, SG, FMoH, SMoH, Hospitals

			Percentage appropriate referral Percentage timely referral of patients	Supervision, data collection and review Hospitals: Periodic reviews	
YEAR 3	Increased compliance with referral protocol	30% compliance with referral protocol	Number of hospitals where referral protocol is available Percentage appropriate referral Percentage timely referral of patients	FG and SG: Periodic reviews FMoH and SMoH: Supervision, data collection and review Hospitals: Periodic reviews	FG, SG, FMoH, SMoH, Hospitals
YEAR 4	Increased compliance with referral protocol	40% compliance with referral protocol	Number of hospitals where referral protocol is available	FG and SG: Periodic reviews FMoH and SMoH:	FG, SG, FMoH, SMoH, Hospitals

			Percentage appropriate referral Percentage timely referral of patients	Supervision, data collection and review Hospitals: Periodic reviews	
YEAR 5	Increased compliance with referral protocol	55% compliance with referral protocol and review	Number of hospitals where referral protocol is available Percentage appropriate referral Percentage timely referral of patients	FG and SG: Periodic reviews FMoH and SMoH: Supervision, data collection and review Hospitals: Periodic reviews	FG, SG, FMoH, SMoH, Hospitals

Human resources for health, training and education					
NSOAP YEAR	Strategic Target	Indicator	How to measure	Responsibility	Feedback
YEAR 1	1336 Surgical skills training for NYSC; Increase admission into nursing school by 20% (1200)	No of NYSC participants per year. No of admissions into nursing training	Number of successful completions of training programme.	NYSC Agency. MDCN, NPMCN, WACS NMCN	Two-way feedback from trainees and trainers
YEAR 2	1336 Surgical skills training for NYSC, 1200 admission into nursing schools; 100 admissions into residency training for Membership and/or Fellowship;800 admission into post basic nursing	Same as above plus no of admissions into all training programmes	Number of successful completion of training programme. No and percentage of passes at all levels of exams	NYSC Agency. MDCN, NPMCN, WACS NMCN	Two-way feedback from trainees and trainers Feedback from teaching hospitals, training colleges.
YEAR 3	1336 Surgical skills training for NYSC, 1200 admission into nursing schools; 100 admissions into residency training for Membership and/or	Same as above plus no of admissions into all training programmes	Number of successful completion of training programme.	NYSC Agency. MDCN NPMCN WACS	Two-way feedback from trainees and trainers

	Fellowship;800 admission into post basic nursing		No and percentage of passes at all levels of exams	NMCN	Feedback from teaching hospitals, training colleges.
YEAR 4	1336 Surgical skills training for NYSC, 1200 admission into nursing schools; 100 admissions into residency training for Membership and/or Fellowship;800 admission into post basic nursing	Same as above plus no of admissions into all training programmes	Number of successful completion of training programme. No and percentage of passes at all levels of exams	NYSC Agency. MDCN NPMCN WACS NMCN	Two-way feedback from trainees and trainers Feedback from teaching hospitals, training colleges.
YEAR 5	1336 Surgical skills training for NYSC, 1200 admission into nursing schools; 100 admissions into residency training for Membership and/or Fellowship;800 admission into post basic nursing	Same as above plus no of admissions into all training programmes	Number of successful completion of training programme. No and percentage of passes at all levels of exams	NYSC Agency. MDCN NPMCN WACS NMCN	Two-way feedback from trainees and trainers Feedback from teaching hospitals, training colleges

Healthcare information, metrics and research					
NSOANP Year	Strategic Target	Indicator	How to measure	Responsibility	Feedback
Year 1	Establishment of national/state NSOANP data dashboard	Functioning data national/state NSOANP dashboards	Tracking of NSOANP data dashboards	FMoH SMoH	NSOANP coordinators NSOANP implementation committees
Year 2	Creation of integrated national and state EHR Collection of surgical, obstetrics, anaesthesia and nursing data Creation of funding for SOAN research	Percentage functioning EHR at national and state levels Inclusion of SOAN data and information in NDHS Available fund for SOAN research	Number of hospitals at national and state levels integrated into EHR Tracking of SOAN information in NDHS Budgeted amount for SOAN research	FMoH SMoH FMoH USAID FG/SG FMoH SMoH	NSOANP coordinators NSOANP implementation committees Hospitals Professional societies/association

					NSOANP coordinators NSOANP implementation committees
Year 3	50% of healthcare institutions and states with functioning HER Strengthen collection of SOAN data 5% of total health budget committed to research	Percentage of healthcare institutions and states with functioning HER SOAN information included in NDHS Percentage of health budget allocated to research	Tracking of EHR at national and state levels Tracking of ongoing inclusion of SOAN information in NDHS Tracking health budget allocated to research	NSOANP coordinators NSOANP implementation committees FMoH/SMoH USAID FMoH/SMoH Development partners/private sector	FMoH SMoH NSOANP coordinators NSOANP implementation committees NSOANP coordinators NSOANP implementation committees
Year 4	75% of healthcare institutions and	Percentage of healthcare institutions and	Tracking of EHR at national and state levels	NSOANP coordinators	FMoH SMoH

	states with functioning HER Strengthen collection of SOAN data 7.5% of total health budget committed to research	states with functioning HER SOAN information included in NDHS Percentage of health budget allocated to research	Tracking of ongoing inclusion of SOAN information in NDHS Tracking health budget allocated to research	NSOANP implementation committees FMoH/SMoH USAID FMoH/SMoH Development partners/private sector	NSOANP coordinators NSOANP implementation committees NSOANP coordinators NSOANP implementation committees
Year 5	100% of healthcare institutions and states with functioning HER Strengthen collection of SOAN data	Percentage of healthcare institutions and states with functioning HER SOAN information included in NDHS	Tracking of EHR at national and state levels Tracking of ongoing inclusion of SOAN information in NDHS	NSOANP coordinators NSOANP implementation committees FMoH/SMoH USAID	FMoH SMoH NSOANP coordinators NSOANP implementation committees

	7.5% of total health budget committed to research	Percentage of health budget allocated to research	Tracking health budget allocated to research	FMoH/SMoH Development partners/private sector	NSOANP coordinators NSOANP implementation committees

Financing surgical care					
NSOANP Year	Strategic Target	Indicator	How to measure	Responsibility	Feedback
YEAR 1	Advocacy towards achieving 10% health budgetary allocation	Willingness of governments to increase budgetary allocation to health	Evaluation of impact of advocacy activities	NSOANP coordinators NSOANP implementation committees	FMoH/SMoH
YEAR 2	Increase health budgetary allocation to 5.5%	Percentage allocation for health in the federal budget Percentage budget allocation for health in each State of the federation	Percentage of health budget allocation to total budget	Federal Government State Governments Ministry of Budget and National Planning National Assembly State Houses of Assembly	Collect Information: a) i. On progress in data collection for future budget planning ii. On release of funds in current budget dispensation b) Collected quarterly c) From

	Reduce out-of-pocket expenditure for health to 55%	Catastrophic expenditure from healthcare	Percentage of households experiencing catastrophic expenditure from healthcare	Federal Ministry of Health State Ministries of Health National Bureau of Statistics	i. Ministry of Health ii. Ministry of Budget and National Planning d) Analysis of i. Allocation adequacy using NSOANP target as benchmark ii. Budget performance using in release of funds and actual project implementation rate as benchmark e) Result of analysis sent to i. Department of Health Services, FMoH ii. NSOANP implementing team f) Analyzed information used to gauge advocacy efforts
YEAR 3	Increase health budgetary allocation to 7.5%	Same as above	Same as above	Same as above	Same as above

	Reduce out of pocket expenditure for health to 45%				
YEAR 4	Increase health budgetary allocation to 9% Reduce out of pocket expenditure for health to 35%	Same as above	Same as above	Same as above	Same as above
YEAR 5	Increase health budgetary allocation to 10% Reduce out of pocket expenditure for health to 25%	Same as above	Same as above	Same as above	Same as above

Healthcare governance and leadership					
NSOANP YEAR	Strategic Target	Indicator	How to measure	Responsibility	Feedback
Year 1	Achieve buy in by states	NSOANP desk created at FMoH Number of states with NSOANP desk at SMoH NSOANP coordinator appointed by FMoH Number of states that have appointed NSOANP coordinator NSAONP implementation committee inaugurated by FMoH Number of states that have inaugurated	Tracking of NSOAP implementation activities	FMoH SMoH	FMoH NSOANP coordinators NSOANP implementation committees

		NSOANP implementation committees			
Year 2	Integration of NSOANP into national strategic health plan (NSHP) Integration of children's component of NSOANP into national child health policy/plan (NCHP)	Percentage integration into NSHP Percentage integration into NCHP	Tracking of integration activities	NSOANP coordinator NSOANP implementation committee	FMoH National Council on Health
Year 3	Integration of NSOANP into national strategic health plan (NSHP) Integration of children's component of NSOANP into national child health policy/plan (NCHP)	Percentage integration into NSHP Percentage integration into NCHP	Tracking of integration activities	NSOANP coordinator NSOANP implementation committee	FMoH National Council on Health

Year 4	Integration of NSOANP into national strategic health plan (NSHP) Integration of children's component of NSOANP into national child health policy/plan (NCHP)	Percentage integration into NSHP Percentage integration into NCHP	Tracking of integration activities	NSOANP coordinator NSOANP implementation committee	FMoH National Council on Health
Year 5	New 5-year NSOANP Integration of NSOANP into national strategic health plan (NSHP) Integration of children's component of NSOANP into national child health policy/plan (NCHP)	Completed NSOANP document 2024 - 2028 Completed integration into NSHP Completed integration into NCHP	Tracking of integration activities	NSOANP coordinator NSOANP coordinator NSOANP implementation committee	FMoH/SMoH FMoH National Council on Health

COSTING OF THE PLAN

The projected and estimated cost of implementing the NSOANP, including monitoring, evaluation and feedback, is summarized in Table 30.

Table 30: Cost of implementation, monitoring and evaluation of NSOANP

IMPLEMENTATION	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	Naira	US Dollars
ADVOCACY	55,387,000.00	62,033,440.00	69,477,452.80	77,814,747.14	87,152,516.79	351,865,156.73	977,457.52
Service Delivery	100,684,000,000.00	112,766,080,000.00	126,298,009,600.00	141,453,770,752.00	158,428,223,242.24	639,630,083,594.24	1,776,848,964.04
Infrastructure	201,768,000,000.00	225,980,162,000.00	253,097,779,200.00	283,469,512,704.00	317,485,854,228.48	1,281,801,306,132.48	3,560,757,003.53
Human Resources, Education and Training	101,560,000,000.00	113,747,200,000.00	127,396,864,000.00	142,684,487,680.00	159,806,626,201.60	645,195,177,881.60	1,792,308,400.14
Health Information, Research and Metrics	14,443,198,980.00	16,176,382,857.60	18,117,584,800.00	20,291,654,656.57	22,726,653,215.36	91,755,438,510.05	254,890,378.66
Healthcare Financing	531,000,000,000.00	594,720,000,000.00	666,086,400,000.00	746,016,768,000.00	835,538,780,160.00	3,373,361,948,160.00	9,370,930,465.47
Healthcare Leadership and Governance	621,900,000.00	696,528,000.00	780,111,360.00	873,724,723.20	978,571,689.98	3,950,835,773.18	10,975,153.55
MONITORING, EVALUATION & FEEDBACK	22,154,800.00	24,813,376.00	27,790,981.12	31,125,898.85	34,861,006.72	140,746,062.69	390,983.01
Total Costs	**950,099,253,780.00**	**1,064,173,197,673.60**	**1,191,873,981,394.43**	**1,334,898,859,161,76**	**1,495,086,722,261.18**	**6,036,187,401,270.97**	**16,768,118,787.91**

One US Dollar = 359.98 Nigerian Naira Estimated annual inflation rate set at 12.00%

REFERENCES

1. Meara JG, Leather AJM, Hagander L et al. Global Surgery 2030: evidence and solutions for achieving health, welfare and economic development, Lancet, 2015, 386: 569-624.
2. Debas HT, Donkor P, Gawande A, et al., editors. Essential Surgery: Disease Control Priorities, Third Edition (Volume 1). Washington (DC): The International Bank for Reconstruction and Development / The World Bank; 2015 Apr 2. doi: 10.1596/978-1-4648-0346-8_ch4 http://dcp-3.org/ (Accessed 13 May 2019).
3. Shrima MG, Bickler SW, Alkire B, Mock C. Global burden of surgical disease: an estimation from the provider perspective. Lancet 2015; 3: S8 – S9.
4. Rose J, Chang DC, Weiser TG, Kassebaum NJ, Bickler SW (2014) The Role of Surgery in Global Health: Analysis of United States Inpatient Procedure Frequency by Condition Using the Global Burden of Disease 2010 Framework. PLoS ONE 9(2): e89693. https://doi.org/10.1371/journal.pone.0089693.
5. World Health Assembly Resolution WHA 68: 15. http://apps.who.int/medicinedocs/documents/s21904en/s21904en.pdf (Accessed 13 May 2019)
6. Ahmed A. Trends in Emergency Surgical Admissions in a Tertiary Health Centre in Nigeria. West Afr J Med 2009; 28: 106 - 109.
7. Ibrahim NA, Oludara MA, Ajani A, Mustafa I, Balogun R, Idowu O, et al. Non-trauma surgical emergencies in adults: Spectrum, challenges and outcome of care. Ann Med Surg. 2015; 4:325–330.
8. Chianakwana GU, Ihegihu CC, Okafor PIS, Anyanwu SNC, Mbonu OO. Adult surgical emergencies in a developing country: the experience of Nnamdi Azikiwe University Teaching Hospital, Nnewi, Anambra State, Nigeria. World J Surg. 2005; 29:804–807; discussion 808.
9. Onyemaechi NO, Urube SU, Ekenze SO. Pattern of surgical emergencies in a Nigerian tertiary hospital. Afr Health Sci. 2019; 19:1768-1777–1777.

10. Onyemaechi NOC, Popoola SO, Schuh A, Iorbo AT, Elachi IC, Oluwadiya KS. Mortality Pattern of Hospitalized Surgical Patients in a Nigerian Tertiary Hospital. Indian J Surg. 2015; 77:881–885.
11. Mofikoya BO, Enweluzo GO, Tijani KH, Ogunleye EO, Kanu OO. Emergency Surgical Services in a Sub Saharan African Country: Can we meet the Needs? European Journal of Scientific Research 2010;43:.265-271
12. Nigeria Demographic and Health Survey 2013. National Population Commission (NPC) [Nigeria] and ICF International. 2014. Abuja, Nigeria, and Rockville, Maryland, USA: NPC and ICF International.
13. Hussein J, Hirose A, Owolabi O, Imamura M, Kanguru L, Okonofua F. Maternal death and obstetric care audits in Nigeria: a systematic review of barriers and enabling factors in the provision of emergency care. Reprod Health. 2016; 13:47.
14. Hirose A, Owolabi O, Imamura M, Okonofua F, Hussein J. Systematic review of obstetric care from a women-centered perspective in Nigeria since 2000. Int J Gynecol Obstet. 2017; 136:13–18.
15. Abegunde D, Kabo IA, Sambisa W, Akomolafe T, Orobaton N, Abdulkarim M, et al. Availability, utilization, and quality of emergency obstetric care services in Bauchi State, Nigeria. Int J Gynecol Obstet. 2015; 128:251–255.
16. Kabo I, Orobaton N, Abdulkarim M, Otolorin E, Akomolafe T, Abegunde D, et al. Strengthening and monitoring health system's capacity to improve availability, utilization and quality of emergency obstetric care in northern Nigeria. PLOS ONE. 2019 Feb 6;14(2): e0211858.
17. Okonofua F, Ntoimo LFC, Ogu R, Galadanci H, Gana M, Adetoye D, et al. Assessing the knowledge and skills on emergency obstetric care among health providers: Implications for health systems strengthening in Nigeria. PLOS ONE. 2019 Apr 8;14(4): e0213719.
18. Repairing Obstetric Fistula in Nigeria. USAID: Nigeria. https://www.usaid.gov/sites/default/files/success/files/fp_nga_fistula.pdf (Accessed 13 May 2019).

19. Nasir S, Elladan AM, Hassan M, Panti AA. Pattern and Outcome of Iatrogenic Genitourinary Fistula from Obstetric and Gynaecological Surgeries in a Tertiary Institution, North-Western Nigeria. Asian J Med Health. 2018; 24:1–7.
20. Ibeanusi SE, Diamond TE. Traffic related injuries from a trauma registry: Pattern and outcome. Niger J Orthop Trauma. 2018; 17:22.
21. Ibeanusi SEB, Harcourt SL. The Pattern and Outcome of Severe Trauma Using the Trauma and Injury Severity Score (TRISS) Methodology in a Dedicated Trauma Centre in Nigeria. J Adv Med Med Res. 2017; 29:1–9.
22. Elachi IC, Yongu WT, Odoyoh O-OD, Mue DD, Ogwuche EI, Ahachi CN. An epidemiological study of the burden of trauma in Makurdi, Nigeria. Int J Crit Illn Inj Sci. 2015; 5:99–102.
23. Osazuwa M, Salawu MM, Orilade A. Abstract PR594: Pre-Hospital Care and Outcome After Trauma in Nigeria. Anesth Analg. 2016;123(3S_Suppl):324.
24. Ibrahim NA, Ajani AWO, Mustafa IA, Balogun RA, Oludara MA, Idowu OE, et al. Road Traffic Injury in Lagos, Nigeria: Assessing Prehospital Care. Prehospital Disaster Med. 2017; 32:424–430.
25. Elachi IC, Adekwu A, Audu O, Yongu WT, Bitto TT, Onyemaechi NO. The profile of trauma-related mortality in Benue State University Teaching Hospital, Makurdi, Nigeria. Highland Medical Research Journal 2016; 16:66-69.
26. Onyemaechi NOC, Nwankwo OE, Ezeadawi RA. Epidemiology of injuries seen in a Nigerian tertiary hospital. Niger J Clin Pract. 2018; 21:752-757.
27. Ekeke ON, Okonta KE, Igwe PO. Surgical inpatient mortality in a Nigerian Tertiary Hospital. Niger J Clin Pract. 2016; 19:308-312.
28. Ugare GU, Ndifon W, Bassey I a. E, Oyo-Ita AE, Egba RN, Asuquo M, et al. Epidemiology of death in the emergency department of a tertiary health centre south-south of Nigeria. Afr Health Sci. 2012; 12:530–537.
29. Stefan DC, Elzawawy AM, Khaled HM, Ntaganda F, Asiimwe A, Addai BW, et al. Developing cancer control plans in Africa: examples from five countries. Lancet Oncol. 2013;14: e189–195.

30. Morounke SG, Ayorinde JB, Adedayo FF, Adewale FO, Sokunle SS, Benjamin A. Epidemiology and Incidence of Common Cancers in Nigeria. J Cancer Biol Res 2017;5(3): 1105.
31. Azubuike SO, Muirhead C, Hayes L, McNally R. Rising global burden of breast cancer: the case of sub-Saharan Africa (with emphasis on Nigeria) and implications for regional development: a review. World J Surg Oncol. 2018; 16:63.
32. Ferlay J, Soerjomataram I, Dikshit R, Eser S, Mathers C, Rebelo M, et al. Cancer incidence and mortality worldwide: Sources, methods and major patterns in GLOBOCAN 2012. Int J Cancer. 2015;136(5): E359–86.
33. Jedy-Agba EE, Dareng EO, Adebamowo SN, Odutola M, Oga EA, Igbinoba F, et al. The burden of HPV associated cancers in two regions in Nigeria 2012–2014. Cancer Epidemiol. 2016; 45:91–97.
34. Yusuf I, Atanda AT, Umar AB, Imam MI, Mohammed AZ, Ochicha O, et al. Cancer in Kano, Northwestern Nigeria: A 10-year update of the kano cancer registry. Ann Trop Pathol. 2017; 8:87.
35. Salako O, Okediji P, Habeeb M, Fatiregun O, Awofeso O, Joseph A. The Burden of Comorbidities in Cancer Patients in Southwestern Nigeria. J Glob Oncol. 2018;4(Supplement 2):61s–61s.
36. Omitola OG, Soyele OO, Sigbeku O, Okoh D, Akinshipo AA et al. A multi-centre evaluation of oral cancer in Southern and Western Nigeria: an African oral pathology research consortium initiative. Pan Afr Med J. 2017; 28:64.
37. Ferlay J, Soerjomataram I, Dikshit R, Eser S, Mathers C, Rebelo M, Parkin DM, Forman D, Bray F. Cancer incidence and mortality worldwide: sources, methods and major patterns in GLOBOCAN 2012. Int J Cancer. 2015; 136(5): E359-386.
38. Adeyemo WL, Ladeinde AL, Ogunlewe MO, James O. Trends and characteristics of oral and maxillofacial injuries in Nigeria: a review of the literature. Head Face Med 2005; 1:7.

39. Akinmoladun V, Gbolahan O, Akadiri O, Akinyamoju A. Evaluation of the scope and practice of oral and maxillofacial surgery in Nigeria. Nig J Clin Practice 2018; 18: 282-286.

40. Mullapudi G, Grabski D, Ameh E, et al. Estimates of number of children and adolescents without access to surgical care. Bull World Health Organ. 2019; 97: 254–258.

41. Butler EK, Tran TM, Nagarajan N, Canner J, Fuller AT, Kushner A, et al. Epidemiology of pediatric surgical needs in low-income countries. PLoS One 2017;12(3): e0170968.

42. Ozgediz D, Poenaru D. The burden of pediatric surgical conditions in low- and middle-income countries: A call to action. J Pediatr Surg 2012; 47:2305–2311.

43. Butler EK, Tran TM, Fuller AT, Brammell A, Vissoci JR, de Andrade L, et al. Quantifying the pediatric surgical need in Uganda: results of a nationwide cross-sectional, household survey. Pediatr Surg Int 2016; 32:1075-1085.

44. Sitkin NA, Ozgediz D, Donkor P, Farmer DL. Congenital Anomalies in Low- and Middle-Income Countries: The Unborn Child of Global Surgery. World J Surg. 2015; 39:36–40.

45. Murray CJL, Vos T, Lozano R, Naghavi M, Flaxman AD, Michaud C, et al. Disability-adjusted life years (DALYs) for 291 diseases and injuries in 21 regions, 1990-2010: a systematic analysis for the Global Burden of Disease Study 2010. Lancet 2012;380(9859):2197–223.

46. The global burden of disease: 2004 update. World Health Organisation. Geneva, 2008. https://www.who.int/healthinfo/global_burden_disease/2004_report_update/en/ (Accessed 13 May 2019)

47. Ekwunife OH, Okoli CC, Ugwu JO, Modekwe VI, Ekwesianya AC. Congenital anomalies: Prospective study of pattern and associated risk factors in infants presenting to a tertiary hospital in Anambra State, South-east Nigeria. Niger J Paediatr. 2017; 44:76-80.

48. Ajao AE, Adeoye IA. Prevalence, risk factors and outcome of congenital anomalies among neonatal admissions in OGBOMOSO, Nigeria. BMC Pediatr. 2019;19(1):88.
49. Ekwochi U, Asinobi IN, Osuorah DCI, Ndu IK, Ifediora C, Amadi OF, et al. Pattern of Congenital Anomalies in Newborn: A 4-Year Surveillance of Newborns Delivered in a Tertiary Healthcare Facility in the South-East Nigeria. J Trop Pediatr. 2018; 64:304–311.
50. Fajolu IB, Ezenwa B, Akintan P, Ezeaka VC. An 8-year review of major congenital abnormalities in a tertiary hospital in Lagos, Nigeria. Niger J Paediatr. 2016; 43:175-179.
51. Adeboye M a. N, Abdulkadir MB, Adegboye OA, Saka AO, Oladele PD, Oladele DM, et al. A Prospective Study of Spectrum, Risk Factors and Immediate Outcome of Congenital Anomalies in Bida, North Central Nigeria. Ann Med Health Sci Res. 2016; 6:380-384.
52. Kiragu AW, Dunlop SJ, Mwarumba N, Gidado S, Adesina A, Mwachiro M, et al. Pediatric Trauma Care in Low Resource Settings: Challenges, Opportunities, and Solutions. Front. Pediatr. 6:155. doi: 10.3389/fped.2018.00155. https://www.frontiersin.org/articles/10.3389/fped.2018.00155/full (Accessed 13 May 2019)
53. Hyginus EO, Okechukwu UJ, Victor IM, Christian OC, Anthony U. Epidemiology of admitted cases of childhood injuries in Nnamdi Azikiwe University Teaching Hospital Nnewi, Nigeria. Ann Trop Med Public Health. 2015; 8:272.
54. Ugezu A, Ihegihu C, Chukwuka NC, et al. Childhood injuries in a teaching hospital setting, Nnewi, South-East Nigeria. Trop J Med Res 2017; 20:171
55. Abdur-Rahman LO, Taiwo JO, Ofoegbu CKP, Adekanye AO, Ajide OO, Ijagbemi CY, et al. Community survey of childhood injuries in North-Central Nigeria. Ann Pediatr Surg. 2015; 11:136-139.

56. Olatunya OS, Isinkaye AO, Oluwadiya KS. Profile of non-accidental childhood injury at a tertiary hospital in south-west Nigeria. J Trop Pediatr. 2015; 61:174–181.
57. Utuk E-OE, Ikpeme EE. Childhood cancers in a referral hospital in south-south Nigeria: a review of the spectrum and outcome of treatment. Pan Afr Med J. 2015; 22:325 doi:10.11604/pamj.2015.22.325.6990. http://www.panafrican-med-journal.com/content/article/22/325/full/ (Accessed 13 May 2019).
58. Stefan DC. Patterns of Distribution of Childhood Cancer in Africa. J Trop Pediatr. 2015; 61:165–173.
59. Ameh EA, Abantanga FA, Birabwa-Male D. Surgical aspects of bacterial infection in African children. Semin Pediatr Surg. 2012; 21:116–124.
60. Ameh EA, Mshelbwala PM, Nasir AA, Lukong CS, Jabo BA, Anumah MA, et al. Surgical site infection in children: prospective analysis of the burden and risk factors in a sub-Saharan African setting. Surg Infect. 2009; 10:105–109.
61. Kesah CNF, Egri-Okwaji MTC, Iroha E, Odugbemi TO. Aerobic bacterial nosocomial infections in paediatric surgical patients at a tertiary health institution in Lagos, Nigeria. Niger Postgrad Med J. 2004; 11:4–9.
62. Barnett BS, Tarpley MJ, Davidson MA, Gbadero DA. Factors Associated with Perioperative Mortality in Typhoid Fever Patients with Intestinal Perforation in Nigeria. Integr J Glob Health. 2017; 1(2):12. http://www.imedpub.com/articles/factors-associated-with-perioperative-mortality-in-typhoid-fever-patients-with-intestinal-perforation-in-nigeria.php?aid=20346 (Accessed 13 May 2019).
63. Anyanwu L-J, Mohammad A, Abdullahi L, Farinyaro A, Obaro S. Determinants of postoperative morbidity and mortality in children managed for typhoid intestinal perforation in Kano Nigeria. J Pediatr Surg. 2018; 53:847–852.
64. Ameh EA. Typhoid ileal perforation in children: a scourge in developing countries. Ann Trop Paediatr. 1999; 19:267–272.

65. Ekenze SO, Anyanwu PA, Ezomike UO, Oguonu T. Profile of pediatric abdominal surgical emergencies in a developing country. Int Surg. 2010; 95:319–324.
66. Davies JI, Vreede E, Onajin-Obembe B, et al. What is the minimum number of specialists anaesthetists needed in low income and middle-income countries? BMJ Glob Health 2018;3: e001005.
67. Bigbee JL. The relationship between nurse to population ratio and population density: a pilot study in a rural/frontier state. Online Journal of Rural Nursing and Health Care 2007; 7: 36 – 43
68. Juran S, Broer PN, Klug SJ, et al. Geospatial mapping of access to timely essential surgery in sub-Saharan Africa. BMJ Glob Health. 2018; 3(4): e000875.
69. GBD 2016 Mortality Collaborators. Global, regional, and national under-5 mortality, adult mortality, age-specific mortality, and life expectancy, 1970-2016: a systematic analysis for the Global Burden of Disease Study 2016. Lancet. 2017; 390:1084-1150.
70. Bickler SW, Sanno-Duanda B. Epidemiology of paediatric surgical admissions to a government referral hospital in the Gambia. Bull World Health Organ. 2000; 78:1330-1336.
71. Ameh EA, Seyi-Olajide JO, Sholadoye TT. Neonatal surgical care: a review of the burden, progress and challenges in sub-Saharan Africa. Paediatr Int Child Health. 2015; 35:243-251.
72. Khan UR, Sengoelge M, Zia N, et al. Country level economic disparities in child injury mortality. Arch Dis Child 2015;100 (Suppl 1): s29–s33.
73. Global Initiative for Children’s Surgery. Optimal Resources for Children's Surgical Care: Executive Summary. World J Surg. 2019; 43:978-980.
74. Krishnaswami S, Nwomeh BC, Ameh EA. The pediatric surgery workforce in low- and middle-income countries: problems and priorities. Semin Pediatr Surg. 2016; 25:32-42.

75. Onajin-Obembe BOI, Alagbe-Briggs. Who wants to be an Anaesthesiologist? International Journal of Educational Research and Reviews 2015; 3: 073-077.
76. Kempthorne P, Morriss WW, Mellin-Olsen J, Gore-Booth J. The WFSA global anesthesia workforce survey. Anesth Analg 2017; 125:981–990.
77. Dubowitz G, Detlefs S, McQueen KA. Global anesthesia workforce crisis: a preliminary survey revealing shortages contributing to undesirable outcomes and unsafe practices. World J Surg 2009; 34: 438-444.
78. Morriss W, Ottaway A, Milenovic M, Gore-Booth J, Haylock-Loor C, Onajin-Obembe B, Barreiro G, Mellin-Olsen J. A global anaesthesia training framework. Anesth Analg 2019;128: 383 – 387.

APPENDICES

Appendix 1: Nigeria NSOANP Hospital Assessment Tool

NIGERIA NATIONAL SURGICAL, OBSTETRIC, ANAESTHESIA & NURSING PLAN
HOSPITAL ASSESSMENT TOOL

GENERAL QUESTIONS	
State:	
Name of health care facility:	
Address of health care facility:	
Phone number of health care facility:	
Date of data collection (dd/mm/yyyy):	
Name, professional title, and contact information of key hospital staff filling out form:	
Name, professional title, and contact information of NSOAP member completing form:	
What level facility is being evaluated?	□ Primary level (Health Centre/Clinic): Primary healthcare centre, comprehensive healthcare centre □ Secondary level (District/Rural Hospital): Cottage hospital, district hospital, general hospital □ Tertiary level: State specialist hospital, state teaching hospital, federal medical centre, federal teaching hospital, specialized hospitals
What type of hospital is being evaluated?	□ Public □ Private □ NGO □ Mission □ Other

INFRASTRUCTURE	
General Infrastructure	
How often is electricity/operational power generator available?	□ 0 (Never) □ 1-25% (Rarely) □ 26-50% (Sometimes) □ 51-75% (Often) □ 76-99% (Almost always) □ 100% (Always)
How often is running water available?	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
How often is internet available?	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
How often is oxygen available?	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
What is the total number of admissions in a year?	#
What is the total number of outpatients seen in a year?	#
How many total hospital beds are there?	#
How many beds are designated for surgical patients?	#
How many post-op recovery beds are there? (0 for none)	#
How many advanced care/ICU beds are there?	#
How many neonatal ICU beds are there?	#
How many functional ventilators are available in the ICU?	#
Operating Room	
How many functioning operating rooms are there?	#
How often is pulse oximetry used in the operating room?	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
How often is inhalational general anaesthesia available?	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)

How often is IV sedation anaesthesia (Ketamine, Midazolam, Propofol etc.) available?	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
How often is spinal anaesthesia available?	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
How often is regional anaesthesia available?	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
Operating Room Equipment	
How many functional anaesthesia machines are available in the ORs?	#
Operating Room Supplies – How often are the following equipment accessible for surgery?	
Adult oropharyngeal airway	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
Paediatric oropharyngeal airway	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
Adult endotracheal tube	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
Paediatric endotracheal tube	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
Adult laryngoscope	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
Paediatric laryngoscope	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
Adult facemask bag valve	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
Paediatric facemask bag valve	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
Adult Magill forceps	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
Paediatric Magill forceps	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
Blood pressure measuring equipment	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
Pulse oximeter	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
Stethoscope	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
Suction apparatus	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
Thermometer	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
Nasogastric Tube	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
Light source	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
Chest tube	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
Electrocautery	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
Sterilizer	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
Forceps	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
Syringes with needles	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
Scalpel	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
Scissors	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
Needle holder	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
Retractor	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
Sterile gloves	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)

	Urinary catheters	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
	Tourniquet	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
	Face masks	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
	Gowns	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
	Disinfectant hand wash	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
	Sterilizing skin prep	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
	Eye protection	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
	Sharps disposal container	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
	Non-sterile Examination Gloves	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
	Sutures	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
Pharmacy		
	How often are narcotics available post-operatively?	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
	How often are antibiotics available for surgery?	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
	How often are IV fluids available for surgery?	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
	How often are paralytics available for surgery?	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
	How often are sedatives available for surgery?	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
	How often is epinephrine available for surgery?	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
	How often are other vasopressors (besides epinephrine) available for surgery?	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
Radiology		
	How often do you have 24-hour access to radiology imaging services?	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
	How often do you have access to a functioning X-ray machine?	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
	How often do you have access to a functioning ultrasound?	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
	How often do you have access to a functioning CT scanner?	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
	How often do you have access to a functioning MRI scanner?	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
Blood Supply		
	How often are you able to administer a blood transfusion within 2 hours in your facility?	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
Laboratory		
	How often is the lab able to run a Complete Blood Count (haemoglobin, haematocrit, WBC, platelets)?	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
	How often is the lab able to run a chemistry panel (BUN, creatinine, Na, K, etc.)?	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
	How often is the lab able to run coagulation studies (PT, PTT, BT, INR)?	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
	How often is the lab able to do a urinalysis?	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
	How often are you able to screen for an infectious panel (HIV, hepatitis)?	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
Access and referral systems		
	What is the population served by this facility?	#
	What percentage of your patients can reach the hospital within 2 hours of travel?	□ 0 (None) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (All)

What is the number of patients that you refer for surgical intervention to a higher level facility per year	#

SERVICE DELIVERY	
Procedures - **How many of the following procedures have you done in the past 1 year?**	
Obstetrics, gynaecology, family planning	
1. Normal delivery	
2. Caesarean birth	#
3. Vacuum extraction/forceps delivery	#
4. Ectopic pregnancy	#
5. Manual vacuum aspiration and dilation and curettage	#
6. Tubal ligation	#
7. Vasectomy	#
8. Hysterectomy for uterine rupture or intractable postpartum haemorrhage	#
9. Inspection with acetic acid, cryotherapy for cervical lesions	#
General Surgery	
10. Suturing laceration	
11. Drainage of abscess	
12. Male circumcision	
13. Wound debridement	
14. Removal of foreign body (throat/eye/ear/nose)	
15. Biopsy (lymph node, mass, other)	
16. Repair of perforations	#
17. Appendectomy	#
18. Bowel obstruction	#
19. Colostomy	#
20. Gallbladder disease	#
21. Hernia, including incarceration	#
22. Hydrocelectomy	#
23. Relief of urinary obstruction	#
Injury	
24. Management of non-displaced fractures	
25. Resuscitation with advanced life support measures, including surgical airway	#
26. Tube thoracostomy	#
27. Trauma laparotomy	#
28. Fracture reduction	#
29. Irrigation and debridement of open fractures	#
30. Placement of external fixator	#
31. Escharotomy/fasciotomy	#
32. Amputations	#
33. Skin grafting	#
34. Burr hole	#
Non-trauma orthopaedic	
35. Drainage of septic arthritis	#
36. Debridement of osteomyelitis	#
Paediatric Surgery (children under age 15)	
1. Male circumcision	#
2. Herniotomy	#
3. Paediatric laparotomy	#
4. Paediatric colostomy	#
5. Repair of anorectal malformation and Hirschsprung's Disease	#
6. Gastroschisis repair	#
Specialty procedures	
1. Repair obstetric fistula	#
2. Repair of cleft lip and palate	#
3. Repair of club foot	#
4. Shunt for hydrocephalus	#
5. Cataract extraction and insertion of intraocular lens	#

	6. Eyelid surgery for trachoma	#
Surgical Volume		
	What is the total number of major surgeries your hospital performed last year?	#
	What is the total number of minor surgeries your hospital performed last year?	#
	What is the total number of paediatric surgeries (age <15 years) your hospital performed last year?	#
	What percent of cases were emergency/urgent (non-elective) cases?	%
Quality and Safety		
	How many peri-operative deaths did you have last year?	#
	How often is the WHO surgical safety checklist utilized in the operating rooms?	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
	How often does the hospital hold a mortality and morbidity conference related to surgery patients?	□ Never□ Weekly □ Every 2 weeks □ Monthly □ Quarterly □ Yearly

WORKFORCE			
Surgeon/Anaesthesiologist/Obstetrician/Provider Density			
	Providers	**Full time**	
	Number of qualified surgeons	#	
	Number of qualified pediatric surgeons	#	
	Number of qualified OBGYNs	#	
	Number of qualified anaesthesiologists	#	
	Number of qualified pediatric anesthesiologists	#	
	Number of general doctors providing surgery	#	
	Number of general doctors providing anaesthesia	#	
	Number of clinical officers providing surgery	#	
	Number of clinical officers providing anaesthesia	#	
	Number of midwives providing surgery	#	
	Number of total midwives on labour and delivery	#	
	Number of qualified radiologists	#	
	Number of qualified pathologists	#	
	Number of qualified pharmacists	#	
	Number of qualified biomedical technicians	#	
	What is your typical nurse to patient ratio on the adult surgical ward during the day?	□1 nurse to < 7 patients □1 nurse to 7-10 patients □1 nurse to > 10	
	What is your typical nurse-to-patient ratio on the adult surgical ward at night?	□1 nurse to < 7 patients □1 nurse to 7-10 patients □1 nurse to > 10	
	What is your typical nurse-to-patient ratio on the labour and delivery ward during the day?	□1 nurse to < 7 patients □1 nurse to 7-10 patients □1 nurse to > 10	
	What is your typical nurse-to-patient ratio on the labour and delivery ward at night?	□1 nurse to < 7 patients □1 nurse to 7-10 patients □1 nurse to > 10	
	How often is a surgical care (including emergency surgery, anaesthesia and obstetrics) available at night or 24 hours a day?	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)	
	How often is a surgical provider available for 24 hours a day?	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)	
	How often is an obstetrics/gynaecology provider available for 24 hours a day?	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)	
	How often is an anaesthesia provider available for 24 hours a day?	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)	
Continuing Medical Education			
	How often do you offer continuing medical education to your staff each year?	□ Never□ Weekly □ Monthly □ Quarterly □ Yearly	

FINANCING		
Health financing and accounting		
	What percentage of your patients have health insurance?	□ 0 (None) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (All)
Budget Allocation		
	What is your total annual hospital budget?	

	How much of your annual hospital budget is allotted to surgery and anaesthesia?	□ 0 (None) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (All)
What is the average out-of-pocket cost for each item?		
	CBC	
	Chest X-ray	
	1 unit of blood	

COST OF COMMON OPERATIONS	
Typical cost of procedure with admission/bed stay (N)	
Adults:	
Caesarean section	N
Laparotomy	N
Open fracture repair	N
Paediatrics (children <15 years)	
Herniotomy	N
Colostomy	N
Repair of anorectal malformation/Hirschsprung's Disease	N

INFORMATION MANAGEMENT	
Information Systems	
What is the method of record keeping in your hospital?	□ Electronic □ Paper □ Both □ None
Are charts accessible across multiple visits for the same patient?	□ Yes □ No
How often is data prospectively collected for patient outcomes, such as surgical site infection, post-op stroke, etc.?	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
How often is data prospectively collected for post-operative mortality rate?	□ 0 (Never) □ 1-25% □ 26-50% □ 51-75% □ 76-99% □ 100% (Always)
How often are you required to report information to the Ministry of Health or an equivalent agency?	□ Never □ Monthly □ Quarterly □ Yearly
Do you use telemedicine?	□ Yes □ No
If yes, what kind?	
Research Agenda	
Is there funding at your hospital for research?	□ Yes □ No

Appendix 2: Children's Surgical Assessment Tool

WHO-PGSSC-GICS CHILDREN'S SURGICAL ASSESSMENT TOOL (CSAT)

FACILITY CHARACTERISTICS (for patients <15 years old)		
	Total number of children's surgical admissions in a year	#
	Total number of children's surgical outpatients (visits) seen in a year	#
	Total number of hospital beds dedicated to children's surgery	#
	Total number children's operating rooms	#
	Total number of neonatal unit/special baby care unit beds	#
	Total number of paediatric ICU/advanced care beds	#
	Total number of neonatal ICU beds	#
	Total number of functional paediatric ventilators in the ICU	#
	Total number of functional neonatal ventilators in ICU	#
	Total number of functional incubators	#
	Total number of patient monitors in paediatric and neonatal ICU	#
Access and referral systems:		
	How many patients per year do you refer to higher-level facilities for surgical interventions?	#
	What is the most common reason for referral of paediatric surgical patients to higher levels of care?	

INFRASTRUCTURE					
General Infrastructure - How often is this item available and functional? Choose (tick) 0- Unavailable (NOT AVAILABLE under any circumstances); 1- Inadequate (available to LESS THAN HALF of the time); 2- Limited (available to MORE THAN HALF, of the time but not all of the time); or 3- Adequate (AVAILABLE all of the time without restrictions).		Unavailable (0)	Inadequate (1)	Limited (2)	Adequate (3)
	24-hour Emergency Unit able to receive paediatric patients	0	1	2	3
Pharmacy – product availability					
	Parenteral nutrition	0	1	2	3
	Intravenous antibiotics				
Radiology & Pathology – service availability					
	Enteral contrast material for bowel evaluation (barium or gastrografin)	0	1	2	3
	Intravenous contrast material				
	Echocardiogram	0	1	2	3
	Anatomic Pathology services	0	1	2	3
Blood Supply - availability					
	Blood component transfusion	0	1	2	3

SERVICE DELIVERY

Rate adequacy as below:
0- Unavailable (NOT AVAILABLE under any circumstances);
1- Inadequate (available to LESS THAN HALF of the time);
2- Limited (available to MORE THAN HALF, of the time but not all of the time) 3- Adequate (AVAILABLE all of the time without restrictions).

If Unavailable, Inadequate or Limited, please identify the barriers to access (check all that apply)
Infrastructure - physical space, equipment or materials; Absent - has never been present; Broken –resources present, but broken; Personnel - resource, service or function available, and staff trained, but limited availability at times (eg, night, weekend or holiday); Training - No staff trained in using resource or performing function; Stock out - cannot be procured, or required equipment or supplies out of stock often due to poor stock management practices or procurement failures; User fees - available, but out-of-pocket payment requirement prevents delivery for some; Other - Other factors

		Total # performe d / year	Rate (0-3)	Infrastru cture	Absent	Broken	Personn el	Training	Stock out	User fees	Other
Procedures- Minor in patients <15 years old											
	Suturing laceration	#									
	Drainage of superficial abscess	#									
	Wound debridement	#									
	Biopsy (tumour)	#									
	Male circumcision	#									
	Management of non-displaced fractures	#									
	Removal of foreign body from ear/nose	#									
	Removal of foreign body from throat										
	Eyelid surgery for trachoma	#									

Procedures – Major in patients < 15 years old											
Children's surgery											
	Appendectomy	#									
	Hernia/ hydrocele repair	#									
	Reduction of intussusception	#									
	Bowel resection	#									
	Gastroschisis & omphalocele	#									
	Rectal biopsy	#									
	Resection of solid abdominal masses	#									
	Creation of Intestinal stomas	#									
	Closure of intestinal stomas	#									
	Pyloromyotomy	#									
	Catheterization/ suprapubic cystostomy	#									
	Orchiopexy	#									
	Repair of testicular or ovarian torsion	#									
	Thyroidectomy *(total or partial)*	#									
	Drainage of septic arthritis/osteomyelitis	#									

	Repair of cleft lip and/or palate	#									
Paediatric Resuscitation & Injury											
	Central lines	#									
	Surgical airway (cricothyroidotomy, tracheostomy)	#									
	Tube thoracostomy	#									
	Trauma laparotomy	#									
	Open reduction & internal fixation	#									
	Placement of paediatric external fixator	#									
	Escharotomy/fasciotomy/ contracture release	#									
	Amputations	#									
	Skin grafting	#									
	Burr hole	#									
	Craniotomy	#									

Procedures - Advanced (<15 years old)											
	Repair of esophageal atresia	#									
	Repair of intestinal atresia	#									
	Myelomeningocele repair	#									
	Repair of club foot	#									
	Atrial / Ventricular Septal Defect repair	#									
	VP Shunt/ETV for hydrocephalus	#									

	Repair of anorectal malformation or Hirschsprung's Disease	#									

Surgical Volume		
	Number of paediatric laparotomies (<15 y/o) performed last year	#
	Number of neonatal (< 1-month age) stomas performed last year	#
	Number of surgical repairs of paediatric fractures performed last year	#
	Total number of procedures performed in pediatric patients (<15 years) last year	#
	Percent of children's surgery cases that were emergent or urgent (non-elective) cases	%
Quality and Safety		
	Is your institution involved in a formal training program for surgical trainees?	☐ Yes ☐ No
	Does your institution have a method of monitoring surgical outcomes over time?	☐ Yes ☐ No
	Does your institution use electronic medical records?	☐ Yes ☐ No
	Does your institution have a trauma registry that includes paediatric trauma?	☐ Yes ☐ No
	Number of post-operative paediatric (<15 y/o) in-hospital deaths last year	#
	Number of surgical site infections (SSIs) in paediatric patients (< 15 y/o) in the last year	#
	What is the highest ASA class of children operated at your institution?	☐ 1 ☐ 2 ☐ 3 ☐ 4
	Is the WHO Surgical Safety Checklist used in the operating rooms for paediatric patients?	☐ Never ☐ Less than half the time ☐ More than half the time ☐ All the time

Is pulse oximetry used in the operating rooms for paediatric patients?	☐ Never ☐ Less than half the time ☐ More than half the time ☐ All the time
How often does the hospital hold a surgical audit (Mortality and Morbidity conference) related to children's surgical patients?	☐ Never ☐ Every week ☐ Every month ☐ Every quarter ☐ As needed ☐ Other _____

Operating Room Equipment and Supplies – How often is the following equipment available and functional for surgery?

	Rating (0-3)	Infra-structure	Absent	Broken	Person-nel	Training	Stock out	User fees	Other
Functional paediatric anaesthesia machines									
Paediatric oropharyngeal airway *(000-4)*									
Paediatric endotracheal tubes *(2.5 - 6 mm)*									
Paediatric laryngoscope *(Miller ≤ 2 or Macintosh ≤ 3)*									
Paediatric facemask bag valve *(< 550ml bag with < size 3 mask)*									
Paediatric difficult airway kit (LMA)									
Paediatric Magill forceps									
Paediatric blood pressure monitor or cuff									
Paediatric pulse oximetry									
Paediatric nasogastric Tube *(<12 Fr)*									
Paediatric chest tubes *(< 20 Fr)*									
Paediatric surgical instruments									
Paediatric urinary catheters *(<12 Fr)*									
Paediatric central lines *(< 7 Fr or 12 cm)*									
Sutures *(4.0, 5.0, 6.0)*									
Minimally invasive surgical instruments (*ie. laparoscopy, thoracoscopy, arthroscopy)*									
Capnography (exp. CO_2 measurement)									
Pre-formed intestinal silos									

WORKFORCE

Children's Surgery Provider Density

Providers	Full-time	Part-time
Number of qualified general surgeons with paediatric exposure (*trained surgeons with expertise in pediatric or neonatal surgery, but without formal subspecialty pediatric surgical training)*	#	#
Number of qualified general paediatric surgeons (*trained surgeons with formal specialized training in children's surgery of ≥ 1 year)*	#	#
Number of general doctors providing paediatric surgery (*general practitioners without formal surgical training)*	#	#
Number of non-physicians providing paediatric surgery (*non-physicians health care professional who performs surgery independently without formal training in surgery)*	#	#
Number of qualified paediatric anaesthesiologists (*trained anaesthesiologists with formal specialization in pediatric anesthesia of ≥1 year)*	#	#
Number of qualified anaesthesiologists with paediatric exposure (*trained anaesthesiologists with experience in pediatric anesthesia without formal subspecialty pediatric anaesthesiology training.)*	#	#
Number of general doctors providing paediatric anaesthesia (*general practitioners without formal anaesthesiology training)*	#	#

	Number of non-physicians providing paediatric anaesthesia (*non-physicians health care professionals who perform paediatric anaesthesia independently without formal training in anaesthesia)*	#	#
	Number of nurses treating only children	#	#

Please identify paediatric specialists that are available at your hospital *(indicate number in brackets)*

☐ cardiac surgeon ( )	☐ plastic surgeon ( )	☐ haematologist ( )
☐ dental surgeon ()	☐ urologist ( )	☐ nephrologist ( )
☐ neurosurgeon ( )	☐ general paediatrician ( )	☐ neurologist ( )
☐ ophthalmologist ( )	☐ neonatologist ( )	☐ respiratory physician ( )
☐ orthopedic surgeon ( )	☐ cardiologist ( )	
☐ otorhinolaryngologist (ENT) ( )	☐ endocrinologist ( )	

Please identify staff members that are present in your hospital *(indicate number in brackets*)

☐ paediatric intensive care nurse ( )	☐ radiographer ( )	☐ radiologist ( )
☐ neonatal nurse ( )	☐ speech therapist ( )	☐ pathologist ( )
☐ operating room nurse ( )	☐ audiometrist ( )	☐ oncologist treating children ( )
☐ qualified nutritionist ( )		

Work Force Availability (*How often are these available 24 hours a day?)*	Unavailable (0)	Inadequate (1)	Limited (2)	Adequate (3)
General children's surgical provider availability				
Paediatric anaesthesia provider availability				

FINANCING

Health financing and accounting

	What percentage of children coming to this hospital have health insurance?	☐ None ☐ Less than half ☐ More than half ☐ All the time	
	Nationally, is there government-sponsored health insurance/financing for children?	☐ Yes ☐ No	

Budget Allocation

	Annual hospital budget allotted to children's surgery and anaesthesia ☐ N/A	Actual amount:	% of total budget:
Cost: average total inpatient cost for a patient for…		Cost	% out of pocket
	paediatric hernia repair		
	paediatric open fracture repair		
	paediatric laparotomy		
	repair of Hirschsprung's disease/anorectal malformation		

TRAINING AND RESEARCH

How many ongoing research projects involve children's surgery?	#
How many ongoing research projects involve paediatric anaesthesia?	#
How many ongoing research projects involve paediatric nursing?	#
How many workshops, trainings, and lectures are in an average month?	#