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Total Health for All:  
Strategies for Health Security in Nigeria

SUPPLEMENT 1 2019



**PROFESSOR BABATUNDE O. OSOTIMEHIN**

*MD, FWACP, FRCP, OON, FAS  
1949 - 2017*

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### **Dedication**

This supplementary issue is dedicated to the memory of  
Professor Babatunde O. Osotimehin  
*MD, FWACP, FRCP, OON, FAS*  
(6th Feb. 1949 - 4th June 2017)

Provost, College of Medicine, University of Ibadan, (1990-1994)  
Chairman, National Agency for the Control of AIDS (2000-2007)  
Editor, African Journal of Medicine and Medical Sciences (2004-2009)  
Honourable Minister, Federal Ministry of Health, Nigeria (2008-2010)  
Executive Director, United Nations Population Fund (2010-2017)

### **Acknowledgements**

This supplementary issue is generously supported by the UNFPA



## Tribute of PROFESSOR BABATUNDE O. OSOTIMEHIN

(Editor, *African Journal of Medicine and Medical Sciences* - 1996 - 2003)

*Gaudemus igitur, Gaudemus igitur!!*

We are gathered here today in honour of a worthy Alumnus and a past Provost of this College of Medicine. I have the special privilege of welcoming to this occasion our special guests, who are connected in a special way with the deceased as we do.

I wish to recognise and welcome all our distinguished members of staff to this Special College Assembly Convened with the sole purpose of celebrating the life of a former Provost of the College of Medicine.

I warmly welcome the dear wife of the departed, Mrs. Olufunke Osotimehin, the children and indeed the entire family. We sincerely appreciate the opportunity given the College to play this part in paying respect to a man deserving honour. The news of death of this foremost Clinician came as a shock to the College, University and indeed the entire nation. Late Professor Babatunde O. Osotimehin who was much loved and fondly referred to as **'Bob'** will be greatly missed.

*Ars longa, Vita brevis* - For life is short, but art is long.

With this phrase Greek philosophers challenged our thoughts about life and death whenever it comes as it must, because in the end the essence of life is not how long it was, but how creative, or impactful, a life had been. From all we have heard about our much loved Professor since his demise, it is safe to say that, whilst it would appear that the length of his life was relatively short, his creativity in living it has ensured that the art of his life will indeed be long. This as he has left many legacies in the various stages of his life, in the places he worked, and with the people he met.

His spent his longest time in the College of Medicine, from his medical student days till death (50 years in all), and what a time. We have been told he was a brilliant student, who did not appear to be an 'effico'. We have heard that he not only acquired the competencies to diagnose the best life-partner for him with just one short-case sitting of the particular derrière on his knees, on the back seat of a crowded car in the dark; but also those with which he found, clerked and investigated that partner at the Scala laboratories one year later; as well as the

skills he managed her with successfully for the next 44 years. What a guy!!! What a well-trained student!!

We have been reminded that Professor Babatunde Osotimehin was a brilliant man of 'molecules', an accomplished scholar and Provost before he 'found his calling' as international social scientist, civil servant and ambassador which position he had first desired at the age of 19. In those testimonies, one caught a hint that the various groups were trying espouse what their part of his life



**Professor Babatunde O. Osotimehin**

*MD, FWACP, FRCP, OON, FAS  
1949 - 2017*

contributed to his legacy. But indeed, a closer look at molecules indicate that Bob was being Bob as he moved determinedly, from one effortlessly executed posting of life to the other. This is because from studying molecules you learn that all life is just a transformation of one type energy to another as is demonstrated by the cell cycle which is the basis of life. In this ever-continuing process, nature is at its best as it transforms cells from one stage to another without losing energy, and even when the cell dies the process of its demise is energy-efficient as all its components are resorbed and used by other cells - its progeny.

*Tribute*

Late Professor Osotimehin had also learned from his time in the molecular laboratory that the life and death of a cell is determined by surrounding cells and is dependent on its environment. This theory was proven first by Schelhammer in 1904 when he showed that a cell isolated from others quickly died not matter the amount of nutrients in its immediate milieu. It was further elucidated by Chung, Cunha and others in the early 1990 when they showed that a normal cell placed amongst cancerous neighbors becomes cancerous, whilst a cancerous cell placed amongst normal neighbors reverts to a normal cell. Realizing his qualities, this understanding may have contributed in part to Professor Osotimehin's decision to redirect his efforts from the relatively small environment of the laboratory and the University to the larger field of international health in his quest to make his society better in as large a scale as possible and thus ensure his own well-being. His success at this task has of course been laid bare over the past month. From the above and other testimonies we can conclude that this Professor's life was made up of a heterogeneous collection of Shakespearean acts with this world as his stage. From his birth in a country of the Tempest, his Macbethian pre-destination, through his emulation of the toasts of Romeo and the nimbleness of the elves of A Midsummer's night dream in his admirable waltzes through his academic and political careers; and finally his Hamlet-like exit from the stage. The art in his life, which has

inevitably made him a legend, can only be admired but not copied, and this is perhaps a welcome comfort to his successors who would rather not be measured by the yard-stick his achievements.

Mrs. Osotimehin and the rest of the Osotimehin family and friends here present, distinguished audience of this Special Academic Assembly, the first of its kind for a departed Provost, it is true that Professor Osotimehin's candle has gone out and that his body will soon leave this institution for ever, we are however assured that through his works and deeds, the light of his legacy will continue to illuminate our hallowed chambers and corridor of academe eternally, and the name 'Bob' will be remembered in this citadel of learning for more than a life time.

We pray that his soul will rest in the peace of his Lord, and that that peace will abide with his family, friends, students and mentees forever. Professor Babatunde Osotimehin, by the grace of God the 4<sup>th</sup> Provost of the College of Medicine, University of Ibadan, 1990-1994. *Requiescat in Pace.*

**E. Oluwabunmi Olapade-Olaopa Esq., FAS**  
Professor & 11<sup>th</sup> Provost  
College of Medicine,  
University of Ibadan  
Nigeria.

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## Preface

One of the most valuable assets of the Nigerian nation is its large population. Since independence, the Nigerian population has grown rapidly; in 2018 the population is estimated to be 198 million, making Nigeria the most populous country in sub-Saharan Africa, and the seventh globally. If the current growth rate of 3% is sustained the Nigerian population is projected to double in the next 22 years i.e. 2040 [1]. High fertility resulting from low use of modern contraceptives is the primary reason for the speedy growth of the Nigerian population [1]. While a large population has several benefits for any country, including ready market for goods and services and global influence, an un-regulated population growth poses several developmental challenges. Nigeria's land mass and other material resources are fixed and unregulated population growth will negatively affect the equilibrium between population and available resources.

Un-regulated population growth is a major threat to the health security of the country. Health security is a condition in which a country and the citizens are prepared for, protected from, and resilient to events that can adversely impact health status [2]. Promoting health security requires a holistic approach encompassing issues linked to diseases (communicable and non-communicable) and injuries (intentional and unintentional), social health linked to human behaviours, environment (food, water, sanitation, housing, sewage disposal), education (from primary level), mental health linked to environmental stress such as disaster/emergency related issues, security and terrorism, financial and job insecurity among others. To achieve sustainable development Nigeria must attain health security among other important milestones. A healthy population will enable the country harness the demographic dividend of its large youth population as healthy lives mean more productivity and improvement in the quality of life of citizens.

Many countries around the world are making projections of the current population and developing short, medium, and long term strategies to ensure that their citizens and countries are health secured. Nigeria should not be left behind in the global efforts to achieve health security. Herein lies the value and purpose of this supplement the African Journal of Medicine and Medical Sciences (AJMMS).

The edition comprises of an Editorial and 18 original articles that focused on the different themes in the Nigerian health system, ranging from overview of the system, behaviours, the environment, drug adherence, food security, drug use, infectious diseases and zoonosis. A multi-disciplinary team of experts developed the articles. Each of the articles starts with an overview of the current situation drawing on the latest literature, offers an analysis using the Strength Weaknesses, Opportunities and Threats (SWOT) model, provides projections for the future, and offers recommendations that should promote health security for the country and the citizens.

When implemented, the recommendations offered in this special edition along with other complementary interventions in other sectors are meant to make Nigeria health secured. The execution of these recommendations requires multi-sector remodelling of not just the health-systems but also the revamping of the socio-economic infrastructure. This demands the commitment of government at all levels, non-governmental agencies, re-orientation of the administrative, technical leadership as well as the security agencies, the judiciary and the contributions of citizens.

This supplement is dedicated to the memory of Professor Babatunde Osotimehin who died in 2017. Professor Osotimehin had a successful career as a scholar, administrator and diplomat having served as a former Editor of AJMMS, Provost, College of Medicine, Director, National Agency for the Control of AIDS (NACA), Honourable Minister of Health of the Federal Republic of Nigeria and Executive Director, United Nations Fund for Population (UNFPA). Before his death, the College was in discussion with Professor Osotimehin about how researchers at the College need to develop innovative interventions to ensure health security not only for internally displaced persons but the country as whole.

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Afr Med J 1986; 85: 76 – 87.
- Brown A. Primary Health Care and the Medical Curriculum  
Edinburgh: Universities Press. 1977.
- Lewis A. Primary liver cell carcinoma. In: Ajose A. Odeku  
EL, Eds. Priorities in Health Planning. Ibadan:  
University Press, 1983; 110 - 117

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## Nigeria's Health Security: A situation analysis, forecasts and suggested interventions

AJ Ajuwon<sup>1</sup>, OO Denloye<sup>2</sup>, AO Adisa<sup>3</sup> and EO Olapade-Olaopa<sup>4</sup>  
Departments of Health Promotion and Education<sup>1</sup>, Child Oral Health<sup>2</sup>,  
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### Abstract

**Background:** With an estimated population of 198 million, Nigeria is the most populous country in sub-Saharan Africa and the seventh globally. Approximately half of the population is aged less than 30 years. The country has a high total fertility rate estimated at 5.5 births per woman. At current rates, Nigeria's population is projected to double by 2050.

**Challenges:** Poorly controlled population growth poses several potential developmental challenges not only to Nigeria but also to the region, and even beyond. The Nigerian population continues to grow, but the country's land mass and other resources remain relatively fixed with some even depreciating. This scenario underscores the need to plan and take actions to forestall the potential threats and catastrophic consequences of uncontrolled population growth.

**Conclusion:** This article describes the current situation of the health care systems in Nigeria, provides a SWOT analysis of the system and offers interventions to ensure health security in the country by 2050.

**Key words:** Health security, Nigeria, situation analysis, forecasts, intervention

### Abstrait

**Contexte :** Avec une population estimée à 198 millions d'habitants, le Nigéria est le pays le plus peuplé d'Afrique subsaharienne et le septième au monde. Environ la moitié de la population a moins de 30 ans. Le pays a un taux de fécondité total élevé estimé à 5,5 naissances par femme. Aux taux actuels, la population du Nigéria devrait doubler d'ici 2050.

**Défis :** Une croissance démographique mal contrôlée pose plusieurs problèmes de développement potentiels non seulement au Nigeria, mais également à la région et même au-delà. La population nigériane continue de croître, mais la masse terrestre et les

autres ressources du pays restent relativement fixes et certaines même se déprécient. Ce scénario souligne la nécessité de planifier et de prendre des mesures pour prévenir les menaces potentielles et les conséquences catastrophiques d'une croissance démographique incontrôlée.

**Conclusion :** Cet article décrit la situation actuelle des systèmes de soins de santé au Nigéria, fournit une analyse SWOT du système et propose des interventions pour assurer la sécurité sanitaire du pays d'ici à 2050.

**Mots-clés :** Sécurité sanitaire, Nigeria, analyse de la situation, prévisions, intervention

### Introduction

The current global population of 7.3 billion is expected to reach 8.5 billion by 2030 and 9.7 billion in 2050 [1]. Most of this increase will occur in the highest fertility countries that are mainly in low and middle-income, with the majority in sub-Saharan Africa [2]. Nigeria will contribute significantly to this rapid projected *population increase*. According to a recent United Nations report, Nigeria's population will surpass that of the United States by 2050, to become the third most populous country in the world [1]. The healthcare system in Nigeria however, is in a deplorable state [3]. This further exacerbates the challenge of caring for such a large population. The need to control Nigeria's population is urgent given the fact that the resources available per capita will continue to reduce as the population grows, underscoring need for interventions to strengthen the health security of the country.

The World Health Organization (WHO), defines health as a "state of complete physical, mental and social well-being and not merely the absence of disease" [4]. Health security is a condition in which the nation and its people are prepared for, protected from, and resilient to events that can adversely impact health status [5]. Therefore health security must encompass issues linked to diseases (communicable and non-communicable) and injuries (intentional and unintentional), social health linked to human behaviours, environment (food, water, sanitation,

housing, sewage disposal), education (from primary level), mental health linked to environmental stress such as disaster/emergency related issues, security and terrorism, financial and job insecurity among others.

To achieve sustainable development by 2050, Nigeria must attain health security among other important milestones. A healthy population will enable the country harness the demographic dividend of a large youth population (a key feature of the Nigerian population) as healthy lives mean more productivity and the lifting of people out of poverty. A study analysing the effects of eradicating pandemic hookworm and malaria in the USA, showed that children born after the eradication had improved incomes as adults when compared to those exposed to these diseases [6]. Even low-cost health interventions can have large scale effects on population health and this makes health investments a promising policy tool for economic growth in developing countries [7].

In this article, we describe the current situation of the health care system, identify the contributing factors that make it under-perform and how to revamp the system to attain improved health indices in Nigeria.

#### *The current situation of Nigeria's health care system*

Like other developing countries, Nigeria has experienced great challenges in health development and delivery. It is therefore unable to meet the health care needs of majority of the citizens. The near collapse of the primary health care system, the growing dual burden of communicable and non-communicable diseases, the widespread prevalence of fake and substandard drugs are some of the indicators of the weaknesses of the health system. This situation clearly indicates that the Nigerian health system is currently not secure. Factors contributory to the current state of health insecurity are poor health awareness and adherence to treatment, insufficient facilities, endemic corruption affecting virtually all sectors in health, the unrelenting brain drain, ineffective regulatory bodies, limited political will or guidance, poor policy implementation, increasing levels of poverty and insecurity.

Currently some interventions, including health sector reform, are being implemented to strengthen the health system. Notable among such interventions is the Economic Recovery and Growth Plan (ERGP), a medium-term plan for 2017-2020 [8], which builds on systematic investment plans aimed

at restoring economic growth while leveraging on the ingenuity and resilience of the Nigerian people. It is quite obvious that the economic viability of the country and the health of its people are interdependent. To achieve the goals of the ERGP, strategies suggested are: strong political determination and commitment, deepening the public and private sectors partnership and provision of effective collaboration/coordination with the states and the federal government [8].

Another significant intervention is the second National Strategic Health Development Plan (NSHDP II), which is a well-articulated and robust five-year (2018-2022) road map for policy implementation on improved health and well being of Nigerians [9]. The NSHDP II plan focuses on building enabling environment for the attainment of positive outcomes; increase utilization of essential healthcare services and strengthening of the health system. It also provides health promotion, intervention and prioritization of health burden in the country, risk sharing and protection as well as sustainable healthcare financing. It is inclusive of all the uncompleted projection of the NSHDP I and focuses essentially on universal health coverage, ERGP and the SDGs [9].

Despite existing shortcomings, the Nigerian health system has several strengths and opportunities that can be leveraged to improve function and security. Details of our SWOT analysis of the current health system are shown in Table 1. Some strengths of the system are that the bulk of diseases affecting majority of the citizens are preventable; there is an increasing number of trained health care professionals and increased internet coverage that improves general public access to health information. Major weaknesses include inadequate number of specialized healthcare professionals in the country, inadequate health insurance [10] and widespread rural-urban differences in health workforce distribution. Opportunities include availability of global policies and frameworks to guide national programmes while threats are regional insecurity, economic instability, noise, air, water and land pollution (Table 1).

#### **Strategic areas that health security should address**

##### *Health literacy*

Health literacy is critical to health empowerment and it plays a vital role in ensuring the health security of any nation. Stakeholders in the health sector must therefore develop and disseminate health information

**Table 1:** SWOT Analysis of the Nigerian Health Care System

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>• Several diseases are preventable and or treatable</li> <li>• Existing “systems” – e.g. structures, personnel (orthodox/traditional) which can be leveraged to provide healthcare</li> <li>• Over the large years, specialty training for medical health professionals has generally increased across the nation.</li> <li>• Increased internet coverage has improved access to online health information.</li> <li>• Existing linkages with national and international academic, health systems, United Nations Agencies and funding organizations.</li> <li>• Impressive human resource characteristics               <ol style="list-style-type: none"> <li>1. Large pools of expertise in health systems and associated disciplines</li> <li>2. A large pool of young and trainable individuals who could potentially contribute to the healthcare workforce</li> <li>3. Large population of generally healthy workforce contributing to economy</li> </ol> </li> <li>• Sizeable grey (untapped) economy</li> </ul>	<ul style="list-style-type: none"> <li>• Near collapse of the primary health care system.</li> <li>• Incessant workplace conflicts in health-systems               <ol style="list-style-type: none"> <li>1. Near-continuous industrial actions by healthcare workers occasioned by continued demand for better welfare packages</li> <li>2. Lack of team-based approach (by the professionals) to address health-systems challenges</li> </ol> </li> <li>• Weak health system which is unable to address the growing dual burden of communicable and non-communicable diseases including injuries</li> <li>• Inadequate numbers of specialized healthcare personnel and poorly trained healthcare workers</li> <li>• Fake and substandard drugs, poor drug distribution and regulation</li> <li>• Healthcare financing is out of pocket in more than 95% of cases with less than 1% national health insurance coverage<sup>10</sup>.</li> <li>• Poor facilities and infrastructure [e.g. poor transportation, communication, water and electricity supply]</li> <li>• Poor retention policies for healthcare workers</li> <li>• An escalating rural-urban migration of healthcare workers</li> <li>• Lack of enforcement of environmental protection policies</li> <li>• Incomplete or inadequate epidemiological (surveillance) data to support an accurate needs assessment</li> <li>• Poorly designed and implemented health-system policies that are not directed at the health needs of, and the realities of health care delivery in, the community</li> <li>• Limited diagnostics for diseases and lack of coordinated prevention activities</li> <li>• Poor prevention/infection control practices both at the community and facility levels</li> </ul>
<p><b>Opportunities</b></p> <ul style="list-style-type: none"> <li>• Available international collaborative health initiatives, programs and development</li> <li>• Leveraging technology (mobile health and telemedicine) for healthcare delivery and reporting</li> <li>• Availability of global policies and frameworks to guide national programs i.e. the SDGs.</li> <li>• Available Public Private Partnership Initiatives for health and development</li> <li>• Leveraging on available expertise and collaborative international efforts on protection of the environmental</li> </ul>	<p><b>Threats</b></p> <ul style="list-style-type: none"> <li>• Bureaucracy in the implementation of health-related policies.</li> <li>• Regional insecurity and economic instability.</li> <li>• Corruption, poor funding and lack of political leadership to implement policies and projections</li> <li>• Internal and external migration of the young, healthy and specialized healthcare personnel</li> <li>• Reduction/total stoppage of external donor aid for healthcare services, e.g. the imminent “graduation” of Nigeria from the global vaccine alliance programme.</li> <li>• Food and water shortage will be a threat to nutrition and general health security by 2050</li> </ul>

- Climate change/natural disasters/existing climate conditions
- Air, Water, Land and Noise Pollution
- Internal and external migration
- Poor regulatory structures
- Political unrest/civil conflict
- Harmful traditional and social practices
- Increasing levels of poverty
- Declining trust/belief in the nation state, its governance structure and systems
- Unregulated proliferation of non-clinically trained physicians and surgeons

**Table 2: Short, Medium, and Long-Term action plans and interventions to promote health security in Nigeria**

	Plans	Deliverables
Short term (<5 years)	<ul style="list-style-type: none"> <li>• Improved health literacy</li> <li>• Training and re-training of all categories of health workers</li> <li>• Revamp existing facilities</li> <li>• Make drugs/vaccines of “common” diseases available</li> <li>• Improve health surveillance systems</li> <li>• Provide effective border control to check drug trafficking</li> <li>• Re-introduction of 5 year national development plans which should include policies to attract the private sector into health-system financing and provision</li> <li>• Increase research into health-needs and health-care delivery</li> <li>• Involvement of health-professionals training institutions in formulation and implementation of healthcare delivery policies</li> <li>• Improve structure and function of health-systems regulatory organization</li> <li>• Define goals of health-system and roles of health-professionals in achieving the same</li> <li>• Enlightenment programmes on, and enforcement of environmental protection policies</li> <li>• Enlightenment programmes on the need for population control</li> </ul>	<ul style="list-style-type: none"> <li>• At least 25% of population are health literate.</li> <li>• At least 75% of media outlets run health-related awareness campaigns.</li> <li>• Surveillance should be functional up to 50%</li> <li>• Border control is improved at 50% functionality</li> <li>• Increased interest of private sector in health care, education and delivery</li> <li>• Streamlining policies and activities of health-professionals training and health care delivery institutions</li> <li>• Reduce workplace conflicts in the health-system</li> <li>• Increase information about health-systems needs and operations</li> <li>• Increased awareness and reduced pollution of the environment and the associated diseases</li> <li>• Increasing awareness on the need for population control</li> <li>• Relevant policies and legislation 80% revised and implemented.</li> <li>• Education curricula 100% revised to include health security issues.</li> <li>• Reduced population growth will reduce pressure on land, water and other resources.</li> <li>• Research outcomes should be applied up to 25%</li> <li>• Production of fit-for-purpose and fit-of-purpose health professional and healthcare workers, thereby increasing their employability</li> <li>• Increase employment and retention of healthcare workers and reducing brain drain</li> </ul>

	<b>Plans</b>	<b>Deliverables</b>
Medium term (5-10 years)	<ul style="list-style-type: none"> <li>• Revise and implement health care policy</li> <li>• Introduce health security issues into education curricula at all levels</li> <li>• Control population growth by adopting a 1-child policy akin to the Chinese family planning policy of 1979<sup>16</sup>.</li> <li>• Country-based/societal-needs health research should be strengthened</li> <li>• Revise health-training curricula to direct them towards health-system needs and operations</li> <li>• Revise health system policies to better define areas for private sector involvement and investment</li> <li>• Increase private sector involvement in the better-defined areas of the health-system</li> <li>• Strengthen the environmental protection agencies</li> </ul>	<ul style="list-style-type: none"> <li>• Further reduction in environmental pollution and the cost of treating the associated diseases</li> <li>• Children under 5 and the elderly (above 65 years) may receive 100% premium subsidy while children from above 5 years old up to 18 years old may receive up to 50% premium subsidy. Others can get a 25% premium subsidy.</li> <li>• Improve the health and quality of life of 70% of Nigerians</li> <li>• Continue increase employment and retention of healthcare workers and reducing brain drain</li> <li>• Reduce unemployment and workplace conflicts</li> <li>• Improve quality of life and life expectancy</li> <li>• Easier enforcement of environmental protection</li> </ul>
Long term (>10 years)	<ul style="list-style-type: none"> <li>• Develop and implement a robust NHIS</li> <li>• Fully link health-training and health-system needs and operations</li> <li>• Fully strengthen prevention infrastructure.</li> <li>• Eradicate malaria and other neglected tropical diseases</li> <li>• Establish accurate statistics on current diseases burden</li> <li>• Empower citizenry socioeconomically (e.g. job creation and security)</li> <li>• Continue drive to focus government involvement to health systems governance and regulation</li> <li>• Entrench the private sector as a major stakeholder in health-systems financing and operations</li> <li>• Reduce health related mortality and morbidity</li> <li>• Reappraise existing policy</li> <li>• Engendering the culture of environmental protection</li> </ul>	

that is accurate, accessible, and actionable taking into cognizance the language, literacy level, and cultural diversity of Nigeria. The health information should be delivered using appropriate health promotion and education approaches.

#### *Economic stability*

The relationship between the economy and health is bidirectional [11], as increased performance of the economy, if the effect is evenly distributed, will enhance household income, improve their welfare, reduce risk of illness, and be able to pay for their health needs. Therefore, securing economic stability for the country is absolutely essential in ensuring health security.

#### *Infectious diseases control*

Infectious diseases remain a leading cause of morbidity and mortality in Nigeria. The communicable nature of infectious diseases has made it difficult to eradicate these diseases. Many infectious diseases can be prevented by simple, effective and relatively low-cost interventions. However, policy failure, poor infrastructure and inadequate healthcare workforce have prevented Nigeria from achieving disease control. Nigeria needs to deal with such diseases and eradicate some by 2050.

#### *Reproductive health*

Huge gaps still exist in the reproductive health indices of Nigeria. Maternal and perinatal morbidity and mortality, poor contraceptive prevalence rate, unmet need for family planning, high incidences of unsafe abortions and its sequelae and high rates of vesico-vaginal fistula remain a huge burden. With all these in perspective, the fertility rate of the country is still too high for adequate population control, as documented in the 2016/2017 Multiple Cluster Survey [12], and this needs to be urgently checked to prevent a population explosion by 2050.

#### *Drug manufacturing, monitoring and compliance*

The facilities and personnel for quality drug manufacturing, distribution and monitoring should be upgraded and their activities well coordinated. Adherence to medication hinges on mental state, access, poverty and education. Therefore there should be restriction of drug sales, with prescriptions necessary for purchase.

#### *Use of psychoactive substances:*

This is an important component of health and national security because with increasing rates of use of psychoactive substances there is a concurrent

rise in crime rates, road traffic accidents and general insecurity. Currently, Nigeria has evolved from a largely transit nation for psychoactive substances to a high consumption nation [13]. This is likely to worsen over time if there is no rational, deliberate and coordinated plan to halt and reverse this trend. Interventions must focus on behaviour change interventions with a special focus on prevention and mental health promotion activities; training and re-training of staff in regulatory agencies, development and revision of existing policies; as well as better policing and enforcement of access restriction.

#### *Violence, conflicts, humanitarian emergencies and natural disasters:*

These all have the similar theme of disorder and chaos, and may be associated with disease occurrence or spread. Successful management of these will depend on the level of preparation, early warning mechanisms and risk assessment and prediction infrastructure put in place.

#### *Oral health*

Very few Nigerians have access to oral health care and this is responsible for the high prevalence of oral diseases. Those that have geographical access may not have the financial capability to pay resulting in the high rate of unmet dental needs. Oral health awareness is also poor and interventions for oral health security must include full integration of oral health care services into existing primary health care, a vigorous oral health awareness campaign and a revision of services covered by the National Health Insurance Scheme (NHIS).

#### *Brain drain of health professionals:*

Migration of health professionals from developing countries has become a major threat to health security. This brain drain worsens the already depleted healthcare resources in poor countries and widens the gap in health inequities worldwide. In Africa alone, where health needs and problems are greatest, around 23,000 qualified academic professionals emigrate annually [14]. According to NOIPolls, a polling organization, the UK employs approximately 12 new Nigerian doctors per week while 88 percent of these professionals in the West African country are reported to be planning to migrate. This has further worsened the physician-patient ratio in Nigeria from 1:4,000 to 1:5,000, contrary to the World Health Organizations' (WHO) recommended of 1:600 [15]. Other professionals like nurses, medical laboratory scientists and pharmacists are also migrating out of the country. For Nigeria to

achieve health security by 2050, far-reaching steps have to be taken to reverse this trend

#### *Health professionals' education*

The quality of the health care in any nation is hinged on the quality of the health care providers. It has been suggested that the primary aim of health professionals' education should be to address the health needs of the population and the systems they serve [16]. Thus the various curricula should be revised to be locally sensitive and globally relevant. The role of this education should go beyond transmission of scientific information to leadership, advocacy, continuous professional development and research. For Nigeria to adequately serve the health needs of its people, existing policies must be adapted to achieve the goals mentioned earlier.

#### *Food security*

The current level of food insecurity in Nigeria is high. Strategies to increase food production, food processing and preservation, strategic grain/food reserves, market and access, food price control, matching income with inflation rates, involving public-private partnerships, cottage industries enabling environment need to be adopted, adapted, and coordinated to ensure food security on a sustainable basis.

#### *Environmental health*

Nigeria has substantial environmental problems. These vary from erosion, drought and desertification, oil pollution from spills to loss of biodiversity, toxic waste from manufacturing industries and e-wastes. All these affect the health of the population in diverse ways. Currently little attention is being paid to waste management, especially that of e-wastes [17]. Urgent attention is needed in this sector to forestall a severely hazardous environment by 2050.

#### *Climate change*

The international scientific accord presented by the Intergovernmental Panel on Climate Change confirms that climate change and global warming are undeniable, are happening now, and will continue in the future. Scientific evidence also shows that some aspects of climate change and global warming have already caused threats to human health; and that the net global effect of projected climate change on human health is expected to be negative [18]. The impacts of climate change in Nigeria include rising temperatures, more intense and frequent extreme weather events and sea level rise. This could result in increased water and food insecurity, higher

exposure to heat stress and ultraviolet radiation, changes in infectious and vector borne disease transmission patterns and an increased threat to coastal communities facing sea level rise [19]. Adequate intervention by the Government and Non-Governmental Organization could help to ensure environmental health security by 2050.

#### **Suggested Plans and Interventions**

The challenges undermining the Nigerian health system are deep-rooted. It is unlikely that a single intervention will be sufficient to address these challenges. We therefore suggest short (less than 5 years), medium (5-10 years) and long-term (>10 years) interventions to ensure that health security is achieved in Nigeria by 2050. Details of the specific intervention components and expected deliverables are provided in Table 2.

**Short-term:** In the short term, there is need for improved health literacy among the citizens, training and re-training of all health workers including emphasis on teamwork and synergy of efforts. Urgent rehabilitation of all existing health facilities in the country is also needed for immediate healthcare impact. Examples of some of the proposed interventions for the medium term are control of the population growth using culturally acceptable means such as the one child-policy adopted by China in 1979 [20], revision of health-training curricula towards health-system needs and operations as well as revision of health system policies to better define areas for private sector involvement and investment.

**Medium-term:** The place of collaboration between government agencies cannot be overemphasized in achieving these goals e.g. the mission for the Nigeria Centre for Disease Control (NCDC), set over five years (2017-2021) is 'To protect the health of Nigerians through evidence-based prevention, integrated disease surveillance and response activities, using a one health approach, guided by research and led by a skilled workforce' [21]. This agrees with our medium term goals, therefore there must be a forum for discussion and planning together, as a team, so that actions by different health-related agencies are properly coordinated and synergistic. There is need to advance the NHIS to cover all Nigerian citizens comprehensively. Also, malaria and other neglected tropical diseases must be eradicated and our prevention infrastructure strengthened.

**Long-term:** The role of the educational sector in achieving health security is also pivotal. This sector can use a multi-disciplinary approach including; research and knowledge generation

(evidenced based reports can influence health policy and interventions), teaching and knowledge reproduction (appropriate health curriculum will develop a work force that prevents and solves problems) and community action (this is engendered by increasing community awareness and participation in health matters).

### Funding the Interventions

Funding these proposed interventions will require development of innovative strategies. We suggest exploration of multiple funding schemes including community funding such as cooperatives and crowd-funding, government funding through capitation, private sector (including public-private) partnerships, creation of health donor funds and foundations and development of a health solidarity fund (sin tax [22]) in which 1% of profits of companies operating in Nigeria will be pooled into the health fund. This should be increased to 2% of the pump price of petroleum products, and of profits of companies with products that have direct impact on the health of the people e.g. tobacco, alcoholic beverage manufacturers and marketers, mining and petrochemical exploration companies.

### Monitoring and Evaluation of Interventions

After implementation, the proposed interventions must be monitored to track progress and modified to ensure they achieve their purpose. There is therefore the need to strengthen the existing national data collection agencies including the National Bureau of Statistics and NCDC. There is also need to adopt the RE-AIM [23] (RE-AIM stands for: Reach your intended target population; Efficacy or effectiveness; Adoption by target staff, settings, or institutions; Implementation consistency, costs and adaptations made during delivery; Maintenance of intervention effects in individuals and settings over time) indicators<sup>(8)</sup> as tools for measurement of health impact, assessing coverage for health services (both geographical and specialty type) and appraising health system outputs (availability, access, quality and safety).

### Conclusion

Ensuring health security for Nigeria in 2050 requires multi-sector remodelling of not just the health-systems but also the socio-economic infrastructure. This demands the commitment of government to the execution of these strategies. It also requires a re-orientation of the administrative and technical leadership as well as the security agencies and

judiciary. Indeed, the resolve of the government and the determination of the Nigerian people must not wane in the promotion of health and preservation of health security, for this is a pedestal to enhance the socio-economic development of Nigeria.

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## Achieving food security in Nigeria by 2050

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### Abstract

**The Problems/Issues:** The level of food insecurity as of now in Nigeria is higher. The consequences in term of morbidity, mortality, malnutrition rates and epidemiological statistics are summarily high. While food production is inadequate and food export bill is rising, population and therefore demand is and will continue to rise. Several agricultural and related policies exist; however if concerted effort is not put in place now and strategies designed and developed, food security in Nigeria by 2050 will be at a very low and problematic level, affecting not only health but economy and social order.

**The Plan of actions:** Strategies to increase food production, food processing and preservation, strategic grain/food reserves, market and access, food price control, matching income with inflation rates, involving public-private partnerships, cottage industries enabling environment need to be adopted, adapted, and coordinated to ensure food security on a long term, sustainable basis. A food cabinet similar to a war cabinet under the Presidency is recommended for success.

**Conclusions:** Planning is a first step in the right direction, however effective, efficient and measurable success depends on political will, adequate funding, prioritization, in-built strategies for sustainability, monitoring and evaluation. Security will guarantee not only food and nutrition security but also health and economic security.

**Key words:** Food security, public-private-partnership, sustainability, food production

### Abstrait

**Les problèmes :** Le niveau d'insécurité alimentaire est actuellement plus élevé au Nigéria. Les conséquences en termes de morbidité, mortalité, taux de malnutrition et statistiques épidémiologiques sont sommairement élevées. Tandis que la production alimentaire est insuffisante et que la facture d'exportation de produits alimentaires augmente, la population et en effet la demande augmente et continueront d'augmenter. Plusieurs politiques

agricoles et connexes existent ; toutefois, si aucun effort concerté n'est mis en place et que des stratégies ne sont conçues et développées, la sécurité alimentaire au Nigéria d'ici 2050 sera à un niveau très bas et problématique, affectant non seulement la santé mais aussi l'économie et l'ordre social.

**Le plan d'action :** Des stratégies pour accroître la production alimentaire, la transformation et conservation des aliments, les réserves stratégiques de céréales / aliments, le marché et accès, le contrôle des prix des produits alimentaires, l'adaptation du revenu aux taux d'inflation, les partenariats publics-privés, l'environnement propice à l'industrie artisanale, ont besoins d'être adapté et coordonné pour assurer la sécurité alimentaire sur une base durable et à long terme. Un cabinet alimentaire semblable à un cabinet de guerre placé sous la présidence est recommandé pour le succès.

**Conclusions :** La planification est un premier pas dans la bonne direction, toutefois, le succès efficace et mesurable dépend de la volonté politique, d'un financement adéquat, de l'aménagement des priorités, de stratégies intégrées de durabilité, de suivi et d'évaluation. La sécurité garantira non seulement la sécurité alimentaire et nutritionnelle, mais également la santé et la sécurité économique.

**Mots clés :** sécurité alimentaire, partenariat public-privé, durabilité, production alimentaire

### Introduction

Until recently, the absence or presence of hunger was the primary measurement by which many experts assessed food security as it applies to an individual's well-being. However Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life [1]. According to the Food Agriculture Organization [2] food insecurity refers to the consequences of inadequate consumption of nutritious food, considering the physiological use of food by the body as being within the domain of nutrition and health. The implications for health security are obvious. The depletion of Agricultural productivity has led to a transition in dietary pattern and eventually an epidemiological transition. Nutrition and Health are inextricably interwoven; there are the preventive and therapeutic functions of Nutrition in Health [3].

People eat food not nutrients, but in the assessment of dietary adequacy, we are more concerned with the latter rather than the former. Nutrition is ironically not prominently emphasized in the formulation and implementation of national development programs of many technically developing countries. Malnutrition is a major public health problem in Nigeria [4]. Considering the increase in the population which is placing pressure on natural resources, coupled with a dependence on importation of food instead of focusing on improved local production, the resultant high levels of food insecurity is not unexpected. It is none less expected that sustainable development is also stunted. The relationships between food (and nutrition) security and national development are directly proportional to each other. The improvement of the former will usually determine the occurrence of the latter, and vice-versa. What is still a deadlock in the Nigerian set up is an inability to fully convert wealth from oil revenues to improve the country's agricultural system. This concept note attempts to describe the present food security situation in Nigeria, examine the possible opportunities for improving the prevalent weaknesses and threats and finally provide an approach for attaining a food secure Nigeria by, or before, the year 2050.

### Situation analysis

The Food Agriculture Organization [2] suggests that for a country to have sustainable food security, food supplies must keep pace with increase in population and urbanization. With an ever increase in Nigeria's population especially coupled with rural urban migration (which reduces agricultural man-power), Food supplies have increasingly been burdened by higher demands and thus leading to an influx of imported alternatives. The emergence of oil sector and the substantial revenue accruing from the sector shifted emphasis from agriculture to the extent that even domestic food production is not given the desired attention. The government felt that it was better to import food than to embark on local production, especially when oil money has changed the preferences of most Nigeria in favor of foreign imported goods. Studies have shown the prevalence of food insecurity in Nigeria to be in the range of 29.3-70.0% across the states in Nigeria [5-8]. Some reasons are mentioned that specifically highlight the factors causing Food insecurity in Nigeria [9,10]: (a) Gender Inequality, (b) Policy inconsistencies and Corruption, (c) Poverty and Hunger (d) Conflicts (e) Natural Disasters and Climate Changes (f) Low level of Technology, (g) Poor Agric financing, Rural Urban migration (h) Post -Harvest losses.

The current Nigeria's National Strategic Plan of Action on Nutrition [11] identified 16 key activities that are crucial to achieving food security in Nigeria; these are (a) Capacity building of small scale farmers on the cultivation of high yield and micronutrient rich crops: cassava, sweet potato, sorghum, soybeans, cowpea, groundnut, (b) Production and promotion of the consumption of Vitamin A, and micronutrient rich foods (orange flesh sweet potato, pro-vitamin A cassava, yellow maize, iron sorghum, soybeans, cowpea, groundnut) (c) Production and promotion of the consumption of iron and zinc bio-fortified beans (d) Promote production and diversification of fruits and vegetables around the homesteads, schools, orchards and farms (e) Capacity building for food and nutrition teachers and food vendors on the need to provide nutritionally adequate meals using locally available foods through linkages of food vendors and school system (f) Capacity Building of Teachers (Agriculture, Home Economics and Food and Nutrition) on nutrition sensitive agriculture to ensure food and nutrition security in community schools (g) Promote Cooperatives, Saving and Loans Schemes so that beneficiaries can expand their businesses (h) Provision of starter packs for fruits and vegetable farming (in seven agro ecological zones) for 1 women for HH gardening (i) Provision of small ruminant starter packs (5 sheep/goats, concentrates, minerals and vitamins, vaccines and drugs) to women farmers (j) Produce IEC materials/ brochures value chain products, including nutritional benefits of consuming the products (k) Community nutrition programs for behavior change communication with focus on exclusive breastfeeding and appropriate complementary feeding practices (l) Promote micro nutrient fortification of common breakfast meals staple food crops (Legislate fortification of industrially processed rice, Noodles and Palm oil) (m) Promote improved food quality and safety through electronic and print media (n) Develop food rations or supplements to promote nutrition and health in emergency situation (o) Develop food recipes in line with the National Food Based Dietary Guidelines, and disseminate to schools, workplaces and food vendors (p) Institute a coordination platform for early warning mechanisms to cope with emergency at community level.

### Forecasts for 2050

(a) *worst case scenario*: if the situation remains as it is now (2018), the country will still remain food insecure by the year 2050 (b) *best case scenario*: if

**Table 1:** SWOT Analysis of Agricultural systems in Nigeria

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>• Superabundance of arable agricultural land. 70% of land in Nigeria is suitable for cultivation [12].</li> <li>• The climatic conditions are also conducive to produce variety of food and cash crops.</li> <li>• A large pool of human resources and technology is available to cultivate the land for food production.</li> <li>• Skilled human resources available from research and development institutions [13]</li> <li>• Existence of agriculture and food security policies, health policies and several relevant policies which are on the book.</li> </ul>	<ul style="list-style-type: none"> <li>• Peasantised, rain-fed agriculture,</li> <li>• Huge post-harvest losses,</li> <li>• Lack of food preservation and processing on a large scale</li> <li>• Poor marketing strategies</li> <li>• Inefficient infrastructure needed for transport and storage.</li> <li>• Unstable nature of policies and poor policy implementation are</li> </ul>
Opportunities	Threats
<ul style="list-style-type: none"> <li>• Tremendous potential for adequate food production, processing, preservation, storage, transformation to other products.</li> <li>• Strategic grains reserves are not available despite infrastructure.</li> <li>• A large and expanding domestic and international market for most of Nigeria's products is still yet untapped.</li> <li>• Substantial income from crude oil sales which could be channeled into various agricultural value chains for a better food security status. The potentials of petrochemical products such as fertilizers could reduce cost of production which will improve productivity [13]</li> </ul>	<ul style="list-style-type: none"> <li>• Post-harvest losses due to lack of industrial food processing.</li> <li>• Lack of basic social/industrial catalysts (electricity, water, enabling environment).</li> <li>• Climate change which is a slow but salient challenge been experienced globally.</li> <li>• More threatening are conflicts and civil insecurity witnessed in numerous parts of country.</li> <li>• Massive displacement of people in a nine-year-long conflict in the northeastern part of Nigeria is affecting 2.3 million people [14]</li> <li>• Herdsmen and farmers clashes affecting value chains of staples originating from the central part of the country.</li> <li>• In the southern parts of the country, absence of environmental friendly exploration of crude oil has left numerous communities without arable land and also water bodies without marine life.</li> </ul>

multiple strategies that complement each other as suggested are implemented, strengthened by security and elimination of corruptive wastages, Nigeria will not only be self-sufficient in food but will also generate income perhaps similar to income from crude oil by 2050 (C) *realistic forecast*: if some attention is generated, but no political will, some efforts will be put in place, the effect of which will be minimal on food and nutrition security. Therefore the food security situation as at 2050 may have improved by 10% to 15%.

#### Short and medium action plans

**Short Term Plans** (1 to 5yrs) A structure need to be built for the set-up and coordinating of strategies, institutions, funding, monitoring and Evaluation

**Deliverables:** (a) In the short term, an institution to coordinate issues of Food Security: Roads, Inputs into agricultural production (seeds, seedlings, cuttings and chemical inputs), Land clearing, Roads, Policy on strategic reserves, price control (b) Policy and infrastructure on processing and Preservation (Provision of electricity for the industrial base perhaps generating industrial electricity from the gas which is being wasted by flaring, and other feasible means!) (c) Adequate Security and the rule of law and order to guaranty safety of investment and continuity in policy

**Medium term (6 to 10 years):** This will have to involve the private sector in order to be sustainable. It must also engage the large populations that are unemployed or under-employed. Is it possible to assist the farming force by providing means of

cultivation at a reduced cost, buy the produce at price which is controlled, store excess in silos, supply enough produce to industries, and provide the critical inputs of production at a cost? These will necessitate business models which are not consistent with government service, but are the modus operandi of the private, for gain ventures.

**Long term (15 yrs. and above);** Food production enough for the increasing population and enough to store to obviate any shocks (catastrophes, droughts etc). There is no need to re-invent the wheel; there are many nations that are currently food secure and also health secure. Let us study them and evolve our own strategy.

**Cost Estimates:** (a) short term: \$2/head/day\* population estimate (b) medium term: \$4/head/day/ population (c) Long term: \$5/head/day/population

**Sources of Funding:** From the crude oil sales as security vote

**Monitoring and Evaluation:** External and Internal (UN Agencies, World Bank, Internal mechanisms specifically set up)

### Conclusion

Nigeria is currently food insecure, the best of the effort may be effective (for now), but increasing population, volatile food prices, alternate source of fuel may render the future into an era of near famine. Examples of counties that were once rich but now poor and unable to provide food and medicine for their population abound. Diversification of income sources and being food secure should move from the theoretical realms to practical experience. Food insecurity in Nigeria is not solely tied to underproduction (Nigeria contributes substantially to global production of roots and tubers, cereal, and legumes). Stepping up production is not a panacea or silver bullet for food insecurity in Nigeria, thus, an all-encompassing, holistic approach needs to be employed and advantages accruing to this synergy would be gotten [15]. Food wastage has also been indicated as a bane of food security in Nigeria, with reported food wastage of 0.81 million metric tonnes between 1995 and 2000 and this would reduce greatly if storage facilities are in place [16].

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## Nigerian environment and health security: Current issues and projections to Year 2050

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### Abstract

**Background:** In line with the NUC request to the University of Ibadan to develop a 'Blueprint for Health Security in Nigeria by 2050', this document was prepared to highlight steps and discuss actions required toward achieving this goal.

**Method:** The situation of environmental problems in Nigeria such as: erosion and land subsidence, flooding (coastal, river and urban), drought and desertification, oil pollution from spills, and well blow-outs, biodiversity loss, industrial and municipal pollution from wastes, climate change, toxic and hazardous wastes, including E-waste, were addressed in the blueprint. **Results / Comments:** Although Nigeria is unlikely to be attacked with nuclear explosives, plans of nuclear power development, makes it desirable for nuclear security and emergency preparedness response measures to be put in place. A holistic forecasting of major environmental health factors is suggested; keeping in view the year 2050 is a little over 3 decades away. In addition, SWOT analysis of Environmental Management was carried out while processes of monitoring and evaluation, as main tools for achieving health security in Nigeria by 2050 were identified and reported.

**Conclusion:** Achieving health care for all by 2050 though a gigantic task, Nigeria has adequate Environmental Health and Scientific manpower and resources to address the issues. This document should educate the general public on Environmental Health and its different components which include; Climate Change, Water, Sanitation and Hygiene (WASH), Environmental Chemical Pollution, Food safety and Hygiene, Waste Management and Air Quality among others.

**Keywords:** *Climate change, Exposure assessment and environmental toxicology, Environmental management, Environmental pollution, Erosion and flooding, Health security,*

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### Abstrait

**Contexte :** Conformément à la demande de la Commission Nationale des Universités à l' Université d'Ibadan pour développer un 'Plan directeur pour la Sécurité Sanitaire au Nigeria d'ici 2050', ce document était prêt à mettre en évidence les étapes et discuter des actions nécessaires en vue d'atteindre cet objectif.

**Méthode :** La situation des problèmes environnementaux au Nigeria tels que: l'érosion et l'affaissement du sol, les inondations (côtière, rivière et urbaine), la sécheresse et la désertification, pollution par les déversements d'hydrocarbures, et éruptions des puits d'hydrocarbures, la perte de la biodiversité, la pollution industrielle et municipale des déchets, le changement climatique, les déchets toxiques et dangereux, y compris les déchets électroniques, ont été abordés dans le plan directeur.

**Résultats / Commentaires :** Bien que le Nigeria soit peu susceptible d'être attaqué avec des explosifs nucléaires, les plans de développement de l'énergie nucléaire rendent souhaitable la mise en place de mesures de sécurité nucléaire et de préparation aux situations d'urgence. Une prévision holistique des principaux facteurs de santé environnementale est suggérée; gardant à l'esprit que l'année 2050 est un peu plus au-delà de 3 décennies. En outre, l'analyse SWOT de la gestion de l'environnement a été réalisée au cours des processus de suivi et d'évaluation comme principaux outils permettant de réaliser les objectifs de sécurité sanitaire au Nigeria d'ici 2050 ont été identifiées et rapportées.

**Conclusion :** Assurer les soins de santé pour tous d'ici à 2050, bien qu'il s'agisse d'une tâche gigantesque, le Nigeria dispose du personnel de santé environnementale et des ressources scientifiques nécessaires pour faire face aux problèmes. Ce document devrait informer le grand public sur la santé environnementale et ses différentes composantes, notamment: Changement climatique, eau, assainissement et hygiène (WASH), pollution chimique de l'environnement, sécurité alimentaire et hygiène, gestion des déchets et qualité de l'air, entre autres.

**Mots - clés :** *Changement climatique, évaluation de l'exposition et toxicologie environnementale, gestion de l'environnement, pollution de l'environnement, érosion et inondations, sécurité sanitaire,*

An abridge submission by the Environmental Health Group, College of Medicine, University of Ibadan, Nigeria.

## Introduction

Environmental Health deals with all the physical, chemical, and biological factors external to an individual and all the related factors. Environmental health plays an important role in impacting ecosystems and human health [1]. Environmental health in Nigeria has evolved from traditional practices through organized systems covering pre-colonial, colonial and post-colonial periods. Understanding of environment related diseases has moved away from centuries old supernatural beliefs to evidence based causative agents which are physical, chemical or biological in nature [2]. Environmental health has several components. These are shown in Figure 1.

was 5.2 per cent. Agriculture contributed to 26% and livestock 6% of GDP in 2003. Industry contributed to 30.5% of GDP, mostly from oil. For the period 1990 to 2003 household consumption grew at an annual rate of 3.7%. In 2001 it was estimated that approximately 51% of household consumption was spent on food, 31% on fuel, 2% on health care, and 8% on education. By 2000 about 60% of the population had income below the poverty line. Of the 57.21 million of labour in 2005, an estimated 70% were in agriculture, 10% in industry, and 20% in services. The unemployment rate in 2005 was estimated at 2.9%. The total number of housing units in 1992 was 25,661,000.



Fig. 1. Components of Environmental Health [3]

## Nigeria at a glance

Nigeria has a total land area of 983,213 km<sup>2</sup> occupied by a population of 195,875,237 with more than 250 ethnic Groups as of 2018. The country has 6 Ecological Zones with varying climate. Roughly 13,517,000 hectares of land (14.8%) is under forest. Oil sector contributed to 89.2% of exports as of 2003. Natural gas reserves were estimated at 176 trillion cu ft (as of 1 January 2005). Politically, the country is divided into 36 States, One FCT and 774 Local Government Areas. In 2002 the country had an estimated 193,200 km of roads, including 1,194 km of expressways. In 2005 Nigeria's GDP was estimated at \$132.1 billion and the annual growth rate

As of 2004, there were an estimated 27 physicians, 66 nurses, 2 dentists, 8 pharmacists, 9 medical laboratory scientists and 52 midwives per 100,000 people. Lack of proper facilities and inadequate salaries promoted more private health facilities. There was also increased brain drain for several years. Total healthcare expenditure stood at 2.8% [4].

## Situation of Environmental Problems in Nigeria and the Health Impacts

A report from Nigerian Environmental Statistics Unit listed the critical environmental problems in Nigeria [5]: sheet erosion, gully erosion, coastal and marine

erosion and land subsidence, flooding (coastal, river and urban), drought and desertification, oil pollution from spills, and well blow-outs, biodiversity loss, urban decay and squatter settlements, industrial and municipal pollution from wastes, concrete jungles/cities and climatic change. Additional to this, air pollution is on increase due to inappropriate cooking fuels, automobiles, motorcycles, unplanned industrial parks, auto mechanic workshops, small and medium scale industries scattered in unauthorized locations, and market and trading activities.

When the current environmental problems are prioritized, Water Sanitation and Hygiene (WASH) based diseases take priority among the communicable diseases. A World Bank report (Punch, August 28, 2017), revealed that Nigeria provided clean water to fewer than 10 per cent of its city dwellers in 2015, down from 29 per cent 25 years earlier i.e. 1990. Water Aid lamented that as of 2018, in Nigeria 59 million people do not have clean water (coverage 67% by 2015), and 123 million do not have a decent toilet (Coverage 33% by 2015) and 59,500 children under the age 5 die every year. Girl education is hampered due to lack of menstrual hygiene facilities in schools. The SDG Goal 6 therefore demands “Ensure Access to Water and Sanitation for all” (Water Aid, <https://www.wateraid.org/uk/where-we-work/nigeria>, Accessed May 23, 2018). Adequate WASH facilities cost US\$3 per capita as of 2010. Water supply and sanitation are not provided efficiently in Nigeria. It was reported that State Water Agencies are massively overstaffed – in 2000, there were about 70 staff per 1,000 customers in State Water Agencies [6].

Nigeria has been fortunate over the years in eradicating small pox, plague, Guineaworm and to a great extent Polio. Nigeria is also plagued with threat of Emerging infections such as Ebola, SARS, Lassa fever and others lurking in the environment and showing up in epidemic proportions. Historically, HIV and the associated secondary infections and Ebola have reawakened the importance of environment in disease transmission and appropriate mitigation measures by addressing sanitation and hygiene at individual and community level. Diarrhea, typhoid, malaria are still threats in many Nigerian communities and effective preventive measures are required. Serious among these are also water-, soil-, air-, and food- borne infections affecting children, and other vulnerable groups particularly in the high and medium density communities.

Waste management is a serious threat and to date no city has found a viable solution. Faeco-oral, zoonotic

infections and vector-borne infections are associated with wastes beside being a nuisance and poor aesthetics. Some years ago in Sokoto a yellow fever epidemic was attributed to uncleared waste dumps in the city. Dengue, Chikungunia and encephalitis are new entries of mosquito-borne infections. Toxic and hazardous wastes including E-waste are mixed with residential municipal waste which is linked with human behavior and attitude. The recent lead poisoning episode in Zamfara State [7] is an eye opener due to mining activities which are environmental in nature. Fortunately, Nigeria does not produce much nuclear waste as most of the usage is in small quantities in nuclear medicine, oil exploration and some diagnostic and research laboratories.

The rural scenario is no better as the farming and fishing populations suffer from preventable diseases due to poor sanitation and hygiene practices and farm inputs such as excessive and inappropriate use of pesticides and other biocides, besides occupational injuries and poisoning. Neglected tropical diseases (NTDs) are also emerging at an alarming rate. In addition, the vector borne infections are closely associated with the environment. Newer infections due to increasing resistance of the organisms to chemicals, antibiotics and drugs is another emerging threat which require priority actions as they are challenging the existing preventive and therapeutic measures. The present situation calls for proper planning and judicious actions through intelligent decisions in the over three decades to make total health achievable in Nigeria. The following forecasting is suggested, keeping in view the year 2050 is a little over 3 decades away.

#### **Forecasts to 2050 and Management Plans**

The year 2050 is just 32 years ahead. This period may be conveniently divided into 3 phases- 2019 – 2030 (12 years), 2031-2040 (10 years) and 2041-2050 (10 years) and some of the priority areas to be addressed are listed (Appendix; Tables 1 & 2)

#### **Sources of Funding**




The sources of funding may include the following:

- International organisations: WHO, UNICEF, UNEP, UNIDP, DFID etc.
- Government Agencies
- Others (philanthropist)

#### **Monitoring and Evaluation**

Monitoring of environmental health programme or intervention project is “an ongoing, continuous

**Table 1. Forecasts for priority Environmental Management and Actions to prevent disease for improved health**

	2019-2030	2031-2040	2041-2050
	Short Term	Medium Term	Long Term
<b>Environmental Component</b>			
<b>Water</b>	Items: 1, 2, 3, 4, 5, 6 and 8.	Items: 7 and 8.	Items: 7 and 8.
<ol style="list-style-type: none"> <li>1. Resources development (Storage, Rain harvesting, recycled water, preventing leakages in distribution)</li> <li>2. Supply development</li> <li>3. Improved water treatment and accessibility</li> <li>4. Improved Quality</li> <li>5. Water Safety Plans</li> <li>6. Behavioral change among water users</li> <li>7. Water Resources data Bank</li> <li>8. Man power training and capacity building</li> </ol>			
<b>Wastewater</b>	Items: 1, 2, 3, 4, 5, 6 and 7	Items: 2, 5, 6 and 7	Items: 2, 5, 6 and 7
<ol style="list-style-type: none"> <li>1. Improved drainage system using underground drainage</li> <li>2. Phasing out of septic tank system in urban areas including mega-cities</li> <li>3. Introduction of Primary and Secondary wastewater treatment systems in phases</li> <li>4. Segregation of municipal and industrial wastewaters with technically sound treatment systems</li> <li>5. Manpower training for maintenance of treatment facilities</li> <li>6. Data Bank</li> <li>7. Capacity building</li> </ol>			
<b>Fecal / Livestock Waste Management</b>	Items: 1, 2, 3 and 4	Items: 4, 5, 6 and 7	Items: 4, 5, 6 and 7
<ol style="list-style-type: none"> <li>1. Abolition of Open Defecation</li> <li>2. Provision of Improved toilets</li> <li>3. Capacity building for toilet construction and maintenance</li> <li>4. Development of fecal sludge based waste to energy technologies (biogas)</li> <li>5. Byproduct utilization for food security and environmental hygiene</li> <li>6. Sanitation and hygiene improvement among targeted groups through education, provision and use of locally made sanitary devices.</li> <li>7. Data Bank and Record Keeping/maintenance</li> </ol>			
<b>Solid Wastes</b>	Items: 2, 3, 4, 5, 6, 7 and 8	Items: 1, 2, 3, 4, 5, 6, 7 and 8	Items: 2, 3, 4, 5, 6, 7 and 8
<ol style="list-style-type: none"> <li>1. Segregation of wastes into municipal, hazardous, and infectious types; E-waste may be specially addressed</li> <li>2. Special waste: nuclear waste</li> <li>3. Waste assessment, quantification and data bank</li> <li>4. Establishment of community based waste storage facility/kiosks for resource recovery</li> <li>5. Establishment of 'Waste to Wealth' and 'Waste to Energy' technologies among the</li> </ol>			

communities is good resource conservation strategy.

6. Reduce landfilling of waste using waste management pyramid.
7. Encourage Public Private Partnership to effectively manage wastes with
8. Institutionalize waste pickers and scavengers to improve their health and dignity

#### **Pollution Control**

Items: 1 and 2

Items: 2, 3 and 4

Items: 3 and 4

1. Control water, soil and air pollution through technology and behavioural change
2. Control eutrophication of streams, rivers and water bodies using pollution control technologies.
3. Utilize aquatic weeds for recycling and use for food production.
4. Identify point source pollutants and control them

#### **Soils**

Items: 1 and 2

Items: 2, 3 and 4

Items: 3 and 4

1. Land treatment of Wastewaters
2. Control of soil transmitted helminths
3. Soil remediation, bio- and phyto-remediation for hazardous chemical removal
4. Control of soil erosion, floods
5. Control of soil degradation and Salinity of soils

#### **Air Quality**

Items: 1, 2, 3, 4, 5, 6,  
7 and 8

Items: 1, 2, 3, 4, 5, 6,  
7 and 8

Items: 1, 2, 3, 4, 5, 6,  
7 and 8

1. Indoor and Outdoor Air Quality monitoring
2. Air pollution (including noise) control
3. Air quality policy Development/Regulations
4. Air quality Data Bank
5. Allergy/Aerosol Research and Development
6. Emission control on highways
7. Capacity building
8. Community education

#### **Food Safety/ Hygiene**

Items: 1, 2, 3, 4 and  
7

Items: 5, 6 and 7

Items: 5, 6 and 7

1. Meat, Fish, hygiene
2. Chemical control in food business/ industries
3. HACCP Practice in food Industries, food waste management
4. Promotion of food hygiene in small and larger eateries and food premises
5. Fadama crops monitoring for toxic chemicals and microorganisms
6. Wastewater reuse for Irrigation
7. School meal programmes - monitoring and improving sanitation and hygiene

<b>Environmental Assessment</b>	Items: 1, 2, 3 and 4	Items: 1, 2, 3 and 4	Items: 1, 2, 3 and 4
1. EIA			
2. EA			
3. Health and Social IA			
4. ISO certification			
<b>Vector Control</b>	Items: 1, 2, 3 and 4	Items: 1, 2, 3 and 4	Items: 1, 2, 3 and 4
1. Environmental			
2. Chemical			
3. Biological			
4. Engineering			
<b>Environmental Toxicology</b>	Items: 1 and 2	Items: 1 and 2	Items: 1 and 2
1. Technical approach; Centres for Toxicological Investigation			
2. Ecotoxicological approach			
<b>Climate Change/Mitigation</b>	Items: 1, 2 and 3	Items: 1, 2 and 3	Items: 1, 2 and 3
1. Carbon credit			
2. Carbon dynamics in different sectors, e.g. municipal, agricultural, industrial, life style sectors			
3. Carbon sequestration			
4. CDM opportunities			
5. Data Bank			
6. Record Keeping			
7. Community training on carbon reduction strategies, capacity building			
8. Cleaner Technologies			
9. Policies and Regulations			
10. Greening the country to reduce desertification, flood control, vector management			

**Table 2. SWOT for Environmental Management**

Strengths	<ul style="list-style-type: none"> <li>• Expertise and leadership in environmental health</li> <li>• Resource avenue (abundant and general availability of natural water resource and wastewater; biomass resources including abundant faecal matter)</li> <li>• Income generation (recycling, biofertilizers)</li> <li>• Abundant human resources / capacity to accomplish all tasks</li> <li>• Availability of natural products for improving sanitation and hygiene</li> </ul>
Weaknesses	<ul style="list-style-type: none"> <li>• Low availability of engineering concepts</li> <li>• High capital expenditure</li> <li>• Lack of operational experience</li> <li>• Limited environmental awareness / non-acceptance to new concepts</li> <li>• Lack of funding</li> </ul>
Opportunities	<ul style="list-style-type: none"> <li>• Employment opportunities (e.g., waste to energy or wealth)</li> <li>• National / regional economic growth</li> <li>• Decrease use of fossil fuel and reduced emission of pollutants</li> <li>• Development of new technologies / innovation (e.g engineering designs) for environmental management</li> </ul>
Threats	<ul style="list-style-type: none"> <li>• Low acceptance of new concepts</li> <li>• Lack of political will</li> <li>• Corrupt practices</li> </ul>

**Table 3: Environmental health indicators and justification**

Indicators	Justification	Possible data sources
• Percentage of residents understanding and supporting sustainable practice	High level of awareness of sustainable principles should be reached	Tertiary institutions, Non-governmental Organisations
• Percentages of schools that have adopted sustainable modules	Increase in the number of school that have adopted modules, the more students will understand and embrace sustainability	Tertiary institutions, Ministry of Education
• Percentage use of renewable (e.g. solar) and alternate energy	Renewable energy use is an indicator for sustainable living	Climate change monitoring agencies, Tertiary institutions
• Proportion with access to improved, functional and safety managed water sources	Access to improved, functional and safety managed water sources reduce incidence of water-related diseases	Federal ministry of water resources, Rural Water Supply and Sanitation Agency (RUWASSA), UNICEF-Nigeria,
• Proportion with improved, and safety managed sanitation facilities	Access to improved, functional and safety managed sanitation facility reduce incidence of sanitation-related diseases	Federal ministry of water resources, Rural Water Supply and Sanitation Agency (RUWASSA), UNICEF-Nigeria,
• Number of community, business, labour, organization and government that adopt sustainable practices and policies	Sustainability is a function of individual as well as institutional actions	Tertiary institutions, Waste Management Authorities, Non-governmental Organization
• Proportion of new automobiles (cars, motorcycle, tricycles etc.) purchased that use renewable fuel technology	This is a measure of community's awareness and practice of sustainable principles	Road maintenance agencies, Federal Road Safety Corps (FRSC), Vehicle Inspector Officers (VIO)
• Proportion of households participating in sustainable waste (liquid and solid) management option	Voluntary participation in sustainable waste management is a measure of community's commitment to sustainability	Tertiary institutions, Waste Management Authorities.

process which requires data collection at multiple points throughout the programme cycle in order to measure progress toward achieving programme objectives" [8]. On the other hand, evaluation refers to an independent assessment of either completed or ongoing activities to determine the extent to which they are achieving stated objectives and contributing to decision making [9]. Therefore monitoring and evaluation (M&E) incorporated into environmental health projects/programmes from the planning stage are important in that they assist in determining whether a programme has achieved its intended outcomes. It identifies programme weaknesses and strengths, areas of the programme that need revision, and those that meet or exceed expectations [10].

The M&E plan should consist of six major steps [11]:

- (i) Identification of programme goal and objectives;
- (ii) Description of indicators (for tracking the process and outcome of the programme);

- (iii) Data collection methods (qualitative and quantitative methods)

- (iv) Define M&E roles and responsibilities with regards to who will collect data for each indicator;

- (v) Create analysis and reporting plan:

- (vi) Plan for result dissemination.

Apart from including M & E from the planning stage, adequate fund (about 5-10% of a project budget) must be set aside. It is also imperative that the data collected should be certified to be of high quality. This can be achieved by employing stringent and systematic data quality assurance procedures. The West Virginia Office of Technology [12] described quality management process as a method (or set of procedures) by which the quality of deliverables and processes is assured and controlled during the project. The process entails carrying out a variety of

appraisal techniques and implementing a set of corrective actions to address any deficiencies and raise the quality levels within the project. This hopefully may significantly address the modern environmental health hazards and attendant health consequences that are serious public health issues engulfing Nigeria and are of increasing significance in the rest of Africa [13; 14].

In summary, accountability of the indicators/benchmark/milestone toward sustainable Nigeria in 2050 could be achieved through viable monitoring and evaluation systems. The most effective way to implement an accountability system is the establishment of a Sustainability Council or strengthening the existing one. This is a lean quasi-governmental agency whose job is to coordinate sustainability efforts and hold us all accountable to the goals, actions, and indicators as contained in the plan. Table -3 presents some of the environmental health indicators required to be monitored and evaluated for a sustainable living.

### Conclusions

Environmental health problems in Nigeria are enormous and require a multi-sectorial approach. Nigeria has adequate Environmental Health and Scientific manpower and other resources to adequately address the issues. Achieving health care by 2050 is a gigantic task but is achievable. What is required are the political will and commitment, with targeted approach to achieve the desired results.

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## **A Systematic Review of the Causes and Challenges of Climate Change on Nigerians' Economy and Ecosystem**

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### **Abstract**

**Introduction:** Climate change is an adverse environmental phenomenon that the impact is felt at both local and global communities. Nigeria like the rest of the entire continent of Africa is considered highly vulnerable to climate change because of its limited coping capacity, poverty, illiteracy, food insecurity, and diseases associated with climate change. While data on the global impacts of climate change is available, those at regional levels are scanty, rarely available and inaccessible. Hence the need for this study on the causes and effects of climate change on Nigerians economy and ecosystem.

**Methods:** The methodology adopted was purely on content analysis of secondary data and observed information from field survey. Reports and presentations from Intergovernmental Panel on Climate Change (IPCC), and Department for International Development (DFID), National Climate Change Commission (NCCC) and Nigerian Environmental Study Team (NEST) were identified for review through a comprehensive search by using electronic and non-electronic databases. Related published literatures and documents were also searched in a systematic manner, using a range of key words relating to climate change impact on the Health, Ecosystem and Nigerians Economy.

**Results:** Our review of the subject matter indicated that many areas of Nigerian economy and ecosystem appear to be directly vulnerable to the impacts of climate change, such as agricultural and health sectors, due to increase in average temperature and rainfall. Rising in sea levels, emerging pest/diseases, changing of the ecosystem and food insecurity were also established.

**Conclusion:** Climate change effects are significant and requires technological and policy innovation to realise low-carbon growth in Nigeria. Field trials on crop production in local ecosystems will highlight crops that are most vulnerable to the changing climate and identify areas of research focus. Greenification of the lands, minimization of pollutants/contaminants in the atmosphere and adoption of environmentally friendly technology are highly advocated.

**Keyword:** *Climate change, ecosystem, global warming, greenhouse gases, greenification.*

### **Abstrait**

**Contexte :** Le changement climatique est un phénomène environnemental néfaste dont l'impact est ressenti au sein des communautés locales et mondiales. Le Nigeria, à l'instar du reste de l'ensemble du continent africain, est considéré comme extrêmement vulnérable au changement climatique en raison de ses capacités d'adaptation limitées, de sa pauvreté, de son analphabétisme, de son insécurité alimentaire et des maladies associées aux changements climatiques. Tandis que des données sur les impacts globaux du changement climatique sont disponibles, celles-ci au niveau régional sont rares, rarement disponibles et accessibles. D'où la nécessité de cette étude sur les causes et les effets des changements climatiques sur l'économie et l'écosystème Nigérian.

**Méthodes :** La méthodologie adoptée a consisté uniquement en une analyse du contenu de données secondaires et des informations observées provenant d'enquêtes de terrain. Rapports et présentations du Panel Intergouvernemental sur le Changement de Climat (PICC), et Département de Développement International (DFID), Commission Nationale sur les Changements Climatiques (CNCC) et l'Equipe d'Etude Environnementale du Nigeria (NEST) ont été identifiés aux fins d'examen par une recherche complète en utilisant des bases de données électroniques et non électroniques. La littérature et documents semblables publiés ont également été recherchés de manière systématique, en utilisant une gamme de mots clés relatifs aux impacts sur la santé des changements climatiques, l'écosystèmes et l'économie Nigérian.

**Résultats :** Notre examen du sujet a montré que de nombreux domaines de l'économie et de l'écosystème nigériens semblent directement vulnérables aux effets du changement climatique, tels que les secteurs de l'agriculture et de la santé, en raison de l'augmentation des températures et des précipitations moyennes. L'élévation du niveau de la mer, l'apparition de parasites / maladies émergents, le changement de l'écosystème et l'insécurité alimentaire ont également été constatés.

**Conclusion :** Les effets du changement climatique sont importants et nécessitent des innovations

technologiques et politiques pour parvenir à une sobre croissance en carbone au Nigéria. Les essais sur le terrain de la production végétale dans les écosystèmes locaux mettront en évidence les cultures les plus vulnérables au changement climatique et identifieront les domaines de recherche. L'afforestation / gazonnage des terres, la minimisation des polluants / contaminants dans l'atmosphère et l'adoption de technologies respectueuses de l'environnement sont vivement recommandées.

**Mot-clé :** *Changement climatique, écosystème, réchauffement de la planète, gaz à effet de serre, afforestation / gazonnage.*

### Introduction

Climate change is an undeniable environmental threat of the 21st century which the world is currently experiencing and seeking measures to adapt and mitigate its impact. The United Nations Framework Convention on Climate Change (UNFCCC) defines 'climate change as a change which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere over comparable time periods'. Climate change is already beginning to transform life on earth. Around the globe seasons are shifting, temperatures are increasing and sea levels are rising. Climate change affects the whole world though the poorest people who contribute least to the change are the ones who suffer the most. Scientific research shows that the net climate resulting from the change will largely be driven by atmospheric greenhouse gases [1,2].

Global warming is closely associated with climate change especially as a co-traveler in the interplay of the equilibrium between hydro-fluorocarbons-(HFCs); and perfluorocarbons (PFCs) the natural and man-made components of the Green House Gases (GHGs) that have been eminently adjudged globally as the culprit for the warming of the Earth's atmosphere and oceans. Global warming is the term used to describe the gradual increase in the average temperature of earth's atmosphere and its oceans [3]; a change that is permanently changing earth's climate forever. Global warming is caused by increase in the emission of GHGs, through the burning of fossil fuels (oils, natural gas and coal), burning of wood, wood products and solid wastes, raising of livestock and the decomposition of organic waste in solid waste landfill; combustion of solid waste and fossils fuel in industrial and agricultural activities, bush burning; and deforestation. All these human (anthropogenic) activities, contribute to alter the balance of the equilibrium between the natural GHGs (water vapour, carbon dioxide, methane and nitrous oxide) and the man-made GHGs (sulfur hexane

fluoride-(SF); hydro-fluorocarbons-(HFCs); and perfluorocarbons (PFCs) in Earth's atmosphere, thus promoting the warming of both the atmosphere and the oceans since they are heat-trapping gases [4].

Available evidences show that climate change will be global, likewise its impacts, but the biting effects will be felt more by the developing countries, especially those in Africa, due to their low level of coping capabilities [5,6]. Nigeria is one of such developing countries. Researchers have shown that Nigerians are already being plagued with diverse ecological problems, which have been directly linked to the on-going climate change [7-12]. A recent finding [7] revealed erratic pattern of weather elements in Nigeria, while in another similar research [8] showed that climate change has started imparting on desertification. Climate change has been documented to be impacting negatively on plant species composition in North eastern Nigeria [12]. These may not be the only impacts of climate change in Nigeria. It is on this premise that this study took an insight into the implications of climate change on the Ecosystem, Health and Economy in Nigeria with the aim of compiling and analyzing them holistically.

### Methodology

The methodology adopted was purely on content analysis of secondary data and observed information from field survey. Reports and presentations from Intergovernmental Panel on Climate Change (IPCC), Ministry of Environment (MOEFNR), and Department for International Development (DFID), National Climate Change Commission (NCCC), Nigerian Environmental Study Team (NEST) were used for review. Literatures were identified through a comprehensive search by using electronic and non-electronic databases. Related published literatures and documents were searched in a systematic manner, using a range of key words relating to climate change impacts on the Health, Ecosystem and Nigerians Economy.

### Causes of climate change

According to a report on climate in Canada [13], Climate change is caused by two basic factors which include natural process (Bio-geographical) and human activities which are also known as Anthropogenic. The earth's climate can be affected by natural factors that are external to the climate system such as changes in volcanic activity, solar output and earth's orbit around the sun, these factors and its effects have relatively short term effects on climate.

The Anthropogenic factors are human activities that emit large amount of greenhouse gases into the atmosphere that depletes the ozone layer or activities that reduce the amount of carbon absorbed

from the atmosphere. Human activities such as burning of fossil fuels, gas flaring, urbanization, agriculture and changes in land use like deforestation, release greenhouse gases (GHGs) into the atmosphere which increases the already existing concentration of these gases. The human factors have been proven to be responsible for the ongoing unequivocal climate change or global warming [14].

According to the South African Confederation of Agriculture Union [15], the main GHGs are Carbon dioxide, methane and nitrous oxide, which account for 80%, 14% and 6% of the total GHG emission respectively. GHGs are good absorbers of heat radiation coming from earth's surface acting like a blanket over the atmosphere, keeping it warmer than it would be. It has been suggested that if the current trends of anthropogenic GHG emissions continue through 2030, earth is likely to experience an average rise in temperature ranging from 1.5°C to 4.5°C [16]. It is well established that the activities of developed nations are mostly accountable for climate change, but developing nations are those suffering more due to inability to cope as a result of poverty and low technological development [17]. The causal factors of climate change as related in a report [18] are as given in Figure 1.

### Ecological implications of climate change

Increasing temperature (global warming) and decreasing precipitation in most parts of the world are the greatest impacts of climate change. These bring about either negative or positive ecological impacts in different parts of the world. The increasing temperature has led to increased land-based ice instability and its melting. The thawing of the Arctic, cool and cold temperate ice, the increasing rainfall in some parts of the world and expansion of the oceans as water warms has started imparting on sea level rise, coastal inundation and erosion. The current global estimate of sea level rise is 0.2 m and it is projected to increase to 1 m by the year 2100 [19,20]. The implication is that the present 0.2 m sea level rise has inundated 3,400 km<sup>2</sup> of the coastal region of Nigeria, and if the sea level rise attains the projected 1m on or before 2100 then 18,400 km<sup>2</sup> of the coastal region may be inundated [9]. Coastal settlements like Bonny, Forcados, Lagos, PortHarcourt, Warri and Calabar among others that are less than 10 m above the sea-level would be seriously threatened by a meter rise of sea-level.

The sea incursion due to sea-level rise means salt-water intrusion into the fresh water, invasion and destruction of mangrove ecosystems, coastal wetlands and coastal beaches. The worst impact is

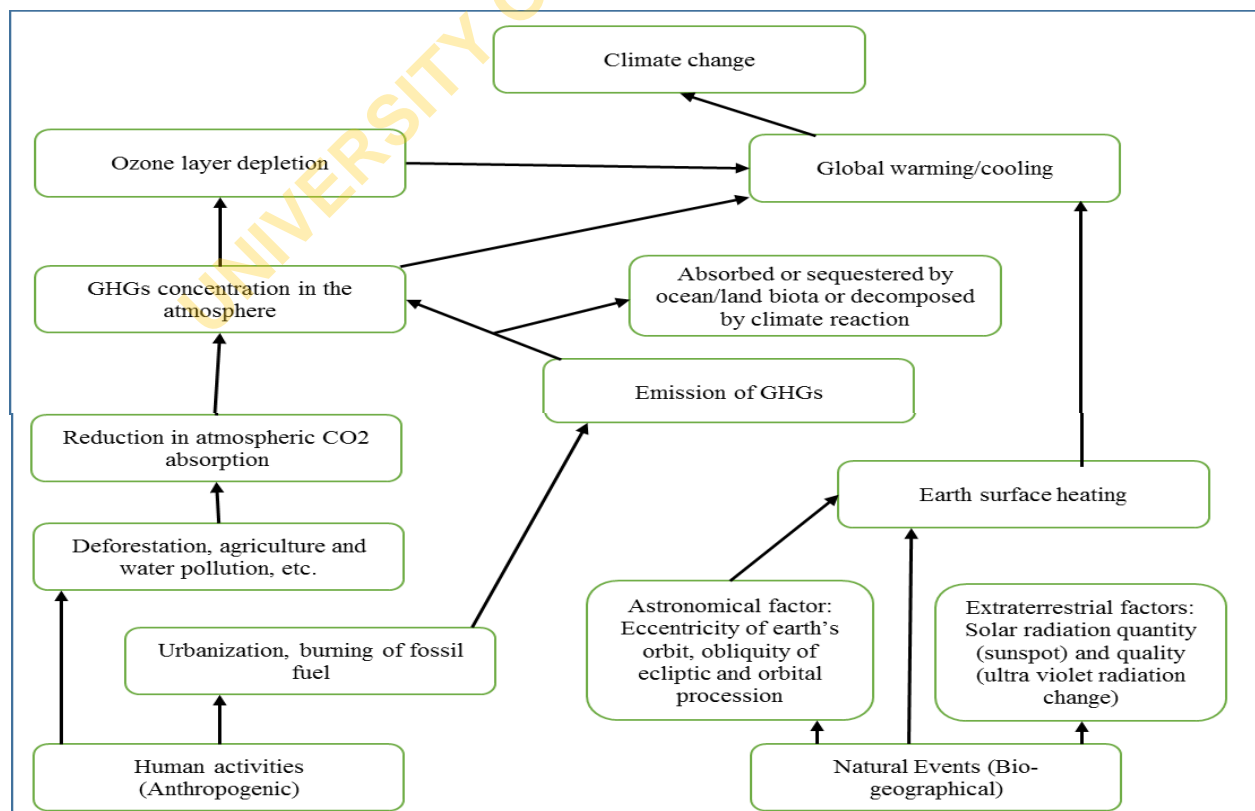


Fig. 1: Causal factors of climate change. Source: [18]

population displacement, which may result in communal crisis. The coastal inundation and erosion with their associated population displacement are currently major environmental problems in Nembe, Eket and other coastal settlements in Bayelsa, Delta, Cross River, Rivers, and Lagos States of Nigeria. It is estimated that a meter rise in sea level will displace about 14 million people from the coastal areas of Nigeria [21]. Sea-level rise up to a meter will displace 10, 13 and 72 million people in the coastal areas of Egypt, Bangladesh and China respectively [22].

The increasing temperature and decreasing rainfall have led to frequent drought and desertification. The Sahara desert is observed to be expanding to all directions trying to engulf the Sahelian region of Africa with annual expansion of 1-10 km [8,23]. The Nigeria north of 12°N is under severe threat of desert encroachment and sand dunes are now common features of desertification in states like Yobe, Borno, Sokoto, Jigawa and Katsina. The migrating sand dunes have buried large expanse of arable lands, thus reducing viable agricultural lands and crops' production. This has prompted massive emigration and resettlement of people to areas less threatened by desertification. Such emigration gives rise to social effects like loss of dignity and social values. It often results in increasing spate of communal clashes among herdsmen and farmers and such clashes resulted in the death of 186 people in six northern states of Nigeria between 1998 and 2006 [23,24]. Most of the destitute that emigrated as a result of drought and desertification usually move to nearby urban areas to beg for alms thereby compounding the already tense urbanization problems [25]. Climate change will alter all aspects of the hydrological cycle ranging from evaporation through precipitation, run off and discharge [26]. The global warming and decreasing rainfall together with the erratic pattern of rainfall produce a minimal recharge of groundwater resources, wells, lakes and rivers in most parts of the world especially in Africa thereby creating water crisis. In Nigeria, many rivers have been reported to have dried up or are becoming more seasonally navigable while Lake Chad shrunk in area from 22,902 km<sup>2</sup> in 1963 to a mere 1304 km<sup>2</sup> in 2000. This shows that what is left of Lake Chad in the year 2000 is just 5.7% of 1963 [27]. It has been established that Lake Chad has shrunk by 95% since the 1960s [28].

### **Impacts on Agriculture in Nigeria**

The agricultural sector contributes some percentage of the Nigerian Gross National Product and majority of the rural populace are employed in this sector.

The concern with climate change is heightened given the linkage of the agricultural sector to poverty. It is anticipated that adverse impacts on the agricultural sector will exacerbate the incidence of rural poverty. Climate change has the potential to affect African agriculture in a range of ways leading to an overall reduction of productivity, which could result to a loss in GDP [29].

Over 80% of Nigeria's population depends on rain-fed agriculture and fishing as their primary occupation leading to a high risk of food production system being adversely affected by the variability in timing and amount of rainfall. Crops occupy nearly 94% of the agricultural sector in Nigeria and some areas are already experiencing a loss in length of growing days by 20% [30]. Growth rates of maize, guinea corn, millet and rice are reduced by rises in temperature. Warming trends also make the storage of root crops and vegetables more difficult for those without access to refrigerators or preservative facility. Agriculture in Nigeria will be adversely impacted by increasing variations in terms of timing and amount of rainfall. Water deficits may also depress crops and livestock production and hence, food supply necessitating imports [31].

Climate change has caused a shift in crop cultivated in northern Nigeria as noted by a researcher [32]. The preferred crops the farmers cultivated were guinea corn followed by groundnut and maize, but due to increasing temperature and decreasing rainfall amount and direction occasioned by climate change, the farmers as a means of adaptation in 2007, shifted to the production of millet followed by maize and beans. Another major problem of agriculture in Nigeria due to climate change is the reduction of arable lands. While the sea incursion is reducing the arable lands of the coastal plains, the desert encroachment with its associated sand dunes is depriving farmers of their agricultural farmlands and grazing lands. Sand dunes and desert encroachment have been reported to cover from 25,000 hectares to more than 30,000 hectares, with its attendant negative impact on food and livestock production [33].

### *Livestock production*

Climatic variations between the Northern and Southern parts contribute to the distribution of animals in the country. Generally, the large ruminants, geese, guinea fowls and turkeys are more common in the Northern parts of the country where rainfall and humidity are lower, the dry season is longer than the diurnal and seasonal temperature fluctuations are wider. The availability of natural grasses for grazing

is very limited and highly dependent on rainfall which is low in most parts of the North. The Southern parts of the country which have more rainfall and more grazing are wetter and have more parasites and endemic diseases. This is because high temperature and high humidity increases the rate of growth of parasites outside their host. Climate stress reduces feed, water intake, grazing time and hence the rate of growth and productivity [34].

High temperatures have hindered livestock (sheep and goat plague; cattle, poultry and piggery) production through retarded reproductive cycles, reduced meat and milk outputs, as well as their grazing lands. Livestock mortalities (stock losses) have increased in poultry, piggery and rodentary production systems to the level of at least 15% per annum. Animal production as well is affected by increases in disease and pests (including *Peste des Petits Ruminants (PPR)*, also known as sheep and goat, is a highly contagious animal disease affecting small ruminants; foot rot; mange, *etc.*) under the influence of climate change impacts that cut investment profits in livestock production system by more than 20% per annum.

#### *Forestry*

Climate change will potentially increase the incidence of pests and diseases that decimate forest trees. This in turn can lead to species extinction in the various ecosystems of Nigeria, as it has already been the case for Iroko and oil bean in the southeast; various mahogany species in southwest; the baobab and the locust bean in the northwest and gum Arabic in the northeast [35]. Nigeria is presently losing about 351,000 square kilometers of its landmass to the desert, which is advancing southward at the rate of 0.6 kilometers annually [34]. The consistent reduction in rainfall leads to a reduction in the natural regeneration rate of land resources, which presents a chain of causal reaction that, makes people to exploit more previously undisturbed lands leading to depletion of the forest cover and increase on the sand dunes deposit. The excessive exploitation of forest resources has cause a serious problem in Nigeria environment. When the forest is destroyed, the vegetative cover of the soil is removed and the soil is exposed to environmental forces of wind and surface runoff and the topsoil will experience erosion and reduction of fertility and become less productive [36]. Moreover, deforestation leads to accumulation of global carbon, emitted from burning of fossil fuels, in the atmosphere, the main consequences of this are global warming and climate change.

#### **Mining and quarrying**

Increase in precipitation in the South combined with irregular rainfall events will trigger flooding which will adversely affects the mining operations located in the region. Also extreme weather events around the coastal region will threaten off-shore drilling. About \$13 billion is at risk of loss from sea level rise in the Niger Delta [37].

#### **Manufacturing sector**

This sector will suffer losses from reduced potentials to produce output requiring agricultural produce as inputs. Sea level rise may lead to flooding which can destroy transportation and other infrastructure as well as plants and industrial layouts that can hamper productivity and efficiency in the sector [38].

#### **Wholesale and retail trade**

Infrastructure is at direct risk due to sea level rise and extreme weather events which consequently damages the infrastructure. This also affects the supply and distribution of their products thus challenging wholesale retail trade business [35].

#### **Transport and tourism**

Roads, bridges, airports terminal and rail line are destroyed due to floods and erosions caused by excess rainfall or sea level rise. Tourism, especially the beach-based tourism will be negatively affected, the beaches and lagoons will be taken over by water due to sea level rise as in the case of Lagos bar beach and Lekki Island [38]. Increase in the occurrences of natural disaster such as flooding, drought, land slide and windstorm may cause a lot of damages to business facilities and activities; this may cause a lot of cost to the insurance companies in compensating its clients [35,39].

#### **Implication of climate change on the future Gross Domestic Product (GDP) of Nigeria**

The data reviewed was based on the up-to-date national economic data and forecasts along with most recent peer reviewed scientific studies of the potential impacts of climate change on Nigeria, including IPCC's 2007 4th assessment report as shown in Tables 1 and 2 and Fig. 2 [31].

In terms of benchmarking these figures against other studies [40], a potential loss of GDP of 11% by 2060 based on a 2°C rise for Nigeria was estimated. Poorer countries could lose in excess of 10% of their GDP based on 5-6°C warming by 2100 [41]. Currently, each wet year in the Sahel causes a loss of around 1.25% of GDP and 3.5% for a dry year.

**Table 1:** Percentage Loss of Sectoral GDP from Climate Change in 2050

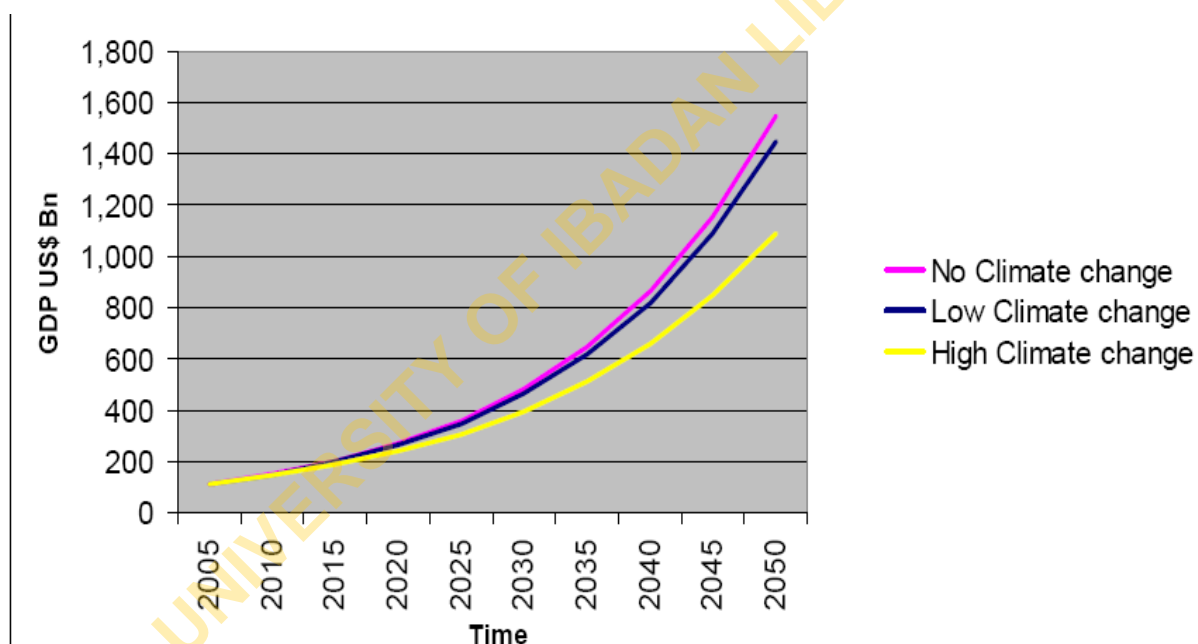
Sector	Low Scenario	High Scenario
Agriculture	8%	36%
Mining	4%	21%
Wholesale & Retail	5%	27%
Others	5%	27%
Overall	6.4%	29.5%

dynamics may increase the distribution of disease vectors such as dengue, malaria and incidence of diarrheal disease [42].

The Guardian Newspaper of 30th march 2010 reported that within one week in the early of 2009, over 209 people were killed by meningitis in Nigeria and Niger republic. From analysis of reports, climate change will increase threats to human health, thereby affecting their productivity [43]. Already a study by the World health Organization showed that

**Table 2:** Percentage Loss of GDP through Climate Change by 2050 according to Regions

Regions	Agric.	Mining	Retail	Others	All
North	8-33%	16%	7-27%	5-23%	8-30%
SE/SS	3-38%	5-22%	2-10%	5-26%	2-25%
SW/Lagos	8-42%	5-25%	7-34%	5-29%	7-34%

**Fig 2:** Potential climate change impact on Nigeria's GDP under a medium growth scenario.

Source: [31, 38]

### Impact of climate change on health sector in Nigeria

Climate change could negatively impact human health in developing country like Nigeria. Climate change affects human health directly or indirectly in many ways. Changes in temperature, precipitation, rising sea levels, increasing frequencies have great implications on human health in the area of injury, illness, morbidity and mortality. Rising sea level is anticipated as a result of climate change. Hence, flooding may result which is likely to increase the vulnerability of the poor to malaria, typhoid, cholera and pneumonia. Also temperature and rainfall

climate change is the cause of 150,000 deaths every year [1]. Heavy rainfall events can also carry terrestrial micro-biological agents into drinking water sources, which eventually could lead to outbreak of cryptosporidiosis, giardiasis, amoebiasis, typhoid and other infections [44].

Recent evidence showed that typhoid is mostly triggered in high temperature, and increased humidity over the years is a proof of climate change. A large part of Nigeria's economy is dependent on natural resources that are vulnerable to climate impacts. When resources are affected, the health of Nigerians can also be affected.

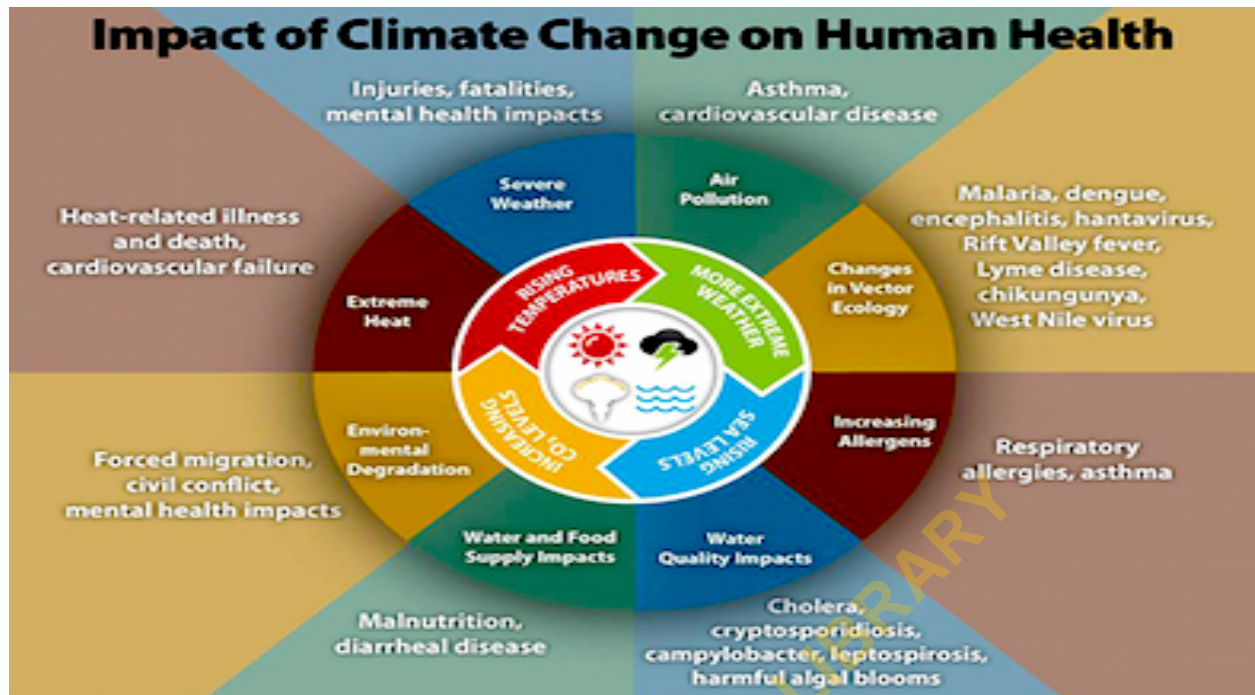


Fig. 3: Impact of Climate Change on Health SOURCE:[38]

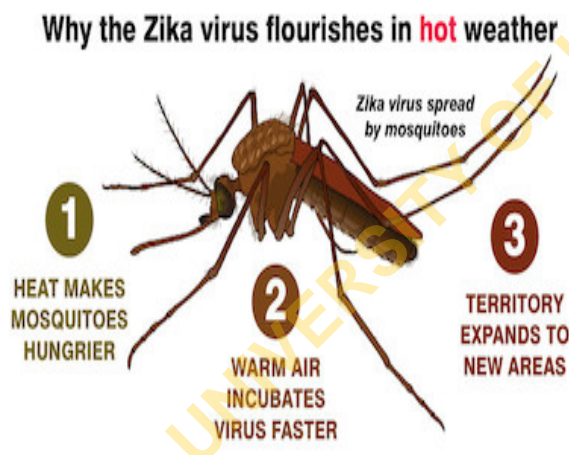


Fig. 4: Insect in hot wether SOURCE: [38]

### Conclusion and recommendations

Climate change impacts are real in Nigeria; they are currently been observed in all spheres of lives. However, it is possible to promote and actualize the strategies for limiting and adapting to the impacts of climate change in Nigeria. Providing cost-effective and sustainable collaboration between governments, development partners and stakeholders can be effective strategies for mitigating the consequences of incessant climate change on the environment and the livelihoods of all. In addition, agricultural adaptation to climate change should be mainstreamed into government's poverty alleviation programs. There should be an explicit national agricultural

research policy framework to provide a conducive environment for continuity and effectiveness in agricultural programs/projects. Nigerians should be encouraged to practice clean technologies geared towards reducing the rate of deforestation and enhanced afforestation programs, with a view to improving the rate of carbon sinks and preventing ozone layer depletion.

With cleaner atmosphere which will lead to self-sustaining ozone layer rebuilding, the current rate of global warming will be drastically reduced and its effects on humans and the ecosystem will with time be a thing of the past. Quality health information and robust enlightenment campaigns should be put in place to help people adapt before any disaster. Campaigns on preventive and defensive medical practices should be taken to the grass roots in local areas. Undertaking research to better understand impacts of climate change on human in respect to Nigeria health sector and status should be considered. In all, there is a strong need for policy to address climate change at the Federal, State and local area levels, and to ensure that the private sector adequately factor the risks posed by climate change into risk assessment, investment planning and project execution.

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## **Towards health security in Nigeria in 2050: Strategies for managing violent conflicts, humanitarian emergencies and natural disasters**

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### **Abstract**

**Introduction:** A very important but neglected aspect of healthcare delivery in Nigeria is the management of outcomes of violent conflicts, humanitarian emergencies and natural disasters within the framework of national health policy and available healthcare infrastructures and services. Although this aspect of national healthcare is often neglected in national healthcare discourses, it constitutes very crucial part of determinants of average life expectancy of citizens and general wellbeing of the population.

**Methods:** Library and archival materials constituted the sources of data for the paper. Policy documents, reports and analysis of the health condition of Nigerians in relation to management of the outcome of natural, humanitarian emergencies and violent conflicts published by non-governmental organisations, government bodies and international agencies were content analysed.

**Results:** This article attempts to characterise the current condition of humanitarian emergencies and disaster management readiness from the purview of the health sector through assessment of the available emergency management and trauma facilities. It projects into the future situation of this aspect of national healthcare by the year 2050 when the population of the country is expected to double. It is observed that if the current despicable condition of the health facilities in the sector is not addressed, the situation is likely to become worse by the projected year and could portend dire situation for Nigeria.

**Conclusion:** The paper makes prescriptions on remedies in terms of human resources development, erection of relevant infrastructures and acquisition of necessary equipment that could boost that aspect of national healthcare. Above all, there is need for strong leadership and political commitment to achieve qualitative improvement in the focused sector of the healthcare before year 2050.

**Keywords:** *National healthcare, Violent conflicts, Natural disasters, Humanitarian emergencies*

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### **Abstrait**

**Introduction :** Un aspect très important mais négligé de la prestation des soins de santé au Nigéria est la gestion des résultats des conflits violents, des urgences humanitaires et des catastrophes naturelles dans le cadre de la politique de santé nationale et des infrastructures et services de soins de santé disponibles. Bien que cet aspect des soins de santé nationaux soit souvent négligé dans les discours nationaux sur les soins de santé, il constitue un élément crucial des déterminants de l'espérance de vie moyenne des citoyens et du bien-être général de la population.

**Méthodes :** La bibliothèque et les archives constituaient les sources de données pour cet article. Les documents politiques, les rapports et les analyses sur l'état de santé des Nigériens en relation avec la gestion des résultats des émergences naturelles, humanitaires et des conflits violents publiés par des organisations non gouvernementales, des organismes gouvernementaux et des agences internationales ont été analysés.

**Résultats :** Cet article tente de caractériser l'état actuel des urgences humanitaires et de l'état de préparation à la gestion des catastrophes du point de vue du secteur de la santé en évaluant les installations de gestion des urgences et de traumatologie disponibles. Il prévoit la situation future de cet aspect des soins de santé nationaux d'ici à 2050, date à laquelle la population du pays devrait doubler. On constate que si l'on ne s'attaque pas à l'état actuel des installations de santé dans le secteur, la situation risque de s'aggraver d'ici à l'année projetée et pourrait laisser présager une situation désastreuse pour le Nigéria.

**Conclusion :** le document énonce des solutions en termes de développement des ressources humaines, de mise en place des infrastructures pertinentes et d'acquisition des équipements nécessaires pour renforcer cet aspect des soins de santé nationaux. Avant tout, un leadership fort et un engagement politique sont nécessaires pour parvenir à une amélioration qualitative du secteur ciblé de la santé avant 2050.

**Mots-clés :** *Santé nationale, Conflits violents, Catastrophes naturelles, Urgences humanitaire*

## Introduction

Violence, conflicts, humanitarian emergencies and natural disasters are some of the features that characterise and define the healthcare situations of modern states because of their emergency nature. They are necessary features that must occur within a population, especially in developing nations and the ways they are handled are important determinants of health security of the state. Their successful management is often determined by the level of preparation, policies, available prevention mechanisms, rescue operation planning and medical equipment to contend with them when they occur [6]. Such preparation to contend with emergency situations contributes to the life expectancy of citizens, hence their importance to the overall health policy of the state.

Violence is basically conceived as any physical or psychological force exerted on an individual or group of people for the purpose of injuring, damaging or abusing them. It consists of actions, words, attitudes, structures or systems that cause physical, psychological, social or environmental damages and which could prevent people from achieving their potentials [5, 10]. Examples of physical violence include war, homicides, genocides, criminal attacks and other such physical activities that cause injury or death of individuals or people. Psychological violence is any indirect act of negative influences that is aimed at arousing fear or breaking the mental resistance of an individual or people. They include verbal abuses, mis-information, brainwashing, blackmail, propaganda, terror activities and any such activities that seek to manipulate the minds of the people and force them to do otherwise what they were not willing to do. The third variety is the cultural violence, which could be described as those aspects of culture that are used to justify, legitimise or direct structural violence [4]. Such aspects of culture that can be used include religion, language, tradition, science, ideology, etc. Abuses that could result from cultural violence may include genital mutilation, female circumcision, scarification and tribal marks, etc. All these aspects of violence could become public health issues because of their potentials to lead to trauma in individuals and among the population. If not managed effectively and efficiently within the ambit of the law and public health policies, violent events could become an epidemic and affect national development.

Humanitarian emergencies could result from massive public violence. It may occur when large

population are forced to move away from violence in their permanent dwellings to avoid being killed or physically injured as a result of violence [1, 8]. When such mass movement of people take place, the population become internally displaced as they move from one location to another within their country; or they may become refugees when they move across the border of their country into other neighbouring countries. Movement of such massive numbers of people could result in health emergencies which may become significant public health issues. As arrangements are made to settle them in refugee or internally displaced peoples' camps, adequate healthcare must be addressed to avoid epidemic diseases breaking out in the camps and affecting surrounding populations [9].

Disasters could occur due to natural or man-made events. Natural disasters are occurrences caused by the force of nature and sometimes, they cannot be controlled or prevented from occurring. Examples include earthquakes, volcanic eruptions, flooding, drought, fire outbreaks, landslides, tornadoes, etc. They become public health issues when they affect large populations, leading to casualties or large movement of people from their natural abodes. However, the effects of natural disasters could be minimized by putting in place effective early warning and active early response mechanisms to predict and prepare for any such event [2, 3]. When such mechanisms are in place, it could reduce the damages and casualties that could result from natural disasters and reduce the costs of managing the consequences of such disasters. Unnatural or man-made disasters are those occurrences that occur as a result of human errors or that could be traced to human carelessness. Examples include vehicle accidents, plane crashes, building collapses, fire accidents and other forms of accidents that claim lives, destroy properties or cause injuries to people. Very often, however, many varieties of man-made disasters can be prevented, reduced or managed by public education, enlightenment and strict enforcement of laws and regulations.

## Current Situation Analysis in Nigeria

Nigeria is rife with violence, humanitarian emergencies, natural and unnatural disasters. These occur recurrently and constitute serious issues for the public health and security of the country [1]. They occur in form of crimes, communal conflicts, ethno-religious conflicts, violent conflicts over resources such as currently between farmers and cattle herders in a number of states across Nigeria such as Benue, Taraba, Plateau, Adamawa, etc. Other vices include

armed robberies, kidnappings, domestic violence, political assassinations, killings by police and other security men, etc.

Religious conflicts have dovetailed into terrorism in Nigeria. The activities of the Boko Haram terrorists ongoing for almost one decade have led to large numbers of internally displaced people, many of which are accommodated in Internally Displaced Peoples (IDPs) camps across the North Eastern and North Central parts of Nigeria. Citizens that fled across the borders into other neighbouring countries are settled temporarily in refugee camps that are being managed by host countries and international agencies. The IDPs and refugee camps have had several outbreaks of diseases due to poor sanitation and poor health management of residents.

Outbreak of violence among different ethnic groups is common across Nigeria and it has claimed thousands of lives and properties. Some examples of such incidents in the recent times includes the Ife-Modakeke intra-ethnic conflicts, the Hausa/Fulani-Berom conflicts in Plateau state, the Aguleri-Umuleri violent conflict in Imo state, the Hausa/Fulani-Tiv conflicts in Benue state, etc. In all these conflicts, it appears that the Nigerian security system lack predictive systems to prevent attacks. Thus, there is always a high casualty rate which the health system is not prepared to manage.

Although the violent activities of the insurgent groups in the Niger Delta have recently subsided, this is a temporary de-escalation because a permanent solution has not been found to the problems. The violent conflict in the Niger Delta has also claimed hundreds of lives and cost billions in loss of properties. There is also a rising prevalence of domestic violence in families stead across Nigeria, sometimes producing casualties.

In the area of natural and unnatural disasters, Nigeria has witnessed many flood disasters and many areas are still prone to flood disasters due to poor management of water channels and river beds. Erosion and landslides are common in the southern and eastern parts of the country while desert encroachments has driven cattle herders from the North into Southern parts of the country. Such environmental disasters lead to violent clashes in rural communities over the use of land resources. Motor vehicle accidents are daily occurrences across the country due to poor driving habits by drivers on one hand, bad roads and poor transport facilities on the other hand. Emergency healthcare departments in most hospitals lack contingency plans, personnel and equipment to handle such disasters, thus morbidity and mortality figures continue to increase.

‘Currently, all the humanitarian emergencies that occur as a result of the described above are poorly handled in Nigeria. Apart from poor hospital facilities, there are no or inadequate search and rescue equipment in most emergency management facilities. In addition, arrangements for trauma management are grossly inadequate.

### **Forecast for 2050**

It is predicted that the Nigerian population will double by 2050 to about 400 million [1]. If the current trend of accidents, crimes, public violence, humanitarian emergencies and disasters are not addressed, it will result in grave consequence for Nigeria. There is urgent need to embark on massive education and enlightenment of citizens on safety measures to reduce accidents and mitigate the effects of emergencies and disasters in addition to providing infrastructural facilities to support emergency services. If these are not efficiently provided, the situation will definitely be worse by 2050.

There is, therefore, need to build at least one emergency treatment facility in every state to treat and rehabilitate victims of violence, accidents and humanitarian disasters across Nigeria. Such emergency treatment centres should include trauma treatment facilities. There is also an urgent need to train medical personnel specialising in emergency treatment and trauma management to operate such facilities.

### **SWOT analysis**

Below are the strengths, weaknesses, and opportunities that could aid quality healthcare in the area of humanitarian emergencies and natural disasters management as well as threats that could prevent its achievement by 2050.

### **Short, medium and long term plans**

In the short term, the country needs to revamp the existing emergencies and trauma facilities to improve the response to emergency medical situations. In the medium term, the country should embark on construction of new world-class emergency and trauma facilities in the six geo-political zones in the country to address the escalating violence, humanitarian and disaster situations. The curricular of the existing health training institutions should be revised to embrace and accommodate emergency medicine that is relevant to the current humanitarian emergencies and disasters. On the long-run, each state and local government area across Nigeria should have emergency medical facilities to reduce the distance travelled to access such facilities during

**Table 1:** SWOT Analysis of the present state of violence, humanitarian and natural disaster management facilities

Strengths	Weaknesses	Opportunities	Threats
<ol style="list-style-type: none"> <li>1. Nigeria has a large young population which could provide rich source of professional personnel</li> <li>2. The Nigerian physical environment is prone to limited natural disasters, most of which can be predicted with appropriate early warning mechanisms and can be effectively managed</li> <li>3. Nigeria has abundant natural resources and endowments to erect infrastructures and acquire materials for emergency management</li> <li>4. There is a well endowed pool of human resources to train personnel and manage institutions for emergencies, humanitarian and natural disasters management</li> <li>5. There are pre-existing traditional humanitarian and violence management mechanisms within the various cultures in Nigeria.</li> </ol>	<ol style="list-style-type: none"> <li>1. There is consistent and seemingly uncontrollable trend of brain drain of trained emergency medical personnel in the country</li> <li>2. There is poor and sometimes unavailable search and rescue equipment to aid emergency management in Nigeria</li> <li>3. There is inadequate and poorly equipped emergency treatment and trauma facilities across Nigeria</li> <li>4. There are poor early warning and early response facilities to predict public violence, humanitarian and natural disasters across Nigeria</li> </ol>	<ol style="list-style-type: none"> <li>1. High possibility of harnessing the young population for appropriate training in emergency, humanitarian and disaster management</li> <li>2. There is an existing culture of good neighbourliness, peaceful co-existence and extended family caring among the population that could aid the initiative</li> <li>3. There is a strong culture of volunteering among the population which could aid emergency and humanitarian disaster management initiatives</li> </ol>	<ol style="list-style-type: none"> <li>1. There is poor inter-sectoral collaboration among emergency management organisations</li> <li>2. Presently, there is irresponsible and uncommitted political leadership to drive the process. This must change before 2050</li> <li>3. There is general culture of poor policy, poor planning and implementation of project activities in the health sector across the country</li> </ol>

emergency situations. It is also important to embark on sustained specialist training on emergency medicine and trauma management across the country to provide personnel to manage the facilities that would be built and equipment that would be acquired on the national project.

#### Sources of funding

The funds for the development of the emergency and trauma facilities should be provided for in the annual budget of states and the federal government

of Nigeria. It could also be sourced from international multi-lateral and donor agencies. Also, the private sector should be encouraged to invest in such facilities in the mode of best international practices. The national health insurance scheme should be strengthened to cater for accident, disaster and emergency care among citizens and private healthcare providers should be encouraged to invest in that aspect of health infrastructure.

### Monitoring and Evaluation

Citizens and professional medical bodies should be involved in monitoring project activities while erecting emergency medical facilities across the country. The federal government could set up a national board, consisting of members of various interest groups to implement and monitor associated projects across Nigeria. Also, a peer review structure could be organised among states to monitor and evaluate the performances of setting up the facilities.

### Conclusion

Violence, humanitarian emergencies and disasters will continue to feature in the national life of Nigeria, just like in other countries across the world [7]. It is therefore very important to plan and prepare for such events, moreso when the population is projected to double in a few years. It is important to build institutions, systems and structures that will sustain national health when such humanitarian emergencies arise.

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## The impact of trauma on the health security in Nigeria by the year 2050

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### Abstract

**Introduction:** Trauma is the leading cause of death in adolescents and young adults. More people died from trauma in 2010 than from malaria, TB and HIV combined. Nearly a third of trauma deaths are from violence and nearly a quarter are from road traffic accidents.

**Situation Analysis:** Nigerian population demographics is very fluid. Communal clashes, acts of terrorism, road traffic accidents and violent crimes are major contributors to trauma. The severity and complexity of injury patterns are unpredictable. Motorcycle road traffic accidents are on the increase. The use of psychoactive drugs plays a role in the occurrence of injuries.

**Forecast:** Desertification and increasing demands on dwindling water supplies will fuel more communal clashes. Improvements in emergency services will allow survival of more severe and complex injuries and the presentation of these to health care facilities will necessitate improvement in personnel numbers, training and competence as well as facilities and infrastructure to cope with the care of the patients. Improvement in communication and social media use will be a major tool in information dissemination and public enlightenment.

**SWOT Analysis:** Strengths include the opportunities to utilise available expertise for tailor made solutions. Social media and the influence of traditional and religious leaders are major opportunities. Weaknesses include the poor road network and instability in the worst hit regions while threats include the cost, anti-orthodox cultural beliefs and the risk to personnel.

**Keywords:** Health security, Nigeria trauma

### Abstrait

**Contexte :** Le traumatisme est la cause principale de décès chez les adolescents et les jeunes adultes. Plus de personnes sont décédées des suites d'un traumatisme en 2010, que du paludisme, de la tuberculose et du VIH combinés. Près d'un tiers des décès par traumatisme sont dus à la violence et près d'un quart à des accidents de trafic routier.

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**Analyse de la situation :** La démographie de la population nigériane est très fluide. Les affrontements communautaires, les actes de terrorisme, les accidents de trafic routier et les crimes violents sont des facteurs majeurs de traumatisme. La gravité et la complexité des types de blessures sont imprévisibles. Les accidents de trafic routier des motocyclettes sont en accroissement. La consommation de drogues psychoactives joue un rôle dans la survenue de blessures.

**Prévisions :** La désertification et la croissante demande en fourniture de ressource d'eau déclinante alimenteront de nouveaux affrontements entre communautés. L'amélioration des services d'urgence permettra la survie de blessures plus graves et complexes et leur présentation aux établissements de santé nécessitera une amélioration en nombre de personnel, formation et compétence, ainsi que des installations et des infrastructures permettant la prise en charge des patients. L'amélioration de la communication et de l'utilisation des médias sociaux constituera un outil majeur de diffusion de l'information et de la sensibilisation du public.

**Analyse SWOT :** Les points forts comprennent la possibilité d'utiliser les compétences disponibles pour des solutions sur mesure. Les médias sociaux et l'influence des chefs traditionnels et religieux sont des opportunités majeures. Les faiblesses incluent le mauvais réseau routier et l'instabilité dans les régions les plus touchées, tandis que les menaces incluent le coût, les croyances culturelles anti-orthodoxes et le risque du personnel.

**Mots-clés :** Sécurité sanitaire, traumatisme au Nigeria

### Introduction

Trauma is currently the leading cause of death in adolescents, young adults, and the middle aged across the globe. According to the World Health Organization, as at 2010, about 5.8 million people die each year from injuries. This accounts for 10% of the world's deaths, 32% more than the number of fatalities that result from malaria, tuberculosis and HIV/AIDS combined. Nearly one third of the 5.8 million deaths from injuries are the result of violence and nearly one quarter are the result of road traffic

crashes with over 3,400 people dying on the road each day and tens of millions injured or disabled each year. As the health care for major diseases improves and survival increases with increasing technology, the proportion of deaths due to trauma is steadily in the increase. Other causes of trauma also include injuries from natural disasters, domestic and intimate partner violence among others.

### **Situation analysis**

Nigerian population demographics constitute a very fluid milieu. Rural-Urban migration, increasing life expectancy, displacement by conflict and occupational mobility contribute to constant changes in population demographics from region to region. With improvement in transportation, increasing population mobility, increasing pressure on the available transport facilities and large volumes of people relocating because of increased conflict and natural disasters, the incidence of road traffic accidents is on the increase.

This is more pronounced in low and middle-income countries where the road infrastructure, quality of vehicles, traffic regulations and driver training and certification are often sub-optimal. In Nigeria, this is further compounded by “commercial motorcycles” many of the drivers of which are untrained youth without other means of income who often ride under the influence of alcohol and other psychoactive drugs with pre-trauma alcohol use in as high as 41% [1, 2]. The risk of dying for every kilometre travelled from a motorcycle crash is 20 times higher than from a motor vehicle crash [3]. This risk is heightened by the fact that aggressiveness on the part of the riders has been found to be one of the contributors to increased income despite the increased risk of injury [4]. Majority of accident victims in urban areas are from motorcycle accidents. The incidence varies from city to city with low incidence in cities that have legislation enforcing the use of helmets and limiting motorcycles to side roads.

Desertification in the northern part of the country is leading to dwindling average land holdings per family, chronic food shortages and food insecurity, increasing food prices and rising pressure on the land [5]. Competition for resources and potable water, grazing land and farmland, resources which are dwindling because of deforestation and desertification, is also fuelling communal clashes between herdsmen and farmers in the middle belt and other parts of the nation [6]. These clashes have recently escalated into full blown battles with heavy casualties. Terrorist activities in the North Eastern

part of the country have also contributed to the heavy toll of trauma with complex, extensive and severe injuries from bomb blasts by suicide bombers, heavy artillery and hand-held weapons. A lot of victims who manage to survive are often unable to immediately assess healthcare with the resultant complications from infection and other challenges of delayed access to optimal care. The demographic pattern of trauma in communal conflicts and terrorist attacks is also unpredictable and often includes the young and the elderly who tend to have a higher mortality rate and place particularly heavy burdens on insufficient resources when they do survive. The elderly because their care is complicated by the delayed healing and recovery, presence of comorbidities and reduced mobility and access to finance, while the children are faced with a lifetime of resultant deformities and social and economic dependence because of disabilities resulting from major trauma.

There is also a rising trend in domestic violence and assault. This is partly fuelled by substance abuse which increases the likelihood of violence within couples, violent robberies as well as social violence [7]. These often give rise to bizarre forms of injuries especially when domestic violence is fuelled by spite and passion and aggravated by substance abuse. Gang wars and cult clashes, especially in educational institutions and low-income neighbourhoods, are also fuelled by drugs and substance abuse. Such clashes often have innocent bystanders caught in the cross fire and thus the demographic distribution of victims may be unpredictable, although the demographics in campus-based cult clashes is usually limited to the student population.

### **Forecasts for 2050**

There are estimates that the population of Nigeria will double by the year 2050, making Nigeria the third most populous nation in the world. If the foregoing is left unchecked, with the rising population, dwindling resources, deforestation and desertification from the North, loss of arable land in the Delta in the South from pollution and oil spills, the competition for land-based resources will surely increase. Water will also become a critical resource. Already, as at March 2018, the Ministry of Water Resources estimates that only 57% of Nigerians have access to potable water. This has the attendant risk of fuelling more communal clashes and increasing the casualties. The increasing rural-urban migration will also increase the population density in urban areas. A lot of the people who have been involved in

violent clashes in the rural areas will migrate into urban areas with their weapons. This will increase both the population density in urban areas and the incidence of violent crimes. There will be an increase in gun violence and gunshot wounds presenting to health facilities nationwide. The increase in population will also increase the volume of people travelling on the roads with the resultant increase in the risk and occurrence of road traffic accidents. These will all contribute to put pressure on the available yet inadequate health infrastructure with resultant worsening in the health indices of the population. Thus, there is an urgent need to increase the number and preparedness of emergency medical staff to attend to the victims while security forces work on prevention of the incidents.

In the coming years, we will need to strengthen our healthcare system to cope with the increase in demands that are inevitable. We will need

to provide emergency rescue services that cover the major highways and townships. This will reduce the rescue time and reduce the number of people that “die-on-the-spot”, a colloquial term that refers to immediate deaths but which in fact alludes to people who died at the accident scene before rescue arrived. This will also increase the survival rate of complex injuries and the need for health care facilities to be able to manage the patients that are rescued on time.

There will be an increase in access to and proficiency with social media which will continue to improve communication and dissemination of news and information and this will be a major determining factor in educating the public about the proper response to trauma, availability of resources and personnel to manage the trauma as well as guiding rescue services to the location of the victims to facilitate speedy and effective evacuation and care.

### SWOT Analysis

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>i) We have an opportunity to develop a system that is suited to our culture, population dynamics and is tailored to our specific needs. This will allow us to avoid the challenges that countries have come up against following the implementation of their own programmes</li> <li>ii) Nigeria has trauma surgeons and safety experts who can serve as the nucleus around which the teams can be built</li> </ul>	<ul style="list-style-type: none"> <li>I) A lot of funding is required</li> <li>II) The success of planning is dependent on stability in the region</li> <li>III) Poor road network and other transportation developed infrastructure</li> </ul>
Opportunities	Threats
<ul style="list-style-type: none"> <li>i) Traditional leaders, clerics, opinion leaders and leaders of associations can be enlisted to enlighten the populace about the need to support the improvements and the value of early and appropriate intervention</li> <li>ii) Social Media: Nigeria has a strong social media culture and information spreads very rapidly via social media. This can be utilised as a tool for public enlightenment and education</li> </ul>	<ul style="list-style-type: none"> <li>i) Strong cultural beliefs and heavy reliance on alternative medicine and traditional healing practices that discourage people from accessing orthodox care acutely</li> <li>ii) Cost: Absence of health insurance or at best, poor or limited coverage. Currently, the basic coverage by the NHIS does not cover the entirety of trauma care especially when investigations like MRI is needed for brain or spine injuries, neither does it cover all the aspects of surgical care (purchase of implants, specialist fees where the care is given in private hospitals)</li> <li>iii) Safety and security of personnel and infrastructure needs to be ensured</li> </ul>

**SWOT Analysis:** A SWOT analysis of our situation is elucidated below.

*Short term plans*

- i) Public enlightenment via social media, print and TV and Radio. These will be aimed at educating the public about preventive measures as well as providing information and basic guidelines on seeking help promptly and from the right sources. One of the major challenges of healthcare in Nigeria is the fact that citizens at every level often opt for traditional alternatives first and only present to hospitals after complications have occurred
- ii) National Agency for Orientation to help with generating social media jingles adverts for public enlightenment
- iii) We urgently need to put legislation in place to protect bystanders and good Samaritans who offer help to accident and assault victims from accusation or harassment by law enforcement agencies. This will serve as a stop gap and shorten the time to commencement of care for victims while we improve ambulance services.

*Medium term plans*

- i) Training of uniformed officers (Federal Road Safety Corps FRCS, Police, Civil Defence, Customs, Prisons, Military), groups involved with transportation (National Union of Road Transport Workers NURTW, Amalgamation of Motorcycle Owners and Riders Association of Nigeria ACOMORAN, etc) in safe evacuation, basic first aid and safe transportation to health care facilities.
- ii) Incorporation of trauma care postings into the curriculum of undergraduate medical students such that at graduation doctors have the basic rudiments of emergency trauma care
- iii) Institutionalising certification in Advanced Trauma Life Support as part of the requirements for renewal of practicing license for doctors practicing in Nigeria

*Long term plans*

- i) Development of a well organised rapid response ambulance system for evacuation of victims and transportation to pre-informed health care facilities that can take care of the number and nature of the identified injuries. This will require provision of ambulances with trained paramedics and coordination by dispatchers who can take calls from the public and direct ambulances to

the location of the victim and thereafter to the nearest appropriate health facility with available bed spaces.

- ii) The dispatch centre must be well staffed with well trained personnel who have a reliable communication network so that they can appropriately guide the ambulances
- iii) Establishment of Trauma Centres: Local and regional
- iv) Training, retraining and certification of medical personnel
- v) Improvement in the coverage of health insurance so that trauma victims do not have to keep paying out of pocket for emergency care
- vi) Establishment of trust funds that will take care of unidentified trauma victims until members of their families and/or their health management organisation can be contacted
- vii) Employment and youth empowerment: This will reduce the number of youth engaged in violent crime and subsequently reduce the number of violence related trauma victims. It will also give an alternative employment to the youth engaging in commercial motorcycle riding

*Sources of funding*

- i) Health insurance: With a population of two hundred million, health insurance premiums of one thousand naira per person per annum gives a total of two hundred billion naira. With well-structured payment plans that makes higher income earners pay more and lower income earners pay less, the funds that can be generated from health insurance are huge. This much funds will go a long way in implementing the plans outlined above. Well administered National Health Insurance schemes will greatly improve access to emergent care for trauma victims
- ii) Repatriated funds and retrieved funds can also be channelled in to provision of health infrastructure and training of personnel.
- iii) A lot of Nigerian based foreign health practitioners are coming back home to set up high quality and world class health care institutions. This group of people can be encouraged to come back home in larger numbers by giving tax cuts and import duty rebates to encourage them to import equipment and set up. In return, they can be encouraged to cater for a certain percentage of indigent patients with minimal charges.
- iv) Foreign investors can also be encouraged to set up well regulated practices with the same proviso of catering for a percentage on indigent patients.

Monitoring and Evaluation: There will be need for ongoing monitoring of the processes:

#### *Monitoring*

A continuous monitoring of ongoing processes would be required. This would include

- i) The response time of emergency services.
- ii) The time to institution of definitive care after arrival at the point of care.
- iii) Outcomes of trauma care will be continuously monitored to ensure the quality of care.

#### *Evaluation*

- i) Number of patients treated will be evaluated to determine the impact of intervention.
- ii) Reduction in incidence of complications arising from trauma care will be assessed.
- iii) The trend of reduction in number of trauma deaths will also be closely followed.

#### **Conclusion**

The pattern of trauma seen in a community is an indication of the lifestyle in that community. Tackling the trauma problem in Nigeria will involve several factors which include but are not limited to: addressing the root causes of the problem to reduce the occurrence, improving access to healthcare, increasing the capacity of existing facilities to cater for the large volumes of trauma cases, regulation of the practices of the healthcare facilities, encouraging public-private-partnership and reduction in brain drain. This will greatly improve the overall health

of the nation and reduce the burden of secondary and tertiary prevention.

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## Ensuring health security for Nigerians by 2050: closing the equity gaps in reproductive health

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### Abstract

**Background:** Reproductive health is a key foundation for strategies to address health security. It constitutes a vital element in the vision to achieve improved health, quality of life and well-being of individuals and families and the realisation of national economic goals. Developing a blue print for health security in reproductive health matters may contribute to closing the equity gaps in Nigeria by the year 2050.

**Methods:** Gaps in reproductive health were identified through situation analysis of selected reproductive health indices. SWOT analysis was also conducted to outline areas of strengths and opportunities, in addition to weaknesses and threats. Key reproductive health indicators were forecasted for 2050.

**Results:** Despite all efforts, gaps still exist in the country's reproductive health indices including maternal, perinatal, contraceptive, abortion and gynaecological. Most pregnancy-related deaths are linked largely to preventable causes. If unaddressed, these challenges would undermine gains from previous interventions and responses from governmental and non-governmental organizations and pose serious threats to the nation's health security.

**Conclusions:** The country must be committed to reproductive health agenda that is focused on the International Conference on Population and Development goal in its bid to achieve health security by the year 2050. Due considerations must be accorded to emerging reproductive health issues like men's reproductive health and their involvement in their partners' reproductive health, and the reproductive health needs of the aged, people with disabilities and those in humanitarian settings. Further in achieving health security for Nigerians by the year 2050, the principles underlying the reproductive health policy of the country must be upheld. These include equity, right based approach, gender and age responsiveness, cultural sensitivity and continuum of care amongst others.

**Keywords:** Health security; Reproductive health; Maternal indices; perinatal health; Nigeria.

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### Abstrait

**Contexte :** La santé reproductive est une fondation essentielle des stratégies visant à assurer la sécurité sanitaire. Elle constitue un élément essentiel de la vision pour améliorer la santé, la qualité de vie et le bien-être des individus et des familles, ainsi que la réalisation des objectifs économiques nationaux. L'élaboration d'un schéma directeur pour la sécurité sanitaire en matière de santé reproductive pourrait contribuer à combler les écarts d'équité au Nigéria d'ici à 2050.

**Méthodes :** Des lacunes en matière de santé reproductive ont été identifiées à l'aide d'une analyse de la situation de certains indices de santé reproductive. Une analyse SWOT a également été réalisée pour définir les zones de forces et d'opportunités, et aussi des faiblesses et des menaces. Les principaux indicateurs de la santé reproductive ont été prévus pour 2050.

**Résultats :** Malgré tous les efforts déployés, il y'a encore des déficiences dans les indices de la santé reproductive du pays, notamment en matière de santé maternelle, périnatale, contraceptive, avortement et gynécologique. La plupart des décès liés à la grossesse sont largement liés à des causes évitables. Si ces problèmes ne sont pas résolus, ces défis affaibliraient les gains tirés des antérieures interventions et réponses des organisations gouvernementales et non gouvernementales et menaceraient gravement la sécurité sanitaire du pays.

**Conclusions :** Le pays doit être commis à un programme de santé reproductive axé sur l'objectif de la Conférence Internationale sur la Population et le Développement visant à instaurer la sécurité sanitaire à l'horizon 2050. Il convient de tenir dûment compte des problèmes émergents en matière de santé reproductive, tels que la santé reproductive des hommes et leurs participations dans la santé reproductive de leurs partenaires, et les besoins en matière de santé reproductive des personnes âgées, des personnes handicapées et de ceux dans des situations humanitaires. En plus, pour garantir la sécurité sanitaire des Nigériens d'ici 2050, les principes qui sous-tendent la politique de santé reproductive du pays doivent être respectés. Ceux-ci incluent l'équité, l'approche fondée sur les droits, la réactivité au genre et à l'âge, la sensibilité culturelle et le continuum de soins, entre autres.

**Mots-clés :** *sécurité sanitaire ; La santé reproductive; Indices maternels; santé périnatale; Nigeria.*

The primary focus of global health security is outbreak of infectious diseases of which Low and Middle Income Countries (LMICs) are at greater risk. The major threats to achieving health security in Nigeria by the year 2050 when its population is expected to double are inadequate resources, weak health systems and poverty. While inadequate resources and weak health systems remain perennial challenges to effective and efficient healthcare delivery in Nigeria, population dynamics is mainly driven by reproductive health factors. Hence, reproductive health is a key foundation for strategies to addressing health security in Nigeria.

The ICPD, held in Cairo in 1994, arrived at a consensus view of reproductive health that was sanctioned by 165 countries, defining it as “a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity, in all matters relating to the reproductive system and its functions and processes” [1]. The definition implies that both men and women have the rights to be informed of, and have access to safe, effective, affordable and acceptable methods of fertility regulation of their choice and rights to have access to appropriate health care services that will enable women to go through pregnancy and childbirth safely, and provide couples with the best chance of having a healthy infant [1]. The issues of reproductive health rights do not exclude adolescents and people with physical and mental needs and those in humanitarian settings.

Nigeria continues to take the lead in the African sub-region with regards to signing on to global initiatives, while at the same time adopting, adapting and/or making policy pronouncements as to the readiness of the government to implement the tenets of the respective initiatives [1,2]. Even though the ICPD principles and benchmarks informed the Millennium Development Goals (MDGs), especially the fifth goal, the achievement of the reproductive health indices in the country remains a mirage. The Nigerian Demographic and Health Survey (NDHS) showed that there is continuing high rates of maternal and perinatal morbidity and mortality, poor contraceptive prevalence rate, high incidences of unsafe abortions and its sequelae, high rates of vesicovaginal fistula and female genital tract malignancies among other reproductive health challenges [2,3]. Perinatal mortality has long been recognized as an index of the quality of obstetric care

reflecting access to basic care and life saving interventions in any given population. Perinatal mortality remains a huge global burden given that it accounts for three quarters of neonatal deaths which in turn is responsible for half of under-5 mortalities [4]. The reproductive health needs and of the older population, people with special physical and mental problems and those in humanitarian settings are equally neglected. These challenges are further aggravated by economic (high unemployment and poverty rates), sociocultural, political and religious factors. If care is not taken; these challenges would undermine gains from previous interventions and responses from governmental and non-governmental organizations and pose serious threats to the nation's health security. It is on this note that the Federal Government of Nigeria has deemed it necessary to develop a blue print for health security in reproductive health matters including perinatal health by the year 2050.

#### **Situation analysis**

Nigeria is one of the six high burden countries accounting for over 50% of the total pregnancy-related deaths worldwide [5]. The recent national data by the National Population Commission estimates the maternal mortality ratio (MMR) for Nigeria to be 576 deaths per 100,000 live births [3]. Most pregnancy related deaths in Nigeria are linked largely to preventable causes such as prolonged obstructed labour, eclampsia, post-delivery infection and haemorrhage [6]. Other associated factors are the low contraceptive utilisation rate resulting in unintended pregnancies and unsafe abortion.

Recent perinatal mortality data provided by research studies and population surveys in the 2013 NDHS in Nigeria reported the perinatal mortality rate as 41 per 1000 pregnancies [3]. Facility based studies reported consistently high perinatal mortality rates that ranged from 62.7 per 1000 live births to 81 per 1000 live births [7-11].

Nigeria is the most populous country in the African region with a population of over 180 million and a Total Fertility Rate of 5.5 per woman [3]. If nothing is done to reverse the demographic momentum, Nigeria is set to double its population in 22 years [6]. Contraceptives utilisation rate for modern methods has remained persistently low stagnating at 10% among currently married women with variation across regions (2.7% in the North East versus 24.9% in the South West), age group (4.8% among all women aged 15-19 years versus 14% among women age 40-44), educational level (1.7%

for women who had no education versus 22.4% for those who had more than secondary education) and wealth quintile (0.9% for women in the lowest wealth quintile versus 23.4% in the highest); overall, unmet need for family planning is reported to be 16% [3].

Unsafe abortion also contributes to the high level of maternal deaths in Nigeria. Recent data indicate that approximately 1.25 million induced abortions occurred in Nigeria in 2012 which translates to 33 abortions per 1,000 women aged 15-49 years. About 212,000 women were treated for complications of unsafe abortion while 285,000 experienced serious health consequences but did not receive the treatment they needed. Regional abortion rates varied widely with the lowest in the North Central and South West zones (27 per 1,000 in each) and the highest in the North East (41 per 1,000) and South South (44 per 1,000) [12].

In the last three decades, sexually transmitted infections most especially HIV & AIDS has remained a global health challenge affecting people from all walks of life, decimating the future generation and most productive segments of the population particularly young people. Over 3.6 million Nigerians are living with HIV and the country has the second highest burden of the infection, 10% of new HIV infections and 14% of HIV-related deaths in the world in 2013 [13]. Nationally, the HIV prevalence in the general population is 3.0% which is lower than 3.6% reported in 2007. The HIV prevalence is higher among women (3.5%) and those aged 35-39 years old (4.4%) compared to men (3.3%) and those aged 15-19 years old (2.9%) [14]. There is significant variation in the sero-prevalence rate at the regions with the North West having the lowest value of 1.9% compared to 5.8% in the North Central zone while six states – Akwa Ibom, Kaduna, Benue, Oyo, Lagos and Kano account for approximately two fifth of people living with HIV in Nigeria [15].

The results of the national HIV sentinel survey showed that the HIV sero-prevalence rate among pregnant women increased over the years from 1.8% in 1991 to peak at 5.8% in 2001 with a gradual decline to 3.0% in 2014. Nigeria has the highest number of mother-to-child transmission of HIV in the world and consequently the highest infections among pregnant women and children. Only 17% of all pregnant women were counselled and tested, 20.2% received anti-retroviral drugs and 6.2% of infants born to women living with HIV received prophylaxis [6,16]. This has grave implication resulting in a growing cohort of

adolescents and young people who were infected with HIV through MTCT route.

With regards to other sexually transmitted infections (STIs), there is limited data but findings from the National Demographic Health Survey revealed that 8% of women and 4% of men reported that they had symptoms of a sexually transmitted infection (STI) 12 months prior the survey [3]. The self-reported prevalence of STIs and associated symptoms was highest among never-married women (15%) while educated females were twice as likely to report STIs or STI symptoms compared to their non-educated counterpart. With regards to geographical variations, women in the South East had the highest prevalence (15%) compared to zones. Health seeking behaviours was very poor; women (27%) were less likely than men (20%) not to seek advice or treatment for their STIs [3].

Cancers of the reproductive systems are emerging as major health problems in Africa due to the epidemiological transition [17]. The incidence of cancer in Africa is projected to reach 1.28 million cases annually and claim 970,000 lives yearly by 2030. In Nigeria, breast and cervical cancers are the leading causes of cancer-related deaths in women while for men, it is prostate cancer [18].

Harmful traditional practices such as early child marriage, female genital mutilation and gender based violence have grave implications for the reproductive health and rights of individuals most especially women. According to the NDHS 2013, 11.6% of adolescent females in Nigeria aged 15 to 19 years were already married by the age of 15 years, a quarter of women in the reproductive age group had been circumcised and gender based violence is still prevalent [3]. These practices impact negatively on health and require concerted, multi-sectoral efforts for its elimination.

Currently, the upsurge in terrorism-related activities is posing a major threat to access to the reproductive health services in several parts of the country with the possibility of reversing some of the gains achieved in previous years. The neglect of the reproductive health needs of special populations like the aged, people living with disabilities and internally displaced persons remains another major challenge. Male involvement in meeting the reproductive health needs of their partners is low. In addition, current RH services do not sufficiently address men's RH needs.

**Table 1: SWOT ANALYSIS**

<b>Strenghts</b>	<b>Weakness</b>
<ul style="list-style-type: none"> <li>• Availability of reproductive health policy.</li> <li>• The current policy has consideration for special populations. e.g. aged, people with disabilities, people in humanitarian settings.</li> <li>• Operations of three tiers of government with emphasis on PHCs approach to health care delivery</li> <li>• Capacity for training and availability of reproductive health experts.</li> <li>• Availability of governmental and non-governmental organisations who are engaged in reproductive health related issues.</li> <li>• Availability of reliable sources of reproductive health information e.g. DHS, NARHS, HIV Sentinel Survey etc</li> <li>• Adoption of Family life and HIV education into school curriculum.</li> <li>• Availability of reproductive health indicators for monitoring and evaluation.</li> <li>• Adoption of Integrated Reproductive Health, Maternal, Newborn, Child and Adolescent Health Strategy (RMNCAH).</li> <li>• Adoption and implementation of the Task Shifting policy</li> <li>• Establishment of Health Insurance Scheme</li> </ul>	<ul style="list-style-type: none"> <li>• Poor implementation of reproductive health policy.</li> <li>• Ineffective health governance structure and poor enabling environment for implementation.</li> <li>• Poor coordination of reproductive health services/ programmes among the three tiers of government and donor partners within the countries.</li> <li>• Inadequate access to reproductive health information</li> <li>• Poor integration of reproductive health services.</li> <li>• RH programmes are not driven by evidence-based information</li> <li>• Poor government priority and funding for RH research</li> <li>• Lack or ineffective monitoring and evaluation of reproductive health services/initiatives.</li> <li>• Lack of evaluation of existing reproductive health programmes e.g. school health, FLHE, Family planning services.</li> <li>• Harmful traditional practices still entrenched in culture and religion.</li> <li>• Government's failure in funding or supporting RH programme.</li> <li>• Lack of sustainability of existing reproductive health programmes.</li> <li>• Poor engagement of reproductive health experts in the planning, implementation and evaluation of reproductive health services.</li> <li>• Lack of awareness and practice of reproductive health rights.</li> <li>• Lack of or reduced funding by the government/ relevant stakeholders.</li> <li>• Neglect of out-of-school youth in ASRH programmes</li> <li>• Inadequate facilities for RH service delivery e.g.</li> <li>• Inadequate Human Resources for RH</li> <li>• Poor enabling environment for RH service delivery at PHC level e.g. road network, infrastructure</li> <li>• Catastrophic out-of-pocket expenditure</li> <li>• High cost of RH services</li> <li>• Poor attitude of healthcare workers</li> <li>• Poor healthcare seeking behaviours</li> </ul>
<p><b>Opportunities</b></p> <ul style="list-style-type: none"> <li>• Availability of international development policies and frameworks.</li> <li>• Availability of agencies/development partners with interest in or special consideration for reproductive related issues or target populations. World Bank, WHO, Centre for Disease Control.</li> <li>• Adoption and endorsement of global agenda on reproductive health goals and strategies e.g. ICPD, MDGs, Sustainable Development Goals (SDGs) etc</li> <li>• Leveraging on the goodwill of corporate bodies, philanthropists, religious and traditional institutions to advance RH</li> <li>• Promoting Public Private Partnership Initiatives</li> </ul>	<p><b>Threats</b></p> <ul style="list-style-type: none"> <li>• Government over-dependence on funding from donor agents</li> <li>• Partners/donor's interest in vertical programming/lack of integration in donor programmes.</li> <li>• Lack or inadequate involvement of relevant stakeholders in reproductive health activities like the academia.</li> <li>• Poor/late responses to global agenda related to reproductive health issues.</li> <li>• Lack of implementation of Abuja declaration of 15% National budget allocation to public health by 2015.</li> <li>• Insufficient/reduced international support from donors.</li> <li>• Rising wave of terrorism, insurgency, religious, ethnic and political upheaval</li> </ul>

**Table 2:** Forecast for Key Reproductive Health Indicators (2019- 2050)

Selected Indicators	Current status based on available national data	Year 2030	Year 2040	Year 2050	Assumption
1. Total Fertility Rate (total births per woman)	5.5 **	4.3	3.1	2.1	Reduce the total fertility rate by at least 0.6 children every five years in line with the National Policy on Population for Sustainable Development
2. Contraceptive prevalence (Modern method)	10%**	35%	55%	75%	Increase the contraceptive prevalence rate for modern methods by at least two percentage points per year in line with the National Policy on Population for Sustainable Development
3. Unmet Need for FP	16**	12	8	4	Reduction by 25% every 10 years
4. Maternal Mortality ratio (maternal deaths per 100,000 live births)	576 **	70	50	20	Target for 2030 in line with the SDGs
5. Percentage of pregnant women receiving antenatal care from a skilled provider	60.6%**	75%	90%	100%	
6. Births attended by skilled personnel	38%**	55%	75%	90%	
7. Proportion of health care facilities providing basic emergency obstetric care services per 500,000 population	18.5%\$	50%	70%	90%	The 2017 Reproductive Health Policy targets at least 80% by 2021
8. Perinatal mortality rate (per 1,000 pregnancies)	41 **	10	8	6	
9. Neonatal mortality rate (per 1,000 pregnancies)	37**	12	7	5	Target for 2030 in line with the SDGs
10. Still birth rate (per 1,000 pregnancies)	---	10	8	6	
11. Percentage of live births that weigh less than 2500g.	15.2%##	10%	5	2	
12. Percentage of pregnant women (15–24) attending antenatal clinics, whose blood has been screened for syphilis, with positive serology for syphilis	0.7+	0.5	0.3	0.1	
13. Percentage of women of reproductive age (15–49) screened for Qhaemoglobin levels with levels below 110 g/l for pregnant women and below 120 g/l for non-pregnant women	58%#	40%	25%	10%	Reduce anaemia in pregnant women by 25% every 10 years

14.	Abortion treatment rate (Women treated for abortion complications per 1,000 women of reproductive age)	5.6 <sup>++</sup>	4.5	3.0	1.0
15.	Reported prevalence of women with FGM	25% <sup>**</sup>	17	9	0
16.	Percentage of women of reproductive age (15–49) at risk of pregnancy (not pregnant, sexually active, non-contraception and non-lactating) who report trying for a pregnancy for two years or more.	3% <sup>**</sup>	2%	1%	0.5%
17.	Percentage of men who reported having STIs in the past 12 months	1.6% <sup>**</sup>	1.0%	0.5%	0.5%
18.	Percentage of women who reported having STIs in the past 12 months	3.9% <sup>**</sup>	3.0%	2.0%	1.0%
19.	Percentage of pregnant women (15–49) attending antenatal clinics who are sero-positive for HIV.	3% <sup>+</sup>	2%	1%	0.5%
20.	Percentage of mothers who received ARV/ART	58.2% <sup>\$\$</sup>	70%	80%	100%
21.	The percentage of all respondents who correctly identify all three major ways of preventing the sexual transmission of HIV and who reject three major misconceptions about HIV transmission or prevention.	37.4% <sup>**</sup>	50	75	100

**Source of data**

<sup>\*\*</sup>National Population Commission, Nigeria

<sup>#</sup>World Health Organisation, Global Health Observatory Data Repository

<sup>##</sup>Federal Republic of Nigeria, National Bureau of Statistics and UNICEF. Nigeria Multiple Indicator Cluster Survey 2011

<sup>†</sup>National Agency for the Control of AIDS

<sup>††</sup>Bankole, A., Adebayo, I. F., Hussain, R., Awolude, O., Singh, S., & Akinyemi, J. O. (2015). The incidence of abortion in Nigeria. *International perspectives on sexual and reproductive health*, 41(4), 170

<sup>§</sup>Federal Ministry of Health and United Nations Population Fund (Nigeria). National Study on Essential Obstetrics Care 2003 ABUJA, FMOH and UNFPA

<sup>\$\$</sup>Federal Ministry of Health 2016 National Health Facility Survey, Saving One Million Lives Programme for Result

**Table 3:** Short, Medium and Long Term Plan (2019- 2050)

Priority areasAREAS	Objectives	Targets by			Deliverables
		Year 2030	Year 2040	Year 2050	
1. Achieving desired and intended fertility	To reduce Total Fertility Rate by at least 0.6 children every five years	4.3	3.1	2.1	Reduction in total fertility rate to replacement level
2.	To increase contraceptive prevalence (Modern method) by at least two percentage points per year	35%	55%	75%	At least three quarter of married women adopt modern contraceptives
3.	To reduce Unmet Need for FP	12	8	4	All women who require contraceptive methods have access to services
4.	Reduction in maternal, neonatal and child morbidity and mortality	70	50	20	Reduction in maternal mortality
5.	To increase percentage of pregnant women receiving antenatal care from a skilled provider	75%	90%	100%	All pregnant women receive ANC from skilled birth personnel
6.	To increase births attended by skilled personnel	55%	75%	90%	Nine out of every 10 births attended by skilled personnel
7.	To increase proportion of health care facilities providing basic emergency obstetric care services per 500,000 population	50%	70%	90%	At least nine out of every 10 health facilities equipped to provide BEOC
8.	To reduce perinatal mortality pregnancies)	10	8	6	Reduction in perinatal mortality
9.	To reduce neonatal mortality rate	12	7	5	Reduction in neonatal mortality
10.	To reduce the percentage of live births that weigh less than 2500g.	10%	5	2	Reduction in low birth weight
11.	Percentage of women of reproductive age (15–49) screened for haemoglobin levels with levels below 110 g/l for pregnant women and below 120 g/l for non-pregnant women	40%	25%	10%	Reduction in anaemia in pregnancy to at least one out of every 10 women
12.	Abortion treatment rate (Women treated for abortion complications per 1,000 women of reproductive age)	4.5	3.0	1.0	Reduction in the complications of abortion to almost zero

13.	Control of sexually transmitted infections including HIV	Percentage of pregnant women (15–49) attending antenatal clinics who are sero-positive for HIV.	2%	1%	0.5%	Reduction in percentage of HIV positive pregnant women to almost zero level
14.		The percentage of all respondents who correctly identify all three major ways of preventing the sexual transmission of HIV and who reject three major misconceptions about HIV transmission or prevention.	50	75	100	Achieve comprehensive knowledge of HIV transmission and/or prevention
15.	Elimination of harmful practices	Reported prevalence of women with FGM	17	9	0	Total elimination of FGM

### Strategies to prevent maternal and perinatal Mortality

The continuum of care model for reproductive health, maternal, newborn and child health refers to continuity of individual care throughout the life cycle (childhood, adolescence, pregnancy, childbirth and postnatal period) and between points of provision of care including households, communities, health facility settings and outreach services. The model is illustrated in Figure 1. These services are to be delivered in an integrated manner rather than through vertical programmes. This model fits in with the strategic objectives of the WHO's Every Newborn action plan [19,20] which are to:

1. Strengthen and invest in maternal and neonatal care to include care during labour, birth and the first week of life.
2. Improve the quality of maternal and newborn care.
3. Reach every woman and newborn to reduce inequities.
4. Harness the power of parents, families and communities.
5. Count every newborn through measurement, programme-tracking and accountability.

For health systems to function effectively, human resource capacity, health facility infrastructure, supply systems, financial resources, governance, district level management and monitoring are components that require to be strengthened.

### Monitoring and Evaluation

Existing reproductive health monitoring and evaluation (M&E) systems at the national, state and local government levels will be strengthened to track the implementation processes, outcome and impact indicators. A detailed M&E plan will be developed and this will indicate indicators and targets, data sources, data collection tools, data flow and the roles and responsibilities of key stakeholders. Data on reproductive health service delivery at the local, state and national levels will be submitted regularly to the reproductive health division of the Federal Ministry of Health (FMOH) through the relevant structures and they will coordinate all M&E activities at the national level. In addition, a comprehensive national reporting system will be developed to capture health and non-health sector data on RH interventions using a multi-sectoral technical working group.

At the end of the implementation of the short, medium and long term plans, the FMOH in collaboration with relevant Ministry, Departments and Agencies such as the National Population

Commission and the National Agency for the Control of AIDS will evaluate the interventions using standards tools to objectively and effectively assess the extent of implementation of the blueprint in line with the agreed objectives and performance indicators. Other existing national surveys (*i.e. the Nigeria Demographic Survey, HIV sentinel survey*) will be leveraged upon to track the impact of the interventions. The FMOH will ensure the timely dissemination of the progress/impact evaluation reports in line with the forecast and projections for 2050.

### Sources of funding

Funding will be mobilized from the government at every level through their budgetary processes. Other sources shall include global financing facility and National Health Act through the basic health provision fund, Insurance Health Scheme at national and state levels, SDGs funds, Social Investment and the reconstruction of North East budget for the provision of RH services for victims of insurgencies and IDPs. In addition, funds will be mobilized from partners, including private sector organization e.g. Telecommunication, Banking and Oil and gas Industries; philanthropists, indigenous and international development partners. Communities will also be involved in contributing to funding of RH services as part of their roles in partnering with the government.

### Conclusion

The huge burden of reproductive health care has been neglected for far too long. Intricately linked with maternal mortality, the high rates of newborn deaths in LMICs reflect underlying problems of poverty and social inequities. Reduction of the huge numbers of preventable maternal and newborn deaths require pragmatic scale up of known cost-effective interventions delivered within the context of existing health care infrastructure with the active participation of an empowered community.

The country must be committed to reproductive health agenda that is focused on the ICPD goal in its bid to achieve health security by the year 2050. Due considerations must be accorded to emerging reproductive health issues like men's reproductive health and their involvement in their partners' reproductive health, and the reproductive health needs of the aged, people with disabilities and those in humanitarian settings. Further in achieving health security for Nigerians by the year 2050, the principles underlying the reproductive health policy of the country must be upheld. These include equity, right based approach, gender and age responsiveness, cultural sensitivity and continuum of care.

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## Reversing the Nigeria stunting dilemma - human capital dimension

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### Abstract

**Background:** The Human Development Index (HDI) shows Nigeria ranks 157 of 189 countries for the year 2017. Human Capital Index (HCI) status in Nigeria shows that as at 2018, Nigerians had 34% relative productivity. These indicators clearly show

human capital.

**The stunting dilemma human capital status:** Nigeria has the second highest burden of stunted children in the world, with a national prevalence rate of 43% of children under five - translating into 16.5 million children. The stunting rate has grown by about 3% in 10 years and Nigeria is behind several African peers. Stunting significantly affects the cognitive ability of children. The recent increase in negative

manifestations of poor early child development.

**Priority options for action:** Given the HCI decline in Nigeria, it is imperative that strategies like comprehensive early child development program, provision of quality and affordable healthcare. a kind

for the poor and vulnerable are considered.

**Conclusion:** Nigeria urgently needs to reverse the gradual slide in human capital. Investments in early child development is key for today and the future of work and productivity in Nigeria.

**Keywords:** Nigeria, stunting, human capital

### Abstract

**Contexte :** L'indice de développement humain (IDH) indique que le Nigéria occupe la 157<sup>ème</sup> place sur 189 pays pour l'année 2017. Le statut de l'indice de capital humain (ICH) au Nigéria montre qu'en 2018, la productivité relative des Nigériens était de 34%. Ces indicateurs montrent clairement que le Nigéria connaît une dégradation de la qualité du capital humain.

**Le dilemme de retard de croissance du statut capital humain :** Le Nigéria est le deuxième pays au monde

avec le taux de prévalence de 43 % d'enfants moins de cinq ans en retard de croissance, soit 16,5 millions d'enfants. Le taux de retard de croissance a augmenté d'environ 3% en 10 ans et le Nigéria est derrière plusieurs pays africains pairs. Le retard de croissance affecte considérablement les capacités cognitives des enfants. L'augmentation récente des vices négatifs parmi les jeunes nigériens semble suggérer la gravité de l'effet multiplicateur du retard de croissance et des autres manifestations d'un développement médiocre des jeunes enfants.

**Options prioritaires pour l'action :** Compte tenu du déclin de l'ICH au Nigéria, il est impératif de prendre en compte des stratégies telles qu'un programme complet de développement du jeune enfant, la fourniture de soins de santé abordables et de qualité, la scolarisation axée sur un apprentissage de qualité et la protection sociale des pauvres et des vulnérables.

**Conclusion :** Le Nigeria doit d'urgence inverser la tendance à la baisse progressive du capital humain. Les investissements dans le développement du jeune enfant sont essentiels pour le présent et l'avenir du travail et de la productivité au Nigéria.

**Mots-clés :** Nigeria, retard de croissance, capital humain

### Introduction

The Human Development Index (HDI) measures of countries shows Nigeria ranks 157 of 189 countries for the year 2017. HDI is a measure of assessing long term human development progress in three basic dimensions; a long and healthy life, access to knowledge and a decent standard of living. Human Capital Index (HCI), on the other hand, is a relative measure of productivity potentials of human beings. Like HDI, Human Capital Index has three basic dimensions: survival chances, learning possibility, and human healthiness/capacity to work. In recent time, an analysis of economic growth (an increase in the amount of goods and services produced per head of the population over a period of time) and economic development (improvement in well-being of a nation resulting from progress in technology, science, general economic growth and innovations) has shown a significant positive correlation between HCI of countries, their growth and development trajectory.

Human capital status in Nigeria shows that as at 2018, Nigerians have 34% relative productivity, indicating that the country operated at 34% of its human capacity. This translates to the fact that the quality of human capital, as a major element in growth and productivity, is at a very low level. So, both HCI and HDI clearly show that Nigeria is experiencing a decline in the quality of human capital.

### The Nigeria human capital status: The stunting dilemma

When HCI status measure is considered from the three basic dimensions (Survival, School and Health) one major question (among others) that is relevant to ask are, how much schooling will children born today complete and how much knowledge will they acquire? What level of skills and knowledge or mental capability and innovativeness will they be able to bring into governance, production and the development

surveys and according to UNICEF [2], Nigeria has the second highest burden of stunted children in the world, with a national prevalence rate of 43 percent of children under five - translating into 16.5 million children. A comparison of the South and North regions shows the South is relatively better than the Northern region. Overall the stunting rate has grown by about 3% in 10 years and Nigeria is behind a few African peers (Fig 1).

Stunting is a particularly worrying situation, as it impacts significantly on the cognitive ability of children. If low at under 5, it is virtually impossible to correct at adulthood. Psychologist and human development reviews are relating stunting to reduced competence, resilience, mental stability and innovativeness in adulthood. The recent increase in kidnapping, crime, depression, suicide and other negative vices among the Nigerian youths, seems to suggest the severity of the multiplier effect of stunting

**Table 1:** Nigeria stunting rates

Stunting in children under 5 years	National	North-West	North-East	North-Centre	South-South	South-East	South-West
Demographic Health Survey 2008	40.6	52.6	48.6	43.8	31.1	21.7	31.2
Multiple Indicator Cluster Survey, 2011	35.8	53.8	52.5	32.8	19.5	14.1	20.3
Demographic Health Survey, 2013	36.5	54.8	42.3	29.3	18.3	16.0	22.2
Standardized Monitoring and Assessment of Relief and Transition (SMART), 2015	32.9	55.9	43.5	30.6	20.0	12.3	17.5
Multiple Indicator Cluster Survey, 2016	43.6	58.5	52.4	34.9	19.0	16.9	19.4

sector of the country? The current status of stunting and the implication for answers to the above questions is clearly a source of concern now and in the immediate future.

The survival rate of children in Nigeria is about 90% which implies that about 10% of all children born die before they reach the age of 5 years. A very significant proportion of those who survive are malnourished. That is, they are not fully developed and therefore grow to be incapable of contributing to the country Gross Domestic Product (GDP).

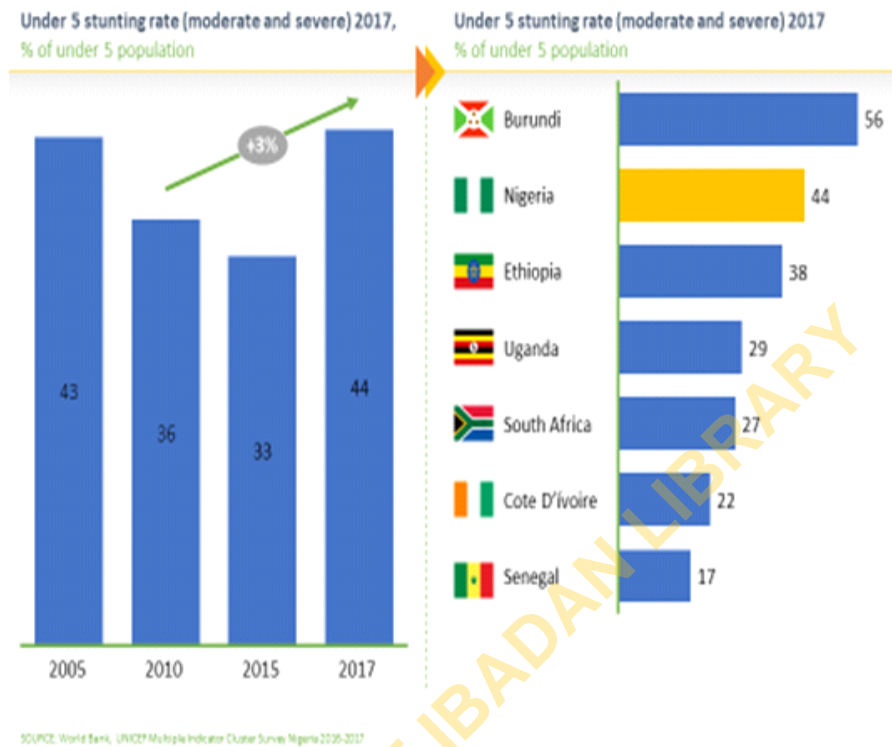
Stunting is a serious nutrition challenge in Nigeria, it is a big dilemma. Stunting or low height for age, is a sign of chronic under nutrition for long period of time [1]. Tables 1 presents the figures of stunting rates at National and regional levels by different surveys. Stunting rate is high across all

and other manifestations of poor early child development.

### Priority options for action

Given the growing severity of human capital decline in Nigeria, it is imperative that some policy and program measures are considered. A few options that are related to reversing the stunting dilemma are presented as follows:

- o Focus on early years: Comprehensive Early Child Development Program will reduce childhood malnutrition, promote early stimulation and learning, then nurture and protect the vulnerable children to ensure they reach their full potentials as they grow into adulthood.



- o Provide quality and affordable healthcare: Reducing infant mortality, malnutrition and improving health care provision for the
- o Provide health Insurance, training for health personnel and medical facilities and equipment are essential. Protecting Nigerians from fake drugs and harmful medications is germane. Drug abuse among youths need to be checked.
- o Make schooling about learning: The quality of education is a major consideration in skills development and preparing children and youths for the future work and future of works. As school infrastructure and services are made available and accessible particularly to poor households, it is essential that issues of teachers, instructional materials, textbooks and curriculum in quantity and quality be strengthened to ensure that learning and skills development is assured.
- o Support and promote the poor and vulnerable – especially women and the girl child: Social safety nets should be embedded in reform processes to protect the poor. They should be an integral focus of Social Protection or Social investment agenda because they play a critical role in building human capital. Evidence across the world shows that programs such as

conditional cash transfer, cash for work or public workfare, and skills for job improve nutrition, health, and skills in the early years – the most sensitive period for human capital accumulation- and improved skills and physical and mental health for adults can make a difference. Social safety nets can positively impact human capital across the lifecycle and in an entire household, from the early years to adulthood.

### Conclusion

There is an urgent need for Nigeria to reverse the gradual slide in Human capital. Investments in early child development is key and a critical development factor for today and future of work and productivity in Nigeria.

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## Blueprint for Health Security in Nigeria by 2050: Infectious Diseases Perspective

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### Abstract

**Background:** Infectious Diseases remain a leading cause of morbidity and mortality in Nigeria. Notably, natural and socio-cultural differences across Nigeria account for significant differences in types of infectious diseases that occur in different parts of the country. The communicable nature of infectious diseases either from person to person or via vectors has made it difficult to eradicate or even stem the tide of these diseases. HIV/AIDS, tuberculosis and malaria in particular are well established and enduring contributors to the infectious disease burden in Nigeria and this is very likely to continue to be the case in the foreseeable future.

**Method:** Literature from PubMed and Google was extracted using the keywords; Health Security, Year 2050 and Infectious Diseases

**Results:** In more recent times in Nigeria, the problem of emerging and re-emerging infections, often of epidemic importance as well as antimicrobial resistance also add to the infectious disease burden and compete for the already inadequate resources available to battle infectious disease. Many infectious diseases can be prevented by simple, effective and relatively low-cost interventions. Such interventions need to be emphasized to maximize cost-effectiveness of any resources expended. Nigeria's young, trainable, potential healthcare workforce and existing infrastructure such as the primary healthcare system, disease surveillance systems and widespread mobile phone use need to be strengthened and leveraged for a good approach to infectious disease control.

**Conclusion:** As Nigeria's population is set to double by 2050, health security from an infectious disease standpoint will require policy change to support continuous training and re-training all cadres of healthcare workers to respond specifically to the problems that are fed back from the population while being fully aware of predictable (corruption, inadequate financing) and unpredictable (disease outbreaks, climate change, microbial mutation) factors that can serve as a hindrance.

**Keywords:** Health Security, Year 2050, Infectious Diseases

### Abstrait

**Contexte :** Les maladies infectieuses demeurent des causes principales de morbidité et de mortalité au Nigéria. Notamment, les différences naturelles et socioculturelles au Nigéria expliquent les importantes différences dans les types de maladies infectieuses qui comparaisent dans différentes parties du pays. La transmissible nature des maladies infectieuses, de personne à personne ou par l'intermédiaire de vecteurs, a rendu difficile l'éradication, ou même endiguer ces maladies. Le VIH / SIDA, la tuberculose et le paludisme en particulier sont des contributeurs bien établis et durables au fardeau des maladies infectieuses au Nigéria et ceci est très probable à continuer d'être le cas dans l'avenir probable.

**Méthode :** La littérature de PubMed et Google a été extraite à l'aide des mots-clés ; sécurité sanitaire, année 2050 et maladies infectieuses

**Résultats :** Plus récemment au Nigéria, le problème des infections émergentes et ré-émergentes, qui revêtent souvent une importance épidémique ainsi que la résistance aux antimicrobiens, alourdit le fardeau des maladies infectieuses et rivalise pour les ressources déjà insuffisantes pour lutter contre les maladies infectieuses. De nombreuses maladies infectieuses peuvent être prévenues par des interventions simples, efficaces et relativement peu coûteuses. De telles interventions doivent être soulignées pour maximiser la rentabilité des ressources dépensées. Le potentiel personnel de santé jeune, susceptible d'être formé, du Nigeria, ainsi que les infrastructures existantes telles que le système de soins de santé primaires, les systèmes de surveillance des maladies et l'utilisation répandue du téléphone portable doivent être renforcés et mis à profit pour une bonne approche de la lutte contre les maladies infectieuses.

**Conclusion :** Puisque la population nigériane est dit à doubler d'ici 2050, la sécurité sanitaire au point de vu de maladie infectieuse nécessitera un changement de politique pour soutenir la formation continue et reformation de tous les cadres du personnel de santé afin de répondre spécifiquement aux problèmes qui sont correspondus par la population tout en étant pleinement conscient des facteurs

prévisibles (corruption, financement insuffisant) et imprévisibles (épidémies, changement climatique, mutation microbienne) qui peuvent constituer un obstacle.

**Mots - clés :** *Sécurité sanitaire, Année 2050, Maladies infectieuses*

### Introduction

As of 2016, infectious diseases accounted for most of the top five causes of death in Nigeria [1]. The well recognized threat of the trio of HIV/AIDS, tuberculosis and malaria remain problematic in spite of well-planned and implemented national control programmes over the past few to several decades [1]. Added to these are the threat of emerging infections, many of which have come to the fore as a result of man's intrusion into the natural habitat of their causative organisms or their natural hosts; unwittingly aided by increasing population mobility, high population density, rural to urban migration and climate change [2,3].

By 2050, Nigeria's population is expected to double to about 399 million, a 100% rise from the current estimate of around 200 million [4]. Health security in Nigeria cannot be attained without duly addressing the infectious disease burden she faces and undoubtedly will continue to face. It is important to note that the burden on infectious diseases varies widely in magnitude and type across the different geo-political zones in Nigeria. This precludes the use of one-size-fits all approach to the infectious disease challenges in Nigeria.

About 2.9% of adult Nigerians (3.2 million people) are reported to be infected with HIV, only 34% (1.1 million people) of them are aware of their HIV status and even smaller proportion (31% or 992,000 of adults and 21% or 56,700 of children) are on lifesaving antiretroviral medications [3]. This is far off from the UNAIDS 90-90-90 goal [5]. Nigeria, because of its large population has the second largest number of people living with HIV and has the highest number of new infections in children worldwide [6]. Malaria deaths in Nigeria remain at high levels and the resilience of the parasite's vector (the anopheles mosquito) appears to be enhanced by the tropical climate, insecticide resistance and sub-optimal vector control [7]. The gains that appear to have been made with the discovery and introduction of artemisinin based combination therapy (ACT) in the era of widespread chloroquine resistance must be guarded closely as resistance of the parasite to ACTs begin to emerge

in other parts of the world [7]. Tuberculosis is the fourth leading infectious disease cause of mortality worldwide and continues to be fuelled by the HIV epidemic as well as the emergence of drug resistant strains. HIV co-infection makes tuberculosis more difficult to diagnose and treat and is a strong predictor for poor outcomes of TB treatment. The TB mortality rate among HIV-negative people per 100 000 population per year, is falling at about 3% per year, and the overall reduction in the period 2000–2017 was 42%. However the reverse is the situation for HIV/TB co-infected patients [8]. Africa has continued to shoulder the heaviest burden of all malaria cases; with 90% of malaria cases documented and 92% recorded mortality rate [9].

Of more recent importance to the healthcare landscape is the threat of emerging infections as evidenced by the 2014 Ebola outbreak in West Africa – the largest of its kind ever known to man [10]. The re-emergence of wild poliovirus in Nigeria in 2016 after previously being declared polio free highlights the impact that civil and political unrest can have on the health of a nation [11]. Also of concern is the growing global threat of antimicrobial resistance which no country, including Nigeria, has been spared. Again, the mobility of Nigeria's very young population, medical tourism excursions during which resistant organisms can be acquired and brought back home and lack of regulations around the access to and use of antimicrobials all contribute to Nigeria's growing antimicrobial resistance problem [3]. Needless to say, infections caused by resistant organisms are more difficult and expensive to treat and associated with worse outcomes.

### The current health situation

At present the Nigeria Health System is fashioned after the 3 tiers of Government; the federal, state and the local levels of Government. The primary healthcare system was adopted to provide health for all Nigerians. However very little community participation and poor funding has limited its effectiveness in solving Nigeria's health challenges. The current existing quality of care needs substantial improvement. Measurable selected health indicators for women health such as ; life expectancy at birth, modern method of cardiopulmonary resuscitation, unmet needs for family planning, maternal mortality ratio, number of women with at least 4 antenatal needs, births delivered by a skilled provider, are all currently far off from the proposed set target. Additionally, the targets remain unmet for paediatric health targets including; under-five mortality rate, proportion of 1 year old children immunized against

measles, children under 5 who are underweight for age, children under 5 who slept under an Insecticide treated net the night before survey and paediatrics HIV prevalence. Government funding on health is still currently poor compared with other developing and developed countries. Ironically, many countries with less wealth than Nigeria, including; Bangladesh, Guinea, Ghana and Senegal have achieved better health. The currently existing political will is not overtly supportive and the current budget allocation to the health sector is also very poor. Table 1 is a summary of the current strengths and weakness of the existing health system.

would help to prevent health insecurity as projected above. The chain of poverty – Poverty – Ignorance – Disease has to be broken to reduce morbidity and mortality across all age groups. Importantly, planned population growth would help to prevent population overgrowth and its numerous attendant complications. Improved securities and prevention of terrorism is also important as it would reduce the number of internally displaced citizenry who become exposed to diseases like cholera, tuberculosis and HIV while residing in concentration camps. Intersectoral collaboration between health, education services and agricultural sectors is desirable to facilitate utilization of improved technology to enhance

**Table 1: SWOT analysis of the existing health system in relation to infectious diseases**

STRENGTHS	WEAKNESSES
<ul style="list-style-type: none"> <li>• Prevention is key: many infectious diseases are preventable and/or treatable</li> <li>• Infectious diseases are often amenable to low cost, low-technology public health interventions</li> <li>• Interventions are often cost-effective</li> <li>• Well developed public health framework for infectious disease surveillance systems</li> <li>• Several institutions for training of human resources for health</li> <li>• Existence of a network of primary healthcare centres which can be leveraged to give universal access for preventive and curative care for infectious diseases</li> <li>• A large pool of young and trainable individuals who could potentially contribute to the healthcare workforce</li> </ul>	<ul style="list-style-type: none"> <li>• Incomplete or inadequate epidemiological data to feed an accurate needs assessment</li> <li>• Limited diagnostics for infectious diseases</li> <li>• Poor infection control practices both at the community and facility levels</li> <li>• Poor access to healthcare/lack of universal coverage</li> <li>• Weak health systems with poorly trained healthcare workers</li> </ul>
OPPORTUNITIES	THREATS
<ul style="list-style-type: none"> <li>• Involvement of key stakeholders at the local government level (including but not limited to community health workers) so as to ensure local buy-in and penetration of services at the periphery</li> <li>• Young, trainable fit for purpose healthcare workforce can be developed</li> <li>• Leveraging technology (mobile health and telemedicine) for healthcare reporting and delivery</li> <li>• Build and strengthen community based primary healthcare centers and increase access to healthcare services</li> </ul>	<ul style="list-style-type: none"> <li>• Population explosion</li> <li>• Climate change/natural disasters/existing climate conditions</li> <li>• Internal and external migration</li> <li>• Political unrest/civil conflict</li> <li>• Harmful traditional and social practices</li> <li>• Poor regulation of drugs and therapeutics</li> <li>• Corruption, lack of political will and inadequate funding</li> <li>• Poverty</li> <li>• Rapid urbanization, setting the stage for rapid spread of highly infectious diseases</li> </ul>

***Proposed plan to prevent health insecurity by the year 2050***

There is need to ensure leadership, governance, management and accountability in Government. Improved Human Resources for Health (HRH) as well as improved delivery of the highest impact interventions, particularly at the PHC level

agricultural productivity and food security. This is because of the interplay between malnutrition, poverty and diseases, particularly among the paediatric age group. Table 2 summarizes the proposed plan and deliverables to prevent health insecurity in Nigeria.

**Table 2:** Timed plans and deliverables to address the anticipated health insecurity due to challenges to infectious disease management and control.

	<b>Plans</b>	<b>Deliverables</b>
<b>Short term</b>	<ul style="list-style-type: none"> <li>- To ensure that vaccines are made available for vaccine preventable diseases.</li> <li>- To increase public sensitization on utilization of existing vaccines including HPV vaccine and polio vaccine</li> <li>- To facilitate training and re-training of healthcare and allied health students and personnel on prevention, recognition and diagnosis of infectious disease</li> <li>- To tackle environmental challenges that predispose to re-emergence of infectious diseases eg. Environmental sanitation, prevention of food drying on shoulders of roads in rural areas, prevention of bush burning.</li> <li>- To strengthen the existing infectious disease surveillance system.</li> <li>- To enhance diagnostic support for infectious diseases.</li> <li>- To ensure that drugs are made available for treatment of infectious diseases including; malaria, tuberculosis and HIV.</li> <li>- To scale up specific programs such as directly observed treatment short course (DOTS) for tuberculosis or integrated management of infant and childhood illness (IMCI) for child health.</li> <li>- To provide healthcare facilities with adequate Personal Protective Equipment (PPE), isolation units and Facility-based policies for monitoring and management of potentially exposed Healthcare personnel.</li> <li>- To develop National guidelines for regulation of antibiotics prescription and consumption.</li> <li>- To scale up community-based health financing; and increase coverage and function of both the social and private health insurance schemes as well as increasing public and private sector investment in health of the Nigerian people.</li> </ul>	<ul style="list-style-type: none"> <li>- Reduced mortality rate from infectious diseases.</li> <li>- Reduced burden of hospital admission.</li> <li>- Increased vaccine coverage</li> <li>- Reduced rate of nosocomial infection among patients and healthcare personnel.</li> <li>- Decline in irrational antimicrobial prescription and consumption.</li> <li>- Improved quality of surveillance data</li> </ul>
<b>Medium term</b>	<ul style="list-style-type: none"> <li>- Strengthening capacity for diagnosis and treatment of infectious diseases of public health concern through in-service training of healthcare workers</li> <li>- To mobilize the local and state governments in prevention programs for infectious disease e.g malaria prevention. Encourage the active</li> </ul>	<ul style="list-style-type: none"> <li>- Deployment of trained community health workers at the community level</li> <li>- Eradication of poliovirus</li> <li>- Reduced frequency of outbreak of diarrhoeal diseases and measles.</li> <li>- Increased level of knowledge among relevant stakeholders in the health system.</li> </ul>

	<p>participation of community health workers and social workers for disease surveillance and contact tracing.</p> <ul style="list-style-type: none"> <li>- To scale up the fight against emerging and re-emerging infectious diseases through personnel training and infrastructural development.</li> <li>- Innovation in prevention, diagnosis, treatment and care of HIV, Tuberculosis and malaria.</li> <li>- To encourage proper utilization of donor funds; encouraging community financing; scaling up community-based health financing.</li> <li>- To strengthen primary health care in order to provide adequate treatment of infectious diseases from the grassroots' level.</li> <li>- To build and develop a bio repository for archive of specimens obtained from patients with infectious diseases.</li> </ul>	<ul style="list-style-type: none"> <li>- A more efficient surveillance system with better outbreak prediction strategies.</li> <li>- Reduced burden of HIV, Tuberculosis and malaria.</li> <li>- Increase donor funding from Non-Governmental organizations..</li> <li>- Reduced stress on the tertiary care centre, with enhanced focus on specialist duties.</li> <li>- Proper planning for disease control and improved technology for prevention, diagnosis and treatment of infectious diseases.</li> </ul>
<p><b>Long term</b></p>	<ul style="list-style-type: none"> <li>- Curriculum re-development for pre-service and in-service training of health and allied health care infectious disease workforce based on feedback from improved health data/intelligence resulting from short and medium term interventions</li> <li>- Eradication of vaccine preventable diseases including measles, mumps, Rubella.</li> <li>- Vaccine and diagnostics discovery for infectious diseases such as HIV, tuberculosis, malaria and Lassa fever.</li> <li>- Building stronger links between the Nigerian health sector and International organization to achieve positive health outcomes.</li> </ul>	<ul style="list-style-type: none"> <li>- Increased number of infectious disease experts and various other cadres of healthcare workers</li> <li>- Increased technical innovation in the field of drug discovery.</li> <li>- Novel vaccine for diseases like Lassa fever and Ebola.</li> <li>- Environmentally stable, accurate point of care diagnostics</li> <li>- Increased uptake of existing vaccines including; HPV vaccine, Rotavirus vaccine and Mumps, measles and Rubella vaccine.</li> <li>- Increased level of participation of the beneficiary community.</li> <li>- Complete removal of user fees and establishment of functional National health policy.</li> </ul>

### Sources of funding

Financing health systems is a major challenge in both developed and developing countries. Nigeria, in particular, currently faces a major challenge in ensuring adequate distribution of the existing resources among its numerous citizenry. The Federal Ministry of Health Budget allocation to the Health sector is grossly inadequate hence the need for dependence on donor agencies. Health care funding in Nigeria depends on tax revenue, out-of-pocket payments, donor funding, and health insurance [8].

Other major funding initiatives that could be explored further by 2050 include:

- Donor agencies such as; Joint United Nations Programme on HIV/AIDS (UNAIDS); the Global Alliance for Vaccines and Immunization;

the Stop TB Partnership; the Roll Back Malaria Partnership; the Global Fund to Fight AIDS, Tuberculosis, and Malaria; International AIDS Vaccine Initiative, the Medicines for Malaria Venture, the Global Alliance for Tuberculosis, the International Trachoma Initiative and the Global Alliance for Improved Nutrition.

- Philanthropic involvement from local and international health foundation including; well-meaning Nigerians. The Bill & Melinda Gates Foundation, the Rockefeller Foundation and the Packard Foundation have brought new resources such as funds, ideas and energy, which has been useful in achieving global goals with local actions in the fight against infectious diseases,

hence they could still be approached to help with aids

- Private sectors could partner with Government to fund health initiatives in exchange for reduction in their taxation charges.
- Industries like Coca cola, Nigerian brewery could partner by offering to provide funding for cold storage facilities for vaccines.
- Community-based financing and cooperatives for health.

### Monitoring and evaluation

There is need for continuous monitoring and evaluation of measurable indicators and results. Electronic health records and data should be implemented to help with monitoring and evaluation. Measurable indices to be monitored include; programme monitoring data, behavioural and biological trends data and evaluation of programmes. Monitoring and evaluation (M&E), helps to determine whether activities are implemented as planned and also to identify program strengths, weaknesses, and areas for improvement.

Nigeria would benefit from a strong country monitoring and evaluation system, which can only be achieved if better systems are built and supported. The national monitoring and evaluation plan should be based upon a simple framework, selected indicators and a plan for data collection, reporting, analysis and dissemination strategy designed to span a period of the next three to five years [9].

Adequate and relevant training and capacity building of M&E staff as well as development of regional networks of consultants and institutions for technical assistance is very important. Additionally, development of locally appropriate tools and methods for M&E would ensure the development of an efficient monitoring and evaluation system. The World Health Organization (WHO) could potentially offer technical expertise to strengthen M&E systems in Nigeria.

### Conclusion

Nigeria is the most populated country in Africa and has a high burden of infectious diseases. Although most of these infections are preventable from routine vaccination or proper primary care, the underestimation of the magnitude of these infections has impaired significant advancements in their prevention or treatment. The poor healthcare system as well as dearth of personnel with expertise in infectious diseases poses a potential threat to the health of the Nigerian populace, as the current population is expected to double by the year 2050.

Poor healthcare financing and high dependence on donor agency funding has prevented proper planning and implementation of national control programmes. It is recommended that Nigeria needs to explore and strengthen other mechanisms of health system and shift focus from out-of-pocket payments, in order to effectively prepare to address the infectious disease challenges that might arise from an increased population by the year 2050.

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## Development of a health security blueprint for the prevention of zoonotic diseases in Nigeria

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### Abstract

**Introduction:** Nigeria with an estimated population of about 198 million people, is faced with increasing health security challenges due to poverty, illiteracy and weak health systems. Further, endemic, emerging and re-emerging infectious or zoonotic diseases are continuously transmitted between humans and animals. Consequently, the country's limited capacity at enforcing/implementing regulatory policies governing livestock production, animal disease surveillance and activities at the human-animal-ecosystem interface, engenders transmission of zoonoses. Unfortunately, the present scenario does not only affect health security, but is also of Public Health importance; thus, impacting negatively on human capital development.

**Recommendations:** To overcome these threats, fundamental steps must be taken. First, setting up of a "One Health" Commission to evaluate the prevalence/burden of prevailing zoonoses. Second, carrying out Strengths, Weakness, Opportunities and Threats (SWOT) analyses of the One Health situation and highlight interventional blueprints towards ensuring health security in the country.

**Conclusion:** Nigeria is faced with myriads of health security challenges that are exacerbated by endemic, emerging and re-emerging zoonoses. To avert resultant imminent and future health threats, we propose the adoption of a One Health approach that will take advantage of the interdisciplinary or multisectoral cooperation among the human, veterinary and environmental health sectors to proactively prevent and control zoonoses in Nigeria.

**Keywords:** Development, Health security, Blueprint, Prevention, Zoonoses

### Abstrait

**Contexte :** Le Nigéria, dont la population est estimée à environ 198 millions d'habitants, est confronté à des problèmes croissants en matière de sécurité sanitaire en raison de la pauvreté, de l'analphabétisme et de la faiblesse des systèmes de santé. En outre, les maladies

infectieuses / zoonotiques endémiques, émergentes et ré-émergentes sont continuellement transmises entre humains et animaux. Par conséquent, la capacité limitée du pays à appliquer / implémenter les politiques réglementaires régissant la production animale, la surveillance des maladies animales et les activités à l'interface homme-animal-écosystème engendre la transmission des zoonoses. Malheureusement, le scénario actuel n'affecte pas seulement la sécurité sanitaire, mais revêt également une importance pour la santé publique ; ainsi, ayant un impact négatif sur le développement du capital humain.

**Recommandations :** Pour corriger ces menaces, des mesures fondamentales doivent être prises. Premièrement, la mise en place d'une commission 'Une Santé' chargée d'évaluer la prévalence/le fardeau des zoonoses prédominantes. Secondement, effectuez des analyses de la situation Une Santé sur les forces, les faiblesses, les opportunités et les menaces (SWOT) et mettre en évidence les schémas d'intervention visant à garantir la sécurité sanitaire dans le pays.

**Conclusion :** le Nigéria est confronté à une myriade de problèmes de sécurité sanitaire exacerbés par les zoonoses endémiques, émergentes et ré-émergentes. Pour éviter les menaces imminentes et futures sur la santé, nous proposons l'adoption d'une approche Une Santé qui tirera parti de la coopération interdisciplinaire /multisectorielle entre les secteurs de la santé humaine, vétérinaire et environnementale pour prévenir et contrôler de manière proactive les zoonoses au Nigéria.

**Mots clés :** Développement, Sécurité sanitaire, Schéma directeur, Prévention, Zoonoses

### Introduction

Zoonoses regarded as diseases, infections and infestations that are naturally transmitted from animals to humans, are a major threat to public health [1]. Consequently, they seriously affect the livestock industry, reduce human capital and threaten global health [2]. Importantly, approximately 60% of all human pathogens cause zoonotic infections [3] and about 75% of emerging infectious diseases in humans are zoonotic in origin [4]. These include such diseases as severe acute respiratory syndrome (SARS), avian influenza (H5N1), Nipah virus infection, Ebola virus disease (EVD) and rabies

which cause significant mortality and morbidity [5]. Importantly, the wildlife remains the origin of some of these zoonotic diseases while others originate in domestic livestock species; with many possessing the potential to affect humans via interactions between livestock and humans [6]. At such an interface, the domestic livestock are said to act as “amplifier hosts” for diseases contacted from wildlife and then get transmitted to humans via frequent and close contact [3, 7]. Consequently, there is increasing interest in consolidating cooperation between medical and veterinary sectors to prevent and control zoonoses through the concept of “One Health” [8].

Zoonotic diseases have a shared ancient history between humans and animals as a result of pathogen exchanges which involve transgression of the species barrier through human activities such as modernization of farming practices, deforestation and habitat destruction [4]. Epidemiologically, agents constituting a major risk for human and animal populations have been categorized by being highly pathogenic and/or transmissible with lack of any means of protection. As such, these agents have been identified as “Select Agents” and possessing the ability to pose severe threat to both human and animal health, as well as to animal and plant products. Further, zoonotic diseases have been found to pose serious challenge to millions of people in recent years, considering re-emerging or novel pathogens which often cause outbreaks in the developing world owing to insufficient public health infrastructure [9]. Again, the rising demand for food, development and industrialization have resulted in infringement on wildlife habitats and unguarded contact between humans and animals. This consequently has resulted in a dynamic upward trajectory of these diseases [10, 11]. Thus, livelihoods have been undermined due to the significant impacts of many zoonotic diseases on human health and livestock productivity, resulting in illness in the household and threatening its livestock and their output [12].

The direct costs of these diseases are on the livestock sector, as reflected through animal deaths, reduced productivity and the cost due to disease control. According to the Food and Agriculture Organization (FAO), between 500 million and 900 million food-insecure livestock keepers exist globally, and 70 percent of the world’s rural population obtain their livelihood from livestock [1]. The impacts of these diseases could also be through indirect costs, including upstream (feed) and downstream (e.g. retailing links). For instance, an estimated 50,000 to 60,000 deaths each year is attributable to rabies, and children are disproportionately impacted. Approximately 10 million

people received post-exposure prophylaxis annually making the cost of rabies substantial [13]. Other sectors such as travel and tourism are often affected by emerging diseases [14]. A whopping sum of USD 1,178 million, or 8% of the value of the livestock sector was attributed to 32 important diseases in the United Kingdom [15]. Similarly, the livestock sector spent up to AUD 979 million, or 16% of the value of the sector in Australia due to the top 21 beef and sheep diseases [16]. However, the impacts of zoonotic and foodborne diseases in terms of human illness and associated costs differ between high- and low-income countries. Up to 13% of the infectious disease burden in 59 low-income countries are due to zoonoses with only less than 1% in rich countries [14]. Further, occupationally exposed individuals including veterinarians, farmers and other livestock- and fish-sector workers are directly exposed to zoonoses; while livestock and fish product consumers are exposed through food.

The major causative agents of zoonoses are mainly bacteria. Some of the major bacterial zoonoses include: Anthrax, Salmonellosis, Brucellosis, Campylobacteriosis, *Escherichia coli*, Leptospirosis, Plague, Shigellosis, Q fever and Tularemia. Besides, most of the zoonoses of viral origin are more virulent with high morbidity and mortality in nature [17] with grave effects among densely populated environments. Among these are Rabies, Ebola Viral Disease (EVD), Avian Influenza, Lassa fever and Yellow fever. Furthermore, there are less devastating zoonoses than bacterial and those of viral origins which are widespread, which are referred to as zoonotic parasites such as Taeniasis, Hydatidosis, Leishmaniasis, Cysticercosis, Toxoplasmosis, Trichinellosis, Trematodosis, Trypanosomiasis. Again, we also have zoonotic fungi diseases equally of public health significance [18] occurring in human populations such as dermatophytoses. These superficial mycoses may be contacted from infected animals affecting the skin, hair and nails of humans, leading to itching, redness, scaling of the skin and hair loss. Overall, some of these zoonoses are transmitted through direct contact with infected animals. This may occur through direct contact with body fluids or contaminated materials of infected animals or persons e.g. EVD, Lassa fever. However, man becomes infected by other zoonotic infections through the bite of an infected animal or vector such as Human rabies or Yellow fever, respectively.

### **Neglected zoonotic diseases**

Neglected zoonotic diseases are zoonoses that are not prioritized or are ignored by government, policy-makers and healthcare agents at all levels of governance [19]. Neglected zoonotic diseases are

usually associated with poverty, and significantly affect the lives and livelihoods of millions of livestock keepers in rural communities of developing countries [20]. Neglected zoonotic diseases occur predominantly in developing countries and are estimated to kill about 500,000 people yearly [21]. The Millennium Development Goal 6 aimed to 'combat tuberculosis, HIV and AIDS, malaria (the 'big three') and other neglected tropical diseases (NTD)'. However, NTDs have received little or no attention by policy-makers, giving so much priorities to the 'big three' diseases; targets that were likely to prove unachievable. While the Global Fund (<http://www.theglobalfund.org>) was established in order to finance the fight against the 'big three', only limited funding was available to scale up NTD interventions. The NTDs comprise 17 viral, parasitic and bacterial infections, affecting millions of people; yet, these diseases only attract relatively little attention from relevant stakeholders and public health bodies [20]. NTDs are both drivers and manifestations of poverty and social inequality leading to long-term disability [22, 23]. Consequently, in low and middle-income countries in particular, key biological and epidemiological data on NTDs occurrence, burden and risk in both animals and humans, are lacking, [19]. Besides, reliable, cheap and easy-to-use tools for diagnostic and control purposes are often unavailable or poorly applied [24].

The NZDs though eradicated in wealthier countries, constitute major concerns causing ill-health and mortality across Africa, Asia, and Latin America [21]. This neglect is partly due to under-reporting, leading to an underestimation of their global burden which downgrades their relevance to funding agencies and policy-makers [25]. Stepping up awareness about the causes of NZDs and means of their prevention have potentials of reducing the incidence of many endemic zoonoses. Mitigating the challenge of NZDs by focusing on the animal reservoir have a double benefit, since enhanced animal health implies a reduced risk of infection for humans, and consequent improvement in livelihoods through increased animal productivity. With increasing urbanization, economic growth and the attendant intensification of animal husbandry coupled with peri-urban livestock production system development, the risks posed by these neglected zoonoses are high. The morbidity and mortality of these diseases are difficult to assess due to difficulty in diagnosis and many of them are often found in poor communities with lack of surveillance or adequate medical or veterinary care [26]. In most developing countries, their control is nearly non-

existent and their impact on human health remains largely unknown [12]. Since these neglected zoonoses are mainly maintained in animal reservoirs; controlling or eliminating them is achievable only through interventions extensively targeting animal reservoirs coupled with public enlightenment and information.

The World Health Organization (WHO) indicated that evidence base for decision making relating to zoonoses in resource poor settings is inadequate [24]. Some of the factors highlighted as important in addressing the information gap included development of field-level diagnostics; field epidemiological studies in humans and livestock; multi-disease studies in communities; estimates of under-reporting; intervention cost-effectiveness studies; and improved understanding of pathogens and host ecology [24].

### **Zoonotic diseases in Nigeria**

Zoonotic infections are major Public Health issue in developing countries and indeed Nigeria considering that about 75% of her population is rural and has contacts with domestic and wild animals. More so, Nigeria is now one of the largest economies in Africa and therefore a business hub for and beyond Africa, experiencing high human traffic in and out of the country [23]. Besides, majority of the country's borders with her neighboring countries are expansive, porous and with little or no cross-border human traffic control. All these portend vulnerability for Nigerians to the emergence and re-emergence diseases especially the zoonotic infections that are likely to attain epidemic proportions. Social and economic factors including poverty, lack of medical facilities and inadequate diagnostic facilities have all contributed to the prevalence of emerging and re-emerging zoonosis in Nigeria [27]. Furthermore, the increased prevalence of zoonoses in Nigeria has been driven by human activities such as deforestation for urban development, hunting and intensified farming operations to feed the ever-growing population [28]. In Nigeria, incidence and prevalence of zoonotic diseases such as Anthrax, Brucellosis, Rabies, Tuberculosis, Salmonellosis, and Yellow fever have affected lives over the years [29]. In recent past, Nigeria has witnessed the emergence of highly infectious zoonotic diseases such as Ebola and Lassa fever with considerable number of deaths recorded. Emergence of zoonotic pathogens has resulted in significant number of deaths especially in rural areas that lack defined preventive and control programme for them. For instance, more than 99% of all human deaths from rabies occurred in developing countries

including Nigeria, with domestic dogs as a major source of human cases [30].

Risk factors associated with zoonotic diseases in Nigeria include animal reservoir [31], animal product consumption [32], close human contact with animals and poor hygienic practices [33]. Substantial epidemiological evidence has shown that brucellosis is present in different pet animals and species of domestic livestock in Nigeria including sheep, goats, camels, horses and dogs [17, 29, 34]. Similarly, dogs have been reported as the predominant reservoir of rabies disease in Nigeria [29]. *Mycobacterium bovis* have been isolated from fresh milk sold in rural markets [35] and from tissues sampled in clinically ill persons [36]. In addition, epidemic neglected zoonotic diseases such as Anthrax has been reported in food animals and humans in close contact with animals in Nigeria [37].

Overall, different zoonotic diseases in Nigeria are characterized with varying severity, epidemic potential, burden and socio-economic impacts as well as ability to prevent and control them (Table 1). However, there is presently no organized control policy in Nigeria for diseases with potential for high economic impact and they have continued to pose high public health risks.

### **Strategies towards Health Security for Mitigating Zoonoses in Nigeria**

Mitigating zoonoses through early detection and control of their outbreaks is a possible strategy to prevent spread of diseases and ensure health security in Nigeria. However, Public Health veterinarians have a huge role to play in disease surveillance and control activities. There is also need to intensify efforts in expanding the knowledge base of the public awareness of zoonoses and their prevention. A multi-sectoral 'One Health' approach; one that involves participation and collaboration of all relevant sectors across the human-animal-environment interface [Figure 1; 16] is a useful strategy that can effectively and efficiently mitigate against zoonotic diseases in Nigeria. This collaborative approach will engage the animal health, public health and environmental sector and therefore foster joint preparation and rapid responses that will lead to better health outcomes. Coordinated planning and sharing of information related to control activities among the relevant sectors will lead to timely and effective response to zoonotic diseases [38]. This however, requires a high level of political will and commitment from all sectors, human and financial resources and strong governmental structures and policies that will enhance

its sustainability [38]. Aligning natural and local policies with existing international regulations can also promote sustainability of multisectoral approach against zoonotic diseases in Nigeria [38]. Effective communication between the government, partner organizations and other relevant sectors such as media and the public is also necessary to successfully combat zoonotic diseases [38]. Factors that influence zoonotic diseases risk including cultural values and beliefs, and economics should also be considered in addressing zoonotic diseases. Effective monitoring and evaluation of resources on activities for zoonotic diseases will provide information about what is working well and what can be improved upon [38].

As shown in Figure 2, an effective zoonotic disease prevention and control programme would also involve incorporation of surveillance and vaccination programmes. Due to the huge economic and financial implications as well as resources involved in implementing effective control strategy, however, there is need for government engagement and investment. International partnerships and collaborations would also go a long way in acquiring necessary supports for procurement of equipment and other facilities [39].

### **Conclusions**

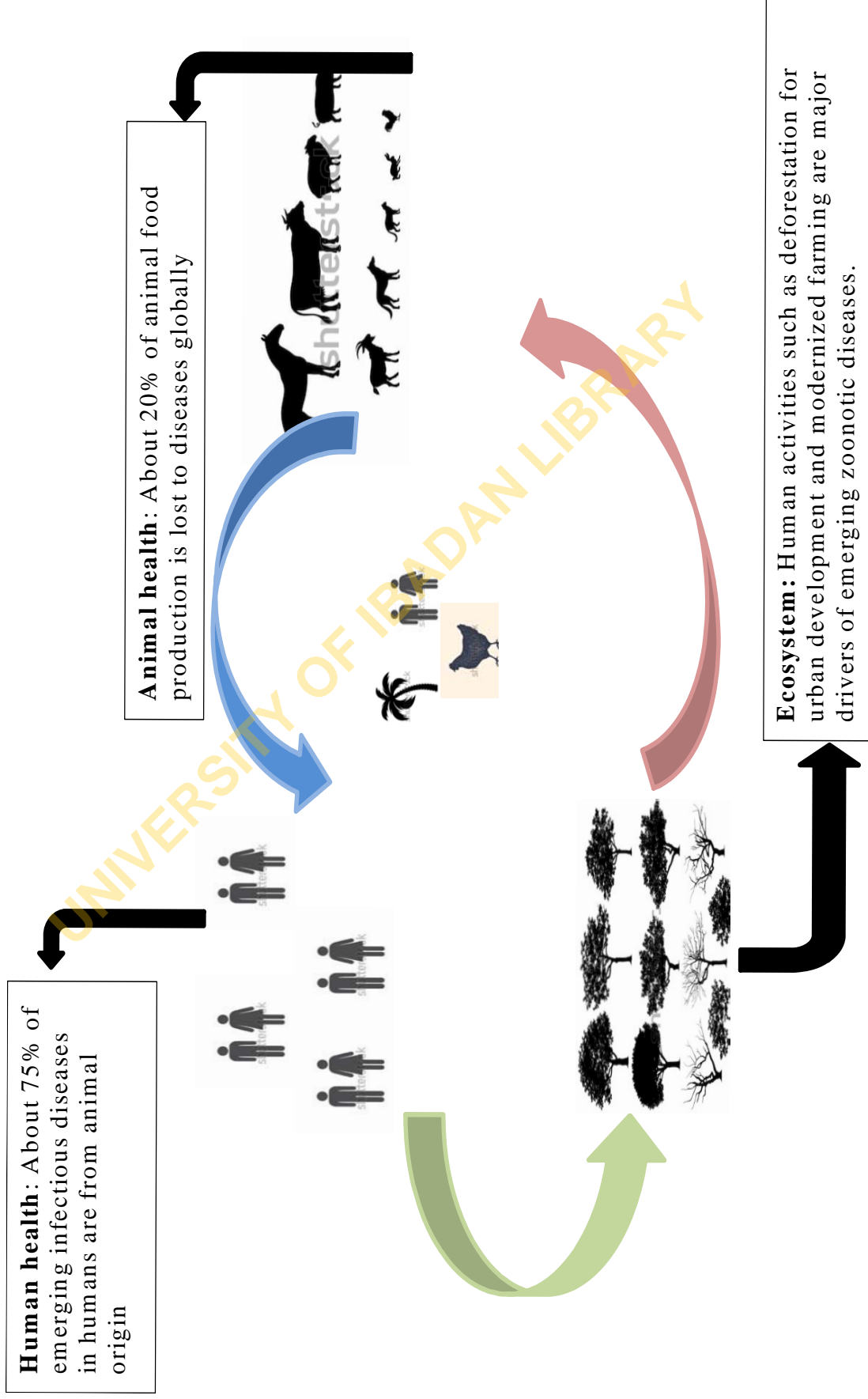
In moving forward, the fundamental issues related to the strengths, weaknesses, opportunities and threats (Table 2) within the Nigerian health systems have to be reviewed. Towards this, particular attention must be given to the weak health infrastructure in the country and the need to align the system to modern innovations in Public Health. Importantly, there must be improved funding, staffing and training of the veterinary architecture in the country in order to curtail the scourge of endemic, emerging and re-emerging zoonotic diseases in the country. Finally, as a way of providing a blue print to averting the scourge/burden of zoonotic and infectious diseases in Nigeria, the "the One Health concept" must be adopted. This will serve as a paradigm shift from the old "silo system" which does not promote multidisciplinary, multisectoral and interagency collaborations in solving Public Health challenges.

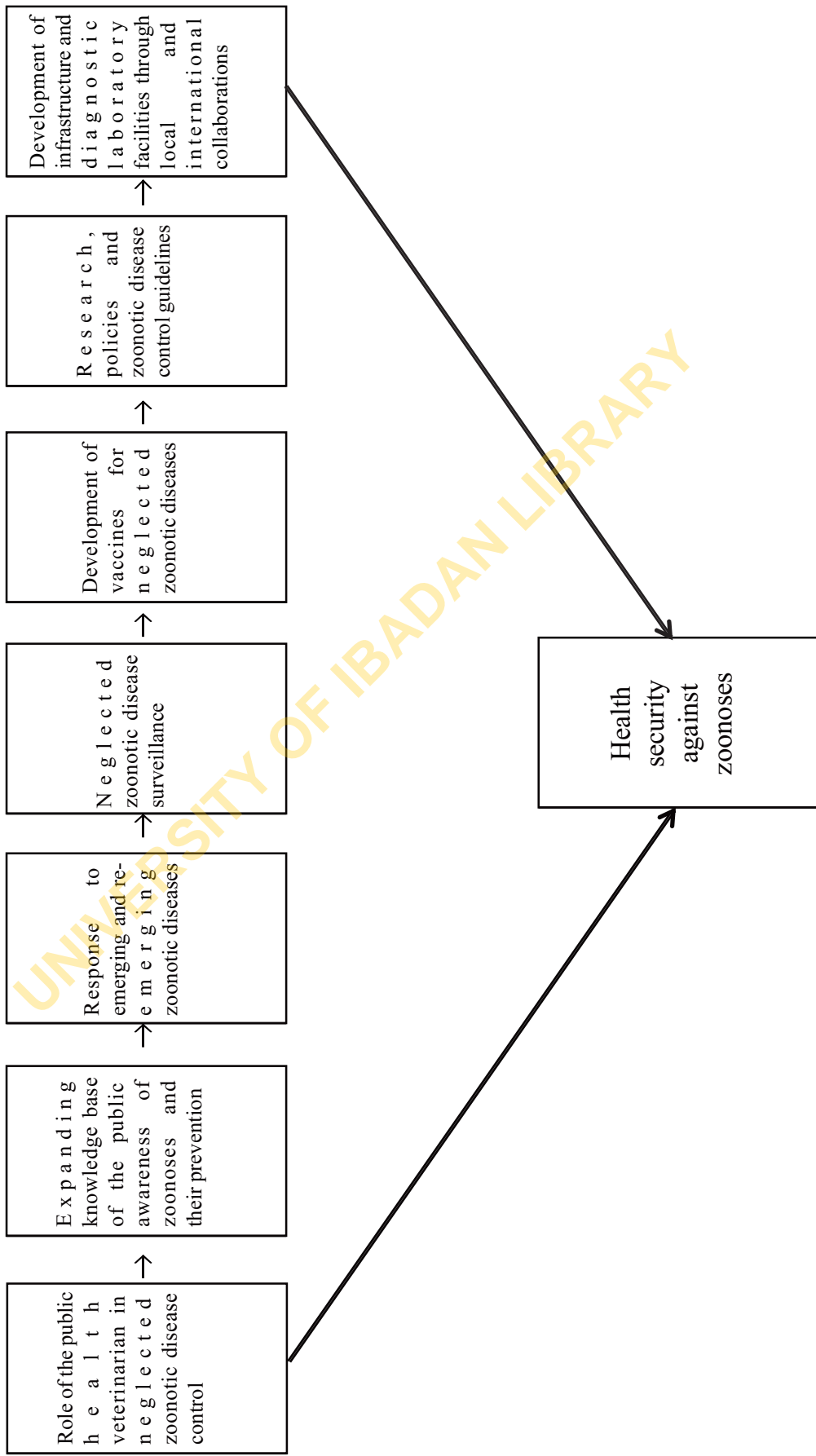
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**Table 1.** Zoonotic Diseases Prioritization List in Nigeria

Disease	Severity	Epidemic Potential	Burden of Disease	Ability to Prevent and Control	Socio-economic Impact	Normalized Final Score
Rabies	1	5	1	3	4	1.00
Avian influenza	2	2	3	7	1	0.88
EVD	1	1	6	9	9	0.71
Swine influenza	5	3	5	7	1	0.68
Anthrax	4	6	4	5	2	0.67
Bovine Tuberculosis	5	7	3	3	3	0.67
African Trypanosomosis	5	9	3	1	4	0.65
Lassa fever	2	3	5	6	9	0.65
Escherichia coli O157	6	4	3	6	5	0.61
Brucellosis	4	10	4	4	4	0.57
Cysticercosis/Taeniasis	6	11	2	2	6	0.55
Staphylococcus infection of animal origins	7	6	6	1	4	0.53
Rift valley fever	7	6	3	6	5	0.51
Clostridia disease	3	9	6	5	5	0.50
Salmonellosis	7	8	4	4	4	0.50
Visceral larva migrans	5	11	5	1	7	0.48
Schistosomiasis	6	8	4	2	9	0.48
Cutaneous larva migrans	6	11	4	1	8	0.46
Yellow fever	3	8	5	8	8	0.45
Listeriosis	4	11	7	3	5	0.45
Dermatophytosis	7	9	5	3	6	0.43
West Nile fever	6	7	5	7	6	0.42
Dengue fever	6	3	5	10	9	0.42
Campylobacteriosis	6	9	6	3	7	0.41
Pasteurellosis	8	11	6	2	3	0.40
Psittacosis/Ornithosis	6	11	6	3	6	0.39
Streptococcal infection	7	9	6	3	7	0.37
Echinococcosis	5	10	5	6	9	0.36
Rotavirus Infections	8	10	3	7	6	0.36
Yersiniosis	7	11	6	3	8	0.31
Q Fever	7	11	7	3	7	0.31
Trichinosis	6	11	7	3	9	0.30
Leishmaniasis	5	10	7	8	7	0.29
Leptospirosis	7	10	7	5	7	0.28
Cryptosporidiosis	7	9	6	9	8	0.23
Toxoplasmosis	6	11	6	9	8	0.23





**Table 2:** SWOT Analysis of one health in Nigeria

Thematic areas	Strengths and opportunities	Weakness and threats
Surveillance and laboratory	<ul style="list-style-type: none"> <li>• Availability of Integrated Disease Surveillance and Response (IDSR) and National Animal Disease Information System (NADIS) platform for disease surveillance</li> <li>• Availability of Laboratories and equipment to handle some disease agents</li> <li>• Availability of trained Laboratory personnel</li> <li>• Availability of rapid response teams from local government authority LGA to National levels</li> <li>• Availability of disease surveillance officers/agents</li> <li>• Availability of trained field epidemiologist and the Nigerian Field Epidemiology and Training Programme (NFELTP) training</li> <li>• Interested partners supporting surveillance of priority diseases e.g, World Health Organization (WHO), African Field Epidemiology Network (AFENET)</li> <li>• Collaboration with partners on training of Lab staff and supply of consumables, external quality assurance</li> <li>• Research opportunities</li> <li>• Networking of laboratories through tools used to connect the human and animal laboratory and exchange of information</li> <li>• Incoming Regional disease surveillance system enhancement (REDISSE) program</li> </ul>	<ul style="list-style-type: none"> <li>• Inadequate logistics for surveillance agents to carry out their duties (inadequate funding)</li> <li>• Poor inter-sectoral collaborations on surveillance activities</li> <li>• Weak rapid response time (RRT) at LGA levels</li> <li>• Inadequate funding for laboratory maintenance and stocking of consumables</li> <li>• Poor training of low level surveillance officers</li> <li>• Inadequate surveillance tools</li> <li>• Inadequate tools for data management</li> <li>• Lack of human resources for equipment maintenance in the laboratories</li> <li>• Poor quality management system in the Laboratories</li> <li>• Poor sample transportation system</li> <li>• Poor, Late and incomplete reporting</li> <li>• Poor harmonization of data (parallel programs and reporting systems)</li> <li>• EPR committee meets only during outbreaks</li> <li>• Donor Fatigue</li> <li>• Global economic recession</li> <li>• Insecurity and political instability in the country</li> <li>• Poor border control</li> <li>• Emerging and reemerging zoonotic disease</li> <li>• Hard to reach areas</li> <li>• Cultural and religious threats</li> <li>• Inconsistent partner policies</li> <li>• Corruption</li> <li>• Foreign support is disease specific</li> <li>• Natural disaster</li> <li>• Migratory birds</li> <li>• Trade in wild life animals</li> <li>• Globalization</li> </ul>
Training and research	<ul style="list-style-type: none"> <li>• Existing one health problems (Diseases, pathogens, environmental risk factors, biosafety, biosecurity issues)</li> <li>• Human Resource <ul style="list-style-type: none"> <li>– Availability of trainers and trainees</li> <li>– Mobilizable during emergencies- NFELTP</li> </ul> </li> <li>• Training institutions <ul style="list-style-type: none"> <li>– Universities</li> <li>– Research institutes and other tertiary institutions</li> <li>– NFELTP</li> </ul> </li> <li>• Research expertise <ul style="list-style-type: none"> <li>– Existing capacity</li> <li>– Laboratory network</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Inadequate infrastructure</li> <li>• Poor funding</li> <li>• Poor enabling environment for research (lack of motivation, incentives)</li> <li>• High turn-over/brain drain</li> <li>• Poor collaboration among researcher/institutions/</li> <li>• Poor collaboration between researchers and policy makers</li> <li>• Poor uptake of research findings</li> <li>• Brain drain/high staff turn-over</li> <li>• Professional quackery</li> <li>• Insecurity/internal-external conflict</li> <li>• Donor fatigue/lack of program ownership</li> <li>• Inter-professional rivalry/conflicts/strife</li> </ul>

		<ul style="list-style-type: none"> <li>Partnership and technical support (WHO, Office International des Epizooties (OIE), United Nations International children Emergency Fund (UNICEF), United Nations Environment Programme (UNEP), Global Environment Facility (GEF), FAO etc)</li> <li>International professional exchanges</li> <li>Available market for indigenous research ideas and products</li> <li>Availability of research questions</li> <li>More platform for evidence-based training</li> <li>Previous, demonstrable success stories</li> </ul>	<ul style="list-style-type: none"> <li>Political instability/lack of government goodwill</li> <li>Competing demands for limited resources</li> </ul>
Governance leadership	and	<ul style="list-style-type: none"> <li>Existence of human health, animal health and environmental health in the concurrent list of the government</li> <li>Existence of three tier of governance structure that involves the LGAs, State and Federal</li> <li>Existence of legislation and policy on human health, animal health and environmental health</li> <li>Establishment of the Nigeria Centre for Disease Control (NCDC) that anchors One Health</li> <li>Inauguration of One Health committee-antimicrobial resistance (AMR) at the federal level</li> <li>Acceptance of One Health concept by the academia</li> <li>Introduction of monitoring system by the government to address corrupt practices</li> <li>International and regional initiative on One Health concept</li> <li>Strong linkages between health, agriculture and environment</li> </ul>	<ul style="list-style-type: none"> <li>Lack of continuity of government policies</li> <li>Lack of institutionalization of One Health platform at the three tier of government</li> <li>Legislative process is expensive and cumbersome</li> <li>Corruption</li> <li>Insecurity</li> <li>Professional rivalry</li> <li>Union strike</li> <li>Loss of interest</li> <li>Lack of sustainability plan</li> <li>Imposition of leadership</li> </ul>
resource mobilization and communication		<ul style="list-style-type: none"> <li>Existence of Natural resources e.g Oil</li> <li>Presence of well-trained Human resource</li> <li>History of successful collaboration in healthcare delivery (Public-Private Partnership)</li> <li>Vibrant Private sector</li> <li>Large population in country and a growing democracy</li> <li>Large Population in the Diaspora</li> <li>REDISSE: Regional disease surveillance system enhancement</li> <li>Presence of Multiple stakeholders/ donors</li> <li>Increasing incidence of emerging diseases/ trans-boundary animal diseases with funding support</li> <li>Consistent Private sector involvement in healthcare</li> <li>Potential for future partnerships with Global institutions in education and research</li> <li>Membership/ influence in Economic Community of West African States (ECOWAS)/ African Union (AU)</li> <li>Increasing Foreign Direct Investment</li> </ul>	<ul style="list-style-type: none"> <li>Donor addiction/ over dependence</li> <li>Poor ownership by Government</li> <li>Duplicity of roles/ functions by partners</li> <li>Weak PPP in healthcare sector</li> <li>Absence of budget lines/ poor funding</li> <li>Mismanagement of resources</li> <li>Brain Drain to the Diaspora</li> <li>Poor micro economic policies</li> <li>Inconsistency in Government Policies</li> <li>Changing Donor Priorities</li> <li>Political instability/ insurgency</li> <li>Global Economic recession</li> <li>Corruption</li> <li>Competition for funding from other developing countries</li> <li>Poor international Image</li> </ul>

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## Oral Health Security in Nigeria: Analysis of the current situation and projections towards 2050

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### Abstract

**Background:** Despite the increasing population in the country, only a few Nigerians have access to oral health care, which seems directly responsible for the high prevalence of oral diseases and the high rate of unmet needs in the country. The few dental facilities and personnel in the country are disproportionately located in the urban areas leaving majority of the population without care.

**Methods:** Internet search was done using PubMed and google scholar. Local library search was done manually to retrieve literature on oral health in Nigeria. Search words that were used include periodontal disease/periodontitis, dental caries, prevalence of dental disease, dental service utilization and Nigeria.

**Results:** No national study was seen during the search. Almost all the retrieved studies reported a high prevalence of periodontal disease, while a few of the studies on dental caries reported a decline in the condition. However, many of the studies on dental caries reported a gradual increase in the prevalence of the condition. A low rate of utilization was generally reported as many Nigerians utilize dental services only when in pain.

**Conclusion:** An increase in the population will be accompanied by a corresponding increase in the prevalence of oral diseases and increased need for oral health care, and this will be disastrous without adequate planning.

**Keywords:** Oral Health, Population explosion, Health security, Utilization

### Abstrait

**Contexte :** Malgré l'accroissement de la population du pays, seuls quelques Nigériens ont accès aux soins de santé bucco-dentaire, ce qui semble directement responsable de la forte prévalence des maladies bucco-dentaires et du taux élevé de besoins non satisfaits dans le pays. Les quelques établissements et personnels dentaires du pays sont situés de manière disproportionnée dans les zones urbaines, laissant la majorité de la population sans soins.

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**Méthodes :** La recherche sur l'internet a été effectuée à l'aide de PubMed et du Google Scolaire. La recherche dans une bibliothèque locale a été effectuée manuellement pour retrouver la littérature sur la santé bucco-dentaire au Nigeria. Les mots de recherche utilisés incluent maladie parodontale / parodontite, caries dentaires, prévalence de la maladie dentaire, utilisation des services dentaires et Nigéria.

**Résultats :** Aucune étude nationale n'a été observée lors de la recherche. Presque toutes les études perçues ont fait état d'une prévalence élevée de la maladie parodontale, tandis que quelques-unes des études sur la carie dentaire ont signalé une réduction de la condition. Cependant, de nombreuses études sur les caries dentaires ont signalé une augmentation progressive de la prévalence de la condition. Un taux faible d'utilisation a généralement été signalé, étant donné que de nombreux Nigériens n'utilisent des services dentaires que lorsqu'ils souffrent.

**Conclusion :** Une croissance de la population s'accompagnera à une correspondante croissance en prévalence des maladies bucco-dentaires et d'un besoin accru de soins de santé bucco-dentaire, ce qui sera désastreux sans une planification adéquate.

**Mots - clés :** Santé bucco - dentaire, Explosion démographique, Sécurité sanitaire, Utilisation

### Introduction

The world health organization defines oral health as a state of being free from chronic mouth and facial pain, oral and throat cancer, oral sores, oro-facial birth defects, periodontal disease, tooth decay, tooth loss and other oral diseases [1]. The Nigerian population is plagued by various common oral diseases as well as their risk factors resulting in high need for dental care [2,3]. The high unmet oral health needs in the Nigerian population has been previously documented [4]. Also, contemporary studies have implicated certain oral diseases in the etiology of common non-communicable chronic medical diseases [5,6]. The socio-economic impact of oral diseases and its effects on the quality of life of the individual has been expressed in Nigeria [7,8]. The need to focus on improving the oral health of Nigerians is imperative.

### Situation analysis

Fewer than 20% of Nigerians have access to oral health care [9-11]. About 15 (0.05%) out of the thirty thousand [11] primary health care clinics in the country, offer oral health care services with no structured unit to reach out to underserved communities. Almost all tertiary and secondary health care centers offer oral health services to a varying degree depending on availability of expertise and facilities. The few oral health care facilities in the country are inequitably distributed with many of them clustered in the urban areas leaving the underserved rural communities without access to basic oral health care [9,12].

There is no national survey describing the extent of the burden of oral diseases in the country, but various reports document increases in prevalence of these diseases. There is a steady increase in the prevalence of dental caries in Nigeria, especially among the younger age groups [13,14]. This may be due to easy access to sugary snacks in the rural areas, lack of access to dental care and low oral health awareness [15]. Periodontal disease has been reported to be high among Nigerians especially among the elderly due to low oral health awareness and poor access to oral health care [2,16]. Children mostly have the acute and aggressive form of this disease. Studies have reported an increasing prevalence of oral cancer due to increasing exposure to common risk factors and with very low survival rate largely due to late presentation [17].

There are eight accredited institutions where dentists are trained in Nigeria, and the regulatory body has placed a limit on the number of dental students that may be admitted by each of the institutions per session due to funding limitation. On the average, Nigerian Universities produce about 200 dental graduates annually, with another ten institutions producing about 500 para-dental staff annually. Oral health financing in Nigeria at present is mainly through out of pocket payment, making many Nigerian not to utilize dental services except when in pain [15].

### *Forecast (Ensuring oral health security by the year 2050)*

The population of Nigeria will most likely be double the present number by the year 2050 and with this increase the oral health needs of the people will also increase. If the reported increase in prevalence of oral diseases is unchecked, then the prevalence of oral diseases will also increase at the same rate as the population.

**SWOT ANALYSIS** – The present state of the oral health facilities and services was analyzed and presented in Table 1.

**PLANNING** – Proposed plan of action on the short, medium and long-term basis was analyzed and presented in Table 2.

### Proposed sources of funding

- a. Expansion of the pre-existing National health Insurance Scheme (NHIS) to include all sectors represented in the country.
- b. Shared responsibility with employers – employers should be encouraged to make adequate provisions for their employee towards their health
- c. Sponsorship by related companies – corporate organizations should be encouraged to contribute towards the development of the health sector as part of their corporate social responsibility.
- d. Oral health related companies including oral health methods in their advertisements – oral health-related companies should be made to pay some amount of money on their advertisement, while some other companies producing products with proven deleterious effects on the oral cavity should be mandated to pay health tax towards the improvement of oral health in the country.
- e. Non-governmental Organizations should be encouraged to take up some programs towards the improvement of the oral health in the country.
- f. Donations /Sponsorship from Industries, companies and Individuals towards the improvement of oral health in the country should be encouraged
- g. Community Participation – communities should be encouraged to directly participate in the administration of oral health program especially at the primary health care level

### Monitoring and evaluation

1. This should be carried out by the collaborative efforts of the Federal, State and Local Governments with the participation of community leaders.
2. A digital oral health data bank should be established to monitor and evaluate oral health in the country, with clear responsibility for individuals concerning data management.
3. Donabedian's principles of quality assurance should be used to evaluate the structure, process, and the outcome of the oral health care systems.
4. Routine surveillance system to monitor disease prevalence in order to determine necessary action to be taken.

**Table 1: SWOT Analysis of the Present State of the Oral Health Facilities in the Country**

<b>Strengths</b>	<b>Weaknesses</b>	<b>Opportunities</b>	<b>Threats</b>
The presence of existing primary health care facilities (30,000) can facilitate the integration of primary oral health care into primary health care.	Oral health care is not properly integrated into the health care system particularly primarily health care.	Many of the common oral diseases are preventable and if identified early, 90% can be treated in primary health care centers.	Brain drain – many of the Nigerian-trained dentists find their way out of the country on regular basis in search of greener pasture.
Already existing natural tooth cleaning material (Chewing Stick) (Fig.1) will be an asset to oral health and oral health education.	There is an exodus of Nigerian-trained dentist to developed countries in search of better working conditions and remuneration.	Available international collaborative health initiatives, programs and development schemes that oral health care planners and providers can embrace	Decaying health facilities and shortage of instruments
The National Health Insurance Scheme when expanded will improve access to oral health care	Oral health care system that is largely dependent on out of pocket funding.		Industrial disharmony in government institutions
Existing well-organized Sub-specialty training of dental surgeons will be an asset to the referral system	Lack of proper plan for maintenance of infrastructure and equipment		Lack of implementation of oral health care policies
Common risk factor method/approach to prevention will inadvertently include some oral diseases in their prevention during the prevention of some medical diseases.	Poor infrastructure [e.g. poor water and electricity supply and un-favorable environment], inadequate equipment and instruments have contributed to unsuccessful oral health care delivery.		Government bureaucracy, which delays and deters progress.
	Poor man power planning, leading to production of inappropriate proportions of categories of oral health care personnel, has contributed to shortage in some cadre.		Inability to implement research findings
	Oral health care is largely urban based with neglect of the underserved communities.		
	Lack of awareness of oral health among Nigerians.		
	Lack of oral disease surveillance and haphazard oral health care planning		

**Table 2: PLANS – Short, Medium and Long-Term action plans**

<b>Plan</b>	<b>Action Plan</b>	<b>Target</b>
Short term	<p>Integration of oral health education into general health education and intensification of oral health awareness in schools at all levels and to general out patients in the hospitals.</p> <p>Equipping the available primary oral health care centers with mobile dental services to reach out to underserved communities.</p> <p>Workshop training for community health extension workers (CHEWs) and community nurses on identification and referral of common oral diseases.</p> <p>Sponsorship of the above programs should be sought from industries and NGOs as part of corporate social responsibility (CSR).</p>	Achievable by 2020
Medium term	<p>Establishment of oral health care facilities at all the primary health care clinics across the country.</p> <p>Introduction of oral health care in the training curriculum of other health care personnel to enable them to identify diseases and to imbibe the common risk factor approach in the prevention of diseases.</p> <p>Integration of oral health into the general medical consultation/practice-oral health talk should be included in the general health talk, in screening for non-communicable diseases, and in general physical examination.</p> <p>Establishment of an oral health surveillance system and introduction of indicators of oral health in medical surveillance questionnaire will improve monitoring of oral health.</p> <p>Increasing the number of trained oral health care personnel in the right proportion across all categories to meet the demand of the increase in oral health care facilities</p> <p>Expansion of National health Insurance Scheme (NHIS) to have a wide coverage to include non-cooperate and non-government participants.</p>	Achievable by 2025
Long term	<p>Rapid development of oral health-related industries to satisfy increasing oral health demands.</p> <p>Improvement of basic infrastructure (water, electricity, ICT schools) in less developed areas of the country to attract health workers.</p> <p>Building up health infrastructures to attract medical tourism from other countries into Nigeria, which will also discourage medical tourism by Nigerians to other countries.</p> <p>The NHIS should be expanded to include more treatment options in oral health care.</p> <p>Regular national health survey to include oral disease surveillance should be carried out routinely.</p> <p>Establishing a robust dental emergency service.</p>	Achievable by 2030



**Fig. 1a:** Pictures of some commonly used chewing sticks in Nigeria [19]



**Fig. 1b:** Picture of one of the commonly used chewing sticks demonstrating the proposed way of proper use of chewing stick

### Conclusion

There is abundant evidence supporting the increasing prevalence of oral diseases. The non-implementation of previous policies on oral health coupled with neglect of oral health has retarded the progress in the oral health of the people in Nigeria. Integration of oral health into health programs as an immediate short-term plan whilst increasing the number of trained oral health care workers and training centers as well as incorporating oral health care into the training curriculum of other health workers will contribute to the improvement of oral health of Nigerians.

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## Optimal mental health for achieving health security in Nigeria: a strategic blueprint

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### Abstract

**Objectives:** Optimal mental health refers to ‘a state of well-being in which the individual realizes his or her abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make contributions to his or her own community’. As such, the catchphrase ‘No health without mental health’ is not just a slogan but an acknowledgement of the importance of mental health in the drive to improve overall wellbeing and productive participation in community and economic activities. **Methods:** We combined an overview of current literature with opinions of key experts from different sub-specialties of mental health practice and present an analysis of the Strengths, Weaknesses, Opportunities and Threats (SWOT) to optimal mental health as a strategy to attaining health security in Nigeria by 2050. We also offered recommendations for feasible strategies to optimize mental health.

**Results:** There is poor mental health coverage in Nigeria, with over 80% of persons coping with mental health problems remaining untreated in their lifetime. Also, only about 3% of the National health budget is allocated to mental health and this is mostly focused on large psychiatric institutions to the exclusion of primary health care (PHC) services.

**Conclusions:** In recognition of the critical role of optimal mental health to global development, the Sustainable Development Goals (SDGs) has mental health firmly covered in its third goal, ‘Health and Well-being’. The SDGs further envision a better world in which, in tandem with the WHO definition of health, “physical, mental and social wellbeing are assured”. Thus, the identification and implementation of strategies to promote optimal mental health for all Nigerians is vital for ensuring health security and national development.

**Keywords:** *Optimal health; Mental health problems; Mental disorders; sustainable development goals; Equity in health: Low and Middle-Income Countries*

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### Abstrait

**Objectifs :** Une santé mentale optimale se réfère à ‘un état de bien-être dans lequel la personne réalise ses capacités, peut faire face au stress normal de la vie, peut travailler de manière productive et fructueuse, et peut contribuer à sa communauté propre’. Ainsi donc, le slogan “Pas de santé sans santé mentale” n’est pas simplement qu’un slogan, mais une reconnaissance de l’importance de la santé mentale dans la résolution d’améliorer le bien-être général et la participation productive aux activités économiques et communautaires.

**Méthodes :** Nous avons combiné une vue d’ensemble de la littérature actuelle avec les opinions d’experts de différentes sous-spécialités de la pratique de la santé mentale et présenté une analyse des forces, faiblesses, opportunités et menaces (SWOT) pour une santé mentale optimale en tant que stratégie pour atteindre la sécurité de la santé au Nigeria d’ici 2050. Nous avons également formulé des recommandations sur des stratégies réalisables pour optimiser la santé mentale.

**Résultats :** Il y a une couverture pauvre en santé mentale au Nigéria, avec plus de 80% des personnes souffrant avec des problèmes de santé mentale demeurent non traitées tout au cours de leur vie. En outre, environ seulement 3% du budget national de la santé est alloué à la santé mentale, et ceci est principalement focus aux grands établissements psychiatriques, à l’exclusion des services de soins de santé primaires.

**Conclusions :** En reconnaissance du rôle critique de la santé mentale optimale dans le développement mondial, les Objectifs de Développement Durable (ODD) incluent la santé mentale dans le troisième objectif ‘Santé et bien-être’. Les ODD envisagent en outre un monde meilleur dans lequel, parallèlement à la définition de la santé donnée par l’OMS, ‘le bien-être physique, mental et social est assuré’. Ainsi, l’identification et la mise en œuvre de stratégies visant à promouvoir une santé mentale optimale pour tous les Nigériens sont essentielles pour assurer la sécurité sanitaire et le développement national.

**Mots - clés :** *Santé optimale ; Problèmes de santé mentale ; Les troubles mentaux; Objectifs de développement du millénaire ; Équité en matière de santé: pays à revenu faible et intermédiaire*

### **Introduction**

Mental health has been described by the World Health Organization (WHO) as ‘a state of well-being in which the individual realizes his or her abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make contributions to his or her own community’ [1]. Viewed from this perspective mental health problems occur when there is a transition from a state of wellbeing, along an optimal health continuum, to states of un-wellness characterised by changes in the awareness of own abilities, ability to cope with normal stresses of life, to work productively or contribute meaningfully to ones’ community. These more externally apparent changes in the awareness of self and environment are often driven by other less obvious internal changes in brain processes that enables thinking, acquisition of knowledge and understanding, emotions and behaviour (or changes in a combination of these processes). Mental health problems that meet diagnostic thresholds for mental disorders are often associated with distress and/or problems with interpersonal relationships (family, social and work situations) and/or personal care [2]. Thus, it is best to conceptualize the transition from optimal health through mental ill-health (mental health problems) and mental disorders as different points on a continuum.

The catchphrase ‘No health without mental health’ popularised by the World Health Organization (WHO) [3] is not just a slogan but an acknowledgement of the importance of mental health in the drive to improve overall wellbeing and attain equity in health. This realization led to the identification of a major gap in the United Nations (UN) Millennium development goals (MDGs) which ended in 2015. This gap relates to lack of equity in the envisioning of the MDG targets for Low and Middle-Income Countries (LMICs) as well as for health. Apart from the need to capitalize on the gains of the MDGs, especially in LMICs, the need to correct the specific gap created by the absence of mental health in the MDGs under-pinned the conceptualization of the health-related goal of the post-2015 Sustainable Development Goals (SDGs) [4]. Mental health and wellbeing across all ages is not only a specific component of the SDGs, it is key to the attainment of all 17 SDGs and targets (United Nations, 2015).

### **Situation analysis**

A quarter of the world’s population will suffer from a mental health condition in their lifetime. Mental disorders contribute about 10% of the total burden diseases [2] and are the leading cause of years lived with disability (YLDs), being responsible for about 28% of the total YLDs [5]. Yet in countries like Nigeria, over 80% of persons coping with mental health problems remain untreated in their lifetime [6]. Also, only about 3% of the National health budget is allocated to mental health [7] and this is mostly focused on large psychiatric institutions to the exclusion of primary health care (PHC) services which according to WHO, should be the first point of call for those with mental health conditions. In Nigeria, mental health has been the 9<sup>th</sup> pillar of primary care since 1991; but this has been very poorly implemented over the years.

Specifically looking at the scope of mental health issues across the lifespan, from childhood to the elderly, reveals the magnitude of the challenges ahead. Children and adolescents make up nearly 50% of Nigeria’s population with estimates of mental disorders in this population reported at 20% [8]. Furthermore, it is estimated that more than 200 million children in LMICs – including Nigeria, have developmental disabilities and fail to reach their developmental potential [9]. Not only do early diagnosis and prompt interventions improve outcomes in affected children [10] but also studies reveal that childhood is the best time for mental health promotion and any prevention interventions. On the other end of the spectrum, there is a global increase in the population of older persons with a concomitant increase in the burden of mental disorders such as depression and dementia among senior citizens

Several other mental health concerns, which bring mental health into the forefront [11] include: the rising prevalence of psychoactive substance use, the high proportion of patients with physical health problems with concomitant associated psychiatric illnesses; the high proportion of patients with mental health conditions with medical comorbidity; and the high rates of suicide, amongst others.

### **Forecast for 2050**

By the year 2050, Nigeria is projected to hit a population of 278 million and be the world’s third most populous country in the world. It is estimated that sub-Saharan Africa will have the highest number of children and adolescents than any other region of

## SWOT Analysis for mental health in the strategic blueprint for health in Nigeria

Strengths	Weakness	Opportunities	Threats
<ol style="list-style-type: none"> <li>1. Mental health was incorporated as the 9<sup>th</sup> component of PHC in Nigeria in 1991.</li> <li>2. The World Health Organization (WHO) Mental Health Gap Action Programme- Intervention Guide (mhGAP-IG) has been contextualized in Nigeria and piloted in different parts of the country.</li> <li>3. The resources provided by complementary and alternative practitioners (CAPS) are available for harnessing. CAPS are the defacto mental health providers in Nigeria</li> <li>4. A revised mental health policy document for Nigeria has been available since 2013 and all that is required is for this to be passed into Law</li> <li>5. Existence of WHO Centres of Excellence for Research in the Neurosciences, Mental Health and Substance use; as well as the Centre for Child and Adolescent Mental Health (CCAMH). CCAMH in the last 5 years has trained over 80 child and adolescent health professionals from diverse disciplines from 9 different African countries and all geopolitical regions of Nigeria.</li> <li>6. Availability of mental health scholars with global expertise to provide policy direction that is in tandem with global best practice and evidence.</li> </ol>	<ol style="list-style-type: none"> <li>1. Cultural Barriers: negative perceptions about mental disorders/stigma and feelings of shame, which reduce service utilization.</li> <li>2. Mental health services are poorly developed in Nigeria and there is limited availability of facilities with the required expertise for mental healthcare</li> <li>3. Paucity of trained mental health professionals and inequitable distribution across the country.</li> <li>4. Absence of legislation regarding treatment of mental health conditions in Nigeria.</li> <li>5. Only 3% of the National health budget in Nigeria is allocated to mental health and this is focused on large institutions to the exclusion of community and primary mental health care in schools, PHC settings etc.</li> </ol>	<ol style="list-style-type: none"> <li>1. The health-related SDG target of the UN focuses on better access to mental healthcare and the promotion of mental wellbeing at all ages</li> <li>2. The traditional extended family system in most parts of Nigeria provides important buffers for older persons. However, this system is eroding at the pace of current socio-economic transition.</li> <li>3. Opportunity to craft Nigerian/African context-appropriate models of mental healthcare from evidence-based and effective services developed in other parts of the world.</li> <li>4. Mental health is part of the psychosocial response to disasters funded by development partners in the North-East of Nigeria. This offers the opportunity to 'Build Back Better' in line with WHO's recommendations for Psychosocial response to emergencies.</li> </ol>	<ol style="list-style-type: none"> <li>1. Nigeria may have one of the largest proportionate growth in the global population.</li> <li>2. Prevailing poverty and general absence of organized social support or insurance for Nigerians</li> <li>3. Mental health literacy is still very low in Nigeria</li> <li>4. Mental health is a distant priority in the distribution of the very limited healthcare resources in Nigeria</li> <li>5. Brain drain (External migration of mental health professionals to developed countries).</li> </ol>

## Proposed interventions

Timelines	Plans	Deliverables
Short term	<ol style="list-style-type: none"> <li>1. Training to build mental health capacity among non-specialist healthcare providers including Complementary and Alternative Practitioners (CAPs).</li> <li>2. Public awareness campaigns and training for media practitioners</li> <li>3. Pilot school mental health programmes</li> <li>4. Need to develop context-appropriate interventions and innovative mental health service delivery systems that benefit Nigerians across all ages. These services should have realistic goals that fit into a low resource context and take advantage of non-specialist healthcare providers including CAPs.</li> </ol>	<ol style="list-style-type: none"> <li>1. At least 25% of primary health care workers have been trained and retrained on identification, treatment and appropriate referral of mental health condition.</li> <li>2. At least 70% of media outlets run mental health awareness campaigns</li> <li>3. Development and publication of a context-appropriate mental health service model for Nigeria</li> </ol>
Medium term	<ol style="list-style-type: none"> <li>1. Development and revision of mental health policies and legislation.</li> <li>2. Incorporation of mental health awareness education into secondary school curriculum to promote mental health literacy as well as the revision and strengthening of the mental health content in the training of all health workers.</li> <li>3. Rolling out school mental health programs.</li> <li>4. Integration of mental health into primary care, general medical services as well as maternal and child health programmes.</li> </ol>	<ol style="list-style-type: none"> <li>1. Relevant policies and legislation revised or developed.</li> <li>2. School mental health programs present in at least 25% of schools.</li> <li>3. Integrated mental health services into routine maternal and child health programmes as well as into primary and general medical services are present in at least 50% of facilities.</li> <li>4. Revised school curricula in place.</li> </ol>
Long term	<ol style="list-style-type: none"> <li>1. Socio-economic empowerment</li> <li>2. Improved budgetary allocation to mental healthcare</li> <li>3. Increased accessibility of neuropsychiatric services</li> <li>4. Improved integration of mental healthcare in the care of persons with physical health problems and other non-communicable diseases.</li> </ol>	<ol style="list-style-type: none"> <li>1. Socio-economic empowerment programs are in place</li> <li>2. Allocation to mental health in the National health budget increased to 10%</li> <li>3. Additional general and specialist health services established with appropriate expertise in mental health.</li> </ol>

the world – with Nigeria accounting for the greatest contribution [12].

An increase in life expectancy is expected to accompany this population explosion, resulting in more neuropsychiatric conditions including dementia. The challenge is that mental health services in Nigeria are currently fragmentary and unprepared for future demands presented by an increasing population. As of now, there is a shortage of competent mental health personnel, services and allied health professionals to manage the burden created by mental health conditions. As we envisage a larger and older population of Nigerians in the coming years, the poor situation of mental healthcare in the country is expected to get worse if urgent steps are not taken to address the deficits in human resources and services.

### Sources of funding

It is to be anticipated that the sources of funding will be from budgetary allocation from the Federal Government of Nigeria. Successful deployment and adequate coverage of citizens using a combination of private and public health insurance can also help with pooling funds and eliminating waste. Other sources of funding include grants and donations from Non-Governmental Organizations and foreign donors. Lastly, even though it exposes the most vulnerable and their families to financial hardships, out of pocket payment for services rendered is also another source of revenue.

### Monitoring and evaluation

The successful implementation of the recommendations requires effective monitoring and evaluation. This should entail:

1. Monitoring of the implementation of the strategic plan,
2. Assessment of evidence of uptake of the strategic plan at federal, state and local government levels.

### Conclusion

The health-related sustainable development goals of the United Nations (UN) specifies improved access to mental healthcare across all ages. However, the challenge for Nigeria is the unpreparedness of her mental health delivery systems for current and future demands. We recommend deliberate policies to

improve access to evidence-based, equitably distributed and Nigerian context-appropriate mental health services.

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## Blueprint for healthcare security in Nigeria by 2050: ensuring access, promoting adherence and safe use of medicines

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### Abstract

*Introduction:* Access to drugs and their safe use are essential to delivery of healthcare. At the present, the healthcare delivery in Nigeria requires a considerable attention as access to quality care remains poor. Population explosion will likely worsen the already challenged situation except proper planning is instituted, and followed through.

*Aim and objectives:* The overall goal of this article is to develop a blueprint for the healthcare security in Nigeria by 2050 by improving access to quality drugs and management of drug-related diseases. The specific objectives include: establishment of facility for serum/plasma assay for therapeutic and non-therapeutic drugs; establishment of poison information and management centre(s) in all the geo-political zones of Nigeria within the next 12 years; development of human and infrastructural capacity to handle drug analyses in, at least, one centre in the six geopolitical zones of Nigeria

*Methodology:* This proposal is a thematic area and part of the National Universities Commission-sponsored blueprint for healthcare security of Nigeria by 2050. Relevant articles and documents relating drug adherence, clinical trial and clinical toxicology were sourced and synthesized as appropriate. Inferences were drawn based on available human and material resources and, in turn projected accordingly.

*Conclusion:* There is a dearth of relevant professionals and infrastructural facility to ensure adequate access and safe use of drugs in Nigeria, even at the present. There is need for strategic planning to overcome the present challenges in the healthcare system, and a phased-approach to capacity development has been proposed.

**Keywords:** Health security, clinical trials, clinical, clinical toxicology, strategic plans, Nigeria

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### Abstrait

*Contexte :* L'accès aux médicaments et leur utilisation sans danger sont essentiels à la provision des soins de santé. À l'heure actuelle, la prestation de soins de santé au Nigéria requiert une attention considérable puisque l'accès aux soins de qualité demeure médiocre. L'explosion démographique aggravera probablement la situation déjà difficile, à moins qu'une planification appropriée soit mise en place et suivie.

*But et objectifs :* L'objectif général de cet article est de développer un schéma directeur pour la sécurité des soins de santé au Nigéria d'ici 2050, en améliorant l'accès aux médicaments de qualité et la gestion des maladies associées aux médicaments. Les objectifs spécifiques comprennent : mise en place d'un centre de dosage du sérum / plasma pour les médicaments thérapeutiques et non thérapeutiques ; création d'un ou plusieurs centres d'information et de gestion des poisons dans toutes les zones géopolitiques du Nigéria au cours des 12 prochaines années ; développement des capacités humaines et infrastructurelles pour gérer les analyses de médicaments dans au moins un centre dans les six zones géopolitiques du Nigéria.

*Méthodologie :* Cette proposition est un domaine thématique et fait partie du projet de loi sur la sécurité des soins de santé du Nigéria parrainé par la Commission Nationale des Universités d'ici 2050. Des articles et des documents pertinents concernant l'adhérence aux médicaments, les essais cliniques et la toxicologie clinique ont été extraits et synthétisés comme approprié. Des déductions ont été établies sur la base des ressources humaines et matérielles disponibles et, à leur tour, projetées en conséquence.

*Conclusion :* Il existe une pénurie de professionnels et de commodités infrastructurelles relevant pour assurer un accès adéquat et une utilisation sans danger des médicaments, même à l'heure actuelle, au Nigéria. Une planification stratégique est nécessaire pour surmonter les défis actuels du système de santé et une approche progressive du développement des capacités a été proposée.

**Mots-clés :** sécurité sanitaire, essais cliniques, clinique, toxicologie clinique, plans stratégiques, Nigéria

## Introduction

This section attempts to explore health security in the areas of drug adherence, clinical trials, and clinical toxicology. A drug is a (chemical) substance that is used (or intended to be used) for modifying pathological state or physiological state for the benefit of the recipient. The goal of therapy for any condition is usually set from its commencement, cure, control, or palliative, achievement of which depends substantially on compliance with the recommended regimen.

Adherence to medication or drug compliance is an aspect of pharmionics concerned with use and misuse of medicines in clinical trials or practice [1]. Determinants of adherence to medication may include mental state, access, poverty, education, drug-related disorder, etc. The success or otherwise of any therapeutic exercise largely depends on such factors being well-managed. Several methods are available to monitor drug compliance; ultimately correlate the drug levels with effect. Adherence may be affected by, among other factors, adverse drug effect, a key reason for drug (or medical devices) clinical trial in the effort to ensure the safety of the end-users.

Clinical Trials provide initial data that establish safety and efficacy of pharmaceuticals (or medical devices) in humans. Clinical trials are mandatory as they afford humanity the opportunity of reducing or eliminating the introduction of unsafe and/or ineffective medication to the general population. Clinical trials of drugs (or medical devices) usually involve four phases (I-IV), phase IV being also known as post-marketing surveillance, essentially providing a means of monitoring end-users responses, particularly adverse, when in use in the general population. In the main, clinical toxicology is an area of toxicology concerned with the toxic effects of agents, whose intent is to treat, ameliorate, modify, or prevent disease states, or, the effects of drugs which, at one time, were intended to be used as such [2]. Clinical toxicology also encompasses effects (and management) of various non-therapeutic agents that may adversely affect humans; these include: alcohol, gases, hydrocarbons, pesticides, etc.

Drug adherence, clinical trial and clinical toxicology are interwoven, for example, adherence may be inhibited by inadequacy of drug clinical trial and/or toxicity of same in susceptible individuals even when the drug is taken at the standard recommended dose. Optimal pharmacotherapeutic experience, therefore, depends on maintaining reasonable balance among the respective variables. Nigeria, at the present, is faced with substantial

unmet needs in the aspect of her healthcare services, for example, clinical toxicology services are almost non-existent. Further, there is a dearth of relevant data. Ensuring health security of Nigerians in 2050 requires that due attention be paid to human and material capacity development.

## Situation analysis and forecast for 2050

Nigeria with an estimated population of over 190 million people ranks as the 7<sup>th</sup> largest country in the world and largest black nation in the world [3]. It has been projected that the country's population will double by 2050, making it the 3<sup>rd</sup> largest country after China and India. The country has a very high proportion of young people as the population is made up of about 60% below the age of 30 years, whereas an estimated 5% are above age 60 years. The 2050 population projection and demographics suggest that people above the age of 60 years will contribute about 9% of the population while proportion of productive age group is expected to remain largely the same.

Drug adherence data are scanty but available information depicts a worrisome picture. In a study of adherence among patients on treatment for type 2 diabetes mellitus, drug compliance was 56-60% [4,5]. Adedapo, *et al*, documented about 75% compliance rate and marked improvement in blood pressure control rate among hypertensive patients [6]. It is noteworthy that since the above studies were questionnaire-based, the rates of drug compliance in such populations may not be accurate. Determination of drugs and relevant metabolites in biological fluids provides a means of affirming relevant information obtained through interview, and it is an essential toxicological tool. Facility for drug assay currently is largely lacking in Nigeria today. The country is also underserved by the relevant professionals, such as medical laboratory scientists, physicians, and pharmacists. For instance, the doctor-patient ratio in Nigeria is 1: 5000 instead of 1:600, and given that about 3,000 doctors are produced yearly; the country may only be able to marginally improve on the ratio to 1:4000. A further confounder is the mal-distribution imposed by geographic regions and social-economic factors. It is trite that as 2050 draws near, a larger population of humans will require drug treatment, as well as toxicological services.

There are reports of high rates of concomitant use of complementary or alternative medicines particularly, herbal preparations, in addition to conventional drugs among Nigerians [7,8]. Unless access to conventional or orthodox medicines

improve use or misuse of alternative medicine may increase or worsen, and further compel the need for clinical toxicological services that are currently lacking. For emphasis, there is urgent need for relevant studies and documentation on drug adherence, drug-drug, drug-herbals interaction, and the establishment of appropriate facilities for clinical trials and, clinical toxicology in order to secure the health of Nigerians as 2050 approaches.

In addition to the above challenges, there is scarcity of training centres, infrastructural facility for adequate training of clinical pharmacologists and other relevant professionals to facilitate capacity development in this aspect of healthcare system.

### SWOT analysis

A well-manged large population provides potential pharmacists, medical laboratory scientists and physicians who could be further trained as clinical trialists and clinical toxicologist hence large population could be a source of strength. In addition, the relatively high proportion of young adults could be prepared for training in other aspects of drug management such as technicians/technologists and middle-level educators for deployment to rural areas. A large population also offers opportunity of a large market that could attract foreign investment in the pharmaceutical industry. Further opportunity and why foreign investment may be attracted is availability of labour at a relatively low cost which will in turn reduce the cost of production. Nigeria is also currently blessed with generations of well-trained pharmacists and clinical pharmacologists who are prepared to contribute in ensuring healthcare security in Nigeria. Residency training in the subspecialty of clinical pharmacology and therapeutics is currently undertaken in few of the country's teaching hospitals, there is urgent need to escalate capacity development in all of these centres with a view to ensuring adequate human and material resources that huge population imposes/may impose.

The weaknesses and threats are also real and may overwhelm the strengths and opportunities if not properly managed. Of the weaknesses, improperly managed population explosion may inundate facilities that are currently inadequate for half of the projected 2050 population with grave consequences. For example, inadequately engaged youths result in increasing involvement in vices including drug use and abuse, and ultimately requiring among others, toxicological services, which is currently virtually non-existent. In the event that population outstrips available facilities, even the inadequate relatively well-trained physicians and

pharmacists may emigrate, brain-drain, a situation that already subsists.

### Strategic plan

This section explores effectively planning premised on achievable (SMART) objectives, and the overall goal of ensuring health security in Nigeria by 2050 and beyond. It is opined that the planning be phased, such that short term be designed to tackle achievable milestones within the next 7 years (2018-2025); medium term (2026-2037); and long term to address 2038 and beyond. The short term aim should be to establish one centre, for example, University College Hospital, Ibadan. In the medium to long term (10-12 years), similar resources, human and material, should be extended to the other five geopolitical zones of the country, and a separate one in the Federal Capital territory. Beyond 2030, facility for clinical trials, and toxicology should be extended beyond the initial six centres such that every state or, at least, every two adjoining states in the country should be adequately resourced to handle such services. The following few paragraphs attempt to further describe the above summary.

### Specific objectives

1. Establishment of facility for serum/plasma assay for therapeutic and non-therapeutic drugs
2. Establishment of (national& regional) poison information and management centre(s) – starting with UCH (Southwest zone), to be extended to all other geo-political zones of Nigeria within the next 12 years.
3. Development of human and infrastructural capacity to handle drug analyses in, at least, one centre in the six geopolitical zones of Nigeria
4. Provision of standardized training for clinical trialist, drug analysts, and other relevant staff at the established centers in the geopolitical zones of Nigeria
5. Provision of technical support to relevant regulatory (security) agencies
6. Provision of requisite short term trainings such as Good Clinical Practice (GCP), Good Laboratory Practice (GLP), etc

### Short term plans

The short term aim should be to strengthen and equip one centre for adequate delivery of drug compliance-related services, clinical trials, and clinical toxicology. The University College Hospital, Ibadan has an autonomous Department of Clinical Pharmacology with five consultants, and the department is developing

a clinical pharmacology laboratory. The Department has all the components including (international) collaboration, required for the purpose of pursuing the objectives listed above. It is thought that (additional) essential equipment be procured, and few additional personnel could be in place and operations commence in 2-3 years, thus a short term. The Department of Pharmacy of the Hospital is also well positioned to meet the objectives stated above.

### Medium to long term plan

In the medium to long term (10-12 years), similar resources, human and material, should be extended to the other five geo-political zones of the country, and a separate one in the Federal Capital territory. Each of these centres will require at least two trained Clinical Pharmacologists, two drug and toxins analysts, as well as the listed items of equipment. Once these centres are established, they will provide the needed facility for training of generations of requisite Experts, for example, Drug Analysts, Clinical Pharmacologist in a sustainable manner.

Bench fees payable by relevant trainees, including residents, postgraduate students, and other users to use the facility

### Monitoring and evaluation

Each centre would be expected to collate data relevant to drug compliance, and profile of toxicants in its respective environs. The coordinating centre will be at the University College Hospital, Ibadan, which will be responsible for collating, analysing and publication of an annual report. Such data will also assist in determining the viability, and review of the needed resources (human and material) that may be required for efficient service and projections.

### Conclusion

It is imperative that the largest black nation in the world improves on its healthcare delivery including increased access to the underserved majority of its citizenry, and expand the scope to include poison information and management services. This has further become necessary in view of projected

**Table 1:** Proposed Institutions to be strengthened for adequate delivery of services in Drug compliance, Clinical Trials, and Clinical Toxicology by 2030\*

Geo-political Region	Proposed Health Facility
Southwest	University College Hospital, Ibadan
South-south	University of Benin Teaching Hospital, Benin
Southeast	University of Nigeria Teaching Hospital, Enugu
Northwest	Ahamadu Bello University Teaching Hospital, Zaria
Northeast	University of Maiduguri Teaching Hospital, Maiduguri
North central	Jos University Teaching Hospital, Jos

\*The National Hospital, Abuja for the Federal Capital Territory

### Funding

The initial funds for establishing all the identified centres (in the 6 geopolitical zones) should be provided by the Federal Government of Nigeria (appropriate estimates can be provided). It is believed that the first Centre, the University College Hospital, Ibadan will only require material resources such as equipment, furniture, and therefore can be concluded in short term of 2 years from the present. Sources of fund necessary for the 'upgrade' and sustainable operations of the University College Hospital, Ibadan sentinel centre will include:

- Grants, subvention, and contracts from government and non-governmental organizations
- Tokens received from services offered to other hospitals and agencies like The Police and Federal Road Safety Corps, etc

population explosion in the face of the already overstretched fragile healthcare system. This proposed incremental capacity development should provide the needed template for the establishment of a sustainable access and management of drug-related challenges by year 2050 and beyond.

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## Achieving health security in Nigeria: A strategic blueprint for addressing psychoactive substance use

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### Abstract

**Introduction:** Psychoactive substance use is an important component of health and national security. Nigeria has evolved from a largely transit nation for psychoactive substances to a high consumption nation. Increasing rates of use result in a concurrent rise in crime rates and insecurity, as well as road traffic accidents. The use of psychoactive substances is also implicated in episodes of civil strife, conflicts and wars, such as the ongoing Boko Haram insurgency in North East Nigeria. This observation is likely to worsen over time if there is no coherent and strategic plan to halt and reverse this trend. The forecast portends higher crime rates, heightened insecurity, civil unrest and violent conflicts by 2050, if the rising trend of psychoactive substance use is not reversed. It is a scenario that will not augur well for the stability of Nigeria and the West African region.

**Methods:** A narrative review of the published literature, as well as expert opinion deliberations was utilized to develop a comprehensive analysis of the strategic strengths, weaknesses, opportunities and threats (SWOT) of psychoactive substance use and health security implications for Nigeria.

**Results:** An array of the unique strengths and opportunities are spelt out; along with the inherent weaknesses and threats that should be taken into consideration in mapping out strategies to address the clear and present danger from the rising use of psychoactive substances in Nigeria.

**Conclusion:** Recommended interventions should focus on public awareness campaigns, utilizing behaviour change communication strategies – with a special focus on prevention, mental health promotion activities, training and re-training of regulatory agencies, development and revision of existing policies, as well as better policing and enforcement of access restriction.

**Keywords:** Health security, psychoactive substance, Nigeria

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### Abstrait

**Introduction :** La consommation de substances psychoactives est un élément important de la santé et de la sécurité nationale. Le Nigéria est passé d'un pays largement en transit pour les substances psychoactives à un pays à forte consommation. L'accroissement des taux d'utilisation entraîne simultanément une augmentation du taux de criminalité et d'insécurité, ainsi que des accidents routiers. L'utilisation de substances psychoactives est également impliquée dans des épisodes de troubles civils, de conflits et de guerres, telles que l'insurrection en cours de Boko Haram dans le nord-est du Nigéria. Cette observation risque de s'aggraver avec le temps s'il n'existe pas de plan cohérent et stratégique pour enrayer et inverser cette tendance. Les prévisions laissent présager des taux de criminalité plus élevés, une insécurité accrue, des troubles civils et des conflits violents d'ici 2050, si la tendance à la hausse de la consommation de substances psychoactives n'est pas inversée. C'est un scénario qui n'augure pas bien pour la stabilité du Nigeria et de la région Ouest Africaine.

**Méthodes :** Un examen narratif de la littérature publiée ainsi que des délibérations d'experts ont été utilisés pour élaborer une analyse complète des forces, faiblesses, opportunités et menaces (SWOT) de l'utilisation de substances psychoactives et les implications sur la sécurité sanitaire du Nigéria.

**Résultats :** Une représentation des forces et des opportunités uniques est décrite ; ainsi que les faiblesses et les menaces inhérentes qui devraient être prises en compte dans la définition de stratégies visant à faire face aux dangers évidents et actuels de la consommation croissante de substances psychoactives au Nigéria.

**Conclusion :** Les interventions recommandées devraient se concentrer sur les campagnes de sensibilisation du public, utilisant des stratégies de communication pour le changement de comportement - avec un accent particulier sur la prévention, les activités de promotion de la santé mentale, la formation et le recyclage des agences de réglementation, le développement et la révision des politiques existantes, ainsi que l'amélioration de la police et application de la restriction d'accès.

**Mots-clés :** sécurité sanitaire, substance psychoactive, Nigeria

## Introduction

Psychoactive substances are brain-altering chemicals, which results in alterations in mood, thinking, sedation, and behaviour. They may be licit (legally permissible) such as alcohol and cigarettes or illicit (illegal) such as cannabis, heroin, cocaine etc. Some others (sedatives, opiates) are prescription medications [1].

The use and abuse of psychoactive substances in Nigeria is of utmost public health significance. Long-term use of psychoactive substances is usually associated with negative consequences which may be physical, social and psychological. For example, psychoactive substance use has been clearly linked with physical hazards such as injuries [2], physical health problems [3], psychological harms such as depression, psychosis and social problems such as decline in social, educational or occupational functioning, marital disruption, truancy in school and crime [4]. Significantly, the development and establishment of addiction, makes the outcome of substance use

gloomier. Psychoactive substance misuse also has serious economic implications – as an expensive habit to maintain, as well as when it causes physical or mental health problems that require treatment [5].

Although large-scale community epidemiological surveys suggest that the prevalence of psychoactive use in Nigeria compared with other countries of the world may not be alarming [6], available data suggest clusters of differential Nigerian population have high rates of alcohol and drug use [7-11], with associated self-reported health problems [3]. The use and misuse of psychoactive substances cut across socio-economic strata, religious affiliation, professional or educational status, geographical location and age group [7, 8, 11, 12]. Several public health initiatives on psychoactive substance use have concentrated on adolescents and youths. Indeed, psychoactive substance use is prevalent across all ages [11] and in the elderly [13]. Among the elderly, a past-week alcohol use of 12.0% in men and 3.6% in women was reported during the National Survey on Mental Health and Wellbeing in Nigeria [13]. The

## SWOT analysis

Strengths	Weaknesses	Opportunities	Threats
Policies for the control of psychoactive substances including alcohol exist	Pervasive, and diverse pattern of psychoactive substance use across the country	Recent political interest and national discourse about tackling the menace of psychoactive substance use	Absence of political will, and vested political interests may truncate efforts to tackle the menace.
Regulatory agencies such as the National Drug Law Enforcement Agency (NDLEA); National Agency for Food and Drug Administration Control (NAFDAC); and the Nigerian Police are in place.	Very few specialized facilities are available to provide expert rehabilitation services for affected individuals.	Collaboration with faith-based and traditional healers to improve access to qualitative rehabilitation services.	Widespread corruption involving regulatory agencies
Availability of expertise to develop strategies to address these problems.	The glaring paucity of drug abuse prevention strategies and school mental health programmes to prevent initiation and experimentation	International support from the United Nations Organization for Drugs and Crime control (UNODC).	Predominantly youthful and increasing population; as well as rising rates of youth unemployment
	Poorly structured and ineffective regulatory bodies (NDLEA, NAFDAC, Police, Federal Road Safety Corps).	Development of Training Programmes and the Training and re-training of the officers and men of the regulatory agencies, including the Nigeria Police Force.	Civil unrest and communal conflicts.

presence of chronic general medical condition is also a predictor of substance misuse [14].

### **Situational analysis**

Although epidemiological surveys in Nigeria reveal that alcohol is the most common substance of abuse, with a lifetime prevalence of 39% - 56% [6, 15]. Other commonly used substances include cigarettes (12.2%), opiates including codeine, tramadol and heroin (11.8%), tranquilizers (11.3%), inhalants (6.8%) and cannabis at 6.6% [6, 15].

It is of utmost concern to note the epidemiological surge in the use of illicit substances, notably prescription opioids, and cocktails of drugs mixed with alcohol (skushi) among adolescents and the youth [16]. The trend is pervasive among the younger age group, and these “toxic compounds” are their first choice of substance use, which is contrary to the commonly accepted gateway hypothesis of starting with milder substances such as cigarettes and then graduating to more addictive substances such as opiates [17]. Similar high rates of alcohol and illicit substances have been reported among other population. For example, among active military service men and women, while lifetime alcohol use rate of 76% and 12-month prevalence of 53.9% have been reported [18], prevalence of lifetime cannabis of 13.5% and 12-month of 6.8% have been reported [7].

Trauma patients presenting for emergency care following accidents have also been found to have prevalence rates as high as 27.9% and 14% for alcohol and cannabis use respectively [19]. These rates are much higher than community prevalence rates. Thus, pre-trauma rates of alcohol and cannabis use have been identified as a risk factor for severe injury and trauma following accidents in Nigeria [19]. Psychoactive substances are freely and readily available in motor parks and among commercial vehicle drivers [10]; as well as among Almajiri children in northeast Nigeria [8].

Despite these alarming rates of psychoactive substance use in Nigeria, evidenced-based effective policies [20] that focus on regulating alcohol and drug marketing, restricting alcohol and drug sales, alcohol and drug taxation and controls on their packaging, strengthening drinking and driving laws, strengthening health sector response, raising political commitment have been rather vague and weak in Nigeria [21]. Thus, policy-driven interventions, aimed at curtailing the growing menace of psychoactive substance misuse in Nigeria is expected to ameliorate the physical and social consequences of use and abuse of psychoactive substances.

### **Forecast to 2050**

The long-term consequences of the increasing prevalence of psychoactive substance use across all ages in Nigerian is likely to result in high rates of adolescent problems such as school drop-out, increasing crime rates and insecurity as well as potential for civil unrest, strife and violent conflicts affecting not only Nigeria but the entire West African sub region as well high rate of substance-related morbidity and mortality with increasing age. More specifically, the adolescents and youth require special focus because of projected exponential population growth, with rising proportion of young persons.

### **Sources of funding**

These proposed strategies can be funded by Federal, States and Local Governments, via the Ministries of Health, Education, Finance, Planning and Budgeting; in partnership with Development Partners and Donor Agencies. Additional revenue from ‘Sin’ Tax and possible telecommunication tax for investment in education and health care can also be useful financing mechanisms. Other possible partners include religious and communal organizations, the organised private sector, as well as the United Nations Office on Drugs and Crime (UNODC).

### **Monitoring and Evaluation**

The strategies and plans will be of minimal benefit if they are not faithfully implemented and monitored. We propose a Technical Working Group (TWG) comprising professionals from several disciplines and representatives from relevant Ministries; the academia; as well as regulatory agencies and the media to serve as the Monitoring and Evaluation Team. This may work best if it is domiciled under the Presidency, as a Special Project. Quarterly and annual narrative and financial progress reports should be generated, with joint annual reviews by all stakeholders

### **Conclusion**

The increasing prevalence of psychoactive substance use presents a clear and present danger to the security, well being and development of the country. Evidence-based strategies and steps to combat this trend as well as available expertise need to be deployed to tackle this menace. These strategies require multi-sectorial collaboration across Ministries and the formal and informal sectors. With concerted efforts, these issues can be addressed and the negative trends halted. Innovative financing strategies

## Proposed short, medium and long-term interventions with deliverables

Time frame	Plans	Deliverables
Short term	<p>Training and re-training of Regulatory agencies</p> <p>Public awareness campaigns using BCC and training for media practitioners</p> <p>Pilot school mental health programmes</p> <p>Ensure improved road safety by random testing of drivers and sanitizing motor parks</p> <p>Effective policing of borders and entry points to reduce drug trafficking into the country</p>	<p>At least 25% of regional commands have been trained</p> <p>At least 50% of media outlets run awareness campaigns</p> <p>At least 25% of states have sanitized motor parks</p> <p>Border control is improved at 50% of our international land and sea ports.</p>
Medium term	<p>Development and revision of policies and legislation</p> <p>Revision of and Development of curricula for multidisciplinary training programmes in addiction</p> <p>Revise and incorporate into school curricula of secondary schools and health professionals training curriculum</p> <p>Roll out school mental health programs (peer support, Drug Abuse Resistance Education [DARE], Resiliency building etc)</p> <p>Employ and deploy more mental health professionals into regulatory agencies as well as to oversee the School MH programmes</p>	<p>Relevant policies and legislation revised or developed</p> <p>Multidisciplinary Training curriculum revised and additional programmes developed</p> <p>School curricula revised.</p> <p>School mental health programmes present in at least 25% of schools.</p>
Long term	<p>Overhaul access to prescription drugs.</p> <p>Introduce ‘sin’ tax and invest the revenue in education and health care services including mental health promotion and prevention services.</p> <p>Invest in socio-economic empowerment and improved productivity via job creation.</p>	<p>‘Sin’ tax is passed on alcohol</p> <p>Socio-economic empowerment initiatives are in place</p> <p>School mental health programmes and public awareness campaigns are mainstream</p>

and engagement with state and non-state actors can support this initiative and facilitate its actualization. The cost and consequences of inaction will be too dire, and all hands must be on deck to ensure it is averted.

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## **Behaviours and behaviour change: Implication for driving health security in Nigeria by 2050**

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### **Abstract**

*Introduction:* Behaviours are dynamic in their interactions and can change overtime based on different factors. Many factors affect people's behaviours, consequently resulting in behavior changes that present serious challenges to preventive health and health seeking behavior in Nigeria. Strategies to change behaviour are targeted towards different levels of individual, organisational, community and population levels, using multilevel interventions to bring about long-term sustainable behaviour change.

*Situation analysis:* Pertinent issues relating to sustainability of health and social care systems in the face of instability and conflict in some regions in the country threatens national health security. Globally, and as true for Nigeria, there is an urgency to address the 'triple burden of diseases' which includes ongoing threats of communicable diseases, and newly emerging and re-emerging diseases and recent increase in occurrence of noncommunicable diseases.

*Forecast:* Behaviour change contribution to achieving health security and sustainable development by 2050 could effectively address national health issues by adopting a holistic approach that encourage health promotion strategies and intersectoral action areas to build healthy public policy, create supportive environments for health, strengthen community action for health, develop personal skills, and re-orient health services, to build sustainable health systems.

*Conclusion:* Operationalising evidence-based practice and public health depends on behaviour change. Behaviour change interventions are vital for effective practice of medical science and public health, and other pertinent issues facing society.

**Keywords:** *Behaviours, behaviour change, Health security, health promotion*

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### **Abstrait**

*Introduction :* Les comportements sont dynamiques dans leurs interactions et peuvent changer tout au cours du temps en fonction de différents facteurs. De nombreux facteurs affectent le comportement des individus, entraînant par conséquent des changements de comportement qui posent de sérieux problèmes pour la santé préventive et le comportement en recherche de santé au Nigéria. Les stratégies visant à modifier les comportements ciblent différents niveaux d'individus, d'organisations, de communautés et de populations, en utilisant des interventions à plusieurs étapes pour provoquer un changement de comportement durable à long terme.

*Analyse de la situation :* Des problèmes pertinents liés à la durabilité des systèmes de santé et de protection sociale face à l'instabilité et aux conflits dans certaines régions du pays menacent la sécurité sanitaire nationale. Universellement, comme au Nigéria, il y a une urgence d'adresser le 'triple fardeau des maladies', qui comprend les menaces actuelles de maladies transmissibles, de maladies émergentes et ré-émergentes et de l'accroissement récent de l'incidence des maladies non transmissibles.

*Prévisions :* La contribution du changement de comportement pour aboutir à la sécurité sanitaire et au développement durable d'ici 2050 pourrait résoudre efficacement les problèmes de santé nationaux en adoptant une approche holistique qui encourage les stratégies de promotion de la santé et les domaines d'action intersectoriels afin de mettre en place des politiques publiques saines, de créer des environnements favorables à la santé, de renforcer l'action communautaire santé, développer des compétences personnelles et réorienter les services de santé afin de mettre en place des systèmes de santé durables.

*Conclusion :* La mise en opération de la pratique factuelle et de la santé publique dépend du changement de comportement. Les interventions visant à modifier les comportements sont essentielles à la pratique efficace de la science médicale et de la santé publique, ainsi qu'à d'autres problèmes pertinents auxquels la société est confrontée.

**Mots - clés :** *Comportements, changement de comportement, sécurité sanitaire, promotion de la santé*

### **Introduction**

The social, cultural, physical and biological environments, where we live and interact are already determining individual or collective behaviours and

has implications for our health in 2050. Our values shape our behaviours and ultimately affects our health, and results in increasing epidemiology of disease and mortality, for example risk factors for non-communicable diseases. Behaviours are a product of complex systems of inter-relationships and collective beliefs that informs what people do or do not do. That is what we see, hear, speak and interact with, do, where we live, and the people we know, consistently shapes our values and eventually our behaviour; our behaviour ultimately affects our health.

Behaviour has been defined in the context of the individual 'behaviour to be an outcome of competing influences balanced and decided upon by the individual' [1]. Behaviour is the way that a person responds in a situation or under particular conditions. Behaviour change is a mirror reflecting an individual's growth and development. Integral to behaviours are determinants of health or factors such as genetic make-up, learning experiences, culture, religion, values, and attitudes; social norms also influence behaviour [2]. Behaviours can add or decrease a person's years of potential life [3], and it's a critical element in the interactions between health, disease and quality of life.

Health behaviours refer to any behaviours that impact on people's physical and mental health and quality of life [4]. It involves any activity undertaken by an individual, regardless of actual or perceived health status, for promoting, protecting or maintaining health, irrespective of whether such behaviour is objectively effective towards that end [5]. Health behaviours can be changed or modified based on people's choice and various factors influence this change. Health behaviour change includes processes that encourage abandonment of health-compromising behaviours and adoption of health-enhancing behaviours. Health policies should therefore be deliberately focused on restoring normalcy through deliberately targeted measures to manipulate individual, family and community resources to adopt behaviours that support positive health habits. However, Individuals are complex, and societies are dynamic. Personality, cultural, and environmental changes may prompt unhealthy practices. This often requires a change from unhealthy to health promoting practices.

### **Situation Analysis**

Raising concerns about health security in Nigeria by the year 2050 with respect to behaviours and behaviour change is very important. Current trends

in the country can attest to the fact that there is decadence in the value chain and culture seems not to hold fast on right morals. Against this background are behavior changes and factors that present serious challenges to preventive health and health seeking behaviour in Nigeria. In addition are pertinent issues relating to sustainability of health and social care systems in the face of instability and conflict in some regions in the country, which threatens national health security. Health promotion which targets behaviour change is germane in addressing public health problems that threatens national health security.

Globally, and as true for Nigeria, there is an urgency to address the 'triple burden of diseases' which includes ongoing threats of communicable diseases, and newly emerging and re-emerging diseases and recent increase in occurrence of noncommunicable diseases. The World Health Organisation estimated that there were 792,600 NCDs related deaths in 2008 in Nigeria compared to HIV which was 240,000 [6]. For example, physical inactivity which is estimated to cause around 21–25% of breast and colon cancers, 27% of diabetes and about 30% of ischaemic heart diseases [7] is on the increase; the prevalence of physical inactivity in Nigeria was reported to be 41% among adults [8]. Globalisation, urbanization, advanced technologies, amongst a few, drive behaviors resulting in positive health outcomes on one hand but has a great contributory effect on negative/poor health outcomes on the other hand. National burdens that includes low life expectancy [9], mortality and morbidity rates, rise in non-communicable diseases and sedentary lifestyle and emerging and inherent communicable diseases, below standard expectation of total expenditure on health as percent of GDP (3.7%), and persistent inequalities among others, are all associated with individual or collective health behavior and requires positive behavior change.

### **Forecasts to 2050**

Various factors affect the health security of people all over the world, especially in developing countries context. Beyond the health sector, different factors, including social, economic and political influence shape individual behaviour and circumstances, resulting in disparities in health and threatens health security. A holistic approach that looks beyond the traditional health sector, and targets behaviour change to all stakeholders, at community and other settings should be considered. This holistic approach embraces the concept of empowerment and capacity

**Table 1: SWOT Analysis**

<b>Strengths</b>	<b>Weaknesses</b>
<ul style="list-style-type: none"> <li>• Existence of policies, for example, Health Promotion Policy;</li> <li>• Resilience of Nigerians in the face of enormous economic and social challenges;</li> <li>• Social Media as a medium to promote preventive health behaviour;</li> <li>• Expertise to develop strategies to address behavioural challenges</li> <li>• Community life and Religious systems</li> </ul>	<ul style="list-style-type: none"> <li>• In policy implementation processes;</li> <li>• Poor education;</li> <li>• Inadequate funding;</li> <li>• Bad leadership</li> <li>• Political instability, public sector institutions are affected by high levels of corruption, agents of behaviour change are corrupt; on average across each of the public sector groups, half of the population or more said that they thought most or all (Religious leaders Traditional leaders Office of the presidency Local government councillors Members of parliament Judges and magistrates Tax officials Government officials Business executives Police) are corrupt and 78% of Nigerians highlighted that the government are doing badly in controlling corruption (Transparency International, 2015).</li> </ul>
<b>Opportunities</b>	<b>Threats</b>
<ul style="list-style-type: none"> <li>• Nigeria is a country of immense potentials with capital and manpower if harnessed positively with her population profile;</li> <li>• mobile health – e health; increase in technology output</li> </ul>	<p>Visible and invisible threats to behaviour change include:</p> <ul style="list-style-type: none"> <li>• Implosion of socio-cultural context of health behaviour due to westernization and globalisation. Nigerians have shifted from hitherto positive to negative health habits, for example, sedentary lifestyle; consumption of high fat calories</li> <li>• Poor access to health information and education, inadequate information, and high awareness among the general populace about health-related issues but low knowledge, which translates to poor health seeking behaviour among the people</li> <li>• Poor health care services and lack of adequate health care providers, especially in rural settings, accessibility, health care cost influence societal health behaviour</li> <li>• Social norms and societal behaviour of stigmatization and discrimination hinders health seeking behaviour</li> <li>• Gender imbalance and male dominance in the traditional Nigerian culture hinders positive health-seeking behaviours</li> <li>• The social media is closely related to behaviour change, and negative influence of social media has impacted on behaviours of people. Increase in social media access has encouraged a lot of potential towards sedentary lifestyle, excessive alcohol intake; use of tobacco related products; consumption of calories in food - Identify risk factors for communicable and non-communicable diseases.</li> <li>• Violent crimes including religion/intertribal, Economic and social effects of all these; impact of the Niger Delta crisis on the Nigerian economy; Different socio-cultural differences.</li> </ul>

**Table 2: Proposed Plans, Deliverables and Sources of Funding**

	<b>Plans</b>	<b>Deliverables</b>	<b>Sources of Funding</b>
Short term Timeline	Increase in awareness and knowledge of health promotion and education	<ul style="list-style-type: none"> <li>• Trained Personnel</li> <li>• Media campaigns</li> <li>• Multimedia efforts targeted at behaviour change</li> </ul>	Federal, State and LGA <ul style="list-style-type: none"> <li>• MOE</li> <li>• MOH</li> <li>• MOF</li> </ul>
Medium Term Timeline	Interventions to provide support for behaviour change. Intervention functions could target the following [4]: <ul style="list-style-type: none"> <li>• <i>Education (e.g., increasing parents' knowledge about the importance of a healthy diet)</i></li> <li>• <i>Persuasion (e.g., inducing positive feelings to pack fruits and vegetables in children's lunchbox)</i></li> <li>• <i>Incentivization (e.g., creating expectation of financial or other rewards if one packed fruits and vegetables in the child's lunchbox every day)</i></li> <li>• <i>Coercion (e.g., increasing the cost of salty food and snacks)</i></li> <li>• <i>Training (e.g., providing training to parents to improve their skills to cook with healthy ingredients)</i></li> <li>• <i>Restriction (e.g., using rules to reduce purchasing of energy-dense food)</i></li> <li>• <i>Environmental restructuring (e.g., using prompts in shops to increase the attractiveness of fruits and vegetables)</i></li> <li>• <i>Modeling (e.g., providing an example for parents to aspire or imitate when managing their children's diet)</i></li> </ul>	<ul style="list-style-type: none"> <li>• Available people trained</li> <li>• Community based social marketing</li> </ul>	Federal, State and LGA <ul style="list-style-type: none"> <li>• MOE</li> <li>• MOH</li> </ul>
Long Term Timeline	Strategic planning for sustainable behaviour change. To ensure translation of positive health behaviours into population health, they must be sustained over the long run and factors influencing sustenance may differ from those	<ul style="list-style-type: none"> <li>• Education for sustainability</li> <li>• Professional learning hub</li> <li>• Enthusiastic and competent project leaders and officers</li> <li>• Linkages between public and private organisations and health professionals</li> <li>• Multifaceted approach</li> <li>• Active and genuine involvement of all stakeholders in</li> </ul>	<ul style="list-style-type: none"> <li>• F e d e r a l Government</li> <li>• External donor agencies</li> <li>• P r i v a t e partnership</li> </ul>

- 
- evaluation of programmes
- Encouragement of pro-environmental behaviours
  - Harnessing innovative technologies
  - New research orientation to target peculiar indigenous problems & behaviours
  - utilising alternative behavioural approaches as a target to provide a broader context of policy options
- 

building in order to promote individual and community action for health and its determinants, and thus lead to improved health security [10].

Nigeria's aspiration for 2050, is targeted towards behaviour change for health, which should significantly surpass past and current trends. Nigeria projects for a future in which increasing population experiences substantial and sustainable improvements and equity in health, and health behaviour targeted at physical, mental, socio-cultural and health-related quality of life. Through public engagement activities, this aspiration is of inherent societal value. To actualise these, we must take a much broader assessment of all indices and drivers of health and development, including economic, GDP, housing, security, increased employment opportunities, and so on. Also, we must harmonise our research and behavioural theories within our cultural context and identify the types of evidence needed, current and future, for behaviour change interventions, in order to promote health and prevent diseases and ill health.

Presently, looking at current trends, the forecast appears grievous and gruesome; corruption is embedded in the societal fabric and it has become an acceptable norm. Young people grew up in a society that adapts to corruptible practices and offenders are not appropriately punished and ameliorated. There is therefore need for behaviour change across the device to avoid implosion, and behaviour change should target education of moral values as a catalyst for development in Nigeria from an early age. Techniques of behaviour change should be emphasised; effective behaviour change should target different levels of individual, organisational, community and population, and multilevel

interventions are very essential [4]. Health promotion behavioural theories and models at individual, social, physical and technology levels can be used to characterise and design behaviour change interventions at population, community and individual levels. These evidence-based principles of behaviour change can be conceptualised under three influences on behaviour, capability, opportunity and motivation. Operationalising evidence-based practice and public health depends on behaviour change [11], and behaviour change interventions are vital for effective practice of medical science and public health, and other pertinent issues facing society [11].

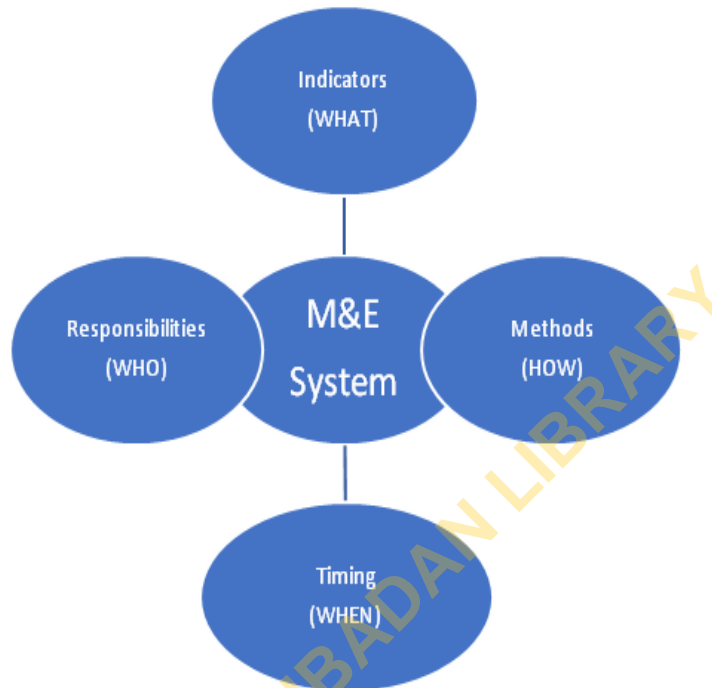
Table 1 highlights the strengths, weaknesses, opportunities and threats (SWOT Analysis) of behaviours to health security in Nigeria. Table 2 shows short, medium- and long-term behaviour change plans to improve health security in Nigeria, with deliverables and proposed source of funding.

#### **Monitoring and evaluation of short, medium- and long-term behaviour change plans**

Monitoring and evaluation processes should involve the following steps as highlighted below:

- Develop implementable and SMART objectives
- Develop indicators and checklists (e.g. WHO Checklist and Indicators for Monitoring Progress)
- Set out tasks and activities
- Monitoring focused on Inputs, Process/Functional outputs, Service outputs and outputs
- Evaluation focused on outputs, intermediate outcomes and long-term outcomes
- Monitoring and Evaluation tools

Monitoring and evaluation systems could include measuring indicators (what to do), methods (how it is being done), timing (when it is being done) and persons responsible for carrying out each task/plan as shown in Figure 1.



**Fig.1:** Monitoring and Evaluation Components

### Conclusion

Behaviour change should become a key target of many government policies across various ministries and parastatals. Main policy areas should focus on behaviour change at the individual, community and political levels, which includes among others the educational sector, social environment, health sector, power and transport sectors. Factors which influence behaviour, for example, Predisposing factors (knowledge, beliefs, attitudes, norms, perceptions), Enabling factors (money, skill, time, facilities, policy) and Reinforcing factors (influence of significant others like parents, husband, friends, employer), should be addressed with through using a holistic approach.

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## Blueprint for Health Literacy: Population education, community health innovation

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### Abstract

**Introduction:** The WHO submits that improving peoples' access to health information and enhancing their capacity to use it effectively are forms of health empowerment. Health literacy involves the acquisition of skills that are essential to effectively search for and obtain, process and interpret and use basic health information available. With the current national data on literacy rate in Nigeria, the future looks bleak for health literacy if appropriate and adequate measures are not put in place to address the problems. A functional health care system relies on efficient health literacy programme as the bedrock of health security. The goal of health literacy review is to establish the gaps and important roles of health literacy in the quest to enhancing health security.

**Methods:** This was an exploratory study design, using an empirical study guide that was developed from the set objectives. Appropriate search engine tools including Google scholar and desk review of documents and journal articles were used as a source of information. Information harvested were analysed thematically based on the themes from the objectives.

**Findings:** Factors influencing health literacy were identified and suggestions to address the observed gaps were highlighted. These include development and dissemination of health information that is accurate, accessible, and actionable, using all appropriate health promotion and education approaches. Increase in research funding, and evaluation of interventions are equally required.

**Conclusion:** The review has revealed the health status will improve when health literacy is fostered. Statutorily, all aspect of health care needs to subscribe to the philosophy of health literacy.

**Keywords:** Health literacy; Health information and Health security

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### Abstrait

**Contexte :** L'OMS affirme que l'amélioration de l'accès des populations à l'information sur la santé et de leur capacité à les utiliser efficacement est une forme d'autonomisation de la santé. La l'alphabétisation en matière de santé implique l'acquisition de compétences essentielles pour rechercher, obtenir, traiter, interpréter et utiliser efficacement les informations de base disponibles sur la santé. Avec les données nationales actuelles sur le taux d'alphabétisation au Nigéria, l'avenir semble sombre pour l'alphabétisation en matière de santé si des mesures appropriées et insuffisantes ne sont pas mises en place pour résoudre les problèmes. Un système de santé fonctionnel repose sur un programme efficace d'alphabétisation en matière de santé comme fondement de la sécurité sanitaire. L'examen de l'alphabétisation en matière de santé a pour objectif d'établir les lacunes et les rôles importants de l'alphabétisation en matière de santé dans le but d'améliorer la sécurité sanitaire.

**Méthodes :** Ceci s'agissait d'un plan d'étude exploratoire, utilisant un guide d'étude empirique développé à partir des objectifs fixés. Outils moteur de recherche appropriés, y compris le Google Scolaire et l'examen préalable des documents et des articles de journaux ont été utilisés comme source d'information. Les informations recueillies ont été analysées de manière thématique sur la base des thèmes des objectifs.

**Constatations :** Les facteurs influençant l'alphabétisation en matière de santé ont été identifiés et des suggestions pour remédier aux lacunes observées ont été mises en évidence. Ceux - ci comprennent le développement et la diffusion d'information sur la santé qui sont exactes, accessibles et exploitables, en utilisant toutes les approches de promotion et d'éducation santé appropriés. Une augmentation du financement de la recherche et une évaluation des interventions sont également nécessaires.

**Conclusion :** L'examen a révélé que l'état de santé s'améliorerait quand l'alphabétisation en matière de santé serait favorisée. De manière statutaire, tous les aspects des soins de santé doivent souscrire à la philosophie de l'alphabétisation en matière de santé.

**Mots clés :** Alphabétisation en matière de santé ; Information sur la santé et sécurité sanitaire

## Introduction

Health literacy is defined as the degree to which individuals have the capacity to obtain, process, and understand basic health information and services that are required to make appropriate informed health decisions. Although, health literacy is a relatively new concept in health literature in Nigeria; however, globally, it has carved a niche for itself due to its far-reaching implications on health outcome and wellbeing [1-4]. According to [5], factors influencing health literacy in Nigeria include the culture and belief system, poor and ineffective communication, lack of education and low educational level, and low socioeconomic status. Low health literacy predisposes to poorer health status, poorer disease outcome, lack of understanding in the use of preventive services, frequent hospital visitations amongst others.

## Methodology

An exploratory qualitative study design was adopted for the review. The themes from the objectives of this presentation were subjected to some search engines including Google Scholar to access documents focusing on health literacy in Nigeria and other countries. In addition, desk review of empirical publications and journal articles were used as a source of qualitative data. These were analysed using thematic content analysis. Qualitative data obtained were used to present the findings under relevant sub-headings.

## Findings and Discussions

Based on the themes developed to search for germane information relevant to the objectives of the review, the findings were presented and discussed under the sub-headings below:

### Situation analysis

Despite the relevance of health literacy to health promotion activities in public health, the level of attention given to health literacy is less than required. Health information is an essential component of any strategy to promote health literacy, self-care, informed choice, shared decision making, medication adherence and self-management of chronic diseases [6]. Providing timely, relevant, reliable, impartial and easy to understand health information should be from trusted sources to achieve greater patient involvement in healthcare [7, 8]. In fact, health literacy is critical to empowerment and it helps to improve people's access to health information and their capacity to use the information effectively.

Poor health information can prevent people from making effective choices [7]. Besides, lack of

health information can be damaging to patients, their relatives, health professionals and the entire society [7]. Low health literacy contributes to socioeconomic disadvantage and may prevent individuals from fully engaging with society and achieving their life goals [9].

Low health literacy is associated with more hospitalizations, greater use of emergency care and poorer ability to demonstrate taking medications appropriately and interpret labels and health messages, and it partly explains racial disparities in a variety of outcomes [9]. In older adults, low health literacy is associated with worse overall health status and increased mortality [9].

Limited health literacy has been established as a major public health problem [10]. However, many obstacles exist that make this very challenging. Patients face economic barriers and difficulties in identifying and understanding quality health information. Studies show that most health information seekers go online right before or right after a primary care or specialist medical visit [11]. Low levels of health literacy are particularly prevalent among older, minority, immigrant, and low-income populations [12].

Because of less time allotted to patient's appointments, it is common for individuals to leave feeling confused, unable to recall what was discussed, or simply missing information. After appointments, or when new issues occur, consumers may have difficulty in accessing their providers, finding them to be unapproachable or too busy [13]. Patients often have to process health information independently without really knowing how to seek information or how to interpret the information they do find [13, 14]. In addition to the resulting gaps in patients' knowledge about their conditions and potential treatments, patients with low health literacy skills are at an increased risk of not knowing how to cope with serious medical conditions.

While the availability and accuracy of health information are important, so is the accessibility and readability of that information. It is common to encounter health information that is technically correct and accurate but is not presented in a manner that most people can understand and apply to their personal needs. Healthcare professionals need skills to more effectively communicate with patients from diverse backgrounds.

Health literacy is directly related to health outcomes [15, 16]. As a concept, health literacy comprises "the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions" [17]. It also provides

health care consumers with the opportunity to obtain, process, and understand the basic health information and services they need to make appropriate health decisions [18].

### **The Current Situation in Nigeria within the Framework of the International Benchmarks**

The major causes of adult illiteracy in Nigeria, which are related to health illiteracy can be summarised as:

- Problems in primary education (low enrolment rates, high dropout rates, inadequate facilities, poor teaching/learning materials, irrelevant curriculum)
- Poor enrolment rates in adult literacy programmes
- High drop-out rates linked both to economic problems which force adult learners to abandon classes in favour of income-generating activities and to problems relating directly to the adult literacy programme such as lack of relevance, funding issues and low morale among adult literacy instructors
- Literacy instructors not properly trained in facilitation skills and gender awareness
- The exclusion of women from adult education programmes

### **Health literacy forecasts in Nigeria by 2050**

In the past decades, researchers have noted education to be a strong determinant of health, impacting on both morbidity and mortality [19]. Empirical studies conducted in the past two decades revealed that inadequate adult literacy skills are strongly associated with less health knowledge, worse self-management skills, higher hospitalization rates, poorer physical and mental health, greater mortality risk, and higher health care costs [20].

According to the 2013 Nigeria Demographic Health [21], a total of 45.7% of the population in Nigeria is under 15 years of age. Forty per cent females and 28% of males in Nigeria have never attended school while 21% male 19% of females have primary education. In rural areas, 49% of females and 35% of males have no education. The proportion of Nigerians with no education increases with age. The proportion of females who have never attended any formal schooling increased from 26% among those aged 10-14 to 78% while for men, it is an increase of 65%. This means a significant percentage of Nigerians will be both illiterate and functional illiterate by the year 2050. Since limited or no education leads to low health literacy, it is

projected that the proportion of Nigerians with low health literacy will be significantly high by 2050.

Since 45% of our children aged 1-14 have never attended school, it means that by 2050 when these folks will be in their late thirties and forties, the health literacy problem in the country will be more pronounced than it is today. It is the educated people that ensure their children also get an education. Consequently, some of those who have no education are unlikely to educate their children thereby increasing the already bad situation.

### **SWOT Analysis of Health Literacy in Nigeria**

The SWOT analysis is a strategic analysis and planning tool used to evaluate the Strengths, Weaknesses, Opportunities, and Threats of a policy, a programme, a project or an intervention. The purpose of performing a SWOT is to reveal positive forces that work together and potential problems that need to be recognized and possibly addressed.

#### *Short, medium and long term plans with deliverables and budget estimate*

To improve health literacy as part of the short term (2018-2023) that will amount to creating awareness; medium plans (2024-2029), which is focusing on resuscitation and promotion of adult literacy programme with health components and long term plan (2030-2050), which considers policy development or reappraisal of Health Literacy efforts. Development of health policy, programmes, and financing must address the need for increased usability of health information and services.

### **Action plan to improve health literacy**

The Action Plan to Improve Health Literacy is a set of health literacy priorities to be addressed in Nigeria. In accordance with its mission, it will develop, implement, and evaluate programmes and provide resources to improve health literacy and healthcare facilities and institutions will strive to address the following five health literacy priorities.

Priority 1: Incorporate health literacy improvement in the mission, planning, and evaluation programmes  
Priority 2: Support health literacy research, evaluation, training, and practice.

Priority 3: Conduct formative, process, and outcome evaluation to design and assess materials, messages, and resources.

Priority 4: Enhance dissemination of timely, accurate, and appropriate health information to health professionals and the public.

**Table 1:** Showing the Possible SWOT Analysis of Health Literacy in Nigeria

No.	Strengths	Weaknesses	Opportunities	Threats
1	Improved communication; availability of IEC materials; educational institutions with health promotion and education and related courses	Poor implementation of policies even when and where available	Advent of social media; multiplicity of media houses both local and international	Religious and cultural dispositions to some health literacy programmes due to lack of trust and perceived negative effects
2	Strong online presence	Limited health literacy level among the populace	Rising literacy rates	Religious and cultural disposition to health literacy programmes. These conflicts play a major role in some interventions such as vaccination campaigns as has been witnessed in the past
3	Recognisable institutions focusing on literacy programme e.g. adult education class	Non-visibility of community library	Health Management Information System (HMIS): Information regarding outbreaks and information of public health importance and prevention that has scientific basis should be easily available	Ethnic and communal clashes
4	Availability of health education materials	Varying culture and belief system	Smartphones and mobile applications: The applications can be used to deliver appropriate health information to users, which may lead to better health management and lower use of health services e-health technologies	Insurgencies
5	Multiple formats targeting different audiences	Poor and ineffective communication in health systems	Involvement of development partners and NGOs: Development partners as well as NGOs are not only providing services but are also actively involved in educating people about health problems. NGOs are therefore instrumental in improving health literacy	Internally displaced population
6	Visually appealing media	Lack of education and low educational level	Achieving SDGs: From a global perspective, improving health literacy is essential for making progress on the Sustainable Development Goals	Lack of comprehensive sexuality education – the young adults and adolescents will benefit most from this and it will also help curb the growing population

No.	Strengths	Weaknesses	Opportunities	Threats
7		Low socioeconomic status	Information, Education and Communication (IEC) and awareness programmes: IEC and awareness is the backbone of health education. "Prevention is better than cure" is epitomised by IEC campaigns	
8			Health systems reforms	
9			Supports from international agencies and donors	

Priority 5: Design health literacy improvements to healthcare and public health systems that enhance access to health services.

#### *Possible Sources of Funding to Promote Health Literacy*

##### *International Funding Bodies*

1. National Institutes of Health (NIH), (<http://www.nih.gov>)
2. United Nations Educational, Scientific and Cultural Organization (UNESCO) <https://en.unesco.org/>
3. World Health Organization (WHO) ([www.who.int](http://www.who.int))

##### *Local Funding Bodies*

4. Dangote Group of Companies (Conglomerate)
5. NUC
6. Health Product Manufacturers (Evans Medicals, Merit Health Limited, Beecham, Nestle, Friesland Campina, etc.)
7. Local NGOs
8. International NGOs based in Nigeria
9. The LGAs, State Government and Federal

#### **Monitoring and Evaluation**

Measuring individual health literacy has often been the first step in addressing health literacy amongst target populations. But in order to align people's skills and abilities with the complexities of navigating a health service, it is necessary to assess whether the service is accessible to clients. Planning, monitoring and evaluation ensure a health literate organisation with a focus on client-centred care.

Proper evaluation of the entire achievement of health literacy programme will be fostered by the development of a Goal of the programme and how this will be achieved through the setting of Specific Objectives that will showcase what will be done to achieve the goal. Poorly set specific objectives will lead to a disastrous outcome of the goal set for health literacy intervention programme. The need for setting appropriate and feasible timelines is very important in programme evaluation.

#### **Conclusion and Recommendations**

Health Security can only be ensured when people have the ability to comprehend what they need to do to remain healthy and where they should go in case they need help without any form of restriction or hindrance of any form. Health literacy has the key to whatever health intervention programmes that are put in place to ensure Health Security by the year 2050. In achieving this, the following are recommended:

##### ***Strengthening partnerships***

The activities of the various organisations and agencies working towards adult literacy should be streamlined in order to make optimum use of meagre resources and minimise unnecessary squabbles and rivalries.

##### ***Literacy survey***

A national assessment of literacy levels and practices is essential if Nigeria is to present a realistic account of its Universal Basic Education achievement by the year 2015 when the assessment of EFA goals will be

conducted. The reliance on citizens' self-reporting on literacy must not continue. For a literacy programme to be relevant and meaningful; a baseline survey/needs analysis is required.

### Training

There is a need to recruit and train competent adult education personnel who will be motivated to support policies and programmes on adult education throughout the country. Without an adequate number of good facilitators and administrators, no amount of funding will yield the desired results.

### Mass literacy campaign

In order to address the poor literacy rates and low enrolment, the Government, in collaboration with NGOs and local communities, should ensure there is improved access to quality non-formal education for adults and out-of-school young people, especially girls and women. The Federal Government should as a matter of urgency set the machinery in motion to institute another mass literacy campaign that will be effectively carried out.

### Funding

Perhaps the greatest challenge facing education in Nigeria is inadequate funding by federal, state and local governments. At all levels, adult and non-formal education suffer seriously from under-funding. If Nigeria is to attain Sustainable Development Goals, there is a real need to consult widely and come up with a reliable and workable funding mechanism. The Federal Government must support workforce literacy by developing tax incentives, infrastructure development and support, public awareness campaigns and supportive policies to ensure accessibility of literacy and numeracy skills training to the masses. State and local governments need to take greater responsibility and treat adult education with the seriousness it deserves. National Orientation Agency can be supported to perform this role.

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## **Blueprint for health security in traditional and complementary medicine for Nigeria in 2050**

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### **Abstract**

**Introduction:** Traditional African medicine is gradually being mainstreamed into an acceptable medical system in Africa in general and Nigeria in particular. Globally, the general acclamation is that traditional medicine is viable, accessible, available, acceptable, and dependable. The discussion regarding the need to integrate traditional medicine with modern medicine for sustainable health and development in Nigeria is getting more intense. Thus, traditional medicine is becoming an essential item in the agenda of our collective search for health security in Nigeria. It is in this light, this study attempts to develop a blueprint for traditional and complementary medicine in Nigeria for the purpose of promoting a sustainable health security by the 2050.

**Methods:** Ethnography using phenomenological approach, Library and policy documents, papers and reports of World Health Organisation and other international agencies constituted the sources of data for the paper. Of particular interest were their various interventions on traditional medicine the basis on which several nations of the world have taken steps to locate traditional medicine as an integral aspect of their medical milieu. The ethnographic data and other documents were content analysed.

**Results:** This article attempts to explain the criticality of traditional and complementary medicine the agenda for health and security in Nigeria. Although many nations of the world have taken giant steps to situate traditional medicine in their medical episteme and national health agenda, the, it projects into the future situation as regards benefits that can be derived from harnessing complementary and alternative medicine. Given the deteriorating state of Nigerian medical system, there is the pressing need to adequately explore complementary and alternative medicine as blue print is developed for health security in Nigeria by the year 2050.

**Conclusion:** This paper made prescription as to the improvement that can be experienced if traditional and complementary medicine is properly placed in Nigerian medical agenda. Nigerian society stands to gain more by working towards the integration of traditional medicine into its health care delivery system. The need to provide enabling environment for the practice to thrive is therefore imperative.

**Keywords:** *Development, blueprint, health security, traditional and complementary medicine.*

### **Abstrait**

**Contexte:** La médecine traditionnelle africaine est progressivement entrain d'être intégrée en un système médical acceptable en Afrique en général et au Nigéria en particulier. Globalement, l'acclamation générale est que la médecine traditionnelle est viable, accessible, disponible, acceptable et fiable. La discussion sur la nécessité d'intégrer la médecine traditionnelle à la médecine moderne pour une santé et un développement durables au Nigéria s'intensifie. Ainsi, la médecine traditionnelle devient un élément essentiel de l'agenda de notre recherche collective de sécurité sanitaire au Nigéria. C'est dans cette optique que cette étude tente de mettre au point un modèle de médecine traditionnelle et complémentaire au Nigéria afin de promouvoir une sécurité sanitaire durable à l'horizon 2050.

**Méthodes:** Une ethnographie utilisant une approche phénoménologique, des documents de bibliothèque et de politique générale, des documents et des rapports de l'Organisation mondiale de la santé et d'autres agences internationales ont constitué les sources de données pour le document. Leurs diverses interventions sur la médecine traditionnelle ont été d'un intérêt particulier et ont servi de fondement à plusieurs pays du monde pour faire de la médecine traditionnelle un élément essentiel de leur milieu médical. Les données ethnographiques et autres documents ont été analysées.

**Résultats:** Cet article tente d'expliquer l'importance de la médecine traditionnelle et complémentaire dans l'agenda pour la santé et la sécurité au Nigéria. Bien que de nombreux pays du monde aient pris des mesures colossales pour situer la médecine traditionnelle dans leur épistème médical et leur

agenda national en matière de santé, il projette dans la situation future en ce qui concerne les avantages que l'on peut en tirer de l'exploitation de la médecine complémentaire et alternative. Compte tenu de la détérioration du système médical nigérian, il est urgent d'explorer de manière adéquate les médecines complémentaires et alternatives, un schéma directeur étant élaboré pour la sécurité sanitaire au Nigéria d'ici à 2050.

*Conclusion:* Ce document énonce les améliorations à apporter si la médecine traditionnelle et complémentaire est correctement placée dans l'agenda médical nigérian. La société nigériane a encore plus à gagner en œuvrant à l'intégration de la médecine traditionnelle dans son système de prestation de soins de santé. La nécessité de créer un environnement propice au développement de la pratique est donc impérative.

**Mots clés:** *Développement, schéma directeur, sécurité sanitaire, médecine traditionnelle et complémentaire.*

### Introduction

Traditional Medicine came into global relevance as a result of the intervention of the World Health Organisation [1] through the Alma-Ata Declaration. This declaration was the first formal recognition accorded traditional medicine as a major source of primary healthcare. It specifically aims at stimulating global interest in the practice of traditional medicine. Since that declaration in 1978, several decisions and official statements on traditional medicine have been agreed upon by member states and the governing bodies of. Some of these resolutions focused on the role of traditional medicine in healthcare systems and the Lusaka declaration, through which the African Union (AU) [2] declared a decade of traditional medicine and encouraged nations to emphasize the need to see traditional medicine as very crucial to the health of African nations [3, 4].

More importantly, traditional medicine has been identified as the alternative medicine often involving the use of herbs; flora and fauna in a non-orthodox manner and process of consulting deities when seeking solution to illnesses [5]. In line with WHO, AU advised on the importance of integrating traditional and complementary medicine services into the Primary Health Care systems of African nations [6].

World Health Organization's (WHO's) Regional Committee for Africa in August 2000, asseverated that the African Member States are aware that about 80 per cent of the region's population depends on traditional medicine for health care [7]. The international communities have been able to enumerate the paradigms to be adopted in order to

understand and address traditional medicine as a viable complementary medicine. Universal Declaration on Bioethics and Human Rights, adopted by acclamation through the UNESCO General Conference in [8]:

The right of every human being to enjoy "the highest attainable standard of health" (Art. 14); and the explicit need to respect "cultural diversity and pluralism" (Art. 12), which includes "respect for traditional knowledge" (Art. 17).

The approach requires commitment to reaffirming the pivotal role of traditional knowledge worldwide, and the capacity to provide guidelines to protect users and prevent any possible risk of discrimination, exploitation and danger to human life [9]. In a number of countries, prominent among which include China, India, Japan and Iran, traditional medicine has become fully recognised as an integral part of health care systems. India and China have purposively developed traditional medicine to strengthen their medical heritage and at the same time enable cost-efficacy in health care delivery. This responds to capitalise on the economic opportunity arising from an increasing demand for herbal products [10]. Although Nigeria has not reached this level because existing traditional medicine policies have not been implemented, precisely the bill is still at the 2<sup>nd</sup> Reading. Yet, the trending developments in traditional African medicine must be explored to identify lacuna and the imperative need for the formalisation, standardisation and legalisation of traditional medicine.

### Situation analysis

Statistics has shown that the use of traditional medicine remains widespread in developing countries particularly some Asian and African countries such as Nigeria and Ghana in which 80% of the population depend on traditional medicine for primary health care [11]. China, India and many other Asian countries have maximized the innate value of traditional medicine as well as few African countries, such as Rwanda, Mali and Ghana. However, deforestation constitutes menacing effects to the sustenance of nature flora and fauna.

### Forecast

- Promote awareness among health care practitioners and health seekers.
- Organise training for practitioners especially on the thematic areas.
- There will be drive for validation of products using scientific experimental procedures.
- Cultivation and conservation to ensure standard and avoid extinction.
- Building of traditional medical hospitals by the side of existing western hospitals in six geopolitical zones in Nigeria.

- Standardization of traditional medicine products for exportation so as to generate non-oil income.

**Table 1: SWOT Analysis**

Strengths	Weaknesses	Opportunities	Threats
<ul style="list-style-type: none"> <li>• <i>Wide acceptability:</i> Around 80% of the population continues to use traditional medicine in Africa, Asia and Latin America and many governments in these regions have incorporated traditional medicine practices to help meet their primary health care needs. In industrialized countries such as, United States, Australia, France and Canada, almost half the population now regularly use some form of Traditional African medicine. Also, considerable use exists in many developing countries such as China, India, Chile, Columbia and up to 80% in African countries.</li> <li>• <i>Ready-made patronage:</i> World market of herbal medicine based on traditional medicine is estimated at US \$71.19 billion (WHO, 2016) and it is expected to exhibit profitable growth over the forecast period. It has been estimated that global market for herbal medicine is expected to reach \$ 111 billion by the end of 2023 (Global Herbal Medicine Research Report, 2018). This further implies readymade market in terms of constant patronage for traditional African medicine products which makes it a sustainable and profitable venture.</li> </ul>	<ul style="list-style-type: none"> <li>• <i>Policy somersault and lack of implementation:</i> This makes codification and integration very difficult. Acupuncture, ayurveda, popularized in developed countries today seem to be commanding better attention due to policy implementation n (Janska, 2005).</li> <li>• <i>Scientific validation – epistemological chasm:</i> There is persistent epistemological chasm between western and indigenous medicine, the offshoot of which lies in the methodological dichotomy. As a consequence, traditional African medicine is not recognised as ‘valid knowledge’ by scientists as it is combined with beliefs and values. In order to promote traditional African medicine in the contemporary context, it is essential to have an intercultural approach. As mentioned earlier traditional medical knowledge in various countries have evolved within socio-cultural and historical context and their epistemic framework, principles, concepts and practice are quite different from those of modern science (WHO 2002: 7, Shankar et al. 2007).</li> </ul>	<ul style="list-style-type: none"> <li>• <i>Economic advantage:</i> Readymade market for traditional African medicine globally and locally, thereby adding to the Nigeria Gross Domestic Product (GDP).</li> <li>• <i>Job opportunities:</i> There are wide opportunities in traditional African medicine as a practice that can be tapped for the purpose of creating employment opportunities for many Nigerians especially in the diverse fields of traditional medical practice namely, general healers, traditional orthopaedic practitioners, bone settlers, birth attendants, poison healers, spiritual therapists, mental health providers, healers specialized in eye, paediatric conditions, skin diseases, etc. Traditional African medicine also has the possibility of fostering income generating activities through local and international trade in medicinal plants for treating diverse illnesses or diseases.</li> </ul>	<ul style="list-style-type: none"> <li>• <i>Over exploitation of national resources leading to extinction:</i> Over exploitation through the process of harvesting renewable resources to the point of diminishing returns mostly constitutes threat of extinction to biodiversity and ecological environment.</li> <li>• <i>Global warming:</i> The continued evolvement of the world as a global village is not without consequences. Environmentally destructive human activities as a result of technological advancement and industrialisation have amounted to climate change, which is becoming increasingly recognised as one of the greatest challenges to human kind and all other life on Earth.</li> </ul>

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- *It is accessible, affordable and available:* Traditional African medicine uses components of ecosystems (plants, animal and mineral/metal derivatives) that are primarily locally available, easily accessible and often cost effective (Patwardhan, 2005).
  - *Non-Codification/documentation of Traditional African Medicine Knowledge System:* Its knowledge system is people oriented as people are the custodian of the knowledge. This knowledge system is transmitted from generation to generation over many years. However, in order to sustain this knowledge system, there is need for proper codification because human brain or memory is not predictable in encompassing all needed information for prophylactic and therapeutic purposes.
  - *Cutting edge research on Traditional and Complementary medicine:* This will proffer solutions to many unsolved medical problem or diseases especially from the root by maximizing both traditional homeopathic and western allopathic approaches. This can be achieved through initiative in conducting research to develop indigenous drug products that will be potent for diseases control.
  - *Epistemological chasm:* As a result of methodological dichotomy between traditional and western medicine, there is a continuous threat of subjecting traditional medicine to western epistemic paradigms which could alter the efficacy and therapeutic effects of traditional medicine as a practice.
  - *Environmental friendly:* According to World Health Organization (2002: 7), “Traditional medicine refers to health practices, approaches, knowledge and beliefs incorporating plant, animal and mineral based medicines, spiritual therapies, manual techniques and exercises, applied singularly or in combination to treat, diagnose and prevent illnesses or maintain well-being.” Because traditional African medicine makes use of both fauna and flora that are abundantly available in our environment, its promotion therefore will give room for more propagation and conservation of these
  - *Market Constraints:* The factors influencing the possibility of market constraints include lack of research and standardisation, poor legal and regulatory framework which causes patent problem, poor manufactured herbal products etc.
  - *Training:* Traditional African medicine as a complementary medicine will create vast opportunities in the training of western practitioners and other non-professional traditional practitioners on the practice and indigenous methodology of traditional African medicine in order to proffer medical solutions to both benign and malignant illnesses.
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fauna and flora in a sustainable way that will further makes traditional medicine more environmental friendly. Because the sustainability of traditional medicine as a practice hinges on adequate conservation and sustainability of these natural resources.

All these are key to the primary goal of WHO's Alma-Ata Declaration on the primary health care.

- *Policy implementation:* As indicated by WHO's traditional medicine strategy of 2002-2005, the government has crucial role to play in developing and implementing policies with regard to provision of education and training, promotion of proper/rational use, provision of capacity building for human resources including allocation of financial resources, provision of coverage by public health insurance and consideration of intellectual property right issues. Thus, the opportunity for policy implementation revolves around the essentiality or indispensability of government full-backing to traditional African medicine as a practice.
- *Conservation and sustainable use of plant genetic resources (PGR):* In a traditional African context, natural resource use, management and conservation are

products of people's spirituality, culture, practices, taboo systems and knowledge accumulated over centuries Sibanda (2000). Hence, conservation and sustainable use of medicinal plants are integral elements of traditional African medicine. Also, recent developments indicate the opportunity many developing countries have in terms of donor depending budget that might allow the conservation of medicinal plants for sustainable use. Thus, such available opportunity must be fully explored through collaboration for the sustainability of plant genetic resources.

- *Increased access to primary health care:* It enables more access to primary health care especially in the rural areas where health facilities, medical personnel, drugs and other medical supplies were inadequate.
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**Table 2:** Work plan and schedule of activities, 2019-2050.

*Operational activities	1 <sup>st</sup> Quarter (2019-2024)	2 <sup>nd</sup> Quarter (2024-2033)	3 <sup>rd</sup> Quarter (2033-2050)
Short term	*	*	*
1. Training of practitioners			
2. Awareness drive			
3. Development of curriculum for training in traditional African medicine.			
4. Development of accredited programmes that can lead to production of doctors that are skilled in traditional medicine.			
5. An Act of Parliament on traditional medicine for the consolidation, application and implementation of policies towards the legitimization of traditional medicine.			
Mid term		*	* * *
1. Extensive Research and Publications on traditional medicine.			
2. Mainstreaming traditional medical practitioners into health in Nigeria.			
3. Professionalisation of the traditional medicine in Nigeria.			
4. Establishment of regulatory agencies exclusively for traditional medicine.			
Long term			* * *
1. Building of hospitals that are exclusively for traditional medicine in six geo-political zones.			
2. Creation of National Bio-diversity centres in six geopolitical zones to control the problem of deforestation and extinction.			

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### Sources of funding

Funds are sought from the Government and governmental agencies; World Health Organization (WHO); Department for International Development (DFID); Food and Agricultural Organization (FAO); West African Health Organization (WAHO); and Pharmaceutical Industries.

### Monitoring and evaluation

The Committee of the federal, state and local governments is responsible for the monitoring and

evaluation processes. These are considerably geared towards the achievement of health and security in 2050. The processes involved can be summarised as follows.

### Conclusion

Traditional and complementary medicine is the key to the attainment of the goals of Primary Health Care (PHC) as it facilitates reduction in maternal and child mortality, reduction in the cost of medical care, creates employment opportunities and improves the

**Table 3:**

S/N	Activities	Monitoring	Evaluation
1.	Symposium and collective actions of the team which involves training, curriculum development, and accreditation of courses for both traditional and western practitioners.	<b>Record Keeping:</b> There shall be minutes of meetings where we shall have detailed information that will guide our actions.	There shall be colloquium at federal, state and local level to develop an Act of Parliament on traditional medicine for the consolidation, application and implementation of policies towards the legitimization of traditional medicine.
2.	Extensive research in traditional medicine through Participant Observation and Interviews.	Video records and photographs of our observations and interviews as well as scripts of our experience.	Direct contacts with practitioners, to generate first hand information. The interview sessions shall elicit data regarding specific examples of clients who are patients of traditional healers, their caregivers and the general public. The impact of their interventions and the materials used in the treatment of diseases shall be assessed and analysed.
3.	Symposium and collective actions of the team that involve the establishment of regulatory agencies exclusively for traditional medicine.	<b>Record Keeping:</b> There shall be minutes of meetings where we shall have detailed information that will guide our actions.	The formation of regulatory agencies that recognise traditional medicine as a profession through laboratory experiment, and by implication, mainstreaming traditional medical practitioners into health in Nigeria.
4.	Building of hospitals exclusively for traditional medicine and creation of National Bio-diversity centres in the six geo-political zone in Nigeria.	Budgeting, adequate supervision and photographs.	Committee of the federal, state and local governments will monitor the progressive reports of these projects.
5.	Report Writing	There shall be mid-term and final reports, progressive information as to how we are advancing in our research.	Committee of the federal, state and local governments will scrutinise the report for implementation towards the achievement of health and security in 2050.

economy. Nigerian society stands to gain more by working towards the integration of traditional medicine into its health care delivery system. In countries where this has been accomplished like China, India, etc., they have continued to contribute to the Gross Domestic Product (GDP) and serve as a major foreign exchange earner. Thus, for a country which a substantial proportion of her population (about 80% percent) relying on traditional medicine for their health care needs, the government should provide the enabling environment for the practice to thrive.

As the practice is being restructured, appropriate legislation should be put in place by the National Assembly to regulate the industry. This law will expectedly take care of issues such as training, documentation, quality control, coordination, standardisation and ethical issue. These steps will go a long way in reinforcing the desire of traditional medical practitioners to modernise their practice and put them on the pedestal with their western counterparts so that by 2050, traditional and complementary medicine will be harnessed to guarantee health for all due to its affordability, accessibility and acceptability. Because indigenous knowledge and western knowledge when put together, we have optimum advantage.

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## **Total health for all in Nigeria 2050 and beyond: Strategies for reforming health professionals' education**

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### **Abstract**

The health indices of a country are influenced by the number and quality of trained healthcare professionals available and their ability to respond to the challenges of societal change. Nigeria, with numerous challenges, which include population explosion, insecurity, changing epidemiology of diseases, and climate change, is in need of reforms in Health Professionals' Education (HPE). These reforms in HPE should be geared towards producing healthcare workers who are fit-for-purpose and fit-of-purpose. Such health professionals are needed to address historic and current inadequacies in the health system as well as future challenges. This review highlights the basis of the problems, consequences and reforms needed in HPE in Nigeria to address the changing needs of the society, changing health conditions, and globalization to contribute to the goal of achieving 'Total Health for All' as a strategy towards health security by the year 2050 and beyond.

**Keywords:** *Health professionals' training, health professionals' education, health security, educational reform, inter professional training*

### **Abstrait**

Les indices de santé d'un pays sont influencés par le nombre et la qualité des professionnels de la santé formés disponibles et par leur aptitude à faire face aux défis du changement sociétale. Le Nigéria, confronté à de nombreux défis, dont l'explosion démographique, l'insécurité, l'évolution de l'épidémiologie des maladies et le changement climatique, a besoin de réformes dans le domaine de l'Education des Professionnels de la Santé (EPS). Ces réformes d'EPS devraient viser à former des agents de santé adaptés à leurs besoins et aux besoins. Ces tels professionnels de santé sont nécessaires pour remédier aux insuffisances historiques et actuelles du système de santé, ainsi qu'aux défis à venir. Cette revue met en évidence la base des problèmes,

conséquences et réformes nécessaires dans l'EPS au Nigeria pour répondre aux besoins changeants de la société, des conditions sanitaires changeantes et de la mondialisation afin de contribuer à l'objectif de 'Santé Totale Pour Tous' en tant que stratégie pour la sécurité sanitaire d'ici 2050 et au-delà.

**Mots-Clés :** *Education des professionnels de la santé, formation des professionnels de la santé, réforme éducationnelle, formation interprofessionnels*

### **Introduction**

The quality of healthcare in a country is a reflection of the quality of human resources that are available for health and their ability to respond to the challenges that attend the inevitable changes in their society. The current health indices of Nigeria and the challenges in the health and education sectors suggest that reforms are needed in Health Professionals' Education (HPE) if we hope to attain the goal of a healthy population. There is, therefore, an urgent requirement to review the training of health professionals in our country in light of the changing needs of the society, the changing health conditions, and the effects of globalization if we are to move towards achieving 'Total Health for All' as a strategy for health security by the year 2050 and beyond.

Major changes are occurring in our society, which have been identified as likely to pose unique challenges to the health security of our nation (and to all systems of governance) by 2050. These changes include: a population explosion (with consequences on Nigeria and neighbouring countries as a result of gross inadequacy of resources to cater for the population and an increased risk of man-made disasters and accidents); a changing epidemiology of diseases (with a negative impact on the control of communicable and non-communicable diseases); and an increase in social health problems (that would be worsened by environmental degradation and failure to meet basic needs of the population). Other challenges include mental and behavioural health problems (due to unemployment, poverty, poor access to health and inadequate security of lives and properties); and an inability to meet educational objectives and create a more literate population. Therefore, to achieve 'Total Health for All', and thus

health security for Nigeria by 2030, there is a need for HPE reform in order to produce fit-for-purpose and fit-of-purpose human resources for health (HRH) who can provide the type of healthcare needed at that time. Importantly, these reforms and innovations must address inadequacies in the health system that are the fallouts of historic, current and (projected) future challenges.

#### *Historical, current and future challenges*

The scramble for Africa and its resources i.e. products and people in the 19<sup>th</sup> century was carried out by European powers to consolidate on the economic prospects to their countries [1]. This led to the amalgamation of individual nation states into countries that were often composed of un-related people. Sometimes neighbouring nation states were balkanised and re-combined into different countries based on the economic considerations of the colonial masters at those times [1]. Inevitably, this resulted in stunted growth and development of the hitherto flourishing nation states. A major consequence of the scramble was that the demand for independence (from colonial masters) was born out of nationalistic desires rather than the needs of individual nation states and their people [2]. Following the attainment of independence, the countries then lacked national identities as they were more or less conglomerates of cities and towns.

There was a failure of identification of true societal needs, hence desires for governance was for precipitous rather than organic, well-conceptualized development [2]. The hitherto colonized, but now presumably free, countries kept colonial structures in place and therefore their educational and health systems were patterned after those of foreign interests [3]. Furthermore, years of military rule intertwined with unstable civilian administrations, resulted in inconsistent government policies. The countries' regulatory mechanisms guiding operations in the health, education and other sectors were also weak and ineffective.

The current challenges faced by HPE in Nigeria include persistence of the stunting of growth and development in nationhood. The country has persisted with educational structures conceptualized after the British system and hence, lack home-grown curricula. Thus, there is a huge mismatch between societal needs and the direction of training, as well as between the learning culture and teaching and training methods for health professionals [4]. Political and socio-economic instability persist, and industrial actions are rife (especially in the health and education sectors). Furthermore, the regulatory

structures in place for most aspects of HPE and healthcare delivery are still weak or dysfunctional [5]. Importantly, the country remains heavily reliant on imports to meet her needs for equipment, drugs and other consumables due to the poor efforts at industrialization and the weak infrastructural development process.

In the meantime, the country is changing rapidly, with a high fertility rate and a large aging population raising concerns about population explosion by the middle of the 21<sup>st</sup> century. More worrisome is the fact that the country is becoming increasingly dichotomized with the extremes of poverty and wealth rising simultaneously. In addition, Nigeria and other countries in the Lake Chad region are facing the effects of climate change, with expanding desertification and loss of 90% of the size of Lake Chad [6]. This is driving southward migration of grazing herdsmen in search of pasture for livestock and has contributed to the security crises in the North West, North East and Middle-belt regions, fuelling terrorism and clashes between herdsmen and farmers with internal displacement and migration as a prelude to other humanitarian disasters. The insecurity of lives and properties is worsening psychological problems among the populace with increase in drug abuse, depression and suicide rates. The consequent economic challenges have led to worsening of internal and external brain drain with constant migrations across the Atlantic and Mediterranean regions, often with great dangers and casualties. Indeed, mass migration from Nigeria and other developing countries towards high income countries is known to be fuelled by insecurity, poor development of infrastructures, weak health and educational systems, political and economic instability, uncertainty about the future and expanding population without adequate planning for societal transformation among others [7].

Unfortunately, future challenges for HPE will include continuation of the unsolved historic and current challenges. New added challenges will be global political and economic instability, and nationalization, which will worsen the dis-harmony between citizens and immigrants. This will be worsened by the reduction in the nation's revenue from oil exports as the demand for fossil fuel reduces with the development of alternatives such as shale oil and renewable energy resources. This will further reduce the government's ability to fund its systems and societal infrastructure with the health, education and welfare systems being hardest hit. In addition the deleterious effects of climate change will continue to manifest as shortages of potable water,

worsening overcrowding and the conflicts will lead to even greater drug abuse, crime rate, suicides, dislocations and humanitarian disasters. Furthermore, there will be greater demand for the country's highly trained healthcare professionals as industrialized countries continue to lag behind fulfilling their required quota of healthcare professionals [8]. All these and other factors will have a negative impact on the country's health security.

### **Consequences of the challenges**

The consequences of the above challenges are both internal and external to the health system. The internal challenges centre around inadequate resources to cater for the health needs of the increasing population. These include poor funding, limited infrastructural support, limited availability of drugs and equipment and poor regulatory mechanisms. Drugs and equipment are largely unavailable because of the lack of facilities for local production, the prohibitive cost of energy, and the high cost of importation. Furthermore, as stated above, there is an increasing demand for highly trained healthcare workers worldwide. This is in spite of the inadequate number and quality of teachers for HPE in our country, and the lack of incentives for healthcare workers to stay in rural areas resulting in the limitations in healthcare coverage of the population in those communities [5, 7, 9]. Poor job descriptions for healthcare professionals also lead to workplace conflicts, rivalry and industrial disharmony in the health sector. The current practice of formulating policies that directly and indirectly affect HPE, such as the National Policy on Health, without the input of the HRH training institutions such as Colleges/Faculties of Medicines also contributes to the disconnect between the various components of the health system.

The external consequences of these challenges include a changing epidemiology of diseases in the country. There are emerging and re-emerging epidemics, and the lack of control of already existing communicable and non-communicable diseases will continue to take a great toll on health resources and manpower. The poor environmental conditions, overcrowding and consequences of man-made and natural disasters, will overwhelm available human and material resources for healthcare. The number and variety of patients are also changing. There will be higher rates of suicides, mental and behavioural health problems. As a result, there will be increased demand for health services, increased cost of accessing healthcare with majority of stakeholders having a limited capacity to pay for these services. These challenges will worsen the increasing internal and external migration of trained HRH, and the vacuum created will be filled

by the widespread patronage of available (but mostly unregulated) alternative health providers resulting in an increased rate of complications, which are even more expensive to treat. The mass migration of the trained young and able population will also result in a dearth of competent workers in other sectors of the economy and further weaken the infrastructure of the economy and the society at large needed to support the education and health systems.

### **Reforms needed in health professionals' education**

Migration and poor physician to population ratios have led to the increased call for adoption of task-shifting as a way to combat physician shortages in Africa. However, task shifting does not replace a need for improvement in the quality of healthcare professionals' workforce. HPE reforms are required to ensure the production of fit-for-purpose and fit-of-purpose HPE graduates who are likely to stay and practice in-country rather than migrate (internally or externally) [9]. In this regard, HPE in the 21<sup>st</sup> century must produce a workforce comprised of interdependent professionals focussed on the provision of effective and efficient healthcare [4, 8, 9]. In addition, there is a need to reduce health-sector conflicts through better clarification of job descriptions of the individual healthcare workers [9] and emphasis on the quality of care of the patient.

The scaling up of medical education is a crucial part of the efforts to strengthen the health systems of countries [5, 10]. Consequently, there is a need to expand the training institutions available for HPE in Nigeria because the recommended ratio of healthcare workers to the population is far from being achieved. The strategies needed to achieve these goals include increasing the enrolment into medical schools, adopting retention strategies for trained healthcare professionals, innovations in the curricula, approval of private medical schools, quality continuing professional development and interprofessional education [5]. In Nigeria, new private medical schools have been licensed to train and a few of the schools had developed innovative curricula [11]. It is also necessary to strengthen regulatory bodies and ensure HPE is being delivered to an international standard [12, 13].

### **Reforming methods of instruction in health professionals' education**

In developing a revised model of HPE for Nigeria for the first half of the 21<sup>st</sup> century, there must be a change in the current philosophy of instruction with the new model focussing on improving the quality of health systems. To achieve this goal, the various curricula for HPE should be locally sensitive and relevant whilst being of global standards [14, 15]. It

is also important that HPE teaches students when and how to work together and identifies the roles of each health professional and where expertise abounds and how to deploy them. In addition, there should be emphasis on multimodal integration of concepts – within each professional group, between different health professions and between healthcare workers and other partners in the society. Towards these objectives, reforms in HPE in recent years have led to evolution from traditional methods of instruction to alternatives such as problem-based learning, community-based education and multidisciplinary team-based learning [4, 5].

Problem based learning emphasizes problem-based scenarios in which cases are used to drive home specific objectives in line with the curriculum requirements [16, 17]. This learning model is associated with greater analytical skills, better scientific thinking, problem solving and conflict resolution skills than what obtains in traditional education methods [17, 18].

On the other hand, community-based education, which was first introduced in Ibadan in the 1960s [7], involves activities in which the health professional student makes use of the community as the learning environment. Community based learning is relevant and will be successful if incorporated into other primary modes of pedagogy in view of the largely rural population in Nigeria [15]. This method of instruction encourages professionals to work in underserved communities including rural areas [7, 19]. Incorporating community-based education into the curricula of HPE will encourage the retention of HRH in underserved (rural) communities in order to improve the access to health by rural dwellers and open up the communities to improvements in preventive and curative aspects of healthcare.

Team based learning has been found to be more conducive to learning, involve greater student engagement and motivation and encourage better preparation prior to the session than problem based learning or other pedagogic strategies [20 – 22]. The role of HPE should go beyond transmission of scientific information to education on leadership, advocacy, continuing professional development and research. Inter-professional training improves teamwork among healthcare professionals and ultimately the quality of the healthcare in a community. There is also a need for interdisciplinary educational innovation to improve inter-professional training [9]. Inter-professional collaborative practice, which is facilitated by team-based learning is a recipe for the mitigation of industrial disharmony in the health sector. It will also help in actualization of the core competencies of each health professional within

the realm of working in a team. There should be enhancement of the ability of healthcare workers to form inter and trans-professional teams. Inter-professional education and inter-professional collaborative practice will help build strong teams [4, 8].

As such, a socially-responsive HPE curriculum should incorporate essential duties that the members of its host community expect healthcare workers to perform [4]. These should be based on skill-sets that are specific for different categories of healthcare professionals and should be as defined by stakeholders [8]. The incorporation of these essential duties to the curriculum of HPE, using appropriate teaching and evaluation methods will produce a responsive healthcare team that is able to work in collaboration, engineer and effect population-impacting health policies and lead to a workforce that values the health of Nigerians. The listing of essential duties of each professional will help in setting job descriptions and standards of care to measure performances of the professionals.

#### *Other aspects of health professionals' education reform*

The health workforce must understand the value of leaders as agents of change; there is a need to incorporate transformative learning concepts into HPE [8]. Uptake of appropriate leadership responsibilities will influence the dissemination of health information and thus educational enlightenment of the populace, thereby improving adoption of positive health habits and lifestyle modifications. The healthcare professional must imbibe the concept of person-centred and population-based approaches to healthcare services through the adoption of appropriate pedagogic tools. The overall health related quality of life of a patient (physical, mental, emotional, and social functioning) should always be in focus. Health professionals need to be taught the value inherent in espousing art and medicine as intertwined social concepts. HPE of the future needs to incorporate elements of literature, story-telling, folklore, music, drama, creative writing, poetry and other tools that enhance the ability to bring health education as close to the community members as is possible. These methods also help in improving the communication skills of healthcare professionals and help in dissemination of health information through print, electronic and social media platforms.

The required reforms also include the development of reading materials and literature directed at younger individuals such as for primary and secondary school students [23]. This will introduce the populace to the key concepts of

healthcare and measures to improve personal and community health early. The adoption of healthy-living practices by the pupils and students are likely to impact on the choices they make about their healthcare in the future. There should be provision of adequate resources for students of HPE. These should not be limited to textbooks alone but include electronic materials available and transmissible via electronic means, which will become increasingly important as the internet coverage improves. Information technology will be required to achieve the HPE reforms. The incorporation of e-learning tools such as massive open online courses (MOOCs), library resources and telemedicine into HPE with improved information technology services are essential in the 21<sup>st</sup> century. These tools are particularly important in an environment, such as in Nigeria as we move towards 2030 and beyond, with low teacher-student ratio.

#### **A role for partnerships and networks**

To survive in the knowledge economy environment of the future, HPE institutions must become more socially responsive and accountable. To this end, these institutions must reinvent themselves and develop new organizational platforms and networks that emphasize a continuing learning process that is better able to respond to the changing needs of the community [24, 25]. These institutions must take advantage of the knowledge economy and establish strong networks particularly as regards their strategic relationships with their communities, the private sector and government agencies. This will enable the identification and construction of local priorities, ease the collection and transmission of research evidence, strengthen its translation into practice for development, and promote accountability for development outputs. This also improves the quality of graduates who are fit-for-purpose thus improving employment and retention indices.

Accordingly, the reforms described above will only succeed if there are partnerships between stakeholders, which may involve the elimination of previous barriers in communication and implementation of policies between governmental agencies, educational networks and communities. In particular, communities of practice and networks must be developed amongst medical schools and the various regulatory ministries and government agencies. Over time, these platforms of HPE and healthcare will expand and become fully integrated into their host communities and become self-sustaining, socially-responsive and socially-accountable [15]. Furthermore, adequate

collaboration between agencies in the education and health sectors will ensure that policies that will influence HPE are well implemented. Funding is a critical issue as resources allocated to health education are quite abysmal. The adoption of Public-Private Partnership (PPP) initiatives in communities will help in bridging the gap in funding between what the government at all levels is able to provide and meeting the needs of the populace.

#### **Conclusion**

Health professional education in Nigeria in 2030 and beyond is likely to face unique challenges that are consequent upon major changes in our society by that time, which include population explosion, insecurity, changing epidemiology of diseases, climate change and social challenges. HPE reform is needed to ensure health security in 2050 and should be geared towards producing fit-for-purpose and fit-of-purpose health professionals. There is a need to adopt curricula that are locally sensitive and relevant whilst being of global standards, which will lead to a workforce that is well motivated and work towards goals established for the benefit of the patient and the community. With strong strategic partnerships between stakeholders, institutionalisation of inter-professional education, strong continuing professional development and adequate human and financial resources, the quality of and the access to health care will improve in the country.

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## Sustaining health security in Oyo State towards 2050

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### Abstract

**Introduction:** Oyo State with 33 Local Government Areas and 351 wards operates a three-tier healthcare delivery system. There are challenges associated with changes in population, climate and environment, social security among others as we move towards 2050. There is a need to highlight the structure of healthcare in the State, review current challenges and propose mechanisms to ensure health security for Oyo State before 2050.

**Methods:** A review of the structure, activities and interventions involved in healthcare delivery in Oyo State was undertaken with a comprehensive analysis of current challenges and future steps to be taken to ensure health security in Oyo State.

**Results:** Oyo State has over 2,000 healthcare facilities distributed across the three tiers of healthcare for a population of over 8 million citizens. There have been recent structural and functional developments to strengthen facilities and policies and improve healthcare delivery in the State. Notable steps were advanced to ensure health security in the State by the year 2050.

**Conclusion:** The goal in Oyo State is the dictum - Health is Wealth, as a healthy workforce is a productive work force. The vision and mission for healthcare delivery are beyond the year 2050. Hence, a multi-sectoral approach to healthcare delivery including but not limited to capacity building, reduction in maternal/infant mortality, a productive and encouraged medical workforce and a private sector involvement will be pivotal towards health security by 2050.

**Keywords:** Health security; Oyo State; universal coverage

### Abstrait

**Introduction :** L'État d'Oyo, qui regroupe 33 communes et 351 quartiers, gère un système de prestation de soins de santé à trois niveaux. Il y a des défis liés à l'évolution de la population, du climat et de l'environnement, de la sécurité sociale, entre

autres, à l'horizon 2050. Il est nécessaire de mettre en évidence la structure des soins de santé dans l'État, de passer en revue les défis actuels et de proposer des mécanismes pour assurer la sécurité sanitaire de l'État d'Oyo avant 2050.

**Méthodes :** Un examen de la structure, des activités et des interventions en matière de prestation de soins de santé dans l'État d'Oyo a été entrepris avec une analyse complète des défis actuels et des mesures à prendre pour assurer la sécurité sanitaire dans l'État d'Oyo.

**Résultats :** L'État d'Oyo compte plus de 2 000 établissements de soins de santé répartis sur les trois niveaux de soins de santé pour une population de plus de 8 millions de citoyens. Des évolutions structurelles et fonctionnelles ont récemment eu lieu pour renforcer les infrastructures et les politiques et améliorer les prestations de soins de santé dans l'État. Des mesures notables ont été avancées pour assurer la sécurité sanitaire de l'État d'ici 2050.

**Conclusion :** L'objectif dans l'État d'Oyo est la diction : la santé, c'est la richesse, car une main-d'œuvre en bonne santé est une main-d'œuvre productive. La vision et la mission de la prestation des soins de santé vont au-delà de l'année 2050. Ainsi, une approche multisectorielle de la prestation des soins de santé, comprenant notamment le renforcement des capacités, la réduction de la mortalité maternelle et infantile, une main-d'œuvre médicale productive et encouragée et une implication du secteur privé servira de pivot pour la sécurité sanitaire d'ici 2050.

**Mots clés :** La sécurité sanitaire ; État d'Oyo ; soin santé primaire ; soin de santé secondaire ; soin de santé tertiaire

### Introduction

Oyo State was created in 1976 from the old Western State. The State is bisected into four equal parts by latitude 8°N and longitude 40E and occupies a land area of 28,454 square kilometers. The State is projected to have a population of 8,236,335 in 2019 [1]. The State is bounded in the north by Kwara State, in the south by Ogun State, in the east by Osun State and in the west by the Republic of Benin. The international boundary with the Republic of Benin provides a unique opportunity for cross-border trading.

The State has 33 Local Government Areas (LGAs) made up of 351 wards. Most of the inhabitants of the State are farmers, petty-traders and artisans with a smaller proportion being civil servants. Like other States of the Federation, it has three senatorial districts, namely: Oyo North, which consists of 13 LGAs, Oyo Central consisting of 11 LGAs and Oyo South with of 9 LGAs. The State has 32 members in the State House of Assembly, 14 members in the Federal House of Representatives and three senators at the National Assembly.

### **The structure of healthcare in Oyo State**

The State operates a three-tier health care delivery system comprising primary, secondary and tertiary health care through facilities that are spread across the urban and rural areas of the State. As of 2018, there are a total of 2,086 health facilities in the state including 1,413 private clinics and hospitals, 622 government owned Primary Health Center (PHCs) 56 secondary health facilities and five tertiary health centers in the state. The tertiary health centers are the University College Hospital, Ibadan; Adeoyo Maternity Teaching Hospital, Ibadan; Ladoke Akintola University of Technology Teaching Hospital, Ogbomosho; Jericho Specialist Hospital and Bowen University Teaching Hospital, Ogbomosho.

### **The structure of the Ministry of Health**

The Ministry of Health oversees all health-related issues and matters in the State. The administration and management of the Ministry is guided by some working policy thrusts, objectives and strategies. It is on these guiding principles that the Ministry is structured into departments and specialized units. The units include: The State Hospitals' Management Board, which is charged with the daily administration of secondary health care facilities in the State; the Ladoke Akintola University of Technology Teaching Hospital – the only state-owned teaching hospital; and Oyo State Health Insurance Agency, which was established

to provide a safety net for individual spending on health thus reducing out-of-pocket expenditure in our communities, especially among vulnerable groups. The other units are: the Oyo State Primary Health Care Board, which was established for effective and efficient coordination of manpower, funding and infrastructure for qualitative service delivery at the grass root level; Oyo State College of Nursing & Midwifery – the State's training institution for the nursing profession; and Oyo State College of Health Sciences and Technology – the

training institution for middle level health care professionals.

The activities of the Ministry are anchored on the vision and mission statements in line with its objectives. The vision of the Ministry is to improve the health status and socio-economic advancement of individuals and families in the State using preventive, promotive, curative and rehabilitative approaches. Her mission is to provide people-oriented broad based purposeful and sustainable health care delivery system with a fundamental structure in functions and performance of health systems; involving all stakeholders to deliver efficient, affordable, accessible, effective and equitable care services to the people.

The objectives of the Ministry of Health includes: to ensure that people obtain the health services they need without suffering financial hardship when paying for them; to provide robust and performing Primary Health Care system that is adequately staffed and funded; to reduce infant and perinatal mortality and morbidity through community and facility based health care interventions; to ensure maintenance and upgrade of secondary care centers and teaching hospitals; to roll in Public-Private-Partnership for essential services and development of capital projects in the hospitals; and to strengthen emergency preparedness and rapid response health intervention activities.

### **Current situation and interventions**

There has been establishments of units and programs to improve the healthcare delivery in the State. The Oyo State Health Insurance Agency was established by an act of law in March 2017 to bring healthcare closer to the people and improve the feasibility of universal health coverage [2]. In view of the realization of the huge role that funding has on improving the health of the populace, the Oyo State Healthcare Endowment Fund was established in 2017 with a mission to raise funds and infrastructural support for capital projects and initiatives. The State Cancer Control Plan was rolled out in April 2018 to reduce the scourge of cancer while emphasizing prevention and early detection through screening of the most prevalent cancers in the State. This policy has been replicated and implemented in all the 33 LGAs and the 38 LCDAs.

In terms of infrastructural development, Primary Health Care (PHC) centers were established between 2011 and 2016 in 27 wards that hitherto lacked such facilities. Prototype maternal and pediatric centers were constructed at Jericho

Specialist Hospital, Jericho Nursing Home, State Hospital Saki and Olodo-Monatan in Ibadan to bring healthcare for two very important groups in the population closer to the people. The Oyo State emergency ambulance services was inaugurated in March 2013.

The State is also in collaboration with development partners and this has culminated in a 43% reduction in the case-incidence of malaria (hospital-based data) and a reduction of HIV prevalence from 3% in 2010 to 0.9% in 2018. The Saving One-Million Lives (SOML) project, which involves specific health interventions for individuals and targeted at reducing maternal- and pediatric-morbidity and mortality was implemented across the State. Similar partnerships are utilized in the Global Fund support for HIV/AIDS, tuberculosis and malaria.

In collaboration with partners in the Federal Government of Nigeria and the World Bank, the Accelerating Nutrition Result in Nigeria (ANRiN) project has been commenced with the aim of improving nutrition in childhood as well as reduction in childhood morbidity and mortality.

More recently, the State has commenced the policy initiative of using the provision of the Basic Health Care Fund from the Consolidated Fund of the Federation to fund activities and social health insurance scheme. Another avenue for funding has led to the expansion of Public Private Partnership (PPP) initiatives in pharmaceutical services from 19 hospitals to cover 36 secondary health facilities in the State as well as other service areas.

The Oyo State Primary Healthcare Board was established by an act of law to coordinate the activities and expansion of PHC services across the entire state such that every ward will have a PHC facility [3].

In recognition of the role of education and training of healthcare professionals, the schools of nursing and midwifery have been upgraded to the Oyo State College of Nursing and Midwifery [4] while the school of hygiene was upgraded to the Oyo State College of Health Sciences and Technology [5]. A School of Basic Midwifery was established at Kisi as a campus of the Oyo State College of Nursing and Midwifery. Similarly, the Okeho campus of the Oyo State College of Health Sciences and Technology was established to improve the availability and retention of middle-level health manpower.

Private health facilities are important in the State as they largely operate as secondary health facilities. There have been instances of people

operating illegal health centers hence a law to amend the Hospitals (Private) Registration Law, 1946 was passed by the State House of Assembly and assented to on 1 July 2017. The Task Force on monitoring and supervision of private health facilities in the State was also invigorated to improve their activities.

The Ladoko Akintola University of Technology Teaching Hospital commenced operations in May 2011. The facility now has accreditation for the training of medical students, house officers and resident doctors from the Medical and Dental Council of Nigeria, the National Post-Graduate Medical College on Nigeria and West African College of Surgeons/West African College of Physicians.

The State has adopted a multi-sectoral approach to healthcare delivery, which includes enhancing capacity building, reduction in maternal/infant mortality, a productive and encouraged medical workforce and a private sector involvement as evidenced by better status report of health in Oyo State [6]. The State in the recent report had the following indices: under-five mortality rate of 73/1000 (National = 120/1000); maternal mortality rate of 148/100,000 (National = 576/100,000); contraceptive prevalence of 45% (National = 13.4%); and skilled birth attendance of 79.8% (National = 43%) [6].

#### **Future steps in health security for the State**

- There is need to ensure provision of adequate health manpower to service facilities in both urban and rural areas and properly equipped facilities to ensure minimum standard of health care delivery. This will be made possible through expansion of training facilities and retention strategies for healthcare professionals while ensuring that funding for the health sector continues to improve.
- There is a need to integrate Information, Communication and Technology (ICT) into the health care system for effective health care service.
- The establishment of Oyo State Private Hospitals Registration, Regulation and Monitoring Agency will help in harnessing the huge resources available in the private sector for healthcare delivery in the State. There is a need to ensure health training institutions maintain current and full accreditation.
- Universal health coverage will be a major requirement for health security in Oyo State by 2050 and this will be achieved by expanding health insurance coverage and empowering the

Oyo State Primary Health Care Board for effective service coordination.

- In terms of provision of acute care services, there should be rejuvenation and expansion of Oyo State Ambulance Service to all the three Senatorial zones of the State.
- With an aging population, the State will need to establish a fully functional Cardiovascular Centre, planned for the Ring Road State Hospital in Ibadan. Similarly, in reinforcing preventive health and surveillance, early detection and prevention of epidemics, there should be zonal public health laboratories all over the State.

### Conclusion

The goal in Oyo State is the dictum - Health is Wealth, as a healthy workforce is a productive work force. The vision and mission for healthcare delivery are beyond the year 2050. Hence, a multi-sectoral approach to healthcare delivery including but not limited to capacity building, reduction in maternal/infant mortality, a productive and encouraged medical workforce and a private sector involvement will be pivotal towards health security by 2050.

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