

## 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

**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

enhance 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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