Emerging, re-emerging disease, population movement and health security in Nigeria

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Abstract

Background: Most emerging diseases originated from poor countries, with little capacity for; disease detection, surveillance and control. To propose a roadmap for health security in Nigeria, this paper provides an overview of the situation analysis on emerging, re-emerging diseases and population movement in Nigeria. A glimpse of the future trajectory vis-à-vis urbanization, and internal population displacement was also captured in the paper and based on existing National Health Policy and development goals, short, medium and long term plans were suggested.

Methods: Situation analysis of emerging and reemerging diseases was conducted based on extensive literature search. Past and recent population movement particularly forced migration were assessed. SWOT analysis on emerging and reemerging diseases in Nigeria was done and projected at short (2019–2024), medium (2025-2030) and long term (2030-2050) goals. The sources of funding, activities/interventions/plans and responsible body aimed at curbing the emerging and re-emerging diseases were identified. The monitoring and evaluation strategies were also suggested.

Results: Risk factors contributing to the emergence and rapid spread of epidemic diseases in Nigeria include climate change, weak surveillance, limited laboratory diagnostic capacity, and increased humananimal interaction. Another critical factor is increased population movement driven by factors rapid urbanization; acute and protracted humanitarian emergencies which often give rise to internal displacement. Increasing trend in outbreaks of infectious diseases and development of new pathogens as a result of displacement and poor environmental conditions is imminent in Nigeria. These factors have debilitating effects on fragile health systems thereby putting health security of Nigerians at great risks. Nigeria's population growth rate of 2.8% is high and the projection indicated that the population will double itself by the year 2050.

Correspondence: Dr. A.S. Adebowale, Department of Epidemiology and Medical Statistics, College of Medicine, University of Ibadan, Ibadan, Nigeria. Email: adehamilt2008@yahoo.com *Conclusion:* There are challenges about emerging and re-emerging diseases in Nigeria especially with highly mobile population. The implications for health security is very critical and should be in the front burners. Realization of the vision of universal health coverage and its sustainability within the context of population doubling time by the year 2050 requires robust planning and meticulous implementation. Ethnic conflicts, insurgency and herdsmen constitute serious challenge to the existing poor security structure and system and this will continue to cause forced migration and pose threat to the future health security of Nigerians if unchecked.

Keywords: Health security, disease, population movement, Nigeria

Résumé

Contexte : La plupart des maladies émergentes provenaient des pays pauvres, avec peu de capacités pour ; détection, surveillance et contrôle des maladies. Pour proposer une feuille de route pour la sécurité sanitaire au Nigéria, cet article donne un aperçu de l'analyse de la situation sur les maladies émergentes, ré-émergentes et les mouvements de population au Nigéria. Un aperçu de la trajectoire future vis-à-vis de l'urbanisation et des déplacements de population internes a également été saisi dans le document et sur la base des politiques nationales de santé existantes et des objectifs de développement, des plans à court, moyen et long terme ont été suggérés.

Méthodes: Une analyse de la situation des maladies émergentes et ré-émergentes a été réalisée sur la base d'une recherche documentaire approfondie. Les mouvements de population passés et récents, en particulier les migrations forcées, ont été évalués. Une analyse SWOT sur les maladies émergentes et ré-émergentes au Nigeria a été réalisée et projetée à court (2019-2024), moyen (2025-2030) et à long terme (2030-2050). Les sources de financement, les activités / interventions / plans et l'organisme responsable pour lutter contre les maladies émergentes et ré-émergentes ont été identifiés. Les stratégies de suivi et d'évaluation ont également été suggérées.

Résultats : Les facteurs risques qui contribuent à l'émergence et la propagation rapide des maladies épidémiques au Nigeria comprennent le changement

climatique, la surveillance faible, la capacité de diagnostic en laboratoire limité, et l'augmentation de l'interaction humaine-animale. Un autre facteur critique est l'augmentation des mouvements de population due à des facteurs d'urbanisation rapide; urgences humanitaires aiguës et prolongées qui provoquent souvent des déplacements internes. La tendance à la hausse des flambées de maladies infectieuses et au développement de nouveaux agents pathogènes en raison des déplacements et des mauvaises conditions environnementales est imminente au Nigéria. Ces facteurs ont des effets débilitants sur les systèmes de santé fragiles, mettant ainsi en danger la sécurité sanitaire des Nigérians. Le taux de croissance démographique du Nigeria de 2,8% est élevé et la projection a indiqué que la population va doubler d'ici 2050.

Conclusion: Les maladies émergentes et réémergentes posent des défis au Nigéria, en particulier avec une population très mobile. Les implications pour la sécurité sanitaire sont très critiques et devraient être au premier plan. La réalisation de la vision de la couverture sanitaire universelle et de sa durabilité dans le contexte d'un doublement de la population d'ici 2050 nécessite une planification solide et une mise en œuvre minutieuse. Les conflits ethniques, l'insurrection et les bergers constituent un sérieux défi pour la mauvaise structure et le système de sécurité existants, ce qui continuera de provoquer une migration forcée et de menacer la sécurité sanitaire future des Nigérians s'ils ne son: pas contrôlés.

Mots - clés : Sécurité sanitaire, Maladie, Mouvement de population, Nigéria

Introduction

Emerging diseases are newly identified and previously unknown infectious agents that cause public health problems either locally or internationally while reemerging disease are infectious agents that reappear, usually in more pathogenic form and in rapidly increasing incidence or new geographic locations after apparent control or eradication [1]. Recent studies/ reviews have shown that there are over 1415 pathogens causing human diseases, out of which 177 are regarded as emerging or re-emerging with about 73% of zoonotic origin [2]. Most of these newly emerging and re-emerging diseases are caused by viruses particularly RNA viruses, such as HIV, influenza viruses, hepatitis viruses, Ebola virus, Marburg virus, SARS, and MERS [3, 4]. The majority of the emerging pathogens were either discovered in Africa (Ebola, Marburg, CCHF. Lassa fever, RVF. CHINF. Zika, malaria, AIDS) or endemic in the tropical world (Nipah, dengue fever, yellow fever, and melioidosis). e.g AIDS, tuberculosis, yellow fever and melioidosis.

Many risk factors contribute to the emergence and rapid spread of epidemic diseases in the region including, climate change, weak surveillance and limited laboratory diagnostic capacity, and increased human-animal interaction [5]. Another critical factor is the increased population movement driven by factors such as rapid urbanization; acute and protracted humanitarian emergencies which often give rise to internal displacement. These have debilitating effects on the weak health systems thereby putting health security at great risks. Migrant populations have played roles in disease dynamics in host populations [6]. They change the incidence of infections, and increase the potential for local transmission. Forced migration in particular leads to the emerging and re-emerging of infectious diseases in the host community. Migrants may also increase the geographic spread of infectious diseases that might be encountered by health professionals that are not familiar with them and may increase the potential for transmission of new infections[6]. Such infections present diagnostic problems and over time also change the face of disease in the population. Displacement of large populations into temporary settlements or camps can lead to overcrowding and rudimentary shelters, inadequate safe water and sanitation, and increased exposure to disease vectors [7, 8].

The poor health security in Nigeria remains a great challenge. In the public health facility, essential equipment and drugs are lacking, the medical personnel who are few in number compared to the number of people who need health care are not adequately motivated. The persistent internal displacement of Nigerians particularly from the part of the country threatened by insurgency, territorial conflicts and violence pose more problems to the health conditions of Nigerians. Increasing trend in outbreaks of infectious diseases and development of new pathogens as a result of displacement and poor environmental conditions is imminent in Nigeria. If these conditions persist in a population that is already experiencing high growth rate, there is the possibility of collapse of the health security in the nearest future. Therefore, this paper provides critical perspective of the interface between emerging, re-emerging disease, population movement and health security in Nigeria. This is with a view to guide planners and policy makers on the need to map out strategies to ensure health security in Nigeria.

Situation analysis

Emerging and reemerging diseases

In Nigeria, several infectious disease outbreaks were detected, investigated, and rapidly contained over the past 5 years including: Ebola, lassa fever, yellow fever, cholera, avian influenza A (H5N1) and dengue fever. The outbreak of monkey pox recently in the country buttresses the potential for re-emergence of diseases in the country. Lassa fever and its continued transmission currently poses one of the greatest threats to health in Nigeria as it stands to be endemic with its associated mortality, morbidity and cost implications if the outbreak is not addressed decisively. Several large infectious disease outbreaks have been reported in Nigeria, including the yellow fever outbreak in 1986 and 1987 that affected 9800 and 1249 people, respectively. The large meningitis outbreak in 1996 with 109 580 cases and 11 717 deaths, cholera outbreaks in the year 2001 and 2004 and more recently, the meningitis outbreak in 2017. In between these was the much acclaimed successful response to the outbreak of Ebola Virus Disease (EVD) in September 2014 [9]. [See appendix Tables 1 and 2]

Response to emerging and reemerging diseases in Nigeria

An overview of the response to emerging and reemerging diseases in Nigeria for the past three decades is summarized as follows:

- 1988 Disease surveillance and notification introduced in Nigeria in 1988 following a major outbreak of yellow fever in 1986/87 which claimed many lives in the country and also affected ten out of the then 19 states of the country. [10]
- 2000 Nigeria, commenced efforts towards implementation of the IDSR strategy in June 2000.
- 2001 In January 2001, a steering committee on IDSR was inaugurated to steer the IDSR implementation process.
- 2008 Nigeria Field Epidemiology and Laboratory training programme for training of field epidemiologist for the country. This is in collaboration with CDC/ University of Ibadan, Ibadan /Ahmadu Bellow University, Zaria and FMoH and FMA&NR.
- 2012 NCDC was established for control of epidemic: the NCDC has institutionalized Nigeria's capacity to respond to the increasing threats of outbreaks of infectious diseases and other public health emergencies. Modelled after

the US Centre for Disease Control and Prevention (CDC), Atlanta, the first formal step to establish NCDC took place in 2011 when units of Federal Ministry of Health—the Epidemiology Division, the Avian Influenza Project and its laboratories—and the Nigeria Field Epidemiology and Laboratory Training Program (NFELTP) were moved to form the nucleus of NCDC.

2018 The National Council on Health approved the establishment of Infection Prevention Committees (IPCs), Emergency Operation Centre (EOC) and Isolation centers in all states of the federation and FCT, Monday 5th February, 2018 in Abuja. The Emergency Operation Centers (EOC) was assigned the responsibility to carry out emergency preparedness and emergency management, or disaster management functions at a strategic level during an emergency. The Council further approved conduct of research on disease outbreaks especially in relation to modes of transmission e.g. Monkey Pox, Lassa fever amongst others. [http://www.health.gov.ng]

Population movement

The most critical population movements in Nigeria in recent times are due to internal displacement as a result of conflicts and violence. The number of internally displaced persons due to the Boko Haram insurgency in North-Eastern Nigeria estimated for October 2017 was 1,713,771 [11]. Due to poor environmental hygiene in many of the IDP camps, malaria, cholera, and outbreaks of new and reemerging pathogens is common. Even though, immigrants constitute less than 1.0% of the Nigeria population [12], the importation of the Ebola Virus Disease into the country in 2014 is an example of the potential risk of population movement for health security in the country. Nigeria is also a major destination country especially in the West African sub-region with countries such as Benin, Ghana and Mali having a larger share. Internal population movement is a significant contributor to spatial redistribution in Nigeria. One clear consequence of this is noticeable in the linear growth in Nigeria urbanization which rose from 29.7% in 1990 to 47.8% in 2015 [13].

Urbanization has its own advantages and disadvantages. Due to better social infrastructure, health, quality of life and general wellbeing are better in urban than rural areas. In contrast, there is increased pressure on social amenities with consequences such as poor sanitation and other environment related problems. The large mobility of people from the rural to urban particularly men who are within the working population is one of the main reasons for striking reduction in agricultural output and food insecurity in Nigeria. An implication for malnutrition and its associated health problems among the poor which constitute a larger part of the country. Recent evidence showed that there is increasing health inequity between urban rich and urban poor many of whom live in slums [14]. Without concerted plans for the consequences of urbanization, there is a serious threat to population health security. Presently, reliable data on internal population movement is a weak link for population and health security.

Forecasts to 2050

The crude net migration rate for Nigeria is projected to be -0.14 per 1000 people by 2050. This implies that the number emigrating exceeds those immigrating into the country. Several factors have been suggested as driving emigration from Nigeria. The main concern in this regard is that emigrants are often highly educated and skilled citizens who move in search of better employment opportunities. This directly affects human resources for health. By the year 2050, it is projected that Nigeria's population will double and 69.9% of the population will live in urban areas (see Figure 1 below). Additionally, air travel increases annually, with more than 100,000 flights per day as of 2014. These factors favor the emergence, evolution, and spread of new pathogens [15]. Population explosion should be a major concern in Nigeria. With explosion, there will be increased struggle for resources. Such struggles are the genesis of most herdsmen/farmers clashes in different parts of Nigeria. These clashes have also resulted in internal displacements with diverse implications for water/sanitation, food security, and health services among others.

The future outlook for emerging and reemerging diseases in Nigeria is presently unknown. However, given the huge population, any outbreak of a new infection would affect large number of people. It can be hypothesized that the magnitude of EREIDs is directly related to health security. In other words, the greater the burden of EREIDs, the more the threats to public health security in Nigeria. The inability to effectively curtail the insurgencies in Nigeria is a major threat to health security in the country especially the affected states.

Sources of Funding

The suggested sources of funding for the implementation of action plan against emerging and re-emerging diseases include, public private partnership, government and non-governmental agencies, development partners e.g. CDC, PMI, USAID, UKAid, DFID, e.t.c and special funds devoted by concerned country in relation to a particular disease. Others are emergency/ad-hoc funds from affected and supporting states or agencies,



Fig. 1: Annual Percentage of Population at Mid-Year Residing in Urban Areas, Nigeria Data source: World Urbanization Prospects: The 2018 Revision

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STRENGTH	WEAKNESSES
 Government commitment to development of a public health structure good enough to address epidemics, emerging and re-emerging diseases Universal health coverage system and upcoming Insurance Schemes Buy-in of the UN system, NGOs, partners and countries to address emerging and re-emerging diseases The recognition and propagation of, the One Health approach supported by WHO, FAO, OIE and USAID ensures a close relationship through coordination mechanism across human and animal sectors at all levels (central to local) that requires sharing of information as well as triggering a joint response Availability of preventive measures to many of the diseases from improved technology and funding for R&D In Nigeria, NFELTP has developed a pool of Field Epidemiologists and Laboratory experts with skills to gather critical information and turn it into public health action, and it is a major public health institute. [Nguku et al] The cooperation and collaboration between countries following epidemic of Ebola Development of capacity for health care system, surveillance and epidemiology across the countries especially in developing countries where most of the emergence and reemergence of disease occurs 	 Not enough space to accommodate professionals willing to train Poor; level of emergency preparedness, early & accurate surveillance and Rapid response Lack of political will to implement agreements/ signed treaty and allocate enough fund to health security Genetic mutation of agents from inappropriate use of drugs and chemicals, climate change, immunosuppression etc - one knows what new diseases will emerge. Continuing insurgencies, terrorism and restiveness THREATS Over dependency on donor agencies The receiving countries may have to work in the donors' area of interest Change of reasoning from traditional health perspectives to views from other disciplines Access to science and technology for developing countries is a key barrier to address but one that requires resources and investment. Abuse, dissemination of unauthenticated information and involvement of many actors
OPPORTUNITIES	countries to globally
 Funding from development agencies Available new technology/tools and approaches Social media for real-time information High access to Mobile phone Newer, more extensive, real-time data sources and analytic methodologies that will 	

evolution.

Table 1: SWOT analysis on emerging and re-emerging diseases in Nigeria

Table 2: short, medium and long term goals

Period Activities/interventions/plans **Responsible body** Short term Harmonize the existing policies such Federal Ministry of Health (FMoH), [2019 - 2024]as : National Health Policy and National Population Commission and National policy on population and other relevant agencies in collaboration sustainable development to adequately with development partners cater for health security in Nigeria To identify all cases of emerging or FMoH in collaboration with Nigeria re-emerging infections (EREID) Centre for Disease Control and through routine preparatory visit with AFENET detection, confirmation and declaration of changes identified during alert and non-alert conditions Federal and State Ministries of Health Taking cue from the 2016 National Health Policy, the National Strategic and other related MDAs Health Development Plan for 2021-2025 should include clearly designed strategies to deal with EREID and health challenges occasioned by population movement Intensify effort at curbing insurgences, Federal and State Government provide adequate health infrastructure at IDPs and emphasis disease prevention WHO and CDC have drafted action Revising International Health Regulations and travel health plans that stress the need to strengthen regulations especially in times of global surveillance of these diseases disease outbreaks/epidemics and to allow the international community to anticipate, recognize, control, and prevent them To implement Coordination and Federal and State Ministry of Health mobilization of resources to support and International Agencies intervention activities Revisit the concept of preparedness Cooperation among states and and consider new approaches internationalization of responses to a problem caused by globalization. Building Health Human Resource Universities and nongovernmental Capacity: Health care professionals organizations, and sovereign states. skilled, competent and motivated in detection, prevention and management of EREID cases, with provision of supervised psychosocial support and risk communication at the national and sub-national levels.

Resource Management and Mobilization: Effectively manage and mobilize available resources from the MoH and partners both local and international needed in EREID detection, preparedness, and response.

Encourage national governments to improve their public health care systems, devote resources to eliminating or controlling causes of emerging diseases and coordinate their public health activities with WHO and the international community

Strengthen international / national research efforts on emerging and reemerging diseases, particularly with regards to antibiotic resistant strains of diseases. This is a continuum across the three terms

Medium term [2025 – 2030] Ensure Sustainable Development Goal (SDG) 3 is achieved in Nigeria

Work towards the achievement of health-related targets in 9 other SDGs [1, 2, 4, 5, 6, 10, 11, 16, and 17]

To ensure re-evaluation, restructuring, reporting and continuing education of all stakeholders involved in containment of diseases

Develop new types of information systems to better anticipate risks but these have to rely on new approaches and engaging new partners.

Establishment of Logistics Management System: Manage the systems of procurement and distribution of logistics for EREID detection, preparedness and response under each mode of disease transmission.

Managing Information to Enhance Disease Surveillance: Improve case detection and surveillance of EREID to prevent and or minimize its entry and spread and to mitigate the possible impact of widespread community and national transmission. Federal and State Ministry of Health and International Agencies

UN and sovereign states

Federal and State Governments and development partners

Federal and State Government

Public health divisions of the health ministry and health related agencies

Improving Risk Communication and Advocacy: Institute a risk communication and advocacy system that is factual, timely and context relevant implemented at the national and sub-national levels

Review of curricula of various institutions – Undergraduate, postgraduate and fellowships

Long term [2030 – 2050] A review of the plans and goals is needed during this time to revise the achievement of the short and medium plan and address deficiencies to achieve the long term goals including the Africa 2063 Agenda

Long term goal should be to achieve national health security by year 2050 by timely reporting and adequate preparedness of all outbreaks due to emerging and re-emerging infectious diseases

To meet the targets and goals set to reducing to barest minimum the occurrence of emerging and reemerging diseases. The ultimate goal of infectious disease control, however, is to achieve total eradication

community cooperatives and insurances – community involvement and loans e.g. World Bank

Monitoring and Evaluation

The national policy on population and sustainable development [16] and that on health [17] recently revised have direct bearing on health security in Nigeria. For proper harmony and effective coordination, the monitoring and evaluation frameworks of these policies should be expanded so that they can serve health security. In addition, the public health division of the Federal Ministry of Health and other relevant stakeholders should put in place monitoring and evaluation strategies to:

 a) Strengthen national and local programmes of active surveillance for infectious diseases, ensuring that efforts are directed to early detection of outbreaks and prompt identification of new, emerging and reemerging infectious diseases; Ministries of Health; National University Commission and other related agencies

FGON and partners

FMOH and partners

FMOH and partners

- b) Improve routine diagnostic capabilities for common microbial pathogens so that outbreaks due to infectious diseases may be more easily identified and accurately diagnosed;
- c) Enhance, and to participate actively in, communications between national and international services involved in disease detection, early notification, surveillance, control and response;

 d) Encourage routine testing of antimicrobial sensitivity, and to foster practices for rational prescription, availability and administration of antimicrobial agents in order to limit the development of resistance in microbial pathogens;

 e) Increase the number of staff skilled in both epidemiological and laboratory investigations of infectious diseases and promotion in such specialization;

Conclusion

The projected doubling of the population by year 2050 also implies that the number of children, women, elderly and other vulnerable part of the population will be on the increase. Therefore, meeting the health needs of this increasing population will demand greater investment in the health system. The vision of the current national health policy for Nigeria is universal coverage for all which is the direct path to health security. There are surmountable challenges especially with highly mobile population and displacement as it obtains in Nigeria. To realize this vision of universal health coverage and sustain it within a context of population doubling by year 2050 requires robust planning and meticulous implementation. The crises in Nigeria as a result of ethnic conflicts, insurgency and herdsmen constitute serious challenge to the existing poor security structure and system and this continue to pose threat to the life of Nigerians. As a result of this, the number of internally displaced individuals is on the increase on daily basis. The neighboring communities where the crises occur are beset with the task of hosting displaced individuals and in some situations; IDP camps are built to support them. The Nigerian refugee crisis put huge strains on Nigeria Government and some international organizations in the crises prone areas. With high population growth rate, Nigeria Government is likely to face serious challenge in providing support for expected high number of forced migrants by year 2050 if the current trend continues. Effective strategies are needed to control population explosion and reduce its attendant challenges.

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Appendixes

Table 1: Emerging pathogens of global significance

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Pathogen	Disease	WHO 2015 ranking/priorities	Place of discovery (Year)	Spread	Case	Case fatality	Threat	Current treatment	Reference
Ebola virus	Ebola virus disease (EVD)	Most dangerous	DRC, Sudan(1976)	Africa, Europe, USA	28500	40-90%	Global	No cure but vaccines and drugs under	Ohimain [42,43]
Marburg (Filoviridae)	Marburg haemorrhagic fever	Most dangerous	Germany, Uganda (1967)	11 countries	444 (total case 1976 -2914); 13	24-88%	Global	trial No cure	Brauberger [44]
Nairovirus (bunyaviridae)	Crimean Congo haemorrhagic	Most dangerous	Crimea, Congo	30 countries	outoreaks	10-40%	Global	Ribavirin	WHO [45]
Lassa Fever (Arenaviridae)	Lassa fever (haemorrhagic faver)	Most dangerous	(1950s) (1950s)	Africa	100000/yr '	1%	Africa	Ribavirin	
RVFV phlebovirus (Runyaviridae)	Rift valley fever (livestock and human)	Most dangerous	Kenya (1931)	30 countries	11 major outbreaks (1992-	50%	Africa	Vet vaccine only	Weiss and Martins [46,47,48]
SARS-CoV (coronaviridae)	Severe acute respirator syndrome	Most dangerous	China (2002)	30 countries	8400	10%	Global	No cure, no vaccine	Shigeta and Yamase (49]
MERS-CoV (Coronaviridae)	Middle East Respiratory Syndrome (MERS)	Most dangerous	Saudi Arabia (2012)	30 countries	1368	36%	Global	No cure, no vaccine	Jozefiak et al. [50,51,52]; WHO [53]
Nipah virus	Encephalitis and	Most dangerous	Malaysia,	Bangladesh,		39%	Asia	No cure,	

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Presti et al, [54] Li [24]	
No cure No cure Medical counter measures available Medical counter measures exist Medical	counce measures exist Medical counter
global Asia global Global Global	Tropical world
0.1% 6-30% 1.2% Up to 100% 100% 23-50%	1-7.3%
Over I million cases ?? ?? ?? ?? ?? ?? ?? ?? ?? ?? ?? ?? ??	countries
Global China 47 countries H1N1 reported in 70 countries Global	95 countries
Tanzania (1953) China (2010) Uganda (1947) USA (1918) (1918) (1980s)	(1002) Algeria (1880)
Serious serious Serious Less Serious Less serious Less serious	Less serious
High fever, joint pain and rash Severe fever with thrombo -cytopenia syndrome Zika fever Zika fever Avian influenza AIDS Tuberculosis	Malaria
ngunya virus viridae) viridae) virus virus virus iridae) Infuenza s sub-types ad H7N o myxoviridae ntivirus iridae)	acteriaceae) dium spp.

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Table 2: Summary of some Emerging	and reemerging diseases in Nigeria		
Disease Type	Outbreak in the last 5years	Where in Nigeria	Casualties
<i>Emerging diseases</i> Ebola Dengue fever	61	Lagos, Port-Harcourt	ø
AIDS Monkey pox	61	Akwa Ibom, Abia, Bayelsa, Benue, Cross River, Delta, Edo, Ekiti, Enugu, Lagos, Imo, Nasarawa, Rivers and Federal Capital Territory (FCT)	-
<i>Re-emerging diseases</i> Cholera Lassa	1558 suspected cases 413	Kwara Abia, Adamawa, Anambra, Bauchi, Benue, Delta, Ebonyi, Edo, Ekiti, Federal Capital Territory, Gombe, Imo, Kaduna, Kogi, Lagos, Nasarawa, Ondo, Osun,	11 114
Meningitis	14,518 cases	Plateau, Rivers, and Taraba Sokoto, Niger, Zamfara, Katsina, kebbi	1166 deaths

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