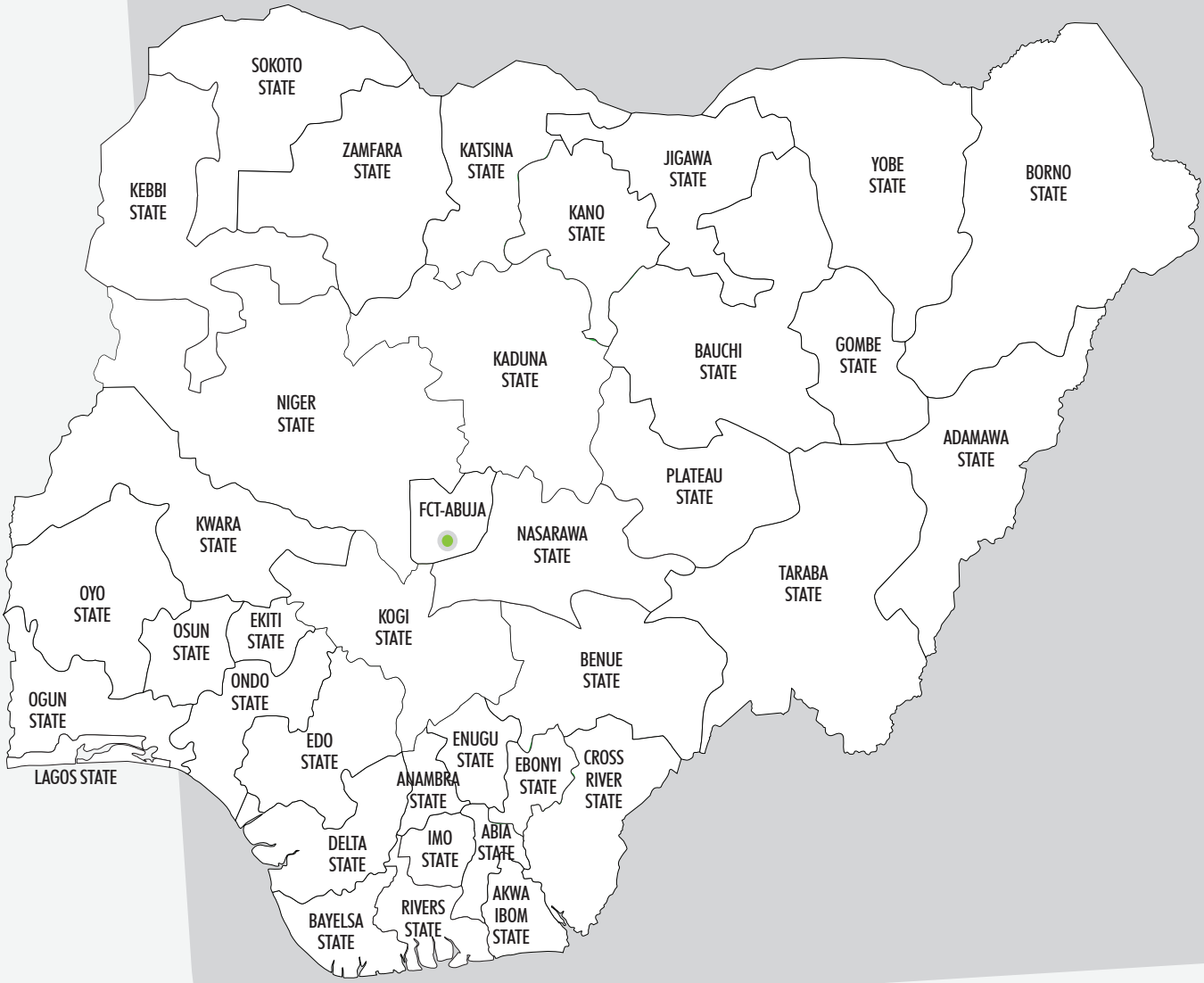
NIGERIA CENTRE FOR DISEASE CONTROL

NATIONAL PUBLIC HEALTH Multi-Hazard Emergency Preparedness and Response Plan



National Public Health Multi-Hazard Emergency Preparedness and Response Plan

December 2020

Cover Design and Layout by Boboye Onduku/Blo'comms, 2020

NATIONAL PUBLIC HEALTH

Multi-Hazard Emergency Preparedness and Response Plan

Contents

LIST OF FIGURES

LIST OF TABLES

About NCDC

The Nigeria Centre for Disease Control (NCDC) is Nigeria's national public health institute with the mandate to protect Nigerians from the impact of communicable diseases of public health significance, amongst other responsibilities. It does this through evidence-based prevention, integrated disease surveillance and response activities, using a One Health approach, guided by research and led by a skilled workforce.

NCDC's operations and activities are guided by five key goals to:

- Accurately measure the burden of infectious diseases in Nigeria
- Ensure Nigeria is able to meet its international obligations as a member of the World Health Assembly
- Develop a Public Health laboratory service network to support the detection and prevention of, and response to critical infectious diseases
- Reduce the adverse impact of predictable and unpredicted public health emergencies
- Create an efficiently managed and evidence-based organisation with a clear focus on health promotion and disease prevention.

NCDC currently operates through five directorates: Surveillance and Epidemiology, Public Health Laboratory Services, Health Emergency Preparedness and Response, Prevention Programmes and Knowledge Management, Finance and Accounts and Administration and Human Resources.

Foreword

In the last 11 months, the Government of Nigeria has been responding to the COVID-19 pandemic. While this pandemic has affected economies across the world, means of livelihood and living, it has also highlighted the need for improved multi-sectoral collaboration for outbreak preparedness and response. Over the last one year, the Nigeria Centre for Disease Control has been working with the Federal Ministry of Health and other Ministries, Departments and Agencies (MDAs) to develop this Public Health Multi Hazard Preparedness and Response Plan. Through an all-hazard approach to preparedness and focus on threats from natural, biological, chemical and radiological events, countries like Nigeria can be better prepared for and respond to urgent threats to the public's health.

This operational public health multi hazard preparedness and response plan has been developed to strengthen emergency preparedness capacity at National, States, LGAs and community levels. This is to ensure a timely, efficient and effective response to events including: local and national outbreaks of infectious diseases that have the potential to cross borders; epidemics and pandemics; and other types of emergencies caused by natural, technological and societal hazards that can have a significant impact on people's health and on the society at large.

This plan underpins and identifies the underlying principles and elements of effective emergency preparedness and lays out the planning process by which National, States and LGAs can determine their priorities and develop or strengthen their operational capacities.

The plan also provides platform for interagency, interdisciplinary and multi-hazard awareness in disaster intervention. In line with this principle all relevant MDAs, partners, public and private at the strategic level will have a buy in and provide inputs relevant to drive implementation of the plan if and when the need arises.

Our goal is for the National Public Health Multi-Hazard Emergency Preparedness and Response Plan (NPHMHEPRP) to provide a holistic, multisectoral and multidisciplinary approach that is needed in addressing gaps and advancing coordination for health emergency preparedness and health security. It is important to emphasise that public health challenges are complex and cannot be effectively addressed by one sector alone.

I thank the various stakeholders who have worked together in developing this plan, towards improving the health and lives of Nigerians.

DR. E. OSAGIE EHANIRE MD, FWACS
HONOURABLE MINISTER OF HEALTH
DECEMBER 2020

Acknowledgements

The Nigeria Centre for Disease Control (NCDC) is very grateful to all colleagues from various Ministries, Departments and Agencies (MDAs) that have worked together to develop this National Public Health Multi-Hazard Emergency Preparedness and Response Plan (NPHMHEPRP). This has been developed to serve as Nigeria's blueprint for multi-sectoral collaboration in outbreak preparedness and response.

We thank the leadership of fellow government agencies and the personnel who have been involved in this arduous process to develop this plan, including the National Emergency Management Agency (NEMA), Inter-Ministerial Committee on Chemical and Biological Weapons in the Office of the Secretary of the Government of the Federation, State Ministries of Health, State Epidemiologists and other individuals.

We also thank our partners including the World Health Organization, US Centers for Disease Control and Prevention (US-CDC), Public Health England, World Bank, Resolve to Save Lives, Pro-Health International, and several other partners (see annex with full list of MDAs, partners and contributors).

At the NCDC, we remain fully committed to our mandate of providing appropriate guidelines and the guidance needed, to ensure national health security. We are grateful for the opportunity to work with other government MDAs to protect the health of Nigerians.

Chikwe Ihekweazu

DR. CHIKWE IHEKWEAZU

DIRECTOR GENERAL, NIGERIA CENTRE FOR DISEASE CONTROL (NCDC)

Abbreviations

ACDC	African Centre for Diseases Control
ACMAD	African Centre of Meteorological Application for Development
AFENET	African Field Epidemiology Network
ARIS	Animal Resource Information System
BMGF	Bill and Melinda Gates Foundation
CGPF	Common Ground Preparedness Framework
CHIPS	Community Health Influencers, Promoters and Services
CONOPS	Concept of Operations
DO	Disaster Office
DSNO	Disease Surveillance and Notification Officers
EOC	Emergency Operation Centre
FAAN	Federal Airport Authority of Nigeria
FAO	Food and Agricultural Organization
FCO	Federal Coordinating Officer
FFS	Federal Fire Service
EBS	Event-based Surveillance
EST	Emergency Support Team
FMARD	Federal Ministry of Agriculture and Rural Development
FMEnv	Federal Ministry of Environment
FMHDSD	Federal Ministry of Humanitarian Affairs, Disaster Management and Social Development
FMIC	Federal Ministry of Information and Culture
FMoE	Federal Ministry of Education
FMoH	Federal Ministry of Health
FRSC	Federal Road Safety Corps
IBS	Indicator Base Surveillance
ICC	Incident Coordination Centre
IDSR	Integrated Disease Surveillance and Response
IPCR	Institute for Peace and Conflict Resolution

LGAs	Local Government Areas
MDAs	Ministries, Departments and Agencies
MoD	Ministry of Defence
mSERS	Mobile Surveillance Epidemic Response System
MSF	Médecins Sans Frontiers
NABDA	National Biotechnology Development Agency
NACA	National Agency for the Control of AIDS
NAC&BWC	National Authority on Chemical and Biological Weapons Convention
NADIS	National Animal Disease Information System
NAQS	Nigeria Agricultural Quarantine Service
NASCP	National AIDS and STDs Control Programme
NBMA	National Biosafety Management Agency
NCC	Nigeria Communications Commission
NCDC	Nigeria Centre for Disease Control
NCS	Nigeria Customs Service
NECC	National Emergency Coordination Centre
NEMA	National Emergency Management Agency
NESREA	National Environmental Standards and Regulation Enforcement Agency
NEWRM	National Early Warning & Response Mechanism
NHIS	National Health Insurance Scheme
NIMET	Nigeria Meteorological Agency
NIPRD	National Institute for Pharmaceutical Research and Development
NIS	Nigeria Immigration Service
NMEP	National Malaria Elimination Programme
NNRA	Nigeria Nuclear Regulatory Authority
NOA	National Orientation Agency
NP	Nigeria Police

NPA	Nigeria Ports Authority
NPHCDA	National Primary Health Care Development Agency
NPHMHEPRP	National Public Health Multi-Hazard Preparedness and Response Plan
NSHDPII	National Strategic Health Development Plan II
NTLCP	National Tuberculosis and Leprosy Control Programme
ONSA	Office of the National Security Adviser
PHC	Primary Health Care
PHE	Public Health England
PHI	Pro Health International
PHS	Port Health Services
RTSL	Resolve to Save Lives
SOC	State Operation Centre
SORMAS	Surveillance and Outbreak Response Management Analysis System
SSA	Service Support Area
STAR	Strategic Tool for Assessing Risks
TBI	Tony Blair Institute
UHC	Universal Health Coverage
VRAM	Vulnerability Risks Assessment and Resource Mapping

CHAPTER 1

Introduction

1.1 Background

The International Health Regulations (IHR, 2005) to which Nigeria is a signatory provides the legal framework for the prevention, detection and response to public health emergencies. Currently, there is no document exists that serves as a guideline for all stakeholders in public health emergency preparedness and response. The Act establishing the Nigeria Centre for Disease Control (NCDC Act, 2018) provides the agency with the mandate to lead the preparedness and response to disease outbreaks, public health emergencies and disasters. In 2018, a Vulnerability Risk Assessment and Resource Mapping (VRAM) was conducted in 18 states of the country. Following the VRAM, specific hazards and risks were identified and prioritised. This document provides a multisectoral framework for engagements to strengthen the country's preparedness and response capacities for outbreaks, public health emergencies and disasters.

1.2 Aim and Objectives of the National Public Health Multi-Hazard Emergency Preparedness and Response Plan (NPHMHEPRP)

1.2.1 Aim

To establish an effective, efficient and coordinated public health multi-hazard emergency preparedness and response system

1.2.2 Objectives

1. To provide effective and efficient coordination of multi sectoral preparedness and response to public health emergencies at federal, state and local government levels
2. To provide clear guidance on timely detection, notification, rapid risk assessment and grading of all health events across all levels
3. To provide clear guidance on procedures for decision making, command and control structures, concept of operations and Incident Management System for effective public health response to health emergencies at all levels
4. To establish procedures for post-emergency transition and recovery from the impact of public health events
5. To provide guidance for continuous assessment of the evolution of risks, monitoring and evaluating response capacities for public health emergencies
6. To provide coordinating mechanisms for multi-sectoral, multi hazard capacity building including simulation exercises for public health emergencies
7. To establish a framework for implementation, science research and learning during response to public health emergencies

1.3. Scope

This document provides a public health multi-sectoral emergency management model for Nigeria.

The NPHMHEPRP also focuses on the concept of PHEOCs at the national, state, and local government area/community/neighbourhood level.

1.4. Audience

The targeted audience for this document includes public health emergency preparedness and response stakeholders

– Government Federal Ministry of Health (FMoH), Nigeria Centre for Disease

Control (NCDC), Port Health Services (PHS), National Emergency Management Agency (NEMA), National Primary Health Care Development Agency (NPHCDA), National Orientation Agency (NOA), Office of the National Security Adviser (ONSA), Federal Ministry of Environment (FMEnv), Nigeria Agricultural Quarantine Service (NAQS), Federal Ministry of Information and Culture (FMIC), Federal Ministry of Agriculture and Rural Development (FMARD), Federal Ministry of Humanitarian Affairs, Disaster Management and Social Development (FMHDSD), Nigeria Meteorological Agency (NIMET), Nigeria Nuclear Regulatory Authority (NNRA), National Health Insurance Scheme (NHIS), Nigeria Ports Authority (NPA), Federal Airport Authority of Nigeria (FAAN), National Biosafety Management Agency (NBMA), National Agency for the Control of AIDS (NACA), National Authority on Chemical and Biological Weapons Convention (NAC&BWC), National Environmental Standards and Regulation Enforcement Agency (NESREA), Federal Ministry of Education (FMoE), Nigeria Immigration Service (NIS), Nigeria Customs Service (NCS), Nigeria Police Force (NPF), Ministry of Defence (MoD), National Biotechnology Development Agency (NABDA), Federal Road Safety Commission (FRSC), Federal Fire Service (FFS), Nigeria Communications Commission (NCC), National Early Warning Response Management (NEWRM), Nigeria Security and Civil Defence Corps (NSCDC), National Institute for Pharmaceutical Research and Development (NIPRD) etc.

– Development Partners/Non-Governmental Organisations/ Civil Society Organisations World Health Organization (WHO), West African Health Organisation (WAHO), Africa Centre for Disease Control (Africa-CDC), US-Centre for Disease Control and Prevention (US-CDC), UNICEF, World Bank (WB), Food and Agricultural Organization (FAO), Médecins Sans Frontieres (MSF), African Field Epidemiology Network (AFENET), Public Health England (PHE), Resolve to Save Lives (RTSL), Pro Health International (PHI), Bill and Melinda Gates Foundation (BMGF), Tony Blair Institute (TBI), Dangote Foundation, TY Danjuma Foundation, George Town University etc.
– Organised Private Sector

1.5. International and National Policy/Legal Framework

This document is guided by provisions of the International Health Regulation (IHR, 2005), Sendai Framework 2030, Regional Strategy for Health Security and Emergency, Integrated Disease Surveillance and Response (IDSR) Strategy, NEMA Act of 1999, National Disaster Response Plan, National Health Act 2014, NCDC Act of 2018, National Biosafety Management Act of 2015, National Chemical and Biological Emergencies Preparedness and Response Plan, National Nuclear and Radiological Emergency, National Animal Health Emergency, Preparedness and Response Plan, National Pandemic Influenza and Response Plan, National Health Sector COVID-19 Pandemic Response Action Plan in addition to relevant state laws.

CHAPTER 2

Context

2.1 Country information

2.1.1 Geography

Nigeria is located on the west coast of Africa and shares boundaries to the west with Benin Republic, to the north with Niger, Chad Republic and Cameroon to the east, and to the south by the Gulf of Guinea of the Atlantic Ocean[1]. It lies between latitude 9.082°N and longitude 8.6753°E Administratively, the country operates a three-tiered system of governance comprising Federal, the 36 States and the FCT, and 774 Local Government Areas or Councils (LGAs). The LGAs are further divided into 9,565 political wards[2], which are the focus of PHC revitalisation to achieve Universal Health Coverage (UHC). For political and administrative purposes, the country is divided into 6 geopolitical zones (North East, North West, North Central, South East, South West and South South). Generally, the geopolitical zones comprise states which share similar culture, ethnic groups or common history.

Nigeria is the most populous country in Africa with an estimated population of over 200 million and is ranked the seventh most populous country in the world. The population is projected to grow to 210 million by 2022 and 396 million by 2050, making Nigeria

the world's third largest population - behind India and China. The country has a young population structure wherein children aged under 15 years constitute 45% and young people (10-24 years) make up 33% of the population. Women in the reproductive age group, children under five and the elderly (at least 65 years) make up 22%, 20% and less than 5% of the population respectively. Consequently, Nigeria has a high dependency ratio of 73.3%, which is worsened by the very high rates of youth unemployment and high total fertility rate of 5.8 in 2017. [3,4]

2.1.2 Climate

Nigeria's climate is entirely tropical and it has two distinct seasons: dry and rainy seasons. The dry season is characterised by a dusty air mass from the Sahara desert, known as Harmattan or the Tropical Continental air mass, while the rainy season is heavily influenced by an air mass originating from the South Atlantic Ocean, known as the south-west wind or the Tropical Maritime air mass[1]. Nigeria's climate varies across the geopolitical zones into equatorial in the south, tropical in the central region, and arid in the north. It is also further sub classified into Tropical savannah in the Southwest, hot semi-arid in the Northwest and Northeast, Tropical Monsoon in the South-south, hot desert in the Northwest, Tropical rainforest in the Southeast and subtropical highland oceanic climates in the North-central region[2].

2.1.3. Historical emergencies

Nigeria has experienced a number of public health emergencies over the last few decades, both of natural and man-made origin, the major one being the COVID-19 pandemic in 2020. Flooding has been a recurrent hazard in the country. Since 1985 to 2014, flooding is reported to have resulted in about 1,100 deaths and loss in valuable items worth over $17billion[3]. In 2012 there was a major flooding of the Rivers Niger and Benue causing deaths and destruction of property[4,5]. Other disasters that have occurred include: various landslides in Enugu, Anambra (South East) and Cross River States (South South), Nigeria between 2005 and 2009.

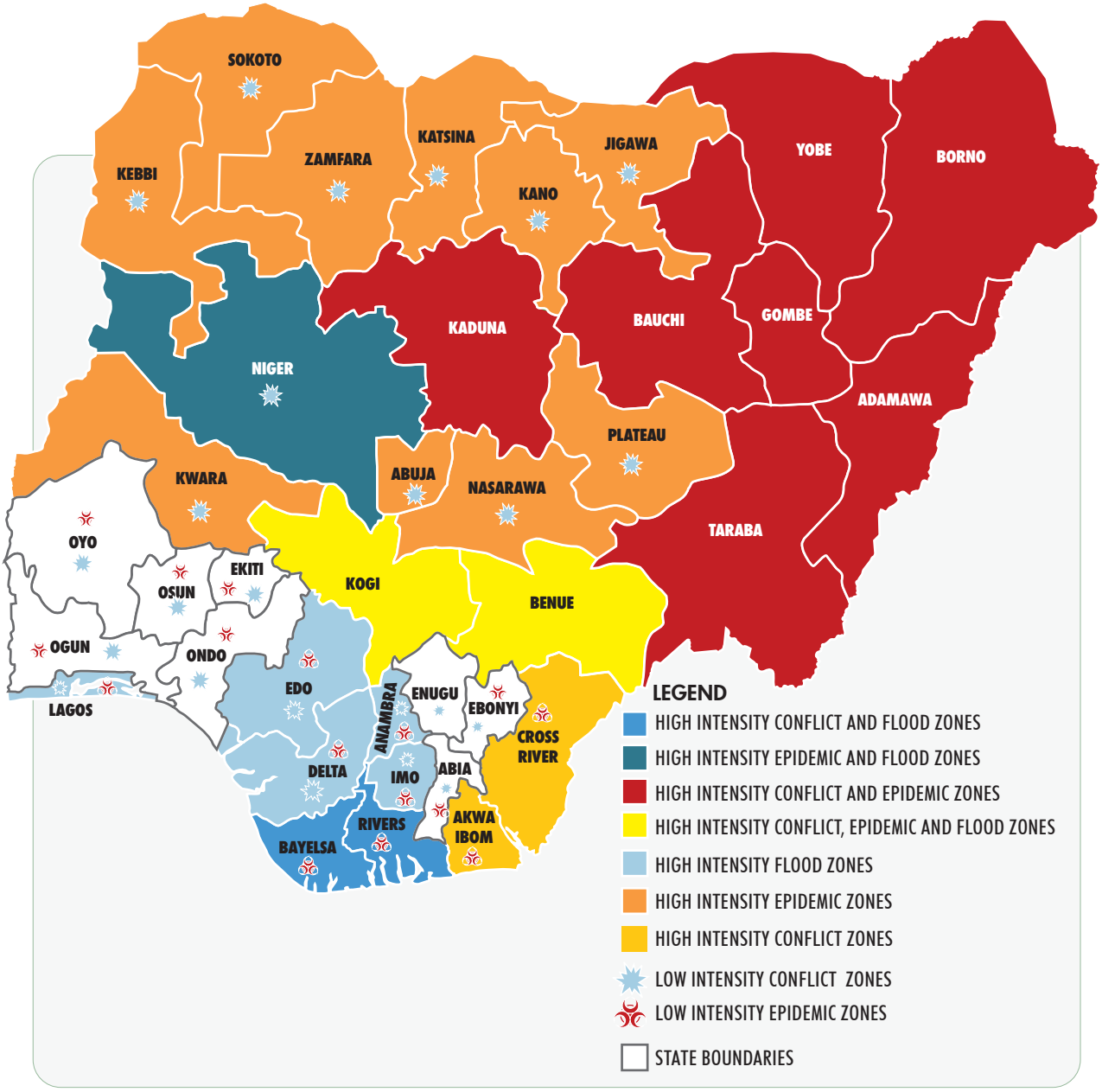


Figure 1: Flood, Drought, Conflict and Epidemic-prone Zones as at 25th July, 2020 [6,4,5]

Other major public health outbreaks since 2014 was the imported case of Ebola Virus Disease in Nigeria. The response to this outbreak was unprecedented and was contained in a short time[7].

Furthermore, Nigeria continues to experience numerous public health related events including armed conflict, insurgencies, ethnic political and religious violent conflicts in several parts of the country. For example, the humanitarian health and nutrition emergency in North-East because of insurgency.

There have also been technological disasters such as: the 2002 Ikeja Military Cantonment Artillery Depot explosion (Lagos State); oil spillage and lead poisoning in Zamfara State 2010; the 2005 Bellview air-crash in Lisa village (Ogun State); the 2005 Sosoliso air crash in Port Harcourt (Rivers State); the ADC air crash in Abuja. Other technological disasters include several pipeline explosions in the Niger Delta, and series of road traffic crashes among others. The above narration of major public health events emphasises the need for preparedness and response. Figure 2 shows recent disasters in Nigeria.

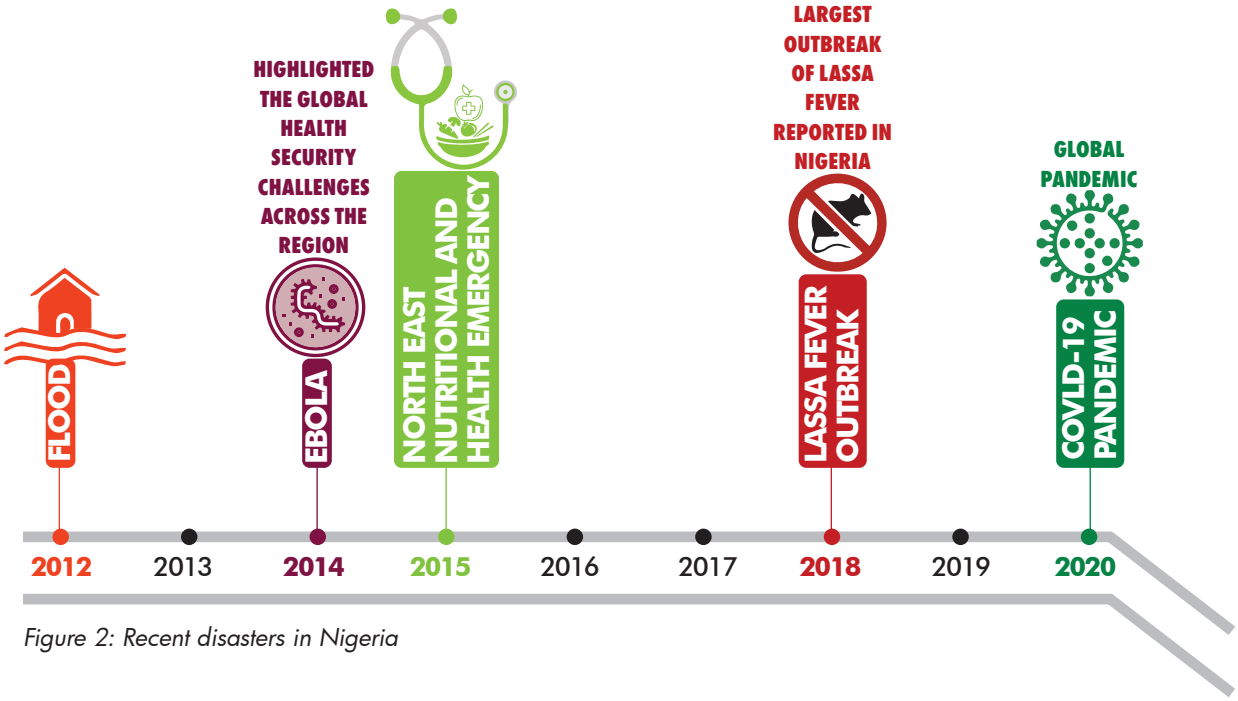


Figure 2: Recent disasters in Nigeria

2.2 Health System Organisation

2.2.1 Structural organisation of the health system

Nigeria runs a pluralistic health care system with public and private sectors, modern and traditional systems providing health care. Public sector healthcare is concurrently the responsibility of the three tiers of government. As shown in Figure 3, LGAs have responsibility for PHC services, State Governments provide secondary level care while the Federal Government provides tertiary level care. In addition to tertiary health care provision,

the FMoH leads the development and implementation of specific public health programmes, e.g. National AIDS and STDs Control Programme (NASCP), National Malaria Elimination Programme (NMEP), National Tuberculosis and Leprosy Control Programme (NTLCP). The Federal and State Health Ministries, Departments and Agencies (MDAs) manage the implementation of these programmes at all levels (NSHDPII, 2018)[8] .

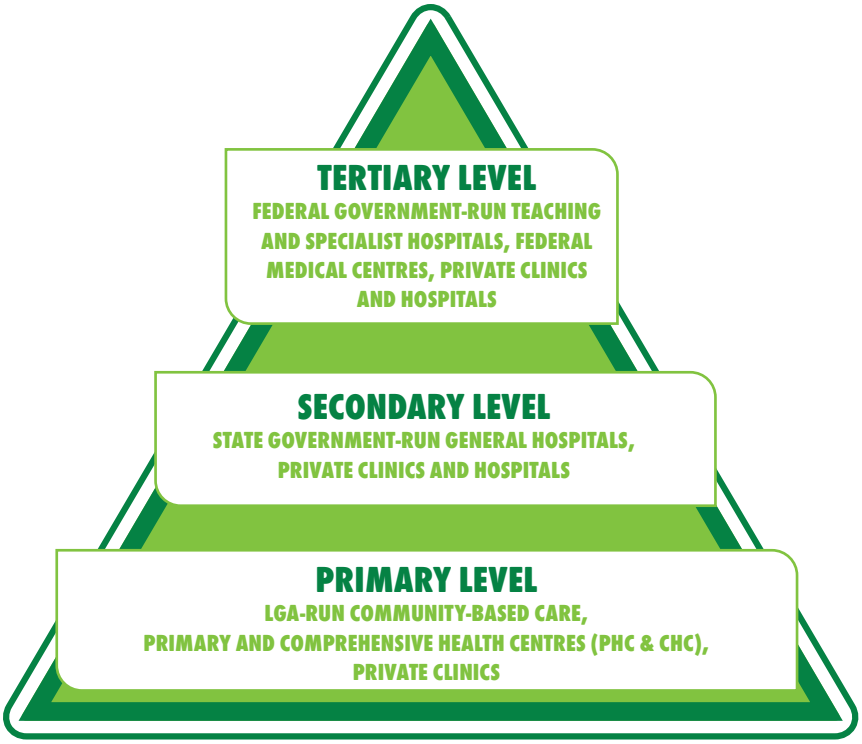


Figure 3: Nigeria's Health care structure

In 2015, FMoH estimated a total of 34,176 health facilities in Nigeria of which 88.1% are primary health care facilities, 11.7% secondary and 0.2% tertiary. Of these, 33% are owned by the private sector, which provides 60% of health care in the country. While 60% of the public primary health care facilities are located in the northern zones of the country, they are mainly health posts and dispensaries that provide only basic curative services[9]. Access to health care in Nigeria remains sub-optimal across the nation with significant rural-urban differences. Nigeria has started moving from the first to the second stage of epidemiological transition since some non-communicable diseases like cancers, hypertension, and diabetes are

increasing in incidence in the country. Since health is on the concurrent list, each of the three tiers of government has its roles and responsibilities regarding health issues.

Integrated Disease Surveillance and Response (IDSR) is a strategy within the WHO-AFRO region which promotes rational use of resources by integrating and streamlining common surveillance activities. The core functions of surveillance and response in the IDSR are to detect (identify cases and events), notify (report cases/events/conditions to next level), process (analyse and interpret findings), establish (investigate and confirm cases/events/conditions) prepare for response, respond (institute control measures), inform (communicate and provide feedback), and finally assess (evaluate and improve the surveillance and response system). Health facilities e.g. dispensaries, health centres, clinics hospitals (both private and public) constitute the first level of surveillance reporting[9]. However, the frontline health facility staff report to Disease Surveillance and Notification Officers (DSNOs) at the LGA level. The DSNOs in turn submit data to the state level, (the state epidemiologists and state DSNOs) who collate the aggregate data for the state and send data to the Surveillance Department of Nigeria Centre for Disease control (NCDC)[12]. The IDSR is therefore implemented at these levels: health facilities, LGA, State, and National[9].

The laboratory is an integral component of surveillance, especially for the purpose of case confirmation through identification of causative organisms or pathogens, management and public response/interventions. The Nigeria Centre for Disease Control (NCDC) manages the National Reference Laboratory in Gaduwa, Abuja, and supports a network of public health laboratories across the country.

The National Health Act (2014) ascribes responsibilities for primary health care to the 774 local governments, secondary care to the States and tertiary care to the federal government. At the local government level, the LGA Chairman provides oversight function and resources for health programmes, while the Medical Officer of Health/PHC Coordinator or any other designated officer administers health services. These officers are mandated to manage primary health care facilities. The secondary

health care facilities are under the purview of State Ministries of Health, which are overseen by State Commissioners of Health. Some States have a Health Management Board to specifically manage their health facilities[9]. The responsibility for tertiary care and training lies with the Federal Government, through the Federal Ministry of Health which is headed by the Minister. Many states periodically organise a State Council of Health meeting to obtain consensus on health issues between the local and state governments. The Minister of Health also meets with State commissioners of Health during the National Council on Health (NCH) meeting to obtain consensus on health issues between the state and federal levels. Each level of government is however largely autonomous in the financing and management of its health services, though guided by policies formulated by the Federal Ministry of Health[10].

2.2.2 Community health programmes and strategies

Community participation and ownership is key for the successful delivery and sustainability of health care, especially PHC services. In resource-constrained settings with weak health systems and socio-cultural challenges, empowerment of individuals, families and communities to get more involved and take greater control over their health is essential for the attainment of UHC[11]. LGAs and community traditional and religious structures are well positioned to strengthen community participation in health care. Notable successes in community participation include the following:

- Traditional and religious leaders are playing a critical leadership and gate keeping role to improve access to and utilisation of health care services.
- The establishment of Ward Development Committees (WDCs) in more than 800 political wards across the country under the leadership of community members.
- Community representation in Hospital Management Committees.
- Facility health committees comprising community members and staff of the health facility have been established and are functional.
- Active engagement and involvement of various cadre of community

health workers in different public health programmes. Plans to harmonise the different community-based health workers under the Community Health Influencers, Promoters and Services (CHIPS) initiative are underway.[8]

Table 1: Nigeria's health response ministries, departments and agencies

SN	DEPARTMENT/ AGENCY	MAIN RESPONSIBILITY
1.	**Federal Ministry of Health (FMoH)** – Special Project – Public Health Department – Hospital Services, Food and Drugs – Chemical Management – Food Safety	Policy development and oversight for health sector
2.	**Nigeria Centre For Disease Control (NCDC)**	Prevention, preparedness, detection, response and control of communicable diseases and public health emergencies
3.	**National Primary Health Care Development Agency (NPHCDA)**	Primary health care system strengthening; immunisation,
4.	**National Institute of Medical Research (NIMR)**	Medical research
5.	**National Food and Drug Administration and Control (NAFDAC)**	Pharmacovigilance, drugs, vaccine, food
6.	**National Health Insurance Scheme (NHIS)**	Universal Health Coverage
7.	**National Biotechnology Development Agency (NBDA)**	Biotechnological research and development
8.	**National Institute for Pharmaceutical Research and Development (NIPRD)**	Employs international standards for testing medicines, food, cosmetics, agricultural and herbal products. Key functions also are: research and developing drugs, biological products, pharmaceutical raw materials and drug specifications for production, Quality assurance for manufactured medicines, food, cosmetics, agricultural products, and herbal products.

Table 2: Nigeria's non-health response ministries, departments and agencies

SN	MINISTRY	DEPARTMENT/ AGENCY	MAIN RESPONSIBILITY
1.	**Federal Ministry of Science and Technology (FMST)**	**National Biotechnology Development Agency (NBDA)**	Promoting, coordinating, and setting research and development priorities in biotechnology
2.	**Federal Ministry of Health (FMoH)**	**National Arbovirus and Vectors Research Centre (NAVRC)**	Conducting field disease vector surveillance and control; studying the ecology, bionomics, distribution and seasonal variation of disease vectors; identifying and incriminating principal arbovirus and other disease vectors
3.	**Federal Ministry of Environment (FMEnv)**	**National Biosafety Management Agency (NBMA)**	Provision of regulatory framework to adequately safeguard human health and the environment from potential adverse effects, while harnessing the potentials of modern biotechnology
4.	**Federal Ministry of Petroleum Resources (FMPR)**	**National Nuclear Regulatory Authority (NNRA)**	Controlling, regulating and supervising all matters related to nuclear safety and radiation protection
5.	**Federal Ministry of Petroleum Resources (FMPR)**	**National Oil Spill Detection and Response Agency (NOSDRA)**	Preparedness, detection and response to all oil spillages in Nigeria
6.	**Federal Ministry of Agriculture and Rural Development (FMARD)**	**National Veterinary Research Institute (NVRI)**	Production of international quality vaccines and offering services for the identification, control, and eradication of economically important livestock diseases
7.	**Office of the National Security Adviser (ONSA)**	**The Presidency, Federal Republic of Nigeria**	Making security policies, coordination of security agencies to prevent counter security threats, and linking public health with security

2.3 Public Health Risk Profile

2.3.1 National risk assessment

Nigeria is prone to outbreaks of diseases and other public health emergencies. Various risk factors are known to be responsible for these emergencies. To address this, the NCDC in collaboration with relevant Ministries, Departments and Agencies (MDAs) as well other key stakeholders in 2018 initiated the process of hazard profiling using WHO Strategic Assessment of Risks (STAR) Tool, and vulnerability and risk assessment mapping (VRAM) data collection tool. This is in line with the World Health Assembly Resolution 64.10 (WHA 64.10) which has committed WHO secretariat to 'provide the necessary technical guidance and support to Member States and partners for developing health emergency and disaster risk-management programmes at national, subnational and local levels.'[12]

The VRAM process serves to identify the vulnerabilities and capacities of the communities exposed to priority hazards (List of identified hazards are highlighted in section 2.3.2 below)[13]. In addition, from the VRAM exercise, recommendations are drawn to mitigate risks through appropriate risk management measures. It informs the development of an operationally oriented and evidence-based preparedness plans to build resilience of the health system and communities[13].

The VRAM exercise was also used to conduct training for national stakeholders to develop a pool of experts versed in VRAM methodology who can support future risk profiling and mapping exercises in the country and in the WHO AFRO region.

2.3.2 Key hazards or scenarios identified for contingency planning

A VRAM planning workshop was convened following several outbreaks of epidemic-prone diseases. At the workshop, the following key hazards

were identified by the stakeholders for contingency planning: Cholera, Lassa fever , Yellow Fever, Measles and Monkey pox ,CSM, COVID-19, Heavy metal poisoning, Floods, Road Traffic Accidents, Communal/ Religious Conflicts, Terrorism, collapsed building,[13] (*See STAR and VRAM Planning Workshop Technical Report, 2018*).

Table 3: Disaster types and consequences

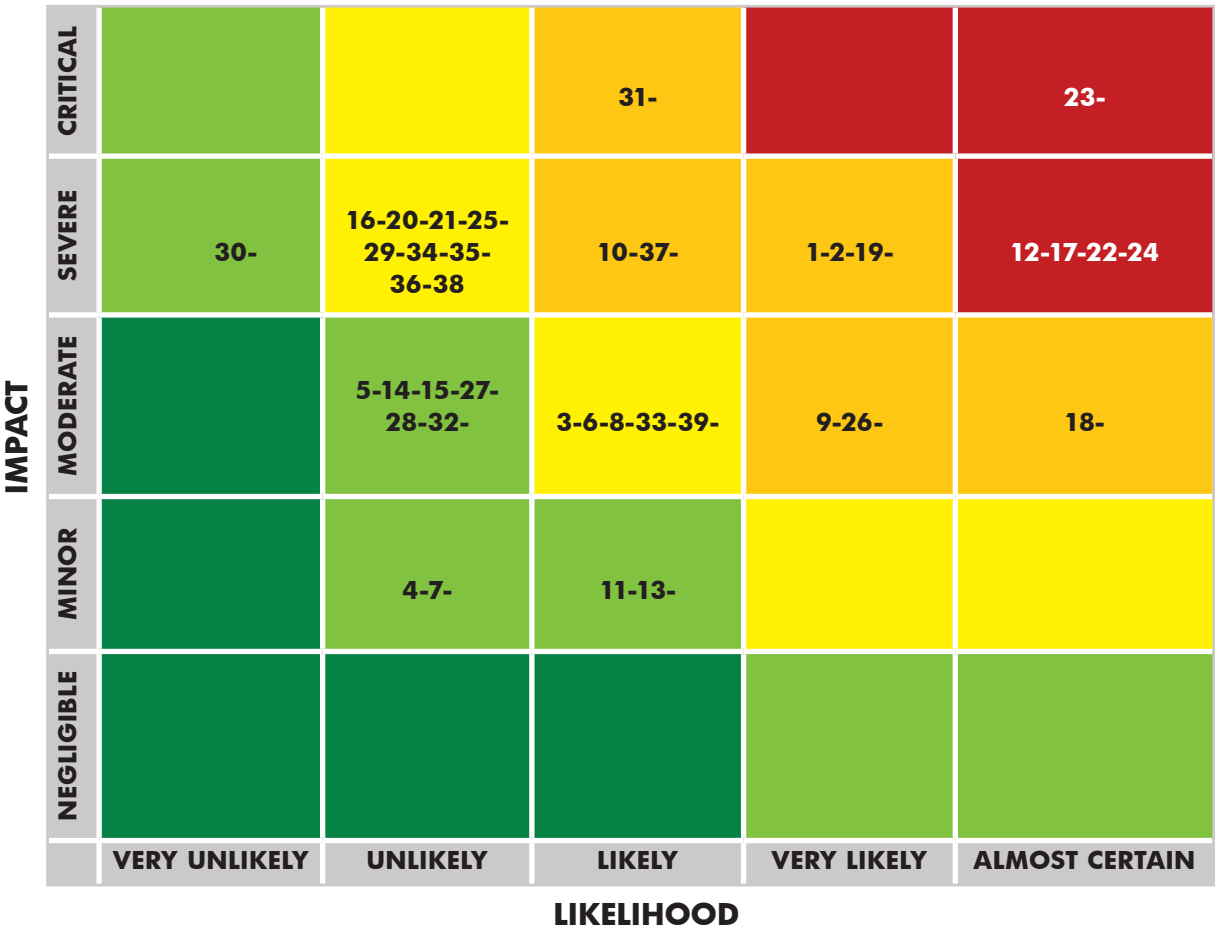
TYPE OF DISASTER	CONSEQUENCES				
	OUTBREAKS	SEVERE INJURIES	DEATHS	FOOD SHORTAGES	DISPLACEMENT
MERS CoV	Many	Common	Few	Possible	Rare
Lassa Fever	Many	Common	Many	Rare	Rare
Yellow Fever	Common	Possible	Few	Rare	Rare
Floods	Possible	Many	Few	Overwhelming	Common
Heavy Metal Poison	Few	Common	Few	Rare	Rare
Communal/ Religious Conflicts	Rare	Many	common	Rare	Common
Terrorism	Common	Many	Many	Common	Common
Road traffic accidents	Common	Overwhelming	Many	Rare	Rare
CSM	Common	Few	Many	Rare	Rare
Measles	Many	Many	Common	Rare	Rare
Collapsed building	Rare	Few	Few	Rare	Common
Monkey pox	Common	Few	Few	Rare	Rare

Table 4: Hazards profiled in Nigeria and risks characterisation [13]

5. VERY HIGH	
24	Meningitis (CSM)
23	Cholera
22	Yellow fever
17	Lassa fever
12	Terrorism =>injuries, burns, respiratory illness, depression, pollution/contamination, displacement, disability, cancer, malnutrition, disruption of health services, water borne diseases, death.
4. HIGH	
9	Urban industrial pollution and waste =>Respiratory illness, depression, contamination, poisoning, skin irritation, cancer, disruption of health services, water borne diseases, death.
37	Lead poisoning
31	MERS
26	Measles
2	Communal/religious conflicts => Fractures, injuries, disabilities, depression, exposure to other infectious disease, impairment, displacement, malnutrition rape, arson, unwanted pregnancies, death.
19	Dengue fever
18	Monkey pox
10	Windstorm => Air borne diseases, visual impairment/blindness, displacement, injuries, malnutrition, disruption of health services, water contamination, death.
1	Road accident => Fractures, injuries, disabilities, depression, exposure to other infectious disease, impairment, death.
3. MODERATE	
8	Insurgency =>Injuries, burns, respiratory illness, depression, pollution, skin irritation, cancer, displacement, disability, malnutrition, disruption of health services, water borne diseases, death.
6	Pipeline vandalisation fire incident =>Injuries, burns, respiratory illness, depression, pollution, skin irritation, cancer, displacement, disability, malnutrition, disruption of health services, death.
39	Landslides => Injuries, fractures, trauma, death, suffocation.
38	Methanol poisoning
36	Tropical Ataxic Neuropathy
35	Aflatoxin
34	Botulism
33	Food poisoning => Diarrhea, vomiting, dehydration, malnutrition, reduced immunity, mental stress, overwhelmed health service.
3	Floods => Displacement, water borne diseases, trauma, electrocution, malnutrition, hypothermia, vector borne diseases, disruptions of health services, death.
29	West Nile Fever
25	Rabies
21	Anthrax
20	Avian influenza (human cases)
16	Ebola

Table 4: Hazards profiled in Nigeria and risks characterisation

2. LOW	
7	Aircraft accident =>injuries, burns, trauma, impairment, respiratory illness, depression, disability, death.
5	Trans-boundary pests (locust, army worm, quail birds) malnutrition, insect borne diseases, death.
4	Drought => malnutrition, water borne diseases, skin infections, respiratory infections, conjunctivitis's, displacement, migration, death.
32	Snakebite => Envenomation, disabilities
30	Zika
28	Rift Valley Fever
27	Polio
15	Stampede/Mass gathering => Injuries, fractures, trauma, death, suffocation.
14	Accidental Explosion =>Injuries, burns, respiratory illness, depression, pollution/contamination, displacement, disability cancer, disruption of health services, death.
13	Coastal submergence => Water borne diseases, displacement, trauma, death.
11	Building collapse => Injuries, trauma, death, displacement.



2.4 Routine Coordination Mechanisms

2.4.1 Coordination mechanisms within the health sector

The NCDC is the country's national public health institute, with the mandate to lead preparedness, detection and response to infectious disease outbreaks and other public health emergencies.

The NCDC coordinates the preparedness and response activities of MDAs in the events of public health emergencies through its established Incident Coordination Centre (ICC). NCDC's Incident Coordination Centre activates Concept of Operations (CONOPS), which is the strategic all hazards framework for NCDC's response to infectious disease outbreaks and Integrated Emergency Management arrangements. It provides the detailed arrangement for responding to infectious disease incidents or emergencies and is underpinned by an ICC activation plan.[14]

To deliver on its disease prevention and control mandate, NCDC works closely with the Ministries of Health at Federal, State and Local Government levels to improve the coordination of the health system response to public health outbreaks and other health events. NCDC supports states and LGAs to develop plans, based upon the risk profile of the locality and harmonize those plans at the national level.

The activation of the EOC enhances the coordination of response activities during emergencies by providing a platform for aligning multi-partner support within a common response framework, preventing duplication of efforts, ensuring need-based deployment of resources among other response strategies. At the NCDC, the physical environment of the EOC is the ICC[15].

Within the NCDC-ICC and affiliated state PHEOCs, incidents are detected, tracked and responded to in three major modes based on the levels of the outbreak. These include:

1. Watch mode
2. Alert mode
3. Response mode

Refer to Figure 15 for a typical diagram of an IMS

2.4.1.1 Incident Management Processes

a. Risk Assessment; conducted by subject matter experts to provide decision-makers with incident information that will guide response.

b. EOC Activation Approval and Appointment of an Incident Manager; the leadership of the Public Health Institute approves the activation of an EOC and appointment of an Incident Manager to coordinate response.

c. Notification of EOC Activation; relevant partner organisations are notified of EOC activation and formally invited to join the response.

d. Call out Procedure, mobilisation of personnel to man response thematic areas.

e. Set-Up of the EOC Workspace; entails allocating EOC space to response pillars.

f. Developing Incident Action Plan; entails outlining objectives related to the strategy of managing an incident.

g. Developing Situation Reports (SITREPs); a priority message that summarises the incident situation to decision-makers developed and shared on a regular basis.

h. Feedback; involves relay of information from the operation centre to the field staff on regular basis.

i. EOC Deactivation; entails closure of the IMS operations as a result of reduction in scale or scope of an incident.

j. After Action Review, is an assessment conducted immediately after the response for evaluation and learning.[16,17]

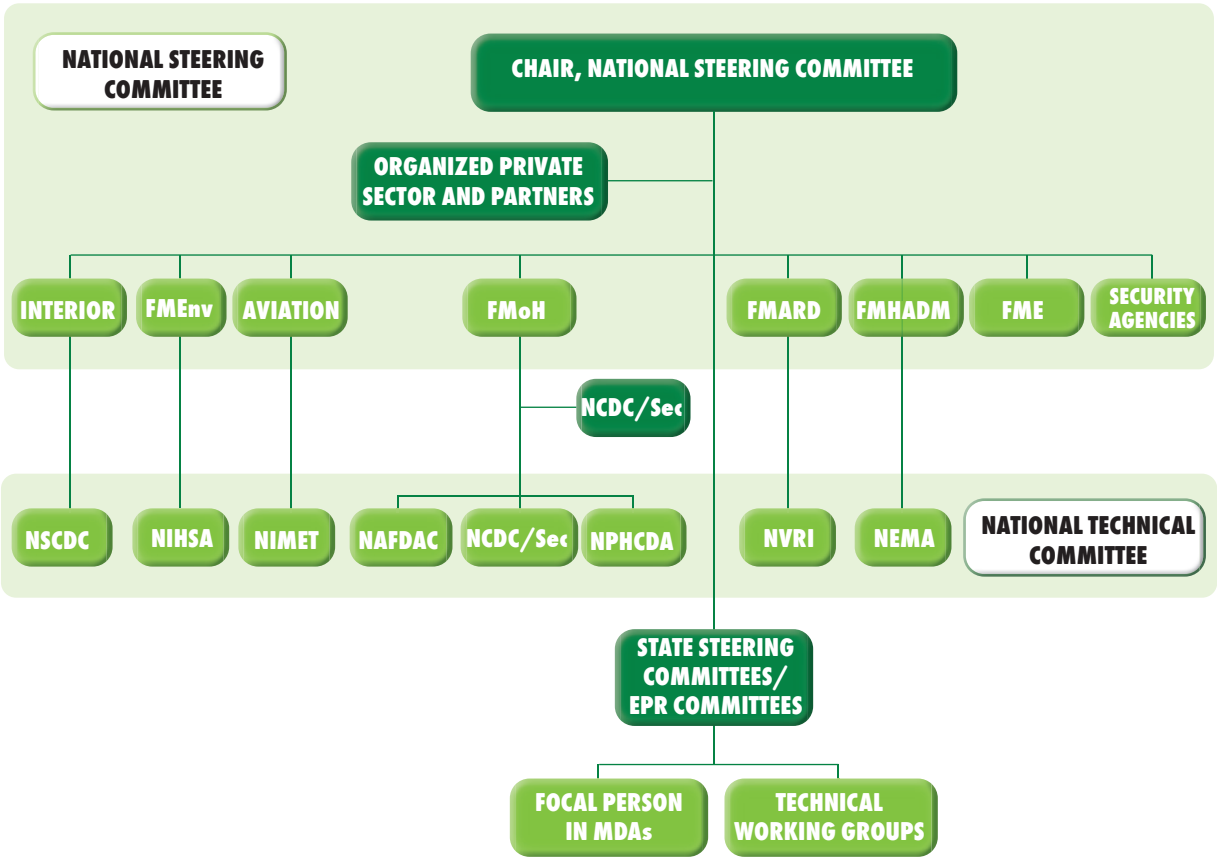


Figure 4: Governance Flow Chart of National Multi-Hazard events [18]

2.4.2 Public health multisectoral functional and sustainable mechanisms coordination

2.4.2.1 Steering Committee

At the national stage high-level coordination can be exerted through a steering committee combining political representation and technical expertise to address strategic, technical and managerial aspects of the coordination. This committee facilitates the building of a collaborative, cooperative and supportive environment for sharing knowledge, information and experience among participating sectors and stakeholders,

between the national and subnational levels, and with regional and global actors and networks. Its tasks include assessing relevant information and data to provide strategic guidance on multisectoral preparedness coordination. The committee has the authority to take strategic decisions, develop terms of reference for roles and responsibilities, and set targets and indicators in relation to the multisectoral preparedness coordination.

Leadership is crucial to initiate multisectoral collaboration and advocate coordination across multiple sectors based on both evidence-based information and qualitative data.[11,12]

The role of this committee is to advise, recommend and promote, and not to implement. The authority to implement resides at the executive level of the responsible jurisdiction/agency. The steering committee should meet regularly and will be accountable to the lead overarching governmental agency with the statutory mandate for the emergency.[11]

2.4.2.2 Technical Committee

NCDC is the lead/ coordinator, guidance in programming is given to the NCDC by the Disaster Risk Reduction Platform, which comprises of the relevant agencies as dictated by the event or emergency at hand.[12,19,20]

2.4.2.3 Initiating Technical Working Groups

Emergency response planning is part of a comprehensive disaster risk management programme that addresses questions about who or which agency does what during an emergency, and when.

TWGs must exist in MDAs to create a framework for responsible agencies to develop and test plans for engagement.[10,11,14,19]

The multisectoral technical working group is a platform for a range of technical activities and outputs conceptualised and

mandated by the steering committee, including conducting research, developing action plans and standard operating procedures, and organising and implementing such activities as simulation exercises and after-action reviews. The working group is convened on a regular basis for systematic exchange of information related to public health risks and threats in the country. The focus of technical working group can include strengthening IHR core capacities and related technical areas, addressing stakeholder-specific needs to emergency preparedness, and linking and integrating the subnational, regional and global levels in country activities for health security.

There is an existing platform for TWG derived from different sectors and MDAs to meet on a quarterly basis. [9,11,12,17]

2.4.2.4 Epidemic Preparedness and Response Committee (EPR) Mechanism

As recommended by the International Health Regulation (IHR) and the Joint External Evaluation (JEE), the functions of Steering Committee at the National level is replicated by the EPR structures and this should be implemented from State to community level.

The mandate of the EPR at the state level is to bring together relevant stakeholders to discuss, develop and establish multi-sectoral as well as state disease specific operational preparedness and response plans. Reactivate and strengthen multi-sectoral EPR committees/RRT at all levels of government; conduct advocacy at all levels to policy makers and like its counterpart at the National level ensure a collaborative and coordinated environment for the implementation of response activities through the Incident Management System hosted at the Public Health Emergency Operation Centres (PHEOCs).[9,22]

Due to its strategic nature and functions the chair of the committee resides in the office of the Governor of the State and its secretary is the State Epidemiologist

EPR committees operate under specified Terms of Reference (TOR) to develop work plan; Hold daily/weekly meetings during outbreaks and quarterly meetings in non-outbreak periods to review epidemiological situations; Take stock of materials required i.e. Medicines, Laboratory and other supplies and logistics required and ensure procurement and prepositioning by the responsible department in the State Ministry of Health[11].

2.4.3 Coordination mechanisms with non-health stakeholders

The Federal Government through NEMA has a mandate to assist States and Local Governments in disaster response and recovery.

When a Federal disaster declaration is issued in response to an incident, key Federal and State recovery officials establish and co-locate at a Disaster Office (DO). This could be at the State Operation Centre (SOC) in the case of a State disaster or at the National Emergency Coordination Centre (NECC) in the case of a national disaster. At some instance this coordination base is determined by the president federal republic of Nigeria.

The coordination base of the National Steering Committee serves as the hub for the coordination of Federal and State disaster assistance as well as a focal point for the associated recovery and reconstruction issues (*see Figure 4).* [5,25]

2.4.3.1 Response and recovery actions

Federal agencies take a variety of actions to assist State and Local Governments in responding to and recovering from a major disaster.

These actions range from initial notification of a disaster to preparation of a final disaster after-action report.

a. Notification

Upon indication of an imminent or actual disaster, the State notifies the NEMA Zonal office.

The Zonal office then immediately notifies NECC and NEMA Zonal staff in accordance with zonal offices' operational procedures.

The NECC notifies key NEMA headquarters staff and other Federal agencies through their respective agency EOCs and/or designated individual(s). An advisory notice is issued to provide an early warning that a possible event being monitored may result in activation. The advisory notice is for information only and requires no formal action. An alert notice is issued when an imminent or actual event is likely to result in activation. It puts federal responders on notice that they need to be ready for immediate deployment. Activation directs immediate deployment to the location specified in the notice. A cancellation indicates that no further action is required or that an activation notification is being terminated.

Catastrophic Disaster Response Group (CDRG) members may be notified to convene at NEMA Headquarters for an initial meeting, depending on the nature of the disaster. CDRG members alternate or remain on call to meet at any time during the disaster response.

b. Activation

With the support of Service Support Areas (SSAs), NEMA's Zonal HQ staff initially deploys members of the Emergency Response Team-Advance Element (ERT-A), including damage assessment personnel, to State operating facilities and disaster sites to assess the impact of the situation, collect damage information, and determine requirements. If zonal resources appear to be overwhelmed or in an event having potentially significant consequences, NEMA Headquarters may deploy an Emergency Response Team-National (ERT-N) to coordinate the initial response.

Meanwhile, if directed by NEMA Headquarters, the NECC informs SSA primary agencies of Emergency Support Team

(EST) activation and provides a time frame for each activated SSA to report to NEMA Headquarters, as part of the EST. Primary agencies are responsible for the activation of their supporting agencies if required. Agencies may activate their headquarters Emergency Operation Centres (EOCs) to provide coordination and direction to their zonal response elements in the field.

NEMA determines the extent of damage and the degree of federal assistance required and forwards a request to the Honourable Minister. A presidential declaration of a major disaster or emergency and official appointment of a Federal Coordinating Officer (FCO), NEMA designates the degree or nature of assistance required and the provinces eligible to receive assistance.

The ERT-A/ERT-N coordinates damage assessment and selection of locations for field facilities with the State. It also coordinates mission assignments for direct Federal assistance and procurement of goods and services. The ERT-A/ERT-N begins the transition to a partial or full ERT.

c. Recovery Operations

The ERT Operations Section is the central coordination point amongst State and Federal agencies and voluntary organisations for dlivering recovery assistance programs. The human services and infrastructure support branches of the operations section assess State and local recovery fundamentals at the outset of the disaster and relevant time frames for programme delivery. The branches ensure that Federal agencies that might have appropriate recovery assistance programs are notified of the disaster and share relevant information with all involved agencies.

In conjunction with the SCO, the FCO determines the need for Disaster Response Centres (DRCs) in the disaster

area. State and federal agencies coordinate the DRCs with knowledgeable officials who provide recovery programs information, advice, counseling, and technical assistance related to mitigation.

The Human Services Branch of the ERT coordinates assistance programmes to help individuals, families, and businesses meet basic necessities and return to self-reliance. The branch also coordinates with voluntary organizations and could become involved in donations' management.

The Infrastructure Support Branch of the ERT coordinates assistance programmes to aid States and Local Government and eligible private non-profit organizations, to repair or replace damaged public facilities.[5]

2.5 Current Response Capacity and Level of Preparedness

Preparedness involves the development and maintenance of national, intermediate and community/primary response level public health emergency response plans for relevant biological, chemical, radiological and nuclear hazards. Other components of preparedness include mapping of potential hazards, the identification and maintenance of available resources, including national stockpiles and the capacity to support operations at the intermediate and community/primary response levels during a public health emergency. The plan will ensure that resource deployment is based on thorough risk assessment and hazard mapping so that surge personnel are drawn from diverse sectors, adequately trained, and work towards a shared evidence-based, all-hazards preparedness plan. It will help in ensuring the availability of health commodities.

However, a public health emergency operations centre is a central location for coordinating operational information and resources for the strategic management of public health emergencies and emergency exercises. Emergency operations centres provide communication and information tools and services, and a management system during a response to an emergency or emergency exercise. They also provide other essential functions to support decision-making and implementation, coordination and collaboration. The emergency response

operations plan intends to strengthen inter-sectoral collaboration for emergency response, establish SOPs for activation and operations, and train personnel.

Also, linking public health with security authorities is considered vital in the overall global health security agenda. Before now, public health emergencies appear limited to pure civil agencies and authorities in Nigeria with the exclusion of a core component from the military and security agencies. However, public health emergencies pose special challenges whether man made or naturally occurring. The involvement of the military in the 2014 Ebola crisis bring to fore the need for synergy between civil and security agencies authorities during public health emergencies. Therefore, it has become imperative for a coordinated approach by linking public health practice with security authorities.[7]

Medical countermeasures are vital to national security and protect nations from potentially catastrophic public health threats. Investments in medical countermeasures create opportunities to improve overall public health. On the other hand, recent pandemics have shown the importance of trained personnel who can be deployed in case of a public health emergency for response. Countries need to have a process in place to receive/send both medical countermeasure assets and health care personnel in the event of public health events of international concern.[17]

2.5.1 Current response capacity

- NCDC EOC has been activated several times and has been an important contributor to the successful control of the several public health emergencies
- NCDC conducts routine public health surveillance and situational analysis and is prepared to respond to public health emergencies, including activating the EOC, 24-hours a day, 7- days a week
- NCDC has supported states to establish Public Health Emergency Operations Centres (PHEOC)
- The polio EOC has been critically important in the successful polio elimination and has provided important lessons learned to the NCDC EOC
- EOC plans and procedures are drafted and have been utilised during EOC activations

- EOC training has been conducted during EOC activations
- Exercise for emergency response and EOC activation have been conducted to explore the NCDC's capacity and capability to co-ordinate and support the international, national and State response to an outbreak of an infectious disease (Full-scale simulation exercise on Yellow fever, global functional simulation exercise on pandemic influenza, yearly national functional simulation exercise 'Exercise Keep Pushing' held twice since 2018 involving 11 states, table-top simulation exercises in 30 states
- NCDC EOC has coordinated several successful responses to public health emergencies
- Procedures have been developed, and were followed during the Ebola and other outbreak response, to safely transport infectious substances to public health laboratories
- Case management guidelines are available for patient management of priority infectious diseases
- Expansion of network of laboratories for COVID-19 testing across the geopolitical zones
- Establishment of treatment centres for infectious diseases including COVID-19 across the country
- Establishment of risk communication technical working group [22]

2.5.2 Current level of preparedness

- Surge capacity (including Nigeria Field Epidemiology and Laboratory Training Program residents) has been identified and effectively utilised during recent public health crises
- Strategic stockpiles have been identified and disseminated to the intermediate health tiers
- Information gathered from IDSR – based surveillance has been used to determine priorities for resource stockpiling and distribution
- Developed Expertise, across relevant agencies in the states,
  - Strengthening of State Public Health Laboratories

  - Conducted training of State Rapid Response Teams (RRT) & Integrated Training for Surveillance Officers in Nigeria (ITSON).
  - Surveillance Outbreak Response Management and Analysis System (SORMAS) rollout in Nigeria
  - Establishment of state Public Health Emergency Operation Centres (PHEOCs)
  - Institution of inter-Ministerial committee on COVID-19
  - Trained state risk communication personnel
  - Trained risk communication personnel across security agencies
  - Trained personnel for health sector response to humanitarian crises in all states
  - Trained health personnel on infection prevention and control
  - Trained risk communication personnel and media reporters and editors
- A budget line exists in several key agencies like NEMA, SEMA, SMoH and NCDC
- Conducted national multi-sectoral all-hazards public health risk assessment and resource mapping to inform national public health emergency preparedness plan in 18 States.
- Developed all-hazards multi-sectoral Public Health Emergency Preparedness Plan (PHEPP)
- Pre-positioned health commodities, equipment and medicines to strategic locations consistent with vulnerability maps (e.g. remote hard-to-access areas).
- Established a national Technical Working Group (TWG) for linking public health and security authorities.
- National Ambulance Policy by Federal Ministry of Health
- Ambulance Services and National Emergency call Number is 112 by NCC while 122 is for FRSC ambulance services, 6232 NCDC for Public Health Emergencies /National Emergency Medical Ambulance System (NEMSAS) Command Control Centres
- Counter-terrorism units in ONSA and Nigeria Police
- Proposition of fire-fighting service equipment

Preparedness, Surveillance and Early Warning System

Preparedness involves risk profiling, risk assessment and communication, SIMEX, resource mapping, Strategic stockpiling and medical countermeasures. Effective and efficient public health response is dependent on adequate preparation involving all stakeholders and investing sufficient resources based on prioritised risk in the community, LGA, State and at national level.

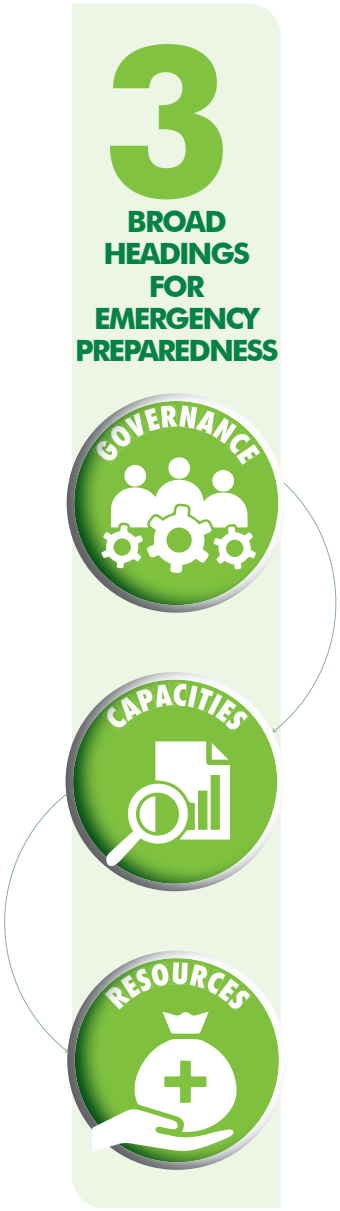
This section is guided by the WHO strategic framework for emergency preparedness. The framework elucidates twelve core components and classified under three broad headings: governance, capacities and resources.[26]

Governance

- National policies and legislation that integrate emergency preparedness
- Plans for emergency preparedness, response and recovery
- Coordination mechanisms

Capacities

- Assessments of risks and capacities to determine priorities for emergency preparedness
- Surveillance and early warning, information management
- Access to diagnostic services during emergencies
- Basic and safe health and emergency services
- Risk communications
- Research development and evaluations to inform and accelerate emergency preparedness



Resources

- Financial resources for emergency preparedness and contingency funding for response
- Logistics mechanisms and essential supplies for health
- Dedicated, trained and equipped human resources for emergencies

'A common, efficient, coordinated multi-sectoral approach, comprising all-hazard and hazard specific measures, is needed to ensure preparedness for all types of emergencies at the community, national and international levels'. This document shall however focus on public health multi-hazards in the Nigerian context. A risk profiling for the country has been done to address public health emergencies.'[6,13]

The strategic objectives of emergency preparedness are to:

1. Develop operational readiness to respond to emergencies
2. Build resilient health system
3. Strengthen One Health at the human-animal-environment interface
4. Foster a multisectoral, whole-of-government and whole-of-society approach.

This will also be built on the fulcrum of twelve components which are captured under 3 distinct areas of work namely:

– **Governance** which is based on national policies and legislation that integrate emergency preparedness
– **Capacities** which assess risks and capacities to determine priorities for emergency preparedness
– **Resources** which include financial resources for emergency preparedness and contingency funding for responses, logistic mechanism and essential supplies.

See Figure 5 showing the role of preparedness in the incident management structure

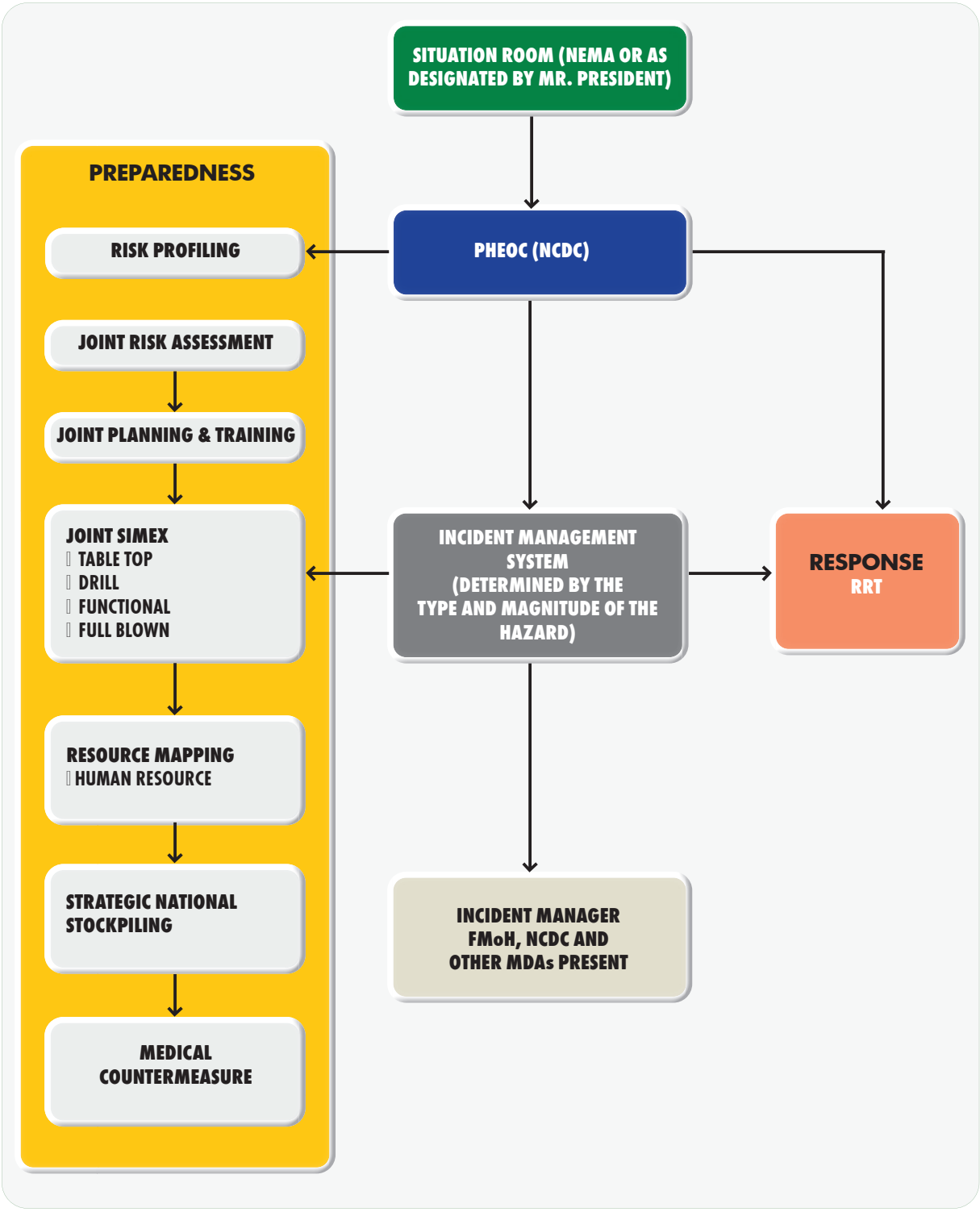


Figure 5: Emergency Preparedness and Response Flowchart

3.1 Surveillance and Early Warning Systems

Surveillance is the ongoing systematic collection, analysis, and interpretation of data. It includes the timely dissemination of the resulting information to those who need them for action. Surveillance is also essential for planning, implementation, and evaluation of public health practice (IDSR Technical Guidelines, 2019).

Early warning systems are the tools put in place for detection of the potential acute risk to human health occurrence of natural or man-made disasters *(CDC EBS Training template, accessed 2019).*

Early warning and rapid alert systems rapidly predict (potential) and/or detect events of potential serious socioeconomic and/or public health consequences, allowing rapid and effective exchange of information among relevant stakeholders for adequate and timely response. These systems are essential to prevent the escalation of non-communicable events into emergencies.

Properly functioning Early Warning and Rapid Alert (EWRA) systems should have the capacity to rapidly predict or detect events with serious consequences and facilitate the rapid exchange of information among relevant stakeholders to create a timely and effective response that eliminates or reduces negative impacts.

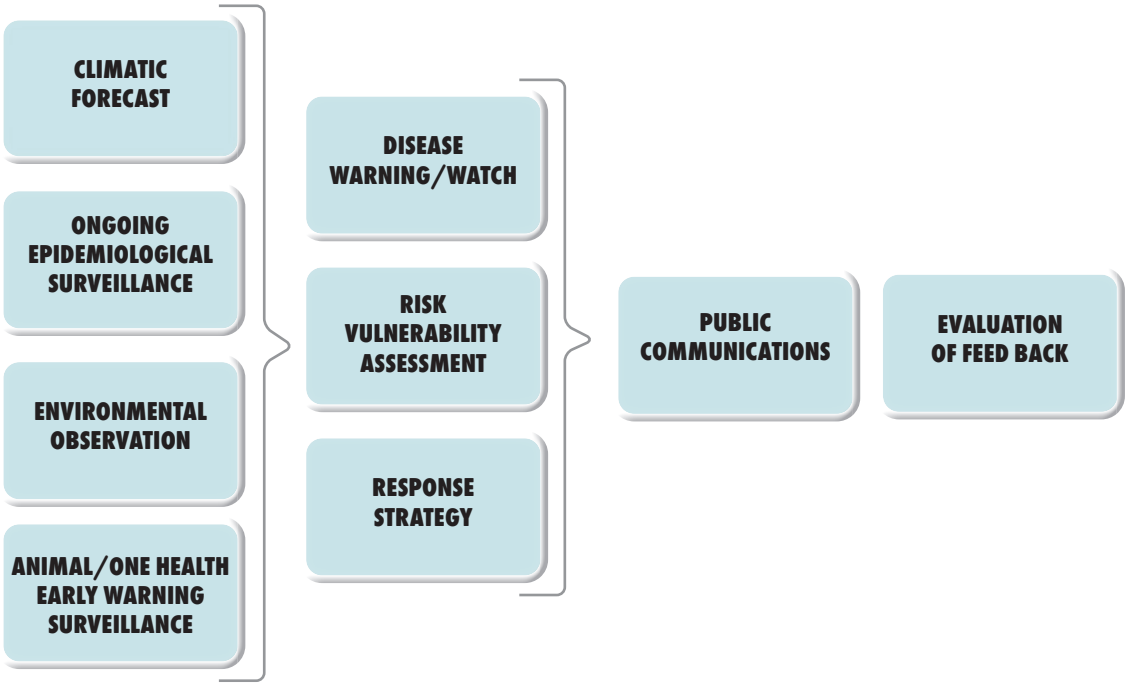


Figure 6: Components of an effective early warning system

3.1.1 Existing epidemiological surveillance system

The lead organisation for disease surveillance is the Nigeria Centre for Disease Control (NCDC) and it has put in place an epidemiological surveillance system. It conducts surveillance of infectious and non-infectious hazards in humans and animals. The tools used by NCDC and other relevant organisations include the National Integrated Disease Surveillance and Response (IDSR) strategy, Surveillance Outbreak Response Management and Analysis System (SORMAS), Animal Resource Information System–II (ARIS-II), National Animal Disease Information System (NADIS), mobile surveillance epidemic response system (mSERS) etc. Event-based surveillance is also conducted at the national level to capture events using both automated and moderated search engines.[9,23]

Routine epidemiological surveillance within the country for infectious and non-infectious hazards is conducted immediately (for epidemic-prone diseases), weekly or monthly, with set reporting timelines against which timeliness of reporting is measured (FGN One Health strategic plan). Environmental surveillance is done by responding to signals, following up with environmental assessment and report generation to inform response.[23]

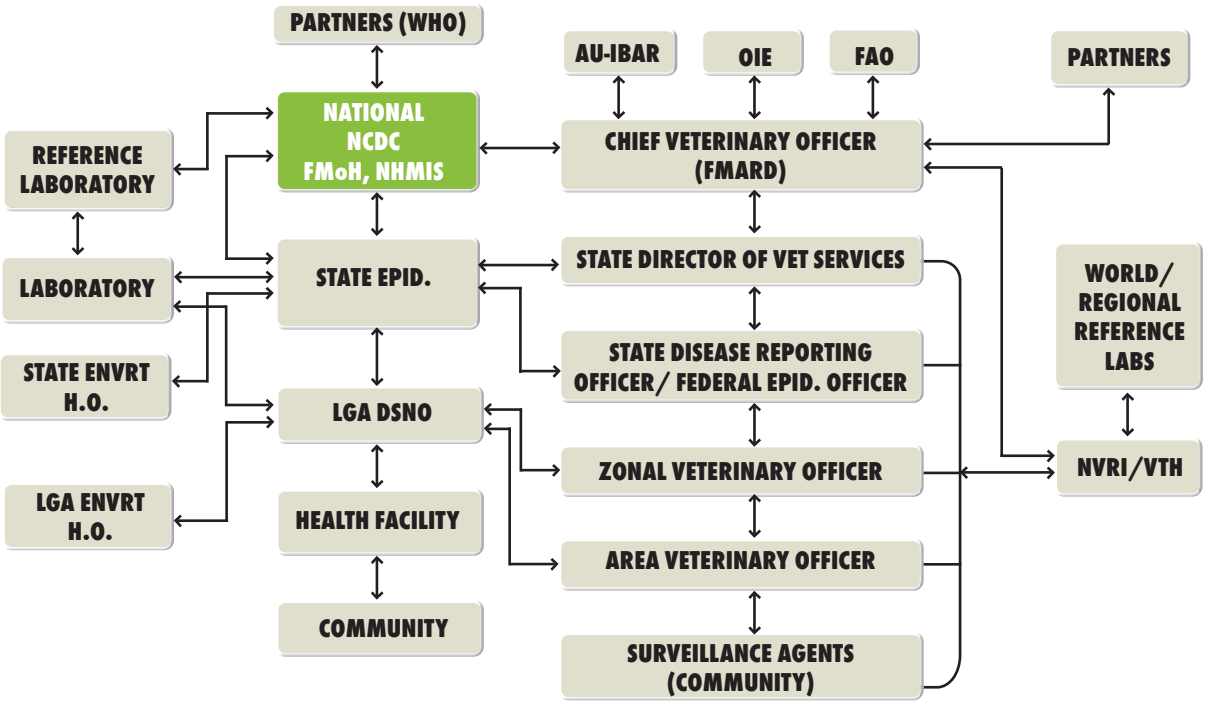


Figure 7: Reporting and information system sharing for human, animal and environment sector [23]

At the Nigeria Centre for Disease Control (NCDC), the surveillance system is linked with the Incident Coordination Centre (ICC) as highlighted in the diagram below. This process utilises a multi-pronged approach including the IBS and EBS pathways described in the IDSR and information exchange with MDAs and other relevant stakeholders

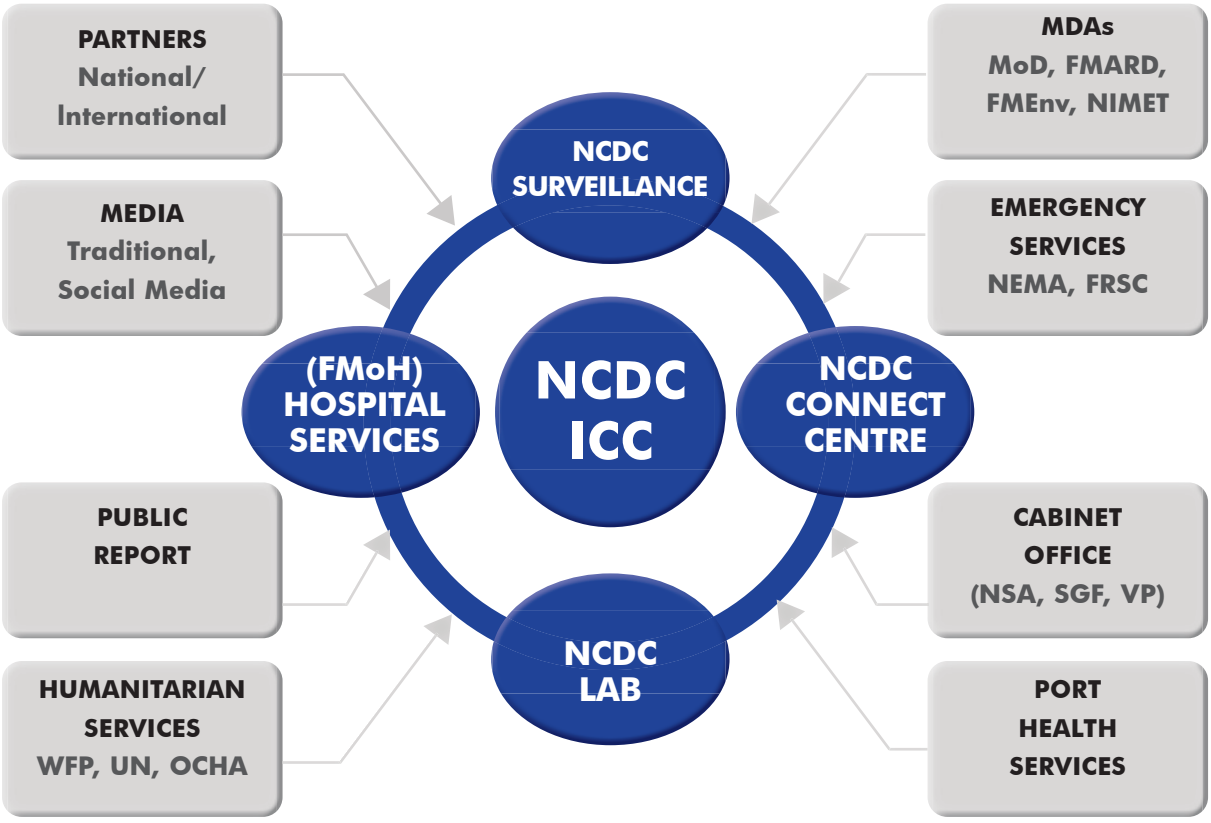


Figure 8: NCDC primary (blue) and secondary (grey) incident sources

The public health emergency response of the NCDC is operationalised by the RRT [17,24].

The flow of information in the IDSR system in Nigeria is from the health facility, where diseases that have epidemic potential and those which are targeted for eradication and elimination, are reported immediately to the focal persons in the health facility and thereafter to the LGA using designated IDSR reporting forms, event based surveillance, indicator

based surveillance or SORMAS. The LGA receive data from the health facilities, collate and send to the next level which is the State Ministry of Health (SMoH), the DSNO at the LGA also take samples and send to the National laboratory network to ensure laboratory confirmation.[9]

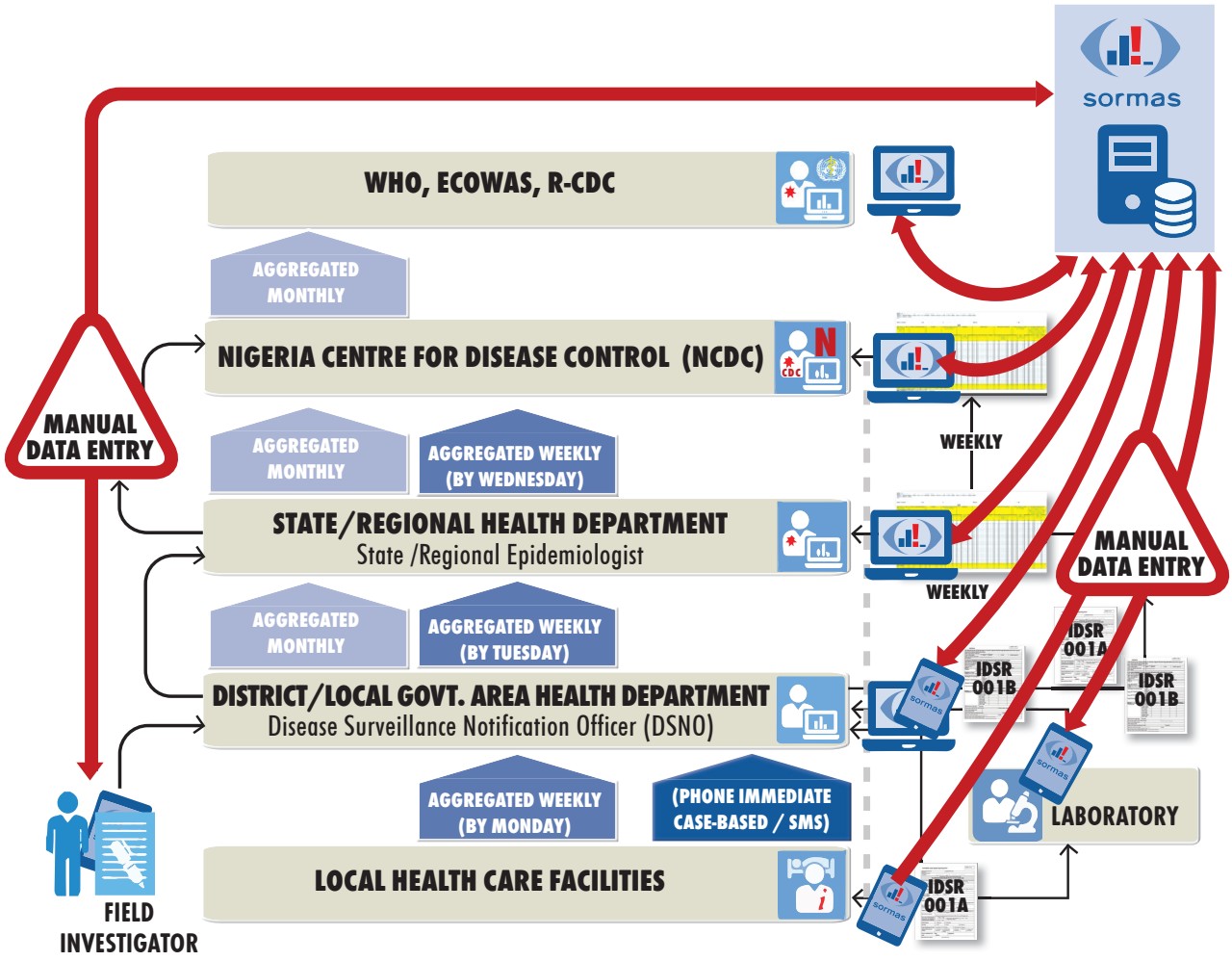


Figure 9: Flowchart for IDSR reporting in Nigeria

The Nigerian surveillance system includes private clinics and hospitals – facilities at all levels both private and public with Surveillance focal person in each facilities.[9,23,25,26]

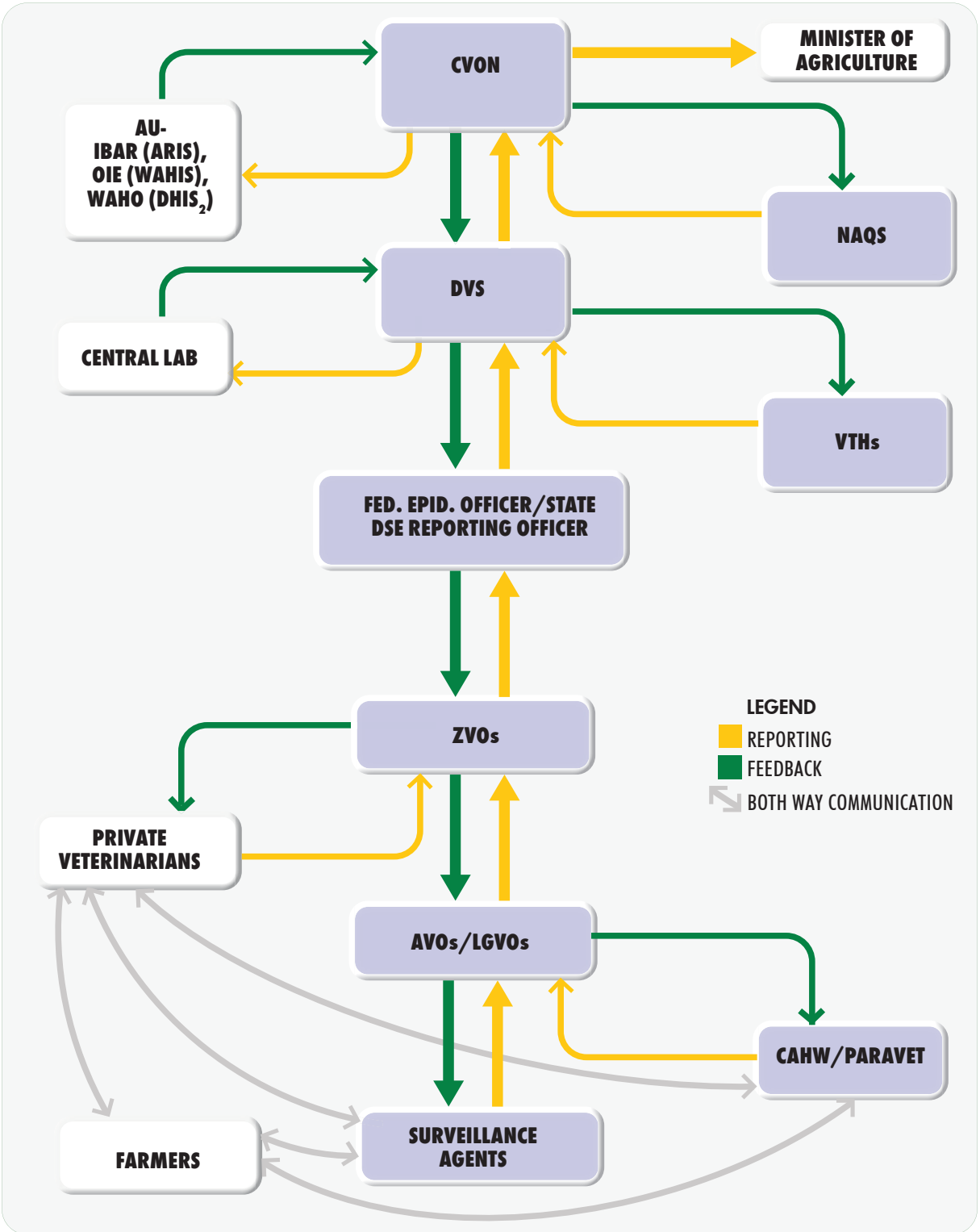


Figure10: Channels of animal disease reporting in Nigeria

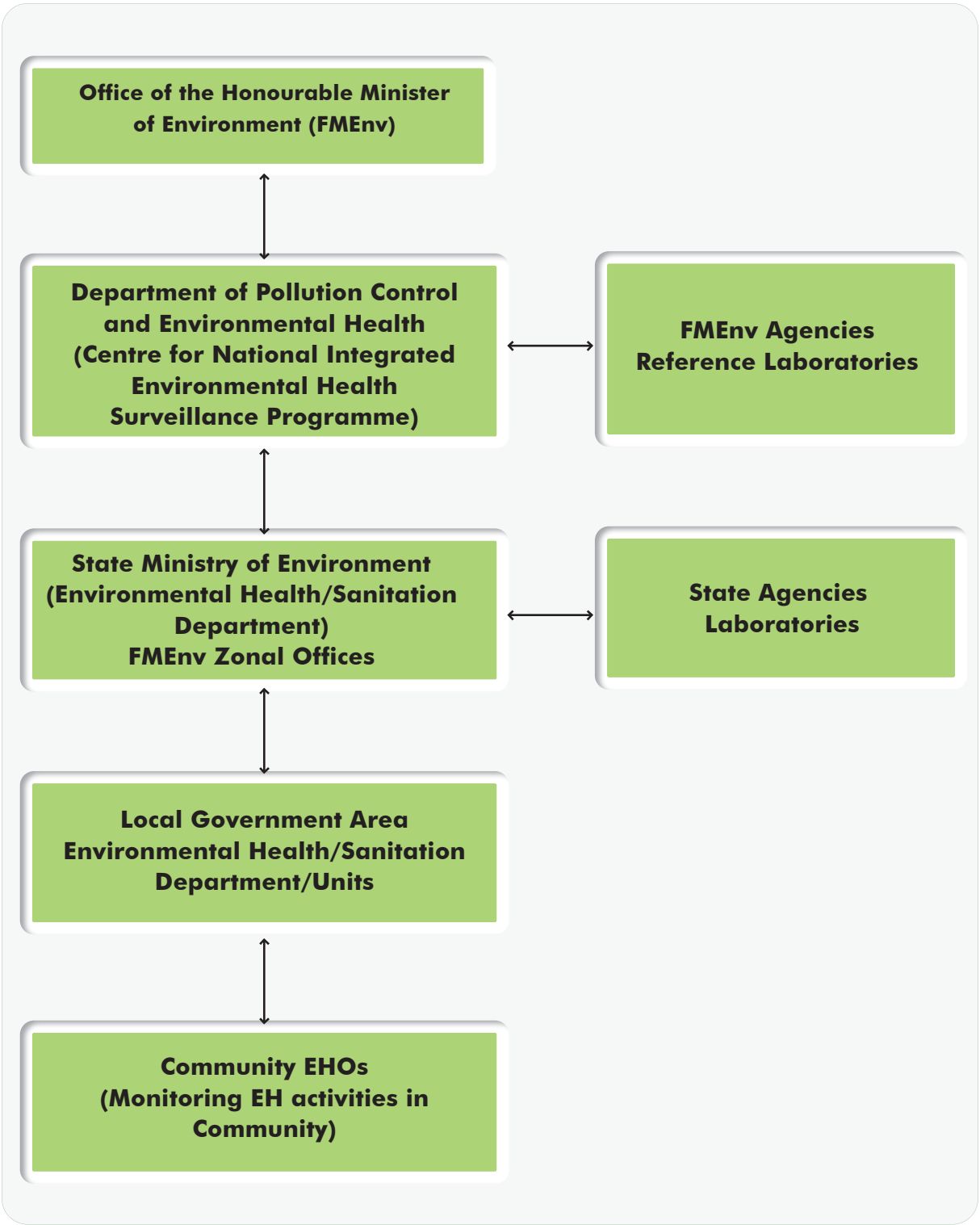


Figure 11: Information flowchart for environmental health

3.1.2 Early warning system for non-infectious hazard

There are no standardised integrated early warning policy document/ guidelines that addresses early warning system for non-infectious hazards in Nigeria. However, there are stand-alone systems/actions that address specific hazards such as flooding, fire outbreaks, road traffic accidents etc.

In the case of flooding for instance, the framework for early warning system consist of three phases, including the monitoring of precursors, forecasting of probable event and notification of a warning or alert should an event of catastrophic proportion takes place.

This system is applicable to other hazards such as Road traffic accidents, fire outbreaks, oil spillage where there are responsible agencies for each of them.[3,4]

Table 5 indicates relevant agencies for monitoring different indicators associated with triggers for specific hazards.

Table 5: Hazards, Triggers, Early Warning and Monitoring

HAZARDS	EARLY WARNING SYSTEM	INDICATORS	RELEVANT AGENCIES
Above normal (heavy) Rainfall	Weather forecasts, Information flow on the rainy season,	Observation of the rise in river level	NIMET, River Basin Authorities, ACMAD
Release of water from natural and artificial Impoundments	Alert warning from river basins, alert from EW mechanisms		River Basin Authorities
Conflicts	Elections, religious uprising, tribal/ethno conflicts and militia/ terrorism activities	Sudden demographic changes and population displacement; rising unemployment rate	IPCR, Security organisations

Table 5: Hazards, Triggers, Early Warning and Monitoring

HAZARDS	EARLY WARNING SYSTEM	INDICATORS	RELEVANT AGENCIES
Drought	Irregular or little rain	Biodiversity loss, depletion of genetic pool, crop failure	Federal Ministry of Agriculture and Rural Development, Department of Strategic Grain Reserve, Federal Ministry of Environment
Epidemics	Severe weather conditions, rapid urbanization, weak Sanitation, air and water pollution	Sudden onset of diseases, unusual event, unusual increase in the number of morbidity or mortality	NCDC/SMoH
Human Induced	Proliferation of indiscriminate and artisanal mining, industrial accidents etc.		Federal Ministry of Mines and Steel, FMoH, FMEnv

3.1.3 National reference laboratories for infectious and non-infectious hazards

The role of the laboratory in detection of infectious and non-infectious hazards cannot be over emphasised. The laboratory is a key factor in surveillance of infectious and non-infectious hazards.

The NCDC maintains a network of public health laboratories within the country and each laboratory is profiled and matched with a disease of public health importance based on the laboratory's existing capacities. During the COVID-19 pandemic, molecular laboratories were activated across all states for SARS-CoV-2 diagnosis. NCDC intends to expand the capacity of these laboratories for other epidemic-prone diseases. Other relevant agencies have laboratories specific for their purposes.

Table 6: NCDC Laboratory Network as at December, 2020

STATE	S/N	LABORATORY	TESTING PLATFORM/ CAPACITY	CURRENT DISEASES TESTING	TYPE OF LAB	PUBLIC OR PRIVATE
Abia	1	State Specialist Hospital, Amachara	Open PCR	COVID-19	State	Public
	2	Federal Medical Centre, Umuahia	Not yet defined	Not yet testing	Federal	Public
Adamawa	3	Federal Medical Centre, Yola	Open PCR	COVID-19	Federal	Public
	4	General Hospital, Yola	Bacteriology	CSM, Cholera	State	Public
Akwa Ibom	5	Akwa Ibom State Molecular Lab	Open PCR	COVID-19	State	Public
Anambra	6	Nnamdi Azikiwe University Teaching Hospital	Sentinel site for sample collection	Influenza Sentinel Site	State	Public
Bauchi	7	Bauchi Molecular Lab	Open PCR	COVID-19	State	Public
	8	Abubakar Tafawa Balewa University laboratory, Bauchi	Open PCR, Bacteriology *(in a separate lab)*	COVID-19, CSM, Cholera	Federal	Public
Bayelsa	9	Bayelsa Molecular Laboratory	Open PCR	COVID-19	State	Public
Benue	10	Federal Medical Centre, Makurdi	Bacteriology	CSM, Cholera	Federal	Public
Borno	11	University of Maiduguri Teaching Hospital	Open PCR, Bacteriology *(in a separate lab)*	COVID-19, Polio, CSM, Cholera	Federal	Public
Cross River	12	Cross River State General Hospital	Bacteriology	CSM, Cholera	State	Public
Delta	13					
Ebonyi	14	Alex Ekwueme Federal University Teaching Hospital	Open PCR	COVID-19, Lassa fever	Federal	Public
Edo	15	Irua Specialist Teaching Hospital	Open PCR	COVID-19, Lassa fever	Federal	Public
	16	University of Benin Teaching Hospital	Open PCR, Serology	COVID-19, Measles, Rubella, Yellow Fever	Federal	Public
Ekiti	17					
Enugu	18	University of Nigeria Teaching Hospital Virology lab	Open PCR, Serology, Bacteriology	COVID-19, Measles, Rubella, Yellow Fever, AMR	Federal	Public
Gombe	19	Gombe state Specialist Hospital	Open PCR	COVID-19	State	Public
Imo	20	Federal Medical Centre, Owerri	Not yet defined	Not yet testing	Federal	Public

Table 6: NCDC Laboratory Network as at December, 2020

STATE	S/N	LABORATORY	TESTING PLATFORM/ CAPACITY	CURRENT DISEASES TESTING	TYPE OF LAB	PUBLIC OR PRIVATE
Jigawa	21	Jigawa State Molecular Lab	Open PCR	COVID-19	State	Public
	22	Rasheed Shakoni Specialist Hospital, Dutse	Bacteriology	CSM, Cholera	State	Public
Kaduna	23	Ahmadu Bello University	Open PCR	COVID-19	Federal	Public
	24	Yusuf Dansoho Memorial Hospital	Open PCR, Serology, Bacteriology	COVID-19, Measles, Rubella, Yellow Fever, Cholera, CSM	State	Public
Kano	25	Aminu Kano Teaching Hospital	Open PCR, Sentinel site for Congenital Rubella Syndrome	COVID-19, Influenza and Congenital Rubella Syndrome Sentinel Site	Federal	Public
	26	Bayero University Kano	Open PCR	COVID-19	Federal	Public
	27	Infectious Disease Hospital, Kano	Bacteriology	CSM, Cholera	State	Public
Katsina	28	State Public Health Laboratory, Kastina	Bacteriology	CSM, Cholera	State	Public
Kebbi	29	Sir Yahaya Memorial Hospital, Birnin Kebbi	Bacteriology	CSM, Cholera	State	Public
Kogi	30					
Kwara	31	General Hospital. Ilorin	Bacteriology	CSM, Cholera	State	Public
	32	University of Ilorin Teaching Hospital	Bacteriology	AMR	Federal	Public
	33	University of Ilorin	Not yet defined	Not yet testing	Federal	Public
Lagos	34	Lagos University Teaching Hospital, Idi Araba	Open PCR, Bacteriology *(in a separate lab)*, Sentinel site for Congenital Rubella Syndrome	COVID-19, Lassa fever/VHF, AMR, Congenital Rubella Syndrome Sentinel Site	State	Public
	35	NCDC Central Public Health Laboratory, Yaba	Open PCR, Serology, Bacteriology	COVID-19, Measles, Rubella, Yellow Fever, Cholera, CSM, AMR	Federal	Public
	36	Nigeria Institute for Medical Research	Corbas/Open PCR	COVID-19	Federal	Public
	37	Lagos State Biobank Lab	Open PCR	COVID-19	State	Public
	38	Lagos State University Teaching Hospital	Sentinel site for sample collection	Influenza Sentinel Site	State	Public

Table 6: NCDC Laboratory Network as at December, 2020

STATE	S/N	LABORATORY	TESTING PLATFORM/ CAPACITY	CURRENT DISEASES TESTING	TYPE OF LAB	PUBLIC OR PRIVATE
Nasarawa	39	Nasarawa State Public Health Diagnostics Laboratory	Open PCR	COVID-19	State	Public
	40	General Hospital, Lafia	Bacteriology	CSM, Cholera	State	Public
Niger	41	General Hospital, Minna	PCR, Bacteriology (in a separate lab)	COVID-19, CSM, Cholera	State	Public
Ogun	42	Babcock University	Bacteriology	AMR	Private	Public
	43	Molecular and Tissue Culture Laboratory, Babcock University Teaching Hospital	Open PCR	COVID-19	Private	Public
Ondo	44	Federal Medical Centre, Owo	Open PCR	COVID-19, Lassa fever/VHF	Federal	Public
Osun	45	African Centre of Excellence for Genomics of Infectious Diseases	Open PCR	COVID-19, Sequencing, Metagenomics	Non-state	Public
	46	Osun State University Laboratory	Open PCR	COVID-19	State	Public
	47	Obafemi Awolowo University, Ife	Bacteriology	AMR	Federal	Public
Oyo	48	University College Hospital Virology Department Laboratory	Open PCR	COVID-19	Federal	Public
	49	Biorepository and Clinical Virology Lab, UCH	Open PCR	COVID-19	Federal	Public
	50	University College Hospital - Medical Microbiology Dept.	Bacteriology	AMR	Federal	Public
	51	Ladoke Akintola University Teaching Hospital	Bacteriology	AMR	State	Public
Plateau	52	National Veterinary Research Institute	Open PCR	AMR (Animal Health), COVID-19, Sequencing	Federal	Public
	53	Plateau General Hospital	Bacteriology	CSM, Cholera	State	Public
	54	Jos University Teaching Hospital	Sentinel site for sample collection	Congenital Rubella Syndrome Sentinel Site	State	Public

Table 6: NCDC Laboratory Network as at December, 2020

STATE	S/N	LABORATORY	TESTING PLATFORM/ CAPACITY	CURRENT DISEASES TESTING	TYPE OF LAB	PUBLIC OR PRIVATE
Rivers	55	University of Port Harcourt Teaching Hospital	Open PCR	COVID-19	Federal	Public
	56	Rivers State University Teaching Hospital	Open PCR	COVID-19	State	Public
	57	University of Port Harcourt Regional Centre for Biotechnology and Bioresources Research	Open PCR	COVID-19	Federal	Public
	58	Rivers State Public Health Laboratory	Bacteriology	CSM, Cholera	State	Public
Sokoto	59	Infectious Diseases laboratory, Usman Danfodio University Teaching Hospital, Sokoto	Open PCR	COVID-19	Federal	Public
	60	Public Health Laboratory Sokoto	Bacteriology	CSM, Cholera	State	Public
Taraba	61	State Specialist Hospital Jalingo	Bacteriology	CSM, Cholera	State	Public
	62	Federal Medical Centre, Jalingo	Bacteriology	AMR	Federal	Public
Yobe	63	General Hospital, Damaturu	Bacteriology	CSM, Cholera	State	Public
Zamfara	64	Ahmad Sani Yariman Bakura, Specialist Hospital Gusau	Bacteriology	CSM, Cholera	State	Public
FCT	65	NCDC National Reference Laboratory	Corbas/Open PCR/Gxpert, Serology, Bacteriology, Sequencing	COVID-19, Measles, Rubella, Yellow Fever, Lassa fever/ VHF, Monkeypox, Influenza, AMR, CSM, Cholera, Sequencing	Federal	Public
	66	State House Annex Clinic - NIA	Open PCR	COVID-19	Federal	Public
	67	Maitama District Hospital	Serology	Yellow Fever, Measles, Rubella	State	Public
	68	Asokoro District Hospital	Sentinel site for sample collection	Influenza Sentinel Site	State	Public
	69	National Hospital, Abuja	Bacteriology	AMR	Federal	Public
	70	University of Abuja Teaching Hospital, Gwagwalada	Not yet defined	Not yet testing	Federal	Public

Table 7: Infectious and non-infectious hazard laboratories in Nigeria

SN	HAZARD LABORATORY	TYPE OF FUNCTION
1	**NCDC laboratory network**	Epidemic prone diseases; notifiable diseases and diseases for elimination
2	**National Veterinary Research Institute (NVRI)**	Veterinary/animal diseases sample specimens
3	**National Institute for Pharmaceutical Research and Development (NIPRD) Laboratories**	Research; drug development; development of biological products; Pharmaceutical raw materials
4	**National Geoscience Research Laboratory (NGRL) of Nigeria Geological Survey Agency (NGSA) for soil sample analysis on heavy metal contamination**	Geological and geochemical Mapping; hydrogeological and engineering geological research
5	**Nigerian Institute of Medical Research (NIMR) Yaba, Lagos**	Research and structured dissemination of research findings
6	**NAFDAC Central Laboratory Oshodi, Lagos**	Quality, safety, efficacy and wholesomeness of regulated products (imported and locally manufactured)
7	**Institute for Oceanography and Marine Research, (IOMR) Victoria island, Lagos**	Research and conservation management of different marine species.
8	**Standard Organisation of Nigeria (SON) Food and Chemical Technology Lab in Lagos**	Environmental management system certification
9	**Water Quality Laboratory, Federal Ministry of Water Resources (FMWR)**	Testing and validation of water quality; detection of water pollutants
10	**Secondary Standard Dosimetry Laboratory in National Institute of Radiation Protection and Research (NIRPR), Ibadan (Nigeria Nuclear Regulatory Authority)**	Calibrations and accuracy in radiation dosimetry
11	**NESREA Reference Laboratories in Port Harcourt and Kano**	Ensuring a cleaner, safer and healthier environment
12	**GMO Detection and Analysis Laboratory at the National Biosafety Management Agency Abuja**	Conduct research and take samples and carry out laboratory analysis of crops, products or materials for purposes of determining if they contain genetically modified organisms and ensure compliance

3.2 Alert, Detection, Rapid Risk Assessment and Grading

3.2.1 Alert detection

Alert detection is the process of capturing information from different sources by different organisation that has been verified to be a concern or a potential public health event. Alert generation is similar across all sectors it is an outcome of surveillance (EBS and IBS) or any other form of surveillance used by the agency. Once an alert is generated, risk assessment and grading of the alert follows to determine the needed response.

For instance, in NCDC, alerts are generated either from verified rumours or from the outcome of the robust surveillance system. Once an alert is generated, a risk assessment is performed to ascertain the level of risk involved then follow up by grading and deployment of rapid response team and/or resources. For effective multi-hazard preparedness, all alerts generated by any agency should be shared immediately with the relevant stakeholders.

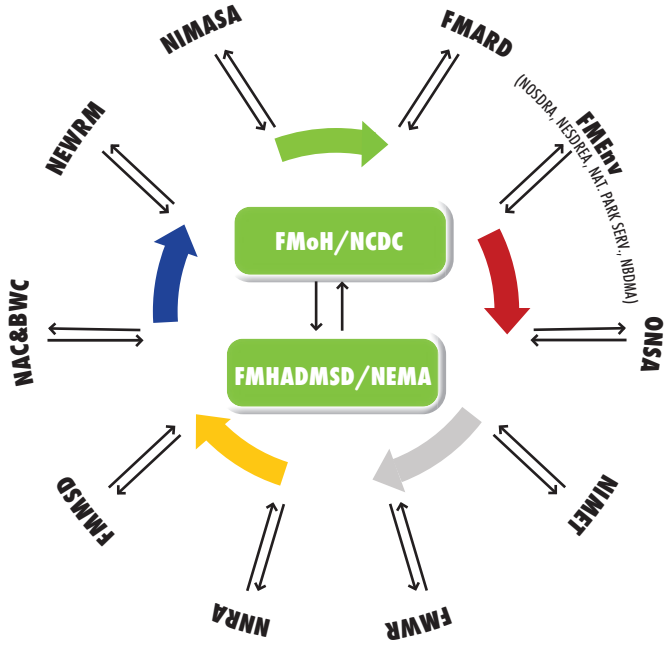


Figure 12: Communication flowchart for alert distribution of infectious and non-infectious hazards

3.2.2 Grading system in an emergency

Grading is an internal activation system that triggers emergency procedures and activities for the management of the response. The grading assigned to an acute emergency indicates the level of operational response required for that emergency. If the risk assessment or situation analysis indicates the need for an operational response, relevant organisations should initiate response activities and then proceed to grading within a maximum of 24 hours of the analysis.

3.2.3 Use of initial Rapid Risk Assessment

The initial risk assessment will characterise the risk to public health and recommend the most effective public health actions specially to prevent amplification of an event into an outbreak. Under this plan, the national Public Health Emergency Operation Centre (PHEOC) shall conduct risk assessment to determine if the incident requires PHEOC activation and determine the level of activation. The assessment can be done by the PHEOC staff and subject matter experts. The levels of activation are determined based on the results of a rapid initial risk assessment after an event has occurred. The PHEOC is activated immediately after the risk assessment is completed and a directive is given. The PHEOC should be capable of activation within 120 minutes as required by IHR indicator for PHEOC to run according to minimum standards.

3.2.4 Grading criteria

The grading process—the risk assessment—starts immediately upon detection/notification or alert, to ensure that a response is urgently and adequately resourced. Continuous reassessment of the incident is required to ensure necessary escalation or de-escalation. The process is often triggered at a tactical level but becomes operational and strategic as additional resources are required or pre-established thresholds are exceeded. The higher the grade of an incident, the more response and management resources will be required. Upon alert that an incident with elevated risk has occurred or is imminent, the incident manager is mandated to monitor the event and adjust the grading and the scale of the response as the situation evolves using the grading level for infectious

and non-infectious events as shown in Tables 8 and 9. This will be done in collaboration with other members of the incident management team. In a national level EOC, the highest grading regardless of the number of grades, would be characterised by extensive impact on the population and the health system, and would require a coordinated, multi-sectoral, multi-jurisdictional response with international assistance.

Table 8: Infectious event grade definitions / level

GRADING		DEFINITIONS	RESPONSE
Grade 0	**Nil**	A public health event or emergency that is being monitored by the National and state emergency response team but does not require an operational response	Local, limited public health impact. Monitor and Prepare
Grade 1	**Low**	An emergency requiring a limited response but can be managed at the state level with minimal or no external support from the National level The provision of National support is coordinated by NCDC	State limited public health impact. National support may be involved
Grade 2	**Moderate**	An emergency requiring a response both state and National level. The provision of National support is coordinated by NCDC	Public Health impact. Require National support
Grade 3	**Severe**	A country emergency, requiring a major/ maximal National response. State level emergency team will not be able to cope with the management of the outbreak.	Severe Public Health impact. Require National support.
Grade 4	**Very severe**	A country emergency that require external / regional response. National level emergency team will not be able to cope with the management of the outbreak. Regional organisations (e.g Africa CDC) may be contacted to help support the coordination	Severe Public Health impact. Require National and Regional support.
Grade 5	**Highly severe**	A country emergency that require external / international response. National / regional level emergency team will not be able to cope with the management of the outbreak. Global health institutions (e.g WHO) may be contacted to help support the coordination	Catastrophic public health impact. Require extensive global support externally

In an outbreak or emergency situation, the severity of clinical signs, transmission of the infection, number of cases, and infection source largely determine the severity of the future development of an outbreak if no emergency measures are implemented to control the outbreak. Under infectious, an event may be rated grade I (mild) at the beginning, but when more cases emerge and more characteristics of the outbreak are known, the outbreak could be re-evaluated as grade II (moderate) or higher. An outbreak may also be rated grade V (severe) at the beginning, but when more data are available to clarify some aspects, the outbreak could be re-evaluated as grade II (moderate)

Table 9: Non-Infectious event grade definitions / level

CLASSIFICATION	COLOUR	DEFINITION AND ACTIVATION
Grade I *(Mild)*		**Type of incident:** Resolution without Deployment **Response:** Resolved **Time of Response:** Call resolved within the communications centre or help desk **Explanation:** No further ongoing police involvement required including advice given and minor incidents / crimes recorded.
Grade II *(Moderate)*		**Type of incident:** Scheduled **Response:** Standard Police response **Time of response:** Deployment within 48 hours **Explanation:** Non vulnerable victim or non-urgent incident where response can be scheduled up to 48hrs with agreement with the caller
Grade III *(Severe)*		**Type of Incident:** Priority **Response:** Priority police response **Time of response: attend within 1 hour** **Explanation:** Vulnerable or repeat victim involved or any incident requiring a prompt response as per the definition including ongoing incidents

Table 9: Non-Infectious event grade definitions / level

CLASSIFICATION	COLOUR	DEFINITION AND ACTIVATION
Grade IV *(Very Severe)*		**Type of Incident:** Emergency **Response:** Requires Immediate response **Time of response:** Must be attended in 15mins and 20 min for rural areas **Explanation:** An emergency is a type of event or imminent threat that: Produces, or has the potential to produce, a range of consequences. Requires coordinated action, usually urgent and often non-routine. Incidents or events often are referred to as emergencies, with the terms used interchangeably. However, not all incidents or events are emergencies Standard Constabulary definition of emergency applies
Grade V *(Highly/Extreme)*		**Type of Incident:** Death **Response**: Requires clean up. **Explanation:** No survival

An incident is a sudden occurrence of a natural or human-induced emergency that requires a response to: Prevent or minimise illness, loss of life, or damage to property or the environment. Reduce economic and social losses.

3.2.5 Removal or changing of grading level

An emergency or an outbreak event may likely escalate or reduce depending on response they provide beyond the first graded score. It is the responsibility of the incident management team to degrade or make amendments on the situation of emergency.

3.2.3.1 Use of Dynamic Rapid Risk Assessment

On receipt of an incident from the Incident Manager, a risk assessment is undertaken to establish the appropriate level

of response by the NCDC ICC team. The Director General is responsible for nominating the Incident Manager (IM) and establishing an Incident Management Team (IMT) In addition, the IM will ensure that the ICC is established for level 2 and 3 responses within two hours of being activated.

At Level 2 and above there may be the need for a Federal response in addition to the State response. The scale of any Federal response required to manage a Level 3 incident will depend on the nature of the incident. All public health incidents will be coordinated through the State Level EOC's.

NCDC's response for higher level incidents may result in the activation of other Federal Agencies, which may or may not take lead of the response. In such cases, it is of importance that NCDC, through its ICC, support the technical and epidemiological requirements.

3.2.6 Grading recommendation process

- Discard the event since it does not present a public health risk. Discarded events should typically be recorded along with a rationale for discarding. This is helpful in situations where the need to revisit the event based on new information arises. As an example, in NCDC, all events are continuously recorded and tracked on its event management platform, 'SITAware'. Recommended actions following the risk assessment process are equally documented including discarding such events where they bear not public health importance.

  'SitAware' is a web-based system designed to assist NCDC and state public health departments in recording and sharing information about incidents and outbreaks. The website is lightweight, operates quickly and offers an intuitive user interface.

- Implement monitoring, mitigation, preparedness and readiness measures. The majority of events can be effectively managed through

standard prevention and mitigation measures using in-country resources. Nonetheless, a proportion of these events will require on-going monitoring by NCDC, WHO and other relevant stakeholders/ partners, as well as active preparedness and readiness measures. Such events can be considered as ungraded or pre-grading.

- Refer the event for grading, if the event: Requires an operational response by NCDC WHO and relevant stakeholders/partners; Has been assessed as high or very high risk. Moderate risks may also be referred for grading, at the discretion of the assessment team.
- Classify it as an event that is reportable under the IHR, in accordance with the IHR Annex 2 decision instrument for the assessment and notification of events that may constitute a public health emergency of international concern (PHEIC).
- Refer the event for consideration as a PHEIC. The determination of a PHEIC is made by the WHO Director-General, following a review of recommendations from the IHR Emergency Committee convened for the event by WHO.[19]

3.2.7 Public Health Emergency Rapid Response Team (PHERRT)

A Public Health Emergency Rapid Response Team (PHERRT) is a technical, multidisciplinary, trained and equipped team that is readily available for quick mobilisation and deployment in case of emergencies to effectively investigate and respond to public health events that present significant harm to humans, animals and environment irrespective of origin or source. The PHERRT shall be established at the national and sub-national levels to provide support depending on emergency grade level and mount timely response within 120 minutes of occurrence of public health emergencies.

Figure 13: Components of an RRT Programme

3.2.7.1 Roles and responsibilities of the PHERRT

The following are the roles and responsibilities of the PHERRT:

a. Investigate rumours and reported outbreaks, verify diagnosis and other public health emergencies including laboratory testing

b. Collect additional samples from new patients and old ones if necessary (human, animals, food, and water)

c. Conduct follow-up by visiting and interviewing exposed individuals, establish a case definition and work with community to find additional cases

d. Assist in laying out mechanisms for implementing infection prevention and control measures

e. Assist in generating a line list of cases and conduct a descriptive analysis of data (person, place and time) to generate hypothesis, including planning for a further analytical study

f. Propose appropriate strategies and control measures including risk communications activities

g. Establish an appropriate and coordinated risk communication system through a trained spokesperson

h. Coordinate rapid response actions with national and local authorities, partners and other agencies

f. Initiate implementation of the proposed control measures including capacity-building

g. Conduct ongoing monitoring/evaluation of the effectiveness of control measures through continuous epidemiological analysis of the event

h. Conduct risk assessments to determine if the outbreak is a potential PHEIC

j. Prepare detailed investigation reports to share with PHEMC committee

k. Contribute to ongoing preparedness assessments and final evaluation of any outbreak response

l. Meet daily during outbreaks and quarterly when there is no outbreak; and

m. Participate in simulation exercises.

3.2.7.2 Composition and Functions of the PHERRT

a. Team Leader

- Coordinates all aspects of the operations response, planning and management which includes:
  - i. Selecting participating organizations and assign responsibilities
  - ii. Design, implement and evaluate control interventions
  - iii. Coordinate technical EPR subcommittees and overall liaison with partners
  - iv. Submit daily situation report on the evolution of the outbreak
  - v. Manage information for the public and news media
  - vi. Provide operational support including mobilisation of resources
  - vii. Ensure staff well-being, Security and evaluate the situation (information gathering and analysis),
  - viii. Evaluates available options and monitor resources.

b. Case Management/Infection Prevention and Control Expert

i. Ensure the availability of guidelines and SOPs for case management and infection prevention and control in all health facilities

ii. Strengthen isolation facilities and reinforces infection prevention and control measures

iii. Conduct risk assessment of health care workers

iv. Ensure that appropriate medical care is provided to patients follows (refer to Operational Guidelines for National Ambulances Services)

v. Provide ambulance services for evacuation and logistic movement of patient on referral, to designated centre linked to NEMSAS

vi. Collect data from all treatment facilities (if available) and submit it to the surveillance subcommittee

vii. Ensure appropriate disinfection of homes and environments with suspected/ probable/confirmed cases/ deaths of an infectious disease

viii. Conduct safe burial of the dead from isolation facilities and community deaths

ix. Ensure the training and refresher training of health workers in the isolation facility and other health facilities in the affected district

c. Surveillance Officer/Laboratory Officer

i. Ensure the availability of all surveillance guidelines and tools in the health facilities

ii. Ensure the use of the outbreak case definition

iii. Conduct active case finding, case investigation, contact tracing and follow-up

iv. Verify suspected cases/ alerts/ rumours in the community

v. Ensures proper filling of case investigation, contact tracing and follow-up forms

vi. Ensure proper collection, packaging, transport, and testing of specimens from suspect/probable cases/ deaths

vii. Communicate test results to clinical services

viii. Conduct data management and provides regular epidemiological analysis and reports

ix. Train health personnel in disease surveillance

x. Ensure close linkage with burial, infection control and social mobilisation groups.

d. Communication/Social Mobilisation Expert

i. Ensure the availability of risk communication materials and plans

ii. Conduct rapid assessment to establish community knowledge, attitudes, practices and behaviour on prevailing public health risks/events
iii. Organise sensitisation and mobilisation of the communities
iv. Serve as focal point for information to be released to the press and public
v. Liaise with the different subcommittees, local
vi. Leadership and NGOs involved in activities on mobilizing communities
vii. Provide psychological and social support to suspected/ probable/confirmed cases, affected families and communities

e. Logistician

i. Provide budget support/ funding for epidemic preparedness and response
ii. Procure equipment and supplies
iii. Maintain adequate stocks of supplies and equipment
iv. Arrange for transport and communication systems
v. Liaise with other agencies for logistical support
vi. Provide accountability for all the resources used during epidemic preparedness and response

f. Other thematic subject matters experts such as

i. Point of Entry
ii. Chemical and oil spill
iii. Lead poisoning
iv. Radiation

Roles and functions are as relevant to their participation in the emergency response at the time.

3.2.5.3 Deployment of the National PHERRT

The national PHERRT shall be deployed when the emergency is beyond the coping capacity of the States and Local Governments. Below is the deployment process in NCDC as an example.

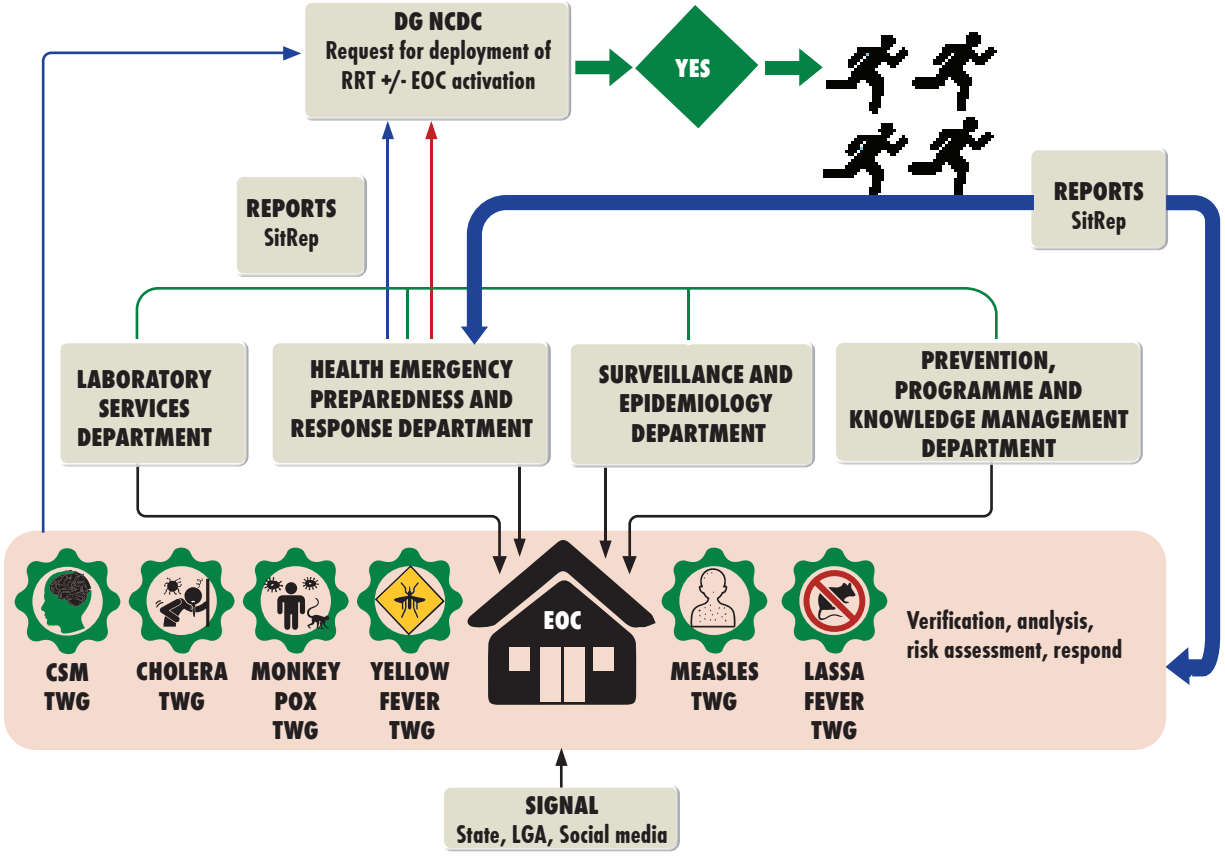


Figure 14: Proposed RRT Deployment Process

3.2.8 Incident Management System (IMS) structures

The Incident Management System (IMS) structure below is developed for public health emergencies management. In event that the public health emergency is however intentional in nature (e.g., bioterrorism) which will require a law enforcement/security response in addition to a public health response, this IMS Structure shall be expanded to integrate with the IMS structure of other relevant response plans (e.g. NCBEPRP) in order to accommodate other designated officials. Refer to the Infectious Disease and Outbreak Response Plan (IDORP) for further details.

3.2.8.1 Functions and roles of IMS

The functions of the other IMS members are highlighted in the Incident Command system in Chapter 4. In the event of a national disaster, NEMA as agency of the federal government shall coordinate all hazards in the country using the structure as shown in Figure 15.

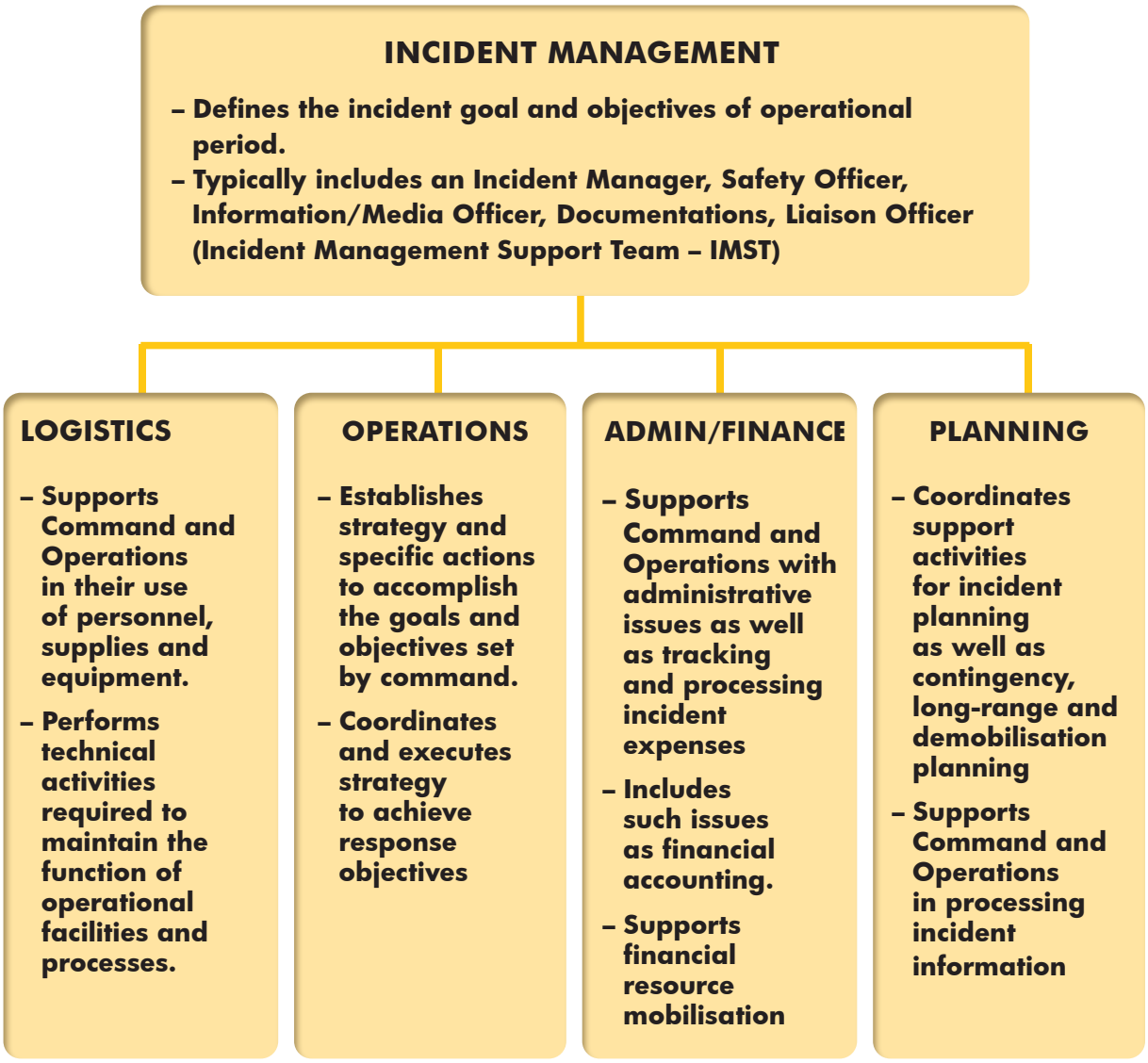


Figure 15: Typical IMS Structure

CHAPTER 4
Response

4.1 Multi-hazard Core Response Mechanisms

This section details the mechanisms used to manage public health emergency such as:

- How incidents are communicated to FMoH and other relevant MDAs.
- What mechanisms are used to officially declare and grade an emergency.
- Which structures will be put in place at the strategic level, at the operational level and at the field level for an efficient and accountable response.

Which platforms for coordination between the health and the non-health sectors exist during a response phase and how the health sector relates to them.

4.1.1 Concept of Operations

This concept of operation is a core element of emergency operations plan that describes essential components of the emergency response. This includes the policies, roles and responsibilities of response management; and how the organization structural and functional element works together.

4.1.2 One Health response to emergency

The One Health approach to public health emergency aims to integrate response mechanism in both humans and animals in the environment using multi stakeholders. To deliver on her disease prevention and control mandate, the NCDC will work closely with the Ministries of Health at

Federal, State and Local Government levels to improve the coordination of the health system response to public health outbreaks. NCDC will support states and LGA to develop plans, based upon the risk profile of the locality and harmonize those plans at the national level.

NCDC provides an integrated approach to protecting the lives of Nigerians through effective proactive public health services, delivered through government health departments at federal, state and local government levels in collaboration with strategic partners and stakeholders working through the state and local government structures.[23]

These stakeholder relationships can be visualised as shown in Figure 16.

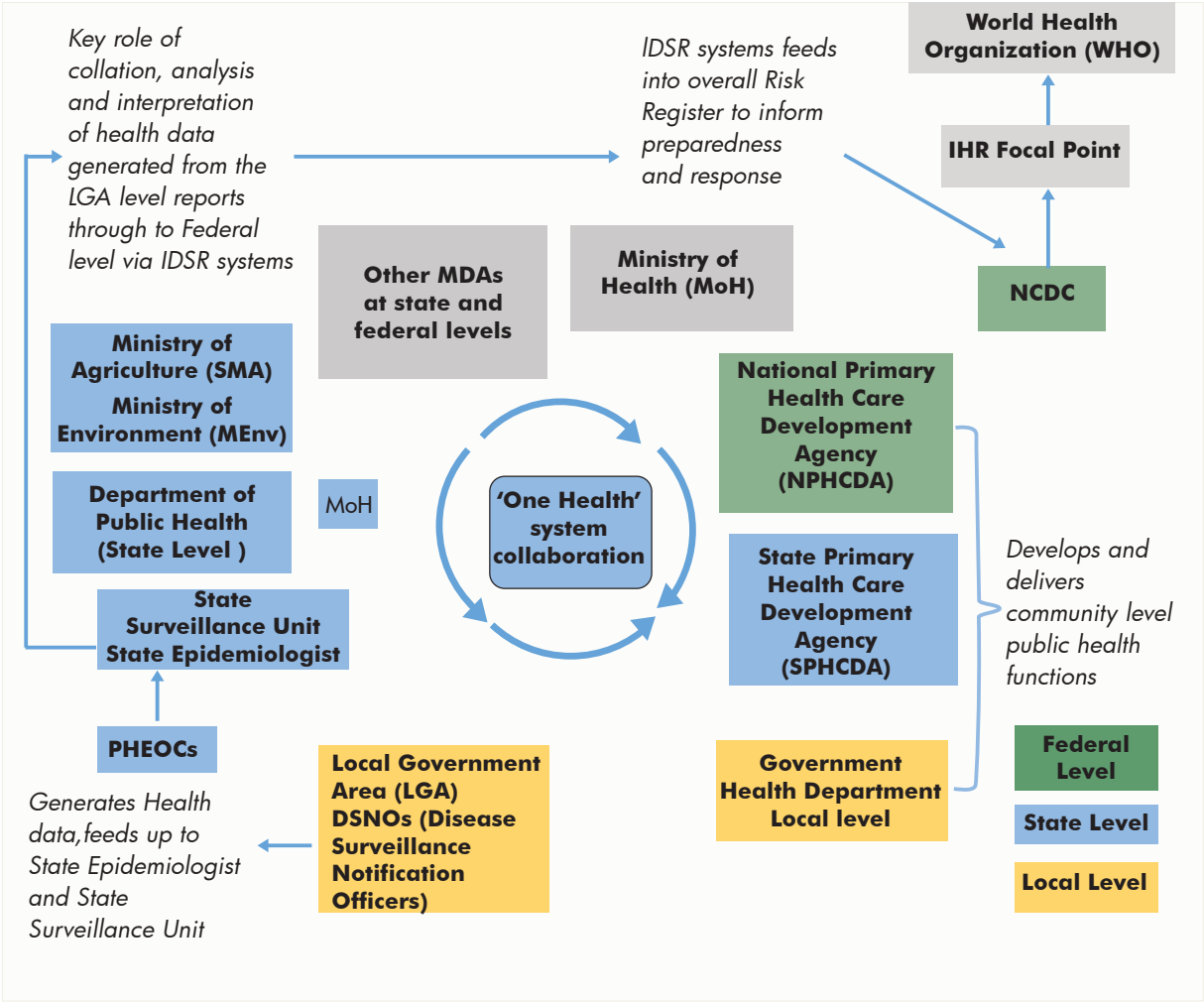


Figure 16: Stakeholders' relationship in emergency, preparedness and response [23]

Health is on the concurrent-list item in the Nigerian constitution, therefore the states exercise autonomy in their preparedness and response and bear significant responsibility for preparation including investment.

4.2 Conceptual Framework for Health Emergency Response

The conceptual framework of health emergency preparedness typically describes what identified stakeholders will need to prepare for, respond to, and recover from public health emergencies. In this section, we adapt the common ground preparedness framework (CGPF) model which combines comprehensiveness with specificity while describing preparedness activities, incident action plans and after-action assessments, resource distribution, information systems as well as training. The CGPF identifies the processes required to address an incident that threatens to overwhelm the routine capabilities of the country's public health system. The processes are grouped into six categories: prepare, monitor, investigate, intervene, manage, and recover. Each of these six process groups falls within 1 of 3 time periods: pre-incident, incident, and post-incident.

Before an incident, all stakeholder organisations are required to prepare by developing capacities for incident response including exercising them for operational readiness. They also monitor, conduct surveillance to identify new incidents as timely as possible. When an incident occurs, they investigate to identify the problem, weigh the extent of resources required to intervene and then intervene to control the problem or its effects. Throughout the incident, organisations should manage their activities, synthesising current information to help direct further activities. Finally, recovery processes deal with long-term effects of the incident and return of operations to normal.

It is important to note that the entire CGPF processes are interdependent, with output from one process serving as input to another. Figure 3 depicts the framework, with arrows indicating generalised process outputs and inputs.

The 'Prepare' group of activities includes hazards identification and mapping, developing, and reviewing policies and plans, mitigating risks including prevention activities. The 'Monitor' and 'Investigate' groups overlap because their processes interact closely. However, the Monitor processes are continuous, whereas the Investigate processes are activated only when needed. The 'Intervene' group contains a wide range of processes, including communicating with response partners and the public, isolating the source of the problem, addressing the effects, and supporting those affected. The 'Recover' group processes return public health operations to a normal state and address an incident's long-term effects. One process, 'assess organisational response capacity,' is shown in both the recover and prepare process groups because it ties post incident evaluations to planning for the next incident.

Consistent with the principles of Incident Management System (IMS), the Management processes can direct and coordinate other processes by setting objectives, distributing information, and allocating resources. An important challenge in emergency preparedness is communication and information flow among processes. CGPF also includes a 'provide communications and information management' process that spans Process groups and Incident time periods, indicating its pervasive role.

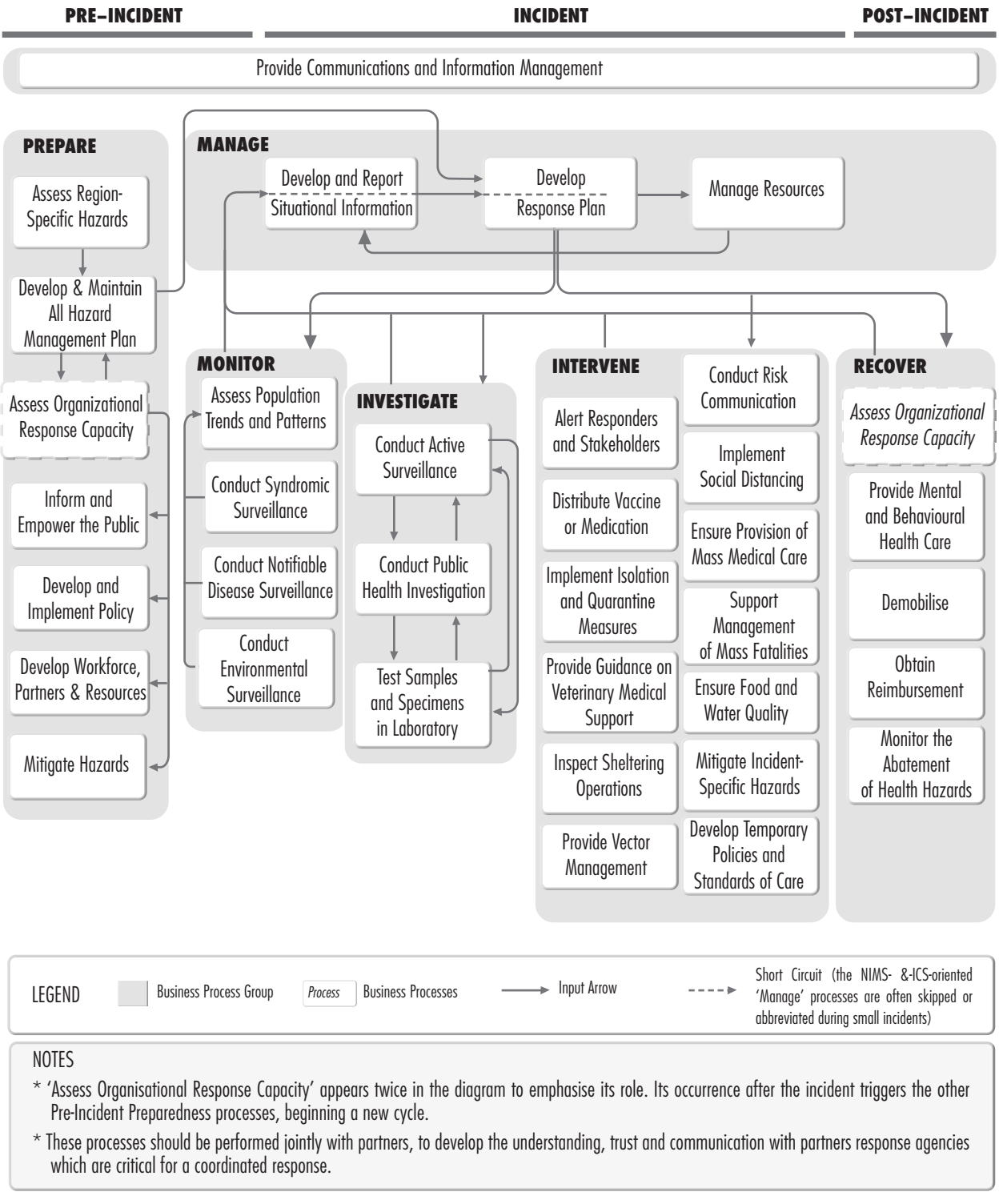


Figure 17: The Common Ground Preparedness Framework

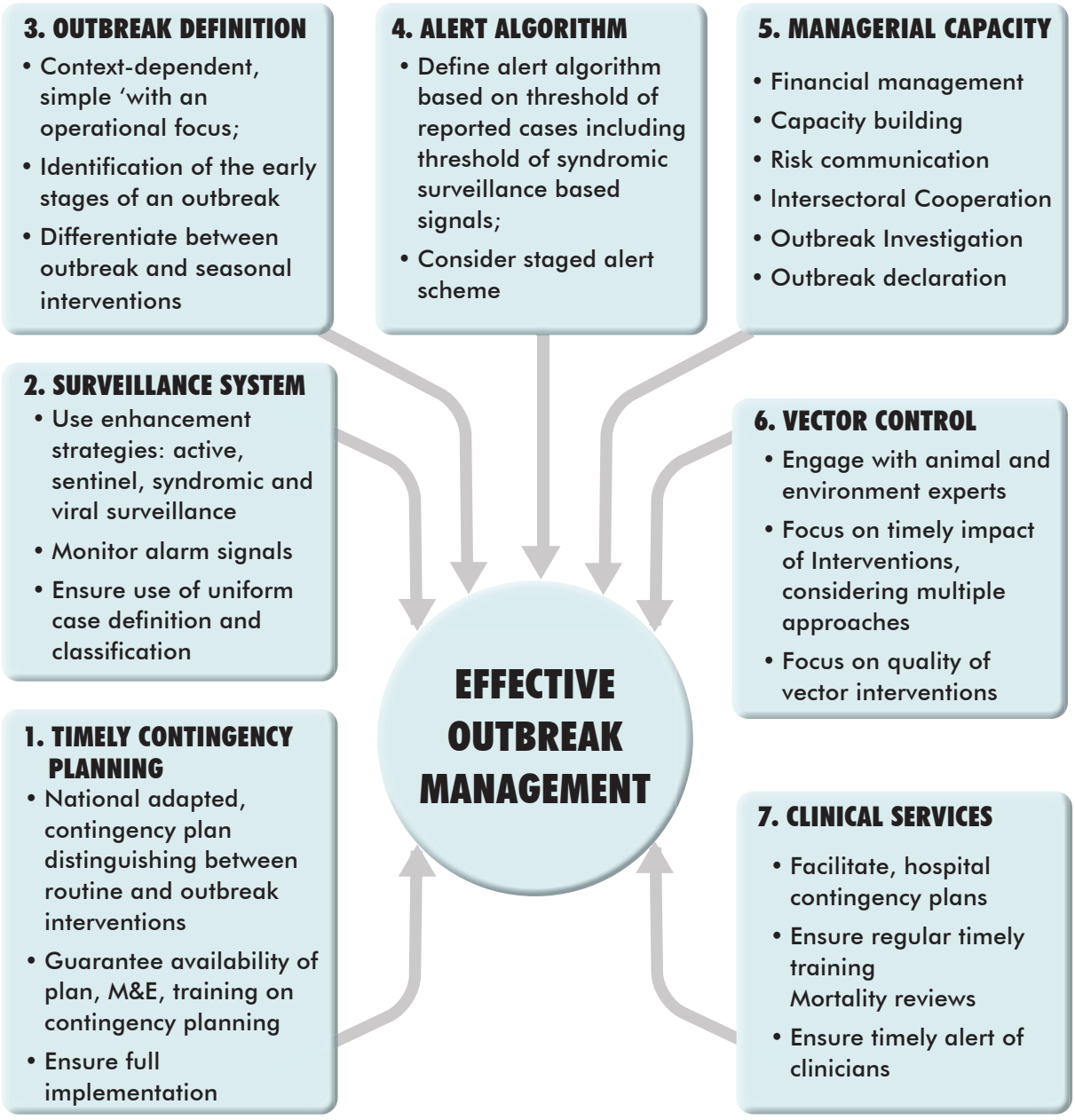


Figure 18: Effective Outbreak Management

4.2.1 Plans and guidance

While the NEMA NCP is entrenched with the national authority and responsibility for all hazard disasters, this section provides the strategic framework on the public health authorities responsibilities in preparing for and responding to public health emergencies. The NPHMHEPRP is the operational plan which details preparedness and response arrangements to multi-hazards (there is a response plan for infectious disease in use at NCDC). This plan works in a coordinated manner with other sectoral plans in other response MDAs.

4.2.2 Notification and communication mechanism

Internal communication has a crucial role to play in ensuring that public health authorities are adequately prepared for the escalation or de-escalation of a health emergency. All necessary information that might impact on different federal, state and LGA systems during Levels 1-3 responses are to be shared from the ICC Incident Management Team via the NCDC DG with approval from the Honourable Minister of Health.

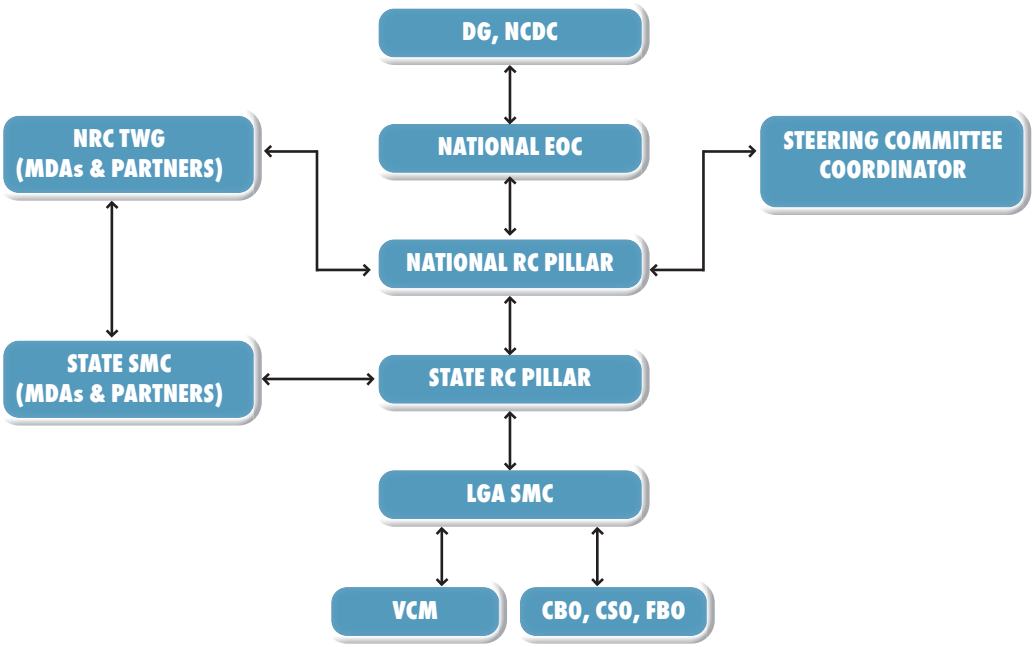


Figure 19: NCDC/FMoH Internal Notification and Communication

4.3 Coordination Framework for State Risk Communication Structure

4.3.1 Inter-agency and hierarchical coordination mechanisms during response

4.3.1.1 NEMA

a. Declaration of a State of Emergency

Declaration of a state of emergency shall depend on the magnitude of the disaster. NEMA, SEMA and LEMC shall make recommendations to the appropriate organ of government on the declaration of a state of emergency at national, state and local levels respectively.

b. Disaster Response Planning

NEMA, SEMA and LEMC shall conduct disaster response planning in their areas of jurisdiction. This shall include:

i. Identifying relevant stakeholders

ii. Defining stakeholder's roles and responsibilities

iii. Developing agreed mechanism for response coordination

iv. Developing shared agreements on stakeholder's response activity monitoring and evaluation

v. Meeting to harmonise response strategies, lessons learned, and challenges encountered

vi. Documenting stakeholders' experience.

c. Disaster Response Plans

NEMA, SEMA and LEMA shall collaborate with relevant stakeholders to develop Disaster Response Plans (DRPs) at federal, state, and local government respectively.

4.4 Emergency Response Phase Out

Closing down special operational support arrangements. It also includes organising evaluations, AARs or at least lessons-learning exercises for both individual projects and the overall sectors of humanitarian response. Planning and overseeing the phase-out and evaluation processes would normally be the responsibility of the Incident Manager.

In humanitarian perspective, activities should be phased out when the exceptional needs arising from the emergency no longer exists and normal health and related services, together with ongoing development activities, can meet the needs of the population. Ideally, there would be a smooth transition from relief through recovery and into normal and development activities.

4.4.1 Phasing out coordination activities

Coordination activities must be continued as long as coordination is necessary, but the resources dedicated to coordination may be reduced progressively as activities become more routine and the number of health actors decline

4.4.1.1 Steering committee functions

At this phase the committee will reduce frequency of its meetings and reassign adhoc staff from other sectors back to their respective ministries, departments and agencies.

4.4.1.2 Deactivation

a. Definition of the criteria for response grade

In taking a decision to deactivate or de-escalate an emergency response the risk assessment process will be used to determine whether or not the response to the incident is complete or no longer appropriate. This will inform the basis for recommending the stand down process, either de-escalation of activities or complete de-activation. The parameters usually considered are the number of cases and/or the quantity of resources needed. Sometimes the support received for an emergency may reduce

due to declining support from donors and stakeholders and may not actually be because the emergency is abating.

In principle, emergency response should be phased out when the exceptional needs arising from the emergency no longer exist and normal health and related services, together with ongoing development activities, can meet the needs of the population. Ideally, there would be a smooth transition from relief through recovery and into normal and development activities. In practice, response activities sometimes have to be phased down, and perhaps even out, earlier because of a lack of resources.

- Considered when:
  - Significant reduction in scope/scale of the incident
  - Evidence of significant deceleration in the epicurve
  - No evidence of sustained human to human transmission
  - Media attentions show downwards trends
  - Cases having little/no impact on national, social, business or economic affairs
- The EOC Manager, will determine when to deactivate the EOC and transit to normal operations.
- The process of demobilising includes demobilising all pillars/units, documenting the incident in preparation for requests for state/federal disaster recovery funds, and documenting the incident in preparation for the After-Action Report and updating to national plans and procedures.
- To accomplish this:
  - The EOC Manager will notify sections when they are no longer required in the EOC.
  - All stakeholders must ensure that any open actions not yet completed will be handled after the deactivation.
  - An official notification will be sent to all involved internal

and external participants that the EOC is deactivated.

– This action signifies the transition from the response phase to the recovery phase.

b. Definition of the response grade review process (who proposes the review, who decides, how often is it reviewed)

Emergency response is sometimes a cyclical response involving repeated assessment, planning action and review to respond appropriately to needs and capacities as they evolve. Usually, the review is proposed and decided on by the Incident Manager and the Incident Management team to the DG of NCDC and notification to the Ministry of Health and relevant international partners. As the incident de-escalates/closes it may be appropriate to convene a Technical Working Group (TWG) to continue operational activities, particularly where there is a likelihood of another occurrence/outbreak in the future.

The phasing out of emergency assistance and activities must be envisaged from an early stage of the operation – preferably at the time when projects are planned. The phasing out of individual activities and of the whole emergency programme and operational set-up (including any field sub-offices) must be carefully planned and managed. The steps involved include Phasing out coordination activities, phasing out programme activities and Closing down the emergency operational support platform

4.4.1.3 Phasing out coordination activities

Based on the level of the emergency and proper consideration of critical factors, coordination of responses can either be escalated or phased out. In phasing out coordination activities, the following processes are considered:

- Progressively reduce the number of meetings, the frequency of bulletins, etc.

- Progressively hand over to states full responsibility for information management and convening and facilitating coordination meetings.
- Work with partners to try to ensure a smooth handover of the activities, supplies and equipment of those that are withdrawing to the SEMA, SMoH and other relevant stakeholders.
- Agree with the Health Coordinator, FMoH and other health partners on the timing of the last emergency coordination meeting.

4.4.1.4 Closing down the Emergency Operational Support platform

Special arrangements for operational support to the emergency programme activities should be progressively scaled down as the field activities are scaled down:

- Procurement arrangements may be phased out ahead of other aspects.
- Security and telecommunications elements must be maintained until all field activities that require NCDC staff and other MDAs personnel presence in the field are completed.
- Adequate HR and financial management arrangements must be maintained until all personal files are closed and all payments and financial reports completed.

4.4.1.5 Reporting

All stakeholders must ensure that all required forms or reports are completed prior to deactivation and have copies made of all logs, reports, messages, and any other documents used and received in the EOC. Leave originals in the position folder

4.4.1.6 Documentation and archiving

All logs, reports, messages and any other documents used during the incident must be properly documented and archived. Both hard and soft copies should be made available for future references, research and planning (Ref: Medical Countermeasure

documents).

4.4.1.7 Remaining resources and assets reallocation

The IM will return supplies and equipment to the storage location and should be secured.

On completion of each emergency response, materials and equipment should normally be handed over as a donation to the SEMA, SMoH or another designated national entity or returned to the stockpile:

- Equipment and materials purchased with should never be given away to individuals or staff.
- All donations should be properly documented and properly transferred to appropriate government offices and personnel.
- Security and telecommunications elements must be maintained until all field activities are completed (Ref: Medical Countermeasure documents).

4.4.1.8 After Action Review process

After Action Review (AAR) is a qualitative review of actions taken to respond to an emergency as a means of identifying gaps, lessons and best practices. The Incident Manager (IM) is responsible for ensuring that an after-action review (AAR) process is undertaken soon after an incident has been de-escalated. This entails a structured, facilitated discussion to capture lessons learnt and review the incident response. All organisations that participated in the response should participate in the AAR.

a. Purpose:

- After the After-Action Review, the Plans Section will write an AAR/Preparedness Plan, which serves multiple purposes.
- Specifically, it:
  - Records what occurred during the exercise (based on response evaluations, such as the After-Action Review).
  - Provides feedback on the achievement of capabilities and associated activities.

- Suggests recommendations for improved preparedness.
- Establishes consensus and buy-in on next steps.

b. Objectives of After-Action Review (AAR)

- Establish how actions were implemented during the response, in contrast to how they are supposed to or normally happen, according to plans and procedures.
- Identify the gap between planning and practice. Analyse what worked well and what worked less well and why.
- Identify actions to strengthen or improve performance and how-to follow-up.

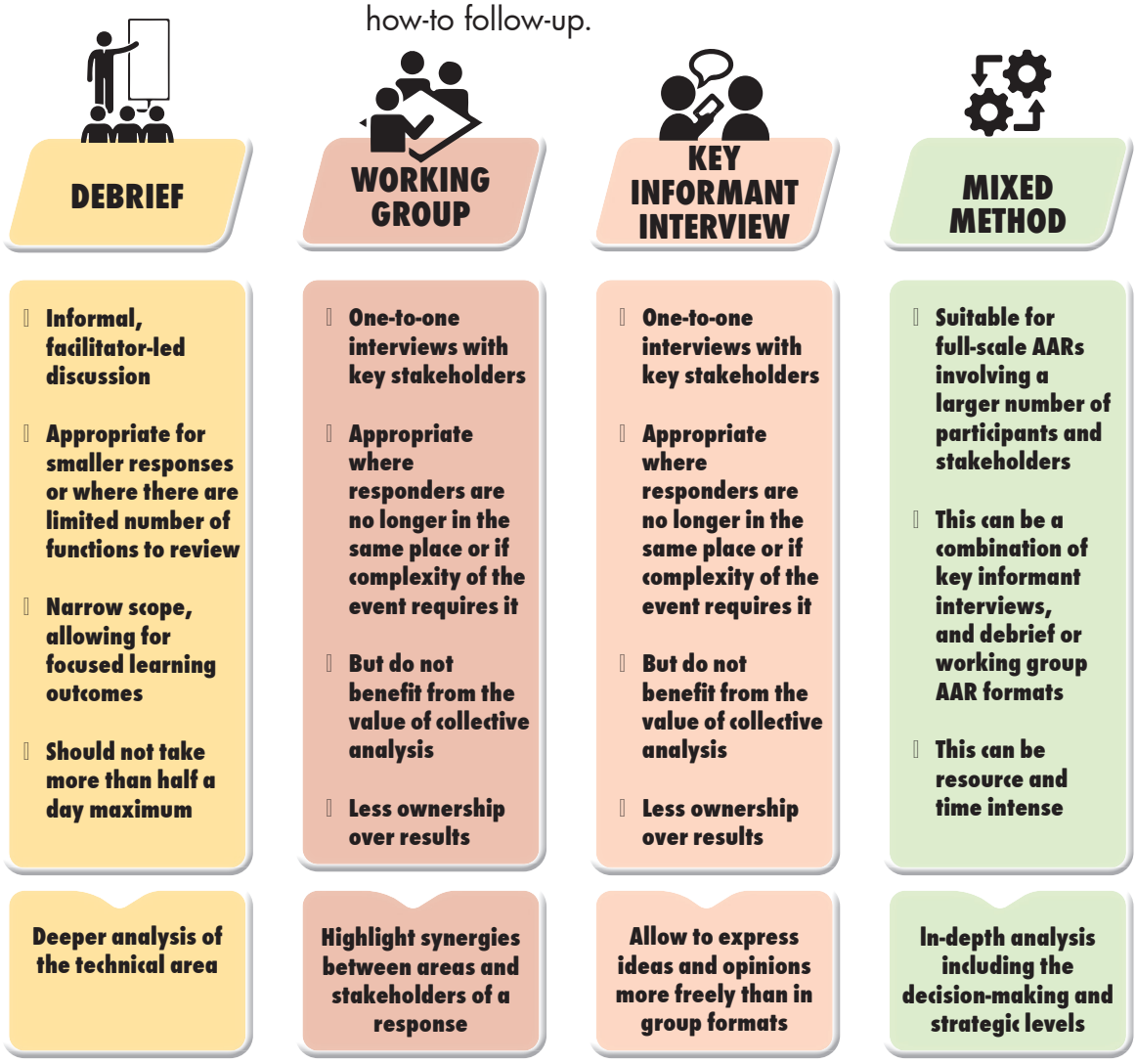


Figure 20: Proposed methodology

Figure 21: Key steps of an After-Action Review process

4.5 Recovery

Recovery refers to the restoration of damaged infrastructure and resources, restoration of routine surveillance and monitoring activities and licensed health facilities, restoration of community infrastructure and resilience, evaluation of response outcomes, conduct of an after-action review, and implementation of an action plan to mitigate risks and improve future responses

Recovery during emergency is aimed at re-establishing the economic, social and cultural life of the people affected by disaster and to rebuild damaged areas.

Recovery is also an opportunity to enhance prevention and increase preparedness, thereby minimising the potential consequences of another event.

The general goal for recovery should be revamping the health sector. This is to say that the system will have safer and improved infrastructure, that will be ready to

prevent and manage key public health hazards and future disasters and provide equitable and affordable services to all.

Health services need to be accessible and of adequate quality to address the changed health needs resulting from the disaster while restoring the health system in such a way that it will be back on the developmental level where it would have been had the disaster not taken place. The recovery framework should ensure an appropriate sustainable health system, strengthen disaster preparedness, management capacity to deal with future crises, instituting vulnerability and risk reduction measures.

The challenge is to find the right balance in restoring the system to its previous level and how much better it needs to be rebuilt. This will depend on the status of development of a state and what a state can afford to sustain. The post-disaster period offers important, but not unlimited and often short windows of opportunities for health sector reform.

The need for reconstruction may be high, but through the help of donors this can be achieved which can equally reduce the resistance to change.

First, it is better that the reconstruction addresses key issues currently faced by the health sector such as health financing to reduce out-of-pocket expenditure by the disaster affected population and provide better health service insurance coverage, benefits, and accessibility to the poor and other vulnerable population sub-groups.

Second, the future health system should be designed to be prepared for and responsive to all major hazards in the future. The building standards and codes for disaster prone zones are critical. Hospitals need to be constructed to higher standards to ensure their integrity and functionality when another disaster hits. Risk based and all-hazard approach for emergency preparedness and response should be practiced.

Third, the existing health system in the affected areas may need to be rationalised and streamlined to meet the changed needs because of different population profiles and epidemiology. Duplications in the public health system can be reduced. Significant pre-disaster constraints in the performance of the health system need to be taken into account and planning for recovery should include further analysis to address these where relevant.

However, stakeholders involved in Post Disaster Need Assessment (PDNAs) need to be cautious with the 'window of opportunity' to introduce institutional and regulatory reforms or to aim for significant improvements in short periods to attain health SDGs. The need for reform needs to be balanced with what can be practically achieved in the context of a disaster recovery framework. There can be high expectations, but there is limited evidence that major reforms in such context works.

There is not always a clear distinction between humanitarian and recovery health interventions. As soon as the immediate needs are addressed, other activities that aim to restore or where possible improve pre-existing health services become possible and should be undertaken. Those recovery activities should already take place in parallel to the humanitarian relief phase and will continue in the period thereafter. For example, in the acute phase, priority will be to re-establish the delivery of life saving health services, and over time, minimum initial packages should be expanded towards more comprehensive services.

An essential element of post disaster recovery is to ensure that the humanitarian response and its coordination are linked to national disaster management mechanisms. Major disasters are characterised by the fact that humanitarian agencies assume significant direct responsibility in re-establishing service delivery. Sometimes according to standards that are higher than what existed before and that maybe unsustainable.

A main objective for recovery and reconstruction is to ensure that the capacities of the local and national health authorities are strengthened so they resume their full responsibility to manage service delivery. Costing estimates for recovery and reconstruction include the costs required to repair or replace damaged infrastructure and costs to compensate losses.

Additionally, funding is required for re-establishing essential services, support to governance and management capacity, and to address crucial issues as access and quality in the context of possibly increased morbidity and lower purchasing power. The total financial budget should take into account the existing total health expenditures and absorption capacity of the health sector so that it is realistic. The difference between the cost of the losses and the cost of the proposed response should not become too large.

Inter-sectoral discussions should take place prior to the design phase of any

assessment or more generally any data collection or analysis exercise. Standards should be discussed and agreed upon, particularly on key dimensions such as administrative boundaries, place names and some of their key attributes such as demographics, which will provide a solid basis for data comparability and therefore cross sectoral analysis. Several other sectors are considered as determinants of health: Environmental health (including hygiene, water and sanitation), nutrition and food-security, shelter and education.

Available data suggest that there is a pattern of gender differentiation at all levels of the disaster process: exposure to risk, risk perception, preparedness, response, physical impact, psychological impact, recovery and reconstruction. Due to social norms and their interaction with biological factors, women and children-particularly girls- may face increased risk to adverse health effects and violence. They may be unable to access assistance safely and/or to make their needs known. Additionally, women are insufficiently included in community consultation and decision-making processes, resulting in their needs not being met. Different age groups will also be affected differently and will have different needs. Chronic diseases common to older age, such as coronary heart disease, hypertension, diabetes and respiratory diseases, can worsen without adequate routine assessment and medication.

Prior to deactivation, the DG NEMA in the case of disaster, will assign staff to a Disaster Recovery Group (DRG) to establish the short-term recovery goals that facilitate long-term recovery.

The recovery plan should address the following:

- The recovery effort's goals
- The recovery organisation's structure, including the roles of government, the public, business, and not-for-profit organisations in the process
- Short-term recovery operations, such as debris removal and volunteer and donations management
- Temporary shelter and housing, permanent housing
- Economic recovery
- Environmental recovery
- Infrastructure and lifelines
- Financial and community resources
- Social and psychological aspects of recovery

4.5.1 Role and interaction of health sector in multi-sectoral recovery processes

Experiences show that following the relief phase, investment in affected communities drop considerably, the Early Recovery Framework is intended to provide a framework for the national disaster recovery effort. It must be stressed that the Framework is intended as a guide. The Recovery Process, as with any other process, must be lead, directed, controlled, monitored and evaluated, in order for it to achieve its objectives. The effectiveness of the Framework is determined by the commitment to its procedures and uses. Recovery is a phased process in which the phases overlap, and the boundaries are blurred. Action in the Recovery context will be required at:

a. The Immediate Response Phase

b. The Restoration phase – Short-term Recovery

c. The Reconstruction phase – Medium term Recovery

d. The long-term Reconstruction Phase

Recovery is a complex, dynamic process which depending on the nature of the event, may extend over many years. This Framework focuses attention on Immediate Response, Restoration and Reconstruction, short- and medium-term Recovery[12]. The Framework is not intended to replace any wider National Strategic Health Development Plan II that the government through FMoH may have in place.

4.5.1.1 Objectives

The objectives of the Framework are:

a. Prioritise recovery action requirements.

b. Promote effective, coordinated actions of all agencies involved in the recovery process

c. Promote timely decision-making and the implementation of such decisions in support of the recovery goal.

d. Reduce, and where possible eliminate, duplication of effort and waste of resources.

e. Establish and maintain appropriate accounting and reporting arrangements for the recovery process.

f. Provide appropriate arrangements for the dissemination of public information.

g. Enhance capacity for dealing with disasters in future.

h. Reduce vulnerability to disasters in future.

4.5.1.2 The Early Recovery Framework

The Early Recovery Framework encompasses a detailed assessment of a range of sectors and activities that take into account the capacity, strengths and resilience of both local communities and the Government Group in charge of recovery processes within the Federal Ministry of Health.

a. Demobilisation Phase

- Authorise demobilisation of section, branches, and units when they are no longer required
- Notify higher level EOCs and other appropriate organizations of the planned demobilisation, as appropriate
- Ensure that any open actions not yet completed will be handled after demobilisation
- Ensure that all required forms or reports are completed prior to demobilisation
- Be prepared to provide input to the after-action report
- Proclaim termination of the emergency response and proceed with recovery operations
- Deactivate the EOC at the designated time.
- Deactivate response and relief operation at Centre and resume L0 activities plus if the situation is under control of the State, then to withdraw and deactivate response mechanism at the Centre, step by step, in coordination with the State. Send out deactivation notification to all ministries. Send out NCCM team for taking stock and documentation of resources used and other preparedness activities during the alert and initial quick response phase of the disaster after the State has completed its response activities.[12]

Table 10: Research framework in an all hazards multi sectoral public health response

PRIORITY	RESEARCH QUESTION
RESEARCH AREA 1: PLANNING AND OTHER PRE-INCIDENT ACTIVITIES	
Planning and organisational structure of public health emergency preparedness	What strategies could be effective in improving public health emergency preparedness planning processes and organisational structure?
Community engagement in public health emergency preparedness efforts	How can diverse communities (e.g., demographic, geographic, cultural) be best engaged in public health emergency preparedness related activities, and how can their engagement be sustained?
Anticipating population behaviour during disasters	How do individuals and communities behave during disasters, and what factors (sociodemographic, sociocultural, socio-political) affect those behaviours?
RESEARCH AREA 2: KEY RESPONSE CAPABILITIES	
Surveillance and early warning system in support of public health emergency preparedness efforts	Which strategies can improve the effectiveness of the routine epidemiological surveillance system and the early warning systems?
Public health laboratory systems	How effective are the strategies being implemented in attaining a seamless laboratory network that can promptly detect, characterise, and confirm threat agents?
Risk communication	Which strategies are effective in disseminating messages to the public that lead to appropriate preparedness and response actions?
Logistics (Medical countermeasures)	What approaches are effective in promptly distributing logistic supplies (medical countermeasures) during a public health emergency?
Recovery	What approaches can improve the public health system's ability to transition into post-emergency phase and recover from public health emergencies?
Workforce and training	What level of capacity (training) is needed for the public health workforce to effectively and efficiently respond to public health emergencies?

PRIORITY	RESEARCH QUESTION
RESEARCH AREA 3: ACCOUNTABILITY AND QUALITY IMPROVEMENT	
Quality improvement	What approaches can be used to ensure that the public health system has access to, and uses standards, metrics, and quality improvement tools?
Data sources and data collection	What approaches can be used to develop data sources to support public health emergency preparedness research and evaluation?
Tools and templates to promote the transfer of research findings into practice	Are stakeholders adapting and implementing research findings?

Annexes

Annex 1: Nigeria STAR Risk Profile Table

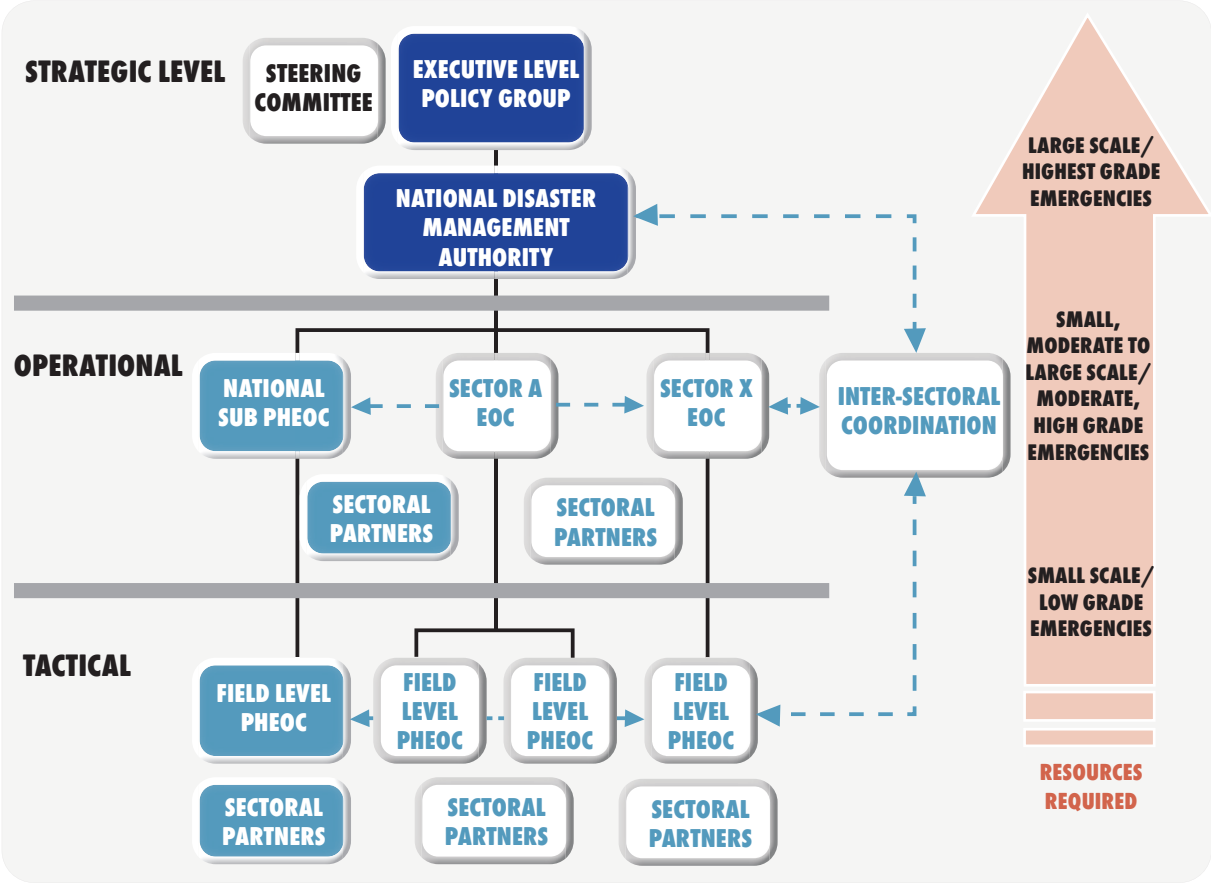
	HAZARD AND EXPOSURE			LIKELIHOOD															SEVERITY, VULNERABILITY AND COPING CAPACITY			IMPACT	CONFIDENCE LEVEL	RISK LEVEL
					SEASONALITY													LIKELIHOOD						
	HAZARD	HEALTH CONSEQUENCES	SCALE	EXPOSURE	FREQUENCY	J	F	M	A	M	J	J	A	S	O	N	D		SEVERITY	VULNERABILITY	COPING CAPACITY			
1	Communal/ Religious conflicts	Fractures, injuries, disabilities, depression, exposure to other infectious disease, impairment, displacement, Malnutrition, rape, arson, unwanted pregnancies, death	North Central (Benue, Kogi, Nasarawa, Plateau, Kwara) North West (Kaduna, Zamfara) North East (Adamawa, Taraba) South South (Cross River, Rivers) South East (Ebonyi)	Above 25 victims	Perennial													Very likely	Very high severity	High	Low	Severe	Good	High
2	Floods	Displacement, water borne diseases, trauma, electrocution, malnutrition, hypothermia, vector borne diseases, disruption of health services, death	36 states plus FCT. Mainly coastal and riverine areas.	100 households	Perennial													Likely	Moderate severity	High	Partial	Moderate	Good	Moderate
3	Pipeline vandalisation fire incident	Injuries, burns, respiratory illness, depression, pollution, skin irritation, cancer, displacement, disability, malnutrition, disruption of health services, death	Oil producing states (Akwa Ibom, Bayelsa, Delta, Rivers, Ondo)	5 victims	Perennial													Likely	Moderate severity	High	Partial	Moderate	Good	Moderate

	HAZARD AND EXPOSURE			LIKELIHOOD															SEVERITY, VULNERABILITY AND COPING CAPACITY			IMPACT	CONFIDENCE LEVEL	RISK LEVEL
					SEASONALITY													LIKELIHOOD	SEVERITY	VULNERABILITY	COPING CAPACITY			
	HAZARD	HEALTH CONSEQUENCES	SCALE	EXPOSURE	FREQUENCY	J	F	M	A	M	J	J	A	S	O	N	D							
4	Insurgency	Injuries, burns, respiratory illness, depression, pollution, skin irritation, cancer, displacement, disability, malnutrition, disruption of health services, water borne diseases, death	Oil producing states (Akwa Ibom, Bayelsa, Delta, Rivers, Ondo) and North-East	5 victims	Perennial													Likely	Very low severity	High	Partial	Moderate	Good	Moderate
5	Building collapse	Injuries, trauma, death, displacement	36 states plus FCT	30 victims or more	Perennial													Likely	Moderate severity	Low	High	Minor	Good	Low
6	Terrorism	Injuries, burns, respiratory illness, depression, pollution/ contamination, displacement, disability, cancer, malnutrition, disruption of health services, water borne diseases, death	North East (Borno, Yobe, Adamawa, Bauchi, Gombe)	20 victims	Perennial													Almost certain	Very high severity	High	Partial	Severe	Good	Very high

	HAZARD AND EXPOSURE			LIKELIHOOD														SEVERITY, VULNERABILITY AND COPING CAPACITY			IMPACT	CONFI-DENCE LEVEL	RISK LEVEL
					SEASONALITY																		
	HAZARD	HEALTH CONSEQUENCES	SCALE	EXPOSURE	FRE-QUENCY	J	F	M	A	M	J	J	A	S	O	N	D	LIKELI-HOOD	SEVERITY	VULNER-ABILITY	COPING CAPACITY			
7	Building Fire	Injuries, burns, respiratory illness, depression, pollution/ contamination, displacement, disability, death	36 states plus FCT	10 victims	Random													Un-likely	Moderate severity	Low	Partial	Moder-ate	Good	Low
8	Stampede/ Mass gathering/ Riots/ Demonstra-tions	Injuries, fractures, trauma, death, suffocation	36 states plus FCT	10 victims	Random													Un-likely	Very low severity	High	Partial	Moder-ate	Good	Low
9	Zoonotic	Ebola	Points of entry, all states	1 confirmed case in the country	Rare													Un-likely	Very high severity	High	Low	Severe	Good	Mod-erate
10	Zoonotic	Lassa fever	Endemic states, other states	1 confirmed case in a native state, 2 or more in a non-endemic state, and 7 cases in endemic states	Peren-nial													Almost certain	High severity	High	Partial	Severe	Good	Very high

	HAZARD AND EXPOSURE			LIKELIHOOD														SEVERITY, VULNERABILITY AND COPING CAPACITY			IMPACT	CONFI-DENCE LEVEL	RISK LEVEL
	HAZARD	HEALTH CONSEQUENCES	SCALE	EXPOSURE	FRE-QUENCY	SEASONALITY J	F	M	A	M	J	J	A	S	O	N	D	LIKELI-HOOD	SEVERITY	VULNER-ABILITY	COPING CAPACITY			
11	Epidemic diseases	Cholera	36 states + FCT (Urban slums, rural, IDP camps, boarding schools, congregate settings, prisons)	Confirmed outbreaks in 2 or more states con-currently	Peren-nial													Almost certain	Very high severity	Very high	Low	Critical	Good	Very high
12	Epidemic diseases	Cerebro Spinal Meningitis (CSM)	States in meningitis belt, Cross River State, urban slums, congregate settings, non - immune populations, rural areas,	5 cases for population < 30,000 or 10 cases/ 100,000 for population > 30,000	Peren-nial													Almost certain	Very high severity	Very high	Partial	Severe	Good	Very high
13		Diarrhoea, vomiting, dehydration, malnutrition, reduced immunity, mental stress, overwhelmed health services	36 states + FCT (Urban slums, rural,NYSC and IDP camps, boarding schools, congregate settings, prisons)	Vulnerable population (children and elderly), an outbreak involving 50 related cases or >30 cases lasting more than 2weeks	Peren-nial													Likely	Low severity	High	Partial	Moder-ate	Good	Mod-erate

Annex 2: Organisational Structure for Command and Control



SOURCE: PHEOC Guidance Document (WHO)

Annex 3: Handbook for Developing a Public Health Emergency Operations Centre

The 'Handbook for Developing a Public Health Emergency Operations Centre Part A: Policies, Plans and Procedures' provides more detailed guidance for implementing the framework for a public health emergency operations centre.

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44.	**Dr. Elimi Osuere**	FMARD/VPCS
45.	**Dr. Muhammad Saleh**	US-CDC
46.	**Zillah Waminaje**	eHealth Africa
47.	**Dr. Olukunle Atofarati**	GIZ
48.	**Idoko Simon**	NOA
49.	**Capt. (Dr.) U. O. Adekanye**	MODHIP
50.	**Dr. Maimuna Hamisu**	NPHCDA
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