

BUILDING RESILIENCE FOR CONTAINING DISEASE OUTBREAK AT THE SUB-NATIONAL LEVEL.

**Presented by: Akin
Abayomi**

**HCH Lagos at the
66th NCH Calabar**



LAGOS STATE GOVERNMENT

What are the types of biosecurity threats and some definitions



- **Sudden outbreaks of contagious diseases:**
 - Natural emergence of dangerous infectious outbreaks, persons to persons or animal to persons
 - Accidental release: Escape of stored or manipulated pathogens from high security laboratory facilities
 - Intentional Release: Conflict and aggression, weaponized pathogens with malicious intent

Pathogen of High Consequence (Natural or Intentional).



Sudden and severe mass morbidity and mortality

Panic and social unrest

Overwhelming the capacity of the health services and supplies

Death of front line first responders

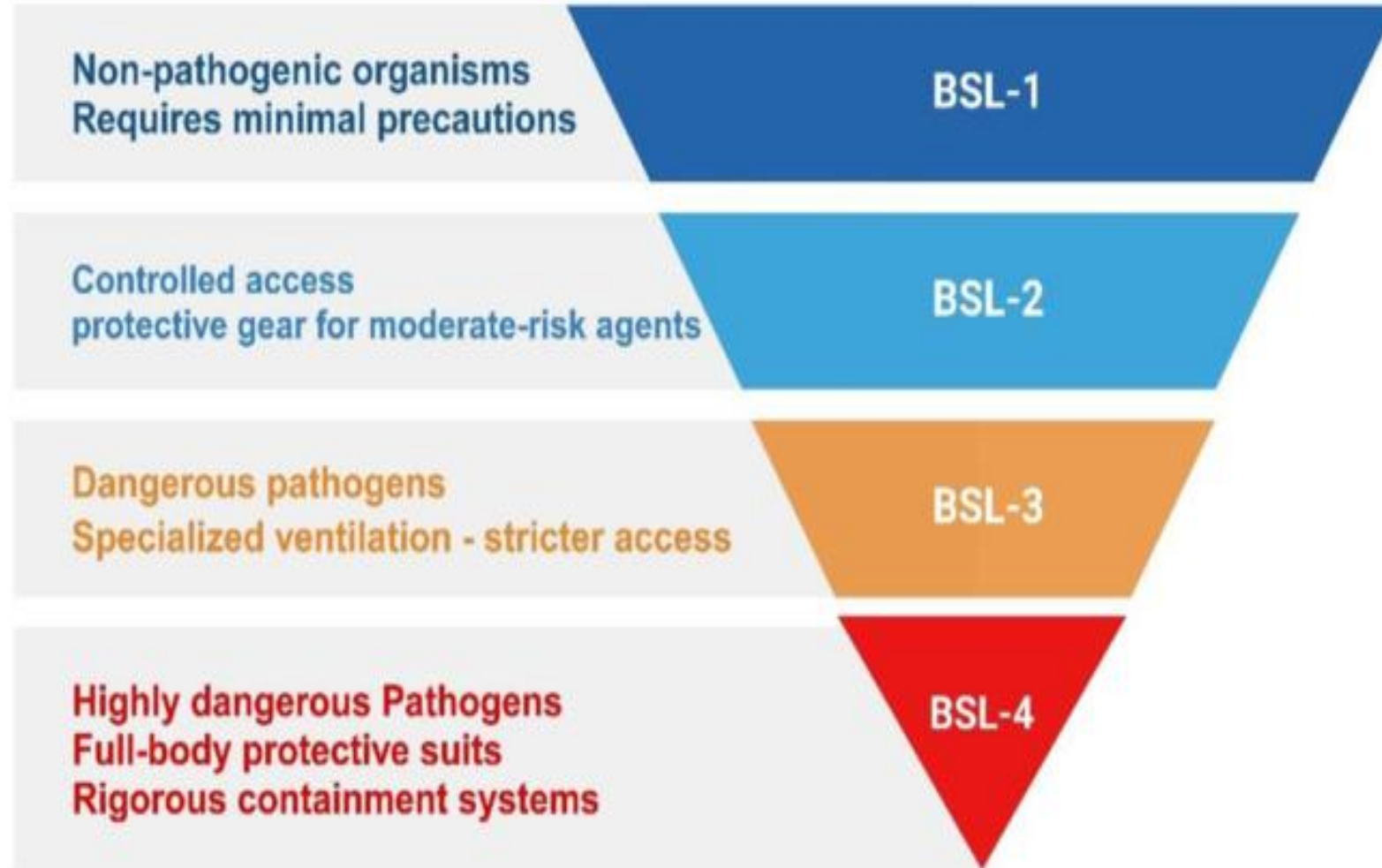
Lock down

Loss of economic activity

Economic downturn

Wars

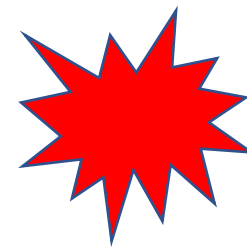
Biosafety Levels



Scenarios of potential public health concern in Africa



- **Pandemic flu**
- **EBOLA/Marburg**
- **Dengue/Lassa Fever/Yellow Fever**
- **Pandemic flu**
- **MDR pathogens**
- **Genetically manipulated pathogen**
- **Unknown Agent** **Pathogen X**



Preparing for Pathogen “X” Requires Big thinking.

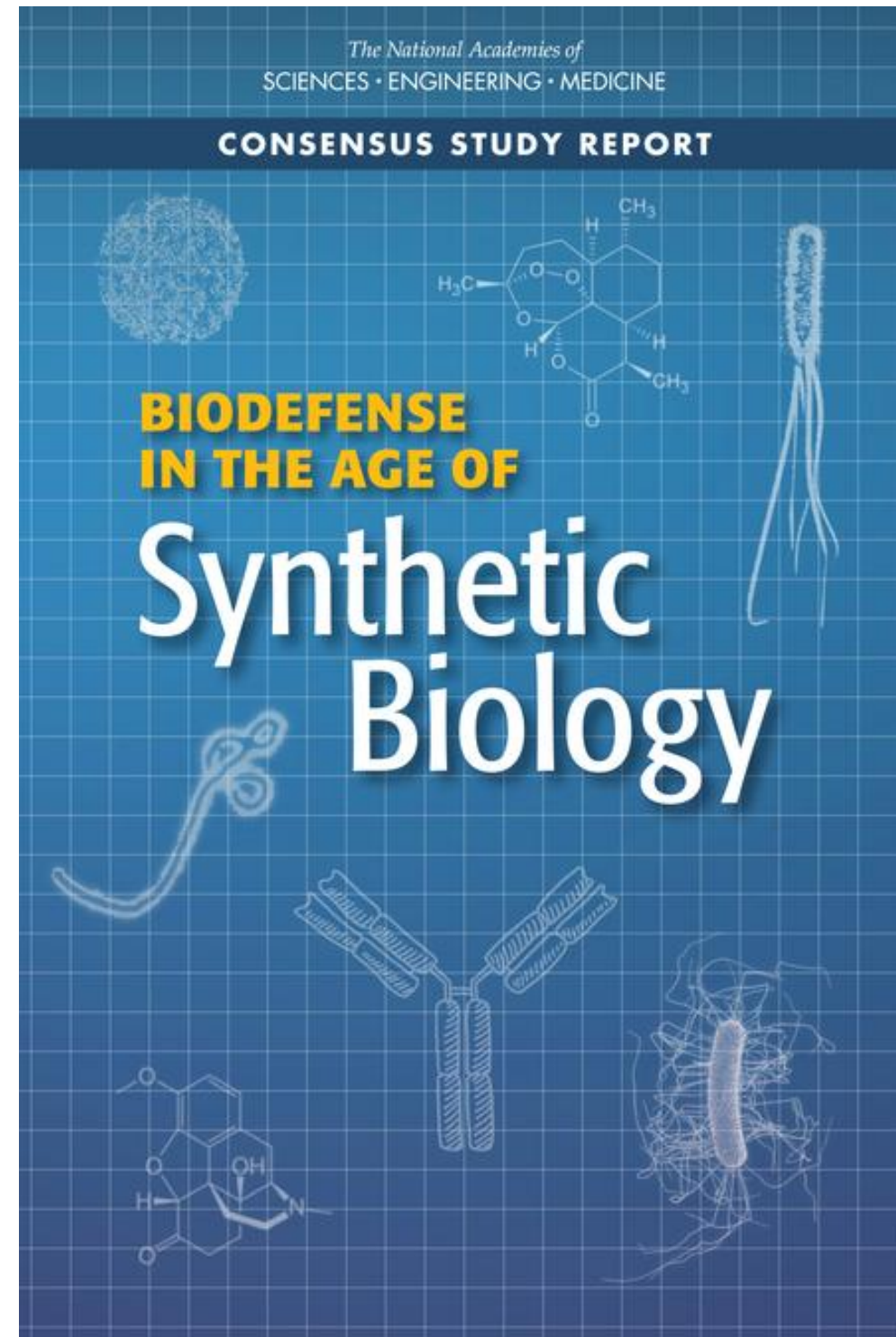
<https://www.undispatch.com/world-health-organization-wants-worry-disease-x/>



- **The World Health Organization Wants You To Worry About Pathogen X**
- **COVID was a mild but perfect example of a Pathogen X**
- **Will Pathogen X emerge from animals?**
- **Will Pathogen X come from people?**
- **Can Pathogen X come from a Biosecurity or Synthetic Biology Research Lab?**
- **Can it be weaponised?**
- **How do we prepare for Pathogen X**



Dual Use in the age of synthetic biology

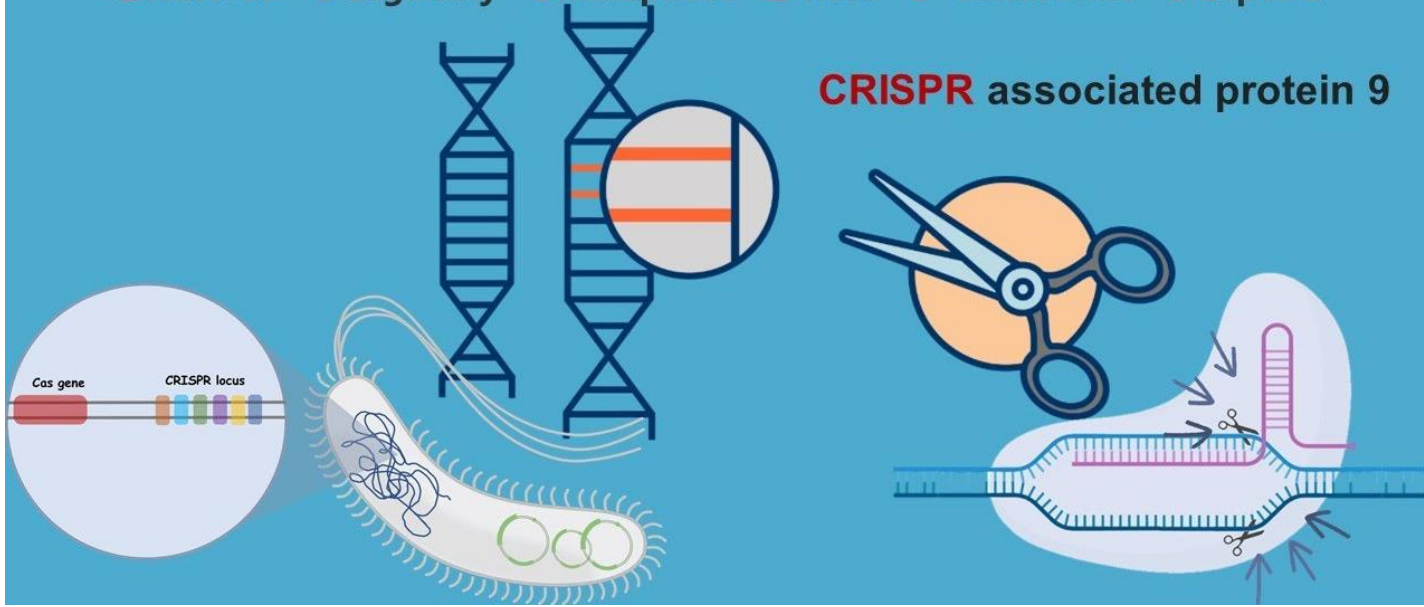




CRISPR-Cas9

Clustered **R**egularly **I**nterspaced **S**hort **P**alindromic **R**epeats

CRISPR associated protein 9



Dual Use Research of Concern & Synthetic Biology: Navigating Unprecedented Risks

Gain-of-Function Research

Experiments that enhance pathogen potency, transmissibility, increasing the risk of accidental release or intentional misuse.

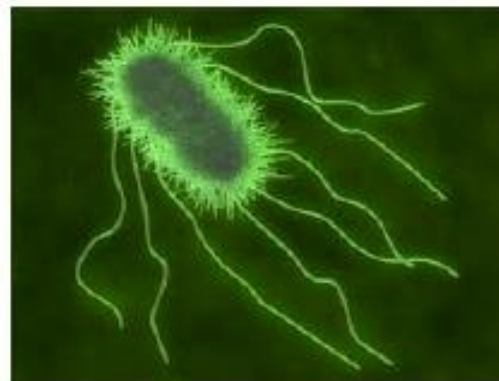
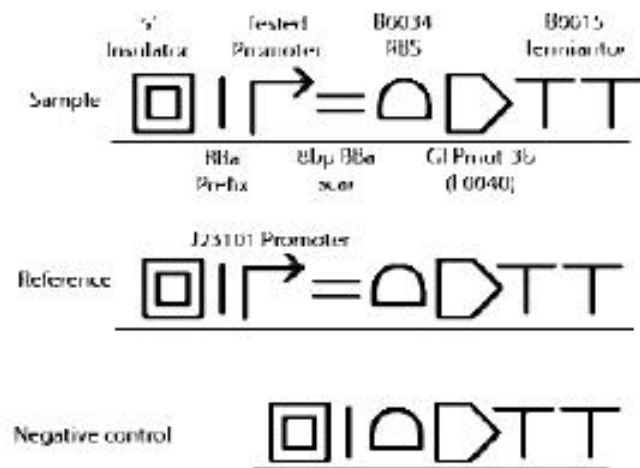
Engineering Toxin Production

Creating organisms designed to produce harmful toxins, posing direct threats to health and ecosystems.

Novel Pathogen Creation

Developing entirely new pathogenic agents with unknown properties, complicating defense strategies.

How do we standardise the construction of living matter?



E. coli



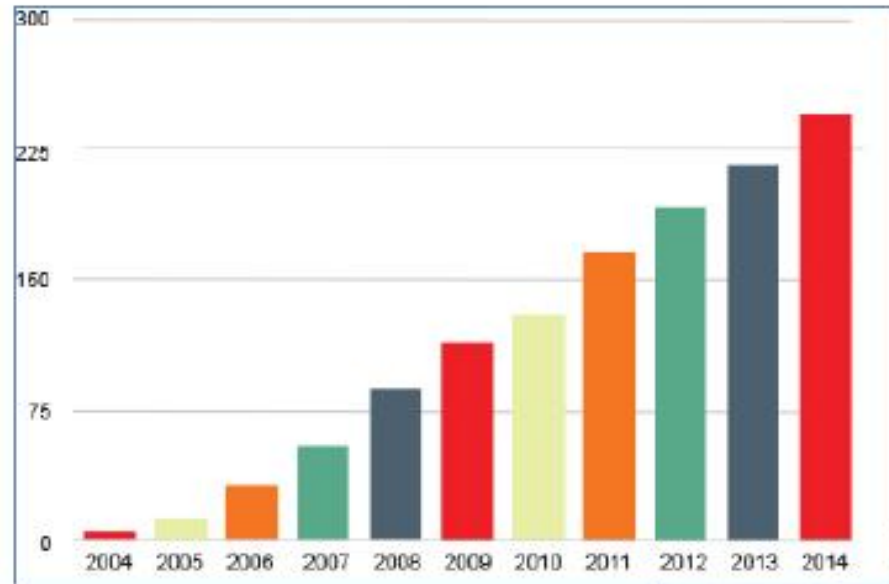
B. subtilis



Bacillus megaterium

A growing community of student researchers – growth of iGEM

International Genetically Engineered Machine Competition

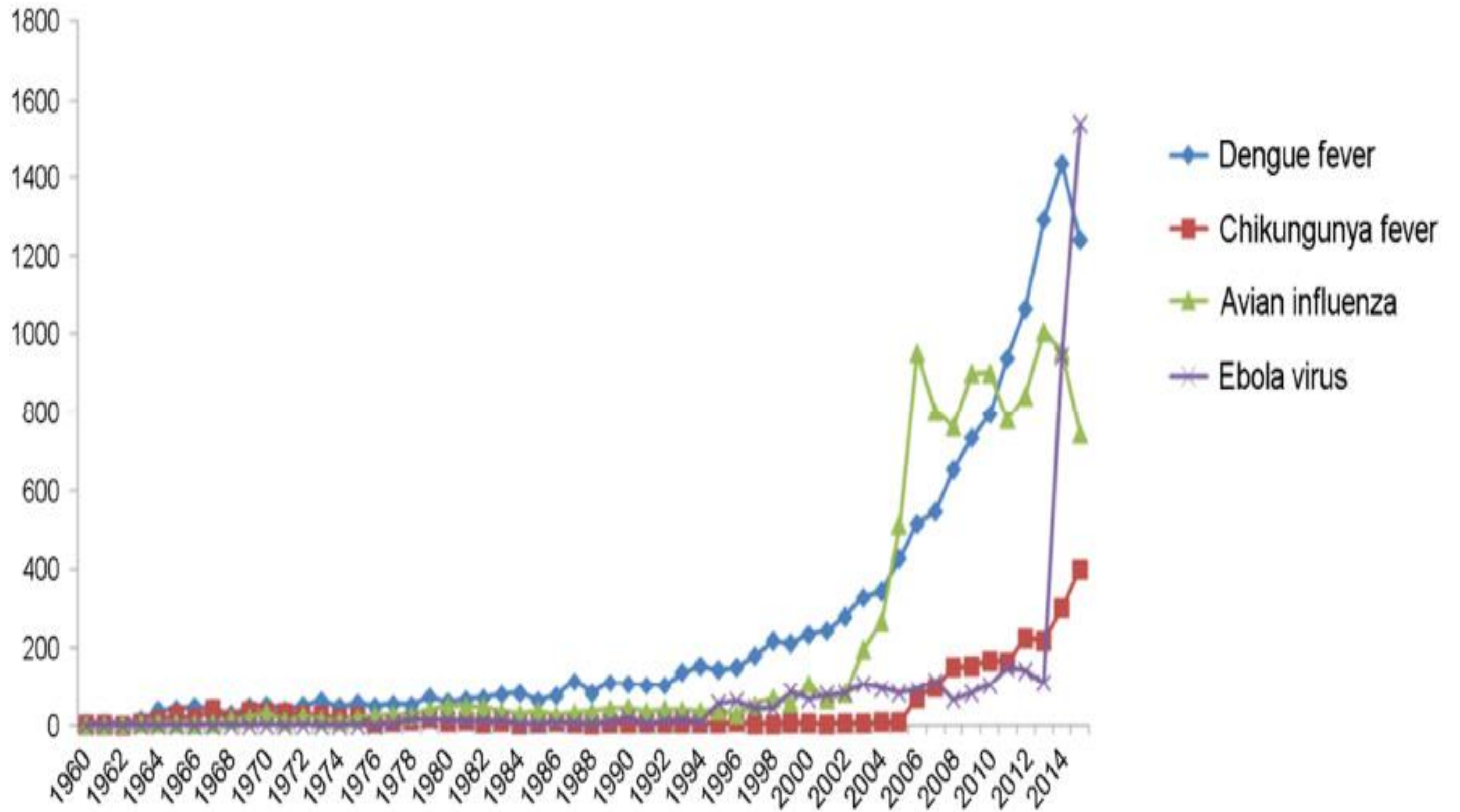


280 teams are registered for 2015
259 teams at the Jamboree
~15,000 iGEM alumni

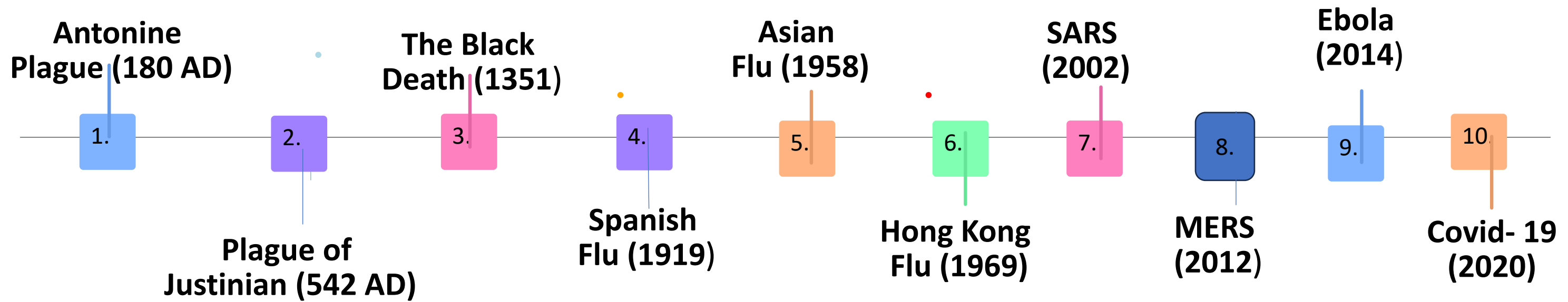




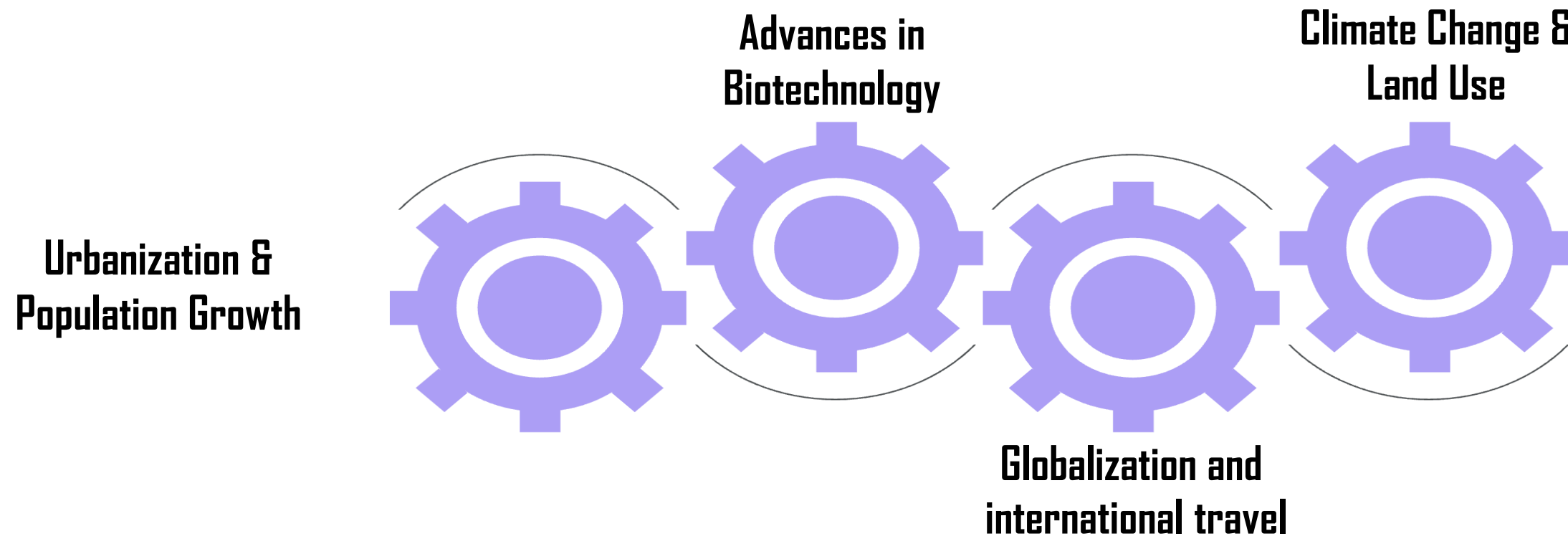
The Rising Tide: Increasing Frequency and Intensity of Global Infectious Disease Outbreaks



Global Pandemics: Frequency & Causes



Root Causes: Why the Acceleration?



What is a Public Health Emergency of International Concern (PHEIC)?

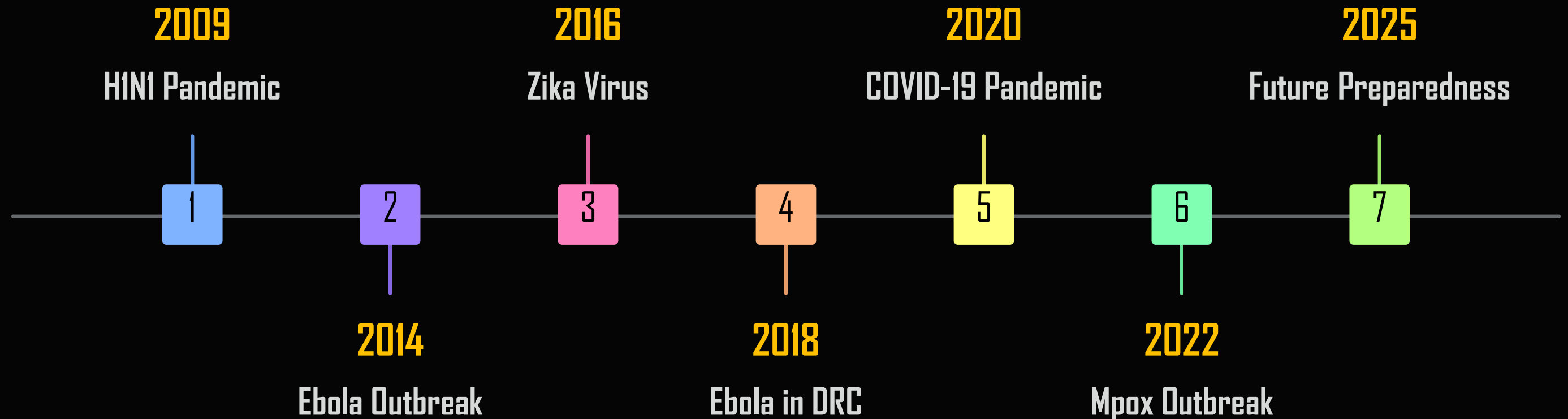
A PHEIC is a formal declaration by the World Health Organization (WHO) of "an extraordinary event" that constitutes a public health risk to other countries through international spread of disease and may require a coordinated international response.



Public Health Emergency of International Concern (PHEICS)

Event that constitutes public health risk through international spread of disease.

Increasing Frequency of PHEICs





Governance originates
from Global Treaties
that coordinate
international handling of
pathogens and response
to biological shocks

UNSCR 1540, BWC, WHO, JEE & IHR

Global Biosecurity Landscape: Key Conventions & Frameworks

1972: Biological Weapons Convention (BWC)

Countries committed to prohibit development, production, and stockpiling of biological weapons.

2016-2020: JEE & International Health Regulations (IHR)

Launched in 2016, these voluntary peer-reviewed assessments evaluate 19 technical areas critical to pandemic preparedness

2004: UN Security Council Resolution 1540 (UNSCR 1540)

This resolution solidifies commitment to preventing the proliferation of WMDs, including biological agents, strengthening legal and regulatory frameworks.

The 2025 WHO Pandemic Prevention, Preparedness and Response Agreement

Adoption

Approved May 2025 at the 78th World Health Assembly (WHA78.1)

Equitable Access

Ensures vaccines, diagnostics, PPE, and therapeutics reach all populations, preventing repeat of COVID-19's devastating inequities.

Implementation

Establishes Intergovernmental Working Group to finalize legal text for signature and ratification by member states.





Africa CDC

Chronological Response to Rising Pandemics & Epidemics in Africa

The Genesis: Building Africa's Epidemic Preparedness (2017–Date)



Foundational Establishment

Africa CDC was officially established to proactively strengthen continent-wide health security and coordinate responses across all Member States.



PHEOC Development

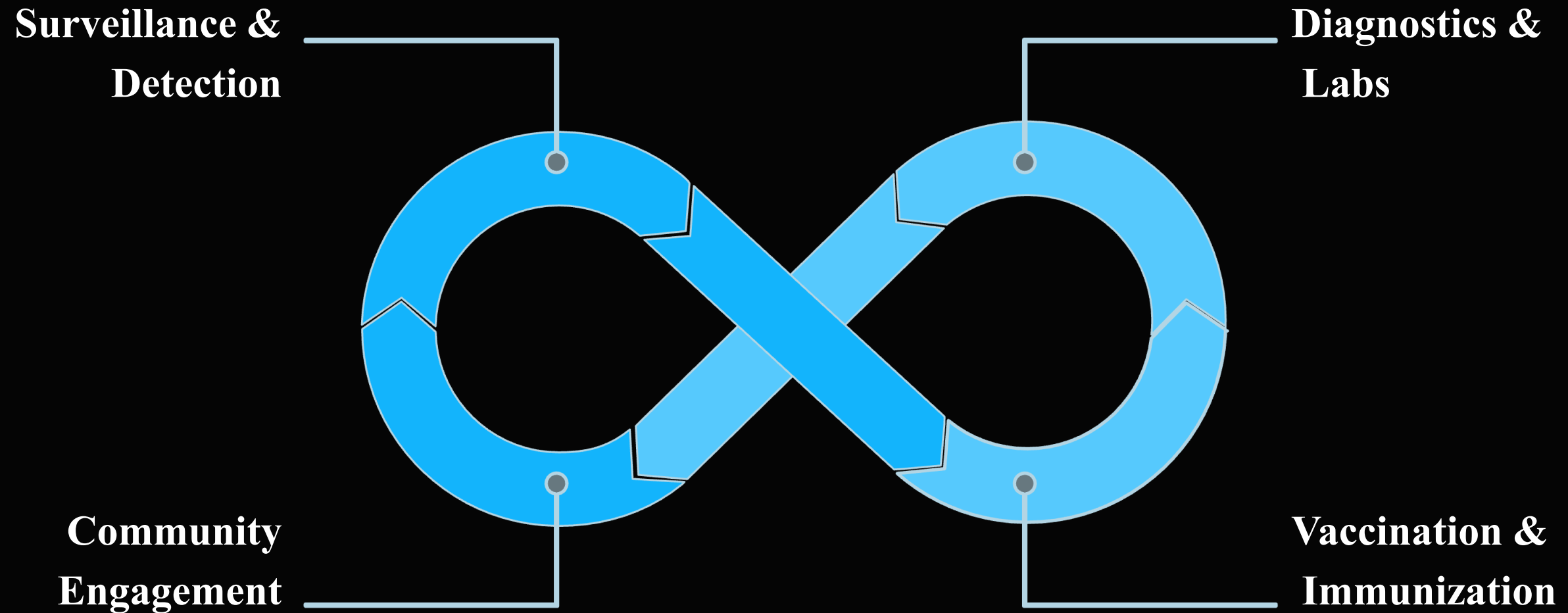
Early efforts focused on developing multi-hazard preparedness plans for Public Health Emergency Operation Centres (PHEOCs) to centralize response efforts.



Rapid Response Mobilization

The African Volunteers Health Corps (AVoHC) was launched to mobilize and deploy skilled health professionals rapidly to outbreak hotspots.

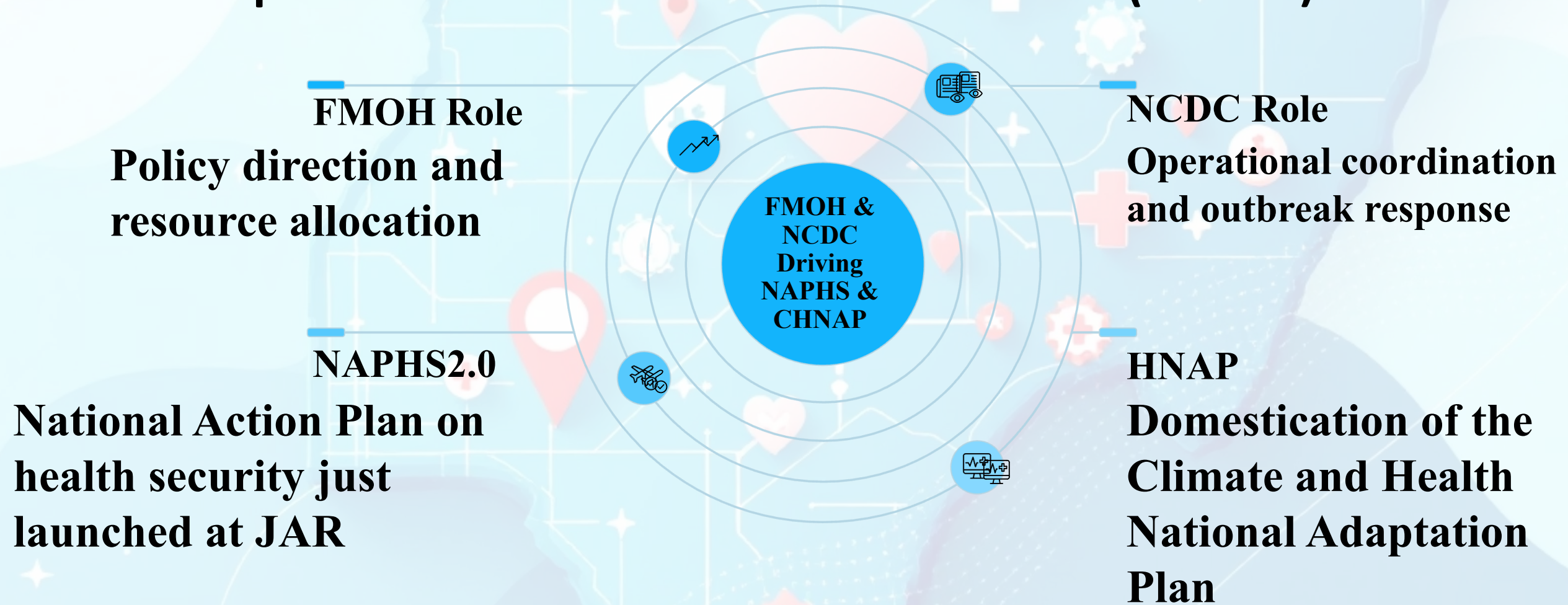
Africa CDC's Comprehensive Pandemic Response Cycle



This 4 stage cycle ensures that every emergency generates knowledge and that feed directly back into enhanced preparedness for the next potential threat.

Federal Ministry of Health & NCDC: Driving Nigeria's Health Security Policy

Their strategies includes : The National Action Plan for Health Security (NAPHS) and the Comprehensive Health National Action Plan (CHNAP).



Nigeria Centre for Disease Control (NCDC): Leading Nigeria's Pandemic Response

Coordinated Response

Integrated Digital Emergency Management

Capacity Building & Deployment of front line workers

Sophisticated Laboratory Network for surveillance and confirmation



Public Health Communication & Vaccine Distribution

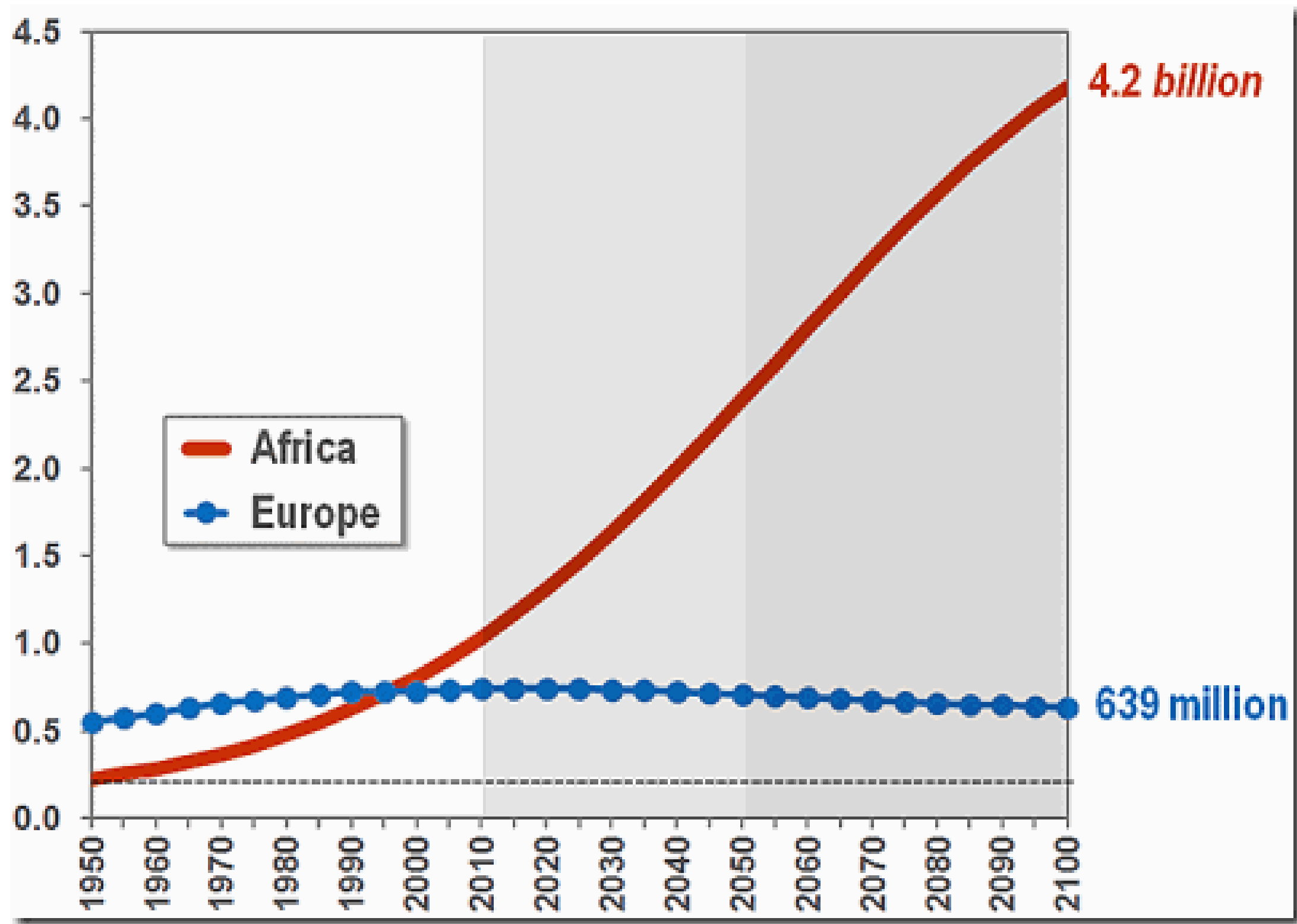


Digital Innovation

Peculiarities of Lagos State, Nigeria

**From Spanish Flu to COVID-19:
A Century of Public Health Challenges**





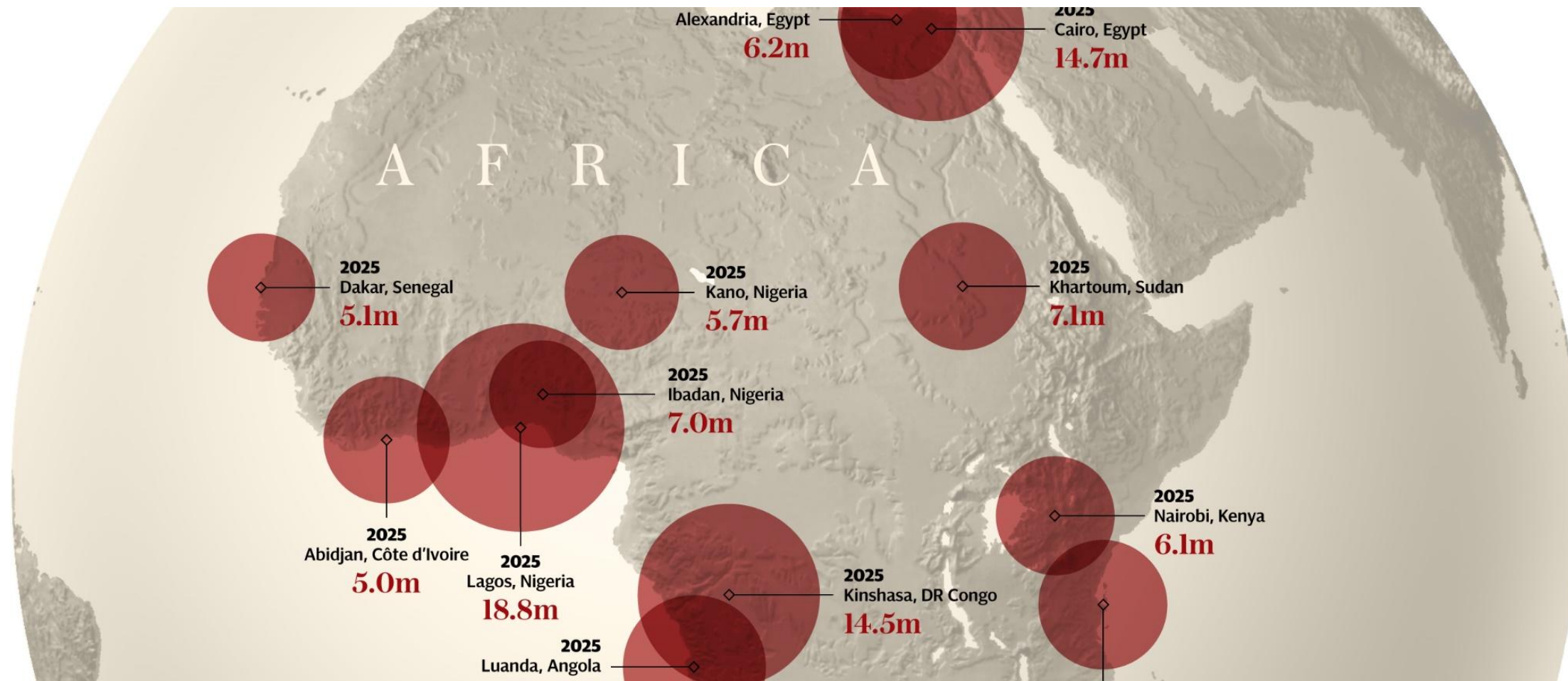
Lagos is a Low-Lying Megacity with 30 million inhabitants, with human density vulnerabilities



An aerial view of a bustling street market in Lagos, Nigeria. The street is packed with people, many carrying items on their heads. Numerous yellow taxis and vans are visible, some with Arabic calligraphy on their sides. The market stalls are covered with colorful fabrics and goods. The surrounding buildings are multi-story, and the overall atmosphere is one of intense activity and urban density.

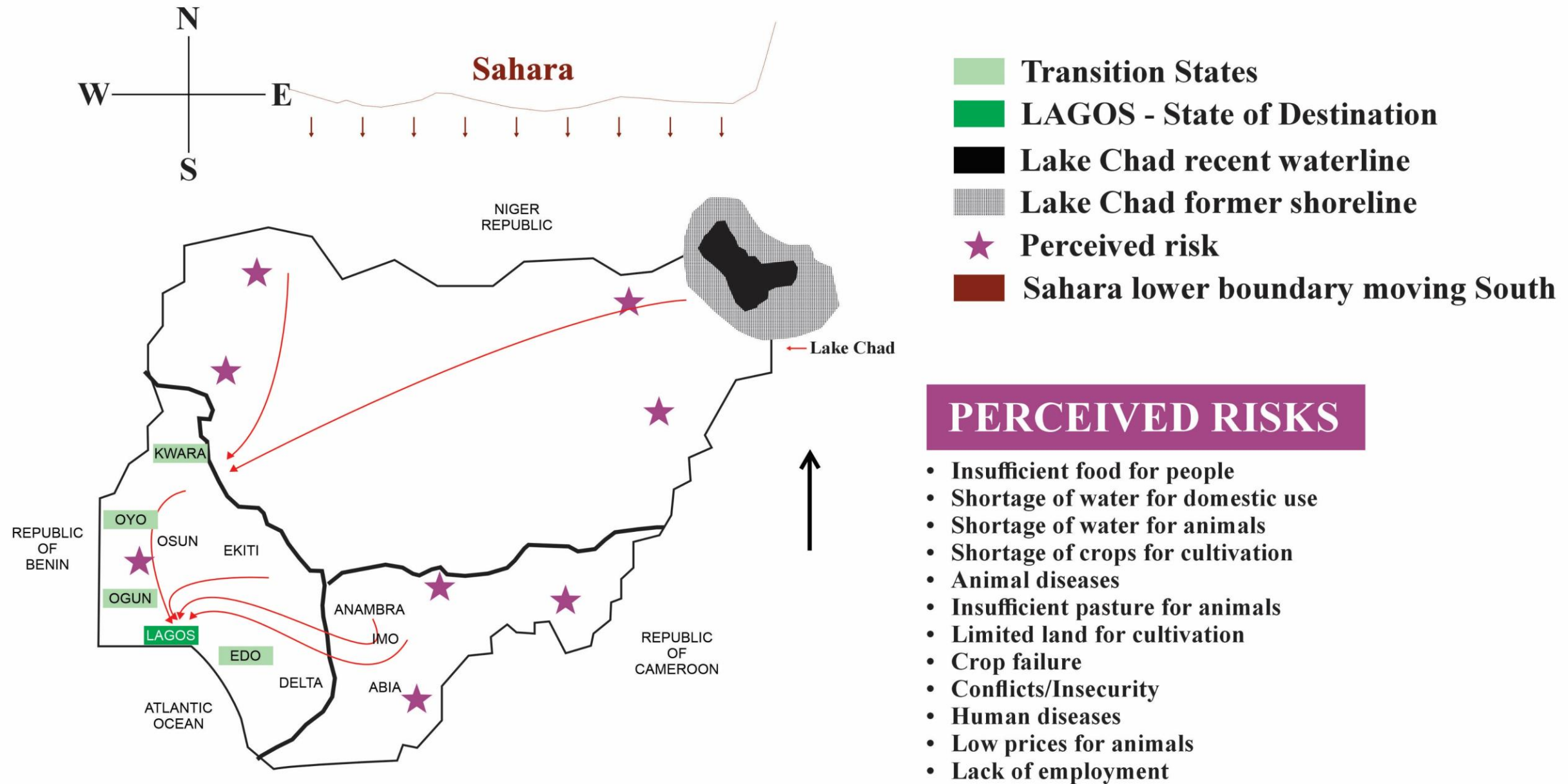
The city that won't stop growing

How can Lagos cope with its spiralling population?



As the African population quadruples in the next 50 years, Africa will be a continent of Mega Cities with major health, environmental toxicity & biosecurity threats.

THE AFRICAN MEGACITIES WILL BE PERFECT FOR RAPIDLY SPREADING CONTAGIOUS DISEASES



Combined effect of Climate Change and Deforestation are drying up Lake Chad, the Sahara desert is moving south creating water stress and scarcity of resources for over 200 million people in Nigeria and neighboring countries.

Lagos: Nigeria's Gateway for Incoming Travelers

70%

International Arrivals

Of all travelers entering Nigeria pass through Lagos.



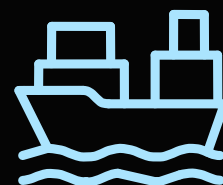
Murtala Muhammed International Airport

A major hub managing millions of passengers annually.

7M

Airport Passengers

Murtala Muhammed International Airport handles annually.



Apapa & Lekki Seaports

Nigeria's largest maritime entry points for cargo and passengers.

30M

Urban Population

Lagos State, the highest density in Nigeria.



Land Borders

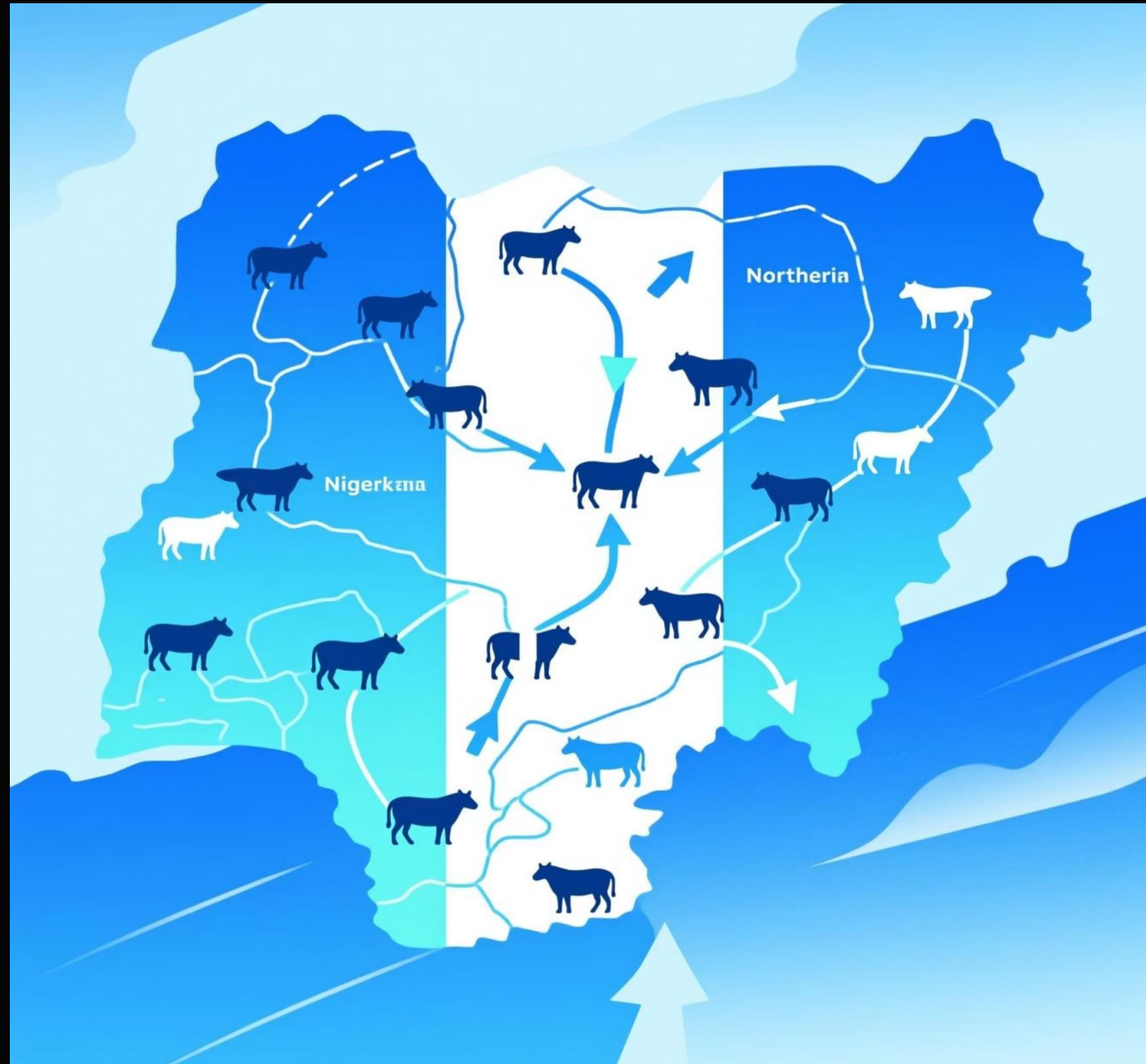
Thousands cross daily from neighboring states and countries.



Importance of Animal Disease Surveillance for Animals Entering Lagos State.

Large numbers of cattle, sheep, goats, fowls, fish, pigs and bushmeat enter Lagos daily. This poses considerable veterinary biosecurity concerns

Livestock Movement into Lagos: Scale & Risk



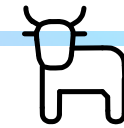
- Daily Lagos consumption 5,000 heads of cattle.
- Monthly influx & consumption - 150,000 heads of cattle.
- Annual consumption estimate 1.8 million heads of cattle.



Economic & Public Health Impact of Animal Diseases



**Livestock disease
Could inflict severe
Economic Losses**



**Very High level of
AMR found in
many agricultural
animals**



**Significant Zoonotic Risks at our
bush meat markets**



History of Lagos State's Response to Combating Pandemics

The Spanish Flu Arrives in Lagos: 1918-1919 (100M)

Maritime Gateway to Pandemic

This pandemic entered Nigeria through Lagos a pattern that would repeat throughout the 20th century to date. It killed 1,200 out of 80,000 Lagosian's.

Poorly contained. Rapidly spread to rest of the country affecting 80% of Nigerians 18m population, collapsing the economy and killing 500,000 people (3%).

In today terms that would be equivalent to 6 million Nigerians



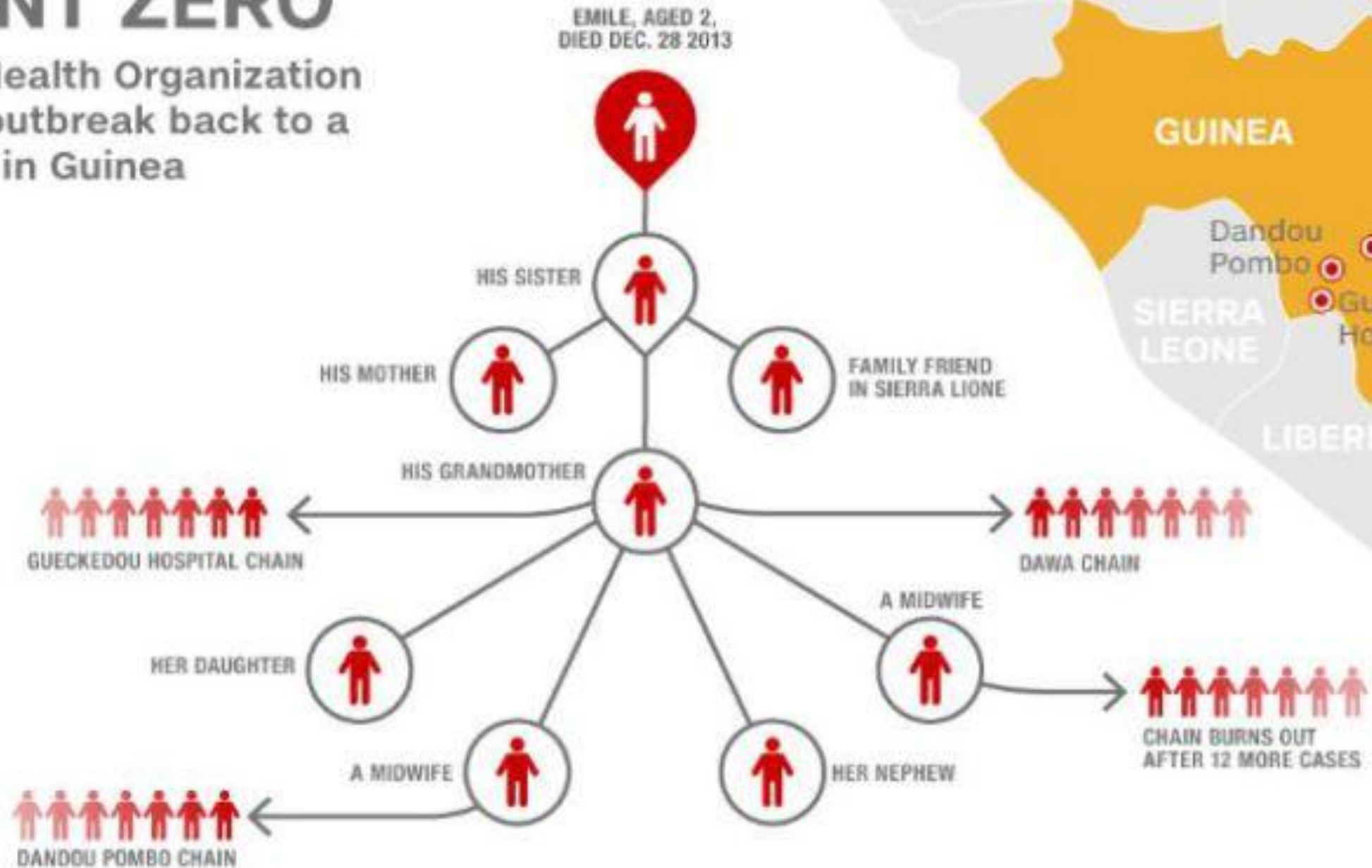
The West Africa Ebola outbreak 2014 to 2016 in Guinea, Liberia, Sierra Leone and Nigeria



Somewhere in a very remote village that borders 3 countries, Guinea, Liberia and Sierra Leone

PATIENT ZERO

The World Health Organization traced the outbreak back to a single child in Guinea

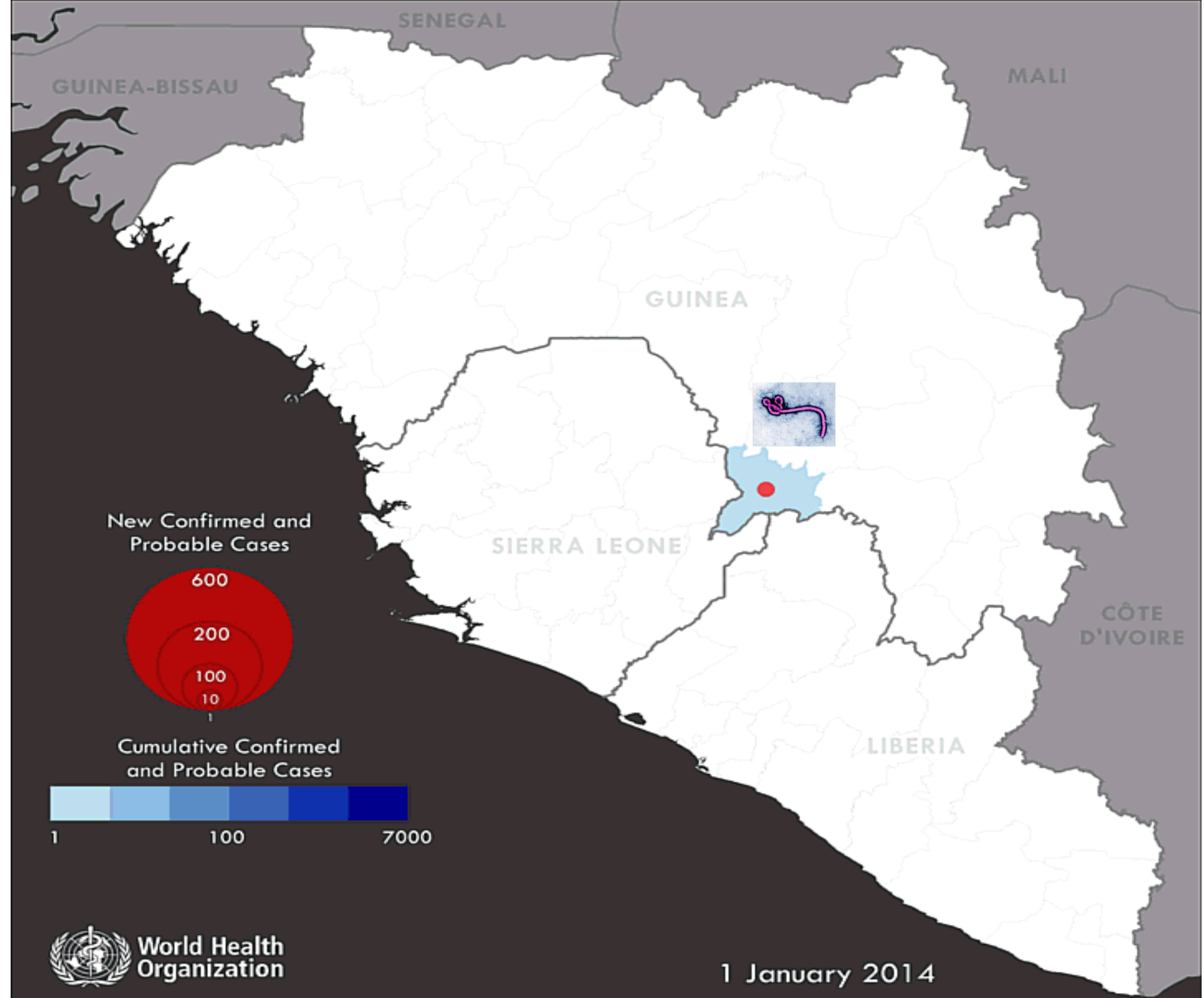




© MerlinTuttle.org







The share magnitude of cases overwhelmed healthcare facilities



VE DISTRICT #13

H H. JOSEPH

 **FIRST RESPONDER**
EMERGENCY MEDICAL SERVICES INC.





Civil Unrest





Lock down, panic and breakdown in security.

Intense Stigma and fear



Violence



Dehumanizing handling of the dead



Mass Graves



Thick smoke of cremation centres in the background



18,000 infections (6,000 deaths of which 500 were HCW)

IMPACT ON HEALTH-CARE WORKERS (HCW)

BEFORE EBOLA	AFTER EBOLA (to date)
LIBERIA 51 physicians 1,700 healthcare workers	LIBERIA 180 healthcare workers deceased 1,520 healthcare workers remaining
SIERRA LEONE 136 physicians 2,435 healthcare workers	SIERRA LEONE 221 healthcare workers deceased 2,214 healthcare workers remaining
GUINEA 1,175 physicians 7,354 healthcare workers	GUINEA 94 healthcare workers deceased 7,260 healthcare workers remaining

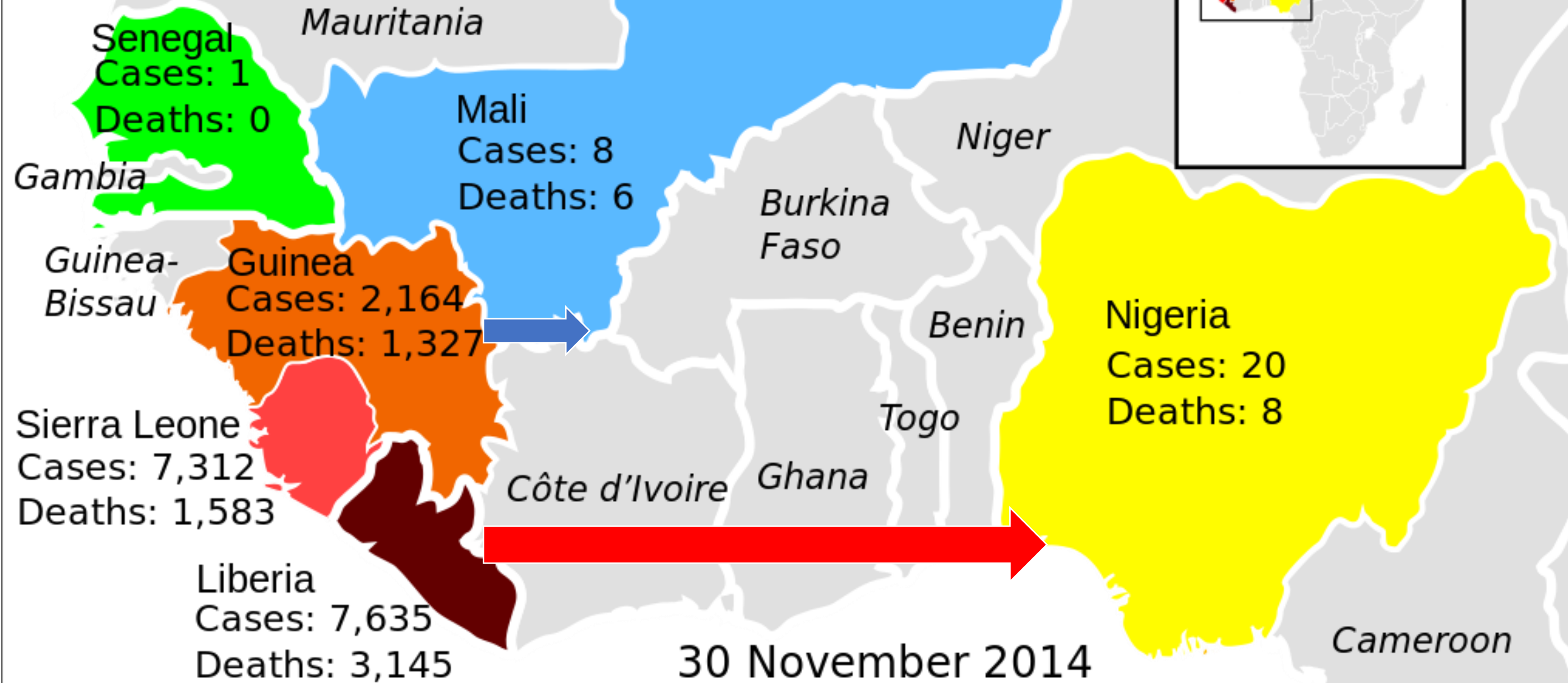
Mapping the movement to Lagos (Courtesy of PHE)



Extent of spread of Ebola in West Africa alone

Ebola virus epidemic in West Africa

Total cases: 17,145 Total deaths: 6,070



30 November 2014

GÖNE

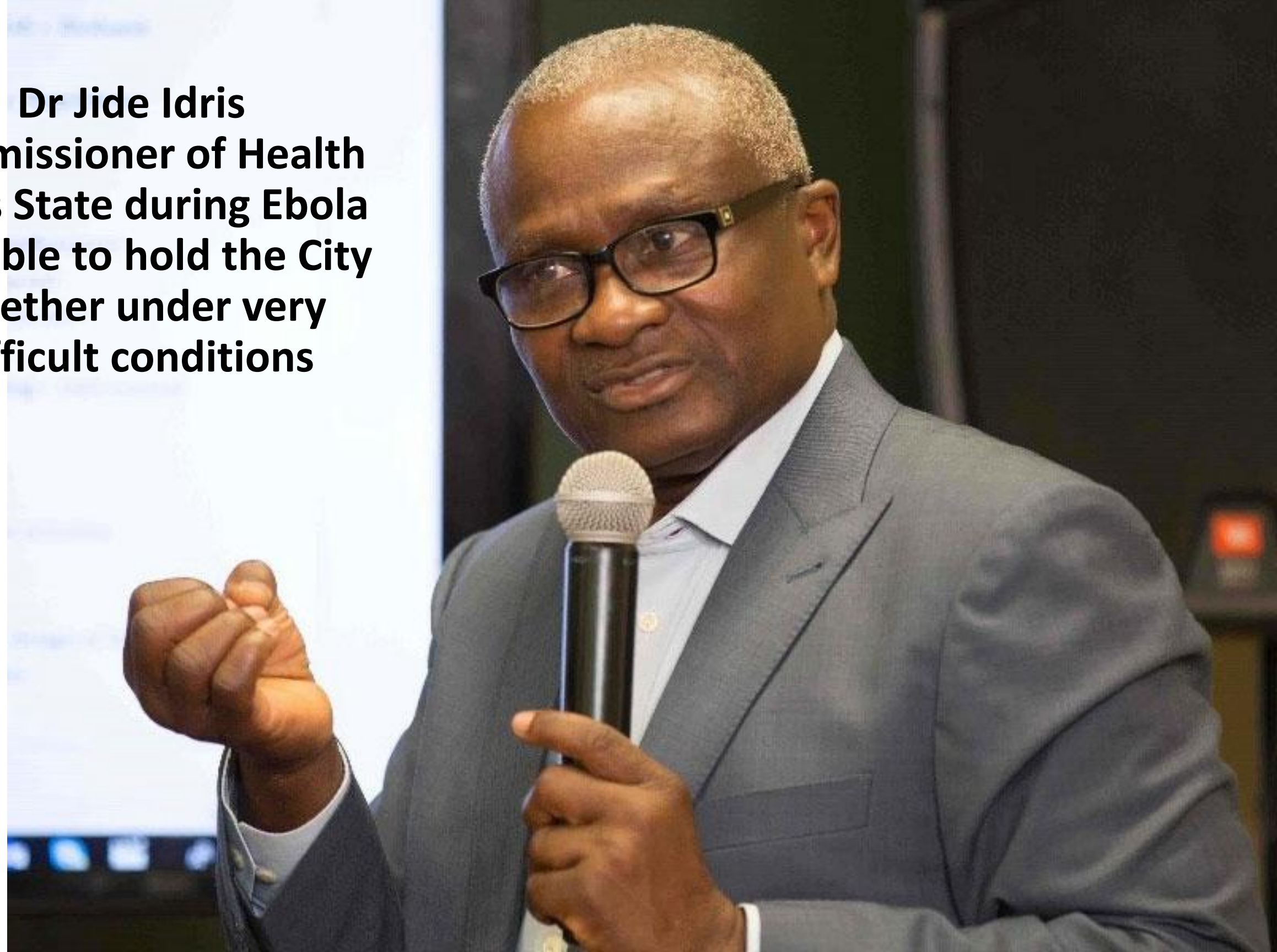
BUT NEVER FORGOTTEN

DR. STELLA AMEYO
ADADEVOH

27 OCT 1956 - 19 AUG 2014



**Dr Jide Idris
Commissioner of Health
Lagos State during Ebola
was able to hold the City
together under very
difficult conditions**





The 2014 Ebola Outbreak:

A Courageous and Defining Moment

Swift Containment

Courageous Leadership

Dr. Stella Adadevoh's decision to refuse releasing the index patient—at personal cost.

Very basic Critical Infrastructure

Ebola in Lagos: 2014 Crisis and Containment

A Critical Test for Lagos and Nigeria



20

Confirmed Cases

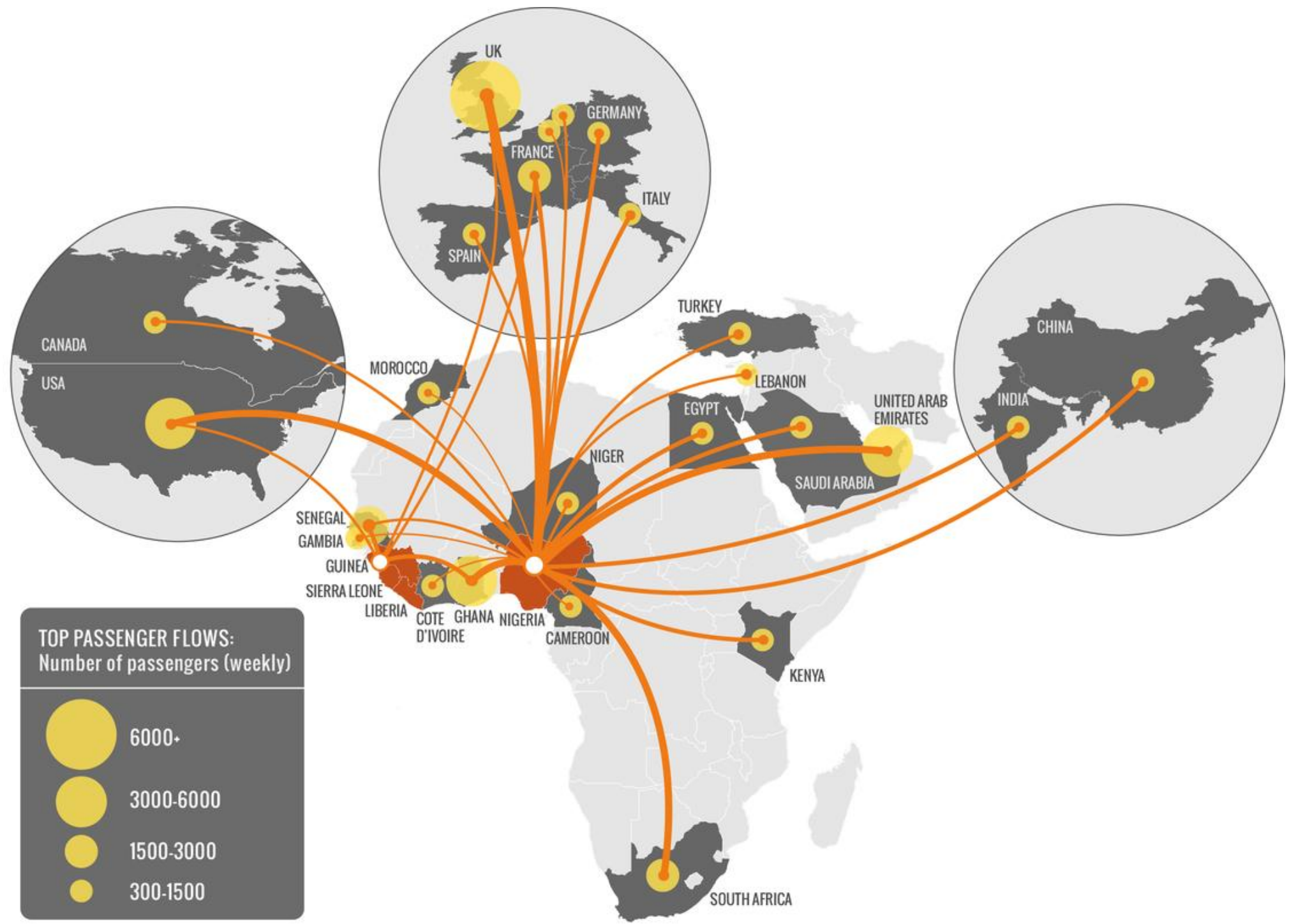
8

Deaths

894

Contacts Traced

A GLOBAL CALAMITY AVERTED BASED ON NIGERIA'S POPULATION AND INTERNATIONAL TRAVEL TRAFFIC



Ebola triggered the birth of the Lagos State's Biosecurity Framework, which positioned it well for COVID containment

Leveraging the robust principles of UNHSCR & BWC, establishing a resilient biosecurity system, rapid response capabilities and medical countermeasures.

Integrated Governance

Emergency Preparedness

Advanced Surveillance

Biosafety Infrastructure

Taking Lessons from Ebola and COVID, Lagos continues to build a biosecurity roadmap



BSL-3 Lab

- Invested in a Biosafety Level 3 Laboratory and Biobank in Lagos State

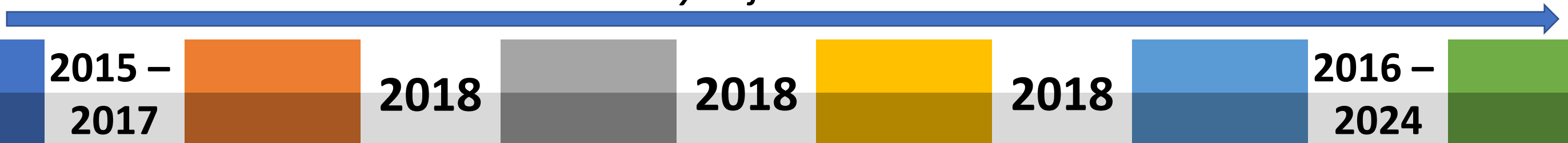
Policy

Completed Lagos State's biosecurity policy and roadmap

Infrastructure

- Continuous upgraded and expanded Isolation capacity at Lagos Mainland hospital; the infectious diseases hospital.

Convened 10 Biosecurity conferences to date



Staff Training

Trained key staff in Biosecurity and Biothreat reduction

Bio-Governance

Established the Biosecurity and Bio-Governance council





Lagos State Biocontainment Biosafety Level 2 and 3 facility in Yaba. Supported by Govt of Canada



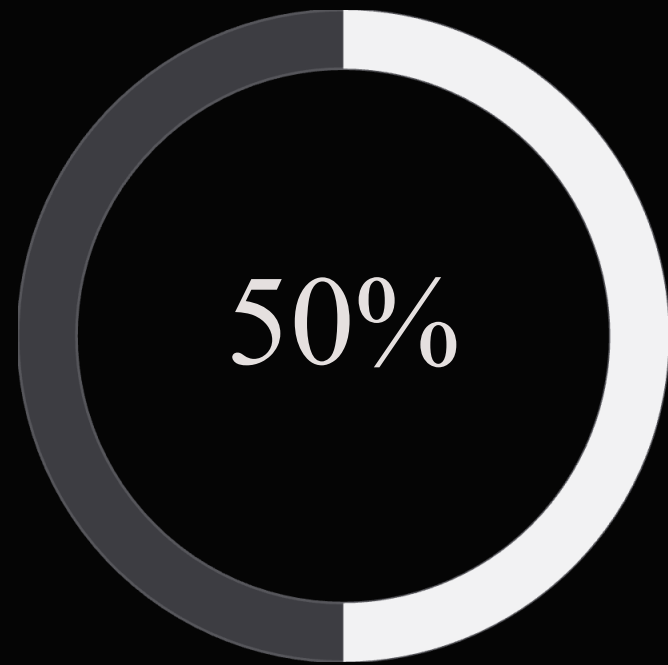
Lagos State Biocontainment facility.

BSL2, BSL3 Biobank and sequencing suite.

Infectious Disease Hospital, designed to operate off grid.

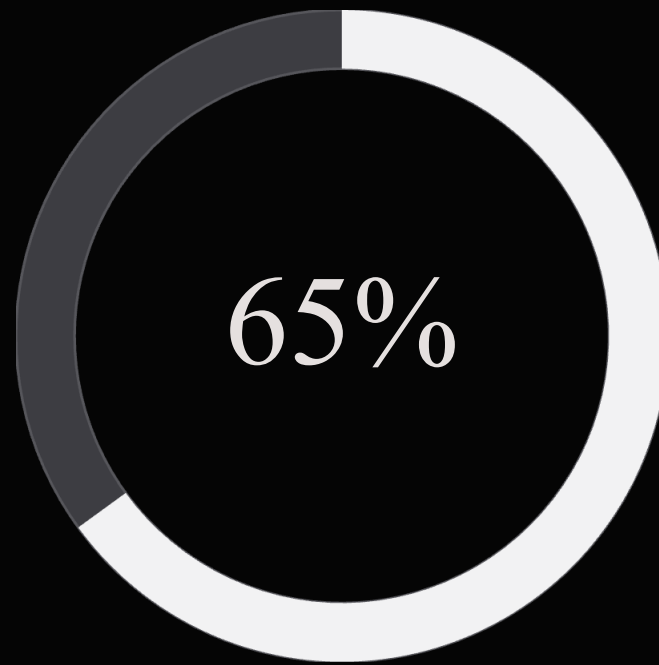


COVID-19: A Pandemic in a Megacity, 900 persons died in Lagos out of millions infected



National Case Share

Early 2020



Vaccination Coverage

By 2023



Duration

Major impact period

Lockdowns, mass testing drives, and vaccination campaigns reshaped daily life while building institutional pandemic preparedness for future crises.

Lagos is under continuous seasonal threat from visitors



Summer Break Influx



**Surge in students
returning home**



**July & August
Peak Travel Period**

Elevated Risk

Detty December: Surge in Inbound Movement

Festive Influx

40% increase in arrivals in months of November, December and January compared to other months.



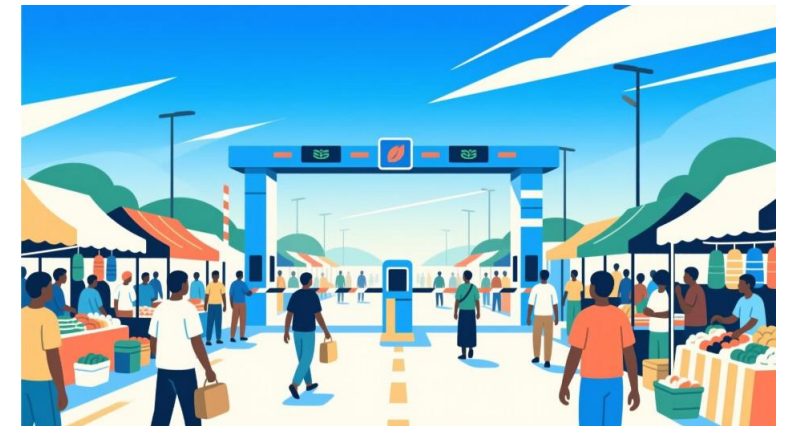
Heightened Risks

Exponential increased social gatherings, visitors coming from cold countries (Flu)



Challenges

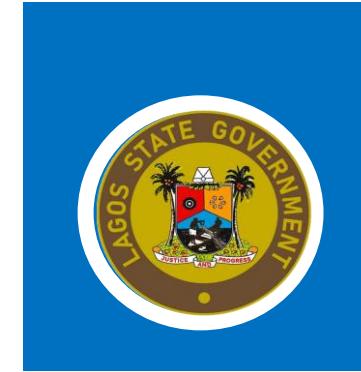
Surveillance capabilities are overwhelmed



“Operation Lagos Bioshield”



**OPERATION
LAGOS BIOLOGICAL SHIELD**



Emergency Preparedness.

Protecting the huge vulnerable population of Lagos and by extension Nigeria from biological shocks like Ebola, Marburg, Mpox, COVID, Flu and Cholera, especially as Defty December and Summer influx of international travelers are here to stay



Integrated Surveillance Framework



Inter-Agency Collaboration

Joint efforts by the **Nigeria Immigration Service** and **Lagos Health Teams** for comprehensive oversight.



Entry Point Screening

Mandatory **temperature checks** and detailed **symptom questionnaires** for all arriving passengers.

Proactive Contact Tracing

Immediate initiation of contact tracing protocols for any suspicious cases among inbound travelers.

Digital Monitoring

Leveraging **advanced digital tools** for tracking arrivals and ensuring quarantine compliance effectively.

SMART HEALTH INFORMATION PLATFORM (SHIP)



*A global data management
system to aggregate all
health system data in Lagos
State*

The PLATFORM

Enhancing collaboration among applications and stakeholders



Applications

- EMR Solutions
- Payment Systems
- Inventory Management
- Biobank / Biosecurity (Surveillance)
- Ambulance Services (Emergency)
- Environment (Sanitation and Epidemic outbreak prevention)
- Education (eLearning, Academia, Research)
- Policy making (data insights, analytics)

Stakeholders

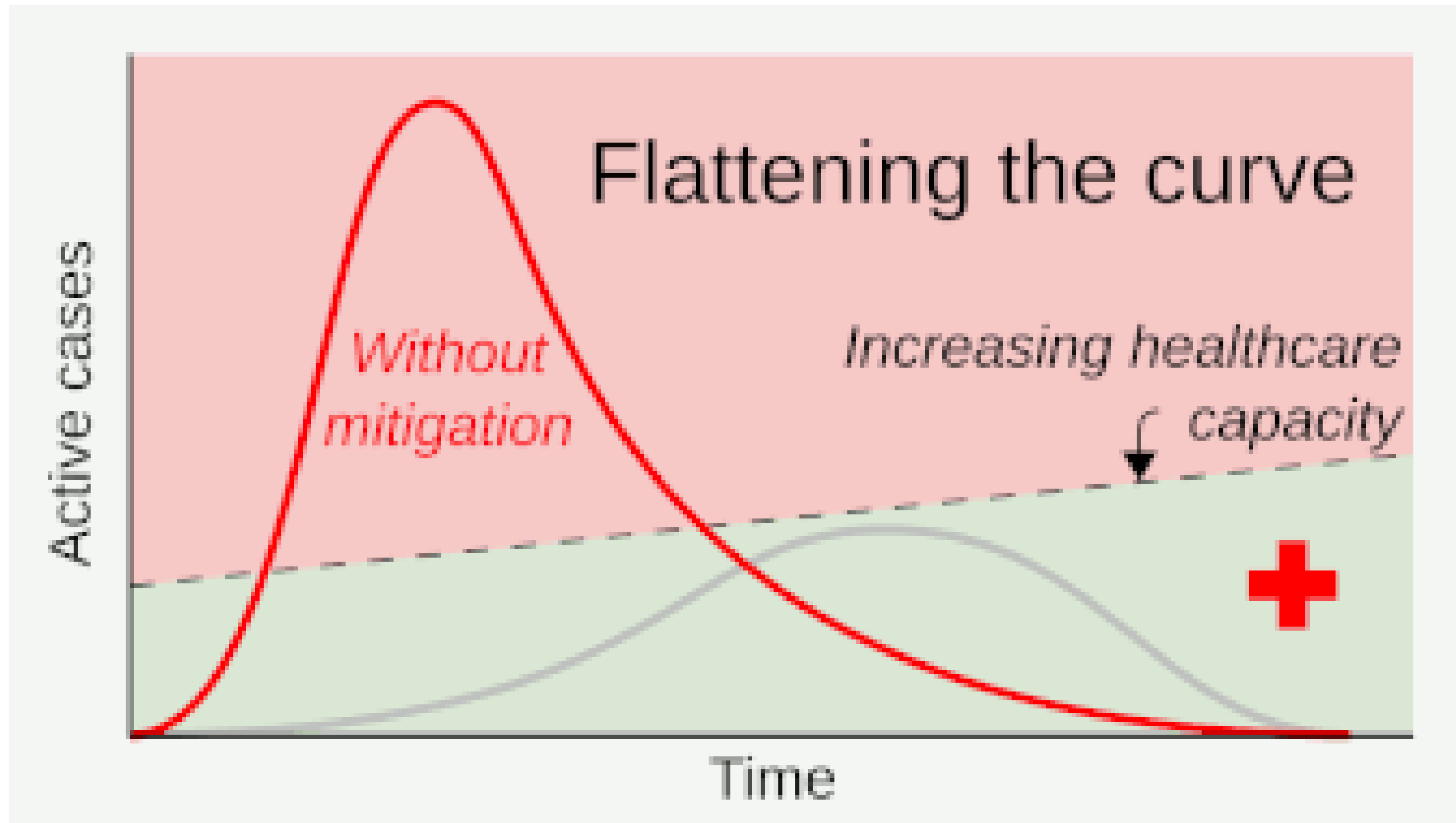




GROUND BREAKING AND SITE PREPERATION HAS COMMENCED

PHLEXCOM
MASS DESIGN GROUP | LTS HEALTH

Excessive death result from a surge of patients exceeding the coping capacity of a health system



The Responsibility of Government



- Each country has the moral responsibility to protect its citizens from biological crises and threats, protecting the integrity of its ecosystem that we depend on.
- Government agencies must be able to do the following:

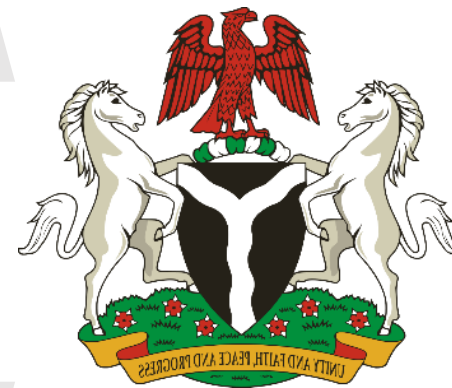
Pre-empt and prevent biosecurity threats

Predict

Mitigate and adapt to insidious unavoidable environmental changes

Find and clearly identify a threat when it emerges

Stop it promptly

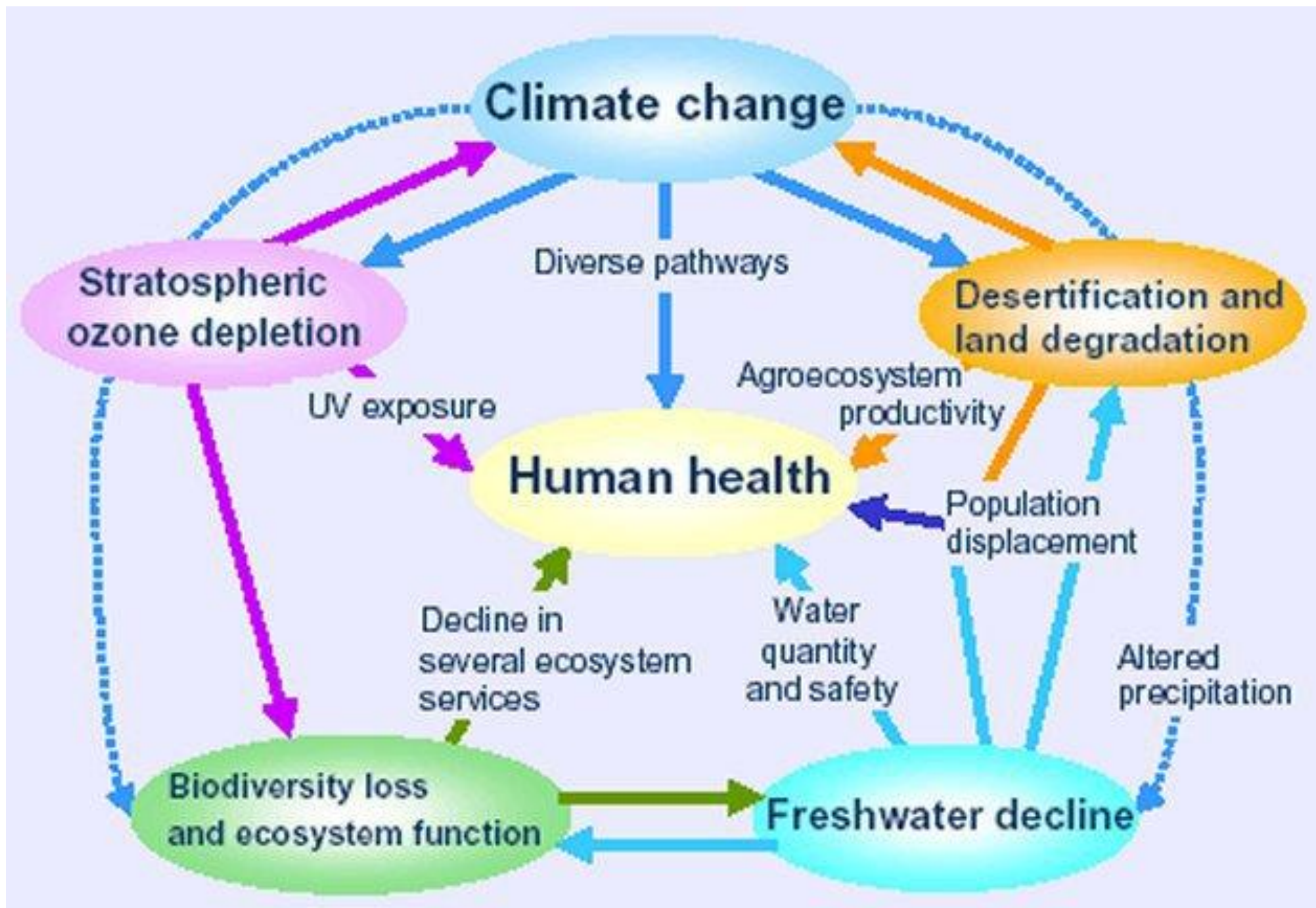


Restore calm and civil disruption & build resilience

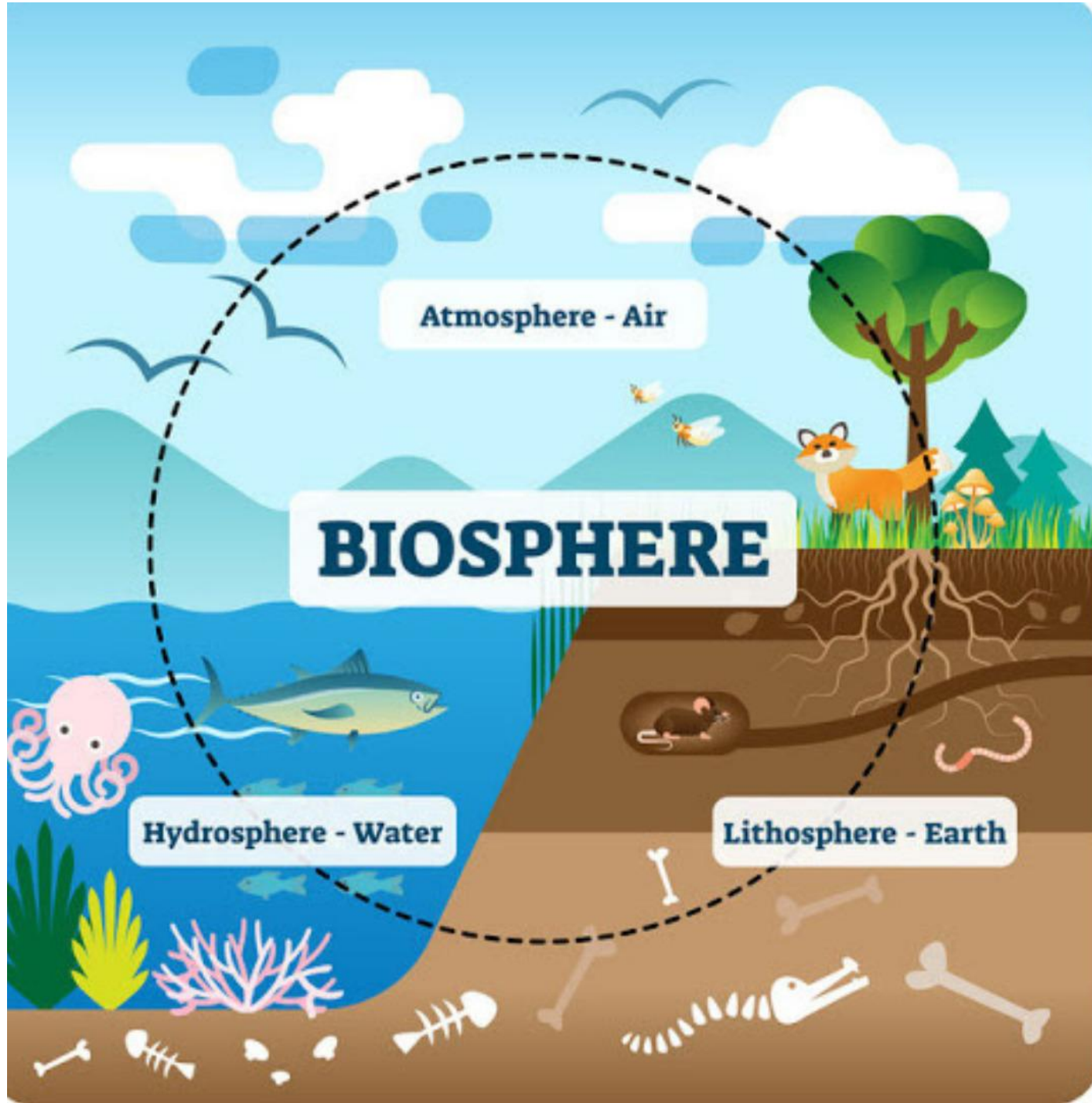
Requires operational systems, policies and regulations and Legislation to deter threats and enable a rapid scale up should an emergency occur despite preventative measures

Trained workforce, Role of Tertiary Academic Institutions, labs, environmental and public health monitoring and surveillance systems, and emergency response inclusive of law enforcement.

A well-informed populace



Biosecurity is the deliberate act of preserving our biosphere for our sake and out of respect.



Thank you

Biosecurity is everybody's business and it is very serious business. The end.



THANK YOU

Prof. Akin Abayomi, Honourable Commission of Health, Lagos



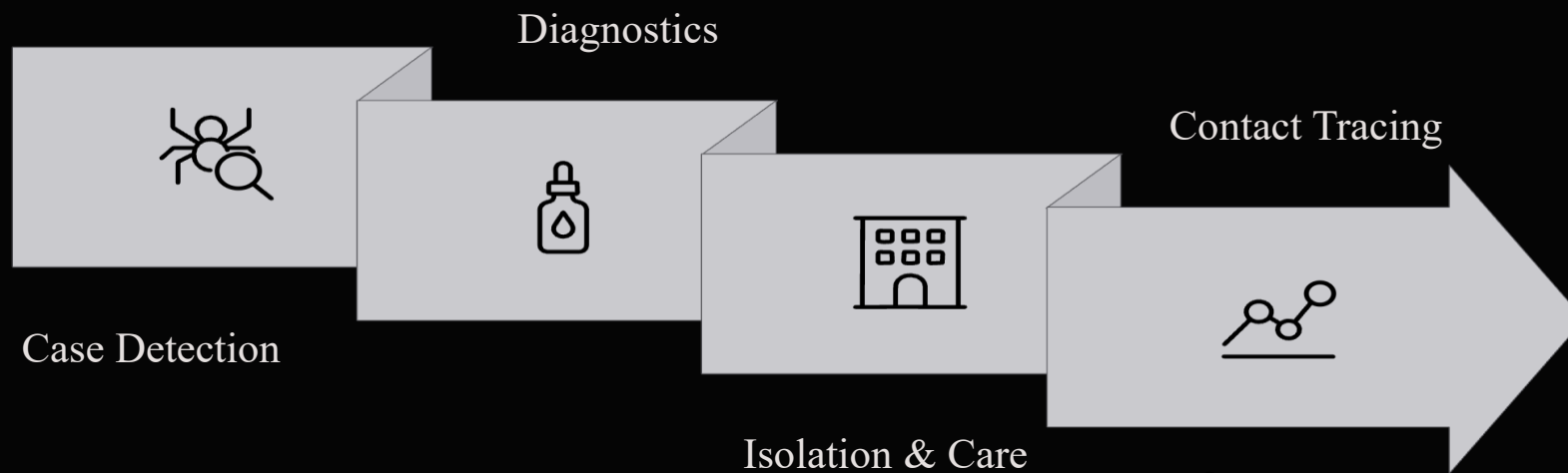
LAGOS STATE GOVERNMENT

November, 2025

COVID-19 Response: Lessons from Ebola Applied

Rapid Diagnostic Excellence

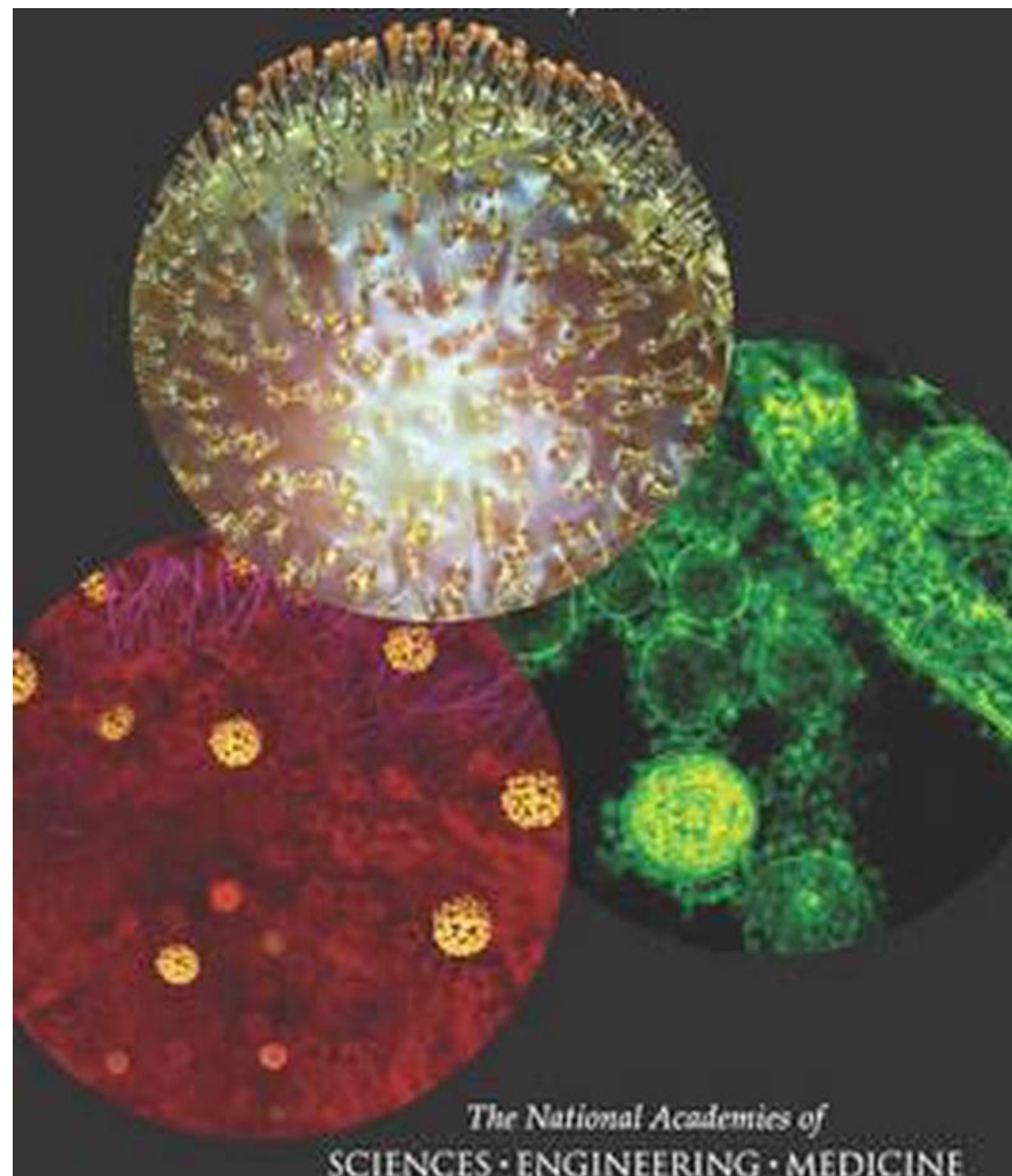
Evidence-Based Interventions





Gain of Function Research of Concern (GOFROC)

- Gain-of-function research is medical research that genetically alters an organism in a way that may enhance the biological functions of gene products
- Gain of Function research that could generate a pathogen that is:
 - Highly transmissible and likely capable of widespread and uncontrollable damage to human populations





Economic Toll of the Ebola Outbreak on West Africa (2014–2016)

The Ebola outbreak caused a massive economic impact on Guinea, Liberia, and Sierra Leone.



Total Economic Loss
\$2.8 Billion

Source: World Bank