World Health Organization

REGIONAL OFFICE FOR Africa

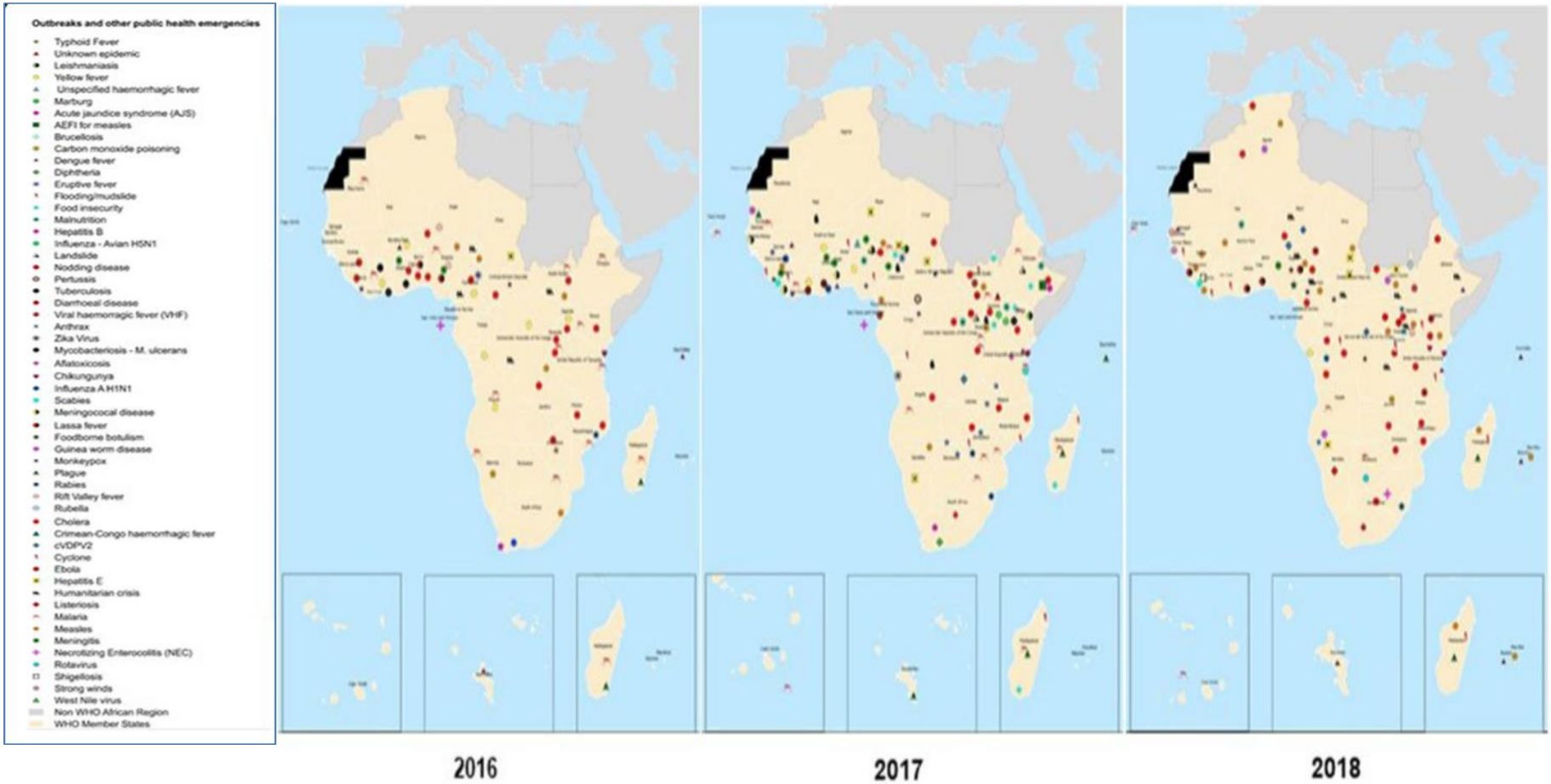
MEDILABSECURE, Regional Meeting

Dakar, Senegal, 20-24 January 2020

Strengthening Public Health Laboratories in the WHO African Region: A Critical Need for Disease Control

Dr Tieble Traore (EPR/WHO AFRO)

Emerging and re-emerging diseases with pandemic potential continue to challenge fragile health systems in Africa



Map showing the spatial distribution of epidemics and other public health emergencies in the WHO African region, 2016–2018

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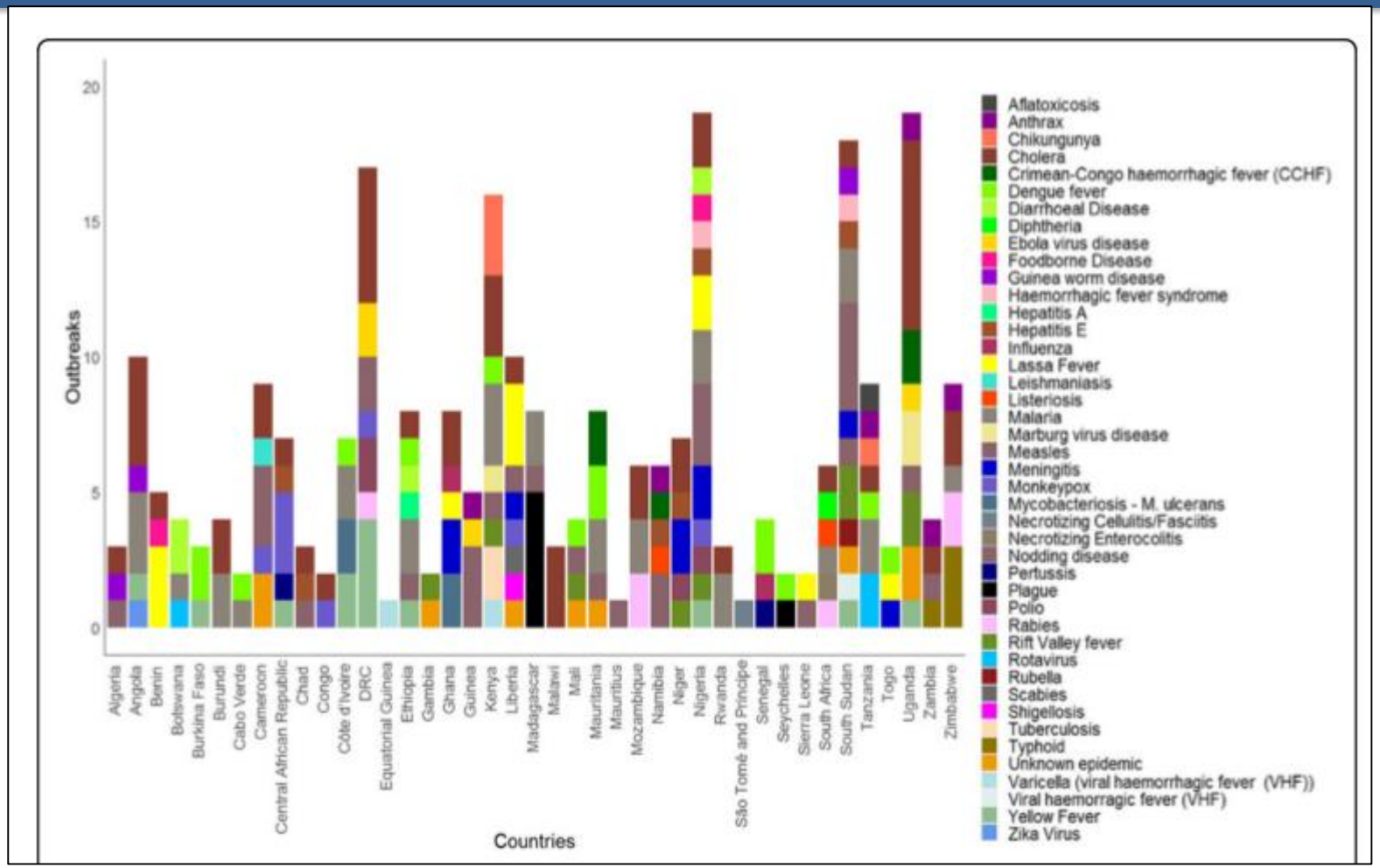
HEALTH EMERGENCIES programme

Recent epidemic events by disease in the countries of the WHO African region, 2016–2018



The top five causes of outbreaks during the period 2016–2018 were: Cholera, Measles and Viral Haemorrhagic Diseases, such as Ebola Virus Disease, Yellow Fever, Dengue Fever, Lassa Fever, and Rift Valley Fever. Other causes were Malaria and Meningitis.

Prioritization of countries, based on frequency of infectious disease epidemics, 2016–2018

The number of events reported was used to classify countries into three priority tiers based on the frequency of epidemics during the period 2016–2018.
High priority (tier 1) are those countries that had 10 or more epidemics during the period 2016–2018. These countries also had limited or developing IHR capacities, based on the 2018 IHR annual reporting data.

Moderate priority (tier 2) are those countries that had 5–9 epidemics during the period 2016–2018.

Low priority (tier 3) are those countries with fewer than 5 epidemics or had no epidemic recorded or reported through the tracking portals detailed in the methods section .

Priority class	Number of countries	Country	IHR average capacity score from the 2018 self-assessment annual reporting
Priority 1 **(tier 1 countries)** 10+ epidemics, 2016-2018	N=7	Angola	59%
		DRC	34%
		Kenya	35%
		Liberia	46%
		Nigeria	52%
		South Sudan	39%
		Uganda	51%
Priority 2 **(tier 2 countries)** 5–9, 2016-2018	N=15	Benin	35%
		Cameroon	38%
		Central African Republic	13%
		Ethiopia	58%
		Ghana	47%
		Guinea	55%
		Côte d'Ivoire	44%
		Madagascar	26%
		Mauritania	26%
		Mozambique	53%
		Namibia	47%
		Niger	44%
		South Africa	66%
		United Republic of Tanzania	47%
		Zimbabwe	55%
Priority 3 **(tier 3 countries)** Fewer than 5 epidemics or no epidemic event recorded, 2016-2018	N=25	Algeria	80%
		Botswana	26%
		Burkina Faso	12%
		Burundi	23%
		Cabo Verde	46%
		Chad	29%
		Congo (Republic of)	34%
		Côte d'Ivoire	44%
		Eritrea	35%
		Eswatini (Former Swaziland)	42%
		Equatorial Guinea	22%
		Gabon	40%
		Gambia	35%
		Guinea Bissau	40%
		Lesotho	33%
		Malawi	42%
		Mali	49%
		Mauritius	62%
		Rwanda	67%
		São Tomé and Principe	39%
		Senegal	45%
		Seychelles	48%
		Sierra Leone	38%
		Togo	32%
		Zambia	31%

Foot note: RED less than or equal to 20% is no capacity; ORANGE 21%–40% is limited capacity; YELLOW 41%–60% is developed capacity; LIGHT GREEN 61%–80% is demonstrated capacity; DARK GREEN more than 80% is sustainable capacity - **No country had sustainable capacity in 2018**

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Member States have made substantial progress to improve health through the implementation of IHR (2005)

- Improvement in public health surveillance, reporting and data collation practices on epidemics and better diagnostics to identify the disease-causing organisms

- Time taken to control outbreaks in the WHO African Region, has reduced from an average of 418 days (well over a year) in 2016 to 51 days (under two months) in 2018
- Further, epidemics are being detected and responded to faster

Enabling environment

- African countries are committed to assess and subsequently strengthen their IHR capacities to prepare for and respond to emergencies
- Reforms in the WHO Health Emergency programme post the 2013–2016 West Africa Ebola

REGIONAL STRATEGY FOR HEALTH SECURITY AND EMERGENCIES

regional committee, June 2016

World Health Organization
REGIONAL OFFICE FOR Africa

AFR/RC66/6
13 June 2016

REGIONAL COMMITTEE FOR AFRICA

ORIGINAL: ENGLISH

Sixty-sixth session
Addis Ababa, Federal Democratic Republic of Ethiopia, 19–23 August 2016

Provisional agenda item 8

REGIONAL STRATEGY FOR HEALTH SECURITY AND EMERGENCIES 2016–2020

Report of the Secretariat

EXECUTIVE SUMMARY

1. The World Health Organization, African Region, is challenged by recurrent outbreaks and other health emergencies. These emergencies, most of which are preventable by addressing their underlying determinants, result in unacceptably high morbidity, mortality, disability and socioeconomic disruptions. They also threaten national, regional and global health security.

2. Presently, there is no global or integrated regional strategy that comprehensively addresses all public health emergencies. However, frameworks and guidelines have been developed to guide Member States. These include the legally-binding International Health Regulations (2005); the regional strategies on integrated disease surveillance and response and disaster risk management.

3. Despite the availability of these frameworks, guidelines and strategies, tackling health emergencies remains a huge challenge. This is largely due to fragmented implementation, limited intersectoral collaboration, inadequate resources, weak health systems, and inadequate IHR core capacities.

4. Learning from the recent Ebola response, WHO is undertaking major reforms to make it fit for purpose to address global health security. A new programme has been created across all the three levels of the Organization to address emergencies.

5. In view of the above, a regional strategy is required to guide Member States. It emphasizes the use of the "*all-hazards approach*", defined as "an integrated hazard management strategy that incorporates planning for and consideration of all potential natural and technological hazards". The strategy will contribute to the achievement of Sustainable Development Goal 3 which focuses on ensuring good health and well-being.

6. The Regional Committee is invited to review and adopt this strategy.

"(2). The IHR (2005) constitute the essential vehicle for addressing global health security... (3) In the African Region, IHR is implemented in the context of IDSR…"

(17). **The objectives are:**

(a) To strengthen and sustain the capacity of all Member States (MS) to (a) prepare for and prevent health emergencies.

(b) promptly detect, speedily report and confirm outbreaks.

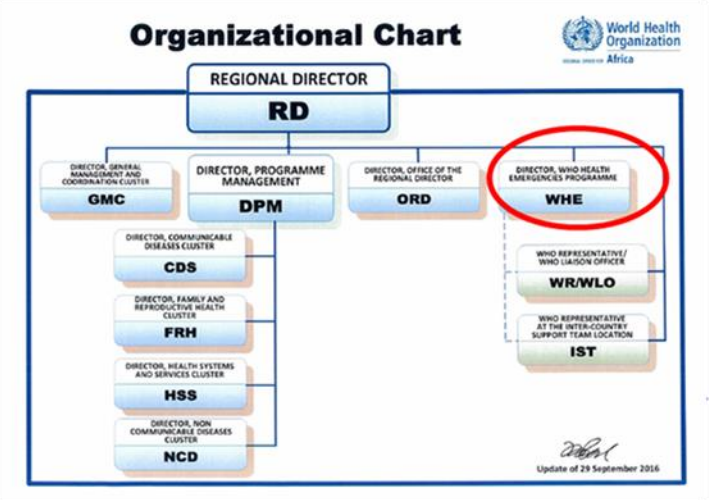
(c) promptly respond to and recover.

(19). **Guiding principles and values**

…f) Fostering **intersectoral collaboration** at local and regional levels between human health, animal or veterinary health, the environment and wildlife sectors using the "**One health Approach**".

Enabling Environment: Fundamental Change in WHO approach to address health emergencies

- Shifting the paradigm: Health Security a core priority



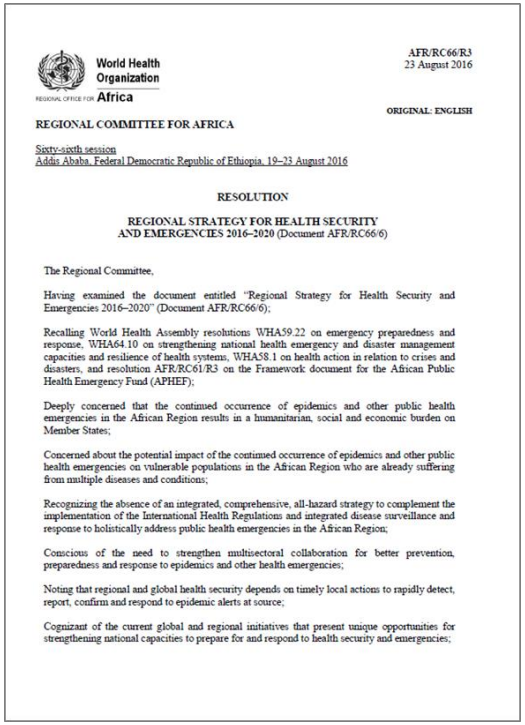
WHE: WHO Health Emergencies Programme

Dr Matshidiso Moeti
WHO Regional Director For Africa

"Since I took office in 2015, I have made improving health security a core priority of the Transformation Agenda of the WHO Secretariat in the African Region."

Implementation of IHR (2005)

- Regional Strategies for Health Security and Emergencies Regional Committee, June 2016



World Health Organization
REGIONAL OFFICE FOR Africa

AFR/RC66/R3
23 August 2016

ORIGINAL: ENGLISH

REGIONAL COMMITTEE FOR AFRICA

Sixty-sixth session
Addis Ababa, Federal Democratic Republic of Ethiopia, 19–23 August 2016

RESOLUTION

REGIONAL STRATEGY FOR HEALTH SECURITY AND EMERGENCIES 2016–2020 (Document AFR/RC66/6)

The Regional Committee,

Having examined the document entitled "Regional Strategy for Health Security and Emergencies 2016–2020" (Document AFR/RC66/6);

Recalling World Health Assembly resolutions WHA59.22 on emergency preparedness and response, WHA64.10 on strengthening national health emergency and disaster management capacities and resilience of health systems, WHA58.1 on health action in relation to crises and disasters, and resolution AFR/RC61/R3 on the Framework document for the African Public Health Emergency Fund (APHEF);

Deeply concerned that the continued occurrence of epidemics and other public health emergencies in the African Region results in a humanitarian, social and economic burden on Member States;

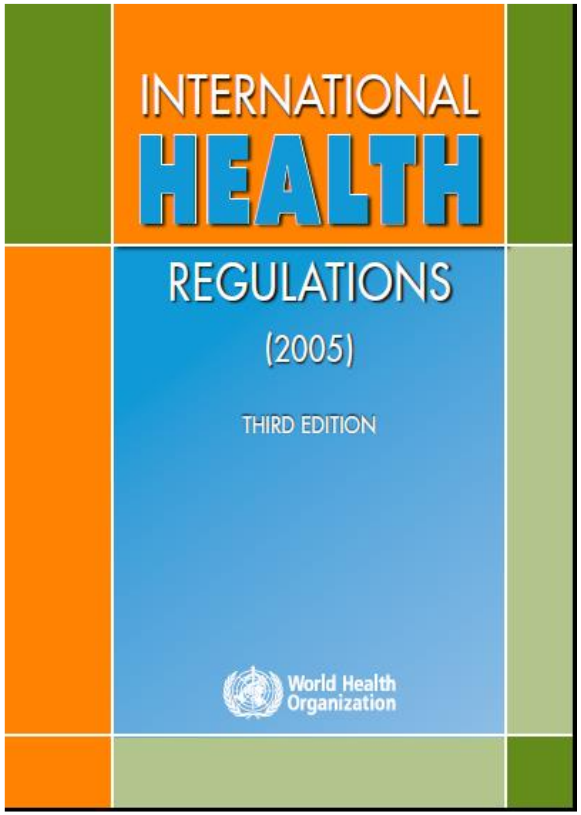
Concerned about the potential impact of the continued occurrence of epidemics and other public health emergencies on vulnerable populations in the African Region who are already suffering from multiple diseases and conditions;

Recognizing the absence of an integrated, comprehensive, all-hazard strategy to complement the implementation of the International Health Regulations and integrated disease surveillance and response to holistically address public health emergencies in the African Region;

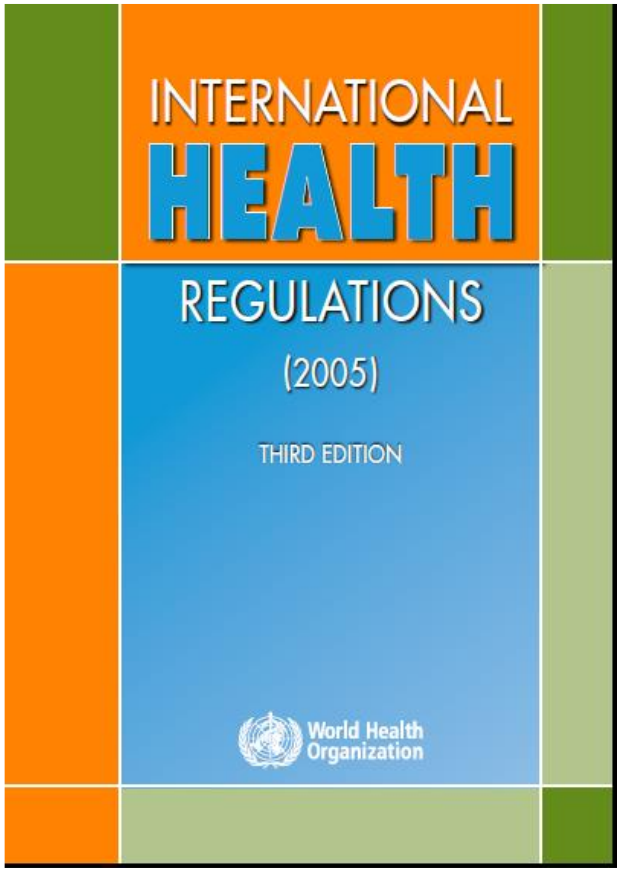
Conscious of the need to strengthen multisectoral collaboration for better prevention, preparedness and response to epidemics and other health emergencies;

Noting that regional and global health security depends on timely local actions to rapidly detect, report, confirm and respond to epidemic alerts at source;

Cognizant of the current global and regional initiatives that present unique opportunities for strengthening national capacities to prepare for and respond to health security and emergencies;



The International Health Regulations (IHR (2005)) are designed to prevent and cope with all major public health threats.



PREVENT	7 Technical areas, 15 indicators
DETECT	4 Technical areas, 13 indicators
RESPOND	5 technical areas, 14 indicators
IHR RELATED HAZARDS AND POINTS OF ENTRY	3 Technical areas, 6 indicators

IHR, 2005 are an overarching legal framework for global health security

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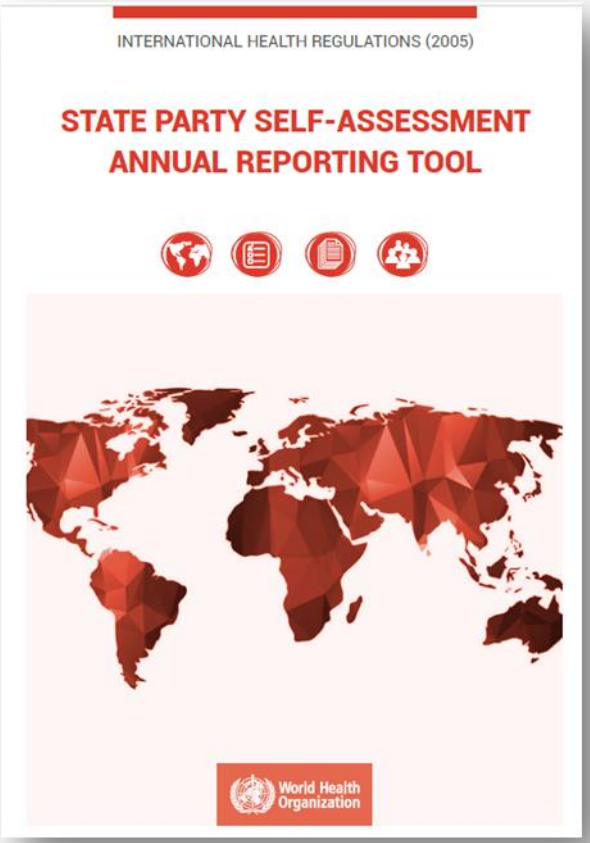
http://www.who.int/ihr/public_health_concerns/en/

HEALTH EMERGENCIES programme

CORE CAPACITIES AND INDICATORS



C1: LEGISLATION AND FINANCING
C2: IHR COORDINATION AND NFP FUNCTIONS
C3: ZOONOTIC EVENTS AND THE HUMAN-ANIMAL INTERFACE
C4. FOOD SAFETY
C5. LABORATORY
C6. SURVEILLANCE
C7. HUMAN RESOURCES
C8. NATIONAL HEALTH EMERGENCY FRAMEWORK
C9. HEALTH SERVICE PROVISION
C10. RISK COMMUNICATION
C11. POINTS OF ENTRY (POE)
C12. CHEMICAL EVENTS
C13. RADIATION EMERGENCIES

Public Health Laboratory Capacity in Africa

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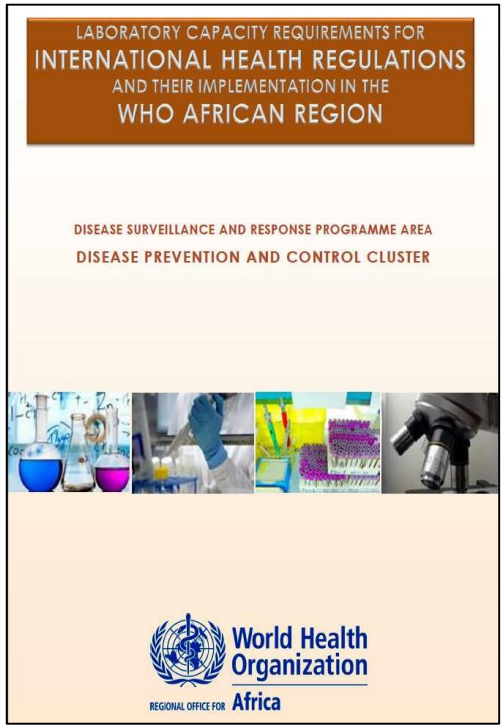
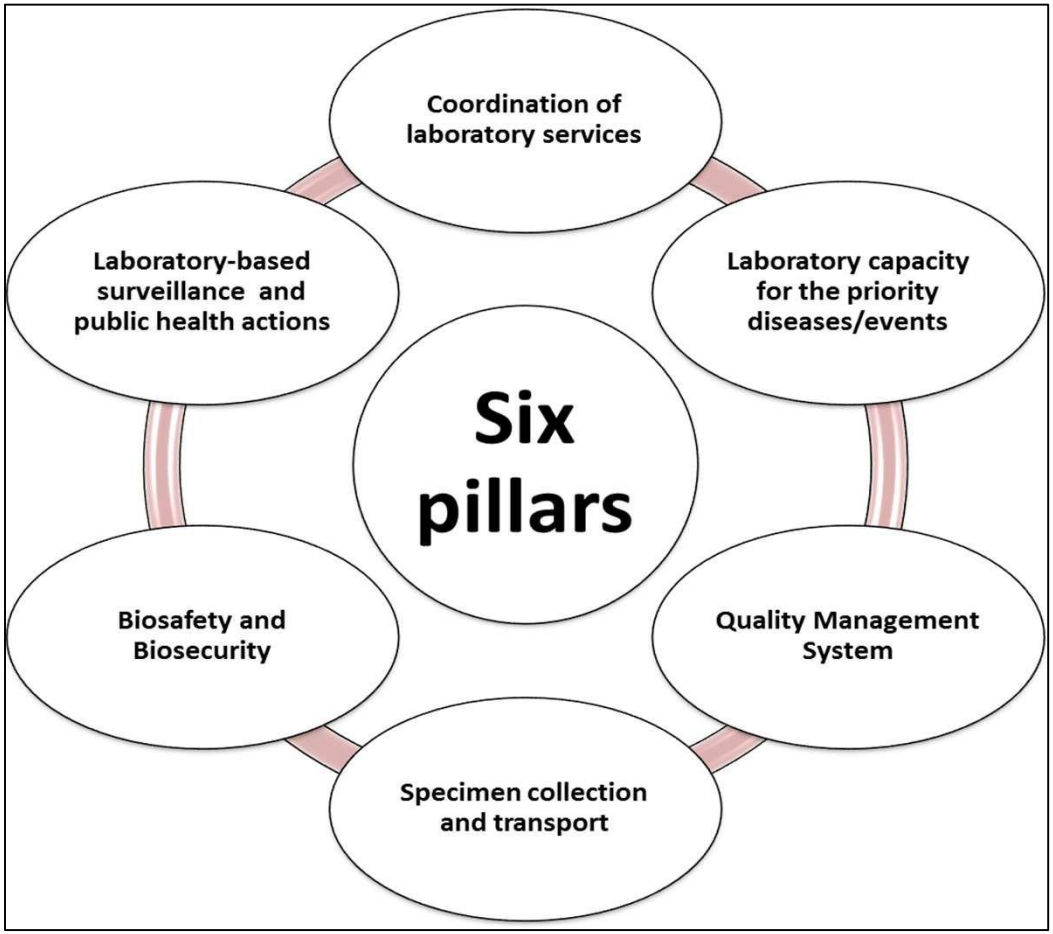
Strengthening laboratory capacity for confirmation of Public Health Events





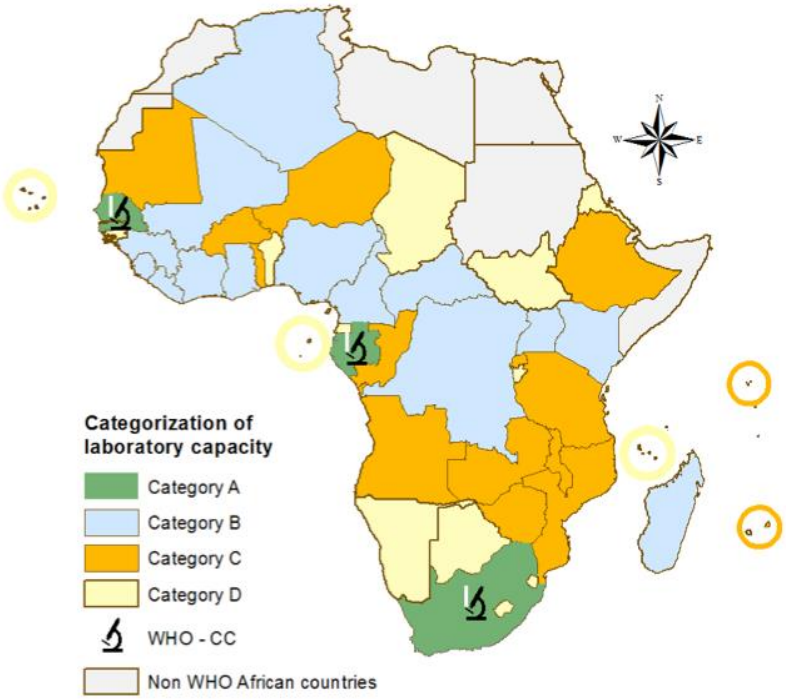
Emerging and Dangerous Pathogens Laboratory Network (EDPLN)

- **Major challenges and threats to global health security**
  - Ebola
  - Rift valley fever
  - Plague
  - Monkeypox
  - Lassa fever
  - SARS (sever acute respiratory syndrome)
  - Tularaemia
  - MERS-Cov (Middle East respiratory syndrome cirus)
  - Nipah
  - Legionellosis
  - Borreliosis
  - Melioidosis etc.

WHO EDPLN was established to assist WHO in:

- Enhancing both readiness and response (timely lab detection and management of outbreaks
- Facilitating transfer of safe and diagnostic technologies, practices and training to laboratories in affected countries (see IHR(2005))
- Providing evidence-based strategies and tools and practices for rapid detection and containment

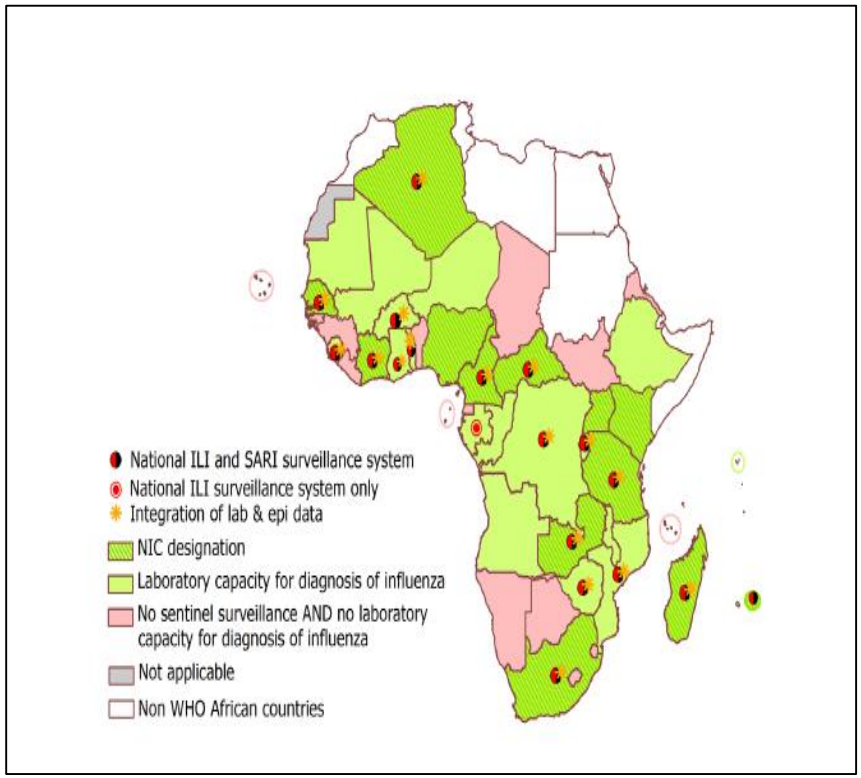
AFR Emerging and Dangerous Pathogens Laboratory Network (EDPLN)



Resources from AFR Influenza Lab Networks: Crucial for MERS-CoV & EVD

Cat A	Countries with VHF laboratory capacity and designated as regional reference laboratories for neighboring countries
Cat B	Countries with VHF laboratory capacity and ensuring national confirmation of VHF
Cat C	Countries without existing VHF laboratory capacity but have a laboratory capacity for confirmation of influenza viruses by PCR (Potential laboratory to be upgraded for VHF confirmation capacity)
Cat D	Countries without VHF and other EDP laboratory capacity and sending VHF suspected clinical specimens to a designated regional reference laboratory

Distribution of influenza surveillance activities in the African Region

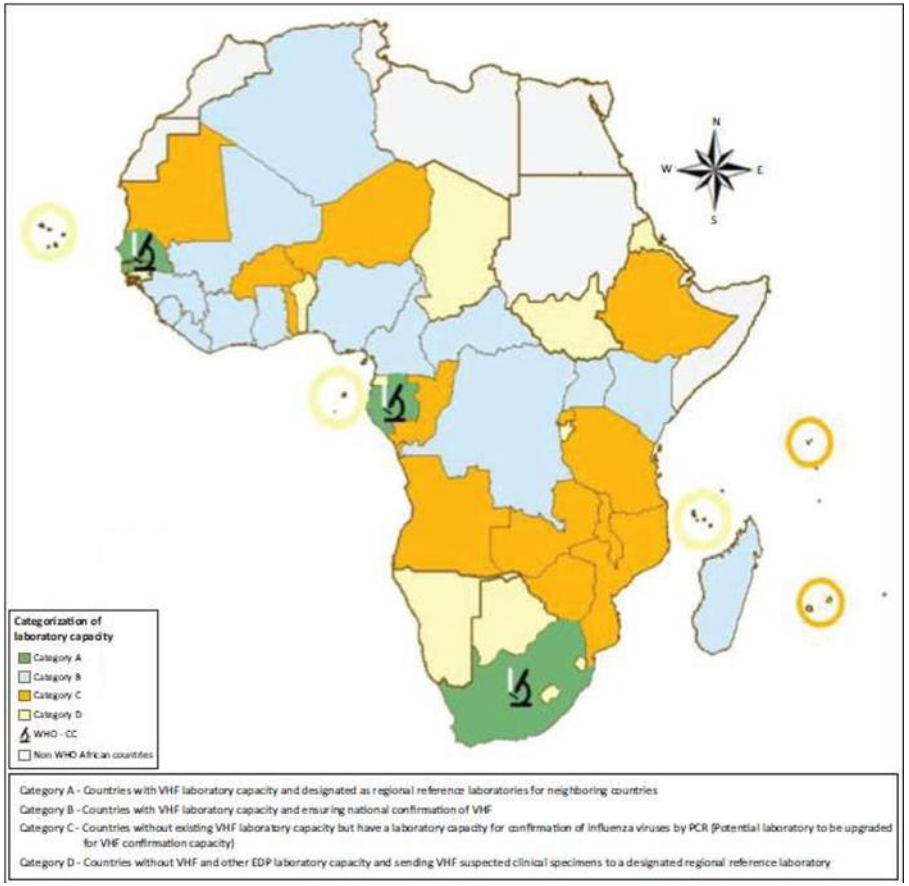


- ILI: influenza-like illness
- SARI: severe acute respiratory infection
- NIC: national influenza centre
  - Seasonal influenza
  - Non-seasonal influenza (pandemic influenza)
    - Avian influenza virus A in human
      - Human infection (H5N1)

Influenza infection is clinically indistinguishable from other viral respiratory illnesses without laboratory confirmation

WHO/AFRO oversees a number of networks of national reference laboratories

Emerging and Dangerous Pathogens Laboratory Network



- Influenza Laboratory Network,
- Emerging and Dangerous Pathogens Laboratory Network (EDPLN)
- Polio Laboratory Network
- Measles and Rubella Laboratory Network
- Tuberculosis (TB) Laboratory Network,
- Rotavirus Laboratory Network,
- HIV Drug Resistance Laboratory Network
- Paediatric Bacterial Meningitis (PBM) Laboratory Network

Building the capacity for functional regional laboratory networks to conduct timely, accurate and safe detection during public health emergencies

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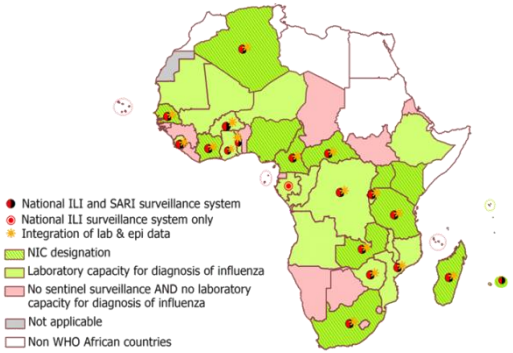
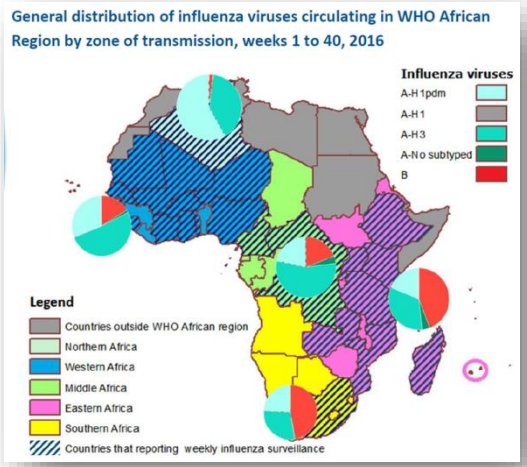
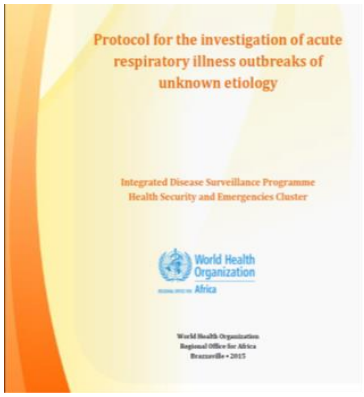
Functional AFR Lab Networks

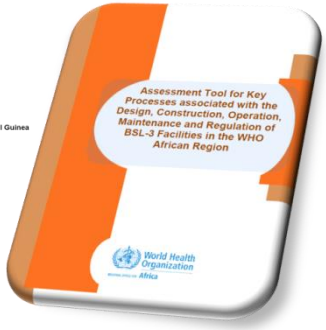
Flu lab Network

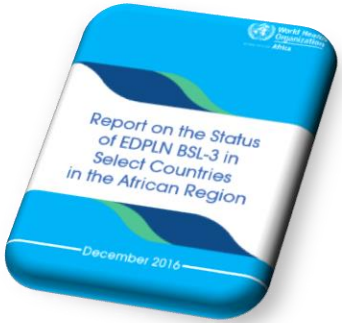


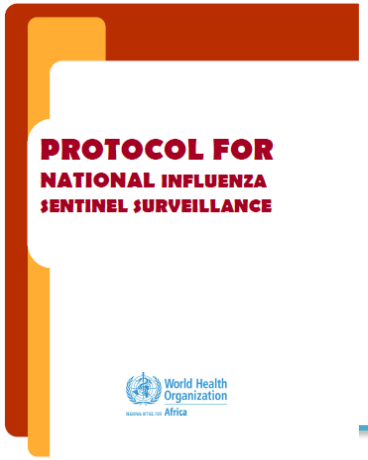




EDPLN





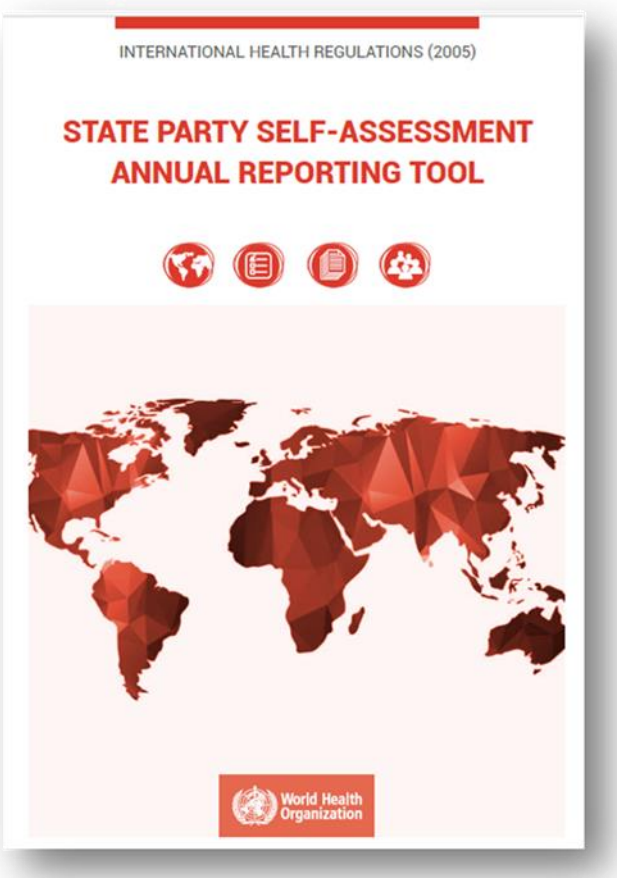


AFR laboratory capacity for diagnosis of Public Health Events

46 Member States: culture, identification & AMR
32 Member States : PCR for influenza viruses
13 Member States : Functional BSL3 used for VHFs
40 Member States :TB culture & confirmation of MDR/XDR
17 Member States : PCR for Ebola & other VHFs
20 Member States : chemicals in soil, water and food

Lab diagnostic testing algorithms +++

“The IHR require States Parties to establish and maintain the capacity to detect, assess, notify and respond to public health risks and acute events, including those at points of entry, (Annex 1 of the Regulations)”.



- Enhancing specimen referral & transport
- Implementing biosafety & biosecurity regimes
- Assuring access to quality-assured diagnostic capacity

"A whole-of-government multisectoral national biosafety and biosecurity system with dangerous pathogens identified, held, secured and monitored in a minimal number of facilities according to best practices; biological risk management training and educational outreach conducted to promote a shared culture of responsibility, reduce dual-use risks, mitigate biological proliferation and deliberate use threats, and ensure safe transfer of biological agents; and country specific biosafety and biosecurity legislation, laboratory licensing and pathogen control measures in place as appropriate".

Biosafety & Biosecurity Regimes

WHO Laboratory Biosafety Manual

4th-edition revision now in final stages

- A central core document
- 7 additional monographs to address:
  - Risk assessment,
  - Laboratory design and maintenance,
  - Biological safety cabinets and isolators,
  - PPE,
  - Decontamination and waste management,
  - Biosafety programme management, and
  - Emergency/outbreak response

Specimen Referral & Transport

- **The WHO guidance on the safe transport of infectious substances, revised biennially**

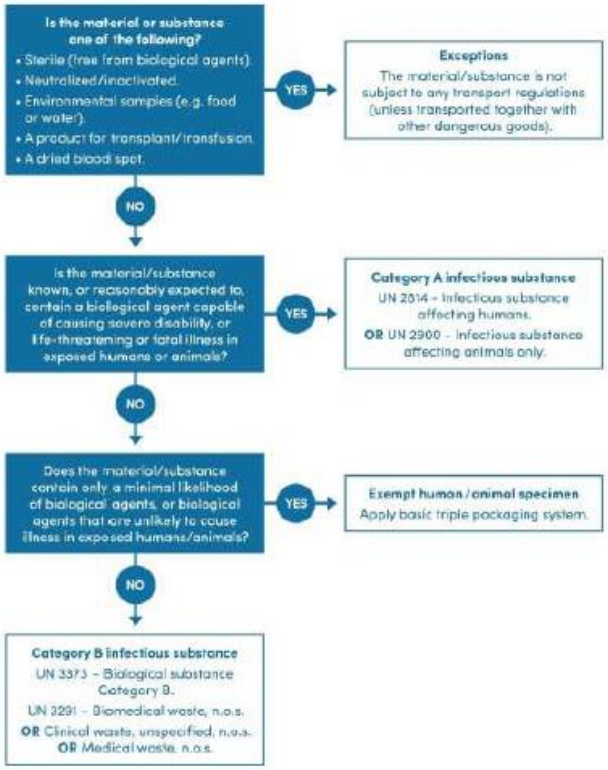


Fig. 5.1. Overview of the process of defining and classifying infectious substances

Source: Illustration created for the 4th edition of the WHO Laboratory Biosafety Manual

WHO BIOSAFETY REGIONAL WORKSHOP FOR AFR MEMBER STATES

Biosafety and Biosecurity: Train-the-Trainers course

Support from Public Health England, Public Health Canada

World Health Organization

HEALTH EMERGENCIES programme

Participants

- One representative was invited from each WHO AFR Member State, such as a director or senior person of the central public health laboratory.
- A representative, who should be able to **organise and coordinate replicate training at their home settings for the national audience.**

OBJECTIVES AND EXPECTED OUTCOME

Objectives

- To share good laboratory practice used amongst participating countries and the trainers to protect the safety of those people working and interfacing with the laboratory and enabling the lab to work to acceptable quality standards;
- Discuss practical measures that can be taken in all laboratories (including resource limited laboratories) using the concept of International Best Practice
- Gain practical skills in biosafety and learn technical procedures in diagnosing and handling pathogens that pose a danger to human health.

Expected outcomes

- Describe possible routes of entry of pathogens and list strategies to control entry
- Demonstrate how to enter and exit laboratories, select appropriate PPE, and wash hands safely
- Demonstrate Good Microbiological Practice in terms of aseptic technique, accuracy and contamination control
- Describe the factors which contribute to the success of chemical disinfection and demonstrate how to clean effectively
- Explain how an autoclave is used to inactivate bacteria and viruses and describe the duty of care to the general public
- Assign typical laboratory waste to the correct waste stream. To include autoclaving, bagging waste, chemical decontamination, sharps boxes.

- Describe the features of biological safety cabinets (BSCs), incubators, centrifuges, bench top equipment and consumables which make them suitable for use with different infectious and pathogenic microorganisms
- Demonstrate the pre-use checks and best practice when using BSCs, centrifuges and other laboratory equipment.
- Describe the pre-employment checks, health screening and post incident reviews that should be available for members of staff.
- Describe the planning required in order to minimize the impact of accidents and prevent future accidents.
- List the action priorities in response to accidents.
- Describe the hierarchy of factors to be addressed by risk assessments and apply these to workplace scenarios
- Demonstrate the fundamental tools of laboratory management including record keeping, audit of laboratories.
- Demonstrate the ability to appraise a workers technique and give feedback.
- Identify measures to put in place to improve a workers performance

International Best Practice

- Personal Protective Equipment (PPE)
- Hand washing
- Aseptic technique
- Disinfection and Waste Disposal
- Lab audit, specialist equipment

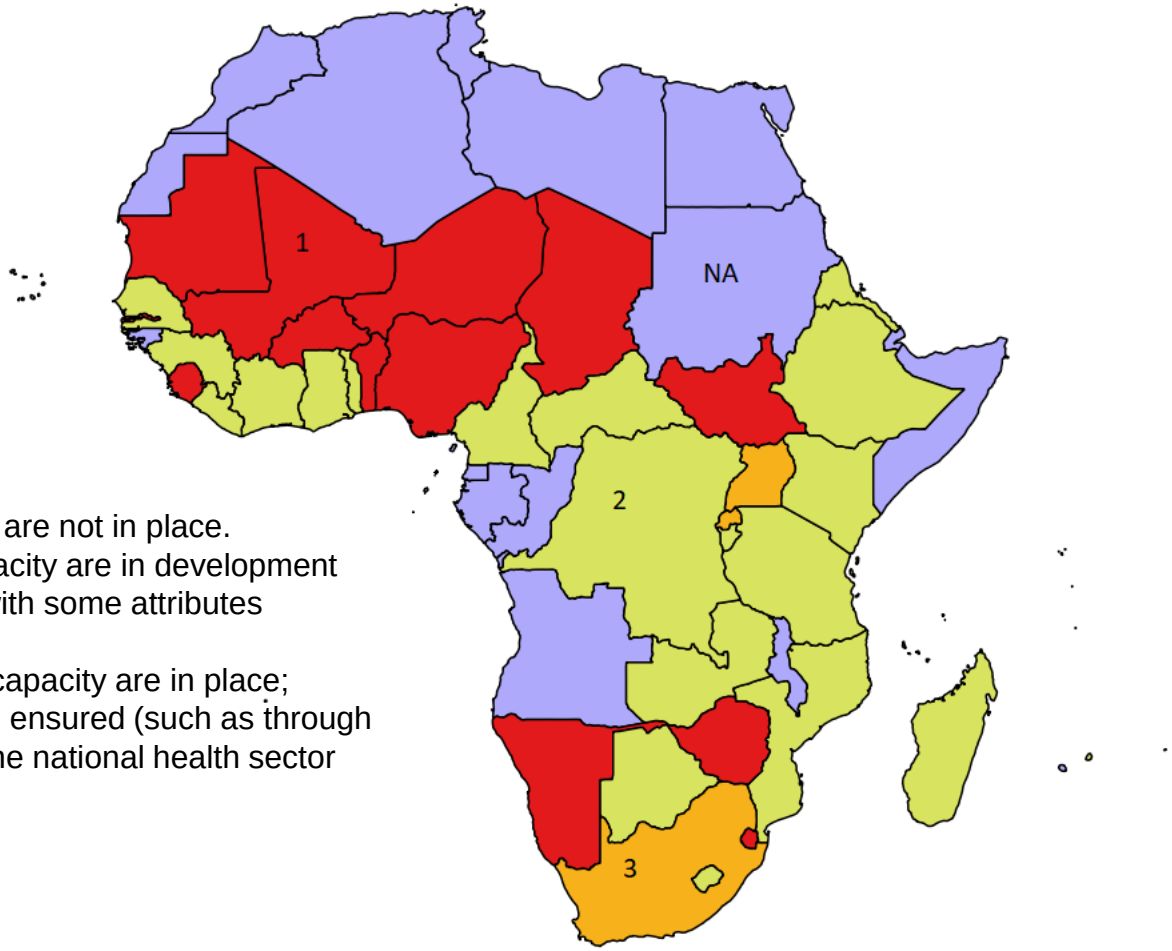
- Risk Assessment
- Accident scenarios
- Accident Investigations
- Preparing Train the Trainer session

- Train the Trainer sessions
- Lessons Learned from Train the Trainer
- Competency and Human Factors – Video review

- **WHO biosafety video series - Biological safety cabinet (BSC) 1: Introduction**
- **WHO biosafety video series - Biological safety cabinet (BSC) 2: Preparatory steps**
- **WHO biosafety video series - Biological safety cabinet (BSC) 3: Best practices for safe usage**
- **WHO biosafety video series - Biological safety cabinet (BSC) 4: Incident management**

Biosafety and biosecurity, Scores from the JEE Reports

P.6.1 Whole of government biosafety and biosecurity system is in place for human, animal and agriculture



1. No capacity: Attributes of a capacity are not in place.
2. Limited capacity: Attributes of a capacity are in development stage (implementation has started with some attributes achieved and others commenced)
3. Developed capacity: Attributes of a capacity are in place; however, sustainability has not been ensured (such as through inclusion in the operational plan of the national health sector plan with a secure funding source)

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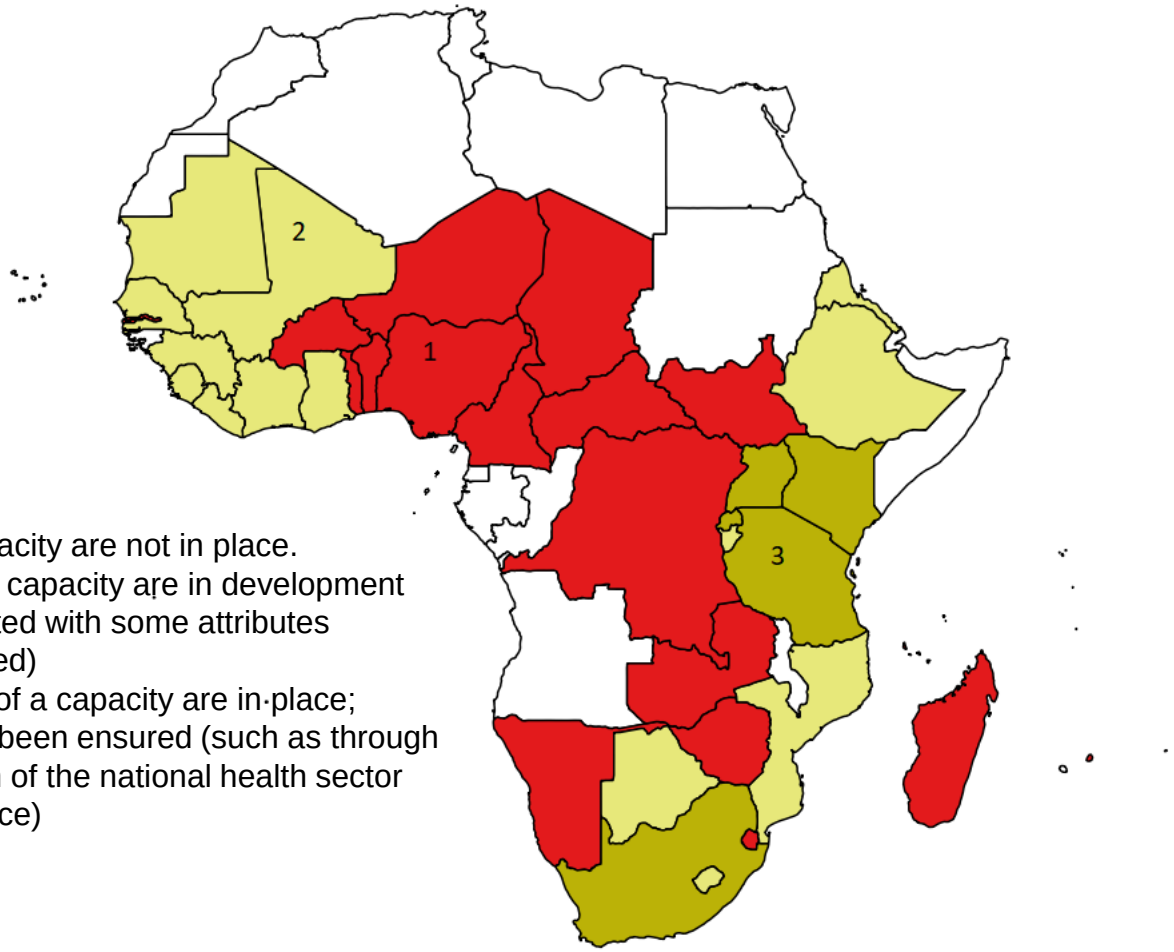
P.6.2 Biosafety and biosecurity training and practices



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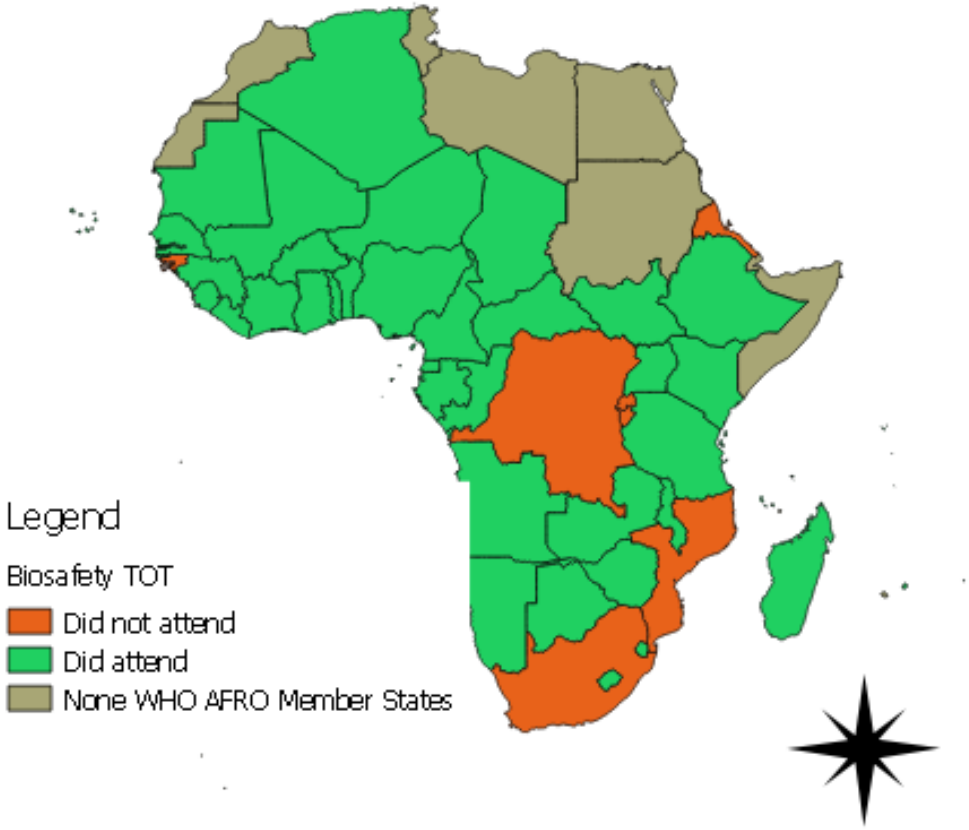
WHO Regional Biosafety Training in 2018



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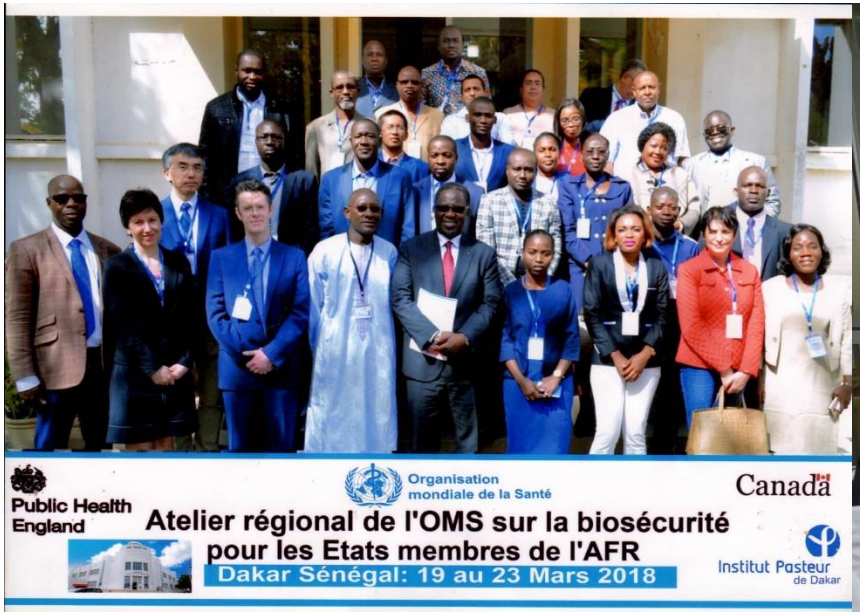
Sub-regional Biosafety Training of Trainers KEMRI

Group photo, IPD



Participants in action, KEMRI, Kenya

INSTITUT PASTEUR DE DAKAR 19-23 MARS 2018, DAKAR-SENEGAL

N°	Country	Name
1	Algérie	Mrs Guer Mesbah Falla
2	Angola	Dr Vera Lucia de F. Martins Vieira
3	Burkina Faso	Mr Sawadogo T. Léon
4	Cameroun	Mme Melingui Sylvie Epse Nomo
5	Tchad	Mr Hota Mathieu
6	Guinée	Dr Aboubacar Savane
7	Gabon	Dr Armel Mintsa Ndong
8	Madagascar	Pr Randriamanantany Zely Arivelo
9	Mali	Dr Abdelaye Keita
10	Togo	Dr Halatoko Wemboo Afiwa
11	Congo	Mr Mieret Tanguy
12	Comores	MOHAMED FOUAD
13	Niger	Dr Ibrahim Dan Dano
14	Bénin	Mme Glitho Egbonoumi Fifatin Mariette
15	Côte d'Ivoire	Mr N'Dri Mbou Martial
16	Côte d'Ivoire	Mr Lathro Serge Joseph
17	Congo	Mrs Mankampa Koria Viviane
18	Madagascar	Raberahona Ando Ny Aina
19	Sao Tomé et Principe	Yarelene Sacramento Sequeira
20	Mauritanie	Prof Mohamed Abdallahi Bollahi
21	Guinée Equatoriale	Mme Mariluz Mangue Oye
22	Cabo Verde	Dr Jessica Ramos
23	République Centrafricaine	Mr Simplice Arthur Sombot-Ndicky Lombekpangba
24	Senegal	IPD, MSAS, DL

KENYA MEDICAL RESEARCH INSTITUTE, NAIROBI-KENYA 05-09 MARCH 2018

N°	Country	Name	Organization	Function
1	Ethiopia	Mr Aschalew Abayneh Workineh	MoH	Advisor, Public Health Emergencies
2	Gambia	Dr Bakary Sanneh	MoH	Deputy Director
3	Ghana	Ms Boateng Gifty	MoH	Biomedical Scientist
4	Kenya		MoH	
5	Liberia	Dogba John B	MoH	
6	Malawi	Alwin B Mbene	MoH	Chief Laboratory Officer
7	Namibia	Mr Mathew Nghipumbwa	MoH	Training Coordinator
8	Nigeria	Mrs Mary Dooshima INDYERIYO-KAAN	MoH	
9	Seychelles	Mr Atala Nicholas	MoH	
10	Sierra Leone	Mr Alusine Fofanah	MoH	Lab led-Moyamba Gov. Hosp
11	Sierra Leone	Mr Jonathan Green	WHO	Lab team lead
12	South Sudan	Mr Abe Gordon Abias	MoH	
13	Swaziland	Dr Derrick Khumalo	MoH	Laboratory Technologist
14	United Republic of Tanzania	Mr Peter Mkama	MoH	Safety officer
15	Zambia	Mr Mpanga Kasonde	MoH	Laboratory scientist
16	Zimbabwe	Mr Sado Belinda	MoH	
17	Senegal	Dr Faye Elhadji Abdourahmane	IPD	

Toolkit and trainers lesson plans

Preventing biological risks increased by environmental & climate change by strengthening Public Health Laboratories

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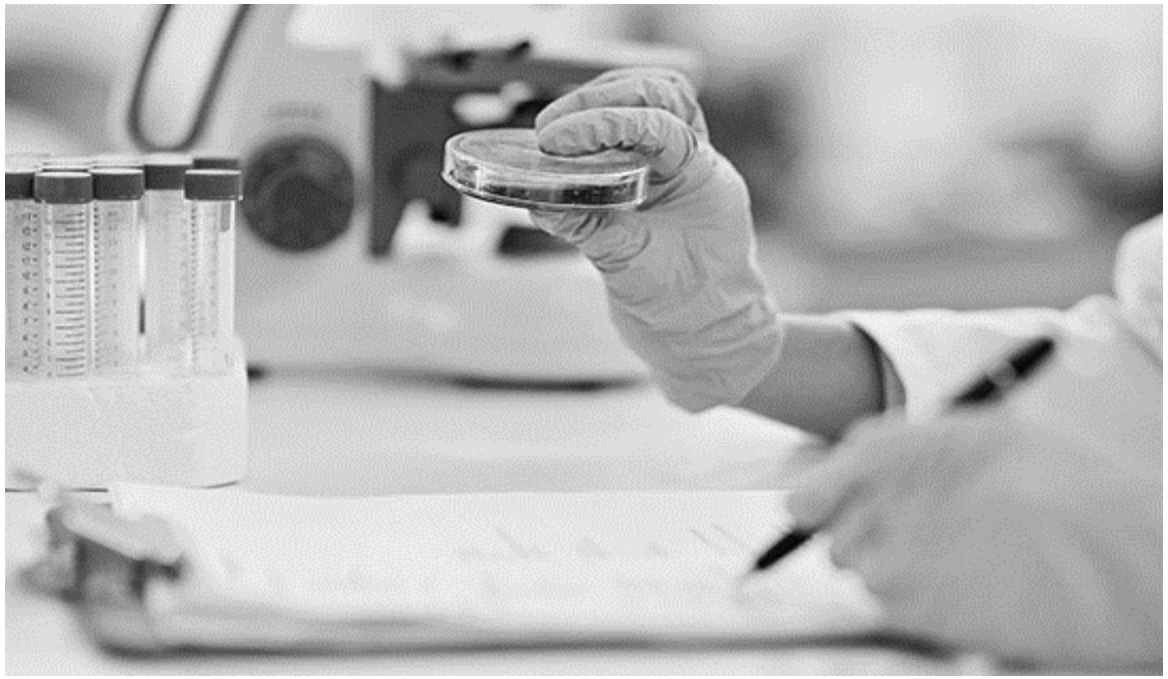

World Health Organization

STRONGLABS areas of work

1.1. Laboratory specimen referral and transport systems are strengthened to ensure early detection and timely confirmation of disease outbreaks.

1.2. Laboratory biosafety and biosecurity regimes are implemented to support storage, handling and sharing of biological materials in a safe and secure manner.

1.3. Access to **quality assured laboratory testing capacity** is ensured for priority diseases for timely, reliable identification and characterization.

STRONGLABS activities planned for Laboratory Biosafety and Biosecurity

- Burkina Faso
  - Development of a national multi-sectorial training plan for relevant staff on biosafety/biosecurity
  - Development of biosafety/biosecurity regulations.
- Niger
  - National training-of-trainers for hands-on biosafety followed by several sub-national replications.
- Mali
  - Two hands-on biosafety training events.
  - Validation of national standards for biosafety/biosecurity.

Other STRONGLABS activities

Burkina Faso	Niger	Mali
- Further elaboration of a harmonized national specimen transport mechanism covering multiple diseases. - Laboratory audits on the implementation of quality management and biosecurity measures.	- Assessment of available national specimen transport mechanisms and elaboration of national guidances. - Training of auditors/mentors on laboratory quality management and implementation of mentoring visits.	- Assessment of avalable national specimen transport mechanisms and develop a guidance on mechanims for priority regions. - Training for laboratory technicians on diagnostic techniques for priority diseases (e.g. Meningitis, Cholera, Lassa, Rift Valley & Dengue fever)

RVF						
Card No	Technical area (cards)	TZA	SEN	MRT	NER	BEN
1	**Coordination at high level**					
2	**Coordination at local level**					
3	**Coordination at technical level**					
4	**Legislation/Regulation**					
5	**Finance**					
6	**Communication w/media**					
7	**Communication w/stakeholders**					
8	**Field investigation**					
9	**Risk assessment**					
10	**Joint surveillance**					
11	**Laboratory**					
12	**Response**					
13	**Education and training**					
14	**Emergency funding**					
15	**Human resources**					
16	**Logisitcs**					
	Total number of times collaboration was assed to be good	**2**	**4**	**0**	**0**	**0**
	% when collaboration was evaluated to be good	13%	27%	0%	0%	0%

The performance of the collaboration between the human health and the animal health sectors is color-coded: **green** for "**good collaboration**", **yellow** for "**some collaboration**", and **red** for "**collaboration needing improvement**". The score uses a semi-quantitative scale (2 points for a red card, 1 for a yellow card and 0 for a green card). Technical areas marked in bold were selected and addressed in-depth throughout the rest of the workshop.

- From May 2016 : first cases of cattle abortions and early postnatal deaths, "milk that changes color".
- In early June 2016, information on mortalities and abortions of cattle, small ruminants and camels in the districts of Tchintabaraden and Tassara were reported by regional authorities
- Veterinary investigation : 17 were all negative samples for brucellosis
- In August (week 32) human deaths with clinical signs such as fever, jaundice, and haemorrhage began to be recorded by health facilities

Major challenges

Timely

- Weak functioning public health laboratory systems and networking
- Inadequate international and national mechanisms for shipment of specimens
- Weak information management systems

Accurate

- Weakness of health systems; workforce, financing
- Old or inadequately serviced equipment
- Lack of essential reagents and consumables
- Insufficient LQMS

Safely

- Inadequate biosafety and biosecurity regulations & guidelines
- Weak laboratory infrastructure
- Lack of regular maintenance of BSC

Real-time bio-surveillance with a national laboratory system to ensure timely, accurately and safely detecting and characterizing pathogens causing epidemic diseases remain a major challenge.

THANK YOU FOR YOUR ATTENTION
MERCI POUR VOTRE ATTENTION

World Health Organization

HEALTH EMERGENCIES programme