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GLOBAL HEALTH EQUITY LECTURE SERIES: COVID 19 PANDEMIC PREPAREDNESS AND RESPONSE: PERSPECTIVES FROM AFRICA

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GLOBAL HEALTH EQUITY LECTURE SERIES: COVID 19 PANDEMIC PREPAREDNESS AND RESPONSE: PERSPECTIVES FROM AFRICA

WELCOME & HOUSEKEEPING

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GLOBAL HEALTH EQUITY LECTURE SERIES: COVID 19 PANDEMIC PREPAREDNESS AND RESPONSE: PERSPECTIVES FROM AFRICA

PERSPECTIVE FROM NIGERIA

Patrick Mboya Nguku MD, MBChB, MSc (Applied epidemiology), PGD AFENET

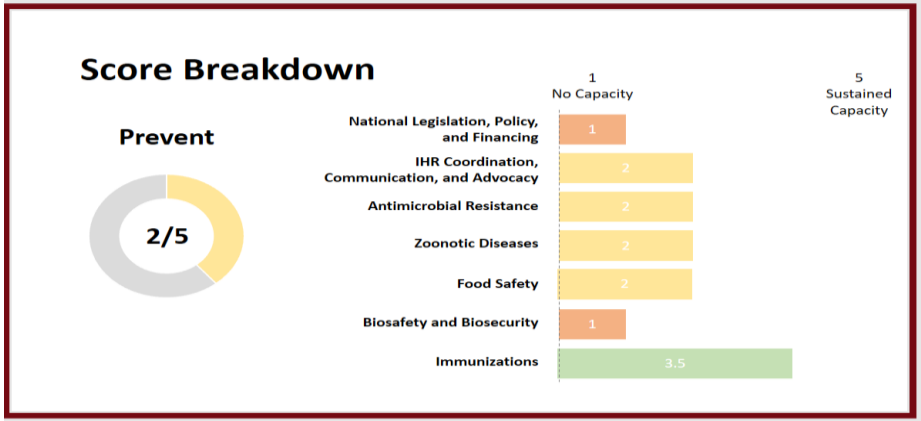
COVID-19 Preparedness and Response: Perspectives from Africa

Nigeria Country Experience

Outline

- Background
- Peace time investments on surveillance & response infrastructure
- COVID-19 outbreak in Nigeria
- Lesson learnt
- Conclusion

IHR/JEE June 2017



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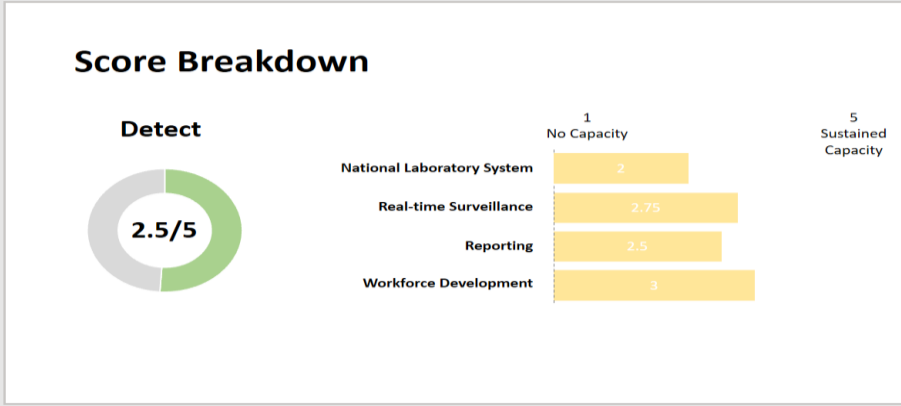

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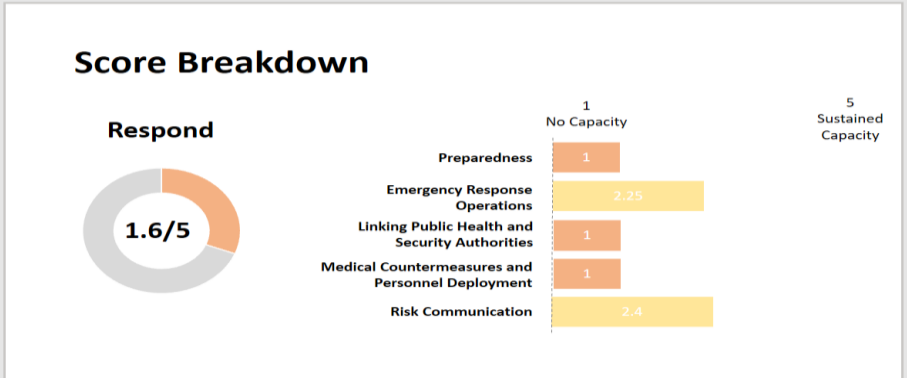
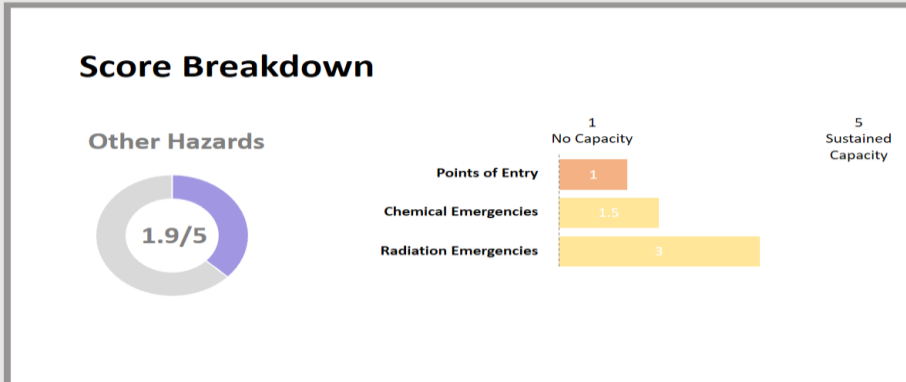
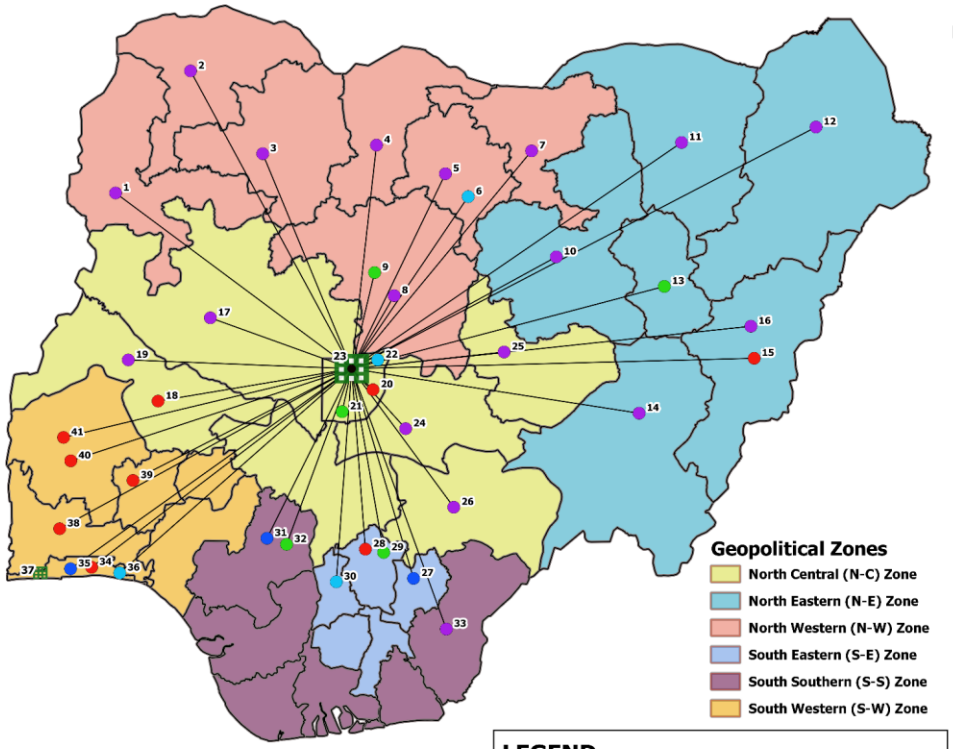




NCDC LABORATORY NETWORK



	Ref. ID	Name	State	Cluster
N-W	1	Sir Yahaya Memorial Hospital, Birnin Kebbi	Kebbi	CSM/Cholera
	2	Public Health Laboratory, Sokoto	Sokoto	CSM/Cholera
	3	Ahmad Sani Yarima Bakura Specialist Hospital, Gusau	Zamfara	CSM/Cholera
	4	State Public Health Laboratory, Katsina	Katsina	CSM/Cholera
	5	Infectious Disease Hospital, Kano	Kano	CSM/Cholera
	6	Aminu Kano Teaching Hospital, Kano (Sentinel Site)	Kano	Influenza
	7	Rasheed Shakoni Specialist Hospital, Dutse	Jigawa	CSM/Cholera
	8	Yusuf Dantsoho Hospital, Kaduna	Kaduna	CSM/Cholera
	9	Yusuf Dantsoho Hospital, Kaduna	Kaduna	Yellow Fever/Measles/ Rubella
N-E	10	Abubakar Tafawa Balewa Teaching Hospital, Bauchi	Bauchi	CSM/Cholera
	11	General Hospital, Damaturu	Yobe	CSM/Cholera
	12	University of Maiduguri Teaching Hospital, Maiduguri	Borno	CSM/Cholera
	13	State Specialist Hospital, Gombe	Gombe	Yellow Fever/Measles/ Rubella
	14	State Specialist Hospital, Jalingo	Taraba	CSM/Cholera
	15	Federal Medical Centre, Jalingo	Taraba	AMR
	16	General Hospital, Yola	Adamawa	CSM/Cholera
N-C	17	General Hospital, Minna	Niger	CSM/Cholera
	18	Univerity of Ilorin Teaching Hospital, Ilorin	Kwara	AMR
	19	General Hospital, Ilorin	Kwara	CSM/Cholera
	20	National Hospital, Abuja	FCT	AMR
	21	Maitama District Hospital, Abuja	FCT	Yellow Fever/Measles/ Rubella
	22	Asokoro District Hospital, Abuja (Sentinel Site)	FCT	Influenza
	23	NCDC National Reference Laboratory (NRL), Gaduwa, Abuja	FCT	Yellow Fever/Measles/Rubella, CSM/Cholera, Lassa/VHF, Influenza, Monkeypox
	24	General Hosptial, Lafia	Nasarawa	CSM/Cholera
	25	Plateau General Hospital, Jos	Plateau	CSM/Cholera
	26	Federal Medical Centre, Makurdi	Benue	CSM/Cholera
S-E	27	Federal Teaching Hospital, Abakaliki	Ebonyi	Lassa/VHF
	28	University of Nigeria Teaching Hospital (UNTH), Enugu	Enugu	AMR
	29	University of Nigeria Teaching Hospital (UNTH), Enugu	Enugu	Yellow Fever/Measles/ Rubella
	30	Nnamdi Azikiwe University Teaching Hospital, Nnewi (Sentinel Site)	Anambra	Influenza
S-S	31	Irrua Specialist Teaching Hospital, Irrua	Edo	Lassa/VHF
	32	University of Benin Teaching Hospital, Benin	Edo	Yellow Fever/Measles/ Rubella
	33	Cross River General Hospital, Calabar	Cross River	CSM/Cholera
S-W	34	Lagos University Teaching Hospital (LUTH), Microbiology Laboratory, Idiaraba	Lagos	AMR
	35	Lagos University Teaching Hospital (LUTH) Virology Laboratory, Idiaraba	Lagos	Lassa/VHF
	36	Lagos State University Teaching Hosptial (LASUTH), Ikeja (Sentinel Site)	Lagos	Influenza
	37	Central Public Health Laboratory (CPHL), Yaba	Lagos	YF/Measles/Rubella,CSM/Cholera
	38	Babcock University Teaching Hospital, Ilisha-remo	Ogun	AMR
	39	Obafemi Awolowo University Teaching Hospital, Ile-Ife	Osun	AMR
	40	Ladoke Akintola University Teaching Hospital, Ogbomosho	Oyo	AMR
	41	University College Hospital, Ibadan	Oyo	AMR

A4EPR
Alliance for Epidemic Preparedness & Response

Multisectoral partnerships to end epidemics

Private Health Sector Alliance of Nigeria

Private sector-led network that mobilizes the business community to deliver better health outcomes in Nigeria

.

Private Sector Health Alliance of Nigeria

Private Sector Track Record

Structure and Governance

Nigeria Centre for Disease Control

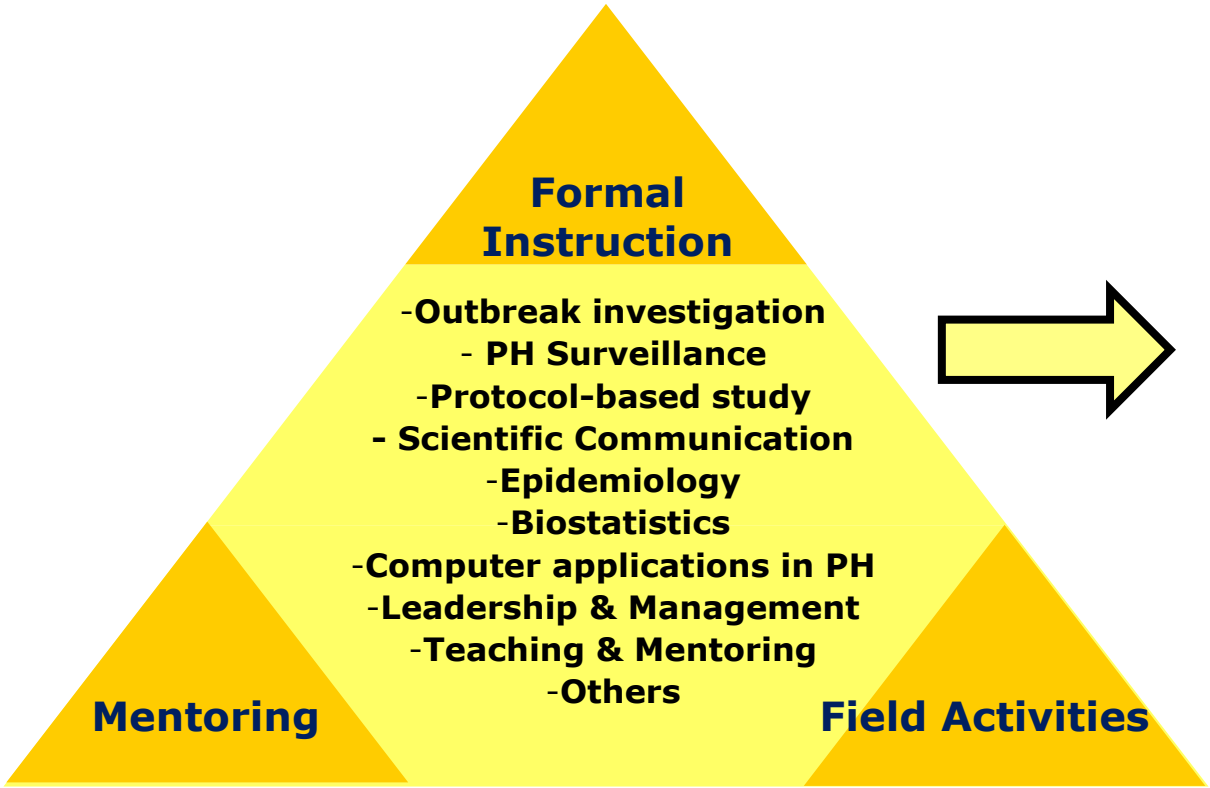
Agency responsible for enhancing Nigeria's preparedness and response to epidemics through prevention, detection, and control of infectious diseases

NCDC
NIGERIA CENTRE FOR DISEASE CONTROL

Technical Expertise

Strong Global Partnerships

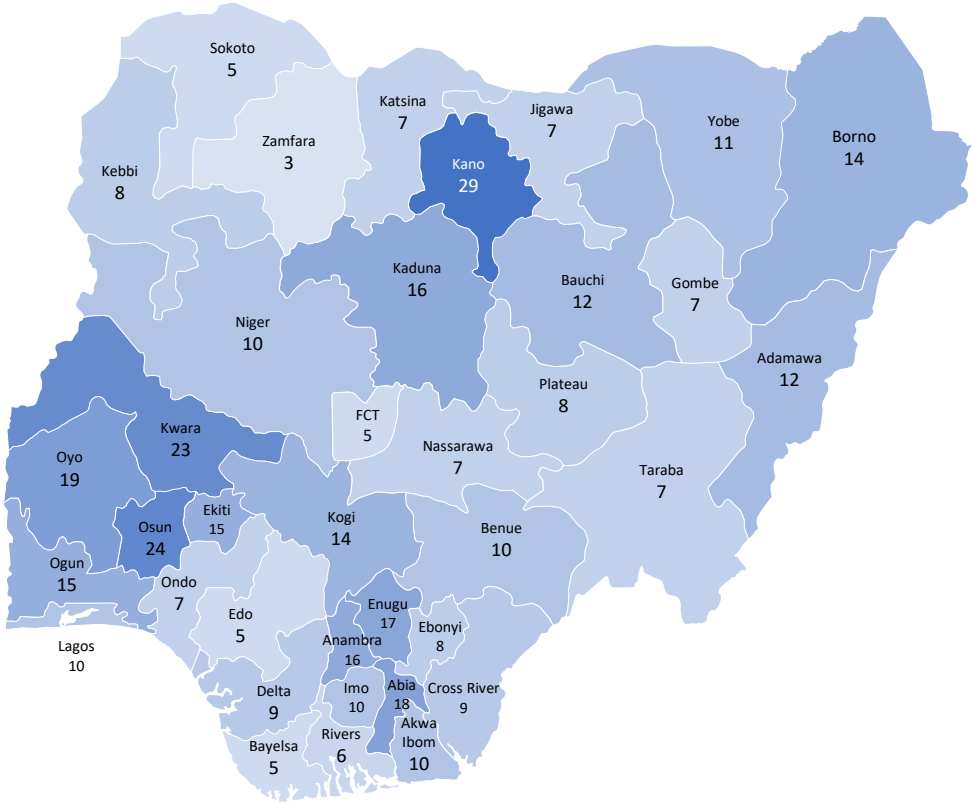
FELTP Competencies and Outputs



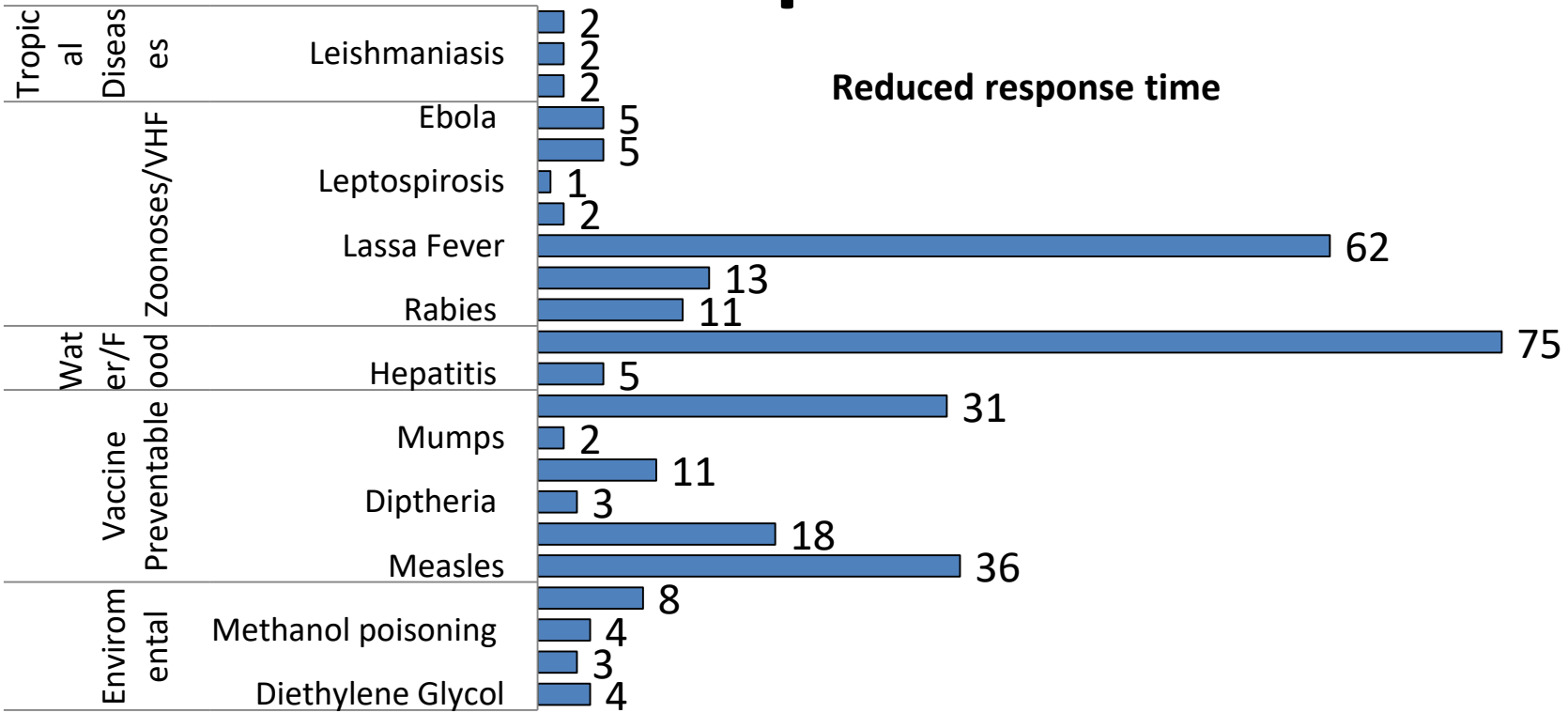
Outputs

- Outbreak report
- Surveillance analysis or data analysis report
- Surveillance evaluation report
- Study protocol
- Abstract
- Conference presentation
- Seminar
- Bulletin article
- Scientific manuscript
- Others
  - Teaching and mentoring reports
  - Management meeting minutes

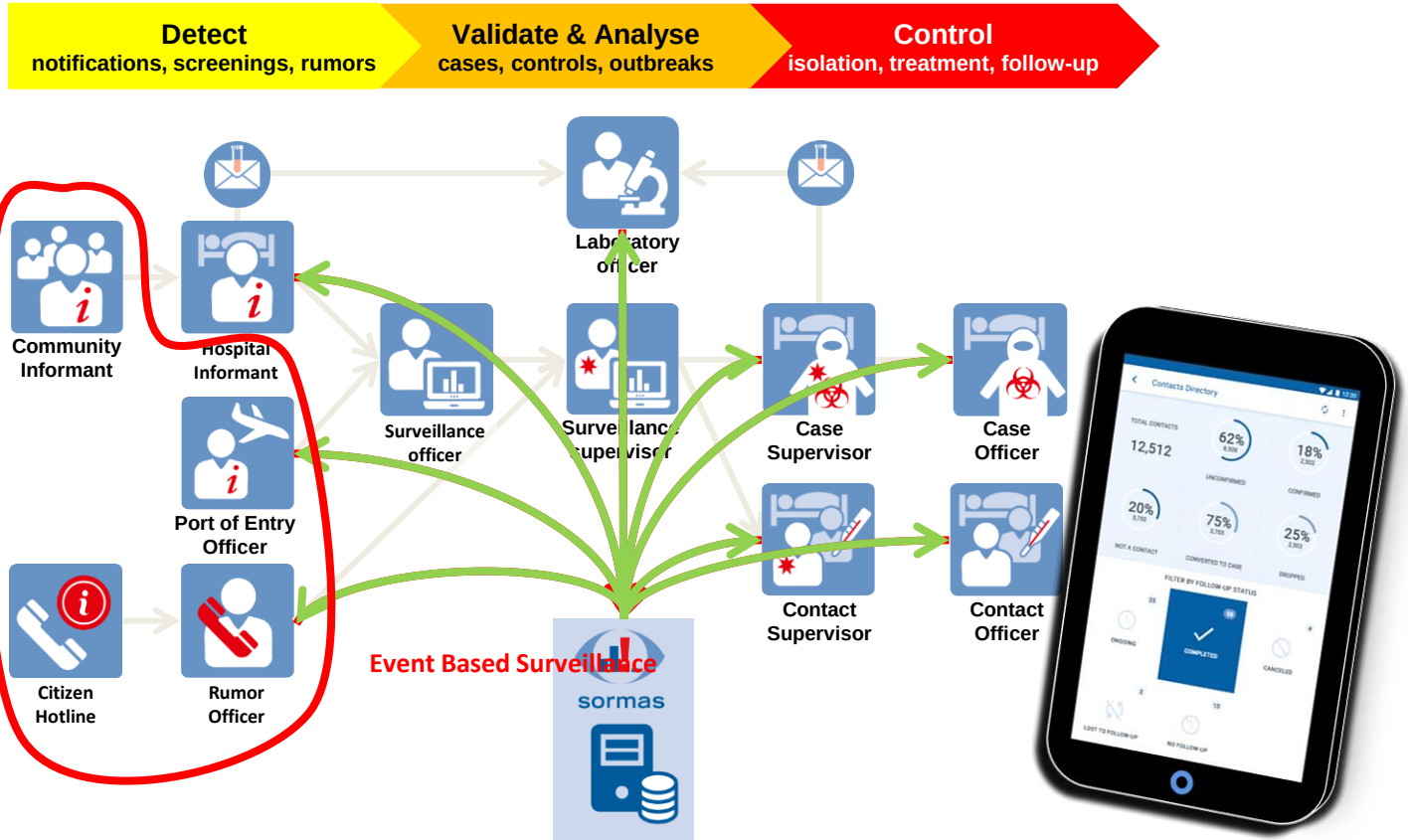
>500 Field Epidemiologists



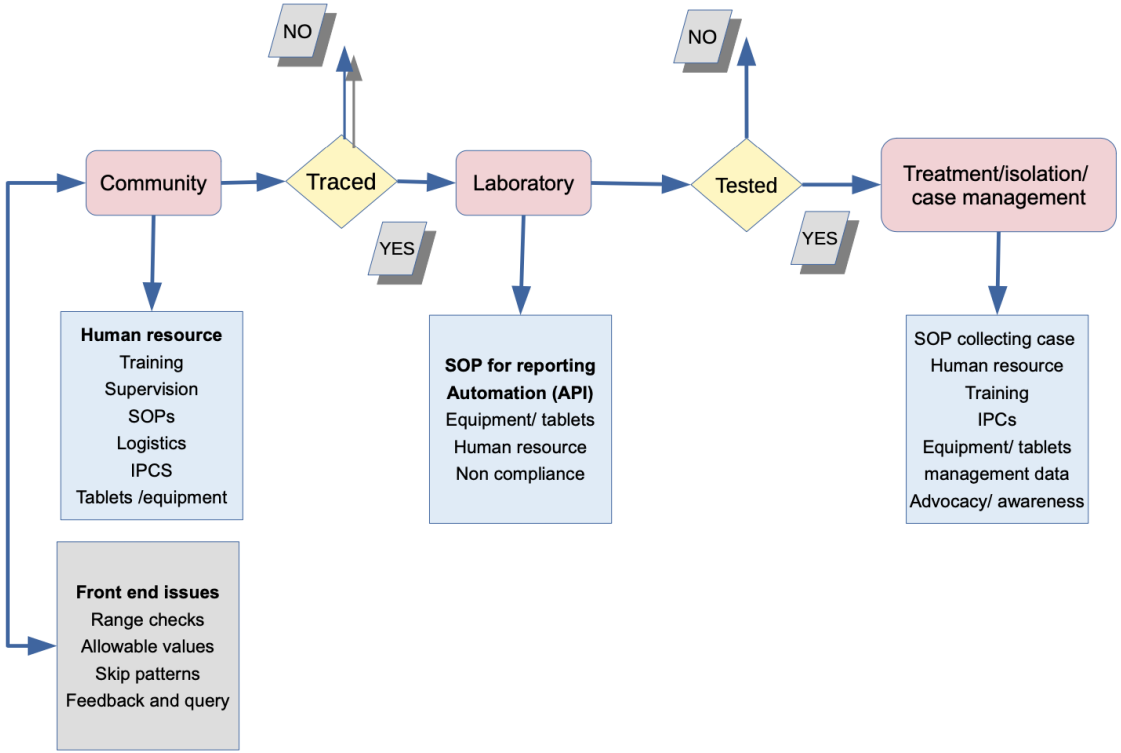
Outbreaks Provide Opportunities to Improve



Digitalizing Surveillance – Surveillance Outbreak Response Management Analytic System (SORMAS)



SORMAS Architecture



- **Back end/ server side issues**
- **Poor/lack of feedback loop to states**
- **Low analytical capacity**

Surveillance Update as at July 27, 2020

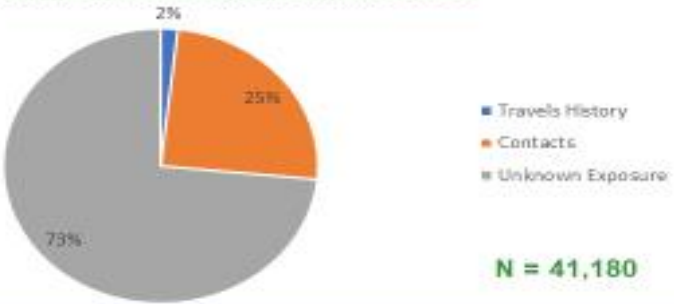
Update on cases (within last 24 hours)

648	2	829	00
New cases	Deaths	Recovered	New LGAs

Aggregate

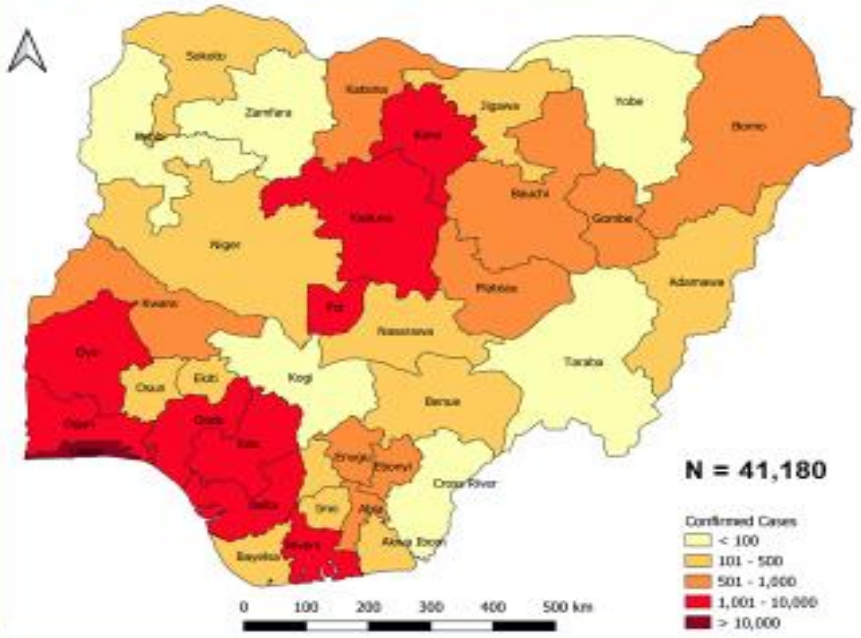
41,180	860	18,203	22,117
Confirmed	Deaths	Recovered	Active

Travel/contact history of confirmed cases



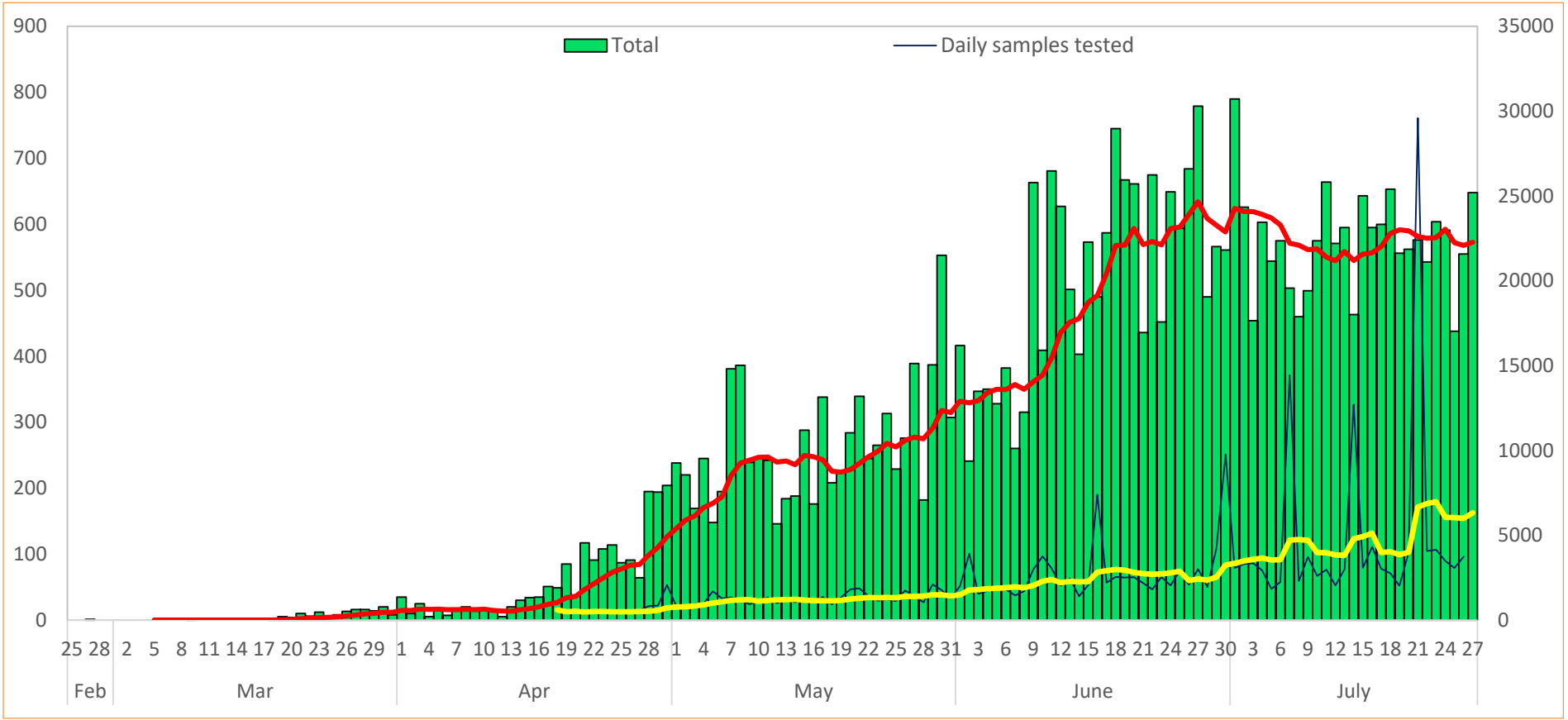
N = 41,180

Spatial Distribution of Confirmed cases

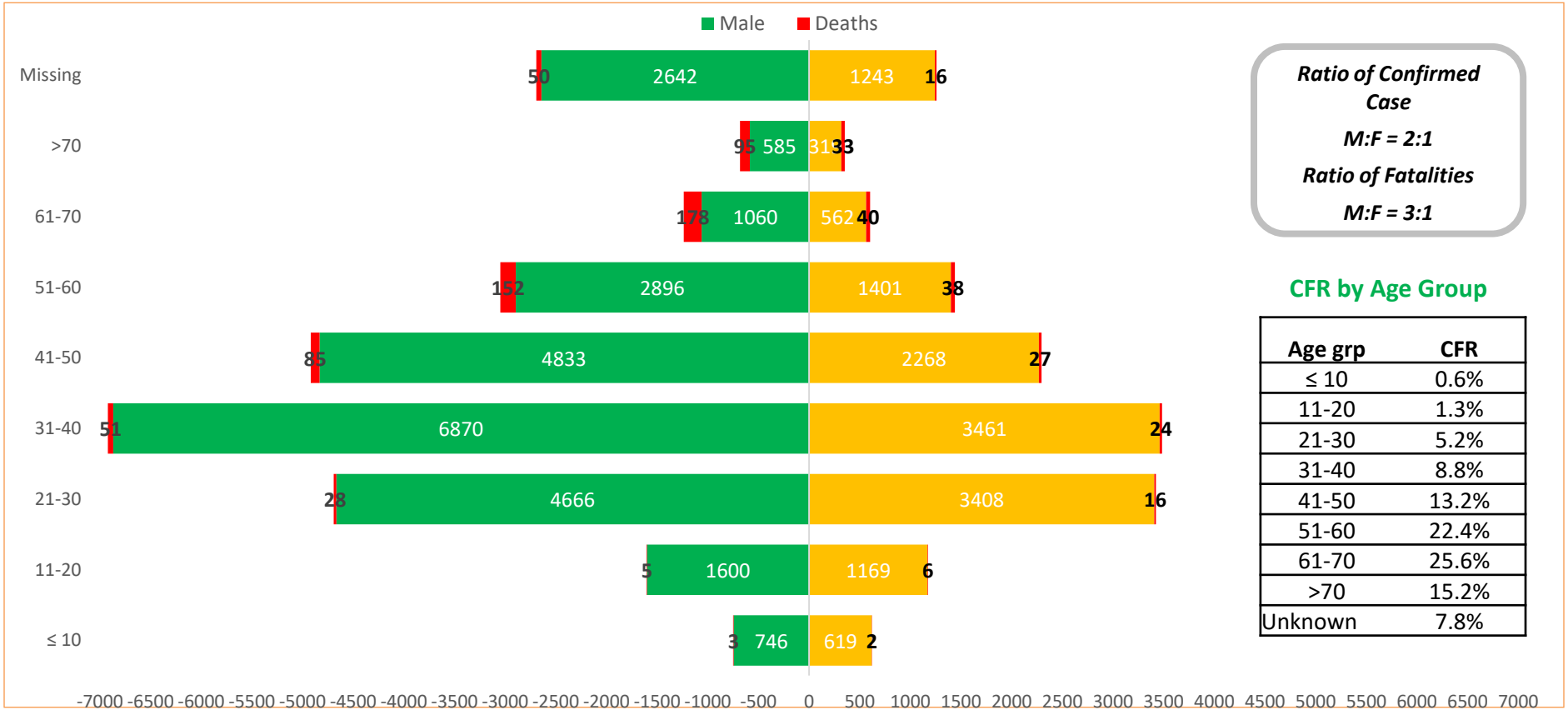


- Surveillance Pillar

National Epi-curve with Testing Trend



Cases and Fatality by Age and Gender



Ratio of Confirmed Case

M:F = 2:1

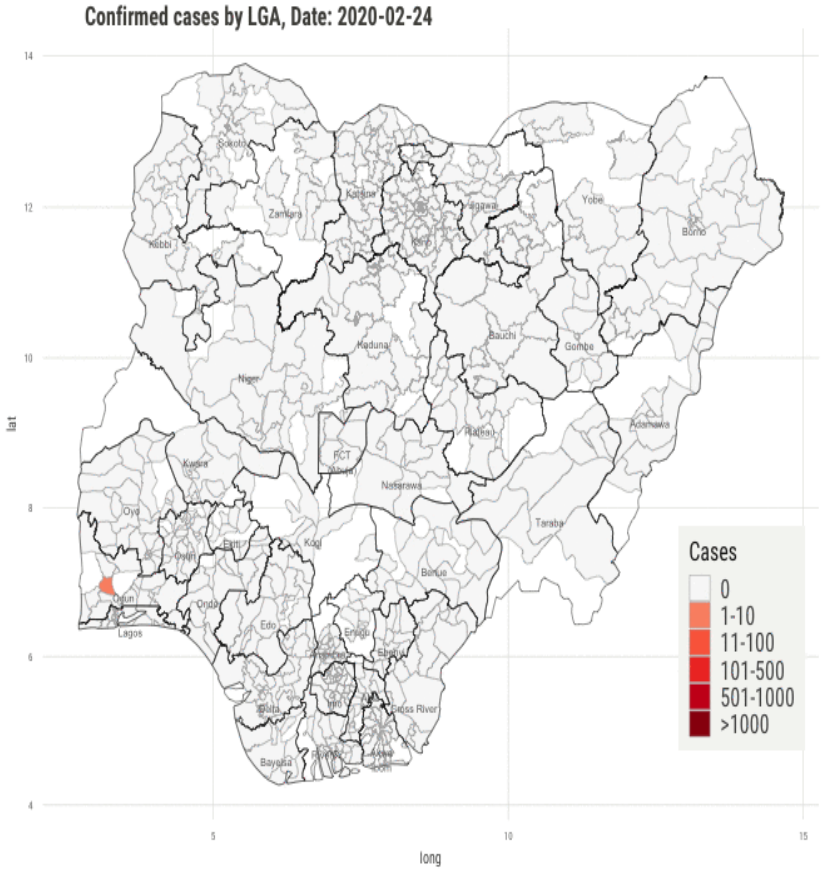
Ratio of Fatalities

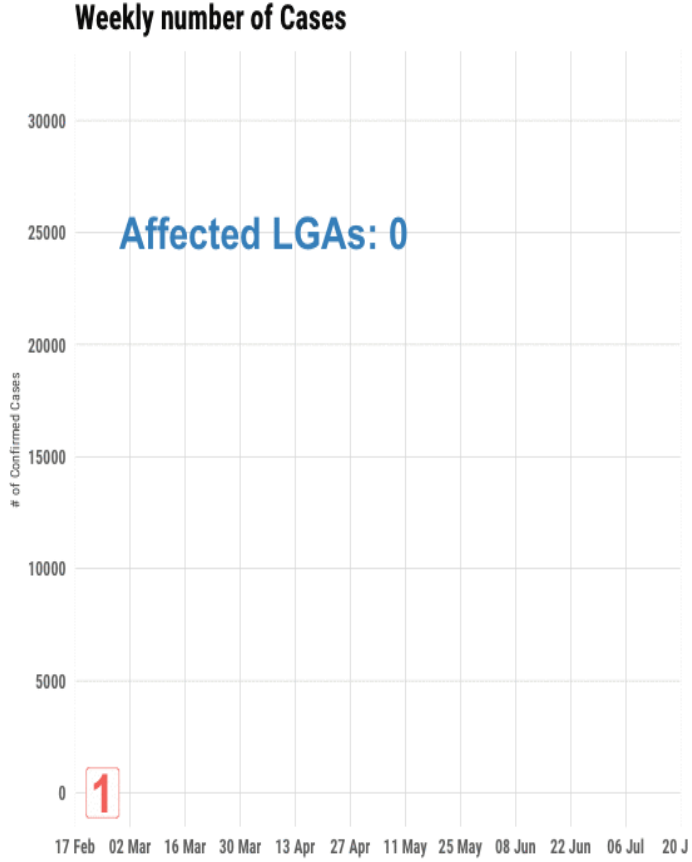
M:F = 3:1

CFR by Age Group

Age grp	CFR
≤ 10	0.6%
11-20	1.3%
21-30	5.2%
31-40	8.8%
41-50	13.2%
51-60	22.4%
61-70	25.6%
>70	15.2%
Unknown	7.8%

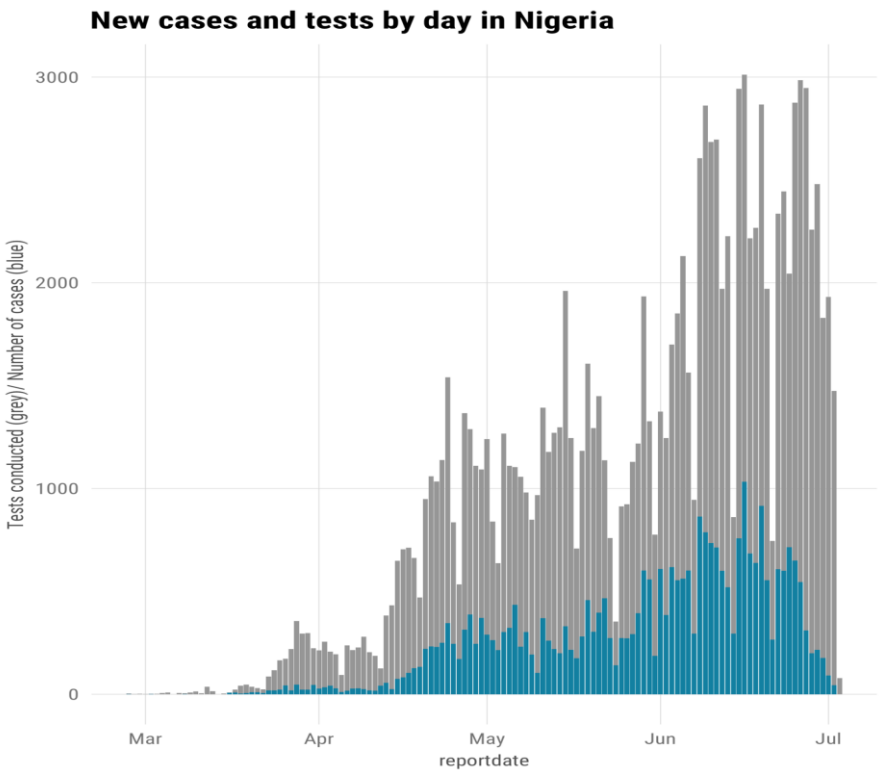
Time trend

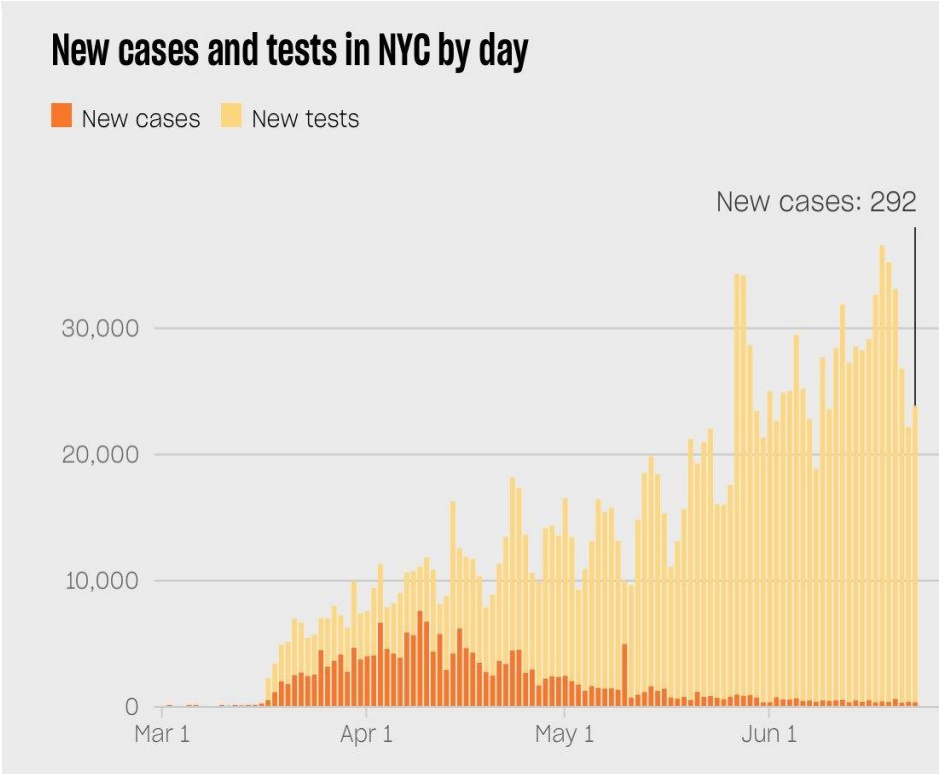

Confirmed cases by LGA, Date: 2020-02-24
lat
long
Cases
0
1-10
11-100
101-500
501-1000
>1000
Sokoto
Zamfara
Katsina
Jigawa
Yobe
Borno
Kebbi
Kano
Kaduna
Bauchi
Gombe
Niger
FCT
Nasarawa
Taraba
Adamawa
Kwara
Oyo
Ekiti
Kogi
Benue
Ogun
Ondo
Edo
Lagos
Enugu
Ebonyi
Cross River
Bayelsa


Weekly number of Cases
Affected LGAs: 0
# of Confirmed Cases
30000
25000
20000
15000
10000
5000
0
1
17 Feb
02 Mar
16 Mar
30 Mar
13 Apr
27 Apr
11 May
25 May
08 Jun
22 Jun
06 Jul
20 J

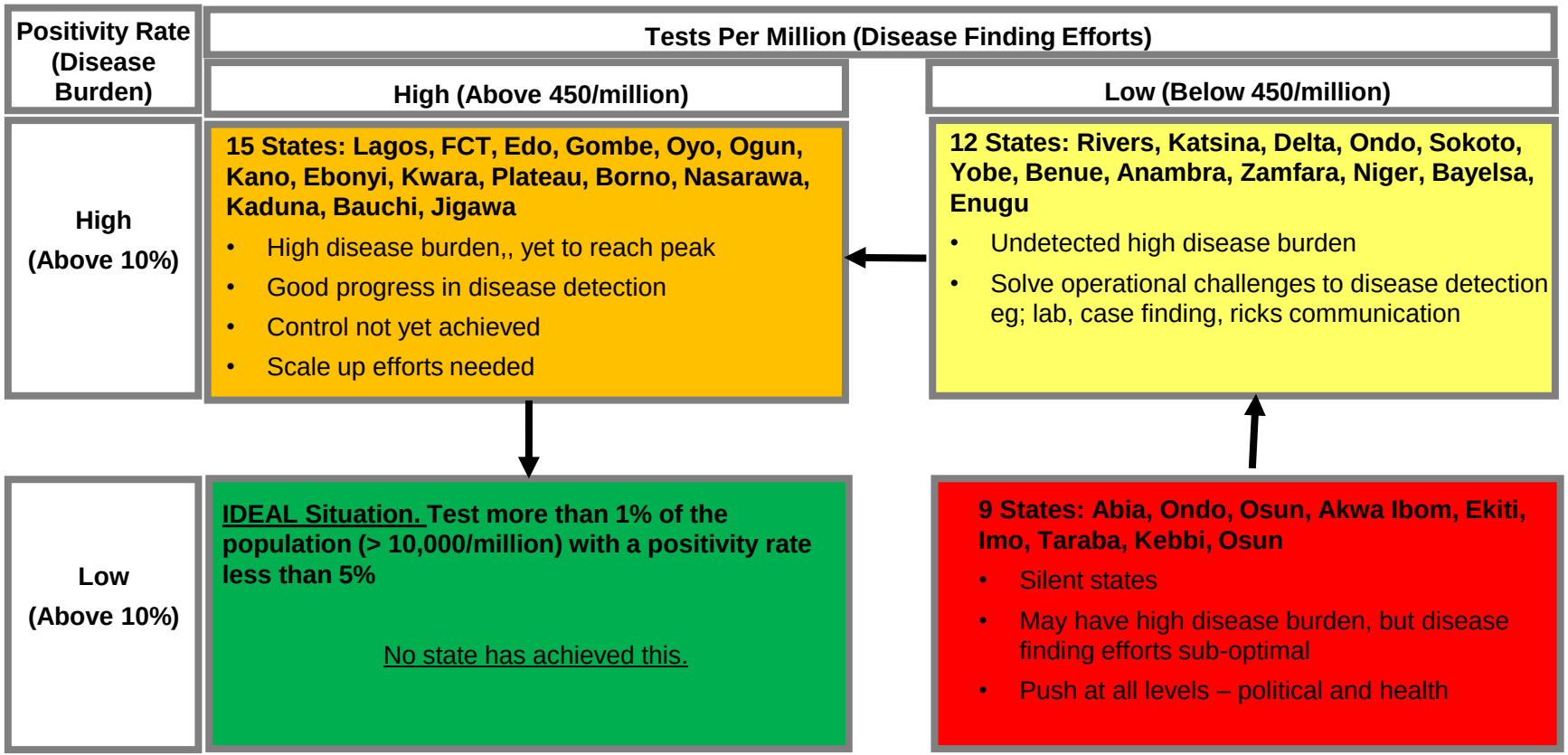
Where we are , Where we want to go……..

Nigeria





Disease Finding Efforts



LGA Categorization – Hot Spotting Strategy

- Identify high transmission LGA for targeted intervention
- Different approaches
  - Historical disease burden
  - Combination of diseases burden , recency and positivity
  - Logistic regression – weighting all potential predictors for high risk
  - Other considerations – contiguity , political engagement , ease of implementation
- 4 week cycle of review
- Engagement process – states
- Monitoring – disease burden and intervention

Criteria for Selection of LGAs/Districts

Criteria 1: Number of currently active cases	Criteria 2: Test positivity rate within the previous 2 weeks	Criteria 3: Percent increase in confirmed cases from the previous week
Definition: The number of patients cases who were diagnosed less than 30 days ago and have not died or been discharged Selected LGAs > 100 active cases	Definition: Proportion of tests conducted in the previous 2 weeks that are positive for SARS-Cov-2 Selected LGAs > 20% positivity rate with a minimum of 10 new cases in the 2 week period	Selected LGAs > 50% increase in new cases of COVID-19 with a minimum of 15 cases at baseline

Other Interventions

- Pre-outbreak planning , simulation
- RRT surge – insurance , medical cover and training
- Private sector involvement – resources, labs , other expertise
- State level PHEOC activation
- Leveraging on existing IPC capacities
- Political and operational engagement

Lessons Learnt / Conclusion

- National Public Health Institute that is empowered , funded , functional and staffed with appropriate sub-national linkages is central in mounting an effective response
- Peace time investments in surveillance and laboratory infrastructure are core to preparedness and response
  - Using existing frameworks – IHR
- Collaboration with the private sector is possible – continuous engagement
- Outbreak not homogenous – hot spotting strategy useful
- Skilled adequate workforce essential – need protection / motivate

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PERSPECTIVE FROM UGANDA

Alex Riolexus Ario MD, Epidemiologist and Public Health Specialist Uganda

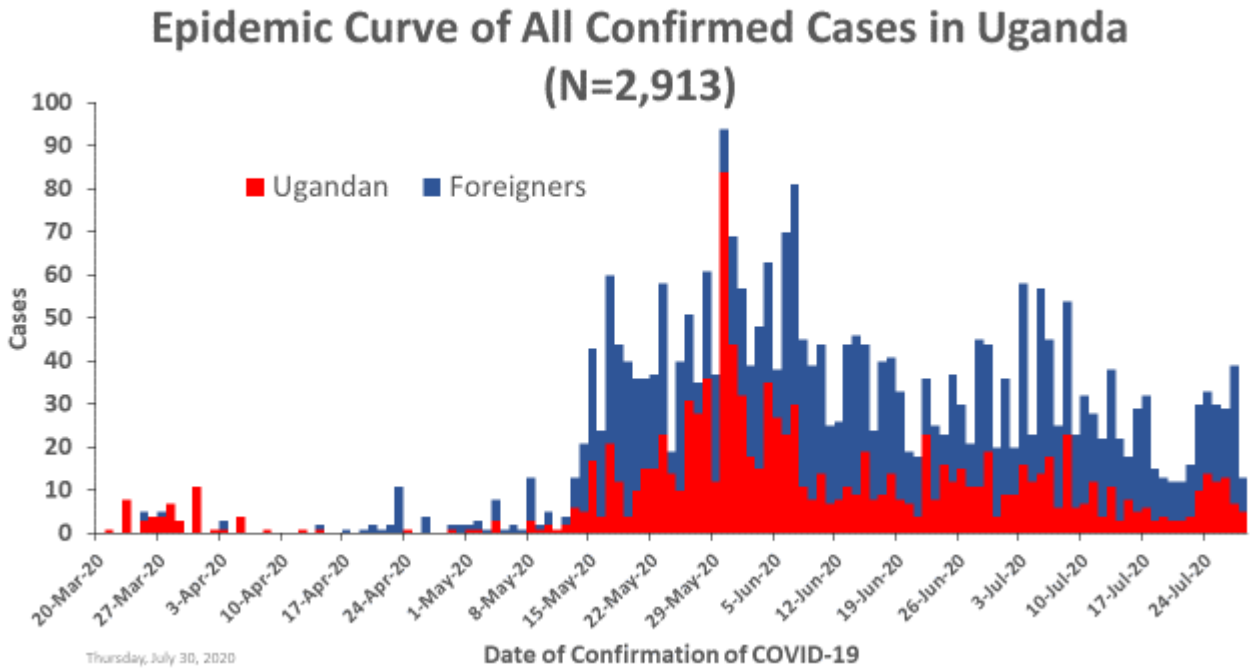
STATUS OF COVID-19 PANDEMIC RESPONSE IN UGANDA

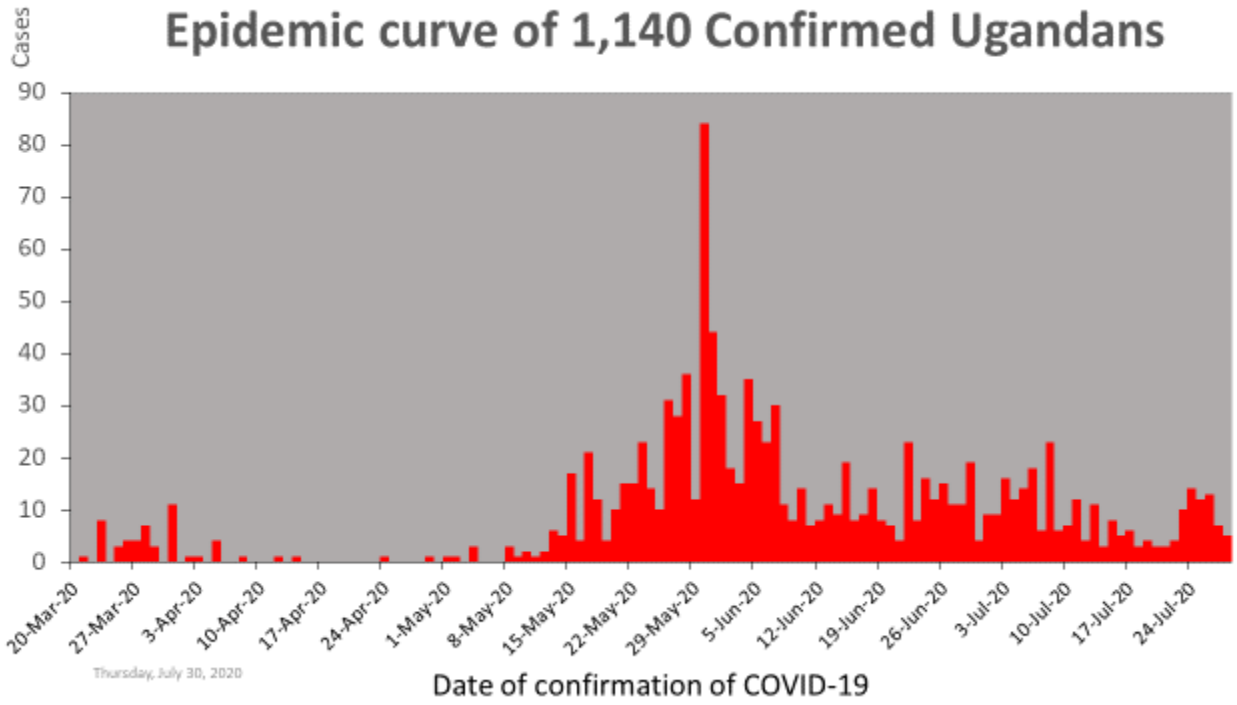
Dr. Alex Riolexus Ario
Uganda National Institute of Public Health

Ministry of Health, Uganda

Background

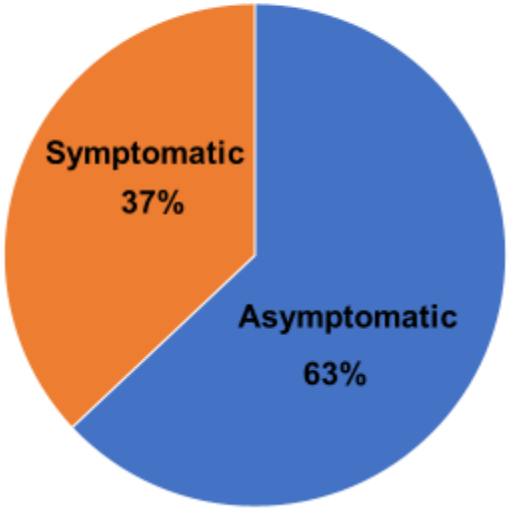
- Uganda declared 1st COVID-19 confirmed case on 21 March 2020
- By 28 July 2020:
  - **1140** Confirmed Cases (Excluding 1,773 foreign nationals)
  - **2** Deaths
  - **1018** Recoveries
  - **122** Active cases
  - **7491** Cumulative in institutional quarantine in 89 sites, **5530** discharged


Epidemic Curve of All Confirmed Cases in Uganda
(N=2,913)
Ugandan
Foreigners
Cases
100
90
80
70
60
50
40
30
20
10
0
20-Mar-20
27-Mar-20
3-Apr-20
10-Apr-20
17-Apr-20
24-Apr-20
1-May-20
8-May-20
15-May-20
22-May-20
29-May-20
5-Jun-20
12-Jun-20
19-Jun-20
26-Jun-20
3-Jul-20
10-Jul-20
17-Jul-20
24-Jul-20
Thursday, July 30, 2020
Date of Confirmation of COVID-19

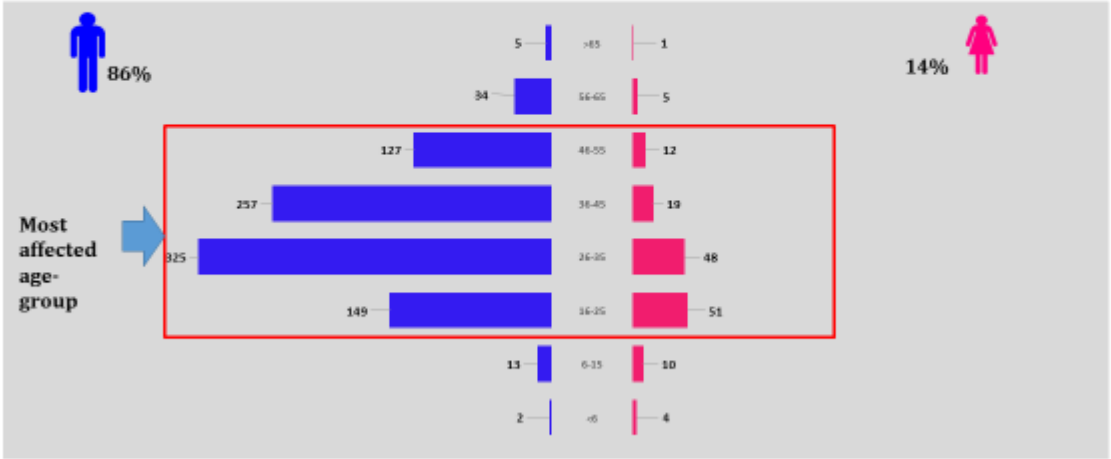

Epidemic curve of 1,140 Confirmed Ugandans
Cases
90
80
70
60
50
40
30
20
10
0
20-Mar-20
27-Mar-20
3-Apr-20
10-Apr-20
17-Apr-20
24-Apr-20
1-May-20
8-May-20
15-May-20
22-May-20
29-May-20
5-Jun-20
12-Jun-20
19-Jun-20
26-Jun-20
3-Jul-20
10-Jul-20
17-Jul-20
24-Jul-20
Thursday, July 30, 2020
Date of confirmation of COVID-19

Most Case-patients were asymptomatic

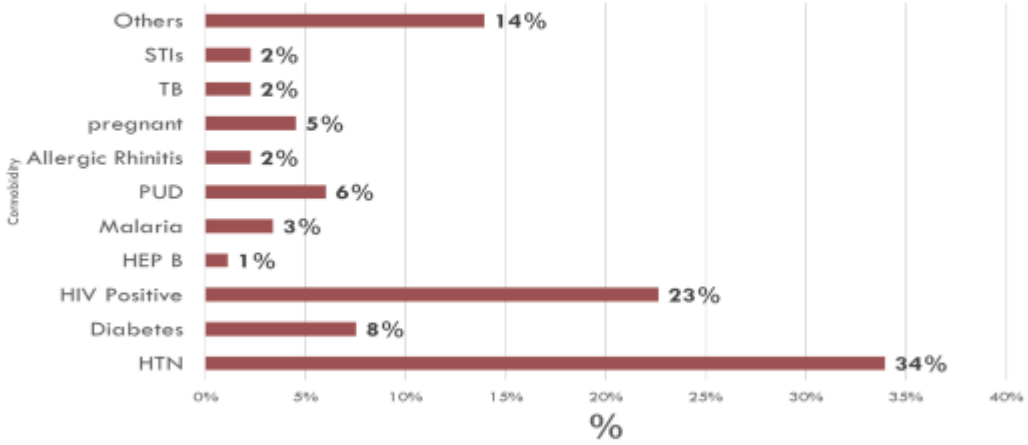
- All case-patients classified as mild



Age and Sex distribution of cases



Co-morbidities (%)



Case Distribution by Sample Collection Point

64%

21%

Institutional Quarantine

12%

Community

3%

Health Facility

Half of Case-patients are Truck Drivers

23%
Contacts

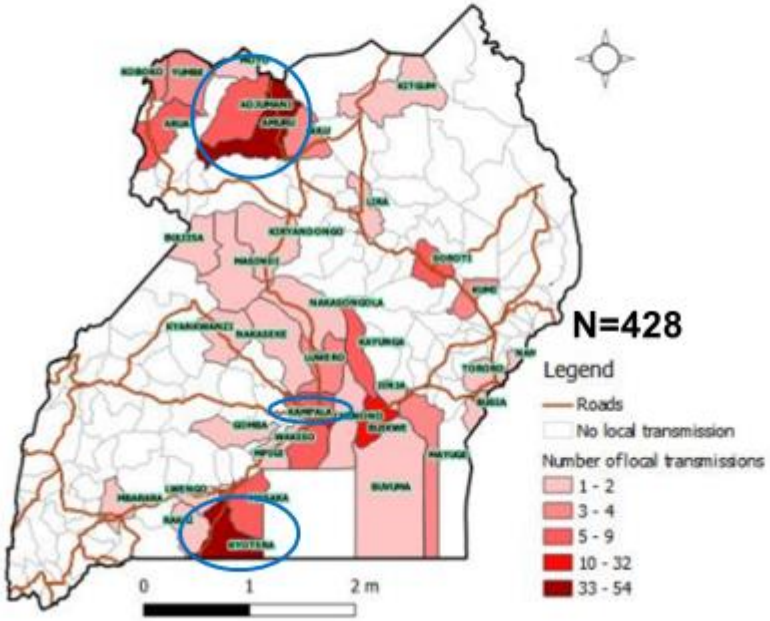
13%
Alerts

0.5%
High risk travellers

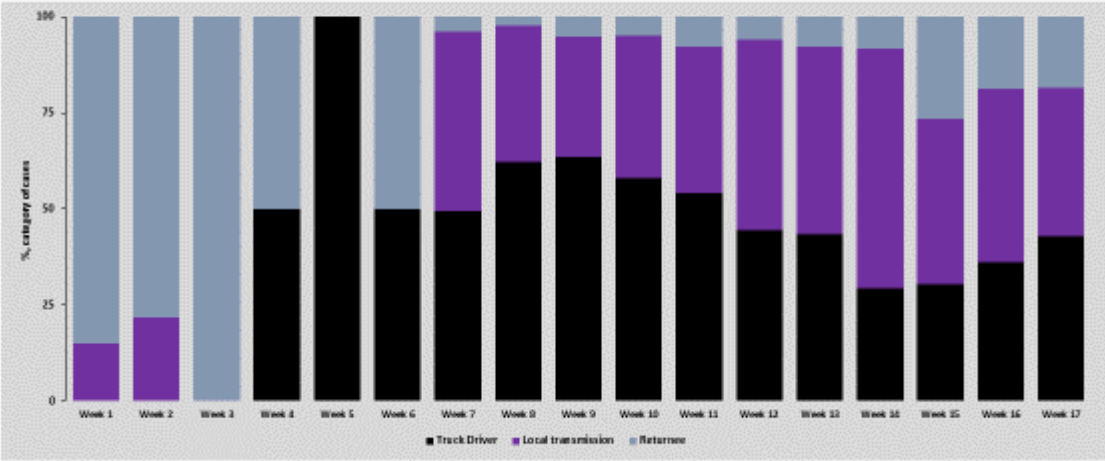
2.5%
Health Workers

5.0%
Law enforcers

39% were Local Transmission



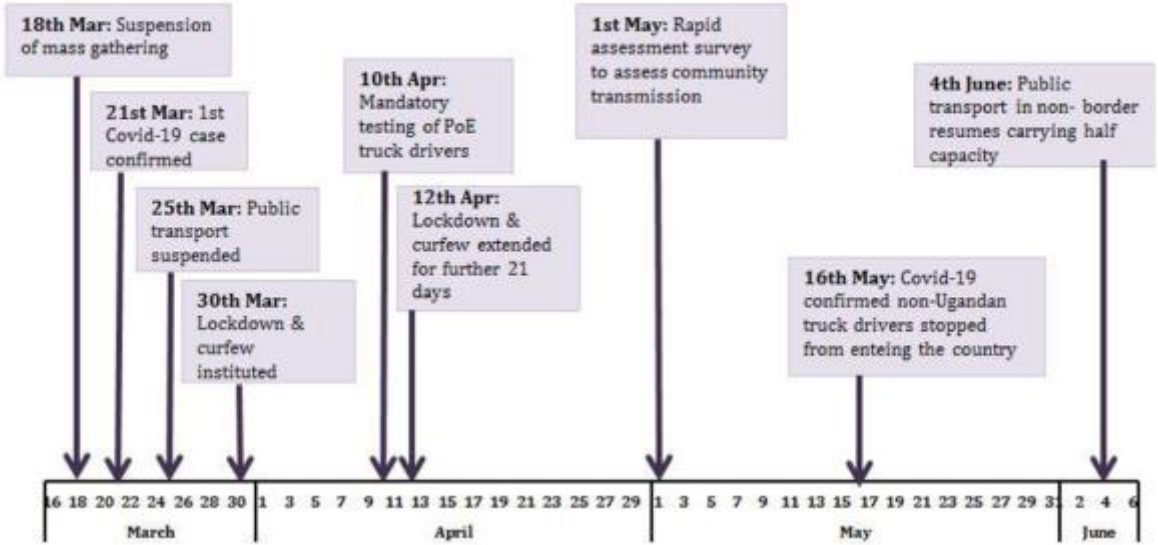
Types of Confirmed Cases over the weeks



COVID-19 Coordination

- Developed a National COVID-19 Response Plan
- Activated National Coordination Mechanisms
  - Incident Management System
  - National and District Task Forces
  - Emergency Operations Centre
- Strategic meetings at regional, national and parliamentary levels
- Coordinated donation of funds
- Deployed regional support teams: Doctors, Critical care nurses, Epidemiologists

Public Health Mitigation Measures



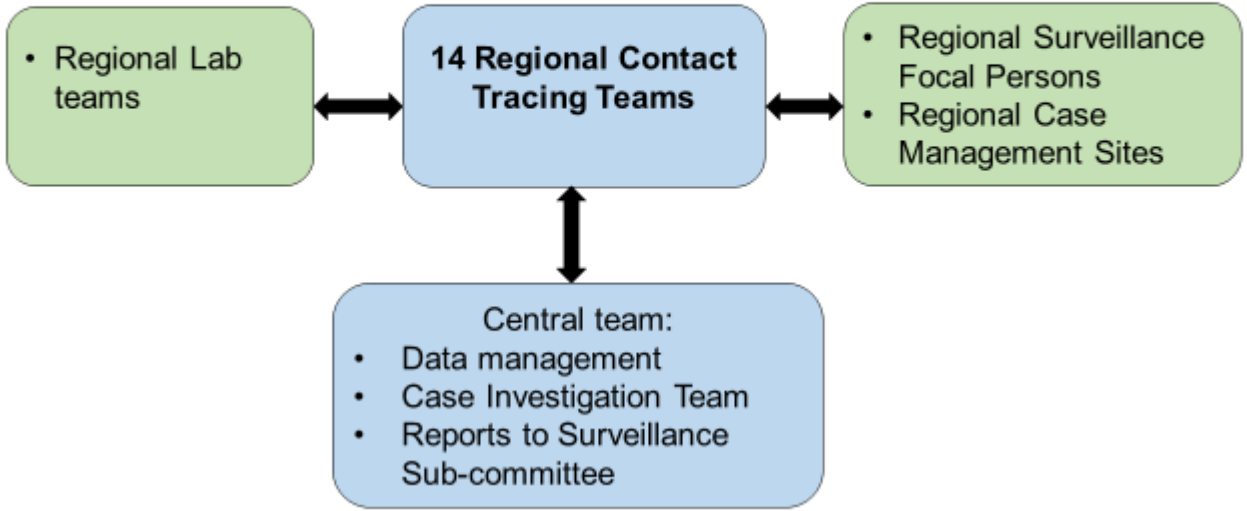
Surveillance Interventions

- Contact identification, listing and follow-up
- Activated COVID-19 alert desks in all districts
- Oriented District and Regional Surveillance Focal Persons
- Activated screening of travelers at 53 PoEs
- Established CBDS in high risk districts

Contact Tracing in COVID-19

- Follows confirmation of case
- Persons who came in contact with case (Contacts) are:
  - Identified
  - Listed
  - Followed up for 14 days
  - Tested at start and end of follow-up

Contact Tracing Team



Contact tracing up-date, 28 July 2020

14,784 Contacts listed

13,738 (93%) Contacts completed follow-up

244 Contacts tested positive

1,046 Active contacts

Secondary Attack Rate = 1.7%

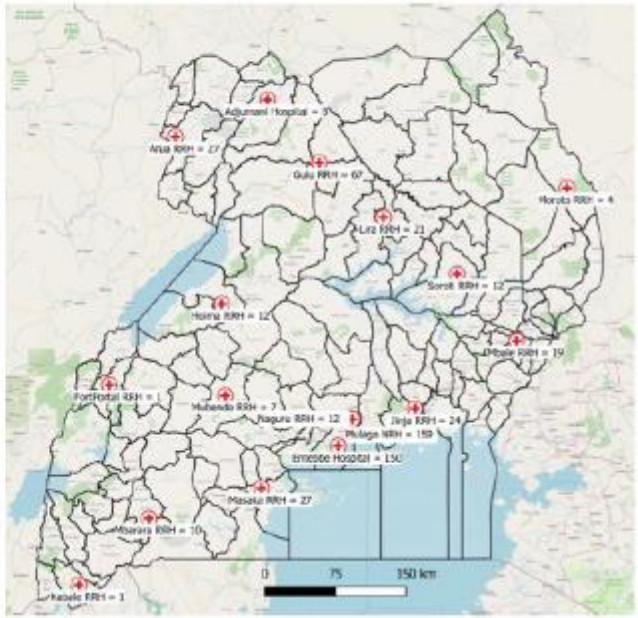
Laboratory Services

6	Established Testing facilities
7	Facilities assessed to test at sub-national level
258,528	Tests (28 July)

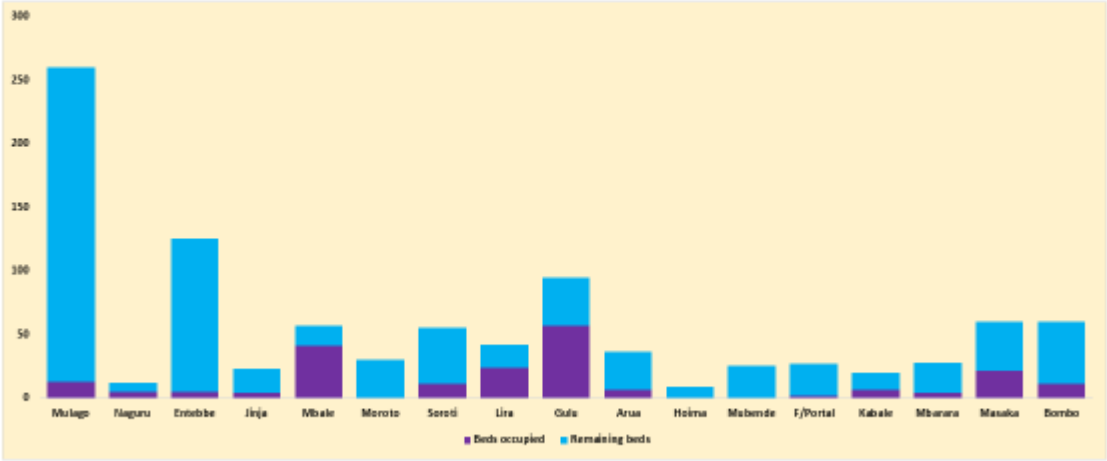
Case Management Facilities

17 Treatment Facilities (28 July)

- 15 RRHs
- 1 General (District) Hospital
- 1 National Referral Hospital
- 930 Total bed capacity



Bed occupancy at treatment facilities

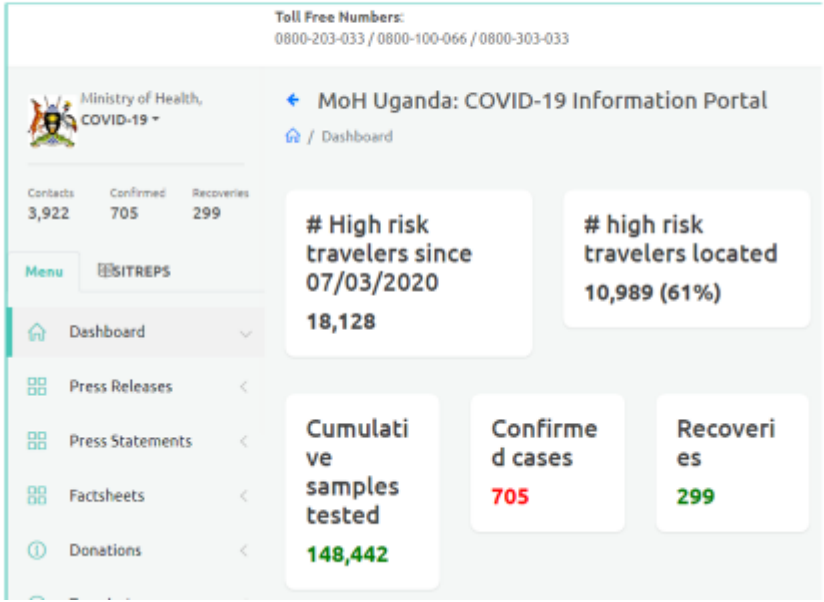


Case Management Interventions

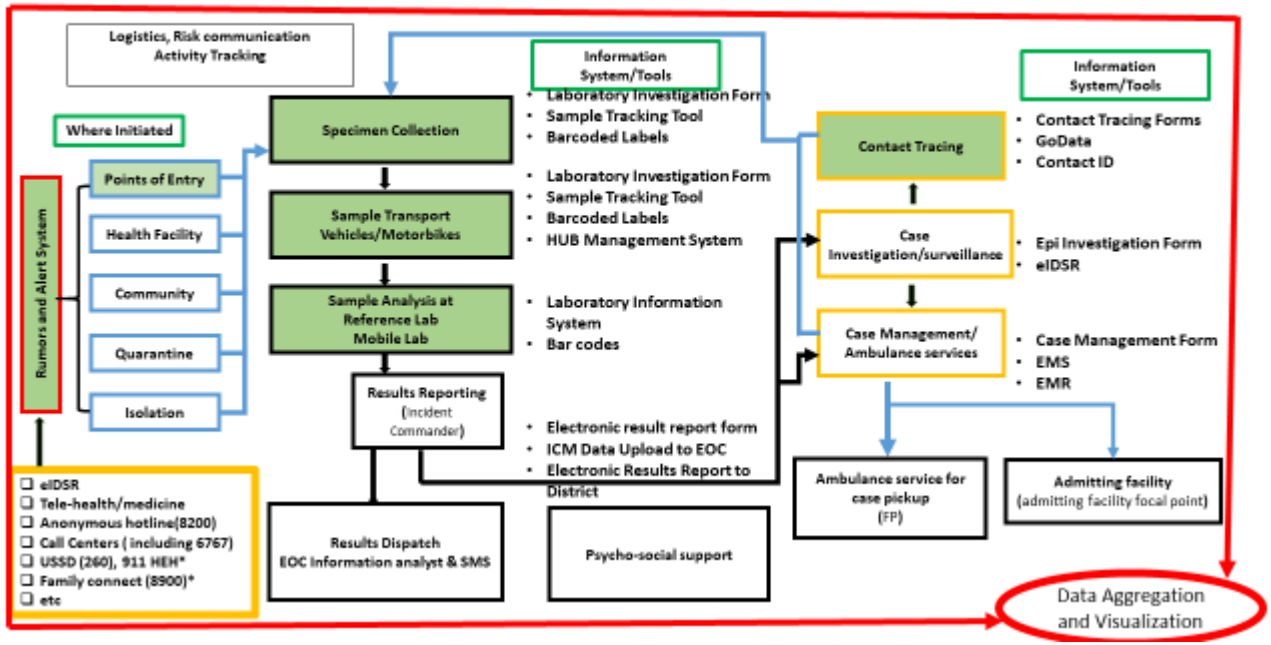
- Developed National Guidelines for Management of COVID-19
- All treatment facilities trained on management of COVID-19
- De-hospitalized approach for management of mild to moderate cases
  - set up treatment units in stadiums and tents
- Psychosocial support offered at PoEs, quarantine centres and treatment units

Online COVID-19 Dashboard

https://covid19.gou.go.ug/



Uganda COVID-19 Response Data Flow



Risk Communication

- **“Tonsemberera Campaign” i.e. Keep your distance:**
  Runs on 309 radio stations and 7 TV stations

- **Other messages:** COVID-19 updates, use of masks, hand hygiene, stigma reduction, #StaySafeUg

Logistics

- Bi-weekly dispatch of logistical supplies to treatment units
- Procured: PPE, medicines, testing kits, ICU equipment and community face masks
- Delivered: non-medical logistics to quarantine sites, community face masks
- Completed: Phase one distribution of public face masks to 27 high risk districts and Kampala Metropolitan totaling 8.5million

Gaps and Challenges

- Disruption of continuity of essential health services especially at hospitals managing COVID-19 patients
- Significant Human Resource need: at Points of entry to support screening; laboratory personnel; contact tracers and VHTs to conduct community based disease surveillance
- Insufficient logistics: PPE and testing kits

Lessons Learnt

- Early preparedness and prompt response averts spread and deaths
- Good coordination and a multipronged approach ensures effective response
- Longevity of an outbreak and mildness of cases creates laxity amongst the population – prevention measures not strictly followed
- Good surveillance and effective contact tracing slows community transmission

THANK YOU

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GLOBAL HEALTH EQUITY LECTURE SERIES: COVID 19 PANDEMIC PREPAREDNESS AND RESPONSE: PERSPECTIVES FROM AFRICA

PERSPECTIVE FROM ZAMBIA

Khozya D. Zyambo, MMed, MBChB, Cert M&E,
Zambia Ministry of Health

COVID 19 Preparedness and Response: Perspectives from Africa

COVID-19 in Zambia: What We Should Know

Khozya D. Zyambo, MD
National Paediatric HIV Mentor
HIV/TB ECHO™ Lead Facilitator
Ministry of Health, Zambia

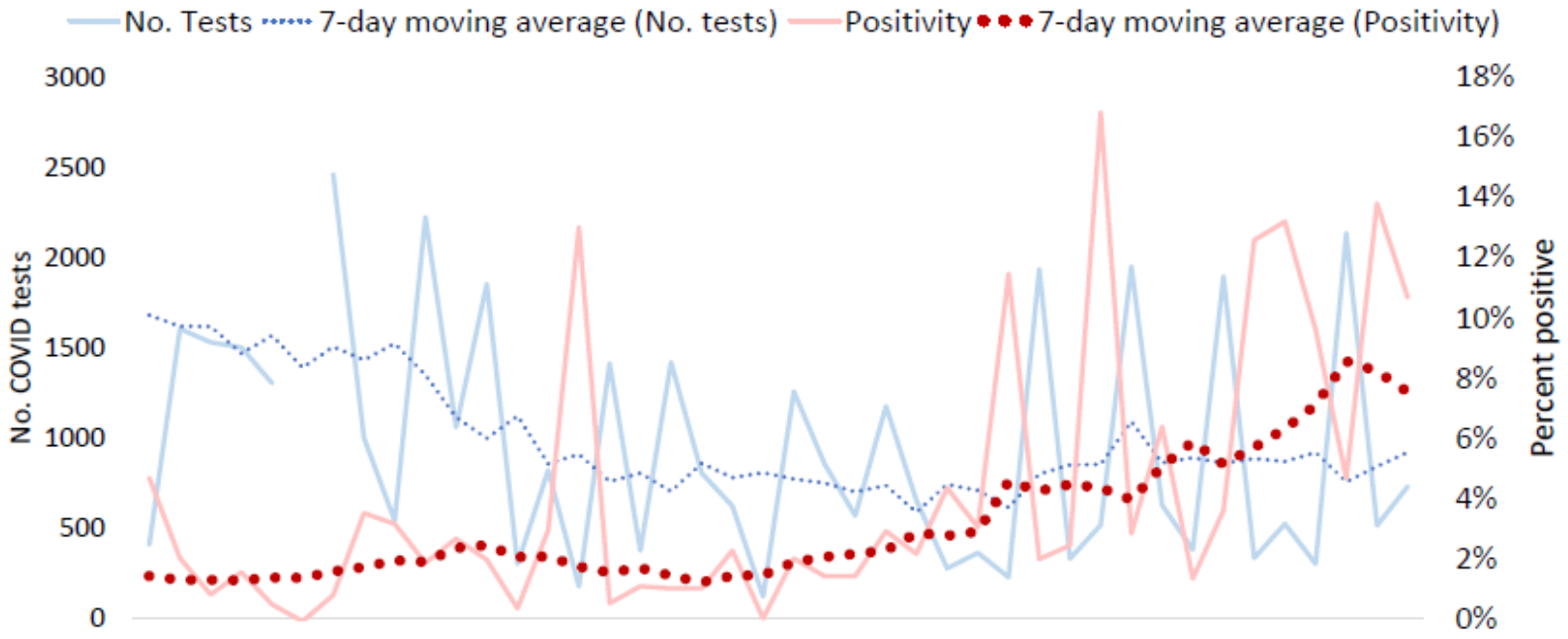
Learning Objectives

1. Describe COVID-19 trends in Zambia
2. Outline the mitigation measures for the COVID-19 peak in Zambia

COVID-19 Updates: 29/07/2020

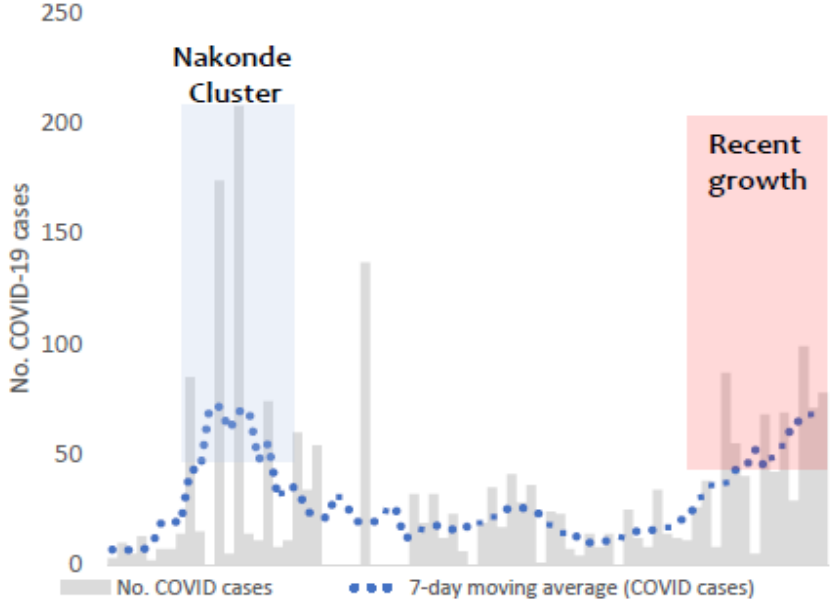
- Cumulative cases **5249**
- Cumulative number of deaths **146**
  - COVID-19 associated deaths 98
  - COVID-19 deaths 40
  - 8 unclassified
- Total recoveries 1818 cumulatively

Rising COVID-19 Test Positivity Rate is Indicative of Increasing Transmission in Zambia

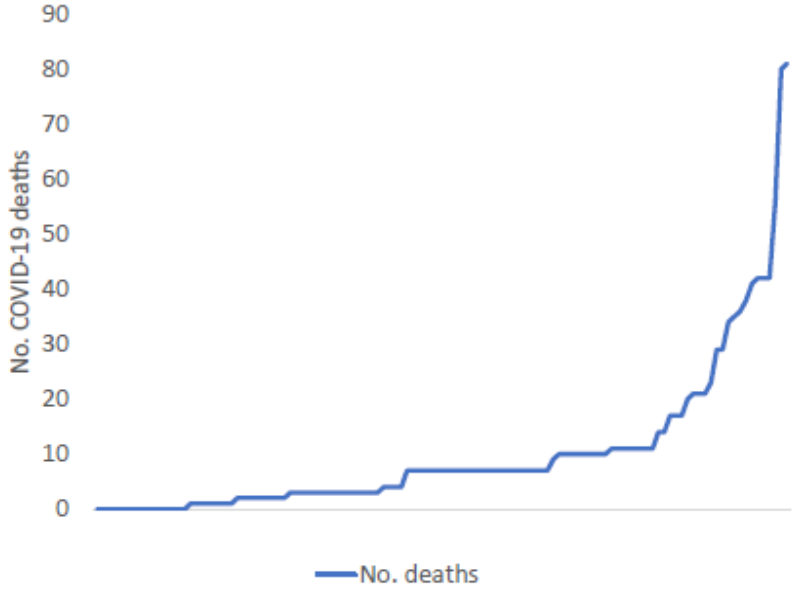


Zambia may be Entering a Rapid Acceleration Phase

Recent COVID-19 cases are occurring throughout Zambia

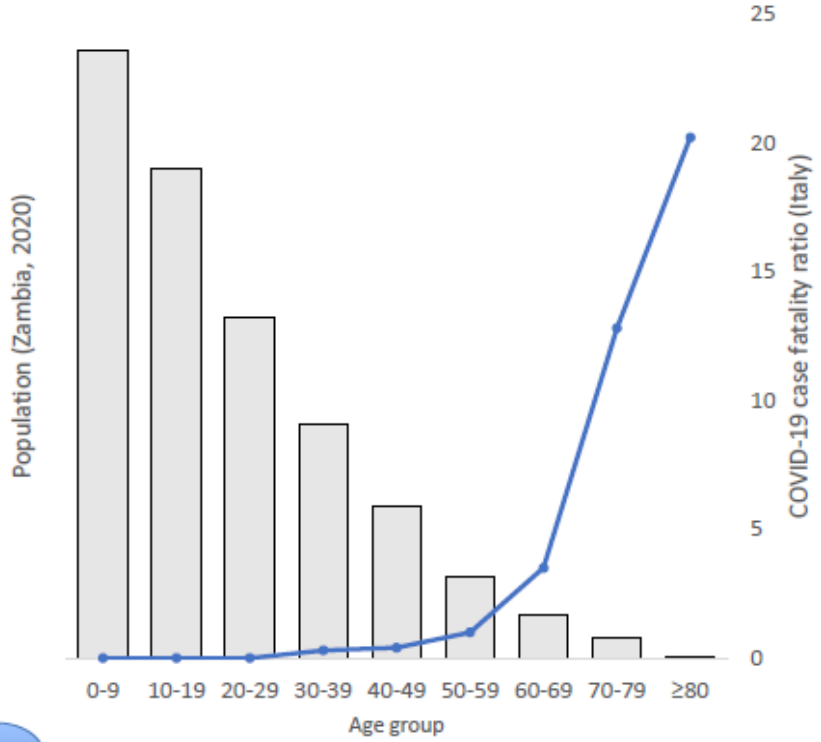


COVID-19 deaths are rapidly increasing in Zambia



What Accounts for the Reported Lower COVID-19 Deaths in Zambia?

- **Population age distribution**: if the case fatality rates by age seen in other settings holds true in Zambia, there could be fewer fatalities
- 2.3% of Zambia population is 65 and above compared to 16% in the US and 23% in Italy
- Not all COVID deaths are recorded
  - Nearly 40% of deaths in Zambia are not registered at health facilities
  - Not all deaths with suspected COVID are tested



Mitigation Measures – Community

- Enhance and maximize on having clear and consistent public messaging regarding risk of COVID-19 so each Zambian can play their part in protecting themselves and their loved ones
- Focus on getting every Zambian to participate on minimizing the impact of COVID-19, things like physical distancing, mask wearing, frequent hand washing, and staying home when they have respiratory symptoms
  - Need to enforce mandated mask wearing in public
  - Need to work with community/church leaders to get public buy-in for these measures
- We have to protect people at highest risk of COVID-19 death
  - Those 60 years and older
  - Those with diabetes, high blood pressure, heart disease, and kidney disease

Mitigation Measures – Community

- **Home deliveries:** Through peer-run groups or private delivery mechanisms that maximize social distancing and respect client's privacy
- **Community or private pharmacies:** Scheduled pick-up times to maximize social distancing
- **Pop-up pharmacy:** Provide additional infrastructure in remote areas outside hospital or clinic settings with pick-up windows that are configured to ensure social distancing

Mitigation Measures – Facility

- Ensure **safety** of patients and providers
  - Provision of PPE
  - Physical distancing
  - Triage
- **Reduce risk of transmission** COVID-19
  - Minimizing contact with health facilities
  - Infection prevention control measures
- Promote muilti-month scripting of medicines for at risk conditions
  - HIV care, Diabetes, Cardiovascular & lung diseases
- Spaced appointment scheduling
  - Appointment by day and time
  - Weekend and after-hours

Telehealth/mobile technologies

- To f/u clients on MMD
- Virtual rounds done in COVID-19 isolation centres; Muilti-Disciplinary Team of experts consulted on management of complicated cases while minimizing PPE use and risk of exposure of healthcare workers
- Virtual training of healthcare workers
- Transmission of various guidelines to all facilities countrywide in the shortest possible time

Mitigation Measures – Facility

Supporting Last Mile distribution of commodities for scale-up of 6MMD

Setting up multiple triage points at ART sites

Lessons Learnt

- COVID-19 Pandemic is on-going and Zambia is yet to peak as number cases & severity of disease increases exponentially
- We are now seeing VERY SICK patients and mortality has increased drastically
  - Based on predictions and earlier models
- The need to protect vulnerable groups has become crucial
  - Very young and the elderly
  - Those with underlying conditions (diabetes, hypertension, kidney diseases, etc.)
  - Immune compromised
- High density areas (compounds) will be more affected
- Healthcare worker safety is paramount, a number of healthcare wokers are getting infected and we have lost a few so far.

Thank You
Questions!!

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GLOBAL HEALTH EQUITY LECTURE SERIES:
COVID 19 PANDEMIC PREPAREDNESS AND RESPONSE: PERSPECTIVES FROM AFRICA

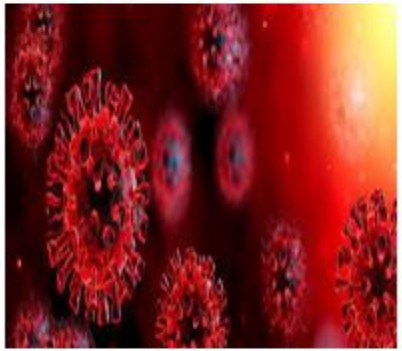
The Role of the African Field Epidemiology Network and Member Field Epidemiology Training Programs

Herbert Brian Kazoora MD | Ag Head of Programs
African Field Epidemiology Network (AFENET)

Presentation Outline

1. Current COVID-19 Situation in Africa
2. About AFENET
3. AFENET Corp of Disease Detectives (ACoDD)
4. AFENET & COVID-19 response in Africa
5. Challenges
6. Acknowledgements

Current COVID-19 Situation in Africa



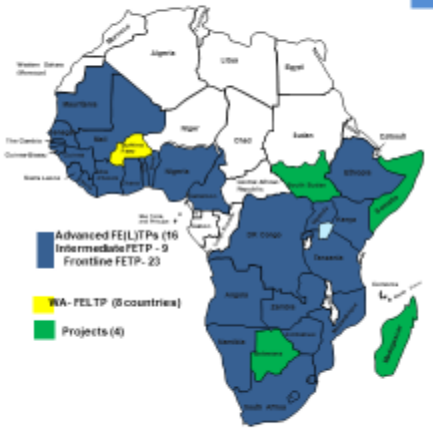
- Cases = 871,970
- Deaths = 18,475
- Recoveries = 523,684
- CFR =2.1%
- All 54 countries affected
- South Africa Most Affected
- Source: https://africacdc.org/covid-19/, Accessed 29/7/2020

About AFENET

About AFENET

- **AFENET**- African Field Epidemiology Network
- Non-profit networking and service alliance of FE(L)TPs in Africa
- Primary implementing partner to develop and sustain FE(L)TPs in sub-Saharan Africa for over 10 years
- Work with Ministries of Health and Agriculture, National Public Health Institutes (NPHIs)

Footprint in Sub-Saharan Africa



AFENET Regionalisation

www.afenet.net

AFENET
African field Epidemiology Network
A healthier Africa

Field Epidemiology Capacity Development

1,965

Advanced FETP Graduates

200

Intermediate FETP Graduates

4000

Frontline FETP Graduates

AFENET

AFENET's Strategic Priorities

01 Field Epidemiology Capacity Development

02 Public Health Laboratory Capacity Development

03 Public Health Disease Surveillance & Effective Response

04 Public Health Program Management & Research Development

05 Networking & Collaboration For Public Health Advancement

06 Documentation & Publication For Public Health

07 Promoting the 'One Health' Approach

AFENET

www.afenet.net

AFENET Corp of Disease Detectives (ACoDD)

- Established in 2018
- Is a civil voluntary professional service of culturally competent field epidemiologists
- Built on the One Health Approach
- Membership- Graduates and Residents of FE(L)TPs in Africa
  - Advanced FETP
  - Intermediate FETP
  - Frontline FETP

Purpose of ACoDD

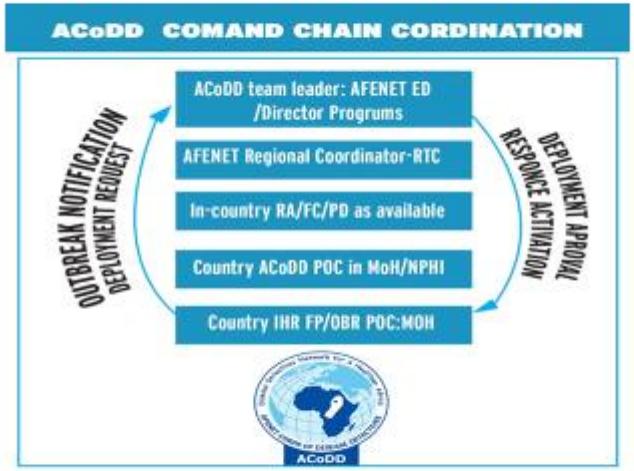
- Platform to rapidly mobilize and deploy field epidemiologists
- Provide prompt and effective response to disease outbreaks and public health emergencies
- Conduct field investigations and epidemiological studies to provide evidence for public health decision and policy
- Sustain local capacity for disease prevention, detection and response

AFENET

Where are the ACoDD members

- ACoDD members are spread across the AFENET member countries
- Over 85% work within the public and private health sectors within their countries

ACODD Deployment Mechanism



AFENET & COVID-19 Preparedness and Response in Africa

Preparedness Phase

AFENET Collaborated with Africa CDC to:

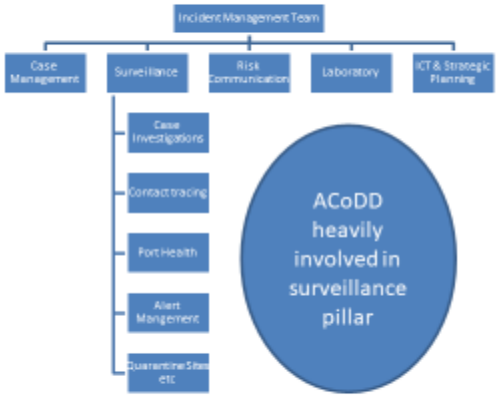
- ❑ Rapidly conduct regional trainings for health workers on :
  - Enhanced surveillance at points of entry – Kenya, Feb 2020
  - Event- based surveillance in Uganda, March 2020
  - COVID-19 laboratory diagnosis using PCR in Senegal, Feb 2020
  - Infection Prevention and Control training, Nigeria
  - Risk communication and Community Engagement, Tunisia
- ❑ Procure and distribute PPEs and Lab supplies
- ❑ Convene an emergency meeting of Ministers of Health - Africa Taskforce for Coronavirus (AFCOR) established

Preparedness Phase….2

Member FETPs supported Ministries to:

- Develop national prepared and response plans
- Develop/adapt surveillance protocols and tools (forms/case definitions)
- Conduct point of entry surveillance – Screening travellers at Airports, ground crossing points
- Risk Communication and community engagements
- Investigate and respond to alerts and rumours
- Orient health workers on case detection, reporting and infection prevention and control
- Conduct risk assessments

Response Phase



- ACoDD members mobilized and deployed to IMS for:
  - Screening travellers at points of entry
  - Case investigation & contact listing
  - Contact tracing and follow up
  - Alert management
  - Risk communication & Community engagement
  - Sample collection
- Supported Africa CDC to mobilize and deploy >200 FETP graduates through African Volunteer Health Corp (AVOHC)

AFENET Teams in the field

FETPs Respond to Disease Outbreaks across Africa

Challenges

- High mobility of non-quarantined contacts especially in Urban Settings (Before lockdowns)
- Limited laboratory capacity to rapidly test all contacts under follow up to inform timely discharge or isolation of contacts
- Shortage of personal protective equipment
- Prolonged stay in institutional quarantine sites by contacts for more than 14 days when one turns positive
- Limited funding to sustain deployment of contact tracers in the field

Acknowledgements

mastercard foundation

CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

RESOLVE TO SAVE LIVES

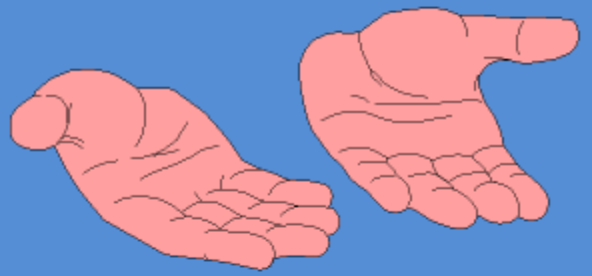
BILL & MELINDA GATES foundation

AFRICA CDC
Centres for Disease Control and Prevention
Safeguarding Africa's Health

skoll FOUNDATION

AFENET

Thank you for your attention



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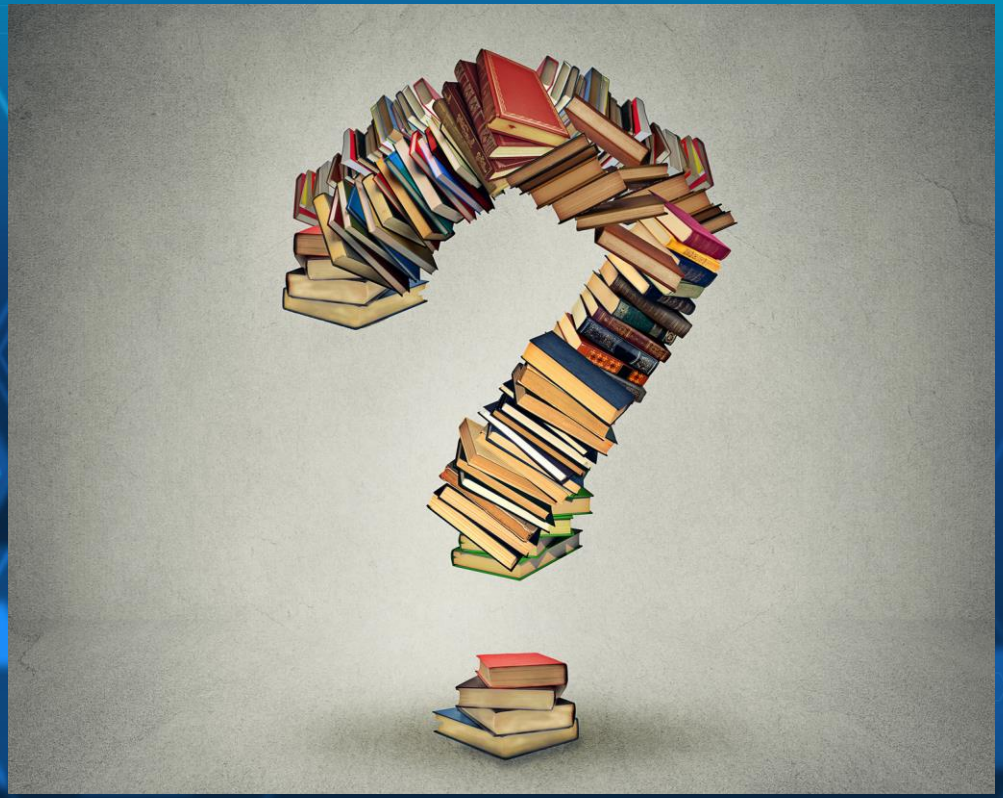

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CLOSING REMARKS
ACKNOWLEDGEMENT

Gilberte "Gigi" Bastien PhD
Associate Director, MSM/OGHE