

A health threat anywhere is a health threat everywhere

Inger Damon, MD, PhD

Director, Division of High-Consequence Pathogens and Pathology, CDC

Inger Damon, Cooperative
Threat Reduction
Programs for the Next Ten
Years and Beyond
September 18-19, 2017



Source: The Lancet 380:9857, 1-7 Dec 2012, pp. 1946-55.
www.sciencedirect.com/science/article/pii/S0140673612611519

An outbreak of infectious disease is always just a plane ride away

DISEASE KNOWS NO BORDERS

A pathogen can travel around the globe to major cities in as little as 36 hours.



www.cdc.gov/globalhealth/healthprotection

272346-AR

Division of High Consequence Pathogens and Pathology (DHCPP)

*Many diseases, many pathogens – technical expertise – zoonoses
laboratory, epidemiology, clinical, disease prevention, communications*

Prion and Public Health Office

Bovine Spongiform Encephalopathy (BSE) (Mad Cow)	Gerstmann-Straussler-Scheinker Syndrome
Sporadic, Genetic, and Iatrogenic Creutzfeldt-Jakob Disease (CJD)	Reye Syndrome
Chronic Wasting Disease	Fatal Familial Insomnia
Guillain-Barre Syndrome	Kawasaki Syndrome/Disease

Bacterial Special Pathogens Branch

Actinomycoses and Nocardiosis	Hansen's Disease (Leprosy)
Anthrax	Leptospirosis
Brucellosis	Melioidosis (Burkholderia pseudomallei)
Buruli Ulcer	Pasteurella sp. Infections
Capnocytophaga	Rat-Bite Fever
Glanders (Burkholderia mallei)	

Chronic Viral Diseases Branch

Myalgic Encephalomyelitis/Chronic Fatigue Syndrome (ME/CFS)	Human Papillomavirus (HPV) Testing
Post-Infectious Fatigue	HPV Associated Cancer and Pre-cancer

Viral Special Pathogens Branch

Family <i>Filoviridae</i>	Family <i>Arenaviridae</i>
Ebola Virus	Lassa Virus
Sudan Virus	Luján virus
Bundibugyo Virus	Lymphocytic Choriomeningitis Virus
Tai Forest Virus	Machupo Virus (Bolivian Hemorrhagic Fever)
Reston Virus	Junín Virus (Argentinian Hemorrhagic Fever)
Marburg Virus	Guanarito virus (Venezuelan Hemorrhagic Fever)
Ravn Virus	Sabia Virus (Brazilian Hemorrhagic Fever)
Family <i>Bunyaviridae</i>	Chapare Virus
Rift Valley Fever	Family <i>Flaviviridae</i>
Crimean-Congo hemorrhagic fever	Tick-borne encephalitis (TBE) complex viruses
Hantavirus Pulmonary Syndrome (HPS) associated viruses	TBE virus
Hemorrhagic Fever with Renal Syndrome (HFRS) associated viruses	Far-eastern TBE virus
Family <i>Paramyxoviridae</i>	Omsk Hemorrhagic Virus
Nipah virus	Kyasanur Forest Disease virus
Hendra virus	TBE virus

Poxvirus and Rabies Branch

Family <i>Poxviridae</i>	
Bovine Papular Stomatitis Virus	Raccoonpox Virus
Cowpox Virus	Skunkpox Virus
Molluscum Contagiosum Virus	Tanapox
Monkeypox Virus	Vaccinia Virus (Smallpox Vaccine)
Orf Virus	Variola Virus (Smallpox)
Pseudocowpox Virus	Volepox
Family <i>Rhabdoviridae</i>	
Non-rabies Lyssavirus	Rabies Virus

Infectious Diseases Pathology Branch

Autopsy-Medical Examiner	Pathology and Telepathology
Histopathology Laboratory-Tissue	Sudden Unexplained Death
Immunohistopathology Laboratory	Unexplained Fatal Illness

Global Health Security Agenda

**Prevent avoidable
catastrophes**



Detect threats early



**Respond rapidly
and effectively**



GHSA: DHCPP works in 11 of 17 phase 1 countries

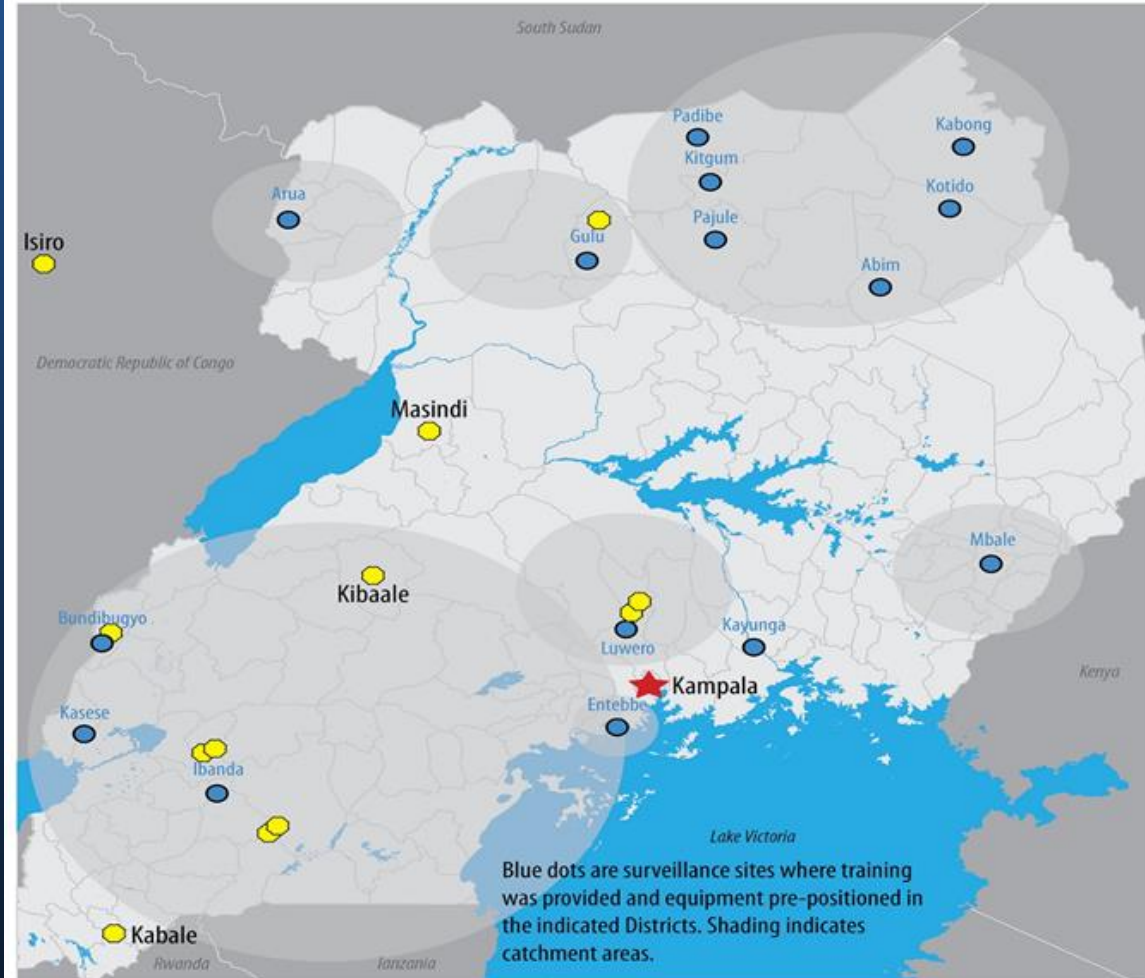



Collaboration and Cooperation-> Joint interests -> Success Stories and Progress:

lab-surveillance -> response
pathogen discovery
prevention programs
leveraging relationships

Outbreak response: Uganda

***VHF training, surveillance, diagnostics,
and health education activities in Uganda:
outbreak response, epidemiology, ecology, pathogen discovery***



 ***Ebola and Marburg virus disease outbreaks in Uganda***

Uganda

New strategies and technologies to find and stop outbreaks

SAMPLE COLLECTION



SAMPLE TRANSPORT – MOTORCYCLE COURIER AND OVERNIGHT MAIL



CENTRALIZED LAB TESTING



EMERGENCY OPERATIONS CENTER OUTBREAK CONTROL



PATIENT CARE

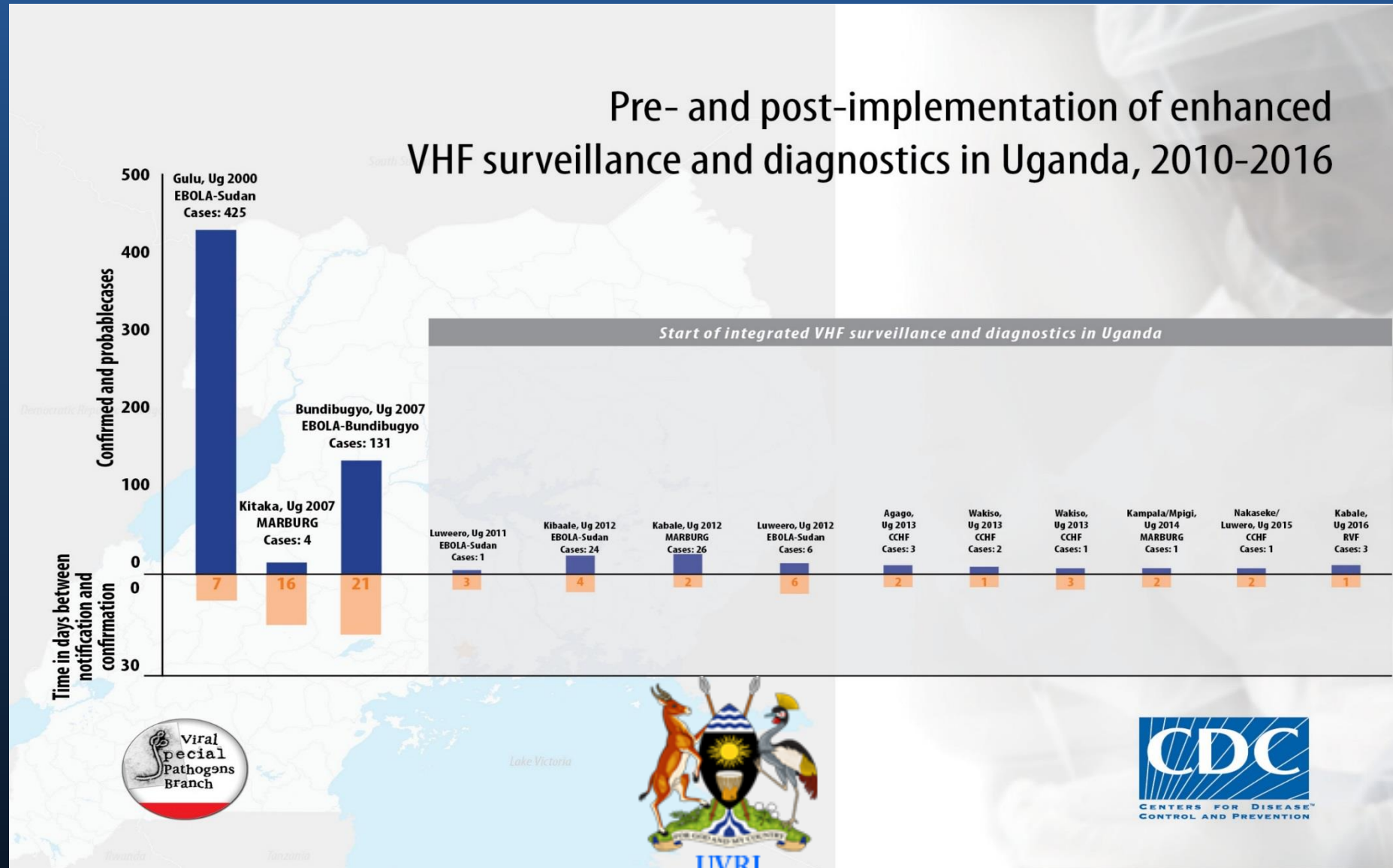


LAB RESULTS SENT ELECTRONICALLY, PRINTED INSTANTLY IN FIELD



Success: reducing the time to recognition and sizes of VHF outbreaks

Uganda VHF Program Implementation: 2010 - 2016

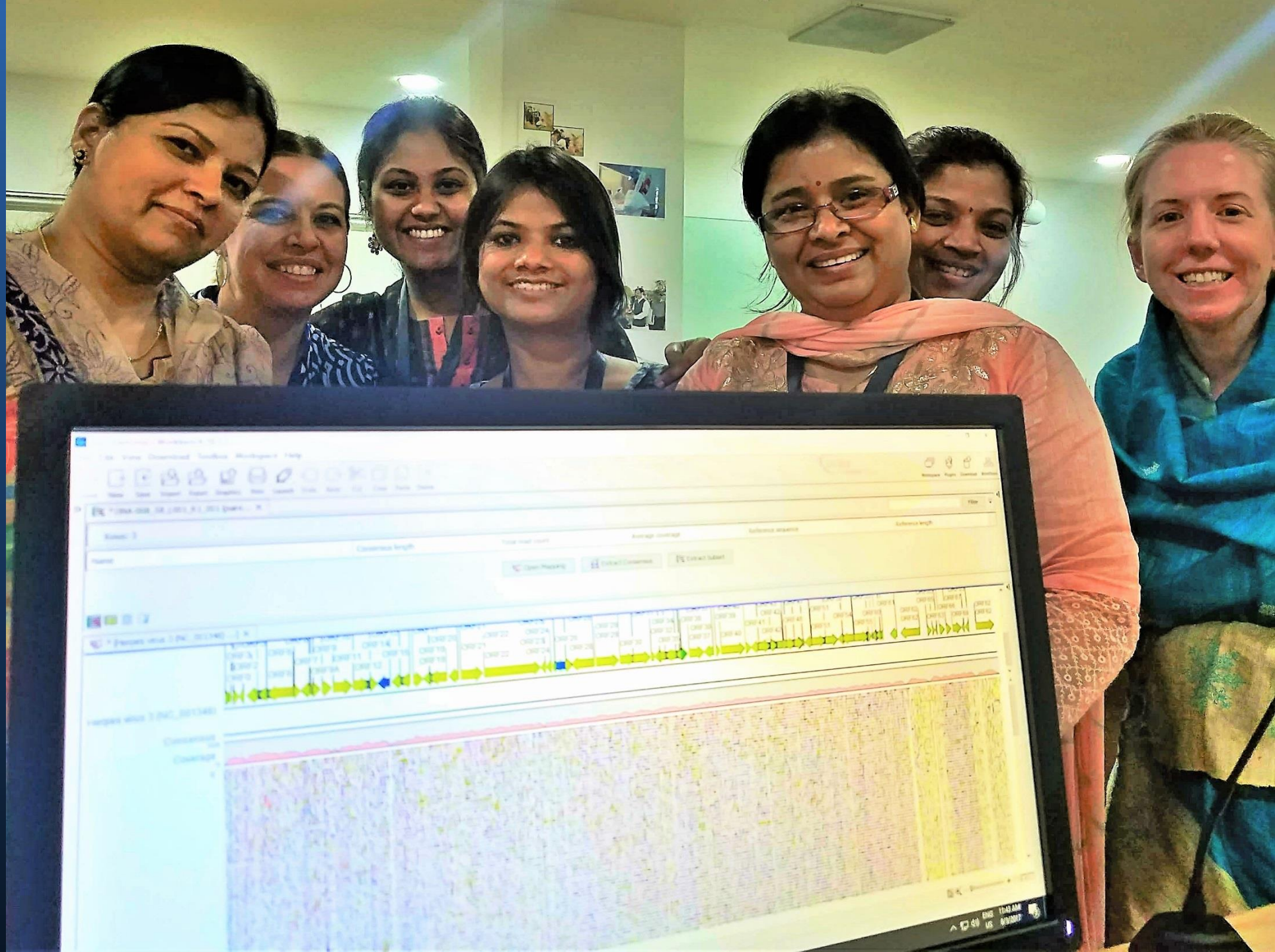


India

NIV

- Collaboration with NIV in Pune
- Containment lab capacity
 - Nipah
 - Kyasanur Forest Disease
 - CCHF





Developing Capacity for Leptospirosis Control

- Partnering with University of Manipal and Indian government
- Assisted in enhancing surveillance to improve knowledge on burden of leptospirosis in India resulting in a larger burden across India than originally thought
 - Use of leptospirosis diagnostic assay to evaluate unknown acute febrile illness cases
- Participated in stakeholders meeting which resulted in country wide tiered algorithm for diagnostics and assisted with initial diagnostic training

Developing Capacity for Anthrax Control

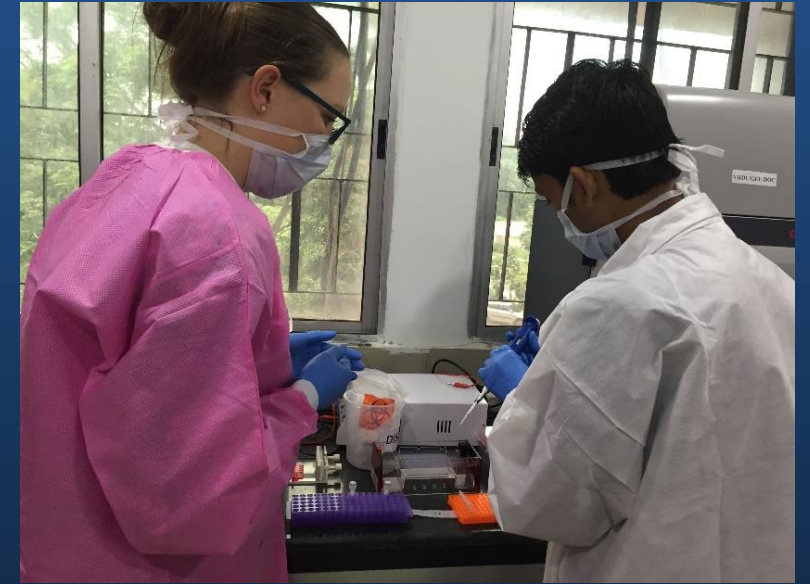
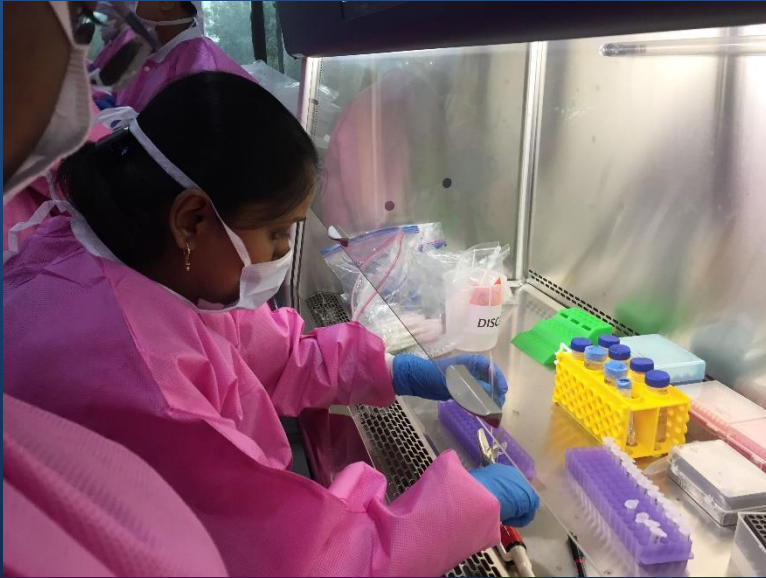
- **Bangladesh**

- Expand anthrax training to regional level health and veterinary staff
- Aim to conduct anthrax vaccine work to improve cold chain management and uptake of vaccine by livestock owners
- Improved anthrax confirmation rate with trained regional staff – PCR

- **India**

- Partnering with Manipal University and government
- Assisting with training regional laboratories (animal and human) for appropriate diagnostic methods based on available biosafety and biosecurity in the labs

India Anthrax PCR Training



Akhmeta virus: Novel OPXV in the Caucasus

- Anthrax investigations -> Discovery of novel OPXV affecting dairy cattle and herders led to development of enhanced local capacity for investigation of a previously unrecognized zoonosis:
 - Enhanced collaboration across human and veterinary health sectors
 - Development and validation of new lab tests
 - Additional surveillance platforms
 - Pathogen detection
 - Ecologic investigation capacity
- Discover and response model can be applied to other emergent communicable disease problems.



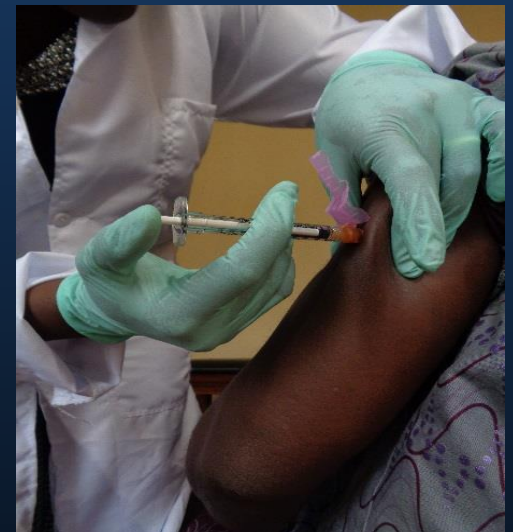
Monkeypox: laboratory based surveillance -> prevention programs



- Clinically similar to smallpox; not recognized as a human pathogen until smallpox eradication efforts
- Endemic in West and Central Africa, and most of the cases occur in DR Congo. A regional approach to disease mitigation is warranted.
- Detection, surveillance, and efficient laboratory diagnosis is key to mitigating this threat and providing appropriate patient care
- Current interventions include infection control, isolation, previous smallpox vaccination
- Future: Role for smallpox medical countermeasures, including antivirals and newer vaccines for targeted or expanded vaccination

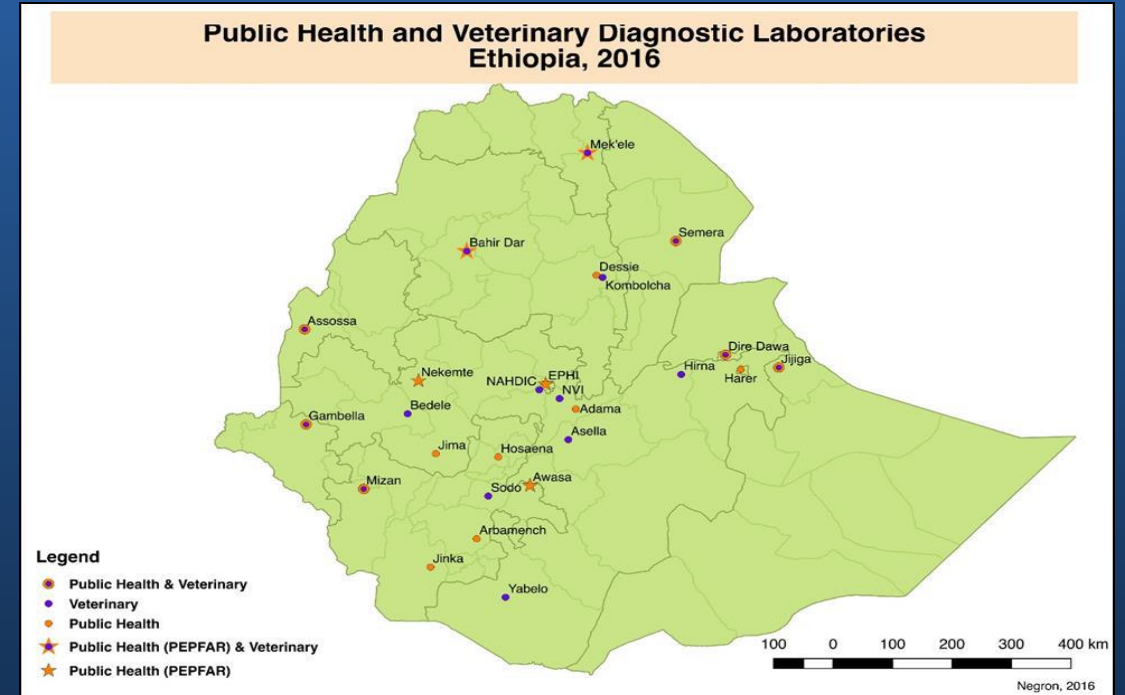
CDC's efforts to combat Monkeypox

- Establish and strengthen laboratory-based surveillance by improving diagnostic capacity and educating front-line public health workers 2006- present
- Provide evidence-based recommendations for outbreaks
- Help establish safe working practices for those who may be exposed
- Identify risk factors for infection (zoonotic and interhuman) and investigate animal reservoir(s)
- Educate communities so they can prevent infections and seek care
- Completed enrollment (1000 HCW) - IMVAMUNE vaccination
- Identify areas where additional countermeasures could be utilized

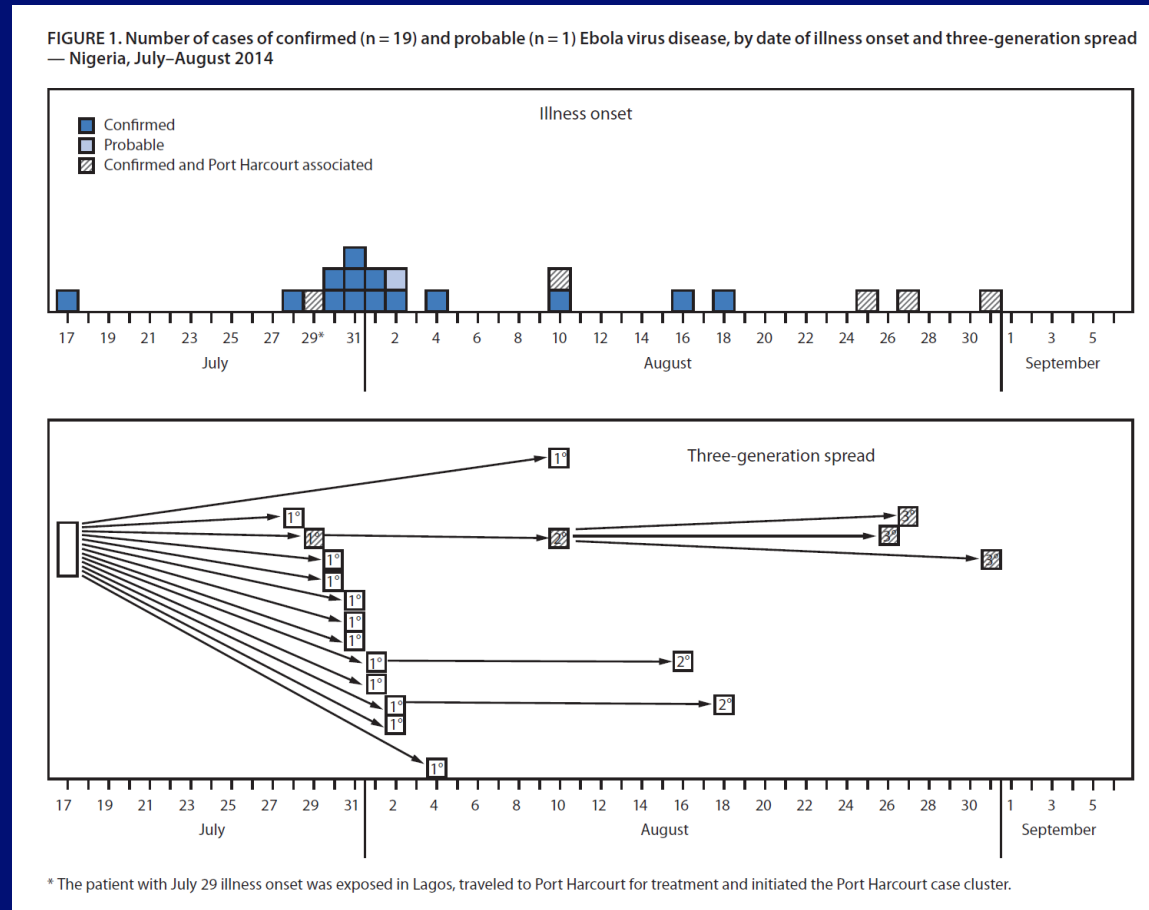


Developing Capacity for Brucellosis Control Ethiopia: Overview

- Ethiopia's Federal Ministry of Health (FMOH), the Federal Ministry of Livestock and Fisheries (FMOLF), and CDC are working together to improve detection, prevention, and control of brucellosis in livestock.
- Multi-year project started in 2016
- Map historic high risk disease zones for brucellosis in four regions (Oromiya, Amhara, Afar, Somali).
- Enhance diagnostic laboratory capacity at the national and regional levels within the ministries of Health and Agriculture.
- 50+ staff from laboratories focusing on the intersection of animal and human health have attended the hands-on training led by a CDC veterinary microbiologist.
- Enhance joint outbreak response capacity for zoonotic diseases within the program sub-regions.
- Vaccine



Leveraging partnerships / Ebola in Nigeria: rapid response = control July–September 2014



- July 20, 2014: traveler from Liberia arrived in Nigeria
 - The patient was sick on arrival and taken to a hospital, died
 - Multiple healthcare worker exposures
 - Laboratory confirmed July 28
 - CDC (ATL) provides infection control, technical and communications support
- Outbreak contained
 - 20 cases (19 confirmed) and 8 deaths
 - 10/22 health care workers
 - 3 generations of disease

THANK YOU