



# ***Effective Reaction:*** Response to the 2014/15 Ebola Outbreak in West Africa

**Multi-Domain Battle in Megacities Conference**

**3-4 APRIL 2018**

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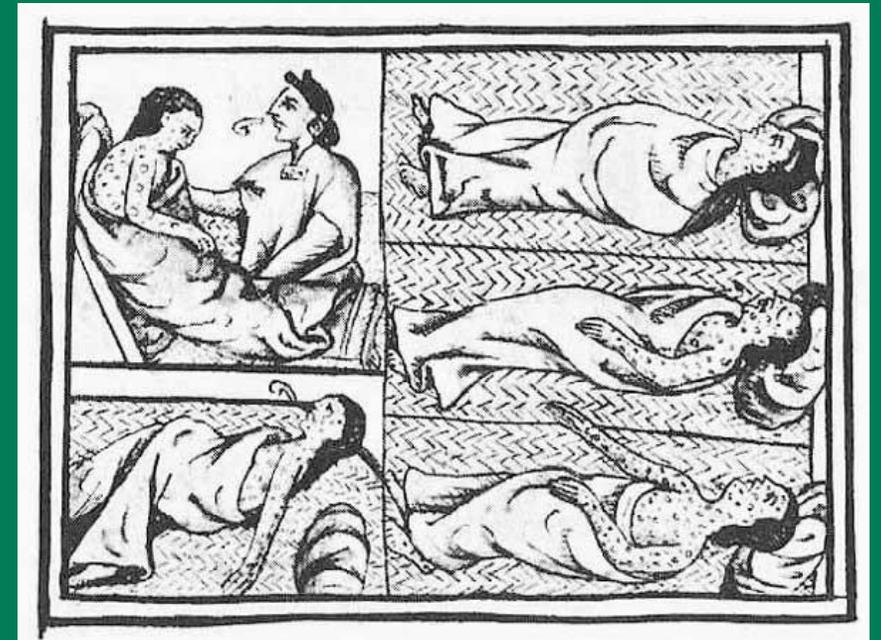


Centers for Disease Control and Prevention  
CDC 24/7: Saving Lives, Protecting People™



# Migration & Disease - Historical Background

- The relationship between the international movement of people and diseases has been recognized since ancient times
- Historically, the focus has been mostly on:
  - Risk of introduction of infectious diseases by migrants
    - (e.g., Smallpox epidemics during America's colonization by Europeans)



# Perception of “foreigners” as a health threat



THE KIND OF "ASSISTED EMIGRANT" WE CAN NOT AFFORD TO ADMIT.

1883 Cartoon  
Text: “The kind of  
‘assisted  
emigrant’ we  
cannot afford to  
admit.”

\*F. Graetz *Puck Magazine*. In Mary and Gordon Campbell, *The Pen, Not the Sword*, Aurora Publishers, Inc., Nashville, Tennessee, 1970.

# Immigration Policies Behind Spread of Rare Respiratory Disease?

Occurrence of Enterovirus D68 seems to be spread by waves of illegal immigrant children from Central America shipped across the U.S. due to stupid immigration policies

ENTEROVIRUS

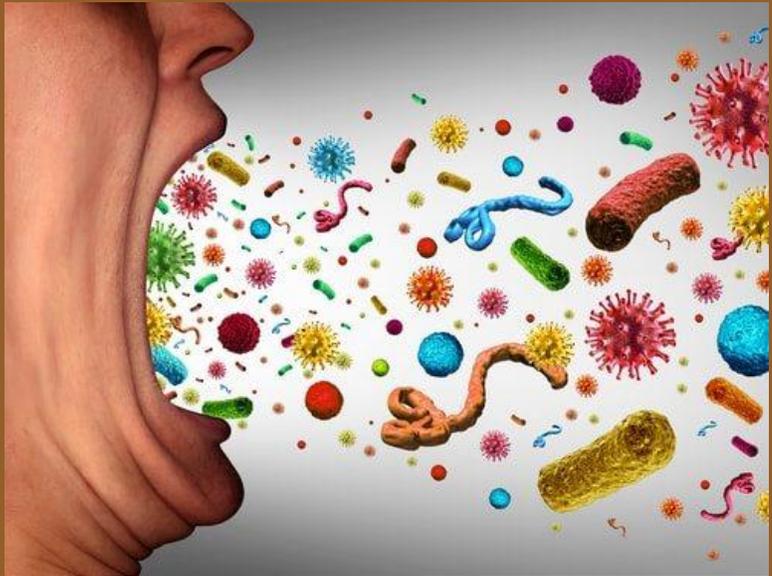


# Perception of “foreigners” as a health threat *in 2018*

**HIV, TUBERCULOSIS, MALARIA, LEPROSY,  
HEPATITIS A-E, DENGUE, CHAGAS, MRSA, MEASLES**



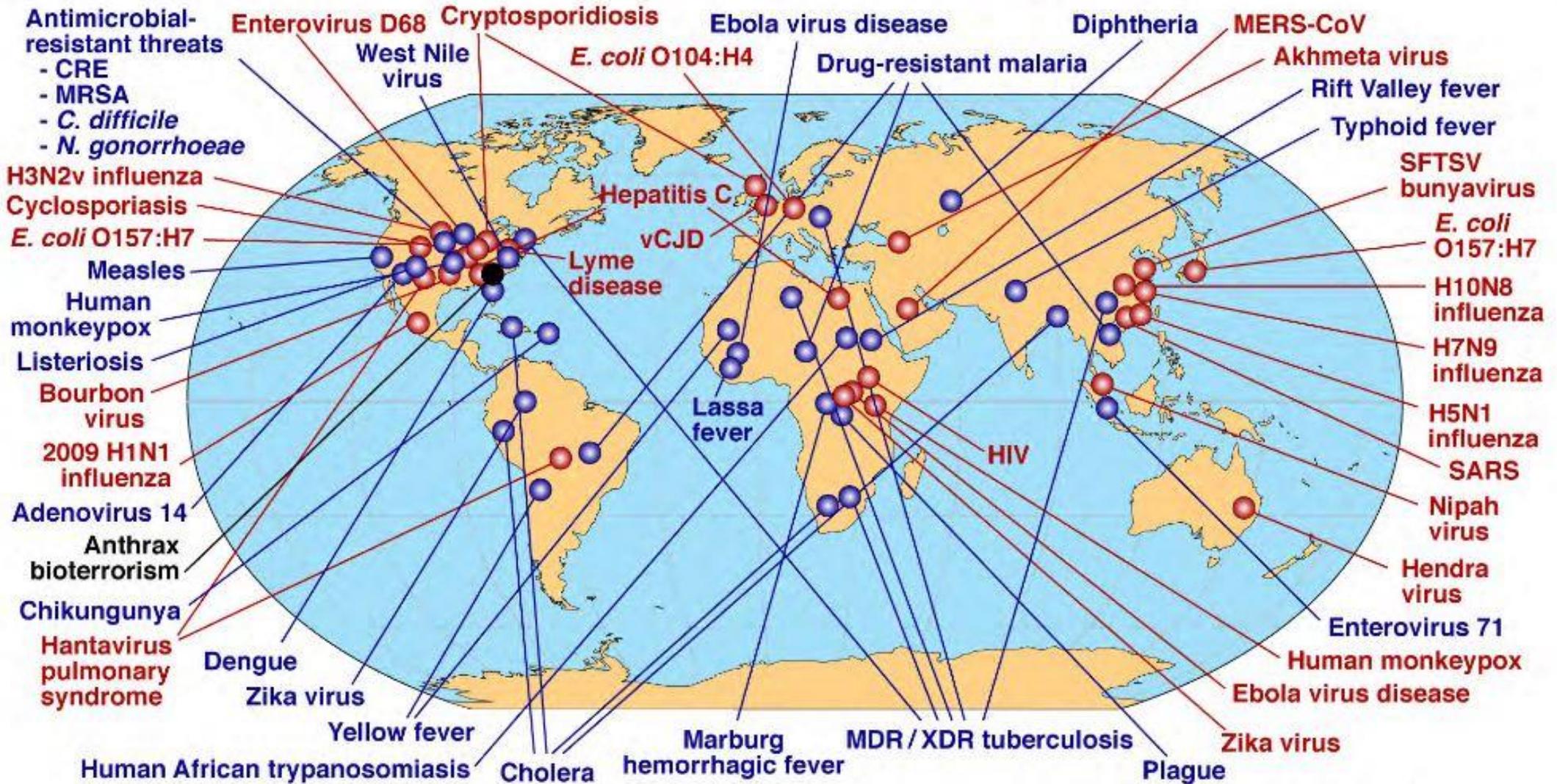
**COMING TO A CITY NEAR YOU!**



# INFECTIOUS DISEASE GLOBALIZATION – INFLUENCING FACTORS

- Regional disparities in infectious disease burden

# Global Examples of Emerging and Re-Emerging Infectious Diseases

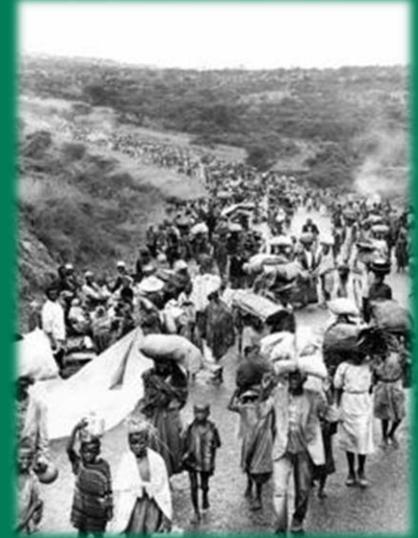


● Newly emerging    
 ● Re-emerging/resurging    
 ● "Deliberately emerging"

# INFECTIOUS DISEASE GLOBALIZATION

## – INFLUENCING FACTORS

- Regional disparities in infectious disease burden
- Global trade
- Climate change
- Changing ecologies or urbanization
- Population mobility



# What is urbanization?

- It is the growth of cities, brought about by a population shift from rural areas and small communities to large ones
  - Change from a largely agricultural to industrial economy
- This results in the development of cities and towns on formerly agricultural or natural lands

# History of Urbanization

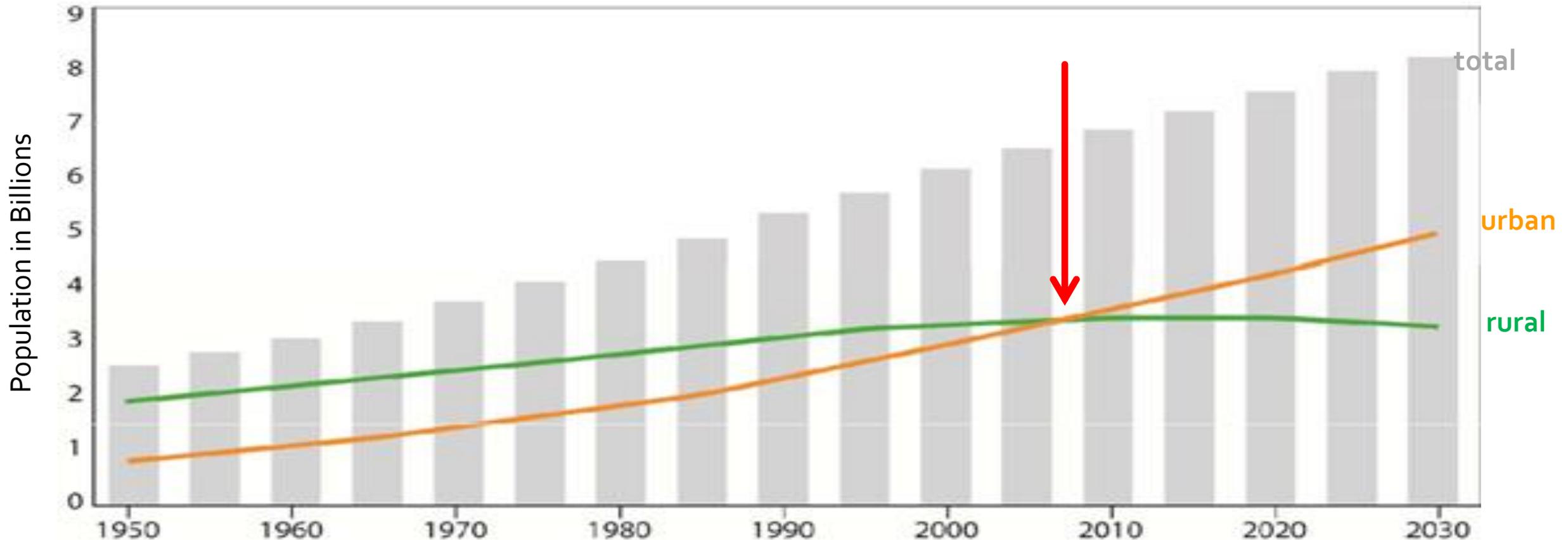
- Through most of history, the human population has lived a *rural* lifestyle, dependent on agriculture and hunting for survival
- In 1800, only 3 percent of the world's population lived in *urban* areas
- By 1900, almost 14 percent were urbanites, although only 12 cities had pops >1 million +
- In 1950, 30% of the world's population resided in urban centers. The number of cities >1 million had grown to 83

# History of Urbanization (cont)

- The world has experienced unprecedented urban growth in recent decades
- In 2007 for the first time in history, over 50% of the world's population lived in urban areas

# Urban & Rural Populations, 1950-2030

## World Population Distribution



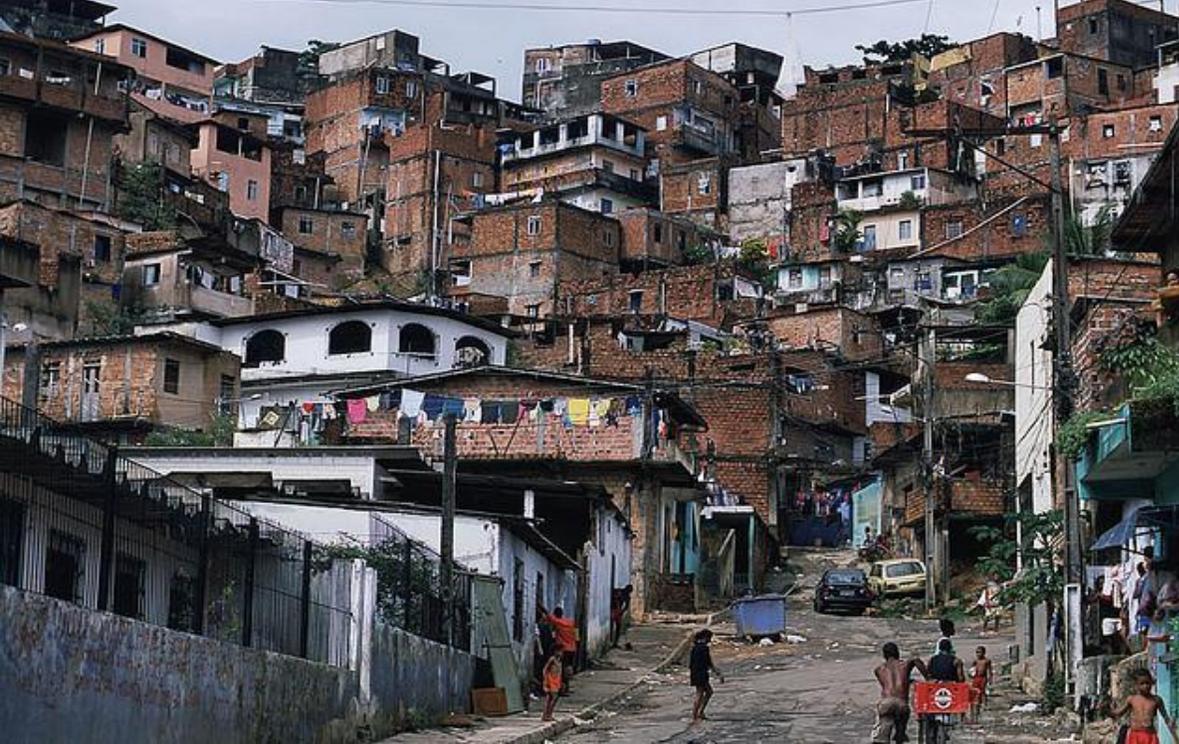
# What is driving urbanization?

- ❑ Much of urban migration is driven by rural populations' desire for the advantages that urban areas offer
  - ❑ This includes greater opportunities to receive education, health care, and services such as entertainment
  - ❑ The urban poor have less opportunity for education than the urban nonpoor, but still they have more chance than rural populations
  - ❑ Additional resources - money, etc.



The “Emerald City” from The Wizard of Oz

Or the “Promised Land”



“Emerald Cities”

# Implications of Rapid Urbanization

- Most communities are not able to keep pace with urban swells in population
- Informal settlements (slums) appear and grow
  - Low rates of urban economic growth
  - High air pollution
  - Increase crime/decreased security
  - Inadequate safe water supplies
  - *Sub-optimal sanitation/hygiene infrastructure*
  - *Dense population/potential for rapid spread of pathogens*

# Ebola Comes to West Africa – A Tale of 2 outbreaks

- First time in West Africa
- Weak public health infrastructure and spotty border control



- Lack of infection control in health care facilities: absence of protective gloves, soap and running water
- Unrecognized cases of Ebola reached poor, crowded cities with global air transportation links

# View from above in northern Liberia

## - *Pristine forests*



12/04/2014



12/04/2014



12/04/2014

# Location of Liberian index case – March 2014



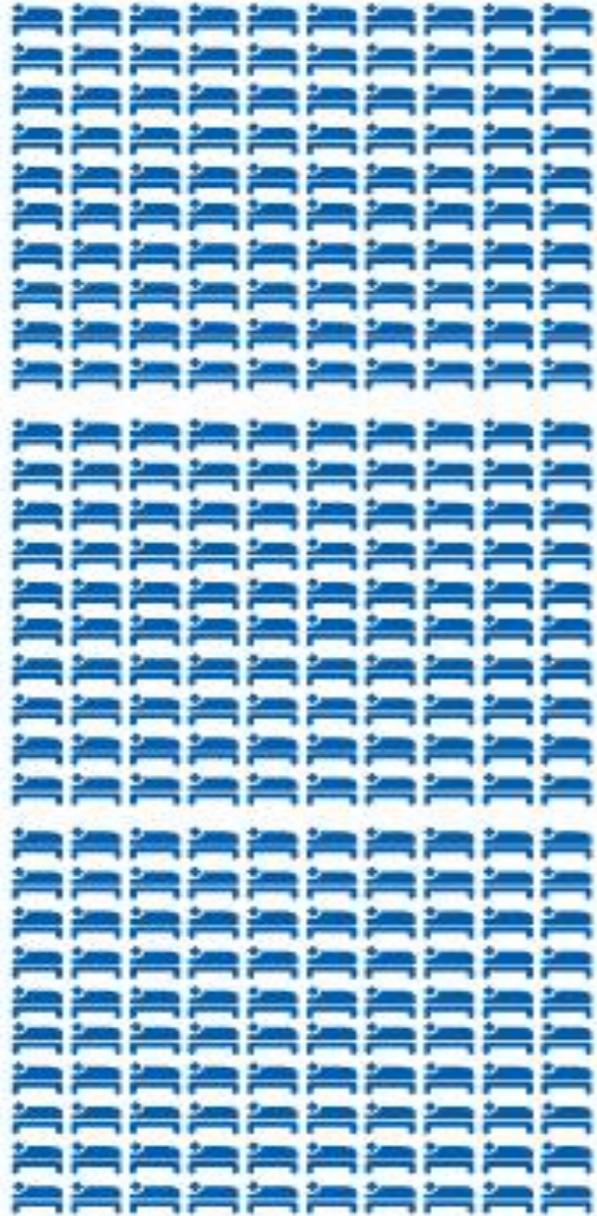
## Laboratory challenges/limitations:

- Few trained laboratorians locally or nationwide
- Access to diagnostics/resources
- Specimen transport
- Little to no PPE



# Monrovia Under Siege

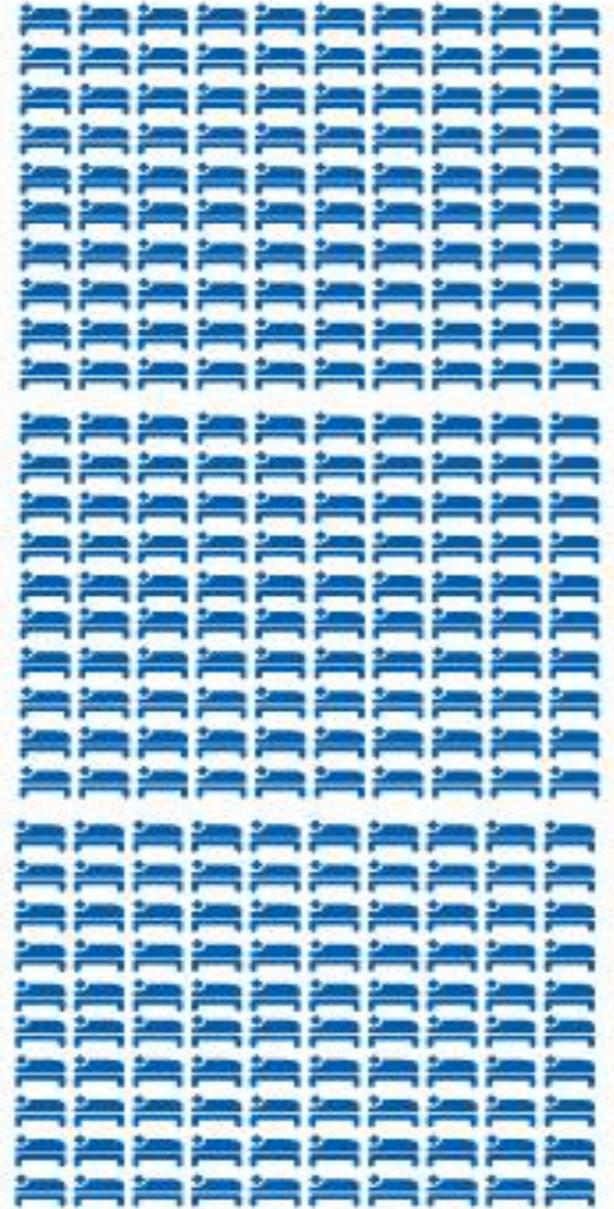
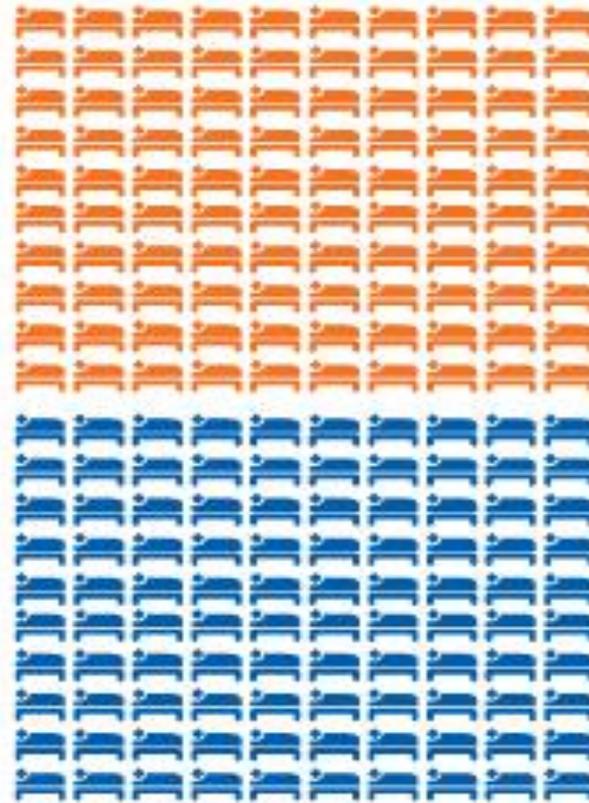
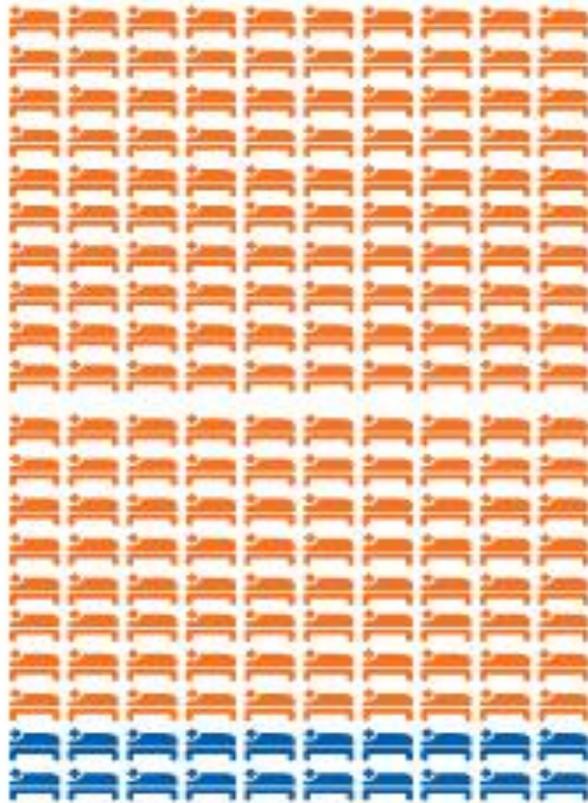
# More Patients than Beds in Ebola Treatment Units



**1000+ Beds**  
in demand



**280 Beds**  
currently available





# Community Deaths



**Fear Spreads!**



# Rioting in Monrovia

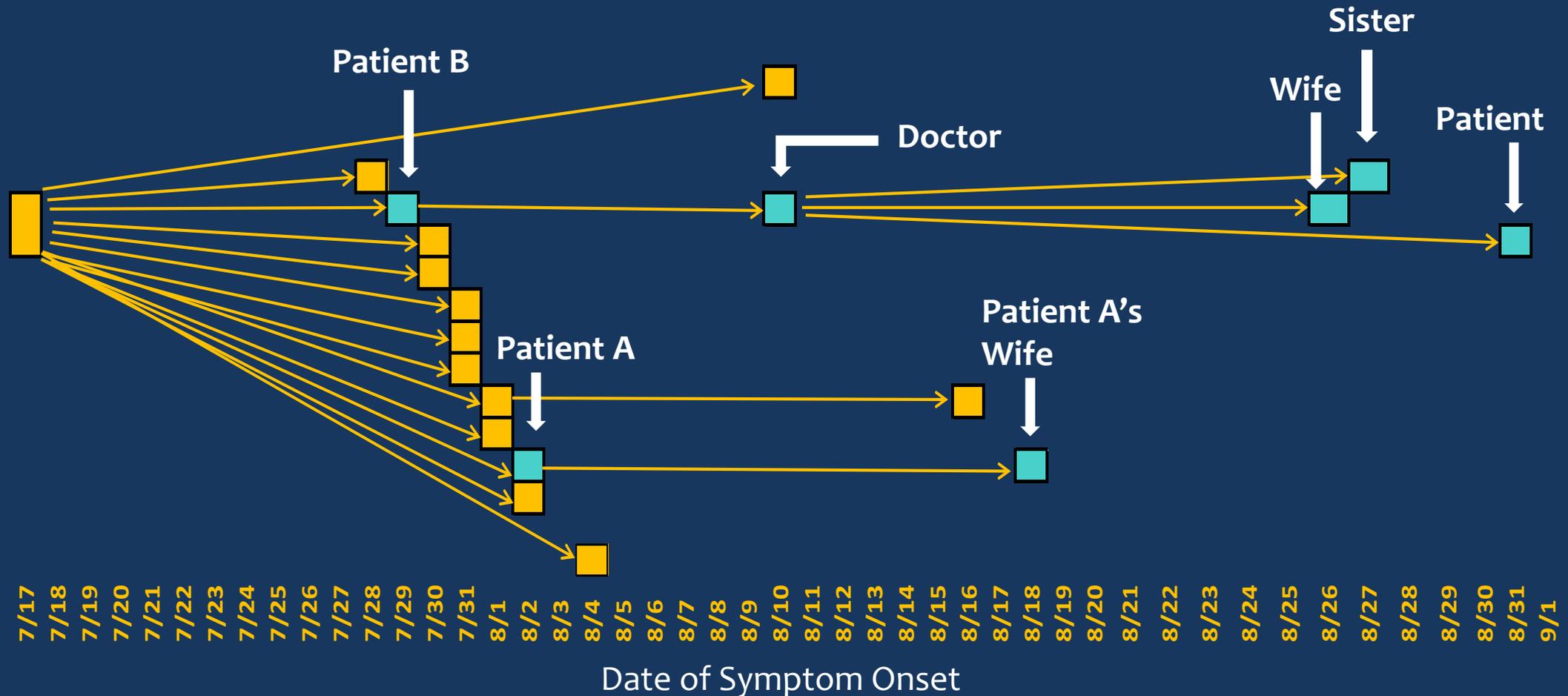
# USG-Liberian MOHSW mobile laboratory near ELWA-3 Ebola Isolation facility



Nigeria:

*An Ebola Success Story*

# Ebola Transmission in Nigeria July-August, 2014



# Nigeria Responds



- Identified 894 contacts
- Completed nearly 19,000 contact tracing visits
- Implemented a social mobilization strategy that reached 26,000 households
- Established an Ebola treatment unit in just two weeks

# Why control in Nigeria was successful

- Availability of SOPs and materials from WHO that were quickly adapted for use in Nigeria
- Adequate human resource – numbers and technical competence; including national and international staff
  - Enough teams to follow up the contacts
- Availability of required logistics – cars, phones, forms, airtime, thermometers
- Use of mobile phone technology enabled real-time follow up of contacts and prompt detection of those with symptoms

# Why control in Nigeria was successful

- Data management initiated from the beginning of outbreak – initially using Excel and later both Excel and Epi Info
- Active rumor/alert investigation system
- Available laboratory support and timely results
- Use of data to monitor response
- Motivated and facilitated team
- Good team work and leadership
- EOC and FELTP

# Nigeria Succeeds!

- With only a trained workforce (FETP) and an Emergency Operations Center, Nigeria was able to contain a potentially disastrous epidemic

**Ebola-free Nigeria hailed as 'success story' in battling outbreak**



Children in Lagos, Nigeria, wash their hands with soap after being tested for signs of the Ebola virus on Oct. 8. (Sunday Alamba / Associated Press)



# Containing the Epidemic in Liberia, Sierra Leone & Guinea



## CDC's Role in West Africa

# Obama Meets with CDC



**President Barack Obama**  
President of the United States of America

**Dr. Tom Frieden**  
Director, CDC

**Ms. S**  
National



# Treatment for HCWs



A health threat anywhere is a health threat everywhere.

Source:

6. W



HIV

Avian Flu

Food Supply

XDR TB

# PUBLIC HEALTH THREATS

Anthrax



SARS



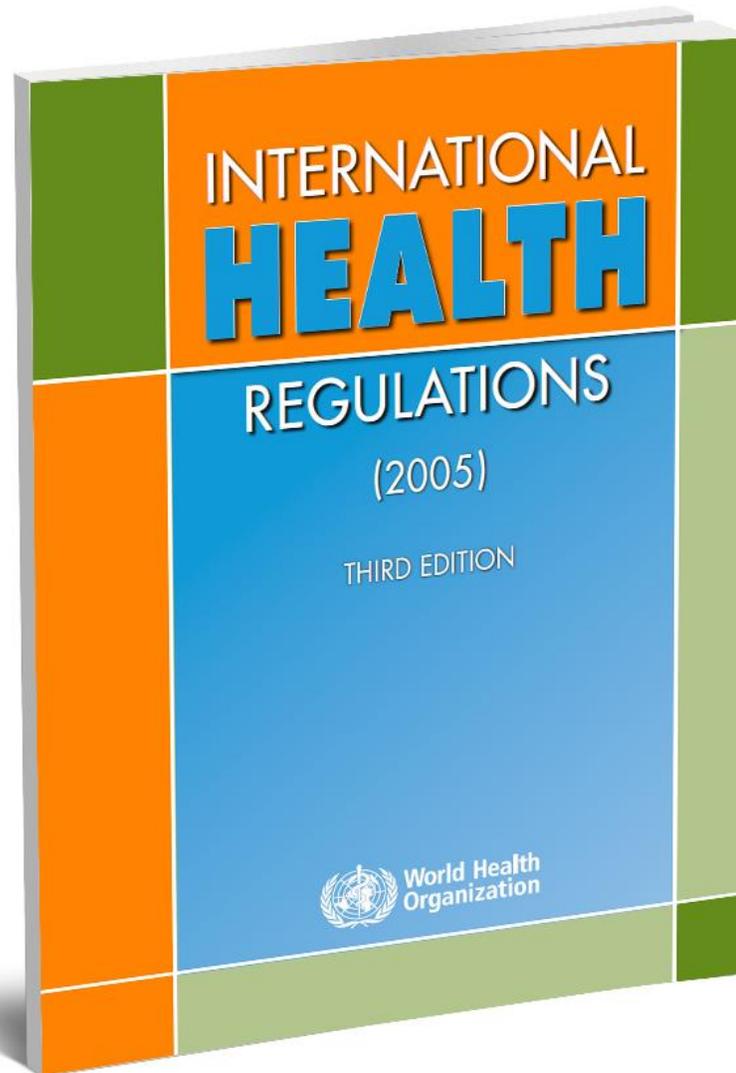
Ebola



Zika



# International Health Regulations (2005)



# The Global Health Security Agenda

A unifying framework to improve our global response to disease outbreaks



 **GLOBAL HEALTH SECURITY—**  
VISION AND OVERARCHING TARGET

**VISION:** *Our vision is a world safe and secure from global health threats posed by infectious diseases—where we can prevent or mitigate the impact of naturally occurring outbreaks and intentional or accidental releases of dangerous pathogens, rapidly detect and transparently report outbreaks when they occur, and employ an interconnected global network that can respond effectively to limit the spread of infectious disease outbreaks in humans and animals, mitigate human suffering and the loss of human life, and reduce economic impact.*

**U.S. OVERARCHING TARGET:** Over the next five years the United States commits to working with at least 30 partner countries (containing at least 4 billion people) to prevent, detect and effectively respond to infectious disease threats, whether naturally-occurring or caused by accidental or intentional releases of dangerous pathogens. We call on other countries to join in this effort to realize the vision of a world where all 7 billion people are effectively protected against infectious disease threats.

We will work with partner countries on specific objectives to prevent, detect and effectively respond to infectious disease threats, and will measure our own progress through the following metrics and milestones. We invite partner countries to use metrics appropriate to their own situations, including these and others:

**Prevent:** Countries will have systems, policies and procedures in place to prevent or mitigate avoidable outbreaks. Considering their own vulnerabilities, countries should prioritize and implement the following:

- ▶ Surveillance to monitor and slow antimicrobial resistance, with at least one reference laboratory capable of identifying at least three of the seven WHO priority AMR pathogens<sup>1</sup> using standardized, reliable detection assays, and reporting these results when appropriate to international or IHR focal points.
- ▶ A whole-of-government national biosecurity system is in place that ensures collections of especially dangerous pathogens are identified, held, secured and monitored in a minimal number of facilities with biosafety and biosecurity best practices in place; biorisk management training and educational outreach is conducted to promote a shared culture of responsibility, reduce dual use biological risks, and ensure safe transfer of biological agents; and country-specific biosecurity legislation, laboratory certification, and pathogen control measures are in place as appropriate.
- ▶ Adopted behaviors, policies and/or practices that minimize the spillover of zoonotic diseases into human populations<sup>2</sup>
- ▶ Immunization of at least 90% of the country's one-year-old population with at least one dose of measles-containing vaccine as measured by coverage surveys or administrative data.

**Detect:** Countries will have real-time biosurveillance and effective modern diagnostics in place that are able to reliably conduct<sup>3</sup> at least five of the 10 core tests<sup>4</sup> (including point-of-care and laboratory-based diagnostics) on appropriately identified and collected outbreak specimens transported safely and securely to accredited laboratories<sup>5</sup> from at least 80% of districts in the country). The United States will also support countries in substantially accomplishing:

- ▶ Surveillance for 3 core syndromes indicative of potential public health emergencies conducted according to international standards.

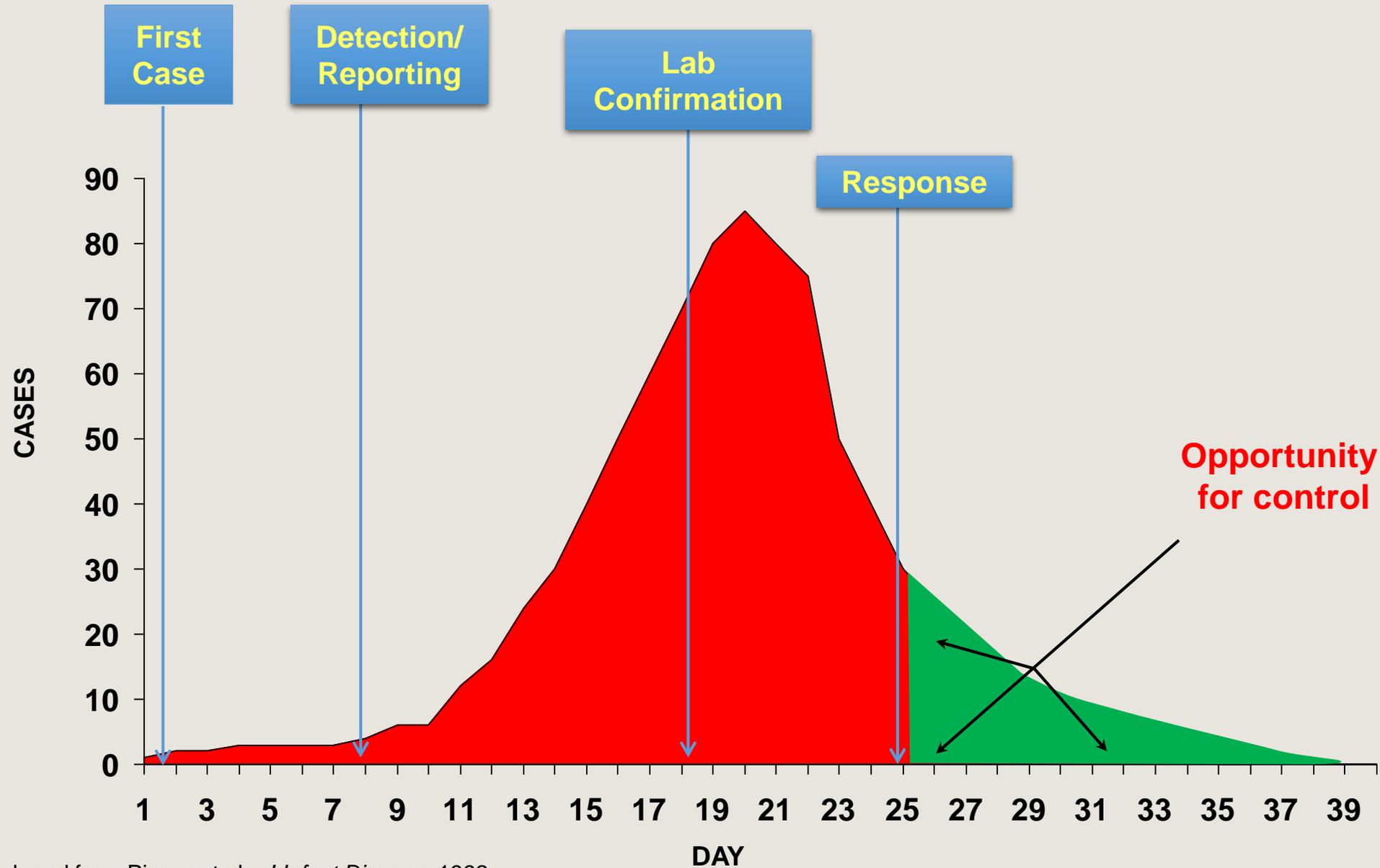
“This [the Global Health Security Agenda] is indeed a timely initiative. It raises the political profile of the threat from emerging and epidemic-prone diseases. And it energizes efforts to improve health security... in line with WHO International Health Regulations....”

*World Health Organization  
Director General Margaret Chan  
February 13, 2014*

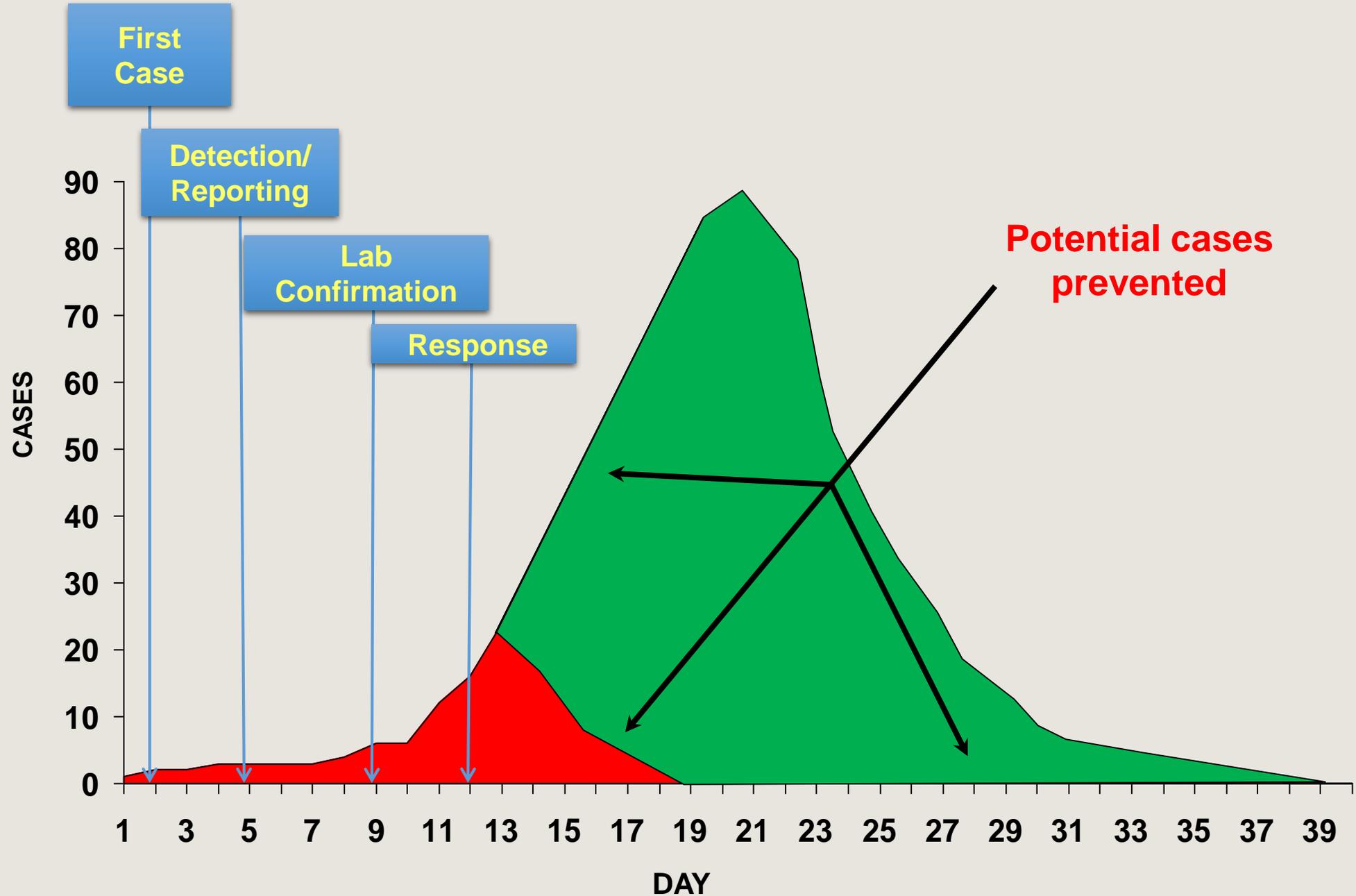
# The Global Health Security Agenda



# Without capacity for early detection & response



# If surveillance & response system is effective – Lab + reporting



# OVERCOMING CHALLENGES & TAKE HOME MESSAGES

- **Dedication to improving the public health workforce**
  - Not just epidemiologists but laboratorians, health communicators, data analysts, etc. - *complex workforce*
- **Development of or consideration for a tiered lab approach**
  - Advanced lab capabilities at the national level to use of simple technologies at the district level
  - Multipathogen detection platforms to RDTs/POC dx
- **Improving reporting time of lab results & linkage with surveillance data**
  - Surveillance data has to be bidirectional – *data for action*

# THANK YOU

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DGHP|CGH|CDC

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Centers for Disease Control and Prevention

CDC 24/7: Saving Lives. Protecting People™

# What did CDC do in West Africa?

- Surveillance and contact tracing
- Isolation, triage and infection control procedures
- Train healthcare workers in Ebola treatment units
- Educate leaders and the public
- Overcome stigma and promote behavioral change
- Laboratory confirmation
- Strengthen preparedness in border countries
- Exit screening at airports and borders



# The Impact of the Global Health Security Agenda



**Prevent illness and death from infectious disease threats globally and domestically**



**Improve countries' ability to meet the priorities they set for themselves (IHR compliance)**



**Reduce impact to travel and trade**