OUTBREAK

Deadliest Pandemics in History

Because a virus doesn’t care about state lines or national borders, it can wipe out millions and span multiple continents rapidly. Here is a look at the infectious diseases the world has battled throughout history.

What is a Pandemic?
Derived from the Greek word pandemos meaning “pertaining to all people,” a pandemic is a widespread disease that affects humans over a wide geographic area.

Key:

- **PANDEMIC YEAR**
- **DEATH TOLL**

### MEASLES
7th Century BC - 1963

**200 million**

### HIV / AIDS
1981 - TODAY

**25+ million**

### PLAGUE OF JUSTINIAN
541 - 750

**25 million**

### SMALLPOX
10,000 BC - 1979

**300+ million**

**Bigpox?**
In terms of an estimated death toll, smallpox is the deadliest pandemic in history. The highly contagious, rash-inducing, infection has killed more than 500 million people. Some believe that 90 percent of the native population of the New World was wiped out by the disease.

### BLACK DEATH
1340 - 1371

**75 million**

**Ring Around the Rosie, a Pocket Full of Plague**
Legend says the Black Death plague inspired the children’s rhyme “Ring Around The Rosey” which alluded to the rash-like rings and ashes of the deceased victims.

### TYPHUS
430 BC - TODAY

**4 million**

### CHOLERA
1817 - TODAY

**3 million**

### SPANISH FLU
1918 - 1919

**50-100 million**

### HONG KONG FLU
1968 - 1969

**1 million**

### THIRD PANDEMIC
1855

**12 million**

Honorable Mentions

Although the following viruses do not have a figure for the total amount of lives claimed, they continue to terrorize various areas around the world.

**MALARIA**

- **1600 - Today**
- **Common Symptoms:** Chills, Headache, Fever, Jaundice, Muscle Pain, Nausea, Vomiting, Seizures
- **Death Toll:** According to the World Health Organization’s 2010 “World Malaria Report,” an estimated 781,000 people are killed by the virus every year.

**TUBERCULOSIS**

- **700 BC - Today**
- **Common Symptoms:** Chest Pain, Cough, Fever, Colds, Fatigue
- **Death Toll:** There are almost 2 million tuberculosis-related deaths worldwide every year.

**YELLOW FEVER**

- **16th Century - Today**
- **Common Symptoms:** Bleeding, Fever, Nausea, Vomiting, Delirium, Jaundice
- **Death Toll:** Worldwide, 30,000 deaths are caused by the infection every year.

Sources:

A COLLABORATION BETWEEN GOOD AND COLUMN FIVE
Smallpox Eradication Program
Ethiopia, 1974
PANIC OVER KILLER VIRUS

EBOLA: WORLD GOES ON RED ALERT
District data for July 2014 not available.
Vaccination coverage: Fully vaccinated
Rivercess County, Liberia

**Vaccinations:**
- BCG
- Penta 1-3
- OPV (Oral Polio) 0-3
- Measles
- Yellow Fever
- Pneumo 1-3

**Fully vaccinated according to DHS among children 12-23 months, by distance to clinic**

- Near-facility: 12% (Basic) 10% (All)
- Remote: 8% (Basic) 5% (All)
- RC: 10% (Basic) 7% (All)
- DHS Rural: 49% (All)

**Note:** Data source is vaccine card and/or maternal report. No DHS Rural 2013 comparison for fully vaccinated.
Receipt of full maternal service cascade
Rivercess County, Liberia

Full maternal service cascade:
• 4 ANC visits
• Facility-based delivery
• Maternal post-natal care by a formal provider

Note: a one-year recall period (Apr 1, 2014 – Apr 1, 2015) was used for LMS. No DHS...
Healthcare spending: National vs Remote Districts

$44/capita in some remote districts

$0.76/capita in some remote districts

Source: Government of Liberia (Konobo District Budget, 2012) and World Bank, 2013
Lesson 1

Blindspots in remote health delivery lead to hotspots of infectious disease – putting us ALL at risk.
Last Mile Health works with governments to create a new workforce to save lives in the world’s most remote villages.
...by professionalizing community and frontline health workers to extend the reach of the primary care system.
Professionalizing Community & Frontline Health Workers

**RECRUIT**
Combines community input and high standards
- Community consultation
- Screening
- Practical assessment
- Probation period
- Preference provided to unemployed women and youth

**TRAIN**
Rigorous and continuous theory and practical training
- Trained to diagnose and treat the top ten killers in Liberia and provide disease surveillance & control
- Regular evaluation and on-the-job mentoring

**EQUIP**
Reliably stock equipment at point of care
- Diagnostic, curative and non-medical supplies
- Equipment provided to enable high coverage and facilitate supervision

**SUPERVISE & MANAGE**
Clinical and non-clinical supervision
- Weekly peer supervision
- Monthly clinical supervision – from nurses, midwives, or physician assistants - serves to strengthen link to health system
- District and county-level management
- Supply audits
- Patient checks

**PAY**
Creates career opportunity that honors life-saving work CHWs do
- Enables more accountability for performance
- Greater likelihood of retention

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**CHWs are supervised by clinical supervisors (e.g. RNs) who coach and link them with remote government clinics**
The Worst Case Scenario:
537,000 - 1,367,000 Cases Predicted Through Jan 20th

Source: US Center for Disease Control
Kayah, Rivercess County
“There's a patient now who is positive and his wife is showing signs and symptoms, their child is a probable case. They are living in a remote village 10 hours from Monrovia. We want to get them out but have not been able to do so. The roads are so bad that the ambulance could not access the community when it tried to move in. The bridges were broken.”

– Lorenzo Dorr, RN/PA (Community Health Worker Clinical Supervisor)
Lorenzo Dorr, RN/PA (Community Health Worker Clinical Supervisor)
IDENTIFY SUSPECTED CASE
- Isolate
- Contact facility
- Educate patient caregiver
- Keep community calm

STEP TWO
- WEEKLY SURVEILLANCE

STEP THREE

STEP FOUR
- CONTACT TRACING

STEP FIVE
- SURVIVORS FOLLOW UP & HELP REINTEGRATE

CAMBIA CHW
LAST MILE HEALTH
SUPERVISOR SUPPORT

LINK BETWEEN COMMUNITY & EBOLA RESPONSE TEAM
“Keep Safe, Keep Serving”

1,800 workers trained

38 health facilities

22 tons of medical supplies delivered

Two counties covered
Dr. Fallah acts as bridge between community leaders and the Health Ministry, and between the government and international organizations.

Daniel Berehulak for The New York Times
Laboratory confirmed cases (Alive and Dead) by County over the past 21 days. The total of 0 as of the date tested.
"Community health workers play the most important...role in our fight against disease; it is...they who have been able to be the contract tracer, they who have been able...to take the risk to go out into the community and bring care.

We need to urgently invest in the training and building of capacity of healthcare workers at the community level."

- President Ellen Johnson Sirleaf at the 3rd International Financing for Development Conference (July 13, 2015)
Lesson 2

Frontline and community health workers have been critical to halting epidemics
Ebola outbreak worsened existing vulnerabilities, and left behind a further weakened health system.

**Liberia % Facility-based deliveries**

- Start of Ebola outbreak

**West Africa maternal deaths per 100,000 live births**

- Start of Ebola outbreak

• In 2011, LMH launches demonstration project with professionalized CHWs and nurse mentors with Liberia Ministry of Health in Konobo District. Baseline assessment reveals only 22% of mothers had full maternal care cascade (ANC visit, facility delivery, PNC visit) and 23% of children under-five had ever sought health care for fever-related illnesses from a health facility.¹

• By 2014, prior to Ebola, the CHWs in these two districts had increased ANC coverage to 97% and facility deliveries to 82% and had covered 100% of children with services for malaria, pneumonia, and diarrhea treatment.²

Skilled Safe Births – Konobo

Facility-based Delivery

- Start of Ebola outbreak
- FBD dropped a mere 3% during Ebola and then rose

Konobo District

Sick Child Treatment

“What works best in an emergency is not an emergency system – it is an everyday system that is robust and resilient.”

- Dr. Tom Frieden, CDC Director at 2015 Global Philanthropy Forum
Lesson 3

When an aware, diverse, self-regulated, integrated and adaptive community-based primary health system pre-exists – health care can remain resilient, mitigating effects of epidemics.
Opportunities
Create a ‘Resilience Dividend’: Invest in Professionalizing Community Health Workers in Areas of Highest Risk

• **CHWs have an economic return of up to $10:1** — due to increased productivity from a healthier population, potentially reducing the risk of epidemics such as Ebola, and the economic impact of increased employment.¹

• **CHWs provide a critical surveillance, preparedness and response network for epidemics** through active case finding, contact tracing, facilitating community trust and education, rapidly identifying an referring patients in need of medical care, and offering pre-hospital care.², ³, ⁴

• **CHWs can sustain life-saving health services** – even during outbreaks – including treatment of pneumonia, HIV, malaria, tuberculosis, and maternal, adult, newborn and child conditions.⁵ This is estimated to prevent 3 million maternal, perinatal, neonatal & child deaths annually.¹
Liberia’s National Health Workforce Program

Goal: Deploy nearly 5,000 professionalized CHWs to increase disease surveillance and access to care for 1.2M Liberians by 2020

INITIAL LAUNCH

Total cost for the Liberia’s Health Workforce Program over 7 years: $165 million

Total cost for the CHW component over 7 years: $65 million

SCALE-UP

TRANSITION & SUSTAIN

Total cost for the Liberia’s Health Workforce Program over 7 years: $165 million

Total cost for the CHW component over 7 years: $65 million
Emerging Zoonotic Disease Events, 1940-2012

Potential Hotspots in US, Western Europe, Brazil, Southeast Asia

Most emerging human diseases come from animals. This map locates zoonotic events over the past 72 years, with recent events (identified by an ILRI-led study in 2012) in blue. Like earlier analyses, the study shows western Europe and western USA are hotspots; recent events, however, show an increasingly higher representation of developing countries.

Key Questions for Remote Health Delivery Science:

• **Surveillance and Preparedness:**
  - What is the role of CHWs in reserve teams, risk stratification, decentralizing surveillance from facility to village level in remote areas?\(^6\,\!^7\) How can we integrate these preparedness functions with everyday service delivery?

• **Delivery Innovation:**
  - What innovations in infrastructure, supply chain, workforce, telecommunications, transportation, research capacity can strengthen resilient health systems in remote areas and lead to dramatic reductions in symptom-to-treatment time, viral transmission, outbreak-related mortality?\(^9\,\!^10\)

• **Health Financing Reform:**
  - **Conventional analytics (e.g. $/capita) are insufficient.** They distort and create bias against spending in remote areas, where cost is higher to achieve similar results due to operational barriers (e.g. lack of roads, longer distances).\(^8\)

  - **What new metrics (e.g. $/capita/km\(^2\)) & policies (e.g. higher budget earmarks for remote areas) will help us close delivery gaps, ensure universal health coverage, and decrease epidemic risk in remote areas?**
Health care for everyone, everywhere, everyday
References


(4) Strong National Community Health Worker Programs: One of the Key Resources for Improving Global Health Security Post-Ebola, for Future Outbreak Surveillance, and for Health Systems Strengthening (2015). In submission.


