

The Ebola Epidemic in Liberia and Its Effects on the Church & Population

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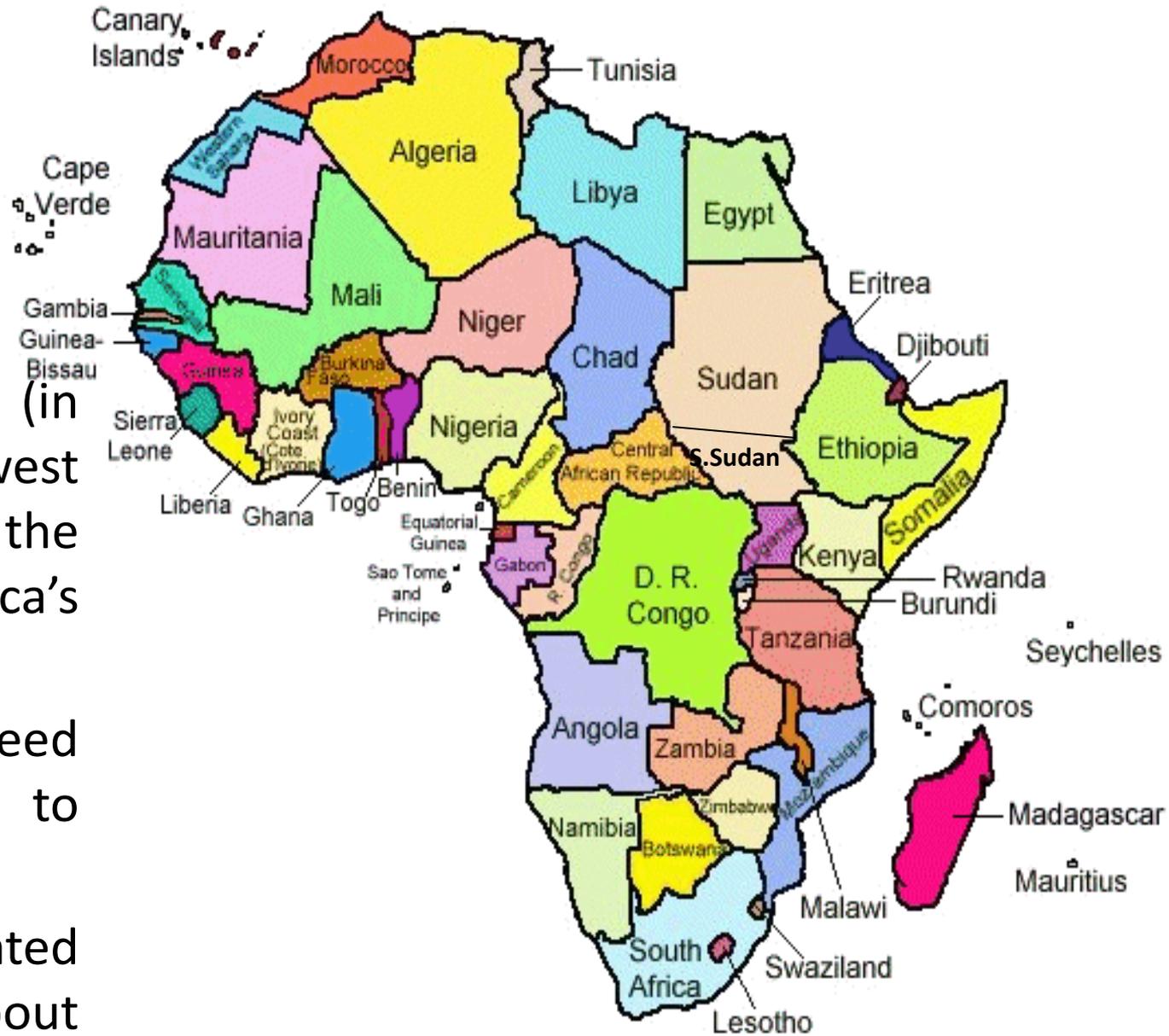
Oct. 18, 2014

COUNTRIES OF THE CONTINENT OF AFRICA (54 in all)

Note Liberia is the small country (in yellow) on the west coast of Africa at the bottom of Africa's western bulge.

Founded by US freed slaves returning to Africa in 1821.

It has an estimated population of about 3,800,000.



The Republic of Liberia

For those who do not know Liberia:

- Liberia is located on the west coast of Africa
- Declared a republic in 1847
- Approximately the size of the state of Kentucky or half the size of Minnesota
- It is within the tropical rainforest belt of Africa
- The capitol is Monrovia, named after U.S. President Monroe
- Population ~95% indigenous



Liberia emerged from a 14-year civil war in 2003 with the country ruined

Living Organisms

- What are the characteristics of living organisms?
 - They take in nutrients (i.e., “eat”)
 - Most take in oxygen to combine with food
 - They metabolize
 - They grow
 - They reproduce

What are the characteristics of Viruses?

Are viruses “living” organisms? Characteristics:

- Do not eat
- Do not breathe
- Do not metabolize
- Do not grow
- Do not (of themselves) reproduce

- Hence, they are **not really “living organisms”** as we usually define “life” (some call them a different form of life without the usual characteristics)
- They are extremely small **complex organic chemical structures with a protein core containing an RNA or DNA genetic code**

- But viruses have the ability to enter cells of living organisms
- Each virus can enter only cells of specific species
- And the genetic-type code (RNA or DNA) which the virus contains takes over the cell and **causes the cell to make copies of the virus which has entered it** (instead of doing what the cell is supposed to normally be doing)
- Now **if a cell stops doing much of what it is supposed to do, it becomes “sick”**
- **And if severe enough, the sick cell dies**

What are Viral Hemorrhagic Fevers?

(From the CDC's Special Pathogens Division)

- Viral hemorrhagic fevers are severe viral illnesses affecting many body systems
- Cause damage to the vascular system causing blood and fluids to leak out of the capillaries
- Usually also damage the body's ability to produce clotting factors to stop bleeding
- Because they often cause bleeding, they are called ***Hemorrhagic Fevers***

Viral Hemorrhagic Fevers

- Viruses come in 2 types: RNA and DNA viruses
- All severe viral hemorrhagic fevers are **RNA** viruses
- There are 4 major groups of these hemorrhagic fever viruses:
 - Arenaviruses
 - Flaviviruses
 - Bunyaviruses, and
 - Filoviruses

Common features of hemorrhagic viral illnesses

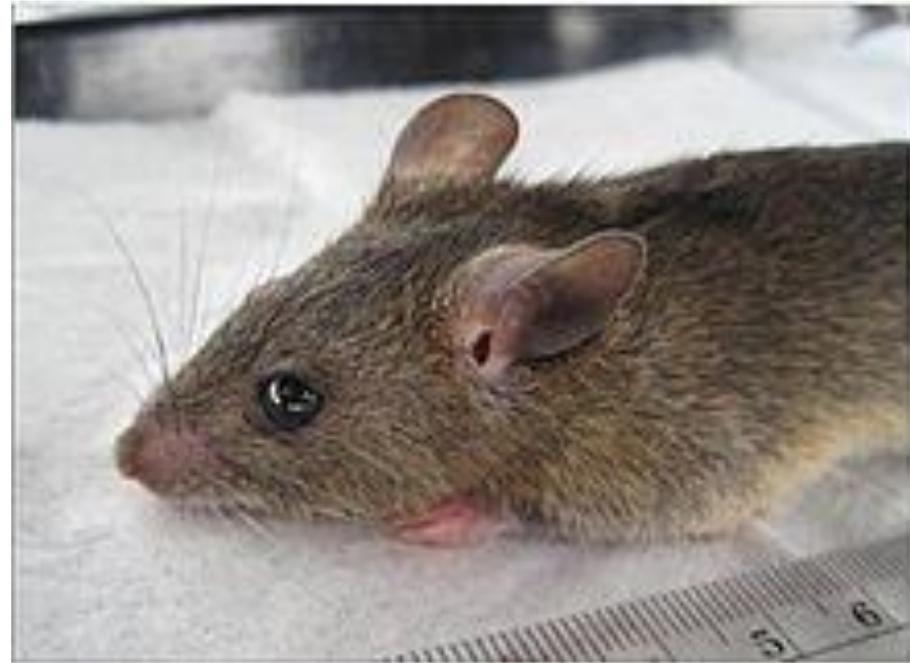
- Besides being RNA viruses, all are covered, or enveloped, in a fatty (lipid) coating
- Their survival is dependent on an animal or arthropod (insect or tick) host, called the natural reservoir—usually they don't seriously injure host
- The viruses are geographically restricted to the areas where their host species live
- Humans are not the natural reservoir for VHF
- Humans are infected when they come into contact with infected animal hosts, or bitten by mosquitoes or ticks carrying the virus from animals to humans

- However, with some VHF viruses, after the accidental transmission from the animal host, humans can transmit the virus to one another
- Human cases or outbreaks of hemorrhagic fevers caused by these viruses occur sporadically and irregularly
- The occurrence of outbreaks cannot be easily predicted
- With a few noteworthy exceptions, there is no cure or established drug treatment for VHFs

The 4 Viral Hemorrhagic Fever (VHF) Groups

1) ARENAVIRUSES:

- **Lassa Fever-West Africa** – especially Nigeria thru Guinea (other Arenavirus illnesses S. America)
- Less ill initially than with Ebola, & Ribavirin helps
- Mortality about 10%
- Young rats do not become ill with Lassa virus
- Curran LH epidemic 1972



**Host: Multimammate rat
(Mastomys natalensis)**

- Humans infected from rat excrements on food or from preparing rats for cooking
- No vaccine available

2) FLAVIVIRUSES

- **Yellow Fever—Tropical Africa, Asia & S. America**
- Mortality approx. 10%
- **Vaccine available & good**
- Used to occur in USA—In 1793—killed 10% of population of Philadelphia
- Also Mississippi & Ohio R. valleys & New Orleans
- **Dengue—Tropical areas-** causes bleeding much less frequently than Yellow Fever



Both viruses are spread by the bite of the *Aedes aegypti* mosquito

Yellow Fever virus may circulate in the monkey population in forests

3) BUNYAVIRUSES:

- **Rift Valley Fever—Africa**
Host: Domesticated animals
- **Crimean-Congo HF—**
Host: Ticks
- **Hantavirus--**
"Hemorrhagic Fever
with Renal Syndrome"
Eurasia, Africa, Americas
Hosts: Rodents such as the
Deer mouse



Ticks Photo: James Occi

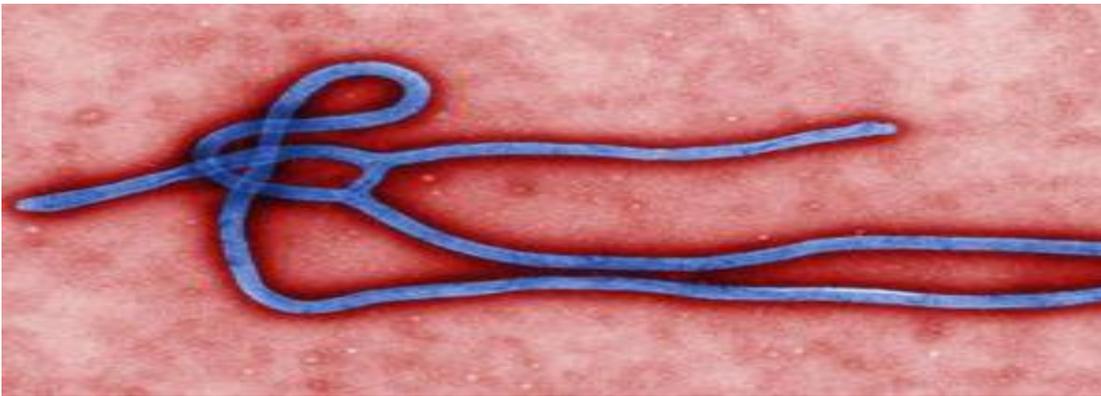


Deer mice

Photo from Google

4) Filoviruses--Two similar hemorrhagic fever viruses with high mortality rates:

- 1) **Marburg**—Has caused epidemics in East, Central and South Africa. First identified in Marburg, Germany in 1967 from an outbreak when researchers developed disease from ill African monkeys.
- 2) **Ebola**—Caused 12 small epidemics in East and Central Africa previously – first recognized in the Congo in 1976. But no previous outbreaks in West Africa.



- Host for both of these viruses—**African fruit bats**
- Note the elongated shape of the Ebola virus as viewed under an electron microscope—looks like a filament
- Both viruses look the same & both illnesses are similar

Fruit bats of the *Pteropodidae* family -- considered to be the natural host of the Ebola virus

Ebola first recognized in 1976 in 2 simultaneous outbreaks:

- In Nzara, Sudan and
- In Yambuku, Democratic Republic of Congo (Zaire)



Above: Fruit bat in flight
(Source:telegraph.co.uk)

Left: Fruit bats resting on a branch (Source:scienceblogs.com)

Yambuku is a village situated near the Ebola River (the river from which the disease takes its name)

Ebola Disease

Initial Symptoms: Sudden onset of Fever, Headache, Muscle pain, Sore throat & Intense weakness

Then Vomiting & Diarrhea

Later: Impaired Liver & Kidneys

Internal & external Bleeding

Sometimes Rash also occurs

- Ebola is a zoonotic (animal) viral hemorrhagic fever
- We believe it normally lives in fruit bats of the *Pteropodidae* family
- But spreads from bats to infect other animals

Ebola: fighting a killer virus

There is no vaccine and no cure for the disease

Symptoms

Early stage

Advanced

Headache

Sore throat

Muscle pain

Sudden fever

Intense weakness

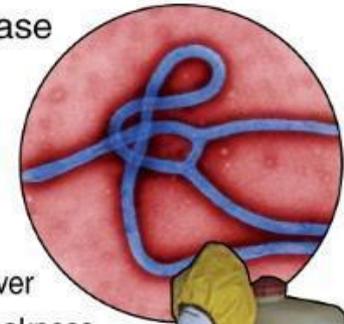
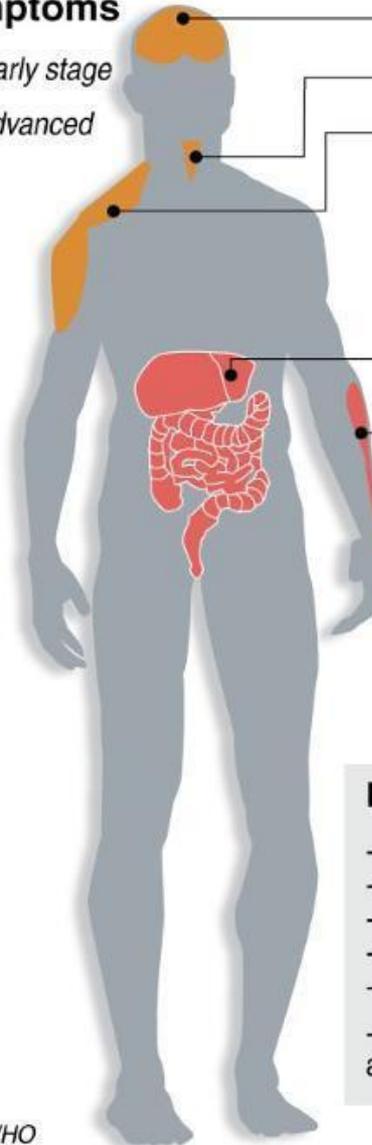
Impaired kidney and liver

Rash

Vomiting

Internal and external bleeding

Diarrhoea



Preventive measures

- Stop the consumption of animal meat
- Isolate the sick
- Prompt disposal of victims' bodies
- Trace those who had contact with infected
- Disinfect homes of the dead and the sick
- Protective clothing for health care workers, anyone handling infected animals

So
Source: WHO

Poster from US CDC

Key facts--WHO

- Ebola Virus Disease (EVD), formerly known as Ebola Haemorrhagic Fever, is a severe, often fatal illness in humans.
- EVD outbreaks have a case fatality rate of up to 90%.
- EVD outbreaks occur primarily in remote villages in Central and East Africa, near tropical rainforests.
- The virus is transmitted to people from wild animals and spreads in the human population through human-to-human transmission.
- Fruit bats of the *Pteropodidae* family are considered to be the natural host of the Ebola virus. (Pigs have also been questioned as possibly being a natural Ebola host.)
- Severely ill patients require intensive supportive care. No licensed specific treatment or vaccine is available for use in people or animals as yet.

The Transmission of Ebola Virus

- The virus spreads from fruit bats to animals (perhaps by eating bits of fruit the bats drop?)
- Then animals to other animals, or to humans
- And then from humans to other humans
- Humans seem to contract it from infected animals (or fruit bats) by handling the ill or recently dead animals, or preparing them for eating (often by skinning and cutting them up for cooking)
- But it is **most often contracted from coming in contact with the body fluids of sick humans (tears, saliva, sweat, vomit, urine, diarrhea, blood) especially when caring for them, or burying them**

Incubation period

- The incubation period, that is, the time interval from infection with the virus to onset of symptoms, is 2 to 21 days—average 13 days
- So a person who has been exposed should be isolated for 21 days—if he does not become ill in 21 days, he is not developing Ebola from that exposure

CDC Recommendations to Prevent Spread

- **Prompt isolation of the sick**
- **Prompt disposal of victims bodies**
- **Trace all contacts of ill patients— isolate and treat if any sign of illness**
- **Disinfect homes of the dead and the sick (Use diluted 1:10 Clorox— releases chlorine)**



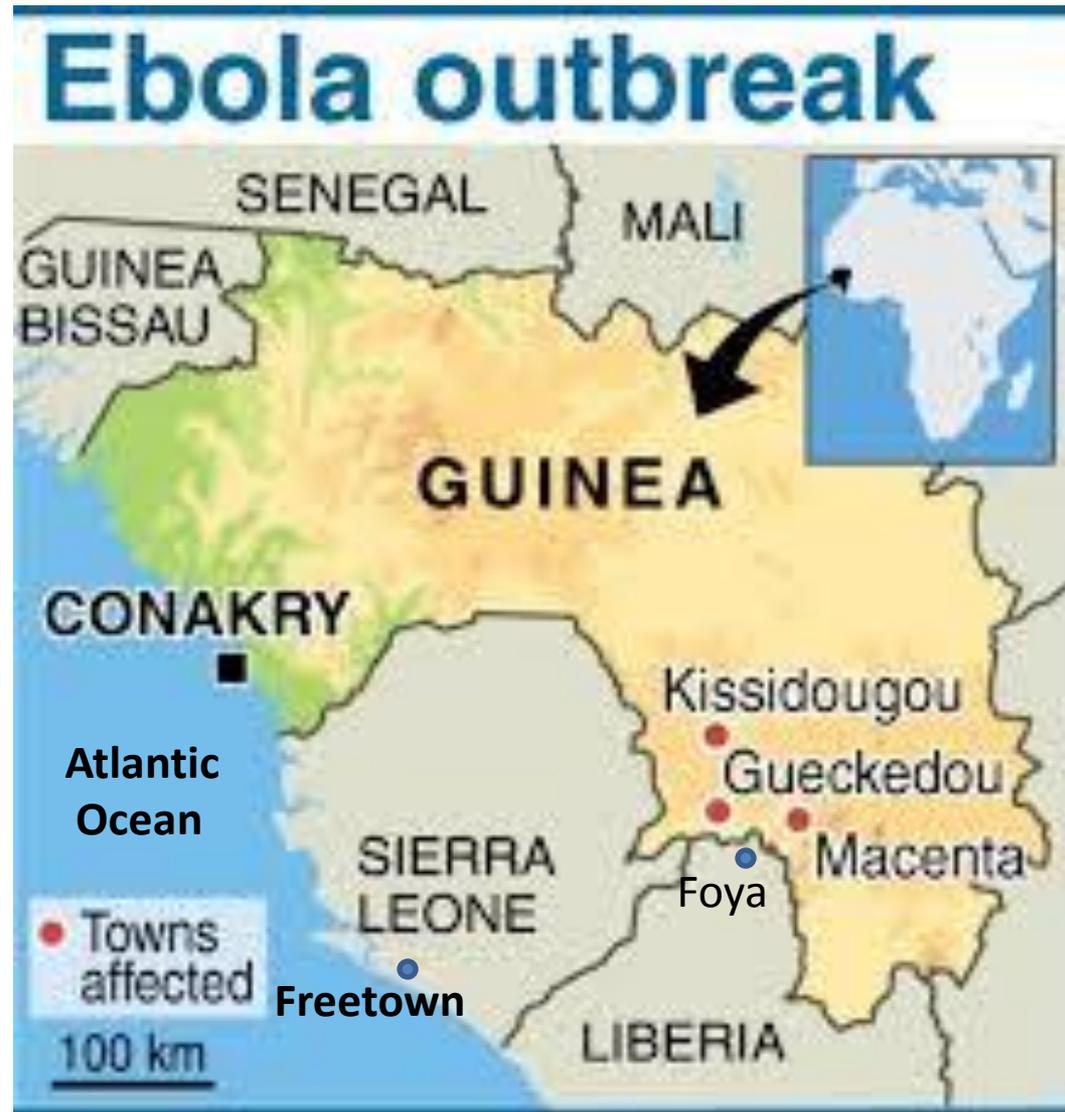
A nurse with Medecins Sans Frontieres examines a patient in the intake area at a centre for victims of the Ebola virus in Guekedou (source:thestar.com)

Recommendations (continued)

- **Avoid eating animal meat (especially bush meat) during an epidemic**
- **But Fish meat is o.k.**
- **Protective clothing for health care workers & anyone handling infected animals is absolutely necessary**
- **Wash hands with soap frequently (soap and alcohol-based hand sanitizers disrupt the viruses lipid envelop)**

Where did this epidemic start?

- Started In Gueckedou, Republic of Guinea
- This is the area where the borders of Guinea, Sierra Leone, & Liberia all come together
- Rural, but fairly large population
- People pass back and forth across the porous borders to trade goods and produce



Map-About Jan 2014-source: amanidc.org

How did this Ebola epidemic start?

- **In trying to answer this question, MSF was able to trace back the history of illnesses and deaths to a 2-year-old boy in the Gueckedou area (Meliandou) who died with a fever Dec. 6, 2013**
- **A week later, it killed the boy's mother, then his 3-year-old sister, then his grandmother**
- **All had fever, vomiting and diarrhea, but no one knew what had caused them to become ill and die**

- **Two mourners at the grandmother's funeral took the virus home to their village**
- **A health worker carried it to still another, where he died, as did his doctor**
- **They both infected relatives from other towns**
- **It was thought the illnesses were severe malaria, or typhoid, or cholera**
- **When bleeding was noted, Lassa Fever became suspect**
- **It was nearly 3 months before the cause of the increasing number of deaths was recognized as the Ebola virus**
- **Ebola had never been seen in West Africa previously**

- By the time Ebola was recognized in March, dozens of people had died in eight Guinean communities
- And cases were occurring in the Foya area of Lofa County, Liberia, and in Sierra Leone
- These are three of the world's poorest countries, recovering from years of political dysfunction and civil war

(From a report by The New York Times)

Ebola had not previously occurred in this region of West Africa



Note the location of Liberia and this Ebola outbreak on the continent of Africa (source: globalnews.ca)

Treatment of Ebola

Although Ebola has a high mortality rate and there are no specific meds and no vaccines, proper supportive care can save many lives

- Dehydration must be corrected & prevented
- Electrolytes must be balanced correctly
- Hypoglycemia must be avoided
- Secondary bacterial infections require treatment
- With such help, about half of the patients will recover



Note the isolation clothing protecting health workers and the IV fluid line for correcting dehydration in this MSF treatment unit in Guinea (source: catholic.org)

Protective Equipment for Medical Personnel

Note these medical personnel at an isolation ward in Guinea

They are wearing protective clothing to prevent developing Ebola:

- Caps
- Goggles or face shields
- Masks
- Gloves
- Protective gowns—impervious to fluids
- Shoe covers



(source: africare.org)

Protecting Medical Personnel

In many cases across Africa, medical personnel treating infected patients often fail to wear the proper protection

- Masks, gloves, face shields and protective clothing are often not available
- This puts health care workers at great risks, aiding the spread to them of the Hemorrhagic Fever
- If needles are not disposed of properly, & someone comes in contact with the infected needle, there lies another potential risk of spreading the disease



Cleaned and decontaminated gloves and boots being dried in the sun for reuse (Clorox and sunlight kill most viruses)

(source: news.yahoo.com)

Hemorrhagic bullae in an Ebola patient

As capillary fragility increases and clotting factors decrease, many Ebola patients develop bleeding. This is an ominous sign.

Bleeding may occur from:

- Injection and IV sites
- Subcutaneous areas
- Gastrointestinal tract
- Other areas

Most of the patients that develop hemorrhage die



Ebola with Hemorrhagic blisters

(source: umuseke.rw)

- By the first week of May 2014, Liberia had seen no new cases of Ebola for nearly 4 weeks and new cases in Guinea were decreasing
- The Ebola epidemic seemed to be coming to an end—no new cases in Liberia for 41 days as May was closing
- Unfortunately the situation worsened in June with an outbreak in Monrovia (the suburb of Bushrod Island with Redemption Hospital) from an individual exposed in Sierra Leone
- Also more cases started occurring in Lofa County

Ebola Spreads to Monrovia

In late May a lady exposed to Ebola in Sierra Leone came to Bushrod Island and infected a household with the virus. Four persons in the household became ill. Ebola patients sought care in Redemption Hospital. All died, and a nurse and doctor giving care became ill and died. Frightened patients with other illnesses and worried hospital personnel abandoned the hospital, leaving empty beds.



As of June 27 Monrovia had had 11 cases, all of whom died

The Capital, Monrovia

After Ebola reached Bushrod Island in late May, 2014 it spread to the rest of the capitol. Monrovia, with its suburbs, is a crowded city of 1.5 million people

- Such a crowded city makes it easy for the virus to spread from person to person
- MOHSW has been informing the public of the symptoms & teaching how to prevent spread, but it is spreading fast



© Wikipedia Commons

Contact surveillance is continuing and isolation units were set up at the JFK Medical Center & ELWA Hospital (picture source: dailymail.co.uk)

Ebola in the West Point Slum

West Point is a narrow low-lying peninsula jutting northward from the much larger peninsula which is Monrovia proper.



West Point is a very poor slum area without a sewer system or running water, crowded with about 50,000 people living in closely-spaced small shanties. The Mesurado River is to the west and north and the Atlantic Ocean to the west.

Ebola began occurring in West Point. An old school building was used as a holding center to quarantine anyone exposed.

Monrovia's Hospitals Close

- People with fevers seeking help went to other hospitals in Monrovia, apparently with Malaria
- But a few of them had Ebola
- Hospital personnel became infected and a number died
- At first protective clothing was not in good supply
- Nurses refused to come to work



**John F. Kennedy National
Medical Center in Monrovia**

**Monrovia's hospitals closed down, including the JFK
National Medical Center and Catholic Hospital**

Phebe and Curran Lutheran Hospitals

From Ebola crossing the border into the Foya area of Lofa Co. in March through the spread of Ebola in June, Phebe and Curran Lutheran Hospitals had escaped the virus and were functioning

- In mid-July an ill lady came to **Phebe** with a fever saying she **lived locally** in Gbarnga town
- Ebola was occurring 170 mi. to the N.W. in Foya, and 112 mi. to the S.W. in Monrovia but not anywhere in local Bong County
- **Precautions for Ebola were not taken** with this patient
- **Actually the patient was from Foya & had contracted Ebola**



Phebe Mission Hospital near Gbarnga in Bong County

Rural Hospitals & Clinics Close Down

- **Four Liberian nurses, 1 aide, 1 Liberian doctor, and a P.A. working in Phebe ER became ill with Ebola**
- **Only the doctor managed to eventually recover**
- **Phebe closed down**
- **Curran Lutheran Hospital became extremely cautious & would not see fevers**



**The virus got into the Gbarnga community (Liberia's 2nd largest city) & deaths started occurring
Other rural hospitals also closed**

Hospital personnel bury one of their own

Ganta Methodist Hospital, 51 mi. north of Phebe, also closed down

Current Status of Phebe and Curran

Status of Phebe & Curran

- Phebe reorganized with only 1 doctor and reopened only for obstetrical and pediatric admissions late August
- Many nurses were afraid to work
- **Finally Phebe opened all hospital services Sept. 15**
- Curran Hospital continued to operate with all services with only 1 doctor, but does not admit suspected Ebola



Curran Lutheran Hospital--One nurse recently developed Ebola—38 personnel exposed. Hospital cautiously continues to operate. Needs our prayers.

Present status Phebe & Curran mission hospitals

Global Health Ministries has shipped:

- 2 air freight – protective gear
- 40' sea freight PPEs & other
- 40' sea-food with Iowa
- 3rd air freight & 2nd sea freight protective equip. & supplies planned
- Collected supplies & food from Liberian community in process
- More food & supplies planned



Phebe OR-Staff in protective gowns, masks & gloves--GHM



Personal protective clothing from GHM at Phebe Hospital

Church leaders also succumb

“Sis” Jartu Kerkulah was in the floral-print chair in her living room when the burial team in biohazard suits found her. Behind her was a bulletin board with snapshots of some of the people who had enriched her life of 46 years, a list that included her four children, her siblings, and friends from her Pentecostal church. An open prayer book lay face-down on her armrest. A toy fire station rested on the linoleum floor beside her feet.

“She was a prayer warrior,” recalled her friend, Retta Livingstone Wahid. She often prayed for the sick.



The congregation of Bethel Heart of Faith Church in Joe Blow Town, Liberia, grieves its losses in late August.

Sis Jartu would place her palms on the stomach, or at times the forehead, of the sufferer she visited. Then she'd speak to the Holy Spirit and request a heavenly intervention.

Effects on the Lutheran Church of Liberia

No churches or church institutions have escaped from the anguish and problems caused by Ebola. Catholic Hospital had 6 staff die, including the administrator and an elderly Spanish priest, and it remains closed. The Ganta Methodist Hospital remains closed.

- Two LCL pastors, 1 deacon, & 1 missionary from India died from other illnesses when they could not obtain medical help
- Some church leaders and many parishioners have also died from Ebola or other illnesses



Trinity Lutheran Church in the New Matadi Suburb of Monrovia

Shortage of Food

The main food staple in Liberia is rice, which is grown locally but not in sufficient quantities. Cassava is the second (less used) staple.

- The Foya area of Lofa Co., epicenter of the Lofa epidemic is the largest rice-growing area
- There will be less rice harvested this year
- Even in good years, Liberia depends on imported rice to survive
- Less ships are coming due to the epidemic and sea quarantine of ships
- A food crisis is developing
- Apparently some patients that might have recovered have died from lack of food



This thatch lean-to shelters the women and children from the rain and sun as the rice is growing. They drive away birds and small animals that would eat the growing rice.

Liberian Ebola Cases & Deaths per Period

Period:	Cases	Deaths	HCW		Cumulative	
			cases	deaths	cases	deaths
Mar – July 2	100	61	10	8	100	61
Jul 3 – Aug 3	398	203	53	30	498	264
Aug 3- Sep 3	1365	875	90	38	1863	1078
Sep 3 - Oct 4	2058	1121	37	16	3921	2199

WHO Situation Report Oct. 15

- Cumulative Cases Liberia 4249*
- Cumulative Deaths Liberia 2458*
- Cum. Cases all 3 Countries 8997
- Cum. Deaths all 3 Countries 4493—will exceed 4500 deaths by Oct 18 & 9000 cases

* Liberian data incomplete

- "It is clear, however, that the situation in Guinea, Liberia, and Sierra Leone is deteriorating, with widespread and persistent transmission of Ebola Viral Disease."

World Health Organization—Aug 28, 2014

- If the world community of nations responds strongly and appropriately to the Ebola epidemic the West African Ebola epidemic it will take at least 6 months to bring it under control
- The Ebola epidemic in West Africa could afflict more than 20,000 people before it is brought under control

Jerome R. Corsi, Harvard Ph.D—report in WND

His chilling report just released Sept. 6 says:

- From an econometric simulation model
- Based on the assumption that the World Health Organization & others with present anemic response will be unable to control the Ebola outbreak in West Africa
- Simulation model **predicts 1.2 million people will die** from Ebola disease in the **next six months**



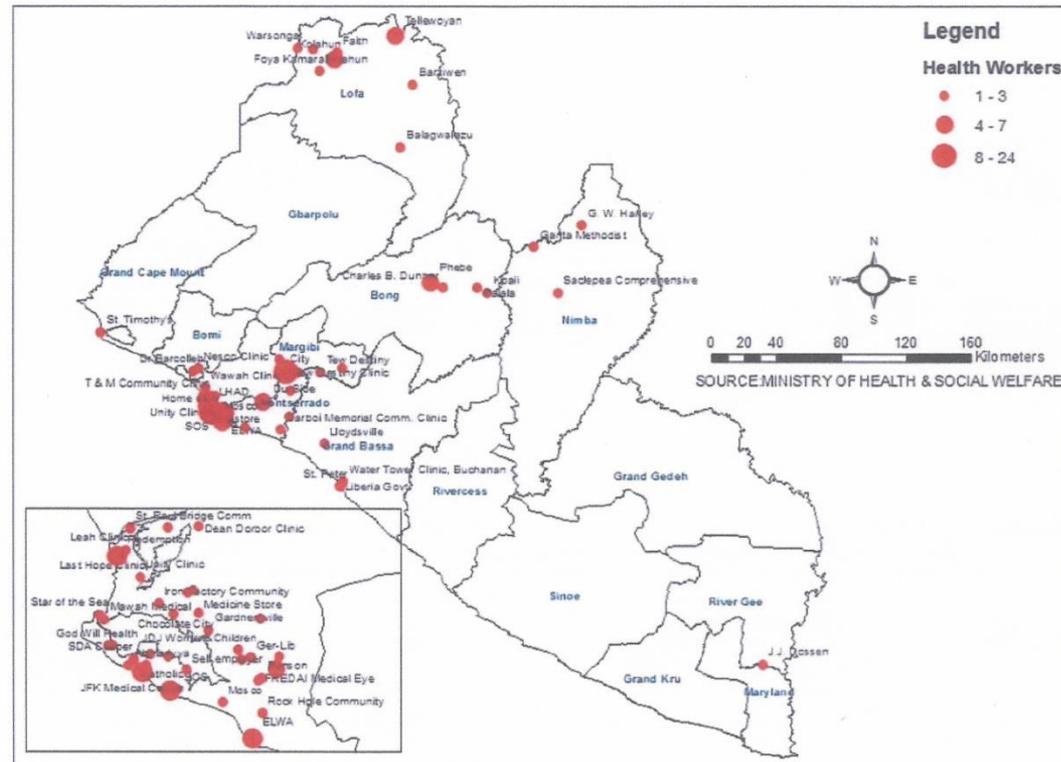
- Burial team in Liberia in Hazmat suits carrying a body

Developing this report, research asst. Francis Smart at MSU used results of Canadian researchers who proved this strain of Ebola could mutate to become capable of being transmitted between humans through breathing

What can we do?

- 1) Pray-God is not limited**
- 2) Encourage our government to actually staff some field hospitals they are setting up**
- 3) Contribute:**
 - Global Health Ministries**
 - Medical Assistance Programs (MAP) Internat.**
 - SIM/Samaritan's Purse**
 - MSF**

Deaths Among Health Workers



As of mid-October 201 Liberian health workers have developed Ebola and 95 have died. Usual causes: 1) Insufficient protective gear or improper use, and 2) Failure to recognize Ebola and take precautions

Projected Deficits of Needed Protective Clothing and Equipment

Stock Summary for MOHSW Warehouse As of October 7, 2014 | 16:41

Category	Product Description	Unit	Balance at MOHSW	Balance at other locations	Arriving in the next week	6 month Forecast	Gap
WATSAN	Body Bags (L)**	piece	205	5,000	600	60,940	55,135
WATSAN	Chlorine Powder	Kg	2,109	128,254		567,304	436,941
WATSAN	Plastic Bucket w/o faucet	piece	116	2,500		146,000	143,384
Disposable PPE	PPE Suit - Hooded Overall	piece	292	48,050	3,000	1,090,000	1,038,658
Disposable PPE	Examination Gloves (S, M, L, XL)	box 100	1,495	29,185	240	2,385,664	2,354,744
Disposable PPE	Face Mask (N95)	piece	244,555	81,410	12,960	1,635,000	1,296,075
Reusable PPE	Goggles	Piece	2,576	13,384	-	540,000	524,040
Reusable PPE	Heavy Duty Plastic Gloves	pair	3,297	127,826	-	708,893	577,770
Reusable PPE	Rubber boot	pair	54	6	97	153,000	152,843
Reusable PPE	Hand Sprayer (1/2L)	piece	44	610	-	180,044	179,390
Reusable PPE	Backpack Sprayer (12-16L)	piece	73	1,171	-	6,000	4,756
Other Equipment	Mattress	piece	15	575	-	5,000	4,410

Protective clothing and necessary equipment are still in short supply and further donated shipments urgently needed