

**Forum on Investing in young Children Globally (iYCG)**

**Supporting Family & Community  
Investments for Young Children**

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**PART 2**

**ACUTE DISRUPTIONS**

# Part 2: Aims

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**Part 2 is intended to address the impacts of acute disruptions on investments in young children and their caregivers across three broad areas:**

- **Human-induced disasters**
- **Natural disasters**
- **Outbreaks**

# Part 2: Aims

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**Specific questions to be addressed include:**

- Who responded to children's needs during acute disruptions? Who were the key actors in-country supporting children & families?**
- What happened to education, health, social protection systems and nutrition serving children during acute disruptions?**
- How can the lessons learned from these examples lead to investments to strengthen families and communities to reduce impact of acute disruptions in the future?**



# **Overview of the Epidemiology of Ebola Virus Disease Outbreaks**

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**Taha E. Taha MD PhD**

**Professor**

**Department of Epidemiology**

**Bloomberg School of Public Health**

**Johns Hopkins University**

**Baltimore, MD**

# Purpose of this review

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- **Consistent with the themes of this workshop the review provides an example of how a single infectious disease can cause disruptions of substantial magnitude.**
- **The review highlights the dynamic forces involved in disease transmission and the resulting impact on individuals and communities.**
- **Management of the recent Ebola outbreak provides lessons for the global community exemplifying failures and successes that are relevant to the aims of this workshop – e.g., multi-sector coordination, integration and implementation.**
- **Provides limited data on underlying factors that impact the health of children and adults in Africa.**

# **Ebola Virus Disease (EVD)**

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- **Ebola virus disease, formerly known as Ebola haemorrhagic fever, is a severe, often fatal illness in humans.**
- **The virus is transmitted to people from wild animals and spreads in the human population through human-to-human transmission.**
- **The average EVD case fatality rate is around 50%. Case fatality rates have varied from 25% to 90% in past outbreaks.**
- **The first EVD outbreaks occurred in remote villages in Central Africa, near tropical rainforests, but the most recent outbreak in West Africa has involved major urban as well as rural areas.**

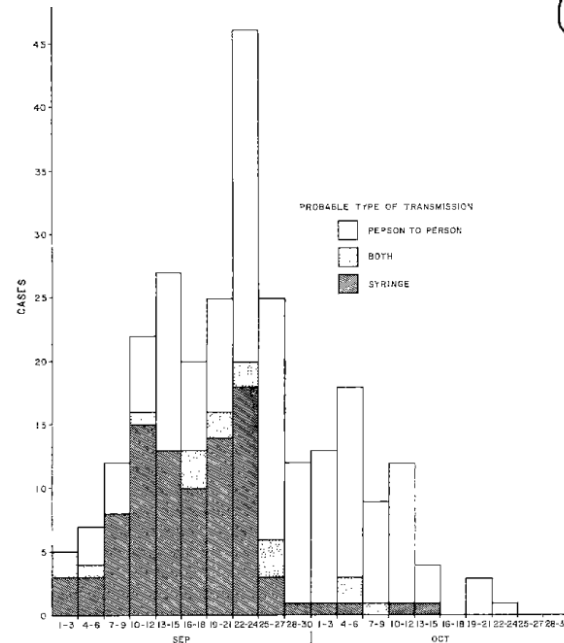
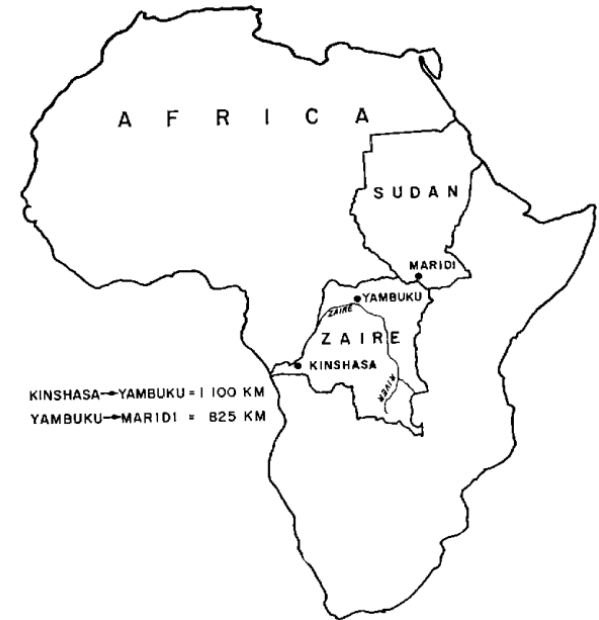
# Ebola outbreaks of 1976

- **Nzara, Sudan**

- 'Sudan' strain
- 284 cases and 151 deaths
- Case fatality rate (CFR) = 53%
- Originated in workers at a cotton factory

- **Yambuku, Zaire**

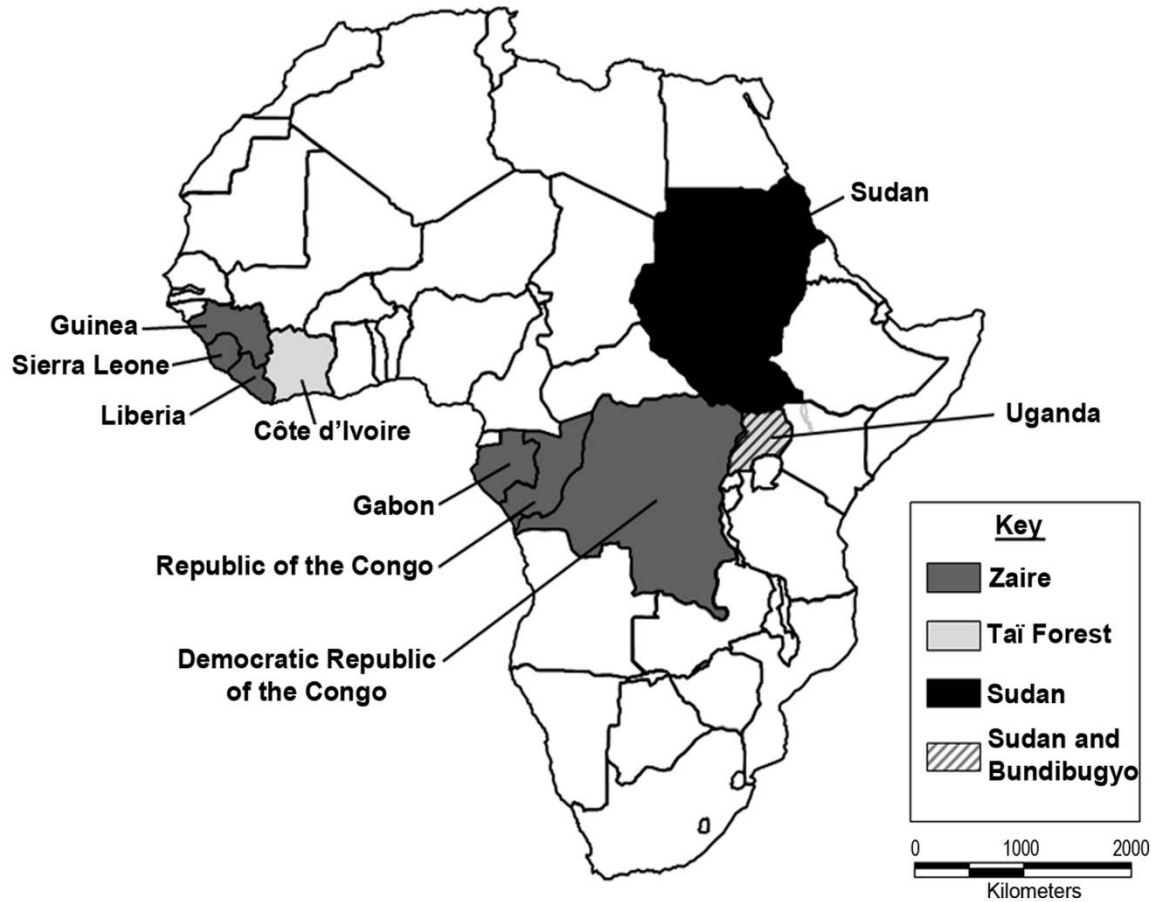
- 'Zaire' strain
- 318 cases and 280 deaths
- CFR = 88%
- Contaminated needles contributed to the spread





# History of Ebola Outbreaks 1976-2012

Country	Town	Cases	Deaths	Species	Year
Uganda	Luwero District	6	3	Sudan ebolavirus	2012
Dem. Rep. of Congo	Isiro Health Zone	36	13	Bundibugyo ebolavirus	2012
Uganda	Kibaale District	11	4	Sudan ebolavirus	2012
Uganda	Luwero District	1	1	Sudan ebolavirus	2011
Dem. Rep. of Congo	Luebo	32	15	Zaire ebolavirus	2008
Uganda	Bundibugyo	149	37	Bundibugyo ebolavirus	2007
Dem. Rep. of Congo	Luebo	264	187	Zaire ebolavirus	2007
South Sudan	Yambio	17	7	Sudan ebolavirus	2004
Republic of Congo	Mbanza	35	29	Zaire ebolavirus	2003
Republic of Congo	Mbomo	143	128	Zaire ebolavirus	2002
Republic of Congo	Olloba	57	43	Zaire ebolavirus	2001
Gabon	Mekambo	65	53	Zaire ebolavirus	2001
Uganda	Gulu	425	224	Sudan ebolavirus	2000
South Africa	Johannesburg	2	1	Zaire ebolavirus	1996
Gabon	Booue	60	45	Zaire ebolavirus	1996
Gabon	Mayibout	37	21	Zaire ebolavirus	1996
Dem. Rep. of Congo	Kikwit	315	250	Zaire ebolavirus	1995
Côte d'Ivoire (Ivory Coast)	Tai Forest	1	0	Tai Forest ebolavirus	1994
Gabon	Mekouka	52	31	Zaire ebolavirus	1994
South Sudan	Nzara	34	22	Sudan ebolavirus	1979
Dem. Rep. of Congo	Tandala	1	1	Zaire ebolavirus	1977
Sudan	Nzara	284	151	Sudan ebolavirus	1976
Dem. Rep. of Congo	Yambuku	318	280	Zaire ebolavirus	1976



**How did Ebola make the jump from Central Africa to West Africa?**

# Emergence of Ebola in W. Africa

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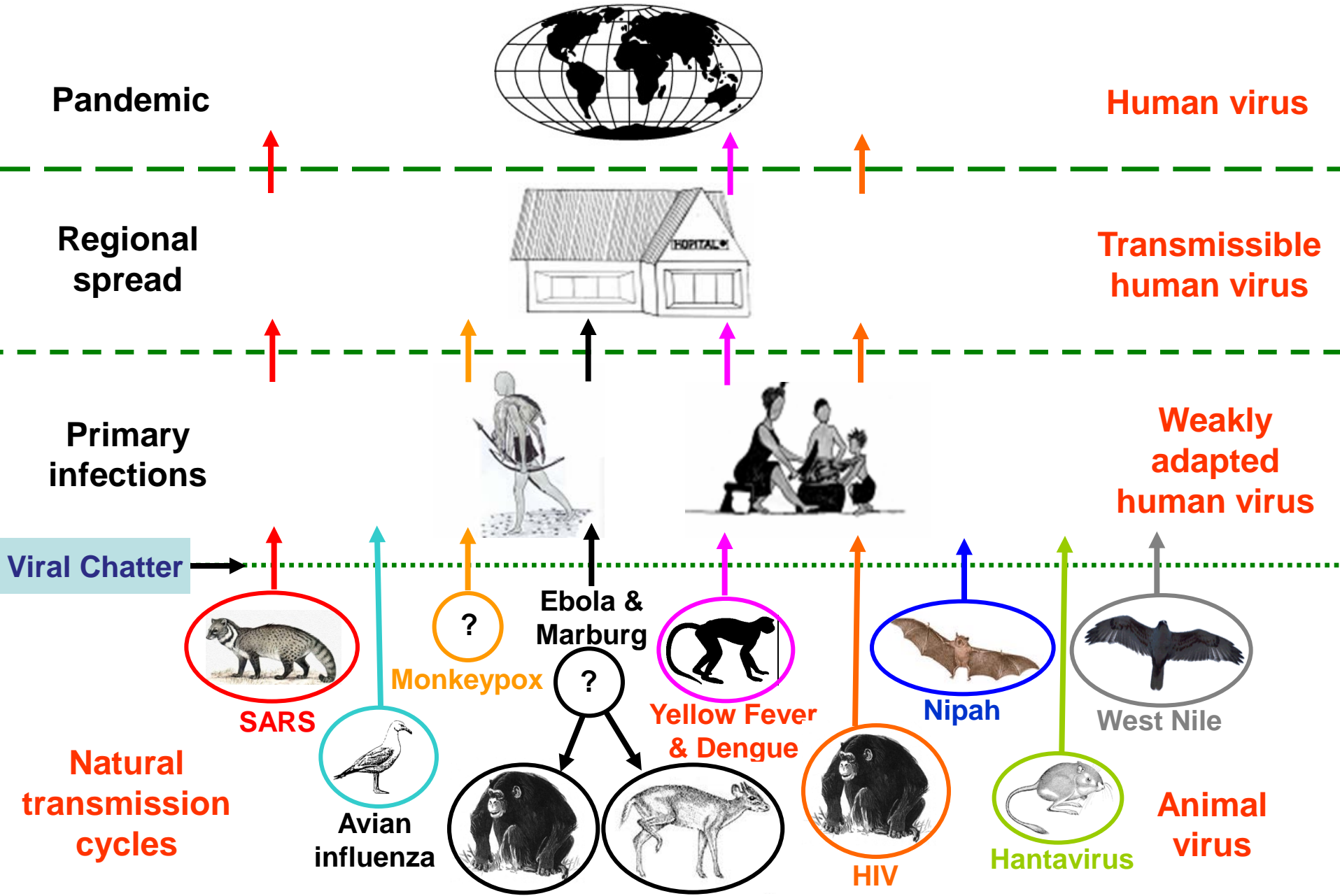
- Always there but never detected?
  - recent increased interaction with animal reservoir
  - small reservoir population
  - non-specific clinical manifestations mistaken for Lassa Fever (frank bleeding not always present)
- Recently introduced?
  - 97% homogeneity with C. Africa strain
- Outbreaks linked to structural factors – disturbed state of equilibrium?
  - Weak infrastructure
  - Demographic factors
  - Civil wars

# **Ebola: What is the source (natural host or viral reservoir)?**

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- Mystery?**
- Non-human primates: suspected but they suffer from Ebola infection as well and unlikely to be the natural host – accidental hosts as humans.**
- Small animals: bats – have been present in large numbers where these outbreaks occurred and are known to maintain other pathogenic viruses. Also, CDC isolated Marburg virus from fruit bats in 2009).**

# Viral Emergence [Courtesy of Dr. Nathan Wolfe]



# **Ebola Transmission**

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**The setting is important: Individual and community.**

- Virus transmitted from wild animals to humans through close contact with blood, secretions, organs or other bodily fluids of infected animals (chimpanzees, gorillas, fruit bats, monkeys, forest antelope and porcupines)**
- Virus spreads in human populations through human-to-human transmission thro' direct contact (blood, secretions, organs or other bodily fluids of infected people) or indirect contact with environments contaminated with such fluids.**

# **Ebola Transmission Potential**

- What is the basic reproductive number for Ebola? I.e., how many cases will each Ebola infection generate – i.e., how many secondary cases?**
- Based on current models this has been estimated to be approximately 1.5-2.0 cases; i.e., each case will lead to ~2 cases on average.**
- The higher this estimate, the more difficult to control an outbreak.**
- Compare this rate with what we expect for measles – each case of measles would generate approximately 17 secondary cases.**

# West Africa Outbreak 2014-2015

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- March 10 notification: “clusters of a mysterious disease characterized by fever, severe diarrhea, vomiting, and an apparent high fatality rate”
- March 14/18, MoH and MSF team sent out to investigate Guéckédou and Macenta in Guinea

**2014 Ebola outbreak resulted from a single unspecified animal reservoir to human transmission event – occurred possibly in late 2013.**



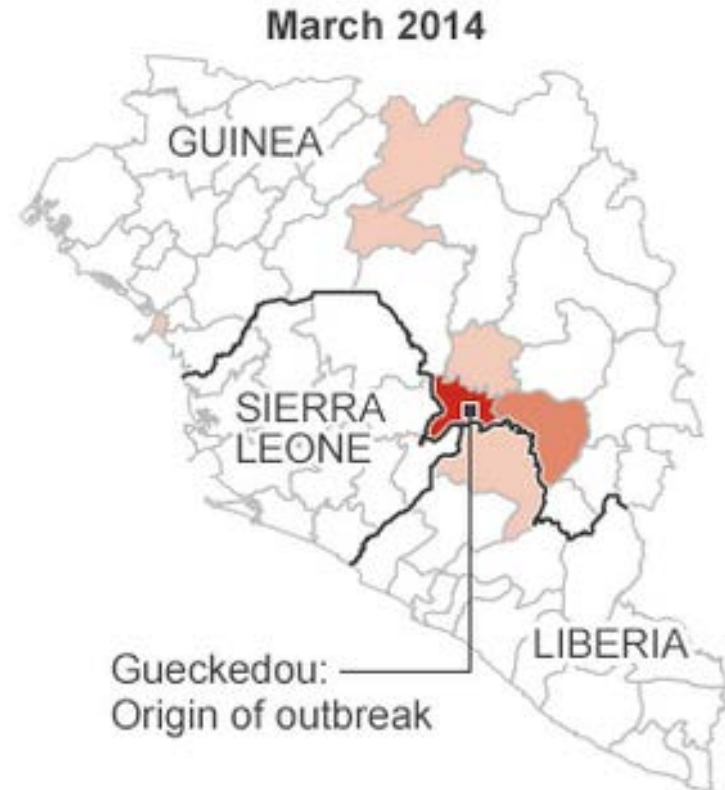


**Figure 1.** Map of Guinea Showing Initial Locations of the Outbreak of Ebola Virus Disease.

The area of the outbreak is highlighted in red. The main road between the outbreak area and Conakry, the capital of Guinea, is also shown. The map was modified from a United Nations map.

# Ebola on the move

- March 30, 2014
  - Two cases of Ebola confirmed in Lofa county, Liberia, near border with Guinea
- April 7, 2014
  - 21 confirmed, probable, and suspected cases reported and 10 deaths
- mid-June, 2014
  - Additional cases reported in Monrovia



# Ebola on the move (again)

- May 24, 2014
  - First confirmed case presents in Kenema, Sierra Leone
    - Patient makes a full recovery
  - Contact tracing led to a traditional healer who had seen many patients from Guinea
    - Became infected and died
- Mid-June, 2014
  - Explosive outbreak underway in Kenema
  - >300 deaths related to funeral



# Ebola Statistics as of July 6, 2015 (CDC)

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<b>Country</b>	<b>Total Cases (suspected, probable, confirmed)</b>	<b>Laboratory Confirmed (%)</b>	<b>Total Deaths (%)</b>
<b>Guinea</b>	3744	3287 (88)	2498 (67)
<b>Sierra Leone</b>	13150	8673 (66)	3940 (30)
<b>Liberia</b>	10670	3154 (30)	4807 (45)
<b>Total</b>	27564	15114 (55)	11245 (41)

# Post-Ebola Complications

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- **Demographic impact**
  - **Orphans ~9600 by Feb 2015 (22% Guinea; 44% Liberia; 34% Sierra Leone) (Evans & Popova Lancet March 2015) (UNICEF March 2015)**
  - **More women dying from EVD – 50-60% of deaths (Washington Post)**
  - **Declines in Life expectancy (Hellinger & Noymer, PLoS Feb. 2015)**
  - **Health impact – health care disruptions leading to increased susceptibility to childhood disease: measles, whooping cough, polio**
- **Socioeconomic impact: UNDP Road to Recovery report.**
- **Chronic clinical complications among survivors**

# The largest in history – why?

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*There are several reasons why the current Ebola outbreak became the largest in history and failed to respond to historically effective transmission control efforts*

- **Inadequate health care infrastructure**
- **Inadequate coordination and leadership issues**
- **Dynamics of the epidemic: urban setting, mobile population**
- **Community factors**
- **Ineffective containment protocols**
- **Lack of safe and proper burials**

### Physicians per 1000 people

	1990	1996	1997	2000	2004	2005	2008	2010
<b>Guinea</b>	.134			0.094	0.11	0.1		0.1
<b>Liberia</b>			0.023		0.03		0.014	0.014
<b>Sierra Leone</b>		0.073			0.03		0.016	0.022

Source: <http://data.worldbank.org/indicator/SH.MED.PHYS.ZS>

In contrast: United States 2.5 doctors per 1000 people; United Kingdom 9.4 doctors per 1000 people; Switzerland 11.3 doctors per 1000 people; and Norway 9 doctors per 1000 people.

*Expenditure on health care as a percentage of GDP*

	<b>2000</b>	<b>2005</b>	<b>2010</b>	<b>2011</b>
<b>Liberia</b>	5.9	8	16.4	19.5
<b>Guinea</b>	5.7	5.4	6.2	6
<b>Sierra Leone</b>	17.5	16.1	20.8	18.8

Source: <http://data.worldbank.org/indicator/SH.XPD.TOTL.ZS>

*GDP in Current USD*

	<b>1990</b>	<b>2000</b>	<b>2005</b>	<b>2010</b>	<b>2013</b>
<b>Switzerland</b>	2.57E+11	2.71E+11	4.07E+11	5.81E+11	6.85E+11
<b>UK</b>	1.06E+12	1.54E+12	2.41E+12	2.40E+12	2.65E+12
<b>Guinea</b>	2666616177	2995360969	2937072009	4735956476	6144131903
<b>Liberia</b>	384400000	529064646	542000000	1292696476	1950960138
<b>S.Leone</b>	649644826	635874002	1627853086	2578159496	4136280752
<b>US</b>	5.97E+12	1.02E+13	1.30E+13	1.49E+13	1.67E+13

Source: <http://data.worldbank.org/>



## Percentage Children Under Age Five Immunized Against DPT

	1990	1995	2000	2005	2010	2013
Guinea	17	54	46	59	64	63
Liberia			46	60	70	89
S. Leone			44	65	86	92

Source: <http://data.worldbank.org/indicator/SH.IMM.IDPT/countries>

## Percentage Children Under Age Five Immunized Against Measles

	1990	1995	2000	2005	2010	2013
Guinea	35	61	42	51	58	62
Liberia			63	62	65	74
S. Leone			37	71	81	83

Source: <http://data.worldbank.org/indicator/SH.IMM.MEAS/countries>

## Incident Tuberculosis per 100,000 people

	1990	1995	2000	2005	2010	2013
Guinea	249	250	228	210	186	177
Liberia	199	220	240	267	293	308
S. Leone	252	282	305	316	317	313

Source: <http://data.worldbank.org/indicator/SH.TBS.INCD/countries>

## Maternal Mortality (Deaths per 100,000 women)

	1990	1995	2000	2005	2010	2013
Guinea	1100	1000	950	800	690	650
Liberia	1200	1600	1100	880	680	640
S. Leone	2300	2400	2200	1600	1200	1100

Source: <http://data.worldbank.org/indicator/SH.STA.MMRT>

## Infant Mortality (Deaths per 1000 live births)

	1990	1995	2000	2005	2010	2013
Guinea	238	206	170	137	112	101
Liberia	248	229	175	118	82	71
S. Leone	268	256	232	202	175	167

Source: <http://data.worldbank.org/indicator/SH.DYN.MORT/countries>

## Human Development Index

	1990	2000	2005	2010	2012	2013	2013 Rank	HDI $\Delta$ from 2012
Liberia		0.339	0.335	0.393	0.407	0.412	175	3
Guinea			0.366	0.38	0.391	0.392	179	-2
Sierra Leone	0.263	0.297	0.329	0.353	0.368	0.374	183	0

Source: <http://hdr.undp.org/en/data>

*The Human Development Index* is a measure of the prosperity of a nation that includes physical, educational, and economic health indicators. It is based on four criteria: life expectancy at birth, mean years of schooling, expected years of schooling and gross national income per capita. The calculation ranges from 0, indicating that a country has negligible human development to 1, indicating that a country has very high human development. The 2013 ranks are the latest official measurements available and countries are listed out of 187, which means that the West African countries have the lowest human development in the world, even before the Ebola outbreak.

## Education Index: Calculated using mean years and expected years of schooling

	1980	1990	1995	2000	2005	2010	2013
Guinea					0.253	0.2861	0.29445
Liberia	0.1703	0.2644	0.3121	0.344	0.349	0.3672	0.3672
Sierra Leone	0.1639	0.1827	0.2215	0.274	0.286	0.296	0.3045

Source: <http://hdr.undp.org/en/content/education-index>

*The Education Index* is a more direct and specific portrait of the educational status of a nation. It is calculated using two variables: mean years of schooling (years that a 25-year-old person or older has spent in schools) and expected years of schooling (years that a 5-year-old child will spend with his education in his whole life). A value of 1 is the highest possible theoretical score, indicating that a country has achieved perfect educational attainment. The scores in West Africa have been consistently low over the past 25 years, with marginal improvements. By way of comparison, in 2013 the United States has a score of .89, the United Kingdom: .86; Switzerland: .84; and Norway: .91.

# Leading causes of death in Africa

(deaths in thousands)

Source: WHO 2012 (Ebola 2014)

