The project described was supported by the National Institute on Minority Health and Health Disparities (NIMHD) Grant Number U54MD008173, a component of the National Institutes of Health (NIH) and Its contents are solely the responsibility of the authors and do not necessarily represent the official views of NIMHD or NIH.
EBOLA AND THE SOCIAL DETERMINANTS OF GLOBAL HEALTH

TCC HEALTH POLICY TO PRACTICE
THURSDAY, OCTOBER 9, 2014

Presented by: Valerie Montgomery Rice, MD
President and Dean
### MSM/MMA International Employees (Faculty, Residents, Staff) as of November 30, 2011

<table>
<thead>
<tr>
<th>Country/Area of Citizenship</th>
<th>Number</th>
<th>Country/Area of Citizenship</th>
<th>Number</th>
<th>Country/Area of Citizenship</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antigua</td>
<td>1</td>
<td>Ghana</td>
<td>3</td>
<td>Salvador</td>
<td>1</td>
</tr>
<tr>
<td>Bahamas</td>
<td>2</td>
<td>Guyana</td>
<td>2</td>
<td>Senegal</td>
<td>2</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>2</td>
<td>India</td>
<td>27</td>
<td>Spain</td>
<td>3</td>
</tr>
<tr>
<td>Barbados</td>
<td>1</td>
<td>Iran</td>
<td>1</td>
<td>Sri Lanka</td>
<td>2</td>
</tr>
<tr>
<td>Belarus (Republic of)</td>
<td>2</td>
<td>Italy</td>
<td>1</td>
<td>Sudan</td>
<td>1</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>1</td>
<td>Jamaica</td>
<td>4</td>
<td>Syria</td>
<td>1</td>
</tr>
<tr>
<td>Burundi</td>
<td>1</td>
<td>Japan</td>
<td>4</td>
<td>Thailand</td>
<td>2</td>
</tr>
<tr>
<td>Cameroon</td>
<td>5</td>
<td>Kenya</td>
<td>1</td>
<td>Trinidad</td>
<td>1</td>
</tr>
<tr>
<td>Canada</td>
<td>6</td>
<td>Korea</td>
<td>3</td>
<td>Tunisia</td>
<td>1</td>
</tr>
<tr>
<td>China</td>
<td>40</td>
<td>Libya</td>
<td>2</td>
<td>Turkmenistan</td>
<td>1</td>
</tr>
<tr>
<td>Columbia</td>
<td>3</td>
<td>Mauritius</td>
<td>1</td>
<td>United Kingdom</td>
<td>7</td>
</tr>
<tr>
<td>Congo Democratic</td>
<td>1</td>
<td>Mexico</td>
<td>2</td>
<td>Venezuela</td>
<td>1</td>
</tr>
<tr>
<td>Cuba</td>
<td>3</td>
<td>Nepal</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dominican Republic</td>
<td>2</td>
<td>Nigeria</td>
<td>33</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Egypt</td>
<td>2</td>
<td>Pakistan</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethiopia</td>
<td>1</td>
<td>Poland</td>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The Employment Eligibility Verification Form I-9 is a U.S. Citizenship and Immigration Services form used to generate this listing.
Figure 1.1: Pathways from Social Determinants to Health

Equitable distribution of social determinants by groups

Socioeconomic status
Race/ethnicity
Sexual orientation
Sex
Disability status
Geographic location

Social determinants

Societal conditions
Social (e.g., freedom from racism and other forms of discrimination)
Economic (e.g., job opportunities, food security)
Physical environment (e.g., housing, safety, access to health care)

Psychosocial factors
Social (e.g., social networks, civic engagement)
Psychological (e.g., self-esteem, hopefulness)

Intermediate outcomes
Health-promoting behaviors

Health equity

Health outcomes
Individual health
Community health

Figure adapted from Blue Cross and Blue Shield of Minnesota Foundation, http://www.bcbsmnfoundation.org/objects/Tier_4/mbc2_determinants_charts.pdf and Anderson et al, 2003.38,39
# Research Centers and Institutes

<table>
<thead>
<tr>
<th>Name</th>
<th>Director</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health Disparities Research Center</td>
<td>Ronald Braithwaite, Ph.D.</td>
</tr>
<tr>
<td>Cardiovascular Research Institute</td>
<td>Herman Taylor, M.D.</td>
</tr>
<tr>
<td>Clinical Research Center</td>
<td>Elizabeth Ofili, M.D.</td>
</tr>
<tr>
<td>National Center for Primary Care</td>
<td>George Rust, M.D.</td>
</tr>
<tr>
<td>Neuroscience Research Institute</td>
<td>Peter MacLeish, Ph.D.</td>
</tr>
<tr>
<td>Prevention Research Center</td>
<td>Tabia Akintobi, Ph.D.</td>
</tr>
<tr>
<td>Research Centers in Minority Institutions</td>
<td>Vincent Bond, Ph.D.</td>
</tr>
<tr>
<td>RCMI Infrastructure for Clinical and Translational Research</td>
<td>Valerie Montgomery Rice, M.D.</td>
</tr>
<tr>
<td>Satcher Leadership Institute</td>
<td>David Satcher, M.D.</td>
</tr>
</tbody>
</table>
Research Focus Areas

Cardiovascular-related Disorders
   HTN, CHF, Diabetes, CHD

Neurological Disorders
   Stroke, Parkinson

Bioinformatics
   CBPR
   Women’s Health
   Health Policy

Integrated Infectious Diseases
   HIV/AIDS, Malaria

Cancer
   Breast and Prostate
EBOLA AND THE SOCIAL DETERMINANTS OF GLOBAL HEALTH

TCC HEALTH POLICY TO PRACTICE
THURSDAY, OCTOBER 9, 2014

Presented by:  Valerie Montgomery Rice, MD
President and Dean
Transdisciplinary Collaborative Center For Health Disparities Research Presents:

“Ebola and The Social Determinants of Global Health”

Atlanta, GA
October 9, 2014

David Satcher, M.D., PhD.
Director, The Satcher Health Leadership Institute and The Center of Excellence on Health Disparities
Poussaint-Satcher- Cosby Chair in Mental Health
Morehouse School of Medicine
16th U.S. Surgeon General
The mission of the Satcher Health Leadership Institute (SHLI) is to develop a diverse group of exceptional health leaders, advance and support comprehensive health system strategies, and actively promote policies and practices that will reduce and ultimately eliminate disparities in health.
“Today, the need for leaders is too great to leave their emergence to chance.”

Institute of Medicine Report, 1988
Best available science
JANUARY, 2014

The 50th Anniversary of the First Ever Surgeon General’s Report on Smoking & Health
Healthy People 2020: Overarching Goals

- Attain high quality, longer lives free of preventable disease, disability, injury, and premature death
- Achieve health equity, eliminate disparities, and improve the health of all groups
- Create social and physical environments that promote good health for all
- Promote quality of life, healthy development, and healthy behaviors across all life stages
Ebola Virus
WEST AFRICA EBOLA OUTBREAK 2014

WEST AFRICA
Ebola Outbreak

Likely host = bats

1st Ebola outbreak in West Africa
4 countries:
• Guinea
• Sierra Leone
• Liberia
• Nigeria

Ebola is fatal in 55-60% of cases reported in this outbreak.
WEST AFRICA EBOLA OUTBREAK

How do you get the Ebola virus?
Direct contact with:

1. Bodily fluids of a person who is sick with or has died from Ebola (blood, vomit, pee, poop, sweat, semen, spit, other fluids)
2. Objects contaminated with the virus (needles, medical equipment)
3. Infected animals (by contact with blood or fluids or infected meat)
WEST AFRICA EBOLA OUTBREAK - EARLY SYMPTOMS

Early Symptoms:
Ebola can only be spread to others after symptoms begin. Symptoms can appear from 2 to 21 days after exposure.

- Fever
- Headache
- Diarrhea
- Vomiting
- Weakness
- Stomach pain
- Lack of appetite
- Unexplained bleeding
- Joint & muscle aches
WEST AFRICA EBOLA OUTBREAK

When is someone able to spread the disease to others?

Ebola only spreads when people are sick. A patient must have symptoms to spread the disease to others.

MONTH

<table>
<thead>
<tr>
<th>S</th>
<th>M</th>
<th>T</th>
<th>W</th>
<th>T</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
</tr>
<tr>
<td>15</td>
<td>16</td>
<td>17</td>
<td>18</td>
<td>19</td>
<td>20</td>
<td>21</td>
</tr>
<tr>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
<td>27</td>
<td>28</td>
</tr>
<tr>
<td>29</td>
<td>30</td>
<td>31</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

After 21 days, if an exposed person does not develop symptoms, they will not become sick with Ebola.
FACTS ABOUT EBOLA

- You can only get Ebola from:
  - Touching bodily fluids of a person who is sick with or has died from Ebola, or
  - From exposure to contaminated objects, such as needles

*Ebola poses no significant risk in the United States.
STOPPING THE EBOLA OUTBREAK

Global Health Security
Stopping the Ebola Outbreak

Find
Find patients and diagnose them

- Fever symptoms
- Blood test
- Laboratory testing

Respond
Isolate patients and find contacts and monitor for 21 days

- Isolation bed
- Patient interview for contacts
- Any new patient restarts process

Prevent
Healthcare infection control and safe burial practices

- Infection control
- Safe burial practices
- Bush meat
Determinants of Health

Source: Healthy People 2010
What are the Social Determinants of Health?

- The conditions in which people are born, grow, live, work and age.

- They are shaped by the distribution of money, power and resources at global, national and local levels.

- Changes in the Social Determinants of Health often require policy changes.
Difference in Child Mortality Rate Changes
Under-five mortality rate by region

Source: UNICEF 2001
CSDH: Fig. 2.2
Under-5 Mortality Rate Per 1000 Live Births by Levels of Household Wealth

Don’t Forget About the Social Determinants of Health

Our WHO commission found that the conditions to which children are exposed— including the quality of relationships they are part of, the language they hear, and the environment around them—literally sculpt the developing brain.

Health Affairs January 2009
CSDH: Three Principles of Action to Achieve Health Equity

1. Improve the conditions of daily life - the circumstances in which people are born, grow, live, work, and age.
2. Tackle the inequitable distribution of power, money, and resources - the structural drivers of those conditions of daily life - globally, nationally, and locally.
3. Measure the problem, evaluate action, expand the knowledge base, develop a workforce that is trained in the social determinants of health, and raise public awareness about the social determinants of health.

**McKinlay’s Population Model of Health Promotion: Healthy Diet for Children**

- **Agriculture policy**
  - Food subsidies
  - And expanded funding
  - Eligibility for NSLP/NSBP

- **State/Federal**
  - Food and menu regulations
  - Lobbying/discharge regulation

- **Community-wide**
  - Education campaigns
  - Zoning/business regulations
  - Inventive for grocery stores
  - Farmers markets

- **School soda bans**
  - Competitive food restrictions

- **Restaurant/grocery store/school point of purchase prompts**

- **Parent training**
  - re: feeding practices/healthy diets

- **Nutrition training**
  - Requirements for professional certification
  - (childcare, healthcare)

- **BMI screening**
  - And treatment

**Source:** Based on McKinlay (1995), Glanz (1999)
“In order to eliminate disparities in health, we need leaders who care enough, know enough, will do enough and are persistent enough.”
Transdisciplinary Collaborative Center For Health Disparities Research Presents:

“Ebola and The Social Determinants of Global Health”

Atlanta, GA
October 9, 2014

David Satcher, M.D., PhD.
Director, The Satcher Health Leadership Institute and The Center of Excellence on Health Disparities
Poussaint-Satcher- Cosby Chair in Mental Health
Morehouse School of Medicine
16th U.S. Surgeon General
Ebola and the Social Determinants of Health
Taxonomy, Biology and Ecology of Ebola
Vincent Bond, PhD
Ebola and the Social Determinants of Global Health

Taxonomy, Biology and Ecology of Ebola
Ebola Virus Taxonomy

- EBOV has the following classification:
  - Order: Mononegavirales
  - Family: Filoviridae
  - Genus: Ebolavirus

- The four EBOV disease-causing viruses are:
  - Bundibugyo virus (BDBV; 2007):
  - Sudan virus (SUDV; 1976),
  - Taï Forest virus (TAFV; 1994),
  - Ebola virus (EBOV, formerly Zaire Ebola virus; 1976)
    - most pathogenic of the known Ebola disease-causing viruses

- Reston virus (RESTV; 1989 Reston, VA), is the fifth Ebola virus.
  - It is not thought to be disease-causing in humans, although humans can be infected.
  - 6/178 animal handlers infected/seroconverted but no illness. Macaques from the Phillipines

- The five Ebola viruses are closely related to the Marburg viruses
Ebola Structure

B. Virion detail

HIV

http://www.liberianobserver.com/security/ebola-aids-manufactured-western-pharmaceuticals-us-dod
Booth et al., 2013
**Ebola Virus Ecology**

**Enzootic Cycle**
New evidence strongly implicates bats as the reservoir hosts for ebolaviruses, though the means of local enzootic maintenance and transmission of the virus within bat populations remain unknown.

**Ebola Viruses:**
- Ebola virus (formerly Zaire virus)
- Sudan virus
- Tai Forest virus
- Bundibugyo virus
- Reston virus (non-human)

**Epizootic Cycle**
Epizootics caused by ebolaviruses appear sporadically, producing high mortality among non-human primates and duikers and may precede human outbreaks. Epidemics caused by ebolaviruses produce acute disease among humans, with the exception of Reston virus which does not produce detectable disease in humans. Little is known about how the virus first passes to humans, triggering waves of human-to-human transmission, and an epidemic.

Human-to-human transmission is a predominant feature of epidemics.

Following initial human infection through contact with an infected bat or other wild animal, human-to-human transmission often occurs.
Ebola hemorrhagic fever

Ebola is a severe, often-fatal disease that affects people, as well as monkeys, gorillas and chimpanzees.

Origins of the disease
- Infection with Ebola virus, named after river in Congo, where disease was first recognized in 1976

Symptoms
1. Fever, headache, joint and muscle pain, sore throat, weakness
2. Followed by diarrhea, vomiting
3. Rash, internal and external bleeding

Confirmed human cases
Since 1976

How it spreads
- Direct contact with blood, secretions of infected person
- Contact with contaminated objects, such as needles
- Contact with infected animal; possibly eating contaminated meat

Treatment
- No standard treatment; sick person isolated, given fluids, oxygen; treatment for secondary infections

Source: U.S. Centers for Disease Control and Prevention
Graphic: Pat Carr

© 2004 KRT
Ebola Structure

VIRION

- Minor Nucleoprotein (VP30)
- Glycoprotein (GP)
- Nucleoprotein (N)
- Genomic RNA
- Polymerase complex protein (VP35)
- Polymerase (L)

VP24, Matrix (VP40)
Ebola Structure - 2 of 3 virus types and proteins

Booth et al, 2013; Trends in Microbiology
Ebola Replication
Ebola virions budding through cell membrane

Pathophysiology of EBV Infection

- Infection targets: Endothelial cells, macrophages, monocytes, and liver cells
- Ebola, like HIV, is deadly because it employs complex, multiple methods for interfering with or avoiding the human immune system (targets)
- Cytopathic effect from ongoing endothelial cell infection causes these infected cells to detach from their neighbor and float off the basement membrane. This is enhanced by the sGP. All this leads to loss of vascular integrity in vascular system and organs and the bleeding observed. (target)
- Liver hepatocyte infection/necrosis leads to liver damage and improper clotting, enhancing bleeding.
The Public Health Response to the Ebola Virus Epidemic
Presented by: Pierre Rollin, MD
EBOLA VIRUS DISEASE

C. Goldsmith /S.Zaki
Ebola Virus Taxonomy

- RNA viruses
  - Ebola viruses, 5 species
  - Marburg virus
**Ebolavirus Ecology**

**Enzootic Cycle**
New evidence strongly implicates bats as the reservoir hosts for ebolaviruses, though the means of local enzootic maintenance and transmission of the virus within bat populations remain unknown.

**Ebolaviruses:**
- Ebola virus (formerly Zaire virus)
- Sudan virus
- Tai Forest virus
- Bundibugyo virus
- Reston virus (non-human)

**Epizootic Cycle**
Epizootics caused by ebolaviruses appear sporadically, producing high mortality among non-human primates and duikers and may precede human outbreaks. Epidemics caused by ebolaviruses produce acute disease among humans, with the exception of Reston virus which does not produce detectable disease in humans. Little is known about how the virus first passes to humans, triggering waves of human-to-human transmission, and an epidemic.

**Human-to-human transmission is a predominant feature of epidemics.**

Following initial human infection through contact with an infected bat or other wild animal, human-to-human transmission often occurs.
Filoviruses: Clinical Features

- Incubation periods
  - Ebola: 1-2 weeks (shorter for percutaneous inoculation)

- Abrupt onset: fever, headache, myalgia’s, sore throat, asthenia, “red eyes”, and cutaneous rash

- 4-5 days: nausea, vomiting, diarrhea, chest pain

- ~45% have observable hemorrhagic events: skin, nose, mouth and GI hemorrhages

- Aggravation in fatal cases with multi-organ failure

- 23-88% case-fatality (average day 7-10 after onset)
Signs and Symptoms on Presentation

- Diarrhea
- *Asthenia
- Headache
- *Anorexia
- Nausea/Vomiting
- Abdominal tenderness
- Chest pain
- Cough
- Abdominal pain
- Arthralgia/Myalgia
- *Sore throat
- *Right upper quadrant tenderness
- Back pain
- *Conjunctival injection
- Hepatomegaly
- Splenomegaly
- Rales/rhonchi
- Hematemesis
- Dyspnea
- Bloody stool
- *Rash
- *Gum bleeding
- Epistaxis
- *Bleeding-injection sites
- Disorientation
- Hiccups
- Anuria
- Hemoptysis
- Hematuria
- Convulsion
- Vaginal bleeding
- Edema

* indicates symptoms that are common in Ebola patients.
Differential Diagnosis for Viral Hemorrhagic Fevers (VHF)

- Febrile tropical illnesses:
  - Malaria
  - Typhoid fever
  - Bacterial gastro-enteritis
  - Rickettsial diseases
  - Lassa fever
  - Viral hepatitis
  - Sepsis

- Common” viral infections:
  - Measles
Ebola Hemorrhagic Fever

- Acute phase
- Convalescent phase

VIREMIA/BLOOD

SALIVA/SWAB

URINE

TEARS/CONJ.

SEmen

SKIN/SWEAT

VAGINAL

RECTAL/FECES

MILK

Acute phase
Convalescent phase

IgM

IgG

Lifelong persistence

MOREHOUSE SCHOOL OF MEDICINE
Ebola virus transmission:
Impact of early hospitalization

Multiple contacts to follow
Multiple secondary cases

Fewer contacts to follow
Fewer secondary cases
VISIT YOUR NEAREST EBOLA TREATMENT CENTRE FOR HIGH QUALITY CARE

1. If you have fever, diarrhoea, or vomiting, go to the nearest health facility. You will be welcome and will receive good care.

2. When you arrive, you can speak with your family on your own phone.

3. You will receive good, healthy food and treatment for other illnesses. You will be treated with respect and kindness.

4. Your family members can visit you and bring you food.

5. The beds are comfortable, and the fan will keep you cool.

6. If you recover from Ebola, you have no more virus and can join your family and community. You cannot transmit Ebola to them.

PROTECT YOURSELF • PROTECT YOUR FAMILY • PROTECT YOUR COMMUNITY
Sometimes a woman would clutch his sleeve, crying shrilly:” Doctor, you’ll save him, won’t you?” But he wasn’t there for saving life; he was there to order a sick man’s evacuation. How futile was the hatred he saw on faces then! “You haven’t a heart!” a woman told him on one occasion. She was wrong; he had one. It saw him through his twenty-hour day, when he hourly watched men dying who were meant to live.

Albert Camus, La Peste (1947)
Ebola Supportive therapy

**Signs, Symptoms**
- Anti-emetics, paracetamol, loperamide

**Others infections**
- Antimalaria
- Antibiotics

**Hypovolemia (Vomiting, diarrhea)**
- ORS
- IV fluids

**Electrolytes (Vomiting, diarrhea)**
- Oral salt
- K, Mg, HCO3
Specific Ebola Therapy
Therapy and treatment

- Serotherapy (convalescent sera)
  No proof, yet
  Need logistic, trial on the way

- Zmapp: Chimeric human-mouse monoclonals
  Non-human primate data
  Given to 8 people
  Availability

- TKM- Ebola Liposome sRNAi 2 genes targeted
  Non-human primate data
  Limited supply

- Chimpanzee adenovirus
  Non replicating
  Developed by NIH

- VSV Ebola
  Developed by PHA Canada
  Used one time
Epidemiology/Surveillance

- Active Surveillance (case-finding): Cases and Contacts
- Database management
- Establishment of trained ambulance and burial teams; coordination with teams
- Coordination with social mobilization
- Mobile team education
- Community education
- Daily reporting of findings to Ministry of Health
Cases 19
Deaths 8
NIGERIA
HCWs 5/1

Cases 1298
Deaths 768
GUINEA
HCWs 38/7

Cases 2789
Deaths 879
SIERRA LEONE
HCWs 95/12

Cases 3924
Deaths 2210
LIBERIA
HCWs 94/188

WHO, October 8, 2014
**UNDP Human Development Report**

<table>
<thead>
<tr>
<th>HDI Rank</th>
<th>Country</th>
<th>Maternal mortality ratio (deaths per 100,000 live births) 2010</th>
<th>Expected years of schooling (of children) (years) 2012</th>
<th>Expenditure on health, total (% of GDP) - 2011</th>
<th>Education Index 2013</th>
<th>Life expectancy at birth - 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Norway</td>
<td>7</td>
<td>17.6</td>
<td>9.1</td>
<td>0.978</td>
<td>81.5</td>
</tr>
<tr>
<td>5</td>
<td>United States</td>
<td>21</td>
<td>16.5</td>
<td>17.9</td>
<td>0.917</td>
<td>78.9</td>
</tr>
<tr>
<td>164</td>
<td>Uganda</td>
<td>310</td>
<td>10.8</td>
<td>9.5</td>
<td>0.6</td>
<td>59.2</td>
</tr>
<tr>
<td>175</td>
<td>Liberia</td>
<td>770</td>
<td>8.5</td>
<td>19.5</td>
<td>0.472</td>
<td>60.6</td>
</tr>
<tr>
<td>179</td>
<td>Guinea</td>
<td>610</td>
<td>8.7</td>
<td>6</td>
<td>0.483</td>
<td>56.1</td>
</tr>
<tr>
<td>183</td>
<td>Sierra Leone</td>
<td>890</td>
<td>7.5</td>
<td>18.8</td>
<td>0.417</td>
<td>45.6</td>
</tr>
<tr>
<td>186</td>
<td>Democratic Republic of the Congo</td>
<td>540</td>
<td>9.7</td>
<td>8.5</td>
<td>0.539</td>
<td>50</td>
</tr>
<tr>
<td>187</td>
<td>Niger</td>
<td>590</td>
<td>5.4</td>
<td>5.3</td>
<td>0.3</td>
<td>58.4</td>
</tr>
</tbody>
</table>

- Ratio of the number of maternal deaths to the number of live births in a given year, expressed per 100,000 live births.
- Number of years of schooling that a child of school entrance age can expect to receive if prevailing patterns of age-specific enrolment rates persist throughout the child’s life.
- Total health expenditure is the sum of public and private health expenditure. It covers the provision of health services (preventive and curative), family planning activities, nutrition activities, and emergency aid designated for health but does not include provision of water and sanitation.
- Calculated using Mean Years of Schooling and Expected Years of Schooling.
- Number of years a newborn infant could expect to live if prevailing patterns of age-specific mortality rates at the time of birth stay the same throughout the infant’s life.
## Broad Characterization of Fragility

<table>
<thead>
<tr>
<th>Fragility Category</th>
<th>General Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weak States</td>
<td>Exhibit low levels of administrative control across an entire territory or portions of it, significant gaps in security, performance and legitimacy</td>
</tr>
<tr>
<td>Divided States</td>
<td>Manifest substantial divisions between national, ethnic or religious groups</td>
</tr>
<tr>
<td>Post-war States</td>
<td>Have experienced violent conflict</td>
</tr>
<tr>
<td>Semi-authoritarian States</td>
<td>Impose order through coercion</td>
</tr>
<tr>
<td>Collapsed States</td>
<td>Core government institutions do not function at all, state has ceased to function completely</td>
</tr>
</tbody>
</table>

Source: Adapted from Call (2008)

<table>
<thead>
<tr>
<th>GROUP</th>
<th>COUNTRIES</th>
<th>CHARACTERISTICS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard States</td>
<td>Benin, Burkina Faso, Cape Verde, Senegal</td>
<td>Democratization of security and defense sectors and regular elections that result in smooth transfer of power</td>
</tr>
<tr>
<td>Sahelian States</td>
<td>Mali, Mauritania and Niger</td>
<td>Porous borders, powerless security forces in the face of vast territories and proximity to groups suspected to have links with Al Qaeda in Algeria</td>
</tr>
<tr>
<td>Fragile States</td>
<td>Guinea, Guinea-Bissau, Liberia, Sierra Leone</td>
<td>Post-conflict countries</td>
</tr>
<tr>
<td>Unstable States &amp; States in crisis</td>
<td>Côte d’Ivoire, Nigeria and Togo</td>
<td>Security is more an issue for the regimes than the states, and even more for the population</td>
</tr>
</tbody>
</table>
Socio-economic development challenges

- One sixth of the world’s population lives in fragile States, which are also home to one out of every three people surviving on less than a dollar a day. Of all the children in the world who die before reaching their fifth birthday, half were born in these countries. Of all the women who die in childbirth, one in three dies in these countries. While other developing countries are making progress towards achieving the Millennium Development Goals these fragile nations, ranging from Haiti to Nepal, from Burundi to Uzbekistan, are falling behind.

OECD, 2010
Recent Developments

- Evacuation of EVD patients and secondary transmission
- Continuation of recent trends with widespread and persistent transmission of EVD (incidence decline in some areas)
- Problems with epidemiological data gathering
- New Ebola Treatment Units and Ebola Community Centers, clinical trials of new therapeutics
- Laboratories deployment in affected countries
- International involvement
- Safe burials and social mobilization
- Preparedness training in unaffected countries
Thank you

The findings and conclusions of this presentation are those of the author and not necessarily represent the official position of the Centers for Disease Control and Prevention

Ebola survivor - Uganda 2012 outbreak