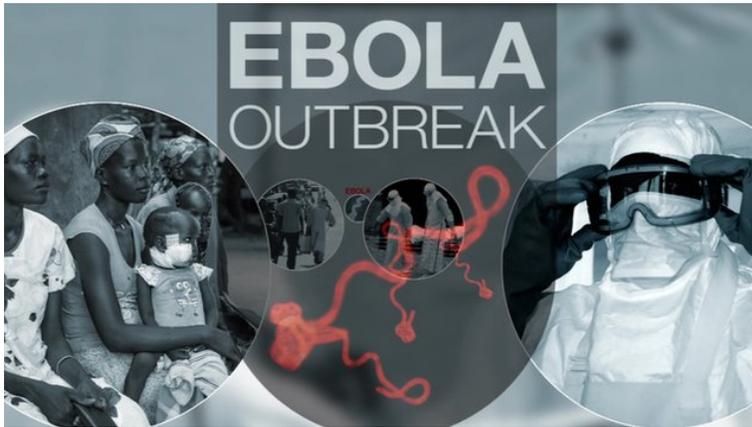


The Aftermath of Ebola: Strengthening Health Systems in Liberia



“I think a major lesson from the Ebola outbreak is that every country really needs the ability to identify and control outbreaks like Ebola before they get out of control.”

~Dr. Steve Redd, Director,
CDC Office of Public Health
Preparedness and Response
[50]

“Our health infrastructure was not designed to cope with the kind of outbreak that we had.”

~Bernice Dahn, Minister
of Health, Liberia [1]



“If we were to have another round of Ebola or another epidemic, are we prepared to cope with that epidemic with such a weak health system? My answer is no.”

~Tabeh Freeman, Professor of Public
Health, Tubman University [1]

I. NARRATIVE

On a humid morning in late December, ten-year-old Hawa Patience Mulbah, a bright-eyed girl with rosy cheeks, an aptitude for mathematics, and a dream of becoming an engineer, arrives at the two-room school building in the improbably-named village of Joeblow, Liberia, dragging her two little brothers along with her. A half-hour later, six more children have joined them in the classroom, sitting together on the mat and wondering when their teacher will arrive. It is unlike Mrs. Susso to be late. Over an hour passes, and Hawa eventually goes to the chalkboard, writing down the day's work for the other children to complete. Lunchtime draws near, and the children grow restless. Mrs. Susso never arrives.

Within the next month, nearly half the people of Joeblow fall sick, including Hawa's parents. The girl takes over her mother's duties, cooking for her family, bringing food and water to the sick, and helping to bury the dead. She is careful to accord those who have died a proper burial, washing, touching, and kissing the bodies so that their spirits will feel honored rather than incensed to stay behind and cause harm. Despite these precautions, Hawa knows that her village is haunted. In quick succession, she buries her beloved teacher Mrs. Susso, the local healer, her father, and her best friend. The next week, Hawa buries her own mother.

By the time a group of men from the Ministry of Health arrives, wearing white bodysuits, yellow gloves, and large masks that make them look like something out of the science fiction novels Hawa used to read at school, the population of Joeblow has been decimated. The shrill cries of hungry, bereaved babies pierce the tense stillness of the village. Hawa knows that the infants are crying in vain - every last mother in Joeblow is already dead [3]. Hawa, somehow spared from the ravages of the mysterious illness that the masked men call Ebola, finds herself serving as a proxy mother to her brothers and the other orphaned children. When her youngest brother, Abdullah, starts shivering at night, his small body wracked with fever and the whites of his eyes yellow, Hawa, familiar with the signs of malaria, hurries to the village aid post, only to find it abandoned. The only licensed nurse in Joeblow succumbed to the ravages of Ebola while caring for the sick. Hawa scrapes together what is left of her parents' meager savings to pay for transportation into town, where she waits in the scorching heat for over a day, joining a long line of sick men, women, and children outside the district hospital. When it is finally her brother's turn to see the doctor, the physician, fearful of contracting Ebola, refuses to even touch Abdullah, much less examine him. Hawa begs the doctor for artemisinin tablets, but he just shakes his head; no medicine has been delivered in weeks, and supplies are beyond limited. The doctor gives Hawa a few aspirin and a plastic bottle of water, but she cannot coax the pills down her brother's throat. Abdullah dies on the truck ride back to the village, his small body joining a growing pile of cloth-wrapped corpses in the bed of the truck.

II. PROBLEM STATEMENT/EXECUTIVE SUMMARY

Liberia is now 42 days post-Ebola, and the World Health Organization (WHO) has declared the country free of Ebola virus transmission. The state is now in the middle of a heightened period of surveillance, and the majority of the disease control measures established at the peak of the

Ebola crisis continue to be in effect. The entire nation remains fearful, as the hemorrhagic disease has destroyed entire villages. Bands of children dubbed “Ebola orphans” roam the streets, unable to find families willing to take them in. The majority of trained health care workers have fled the country, and many of those brave nurses, doctors, and midwives who stayed behind to fight Ebola have themselves died of the disease. Medical and other resources are scarce, since trade with Liberia practically ceased during the crisis. Now, as the death toll from the actual virus winds down, those who managed to survive Ebola are falling victim to diseases common in areas of overcrowding, poverty, and poor sanitation, including hepatitis, malaria, tuberculosis, dengue fever, and parasitic infections. The country’s health system has been almost completely devastated, with hospitals and aid posts abandoned, nursing and medical schools closed, and the nation’s health budget far exceeded by the expenses of containing Ebola, despite international emergency aid. Liberia is a nation in the aftermath of crisis, and the time has now come to rebuild.

III. LIBERIA’S BACKGROUND / HISTORY

In 1820, the American Colonization Society (ACS) resettled a group of 86 free African-Americans and freed slaves in a small region on the west coast of Africa, which the ACS christened Liberia, or “land of the free.” Thousands of additional African-Americans, both free men and women as well as former slaves, soon followed, aided by the ACS, which governed the Commonwealth of Liberia until July 26, 1847, when the newly formed Republic of Liberia officially declared independence from the influence of the ACS and the United States. Indigenous Africans were not considered citizens of the new nation until 1904, and from the inception of the new nation, the Americo-Liberian elite held all political power, exploiting the native Africans whose land they had usurped. For 133 years, the True Whig Party, run by the Americo-Liberians, controlled every aspect of life in the one-party state [4].

In April of 1980, indigenous Liberian Master Sergeant Samuel K. Doe, of the Krahn ethnic group, violently rose to power in a coup d’état, executing the president and many members of the government and forming the People’s Redemption Council (PRC). The PRC, led by Doe, placed members of Doe’s own Krahn ethnic group in positions of political and military power, leading to ethnic tension in the country. The reign of the Doe government was characterized by election fraud, widespread human rights abuses, corruption, and attempted coups. However, the United States, under President Reagan, maintained a positive relationship with Doe, providing him with considerable financial support [4].

On December 24, 1989, the National Patriotic Front rebels, led by Doe’s former procurement chief, Charles Taylor, invaded Liberia, gaining the support of many Liberians as they made their way to the capital city, Monrovia, to seize power from the Doe government. This act launched a bloody eight-year civil war that resulted in the deaths of more than 200,000 Liberians. Over one million more citizens were displaced and forced to resettle in refugee camps in neighboring African countries. After the assigination of Doe, the Economic Community of West African States intervened, and attempted to form an interim government in 1990. Yet many of the Liberian factions refused to work with this new government, and opted to continue fighting instead. After

over a dozen peace accords, Taylor finally agreed to the formation of a transitional government, and the war ceased. However, Taylor and his National Patriotic Party won the 1997 elections by a landslide, as the Liberian people feared that war would resume should Taylor not emerge victorious [4].

After officially securing power, Taylor did not work to improve the lives of Liberians; instead, he spent the next six years providing political, financial, and military aid to the Revolutionary United Front in Sierra Leone. By 2003, when Taylor's enemies resumed armed rebellion against him, the rates of unemployment and illiteracy in Liberia had risen to over 75%. Armed rebels challenged Taylor's forces on the outskirts of Monrovia, leading the Economic Community of West African States to broker a ceasefire, which all sides failed to respect. In the summer of 2003, the brutal fighting reached downtown Monrovia, resulting in an internationally denounced humanitarian disaster. Under mounting pressure from the U.S and her allies, President Taylor resigned from office in August of 2003, retreating into exile in Nigeria. A two-year interim government, headed by businessman Charles Gyude Bryant, succeeded Taylor, and in October of 2003, the UN took over security and peacekeeping duties in Liberia [4, 5].

The free, peaceful elections of October and November 2005 resulted in the election of Liberia's first democratically elected female president, Ellen Johnson Sirleaf. This set the tone for a Liberia ready to rebuild; however, the shadow of 14 years of terrible civil war still clung to the nation. Out of a population of 3.5 million, over 270,000 Liberians were killed in the violence, and another 800,000 were displaced. Women suffered tremendously in the conflict, frequently falling victim to physical and sexual abuse, while the numerous child soldiers who joined the various rebel groups returned from the war traumatized and scarred - if they returned at all [4]. The country's infrastructure was in disarray, and most people found themselves without running water and electricity. 196 of the nation's 550 prewar health facilities had closed, and by the end of the war, nine out of 10 Liberian doctors had fled the country. The period from 2002-2006 recorded an infant mortality rate of 71 per 1,000 live births, placing Liberia 183rd out of 188 countries with regards to infant mortality [6, 31]. Only 39% of children under the age of two had received their recommended vaccinations, and one in nine Liberian children died before his or her fifth birthday. Liberia's maternal mortality rate was 994 deaths per 100,000 live births (as compared to the 2005 global maternal mortality rate of 400 deaths per 100,000 live births), and only 46% of Liberian women gave birth with the assistance of a skilled birth attendant [6, 30]. From 2005 to 2012, the new government of Liberia, assisted by foreign aid, began the long road to recovery, and the nation's health systems, training programs, and infrastructure improved significantly before being devastated once again, this time by the Ebola crisis [6].

IV. LIBERIAN CULTURE

Liberia is located in West Africa, bordering the North Atlantic Ocean, Cote d'Ivoire, Guinea, and Sierra Leone (see Appendix 1). The nation covers 111,369 square kilometers, and is slightly larger than the state of Tennessee. The climate is tropical, hot, and humid, with dry winters and wet, rainy summers. The majority of the nation's land is either rainforest or used for agricultural purposes, though much of the rainforest is presently in danger of deforestation. Liberia's

coastline boasts mangrove swamps, lagoons, and sandbars, while the inland plateau is grassy, supporting limited agricultural endeavors. The majority of the population survives through subsistence farming, and land is inherited through patrilineal descent [7].

Liberians are a varied people with regards to ethnicity, religion, and language. Sixteen distinct ethnolinguistic groups make up the nation, including the Kpelle, Basa, Grebo, Gio, Mano, Kru, Lorma, Kissi, Gola, Krahn, and the Americo-Liberians. Liberia's pre-colonial history of intertribal violence and, more recently, civil war, nepotism, and oligarchy, have contributed to ethnic tensions and prejudice that exist to this day [7].

English is Liberia's official language, but it is only spoken by about 20% of the country's total population of 4,195,666 individuals. The remaining 80% of the population speak one of 20 different languages, the majority of which are solely oral tongues. In order to facilitate communication amongst diverse groups of people, most citizens utilize "Liberian English," a creole form of English [7]. Approximately 86% of the population is Christian, and 12% are Muslim. The remaining Liberians espouse tribal or traditional religions, no religion, or a variety of other spiritual beliefs. Only about 20% of those who identify as Christian are actively involved in the Christian church, however. In Liberia it is very common for people to mix elements of Christianity, Islam, and traditional religions, drawing on indigenous beliefs such as ancestor worship, membership in secret societies, witchcraft, polygyny, and trial by ordeal along with Christian and/or Muslim prayer and worship [5,7].

Liberians are, overall, a young people, particularly in the aftermath of the Ebola crisis that killed so many older citizens. The median age is currently 18.1 years. Around 50% of Liberians live in urban areas, with a third of the population concentrated in the ever-growing slums of Monrovia. The other 50% live in rural villages that are difficult to access via roads and waterways [4]. Gender roles in Liberia are largely traditional, although educated women can work outside the home; indeed, Liberia's current president is a woman. The female tasks of caring for the house, the farmland, and the children, tending to the sick, and preparing the dead for burial, are considered very valuable in Liberia. While polygamy is permitted in the country, less than 30% of Liberian men actually practice true polygamy. However, it is common for wealthy men to have both an official "ring wife" who shares their primary residence and raises their children as well as unofficial "country wives" who have married into the family through bridewealth, or the dowry tradition [7].

Current president Ellen Johnson Sirleaf led the nation through the Ebola crisis, and will remain in office until the next election cycle in November of 2017. Numerous political parties and factions, some of which are led by the demobilized military officers who held key roles in the most recent civil war, still vie for power within Liberia's political and legal systems [5].

Liberia is considered a low-income country, and relies heavily on international aid, particularly from the United States, Liberia's main financial donor and partner in development efforts. In 2009, the U.S. provided 22% of Liberia's entire health budget, the largest percentage of any contributing country, even larger than the contribution from Liberia's own government. The U.S.

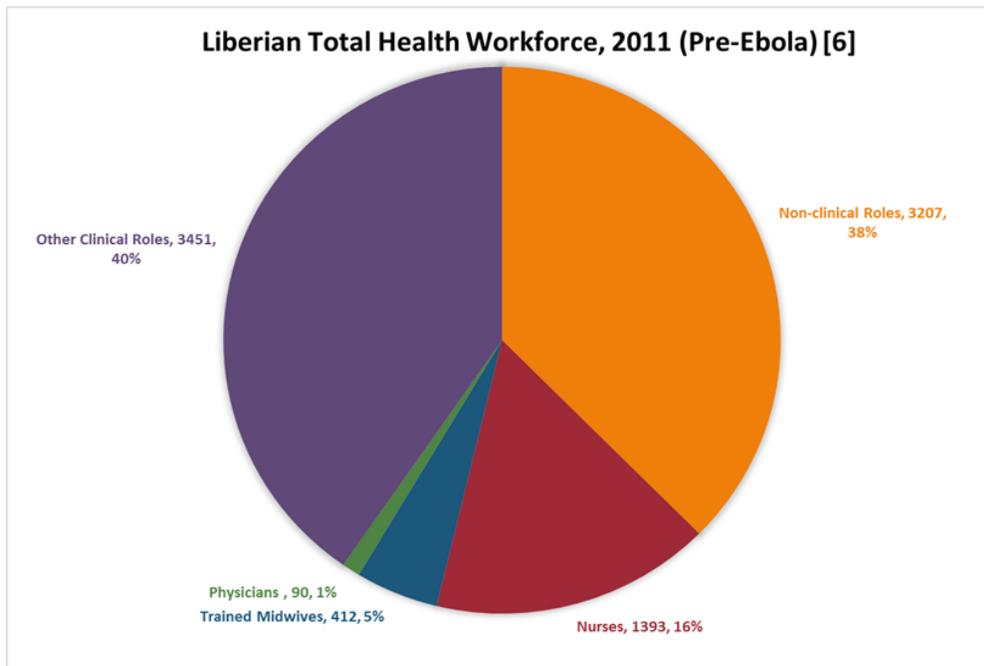
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also provided additional assistance in the form of contributions to organizations such as USAID, the Global Fund to Fight AIDS, Tuberculosis, and Malaria, and the Global Alliance for Vaccines and Immunization (GAVI), all of which are active in Liberia [6]. International aid agencies and religious organizations provide the majority of social welfare services in Liberia, including health care and education [7]. Liberia met the World Bank criteria for debt relief in 2010, gaining \$4.6 billion in full and irrevocable debt relief [8]. This allowed the country to achieve economic growth from 2010-2013, thanks to lucrative revenues from its main exports, which include iron ore, rubber, gold, diamonds, cocoa, coffee, and timber. This growth, coupled with \$62 million in aid given in four years through the USAID-funded Rebuilding Basic Health Services Project (RBHS), enabled Liberia to rebuild and restructure its health sector and workforce, as well as other key aspects of the nation's economy, such as schools and universities. However, as Ebola started to spread in 2014, the country's economy plummeted. Many business owners, entrepreneurs, health care workers, and investors fled Liberia, taking with them not only much-needed capital but also valuable expertise. The Liberian government was forced to divert funds to the response and management of Ebola, and as a result, the country now faces significant development challenges [8].

V. COUNTRY FACTS & STATISTICS

<i>I. Poverty, Employment, Literacy, and Economy:</i>	Liberia	USA
UN Human Development Index ranking (out of 187): 182 [6, 38]	182	8
World Bank income classification (2013): Low [32, 38]	Low	High
Percent of people below the international poverty line of \$1.25/day (2011): 84% [6, 47]	0.84	0.016
Gross national income per capita (2014): \$370 current U.S. dollars [33]	370	52, 947
National debt: \$757 million current U.S. dollars [35]	.000757 trillion	21.7 trillion
Major seaports: Buchanan, Monrovia [5]	2	99
Adult literacy rate (2011): 59% [6, 49]	0.59	0.86
Mean years of schooling: 4.1 [38]	4.1	12.9
<i>II. Access to Resources:</i>		
Percent of population using the Internet (2014): 8.3% [36, 46]	0.083	0.744
Teledensity (number of mobile phones per 100 people, 2011): 0.5 [5, 39]	0.5	0.94
Percent of population with access to adequate sanitation (2009): 44% [6, 43]	0.44	1
Percent of annual income spent on health by the poorest one-fifth of the population (2007): 17% [6, 45]	0.17	0.08
<i>III. Health Statistics:</i>		
Number of live births (2013): 152,000 [32, 44]	152, 000	4,229,900
Live births per thousand [43]	35.5	12.4
Life expectancy at birth: 62.8 (males), 63.6 (females) [34, 42]	63.1	78.8
Number of deaths (2013): 343,000 [32, 42]	343000	2596993
Fertility rate (2013): 4.8 children per woman [32, 41]	4.8	1.88
Maternal mortality ratio per 100,000 live births (2013): 640 [32, 40]	640	14
Under-5 mortality rate (2013): 71 per 1,000 live births [32, 42]	71	5.96
Deaths due to HIV/AIDS per 100,000 population (2012): 45.8 [32, 48]	45.8	2.2
Deaths due to malaria per 100,000 population (2012): 68.8 [32, 44]	68.8	0
Deaths due to tuberculosis among HIV-negative people per 100,000 population (2013): 49 [32, 44]	49	0.15

iv. Health Workforce:



v. Current National and Transnational Concerns (Non-Ebola-related) [5]:

- Ethnic conflict and civil unrest in neighboring Cote d'Ivoire (Liberia presently shelters 38,102 refugees fleeing from the violence and unrest in the region).
- Around 23,000 internally displaced persons dwell in the slums of Monrovia, uprooted from their homes by Liberia's fourteen years of civil war and post-election violence.
- UN sanctions prevent Liberia from exporting diamonds and timber, leading to illegal diamond trading on the international level.
- Liberia is a transshipment point for cocaine and heroin for the European and U.S. markets, resulting in arms dealing, corruption, and criminal activity.

VI. EBOLA IN LIBERIA

The first case in this recent West African outbreak was identified in December 2013 in Guinea, a country that borders Liberia. In March of 2014, the WHO officially declared that this mysterious disease was Ebola, an infectious virus speculated to be initially transmitted to humans by contact with infected bats, primates, or other wild animals, after which human-to-human transmission rapidly increases the spread of the disease (see Appendix 2). Liberia also confirmed its first Ebola cases in March 2014. The outbreak initially appeared to be contained in rural areas, until it reached the capital city of Monrovia and began spreading exponentially in June 2014. By August 2014, President Johnson Sirleaf had declared a state of emergency and placed restrictions on the movement of the population as well as on activities known to increase the spread of the disease, such as traditional burial practices. Liberia's health system was completely overwhelmed by the exploding number of Ebola cases. Without enough health care

workers, hospital beds, and resources to treat the number of people who were already sick, many people seeking care were turned away. Family members also opted not to bring the ill in for treatment, contributing to the further spread of the disease. As 2014 drew to a close, however, the number of new cases and deaths began to decline. This was due to a massive influx of international assistance, which centered around the construction of additional treatment facilities, infection control, the provision of epidemiological support for contact tracing, and increasing the capacity of available laboratories to confirm an Ebola diagnosis [9].

By the time the WHO officially declared Liberia free of Ebola on September 3, 2015, over 4,800 Liberians had died of the disease [10]. The Ebola epidemic had a substantial effect beyond these deaths, both on other health outcomes in the country and on Liberia as a whole. An increased number of people died of infectious diseases like malaria because health centers were not functioning at full capacity, and because fear of contracting Ebola kept people from seeking treatment [11]. The maternal mortality rate increased drastically, and is expected to return to its appalling 1995 level [12]. Since schools were closed for months, children have missed out on crucial aspects of their education; the national economy is expected to contract or experience a recession in the next year; and widespread crop failures mean that food security is expected to become an issue as Liberia begins to rebuild [12-14].

VII. WHAT IS HEALTH SYSTEMS STRENGTHENING?

The WHO and partner organizations define a **health system** as that which includes “all levels, from service delivery to policy making and implementation ... [and] all the organizations, institutions and resources that are devoted to producing health actions whose primary intent is to improve health” [15]. From a prevention perspective, a nation’s vulnerability to ongoing and newly emerging public health risks can be considerably mitigated by the existence of robustly coordinated health systems [16]. The WHO identifies six foundational focus areas for creating resilient health systems [17]:

1. Provision of effective, safe, and appropriate health care services,
2. Creation of a high-functioning health workforce,
3. Utilization of a health information system that provides reliable health data,
4. Access to quality medical supplies,
5. Support from a successful health financing system, and
6. Effective leadership and governance.

Generally speaking, **health systems strengthening (HSS)** requires “improving these six health system building blocks and managing their interactions in ways that achieve more equitable and sustained improvements across health services and health outcomes,” which in turn necessitates technical and political expertise and intervention in the actual rebuilding process [17]. Simply put, HSS requires considerable improvements to and integration of all health sector functional components, as well as earnest and focused collaboration among key players. Government leaders in the Ministry of Health (MOH) and various other entities, donor agencies, non-governmental organizations (NGOs), and the private sector must be present, functional,

well-supported, and united [18]. To that end, Isabelle Wachsmuth of the WHO has identified some of the key concepts for successful HSS: understanding the local context and stakeholders, building trust, emphasizing local leadership and ownership, collaboration, and empowering other sectors of society, such as educators and entrepreneurs.

It must be noted that these definitions are as inclusionary as possible, identifying all the priority areas that HSS ought to focus on in an ideal world. In reality, however, the majority of low- and middle-income countries (LMICs) face many difficulties in their HSS efforts as compared to high-income countries, whose health systems function at increased capacities and with higher standards [19]. For LMICs to be capable of meeting the recognized operational standards and required international guidelines, they need, amongst other priorities, substantial donor funding, technical assistance, and advances in infrastructure and technology [19].

VIII. CURRENT CHALLENGES / AREAS FOR POSSIBLE INTERVENTION

“Rapid progress towards disease control targets in developing countries is greatly hampered by weak, poorly functioning or in some cases non-existent health systems.”

~ *Strengthening Health Systems: The Role and Promise of Policy and Systems Research* [15]

Prior to the Ebola crisis in Liberia, the country had begun prioritizing efforts for strengthening its overall health system [20]. Areas of concentration included the following:

i. **Health care delivery:** Disparities in health care delivery and access to care have long been a hindrance for improving health outcomes in Liberia. The 2008 Population Census found that 66% of rural residents live more than one-hour’s walk from the nearest health facility, compared with 15% of their urban counterparts, thus complicating the provision of care [6]. Prior to the Ebola crisis, the MOH was transitioning from a nationally run, urban-concentrated health care system to a decentralized delivery system in an effort to facilitate access for those in the more rural regions [6, 20]. This transition entailed the restructuring of the MOH in order to offer accessible, integrated, and affordable health care for all, thus establishing a robust sub-national system [6, 20]. With the significant weakening of the entire health care system during the Ebola epidemic, additional plans to improve the nation’s health systems could not be carried out. The further strengthening of the newly decentralized health care system will require careful coordination, communication, supervision, training, and recruitment efforts.

ii. **Surveillance:** Per the International Health Regulations (IHR) established by the WHO in 2005, all World Health Assembly member countries, including Liberia, are obligated to strengthen their core public health capacities for surveillance and response [19, 20]. The IHR instruct that no country can be prepared for and/or respond adequately to its own emerging public health needs or crises if it is not able to successfully monitor the situation. For countries

such as Liberia that possess a weak infrastructure and few resources, these surveillance, reporting, and response requirements cannot be met without considerable financial and capacity-building aid [19]. For Liberia, compliance will require building capacity within the currently transitioning system to ensure that at each level of the system, surveillance can be conducted sustainably and effectively. Rather than passively responding to observable trends, an effective surveillance system must “prevent, detect and manage” diseases and outbreaks [21]. It is particularly crucial to direct resources to improving and securing the widespread availability of diagnostic tests (ideally, rapid tests) for Ebola and other infectious diseases, as well as point of care tests that can be administered in clinical settings. One significant surveillance constraint in Liberia is the country’s weak capacity for data collection, with current reliance on paper as opposed to electronic documentation, which often results in lost and inconsistent data [6].

iii. **Health workforce:** Though Liberia was dealing with a severe workforce shortage prior to the Ebola crisis, the epidemic has unquestionably exacerbated this shortage. Since the recent outbreak of Ebola in Liberia, approximately 8% of the country’s health care workers have died [6, 12, 20]. Recognizing the need for trained health personnel as a major priority, the Liberian government has begun strengthening its training programs, and intends to place significant resources on expanding and expediting these efforts [6, 20]. The government has also started to focus on increasing utilization of community health workers (CHW), and plans to employ CHW as a link between community members and the health system. CHW are capable of bringing health messaging and awareness to communities, connecting individuals to providers, and rebuilding community members’ trust in the health sector [20].

iv. **Maternal and child health:** High rates of poverty, low rates of literacy and education, and poor access to quality health services have all contributed to Liberia’s high infant and maternal mortality rates (see Health Statistics, section V.iii., above) [22]. In fact, the Liberian government labeled its high maternal mortality rate as one of the country’s most important public health concerns prior to the Ebola crisis [6]. HSS efforts as well as national public health objectives continue to prioritize improvements in maternal and child health [6, 20, 23]. For example, the World Bank provides funding to Liberia’s MOH for its Health Systems Strengthening Project, which aims to improve the quality of service provision at secondary-level health centers providing maternal and child health (MCH) services as well as infectious disease care [23]. However, in May 2013, the World Bank decided to reallocate \$6 million (USD) of that funding to the immediate needs of containing and controlling the transmission of Ebola [23]. This substantial shift in focus has led, at least temporarily, to reduced funding and resources available to address MCH improvements. This issue, coupled with the post-Ebola reality of significant human resource losses in the form of health care personnel trained in providing MCH services, has led to a lingering fear of seeking maternal and pediatric care at health facilities in some Liberian communities.

v. **Physical infrastructure:** As the presence of the Ebola virus in Liberia so desperately demonstrated, the country currently suffers from weak infrastructure on a variety of levels. The nation faces a considerable challenge with regards to establishing clean, safe, and reliable

water sources for a large number of communities, especially in health care settings [24]. Also made painfully more evident by the recent epidemic was the fact that Ebola control and prevention efforts were greatly hindered by significant delays in receiving laboratory confirmation of infection, caused in part by weak laboratory systems and low numbers of trained laboratory personnel [25]. The country has a recognized shortage of health care facilities, and plans to build many new facilities in its continuing decentralization efforts [20]. Debate still exists regarding which strategy will prove most cost-effective, efficient, and appropriate: building at the nation-wide and/or health system-wide level or focusing on each region's individual needs. Leaders need to prioritize the planning and implementation of growth, and must determine what resources are available and of what quality those resources are, what types of facilities are needed, and reasonable plans for the construction of those facilities.

vi. **Coordination:** Almost by definition, HSS requires collaboration between government sectors, health care systems and/or system levels, international aid agencies, and NGOs working in similar and/or overlapping areas. Greater focus is being placed on forging connections between the public and private sectors, as well as NGOs and government entities. In January 2015, while still in their emergency Ebola response phase, the government of Liberia created nine working groups to coordinate between all the partnering agencies and collaboratively create strategic plans for the future [26]. While each organization comes to the table with its own funding, mandates, and restraints, these stakeholders must all cooperate and negotiate in order to implement effective programming and improvements [26]. Successful coordination should be based on a foundation of trust and respect amongst partners, which necessitates that the government, NGOs, and private entities involved each operate under guiding principles promoting good governance, accountability, and transparency [27]. Additionally, efficient use of limited HSS resources (funding, personnel, and time) requires minimizing or preventing, as much as possible, any duplication of efforts across programs and organizations. Ideally, partners should communicate and coordinate amongst themselves thoroughly enough that each agency is aware of the others working in a particular technical area, geographic region, or with certain resources, so that existing programs can be fully leveraged and new resources and ideas directed to where they are most needed [27].

IX. FACTORS AND COMPLICATIONS TO KEEP IN MIND

i. **Financing:** Liberia has been dependent on international aid for the past decade, specifically from the U.S. and other foreign governments, multilateral coalitions, and NGOs. Notably, in 2012, the Liberian government contributed only 19% (\$20 USD per capita) of the country's total health care expenditure. The realities witnessed, losses experienced, and funds exhausted during and after the Ebola epidemic have only increased the necessity for Liberia to continue receiving external aid for expediting HSS efforts [6].

Most international aid given to Liberia's health sector in the past ten years has been allocated to the control and prevention of HIV, malaria, and tuberculosis, as well as improvements in MCH services [16]. Only recently, in hindsight from lessons learned during the Ebola crisis, has the development and strategic strengthening of the country's health system come under critical

scrutiny, and stakeholders have identified specific needs for improvement, including the urgency of adequate external funding [16]. Simply put, “instead of allocating huge resources that ‘react’ to pandemics, funds must be earmarked to ‘prevent’ pandemics” [19]. Complicating this effort is the fact that a portion of international aid recently specified for HSS was, by necessity, reallocated to address the immediate needs of Ebola response and control [23].

In addition to restructuring the health care delivery system (see Section VIII.i.), the Liberian government has recently restructured its handling of external aid, with a new “pooled fund for co-mingling donor funds and aligning them with national priorities” [20]. This new model promotes contracting of services and allocation of necessary funds from the national level directly to agencies at the sub-national level, reducing the need to outsource service delivery to NGOs [20].

ii. **Sustainability:** In September 2015, President Johnson Sirleaf announced that Liberia has now entered the implementation stages of its Post-Ebola Economic Stabilization and Recovery Plan. Johnson Sirleaf highlighted the need, and even “expectation,” of support from the country’s bilateral and multilateral partners [28]. Aside from the necessary financial aid for development and improvement, the country’s leaders and health experts must also consider how to ensure that HSS efforts are undertaken in a way that promotes sustainability for all components of the improved system [26]. In line with this, measures must be put into place to avoid external aid leading to greater vulnerability and/or reduced governance, for either the health system or Liberia as a whole. In other words, the receipt of aid for health systems strengthening should not promote Liberian dependence on the international community [26].

Alternatively, Liberian officials must find partners willing to invest in long-term recovery and development efforts, which is often a greater challenge than seeking emergency funds for immediate crises. Speaking of the loss of many health care professionals during the Ebola crisis and the need for increased clinical education, Dr. Paul Farmer realistically notes that “it’s not attractive to many development funders to spend money on long-term postsecondary education” [29]. It must also be noted that the aid received during the initial Ebola response helped establish an external emergency system and stronger surveillance operations in the country; to leverage these resources utilizing a more sustainable approach, all partners should consider how these various system components can best be integrated into Liberia’s public system (or with other private programs) [26].

iii. **Contextual:** Unfortunately, many Liberian citizens continue to distrust the government and/or the health system; any HSS efforts will thus require community components in order to rebuild trust and partnerships. Similarly, but at a different intersection, fatigue within the Liberian government (as well as many other African nations) exists concerning the receipt of external aid and governance. Past and new partners must be sensitive to this wariness when attempting to build and reinforce collaboration for HSS projects.

Furthermore, given Liberia’s coastal seat in the West African region and the rapid pre-Ebola expansion of global trade and tourism in the area, the country is increasingly vulnerable to other

infectious diseases such as HIV, malaria, Lassa fever, and hepatitis, as well as potential future Ebola epidemics. It would be foolhardy to presume that Ebola could not return to Liberia or to believe that another infectious disease or major public health crisis could not appear in the region. If this occurred at present or even in the near future, the same systematic weaknesses, surveillance shortcomings, and financial hardships experienced during the recent Ebola outbreak would likely limit the Liberian government's ability to respond to the new threat. Furthermore, certain cultural factors that contributed to the proliferation of Ebola transmission, including preference for familial care of the sick and certain burial practices, remain considerable obstacles for preventing or curbing the rise of another epidemic in the country.

X. INSTRUCTIONS

The Question: what is your team's plan for health systems strengthening in post-Ebola Liberia, and how will you defend that plan as the most effective plan?

i. Your Task:

The challenges facing Liberia in the post-Ebola phase are immense. You and your fellow group members will serve as interdisciplinary consultants to a large, international, non-governmental organization working on tackling health systems strengthening in Liberia. This NGO, a current partner of the Liberian government, has been asked by the Ministry of Health to provide technical consulting and expertise, and, ultimately, to assist with the development of a strategic plan for HSS in Liberia post-Ebola.

The Liberian government and this large NGO partner are eager to move forward, and therefore need you to work quickly to develop a post-Ebola HSS plan that is **realistic**, **prioritized**, and **actionable**. While you are not expected to provide a solution to every single health systems-related challenge currently confronting Liberia, you are required to **justify** your decisions, plans, and priorities. Please focus on no more than five key priorities. Think hard about which issues are most immediately pressing *now* and which issues presently need solid groundwork laid for the *future*, as well as the priorities of the Liberian government. Your proposal should include a timeline that considers short-, mid-, and long-term HSS needs [26]. Your budget is **unspecified and unrestricted**, because your NGO partner needs innovative solutions and does not want your creativity constrained; however, a feasible, sustainable, and timely approach is also expected. Think about what could reasonably be accomplished in a **five-year timeframe**. It is highly recommended that your team research operational budgets and funding streams in order to justify your figures.

ii. The Details:

You and your interdisciplinary team must prepare a 12-minute oral presentation with supporting slides outlining your plan for your NGO partner and the Liberian government. All members of your group must be present for the final presentation, and should be prepared to respond to questions from the judging panel, although there is no requirement that all group members speak. There will be six minutes of Q&A immediately after your presentation. Please cite all sources consulted on a single slide at the end of your presentation (although there is no need to discuss your references in the actual oral presentation). Please create a one-page budget brief (normal margins, 12 pt. font). The judges do not need to see specific line items, but the budget should show how you would justify your overall budget decisions. Bring four physical copies of your slides and budget brief to the presentation for the judges to have in hand. Please save your slide deck and budget brief to the provided flash drive. Your slide deck must be presented in PowerPoint, and the budget brief must be presented in Word. The team flash drive with the saved slide deck and budget brief should be enclosed in an envelope labeled with your team number and submitted to the front desk of the Vanderbilt Institute for Global Health (2525 West End Ave. Suite 750) between 8AM-10AM on Friday, February 12, 2016. No late entries will be accepted.

XI. CONCLUSION

The Liberian government and their NGO partner are looking forward to hearing your proposals and taking action to strengthen Liberia's health system for the benefit of all Liberians. They are excited to see the results of your passion, skills, and creativity, and appreciate your dedication and thoughtfulness.

XII. JUDGING RUBRIC

Category	Possible Points
<p>Justification The proposed intervention ...</p> <ul style="list-style-type: none"> - Accounts for educational, economic, political, cultural, and religious factors - Is evidence-based and/or uses an evidence-based approach - Includes relevant data to support the project - Analyzes strengths, weaknesses, opportunities, and threats/challenges (SWOT analysis) 	20
<p>Creativity and Innovation The proposed intervention ...</p> <ul style="list-style-type: none"> - Integrates multiple disciplines - Uses resources creatively - Reflects “outside-the-box” thinking - Is culturally acceptable - Is feasible with regard to financial, human resource, and time constraints - Has potential for expansion and growth 	25
<p>Clarity and Organization The proposed intervention has (a) ...</p> <ul style="list-style-type: none"> - Clear definition of the problem - Outcomes that are specific, measurable, achievable, realistic, and time-bound (SMART objectives) - Plan for assessment and evaluation of goals and outcomes - Plan for logical implementation of project activities 	20
<p>Case Specific Information The proposal addresses ...</p> <ul style="list-style-type: none"> - How it will alleviate the critical global health issue - How it will impact education, economics, politics, and culture of Liberia - Feasibility of implementation in Liberia - Sustainability beyond the project period - Cultural acceptability and involvement of key stakeholders 	25
<p>Delivery of Presentation Presenters ...</p> <ul style="list-style-type: none"> - Effectively use their team’s visual aids (PowerPoint, Prezi, etc.) - All speak with a clear voice, use appropriate body language, and make eye contact with audience - All demonstrate knowledge and command during Q & A session 	10
Total Possible Points	100

XIII. ACKNOWLEDGEMENTS

Case Writers:

Grace Fletcher, Graduate School and School of Medicine

Erin Graves, RN, School of Medicine

Jennifer Neczypor, RN, School of Nursing

Please see a complete list of acknowledgements in the event program.

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XV. APPENDICES

Appendix 1. Map of Liberia and surrounding West African nations



Map No. 3775 Rev. 7 UNITED NATIONS
October 2010

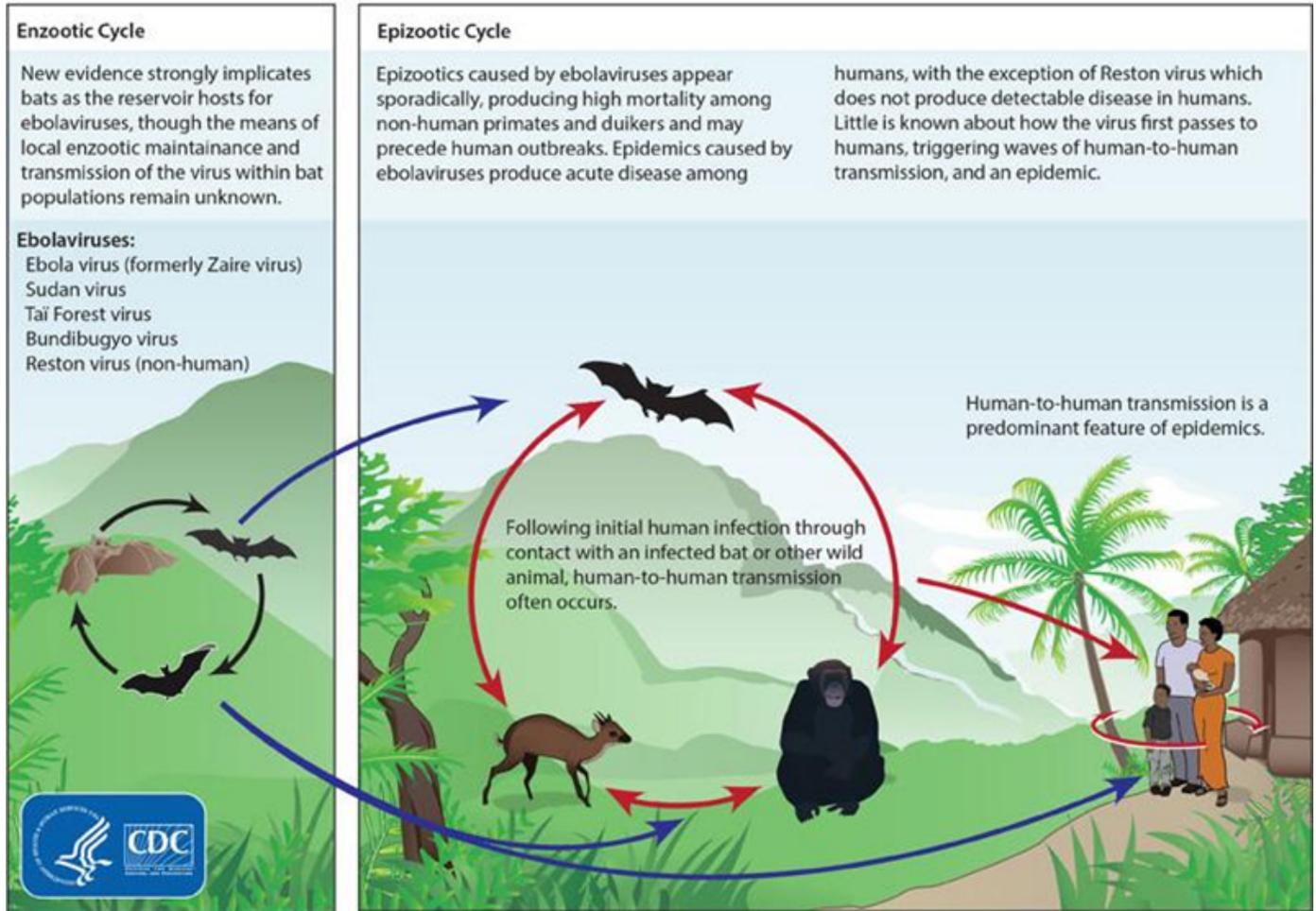
Department of Peacekeeping Operations
Cartographic Section

Source: United Nations, Department of Peacekeeping Operations, Cartographic Section, October 2010.

Adapted from Center for Strategic and International Studies, 2012 [8]

Appendix 2. Ebolavirus transmission (speculated)

Ebolavirus Ecology



Obtained from Centers for Disease Control and Prevention, 2014 [37]