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*A Report of the CSIS Global Health Policy Center*

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# How Did Ebola Impact Maternal and Child Health in Liberia and Sierra Leone?

Cathryn Streifel<sup>1</sup>

The current Ebola epidemic, which originated in Guinea in December 2013 and subsequently swept through Liberia and Sierra Leone, is the largest outbreak of the virus in history.<sup>2</sup> As of September 23, 2015, a total of 28,295 cases, including 11,295 deaths, have been reported in the three most affected countries.<sup>3</sup> The number of reported Ebola cases varied widely in Liberia and Sierra Leone at the subnational level, with the capital cities reporting a shockingly high number of new cases at the height of their respective outbreaks.<sup>4</sup> Health workers were exceptionally vulnerable to the virus and suffered a disproportionately high loss of life, with 513 fatalities<sup>5</sup> (7.16 percent of Liberia's health workers, 5.61 percent in Sierra Leone).<sup>6</sup>

At the start of the Ebola outbreak, health systems in Liberia and Sierra Leone were among the weakest in the world. Each country had gone through more than a decade of internal war, and was in the midst of a slow recovery since peace accords were concluded in the early years of the twenty-first century. In 2014, both countries recorded two of the world's highest rates of maternal mortality, with Sierra Leone at the very top of the list.<sup>7</sup> While Liberia had made considerable progress on improving health outcomes among children under the age of five over the previous decade, in 2014 Sierra Leone still recorded the world's highest rate of child mortality of the countries in which data was

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<sup>1</sup> Cathryn Streifel is a program manager and research associate with the CSIS Global Health Policy Center. The author would like to thank CSIS Global Health Policy Center interns Emily Foecke and Gillian Locke for their research support.

<sup>2</sup> This paper focuses on Liberia and Sierra Leone because of similarities in their recent histories and in their epidemic curves.

<sup>3</sup> World Health Organization, "Ebola Situation Report—23 September 2015," 2015, <http://apps.who.int/ebola/current-situation/ebola-situation-report-23-september-2015>. To put these figures in perspective, the largest outbreak of Ebola ever recorded prior to the current one occurred in Uganda in 2000–2001 and consisted of 425 cases, including 224 deaths.

<sup>4</sup> World Health Organization, "Reported Ebola Cases Monthwise," <http://maps.who.int/MonthlySituationReports/>.

<sup>5</sup> WHO, "Ebola Situation Report—23 September 2015."

<sup>6</sup> David K. Evans, Markus Goldstein, and Anna Popova, "The Next Wave of Deaths from Ebola? The Impact of Health Care Worker Mortality," World Bank, Policy Research Working Paper 7344, July 2015, [http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2015/06/26/090224b082f92f94/2\\_0/Rendared/PDF/TheNext0wave00are0worker0mortality.pdf](http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2015/06/26/090224b082f92f94/2_0/Rendared/PDF/TheNext0wave00are0worker0mortality.pdf).

<sup>7</sup> World Bank, "Data: Maternal mortality ratio (national estimate, per 100,000 live births)," <http://data.worldbank.org/indicator/SH.STA.MMRT.NE>.

available.<sup>8</sup> These poor health outcomes were reflective of the countries' severe shortage of health workers; Liberia and Sierra Leone figured among the 11 countries with the world's smallest and least-skilled health workforce.<sup>9</sup> With health workers heavily concentrated in the countries' capital cities, the deficit of health workers was especially stark in rural areas. Further, the populations faced important barriers to accessing health services, particularly during the rainy season when levels of health service utilization routinely and sharply declined.<sup>10</sup> It was in this context that Ebola struck the region.

Our understanding of how exactly Ebola impacted maternal and child health in Liberia and Sierra Leone is constrained by limited and often dubious data. Even so, there is a widely held belief that health facilities in Liberia and Sierra Leone were completely overwhelmed by the outbreak, leaving the population largely unable to access basic health services for over a year. Many assume that the toll on maternal and child health was especially substantial and that the indirect effects of the outbreak will be far greater than the direct consequences of Ebola.<sup>11</sup> These assumptions intuitively make sense given the high fatalities among health workers and reports of health personnel deserting their posts or being reassigned to work in Ebola treatment facilities. In reality, however, Ebola's impact was not such a sweeping transformative factor. Explaining what actually happened in the health sector during the Ebola outbreak in Liberia and Sierra Leone requires taking into account preexisting weaknesses in the health systems, seasonal weather patterns, and considerable variation in number of Ebola cases at the subnational level.

Moreover, it is critical to be cautious in making categorical cause-and-effect claims. At present, there is insufficient available data to conclusively identify which specific factors allowed certain health facilities in highly affected areas to remain open throughout the outbreak. What data does exist shows that health systems were weak prior to the outbreak and they did not entirely collapse in the wake of Ebola. Contrary to what is widely presumed, the majority of health facilities in Liberia and Sierra Leone remained open throughout the outbreak. While citizens' confidence in health systems was damaged during the outbreak due to fear, and rates of health service utilization declined at the national level, there was considerable variation at the subnational level. In Sierra

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<sup>8</sup> Save the Children, "State of the World's Mothers 2014: Saving Mothers and Children in Humanitarian Crises," 2014, [http://www.savethechildren.org/atf/cf/%7B9def2ebe-10ae-432c-9bd0-df91d2eba74a%7D/SOWM\\_2014.PDF](http://www.savethechildren.org/atf/cf/%7B9def2ebe-10ae-432c-9bd0-df91d2eba74a%7D/SOWM_2014.PDF).

<sup>9</sup> World Health Organization, "Density of Doctors, Nurses and Midwives in the 49 Priority Countries," [http://www.who.int/hrh/fig\\_density.pdf?ua=1](http://www.who.int/hrh/fig_density.pdf?ua=1).

<sup>10</sup> Richard Mallett, "Understanding rainy seasons, malnutrition, and community health in Sierra Leone," *Washington Post*, September 16, 2014, <http://www.washingtonpost.com/blogs/monkey-cage/wp/2014/09/16/understanding-rainy-seasons-malnutrition-community-health-in-sierra-leone/>.

<sup>11</sup> See Craig Spencer, "Ebola Isn't Over Yet," *New York Times*, August 17, 2015, [http://www.nytimes.com/2015/08/18/opinion/craig-spencer-ebola-isnt-over-yet.html?\\_r=0](http://www.nytimes.com/2015/08/18/opinion/craig-spencer-ebola-isnt-over-yet.html?_r=0); Erika Hayden, "Maternal health: Ebola's lasting legacy," *Nature*, March 4, 2015, <http://www.nature.com/news/maternal-health-ebola-s-lasting-legacy-1.17036>; Betsy McKay, "Ebola's Long Shadow: West Africa Struggles to Rebuild Its Ravaged Health-Care System," *Wall Street Journal*, June 4, 2015, <http://www.wsj.com/articles/africa-struggles-to-rebuild-its-ravaged-health-care-system-1433457230>; Assessment Capacities Project, "Ebola in West Africa: Impact on Health Systems," February 26, 2015, 1–3, [http://acaps.org/img/documents/b-20150226 Ebola\\_health\\_system.pdf](http://acaps.org/img/documents/b-20150226 Ebola_health_system.pdf).

Leone, while districts that were heavily affected by the outbreak recorded the largest reductions in health service utilization by women and children, some districts minimally affected by the outbreak noted similar reductions, while others actually reported increases in health service use.<sup>12</sup> Liberia also recorded an imperfect correlation between the number of Ebola cases and impact on health service utilization at the county level.<sup>13</sup>

Today, health systems in Liberia and Sierra Leone are both weaker and stronger than they were prior to the outbreak. On the one hand, the outbreak took a heavy toll on health systems due to the loss of a large portion of a small pool of health talent.<sup>14</sup> It is clear that investing in health workforce development and devising strategies to attract and retain health professionals in rural areas will be a top priority for rebuilding the health system. On the other hand, the response to the outbreak created opportunities for health system strengthening. Efforts have been made to document health workers in both countries and there are now new or strengthened payment systems in place for them.<sup>15</sup> There are also new capacities in infection prevention and control and improved channels to reach citizens with crucial health messages.

## The Course of the Ebola Outbreak in Liberia and Sierra Leone

Liberia's first two cases of Ebola were confirmed in Lofa County at the end of March 2014. By May, the virus had spread to the Kailahun District of Sierra Leone.<sup>16</sup> At the start of the outbreak, Liberia did not have a single hospital with an isolation ward and Sierra Leone had one isolation ward in Kenema District that was established to treat cases of Lassa fever.<sup>17</sup> In both countries, most health facilities did not have any personal protective equipment and few staff were trained in infection prevention and control. Further, early government messages on Ebola were met by citizens with mistrust and resistance due to misperceptions about an unfamiliar disease and unfamiliar response measures. In this environment, the number of cases of Ebola quickly multiplied and then increased exponentially.<sup>18</sup>

On August 9, Director-General Margaret Chan of the World Health Organization declared the outbreaks a public health emergency of international concern.<sup>19</sup> By September, Ebola

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<sup>12</sup> Sierra Leone Ministry of Health and Sanitation and UN Children's Fund, "Sierra Leone Health Facility Assessment 2015: Impact of the EVD [Ebola virus disease] Outbreak on Sierra Leone's Primary Health Care System," June 1, 2015.

<sup>13</sup> Government of Liberia Ministry of Health, "Investment Plan for Building a Resilient Health System in Liberia: 2015 to 2021," April 15, 2015, <http://pages.au.int/sites/default/files/LIBERIA-%20Investment%20Plan%20for%20Building%20a%20Resilient%20Health%20System.pdf>.

<sup>14</sup> Evans, "The Next Wave of Deaths from Ebola? The Impact of Health Care Worker Mortality."

<sup>15</sup> UN Development Programme, "Payments Programme for Ebola Response Workers: Cash at the Front Lines of a Health Crisis," May 2015.

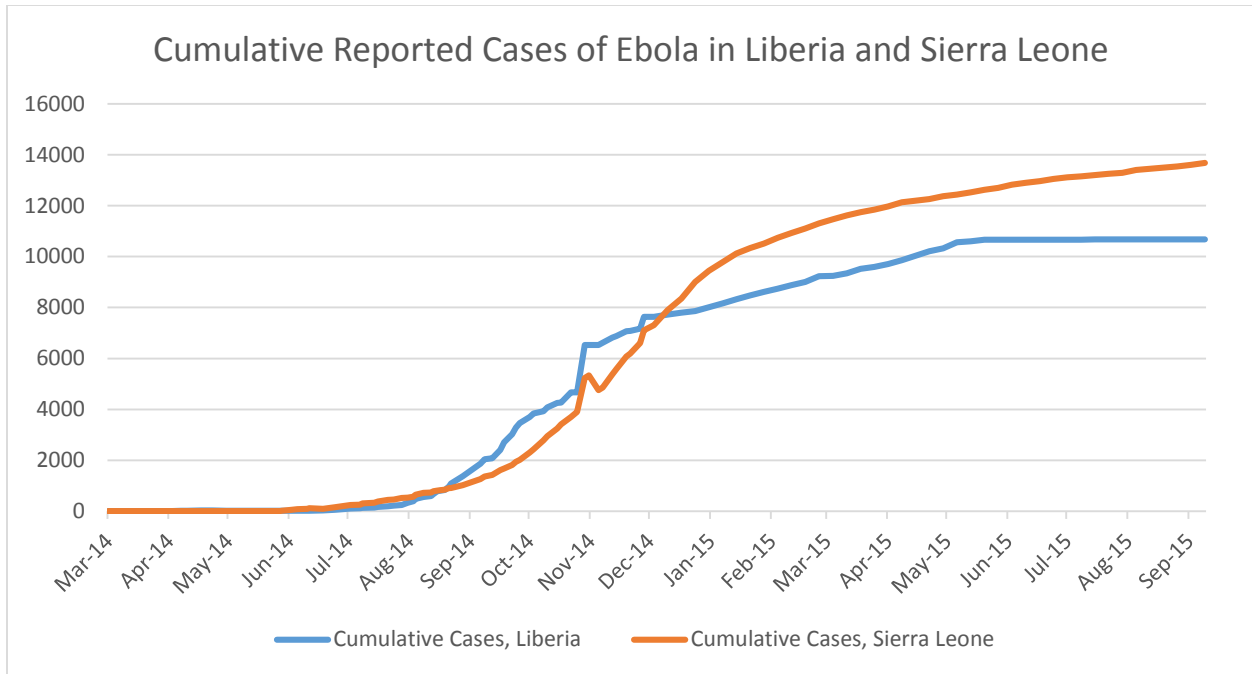
<sup>16</sup> Liberia's Lofa County and Sierra Leone's Kailahun District both border Guinea. The first cases of Ebola in Liberia and Sierra Leone were importations from Guinea.

<sup>17</sup> Lassa fever is an acute viral hemorrhagic illness that occurs in West Africa.

<sup>18</sup> World Health Organization, "One year into the Ebola epidemic: a deadly, tenacious and unforgiving virus," January 2015, <http://who.int/csr/disease/ebola/one-year-report/ebola-report-1-year.pdf>.

<sup>19</sup> Ibid.

had been recorded in all of Liberia’s 15 counties and Sierra Leone’s 14 districts.<sup>20</sup> It was not until this time that the international community pledged substantial resources to the response. In October, Monrovia, Liberia’s capital, was reporting more than 300 new cases per week and Sierra Leone was reporting more than 400 new cases per week nationwide. Health workers were particularly vulnerable to the virus due to their proximity to those infected with Ebola.<sup>21</sup>



Source: Centers for Disease Control and Prevention, “2014 Ebola Outbreak in West Africa—Reported Cases Graphs,” September 24, 2015, <http://www.cdc.gov/vhf/ebola/outbreaks/2014-west-africa/cumulative-cases-graphs.html>.

In November, Liberia saw new cases of Ebola decline suddenly and unexpectedly, and in December Sierra Leone surpassed Liberia as the country with the largest cumulative number of cases.<sup>22</sup> By early December, the World Health Organization estimated that both countries had sufficient beds in Ebola treatment facilities to safely meet the demand for services at the national level. However, due to the uneven geographic distribution of cases, some areas continued to be overwhelmed, while others had unused capacity.<sup>23</sup> In December and early January 2015, cases in Sierra Leone began to drop rapidly. The sharp decline plateaued in February but cases continued to decrease slowly and steadily.

Liberia was declared free of Ebola on May 9, but new cases resurfaced less than two months later.<sup>24</sup> Following an effective government-led response, Liberia was again

<sup>20</sup> WHO, “Reported Ebola Cases Monthwise.”

<sup>21</sup> WHO, “One year into the Ebola epidemic: a deadly, tenacious and unforgiving virus.”

<sup>22</sup> Ibid.

<sup>23</sup> World Health Organization, “Ebola Response Roadmap Situation Report—December 3, 2014,” December 2014, <http://apps.who.int/ebola/en/ebola-situation-report/situation-reports/ebola-situation-report-3-december-2014>.

<sup>24</sup> World Health Organization, “Recurrence of Ebola transmission in Liberia,” July 3, 2015, <http://www.who.int/mediacentre/news/ebola/03-july-2015-liberia/en/>.



declared Ebola-free on September 3 and is currently in a period of heightened vigilance.<sup>25</sup> On August 24, for the first time since the start of the outbreak, no patients were being treated for Ebola in all of Sierra Leone. However, new cases were identified in September.

Since the end of July, case incidence throughout the subregion has stayed below 10 cases per week.<sup>26</sup> In the week to September 20, only two new cases of Ebola were confirmed, both of which were in Guinea.<sup>27</sup>

## The State of Health Systems Prior to the Ebola Outbreak

When considering the second-order impacts of the epidemic, it is important to understand the state of the health systems and the health trends that existed in the two countries when the outbreak began. While progress in health outcomes, particularly among children under the age of five, has been more promising in Liberia than in Sierra Leone, the health systems in both countries were exceptionally weak at the start of their outbreaks. Both countries faced similar, persistent challenges: stubbornly high maternal mortality and acute shortages in skilled health workers. These inadequacies exacerbated the Ebola crisis and its effects.

### Liberia

When the first case of Ebola was confirmed in Liberia, the country's health system was fragile, but showing encouraging signs of progress. After the end of the country's civil war in 2003,<sup>28</sup> Liberia's Ministry of Health and Social Welfare introduced sound policies to rebuild its shattered health system and expand financial transparency in the health sector. In 2007, Liberia introduced a National Health Policy that provided citizens with access to a free package of basic health services that included communicable disease control, emergency care, maternal and newborn health, and mental health care.<sup>29</sup> In 2008, Liberia and its international development partners entered a Joint Financing Agreement for health; under this agreement, partners channeled their contributions to Liberia via a Health Sector Pool Fund, which allowed the Ministry of Health and Social Welfare to finance programs aligned with Liberian domestic priorities.<sup>30</sup> In 2011, the basic package of free health services was broadened to include treatment for

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<sup>25</sup> World Health Organization, "Ebola transmission in Liberia over. Nation enters 90-day intensive surveillance period," September 3, 2015, <http://www.who.int/mediacentre/news/statements/2015/ebola-transmission-over-liberia/en/>.

<sup>26</sup> WHO, "Ebola Situation Report—23 September 2015."

<sup>27</sup> Ibid.

<sup>28</sup> Between 1989 and 2003, Liberia endured a 14-year civil war that claimed the lives of an estimated 270,000 Liberians and displaced more than 800,000.

<sup>29</sup> Richard Downie, *The Road to Recovery: Rebuilding Liberia's Health System* (Washington, DC: CSIS, August 2012), [http://csis.org/files/publication/120822\\_Downie\\_RoadtoRecovery\\_web.pdf](http://csis.org/files/publication/120822_Downie_RoadtoRecovery_web.pdf).

<sup>30</sup> Although the United States is Liberia's single-largest bilateral donor, it has not made its bilateral contributions to Liberia through the Health Sector Pool Fund. Patrick T. Lee et al., "An analysis of Liberia's 2007 national health policy: lessons for health systems strengthening and chronic disease care in poor, post-conflict countries," *Globalization and Health* 7, no. 37 (October 2011), <http://www.globalizationandhealth.com/content/pdf/1744-8603-7-37.pdf>.

noncommunicable diseases, child nutrition, dental and eye care, and neglected tropical diseases.<sup>31</sup>

During this period, health outcomes, particularly those of children under the age of five, improved steadily. By 2012, Liberia was one of the first countries in sub-Saharan Africa to achieve its millennium development goal target of reducing the mortality rate of children under the age of five to one-third of its 1990 level. Programs to prevent and treat malaria among children and progress in extending vaccine coverage contributed to this success.<sup>32</sup> In 2013, 89 percent of children under the age of two were immunized against diphtheria, pertussis, and tetanus, compared with just 31 percent in 2004.<sup>33</sup>

The challenges, however, remained immense. With a stubbornly high maternal mortality ratio of 1,072 deaths per 100,000 live births in 2013, Liberia figured among the 15 countries with the highest maternal mortality in the world.<sup>34</sup> Low access to family planning services, a high number of teenage pregnancies,<sup>35</sup> and a high national fertility rate all contributed to the high incidence of maternal death.<sup>36</sup> In addition, Liberia faced a chronic shortage of health workers and remained a long way off from employing even the bare minimum number of health workers required to provide the services included in the National Health Policy package. Indeed, in 2010, stark statistics showed Liberia with 3 doctors, nurses, and midwives per 10,000 people, well below the 23 per 10,000 people minimum recommended by the World Health Organization.<sup>37</sup> Further, the distribution of the health workforce was uneven, with populations living in rural areas particularly underserved. At the start of the outbreak, 60 percent of Liberia's health workers were concentrated in Monrovia, where only a little over 30 percent of the country's population lived.<sup>38</sup>

## Sierra Leone

Since the end of its civil war in 2002,<sup>39</sup> Sierra Leone has faced challenges translating post-conflict reconstruction into improved health outcomes, particularly for women and children. Sierra Leone continues to be one of the poorest countries in the world and has some of the world's worst social and economic indicators. For instance, 90 percent of

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<sup>31</sup> Downie, *The Road to Recovery: Rebuilding Liberia's Health System*.

<sup>32</sup> Countdown to 2015, "Fulfilling the Health Agenda for Women and Children, The 2014 Report: Liberia," [http://www.countdown2015mnch.org/documents/2014Report/Liberia\\_Country\\_Profile\\_2014.pdf](http://www.countdown2015mnch.org/documents/2014Report/Liberia_Country_Profile_2014.pdf).

<sup>33</sup> Gavi, "Liberia Factsheet," <http://www.gavi.org/country/liberia/>.

<sup>34</sup> World Bank, "Data: Maternal mortality ratio (national estimate, per 100,000 live births)."

<sup>35</sup> According to the latest Demographic and Health Survey (2013), 31 percent of adolescent women between the ages of 15 and 19 in Liberia are already mothers or pregnant with their first child.

<sup>36</sup> Liberia Institute of Statistics and Geo-Information Services, Ministry of Health and Social Welfare [Liberia], National AIDS Control Program [Liberia], and ICF International, "Liberia: Demographic and Healthy Survey, 2013," National Demographic and Health Survey Program, August 2014, <http://dhsprogram.com/pubs/pdf/FR291/FR291.pdf>.

<sup>37</sup> WHO, "Density of Doctors, Nurses and Midwives in the 49 Priority Countries."

<sup>38</sup> Government of Liberia and Development Partners, "Republic of Liberia: The Economic Stabilization and Recovery Plan," United Nations Ebola Response, April 2015, [http://ebolaresponse.un.org/sites/default/files/liberia\\_recovery\\_strategy\\_en.pdf](http://ebolaresponse.un.org/sites/default/files/liberia_recovery_strategy_en.pdf).

<sup>39</sup> Between 1991 and 2002, Sierra Leone endured an 11-year civil war that claimed the lives of an estimated 70,000 Sierra Leoneans and displaced another 2.6 million.

women aged 15 to 49 are circumcised, making Sierra Leone one of the countries with the highest prevalence of female genital mutilation in the world.<sup>40</sup>

At the start of the outbreak, Sierra Leone had among the highest rates of maternal and child mortality in the world. In recent years, these rates had actually been increasing. In 2014, 18 percent of children in Sierra Leone did not survive until age five.<sup>41</sup> This is due in part to the country's slow progress in extending vaccination coverage; vaccination coverage increased from 38 percent in 2001 to 78 percent in 2013.<sup>42</sup> Further, statistics showed that in 2014, only 24 percent of pregnancy needs were met by midwives and 1 out of 23 women died during pregnancy or childbirth.<sup>43</sup> In addition to a lack of essential drugs and medical equipment, Sierra Leone's severe deficit of health workers contributed to these poor health outcomes.<sup>44</sup> Similarly to Liberia, the distribution of the health workforce was starkly uneven; at the start of the outbreak, 50 percent of the health workforce was concentrated in Freetown, Sierra Leone's capital, where just 16 percent of the population lived.<sup>45</sup>

To improve on these poor health outcomes, the Ministry of Health and Sanitation launched the Free Health Care Initiative in 2010. Under this initiative, children under the age of five and pregnant and lactating women were granted access to a free package of basic health services. According to government reports, this initiative led to an uptake of medical care for children and facility-based deliveries. However, the initiative's success was hampered by a lack of accountability and institutional capacity.<sup>46</sup> Auditors from Sierra Leone's anticorruption agency found that nurses and doctors were selling drugs and charging for services that were supposed to be free under the Free Health Care Initiative. Moreover, in March 2013, Sierra Leone's Anti-Corruption Commission indicted the country's 29 top health officials on charges of misusing half a million dollars in grants from Gavi, the Vaccine Alliance.<sup>47</sup>

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<sup>40</sup> Statistics Sierra Leone and ICF International, "Sierra Leone: 2013 Demographic and Health Survey, Key Findings," National Demographic and Health Survey Program, 2014, <http://dhsprogram.com/pubs/pdf/SR215/SR215.pdf>.

<sup>41</sup> Save the Children, "State of the World's Mothers 2014: Saving Mothers and Children in Humanitarian Crises."

<sup>42</sup> Statistics Sierra Leone and ICF International, "Sierra Leone Demographic and Health Survey 2013."

<sup>43</sup> UN Population Fund, "The State of the World's Midwifery 2014: A Universal Pathway, A Woman's Right to Health," June 2014, [http://www.unfpa.org/sites/default/files/pub-pdf/EN\\_SoWMy2014\\_complete.pdf](http://www.unfpa.org/sites/default/files/pub-pdf/EN_SoWMy2014_complete.pdf).

<sup>44</sup> Sierra Leone employed 2 doctors, nurses, and midwives per 10,000 people in 2010.

<sup>45</sup> Government of Sierra Leone, "National Ebola Recovery Strategy for Sierra Leone 2015–2017," United Nations Ebola Response, July 2015, [http://ebolaresponse.un.org/sites/default/files/sierra\\_leone\\_recovery\\_strategy\\_en.pdf](http://ebolaresponse.un.org/sites/default/files/sierra_leone_recovery_strategy_en.pdf).

<sup>46</sup> Amnesty International, "At a Crossroads: Sierra Leone's Free Health Care Policy," August 2011, [https://www.amnestyusa.org/sites/default/files/pdfs/sierrall\\_maternaltrpt\\_0.pdf](https://www.amnestyusa.org/sites/default/files/pdfs/sierrall_maternaltrpt_0.pdf).

<sup>47</sup> Adam Nossiter, "Sierra Leone's Health Care System Becomes a Cautionary Tale for Donors," *New York Times*, April 13, 2013, [http://www.nytimes.com/2013/04/14/world/africa/sierra-leone-graft-charges-imperil-care-and-aid.html?\\_r=0&gwh=710624B49AF7E03FCD4B285B9DDD58B0&gwt=pay](http://www.nytimes.com/2013/04/14/world/africa/sierra-leone-graft-charges-imperil-care-and-aid.html?_r=0&gwh=710624B49AF7E03FCD4B285B9DDD58B0&gwt=pay).

Select Health Indicators				
	Liberia		Sierra Leone	
	2007	2013	2008	2013
Under-five mortality rate (deaths per 1,000 live births)	110	94	140	156
Infant mortality rate (deaths per 1,000 live births)	71	54	89	92
Neonatal mortality rate (deaths per 1,000 live births)	32	26	36	39
Maternal mortality rate (deaths per 100,000 live births)	994	1,072	857	1,165
Fertility rate (births per woman)	5.2	4.7	5.1	4.9
Married women using a modern family planning method (percent)	10.3	19.1	8.2	16
Unmet need for family planning among unmarried women (percent)	35.6	31.1	27.6	25
Births in health facilities (percent)	36.9	56	24.6	54
Children 12–23 months fully vaccinated (percent)	39	55	39.8	58

Sources: Liberia Institute of Statistics and Geo-Information Services, Ministry of Health and Social Welfare [Liberia], National AIDS Control Program [Liberia], and ICF International, “Liberia Demographic and Health Survey 2013”; Liberia Institute of Statistics and Geo-Information Services, Ministry of Health and Social Welfare [Liberia], National AIDS Control Program [Liberia], and Macro International Inc., “Liberia: Demographic and Health Survey, 2007,” National Demographic and Health Survey Program, June 2008, <http://dhsprogram.com/pubs/pdf/FR201/FR201.pdf>; Statistics Sierra Leone and ICF International, “Sierra Leone Demographic and Health Survey 2013: Key Findings”; Statistics Sierra Leone and ICF Macro, “Sierra Leone Demographic and Health Survey 2008,” National Demographic and Health Survey Program, July 2009, <http://dhsprogram.com/pubs/pdf/FR225/FR225.pdf>.

## The Indirect Effects of the Ebola Outbreak

Although international development partners have made generous pledges in support of the countries’ recovery plans for the health sector, important data and resource gaps persist. What little data has been collected during the outbreak comes mainly from a small number of innovative studies, news stories, and reports by implementing partners that estimate the level and projected impact of the decline in service utilization in the select facilities in which they have been operating.<sup>48</sup> In Sierra Leone, two health facility surveys were conducted, making it the country with the most comprehensive data

<sup>48</sup> See McKay, “Ebola’s Long Shadow: West Africa Struggles to Rebuild Its Ravaged Health-Care System”; Preetha Iyengar, Kate Kerber, Cuallah Jabbeh Howe, and Bernice Dahn, “Services for Mothers and Newborns during the Ebola Outbreak in Liberia: The Need for Improvement in Emergencies,” *PLOS Current Outbreaks*, April 16, 2015, <http://currents.plos.org/outbreaks/article/services-for-mothers-and-newborns-during-the-ebola-outbreak-in-liberia-the-need-for-improvement-in-emergencies/>; UNFPA, “Rapid Assessment of Ebola Impact on Reproductive Health Services and Service Seeking Behaviour in Sierra Leone,” March 2015, [http://www.mamaye.org.sl/sites/default/files/evidence/UNFPA%20study%20\\_synthesis\\_March%2025\\_final.pdf](http://www.mamaye.org.sl/sites/default/files/evidence/UNFPA%20study%20_synthesis_March%2025_final.pdf).

available.<sup>49</sup> A sizeable portion of the data fails to take seasonal variation into consideration. The fact that only a few studies have been conducted and under difficult circumstances is an important limitation that must be kept in mind when coming to conclusions about the indirect effects of the Ebola outbreak.

Available data shows that in both Liberia and Sierra Leone, the majority of health facilities remained open throughout the Ebola outbreak. This is contrary to the presumptions made by the international community. According to health facility surveys conducted in October 2014 and March 2015 in Sierra Leone, only 4 percent and 2 percent of peripheral health units were closed, respectively.<sup>50</sup> Further, the March survey found little evidence of health care workers being absent from their peripheral health units.<sup>51</sup> These estimates seem surprisingly low and should be independently verified. In Liberia, there were some health facility closures, but they were mostly partial or temporary.<sup>52</sup> During the second half of 2014, more than 80 percent of public and private health facilities, except for facilities located in Montserrado County and Margibi County, Liberia's counties most heavily affected by Ebola, continued to report on routine health information at levels consistent with the pre-Ebola period, suggesting that they were still operational.<sup>53</sup> As Ebola cases declined, health service utilization levels began to recover to pre-Ebola levels and in February 2015 a World Bank Group survey conducted throughout the country found no evidence of households avoiding health services.<sup>54</sup>

While facilities remained open, they lacked basic amenities, such as water, functional latrines, electricity, and refrigeration, due to the poor conditions that existed prior to the outbreak. For instance, only 34 percent of peripheral health units in Sierra Leone currently have access to electricity.<sup>55</sup> In Liberia, only 55 percent of health facilities have access to both water and electricity.<sup>56</sup>

It is clear, however, that the Ebola outbreak damaged confidence in the health systems. In both countries, communities expressed fear and mistrust of health facilities and health workers. Similarly, there were reports of health workers fearing patients,

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<sup>49</sup> UN Children's Fund, "Sierra Leone Health Facility Survey 2014: Assessing the impact of the EVD outbreak on health systems in Sierra Leone," December 3, 2014, [http://www.unicef.org/emergencies/ebola/files/SL\\_Health\\_Facility\\_Survey\\_2014Dec3.pdf](http://www.unicef.org/emergencies/ebola/files/SL_Health_Facility_Survey_2014Dec3.pdf); Ministry of Health and Sanitation [Sierra Leone] and UN Children's Fund, "Sierra Leone Health Facility Assessment 2015: Impact of the EVD Outbreak on Sierra Leone's Primary Health Care System," June 1, 2015.

<sup>50</sup> In Sierra Leone, peripheral health units include maternal and child health posts, community health posts, and community health centers. They are the entry point for mothers and children into the public health system. In 2010, the national public health system included 11 clinics and 30 hospitals.

<sup>51</sup> Ministry of Health and Sanitation [Sierra Leone] and UN Children's Fund, "Sierra Leone Health Facility Assessment 2015: Impact of the EVD Outbreak on Sierra Leone's Primary Health Care System."

<sup>52</sup> Government of Liberia Ministry of Health, "Republic of Liberia Investment Plan for Building a Resilient Health System in Liberia: 2015 to 2021."

<sup>53</sup> Ibid.

<sup>54</sup> World Bank, "The Socio-Economic Impacts of Ebola in Liberia: Results from a High-Frequency Cell Phone Survey, Round 4," February 24, 2015, [http://www-wds.worldbank.org/external/default/WDSContentServer/WDS/IB/2015/08/07/090224b082c253a6/1\\_0/Rendered/PDF/The0socio0econ0cy0cell0phone0survey.pdf](http://www-wds.worldbank.org/external/default/WDSContentServer/WDS/IB/2015/08/07/090224b082c253a6/1_0/Rendered/PDF/The0socio0econ0cy0cell0phone0survey.pdf).

<sup>55</sup> Ministry of Health and Sanitation [Sierra Leone] and UN Children's Fund, "Sierra Leone Health Facility Assessment 2015: Impact of the EVD Outbreak on Sierra Leone's Primary Health Care System."

<sup>56</sup> Government of Liberia Ministry of Health, "Investment Plan for Building a Resilient Health System in Liberia: 2015 to 2021."

particularly pregnant women, and being unwilling to care for them.<sup>57</sup> This led to a decrease in the utilization of health services in the two countries; in 2014, the use of health services fell by 23 percent in Sierra Leone<sup>58</sup> and by 39 percent in Liberia.<sup>59</sup>

Accurately attributing drops in service utilization to the Ebola outbreak, or any single factor, is difficult. In both Liberia and Sierra Leone, health service utilization is subject to seasonal variation under normal circumstances, with the rainy season seeing a decline in use.<sup>60</sup> The rainy season makes preexisting barriers to accessing health facilities—such as long distances to health facilities, poor road networks, and inadequate transport services—even more difficult for patients to surmount.<sup>61</sup> Additionally, the rainy season tends to be a food-insecure period in which families do not have the financial resources to miss a day of work or pay for transportation and health services.<sup>62</sup> The Ebola outbreak was in full swing at the start of or during the rainy season in both countries.

Given that available data shows that health service utilization fluctuated at the subnational level, it is important to note the large variations in the number of Ebola cases recorded between districts and counties. While the staggering number of cases recorded in Freetown and Monrovia were widely publicized, there is less awareness that some areas in both countries were not heavily affected by the virus. For instance, Liberia’s Maryland County has not recorded an Ebola case since September 2014 and Sierra Leone’s Bonthe district only ever recorded one case. Further, five counties in Liberia did not record more than 11 cases each throughout the entire outbreak.<sup>63</sup>

The following graphs highlight the wide variations in the ways Ebola affected districts in Sierra Leone and counties in Liberia differently over the course of the outbreak and underscore the importance of taking a subnational perspective when considering the indirect effects of the outbreak on maternal and child health services, while remaining cognizant of the national-level factors that impact the local level.

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<sup>57</sup> Pregnant women were especially feared because caring for them required a high-risk exposure on the part of the health worker. UNFPA, “Rapid Assessment of Ebola Impact on Reproductive Health Services and Service Seeking Behaviour in Sierra Leone.”

<sup>58</sup> Government of Sierra Leone, “National Ebola Recovery Strategy for Sierra Leone 2015–2017,” United Nations Ebola Response, July 2015, [http://ebolaresponse.un.org/sites/default/files/sierra\\_leone\\_recovery\\_strategy\\_en.pdf](http://ebolaresponse.un.org/sites/default/files/sierra_leone_recovery_strategy_en.pdf).

<sup>59</sup> Republic of Liberia Ministry of Health and Social Welfare, “Ministry of Health and Social Welfare Annual Report 2014,” [http://www.mohsw.gov.lr/documents/MOHSW%20Annual%20Report%202014\\_Revised.pdf](http://www.mohsw.gov.lr/documents/MOHSW%20Annual%20Report%202014_Revised.pdf).

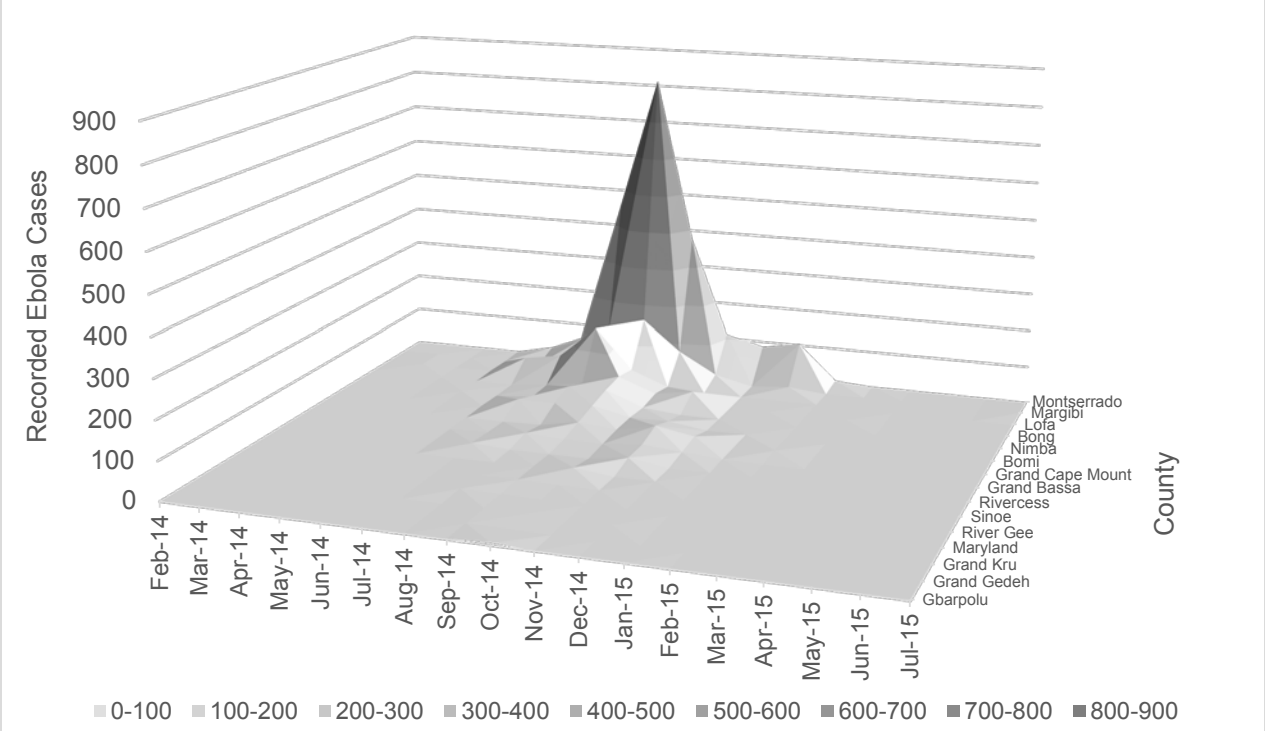
<sup>60</sup> The rainy season in Liberia and Sierra Leone occurs between May and November.

<sup>61</sup> UN Children’s Fund, “Sierra Leone Health Facility Survey 2014: Assessing the impact of the EVD outbreak on health systems in Sierra Leone.”

<sup>62</sup> Mallett, “Understanding Rainy Seasons, malnutrition, and community health in Sierra Leone.”

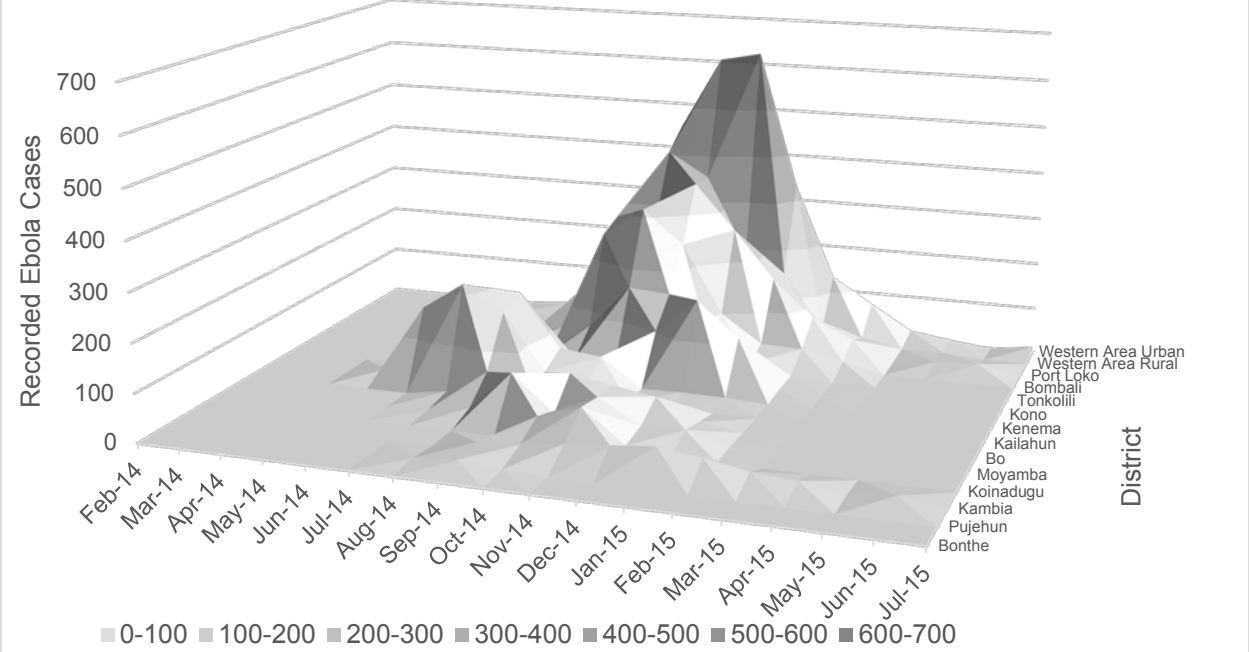
<sup>63</sup> WHO, “Reported Ebola Cases Monthwise.”

**Liberia: Monthly Recorded Ebola Cases by County**



Source: WHO, "Reported Ebola Cases Monthwise," <http://maps.who.int/MonthlySituationReports/>.

**Sierra Leone: Monthly Recorded Ebola Cases by District**



Source: WHO, "Reported Ebola Cases Monthwise," <http://maps.who.int/MonthlySituationReports/>.

## Effects on Maternal Health Services<sup>64</sup>

### Sierra Leone

Between May and September 2014, facility-based deliveries decreased by 23 percent and antenatal care visits by 27 percent in Sierra Leone. These national figures obscure the large variations that existed between districts. For instance, while Kambia, Port Loko, and Bonthe experienced large reductions in facility-based deliveries during this period (between 38 and 41 percent), Pujehun recorded a decrease of just 5 percent. It is noteworthy that Bonthe, which recorded only one case of Ebola throughout the outbreak, is one of the districts that reported some of the largest declines in women giving birth in facilities. Similar geographic variation was seen in reductions in antenatal care visits.<sup>65</sup> Because these figures do not account for seasonal variation, these reductions cannot be solely attributed to the Ebola outbreak. For instance, Kambia began recording these large reductions several months before it was directly affected by the virus. By September, facility-based delivery levels and antenatal care visits were actually showing signs of recovery in many districts, including in Kailahun and Kenema, the first epicenters of the outbreak in Sierra Leone.<sup>66</sup>

When seasonal variation is accounted for, facility-based deliveries decreased by 7 percent and antenatal care visits by 14 percent nationwide during the period October 2014 to January 2015.<sup>67</sup> Port Loko and the Western Area, the districts most heavily affected by the outbreak, recorded the largest drops in facility-based deliveries and antenatal care visits.<sup>68</sup> The districts recording the largest reductions in health service utilization during the outbreak differ depending on whether seasonal variation is accounted for, suggesting that a large decline in health service use should be expected even under normal circumstances. This highlights the challenges in precisely estimating the impact of the crisis.

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<sup>64</sup> This section examines the effects of the Ebola outbreak on facility-based deliveries and antenatal care visits. The fourth antenatal care visit is used as a proxy for antenatal care visits. These indicators were selected based on availability of at least some data from both countries and their suitability as proxies for overall maternal and neonatal health.

<sup>65</sup> Kambia, Bonthe, and Port Loko also experienced large reductions in antenatal visits (48, 39, and 37 percent, respectively).

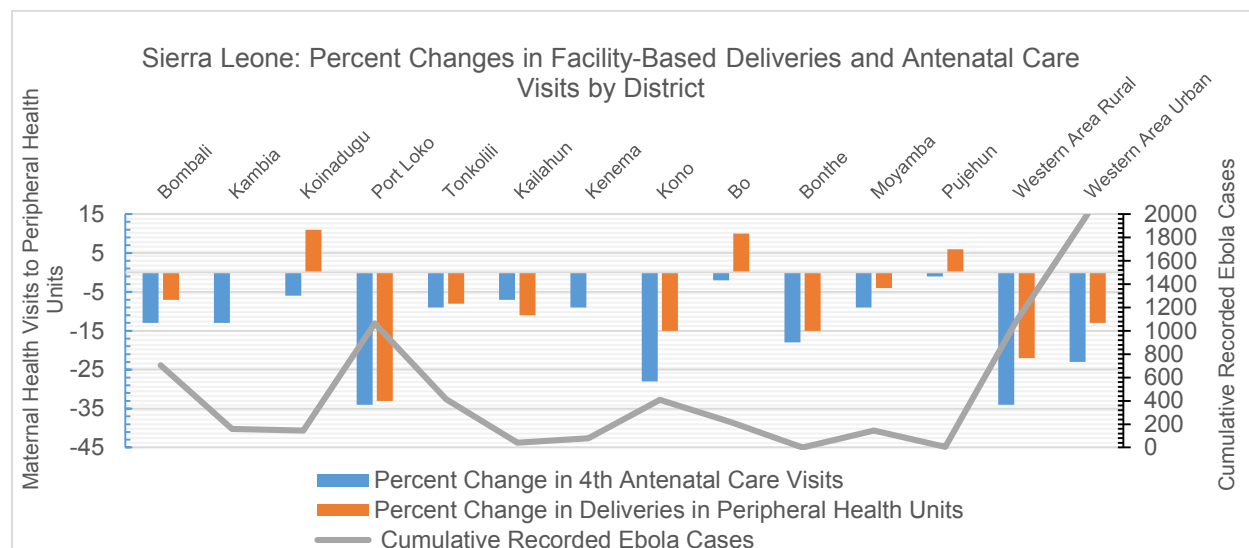
<sup>66</sup> UN Children's Fund, "Sierra Leone Health Facility Survey 2014: Assessing the impact of the EVD outbreak on health systems in Sierra Leone."

<sup>67</sup> Seasonal variation is accounted for by comparing the change in average levels between this period and the same period the previous year. This makes it more likely that reductions in health service utilization are due to the Ebola outbreak. Using currently available data, it is not possible to compare the overall reduction in health service use with estimates that take seasonal variation into account across the same time period. This is an important limitation in available data. In the absence of such data, the comparison between the period May through September and the adjacent period October through January may still be revealing because the rainy season occurs during the period May through September and during the start of the period October through January and Ebola cases reached their highest levels during the period September through November (across the two periods).

<sup>68</sup> In Port Loko and the Western Area, facility-based deliveries decreased by 33 percent and 17 percent, respectively; and antenatal care visits decreased by 34 percent and 27 percent, respectively. Ministry of Health and Sanitation [Sierra Leone] and UN Children's Fund, "Sierra Leone Health Facility Assessment 2015: Impact of the EVD Outbreak on Sierra Leone's Primary Health Care System."



Among the least-affected districts, there are noteworthy variations that would be missed if these districts were considered in aggregate. For instance, while Bonthe recorded a decrease in facility-based deliveries by 15 percent and a decrease in antenatal care visits by 18 percent compared to the same period the previous year, facility-based deliveries in Pujehun actually increased by 6 percent.<sup>69</sup>



Note 1: Kambia and Kenema districts recorded no changes (zero percent) in facility-based deliveries.  
 Note 2: Pre-Ebola period: October 2013–January 2014. Post-Ebola period and cumulative Ebola cases reported between October 2014–January 2015.  
 Source: Ministry of Health and Sanitation [Sierra Leone] and UN Children’s Fund, “Sierra Leone Health Facility Assessment 2015: Impact of the EVD Outbreak on Sierra Leone’s Primary Health Care System.”

While some pregnant women continued to access peripheral health units for antenatal care throughout the outbreak, overall the quality of care they likely received was inadequate. Indeed, in March 2015, only 26 percent of facilities were equipped with the complete antenatal care drugs package.<sup>70</sup>

## Liberia

Between August and December 2014, facility-based deliveries decreased by 38 percent and first antenatal care visits by 43 percent in Liberia.<sup>71</sup> Data on maternal and neonatal health service use at the subnational level is not currently available. However, there is some data available from Monrovia, which shows that 74 percent of deliveries in Monrovia took place in a health facility and 89 percent of pregnant women accessed antenatal care.<sup>72</sup> Given that this time period corresponds to the height of the outbreak

<sup>69</sup> Ministry of Health and Sanitation [Sierra Leone] and UN Children’s Fund, “Sierra Leone Health Facility Assessment 2015: Impact of the EVD Outbreak on Sierra Leone’s Primary Health Care System.” Bonthe and Pujehun share a border.

<sup>70</sup> Ibid.

<sup>71</sup> These figures take seasonal variation into account. Government of Liberia, “Investment Plan for Building a Resilient Health System 2015–2021.”

<sup>72</sup> Data for Ebola Recovery, “Results from a Population-Based Survey of Monrovia: Key Findings,” <http://www.data4ebolarecovery.org/health/>. A country-wide SMS-based mobile phone survey found consistent findings. See Karen Grépin and Rumi Chunara, “Using SMS Data to Monitor Exposure to the Ebola

and Monrovia is located in Montserrado County, the hardest-hit county by far, this estimate is surprising, as a higher level of service disruption would have been expected. This figure may reflect the higher concentration of health workers and health facilities that serve Monrovia.

## Effects on Immunization Services<sup>73</sup>

Over the past year, both countries recorded alarming drops in immunization coverage. As a result of these immunity gaps, both countries have recorded cases of measles, with Liberia seeing its worst measles outbreak in years.<sup>74</sup> “Catch up” vaccine strategies are underway in both countries and will be essential to reducing preventable child deaths and the spread of outbreaks of vaccine-preventable infectious diseases.

### Sierra Leone

Between May and September 2014, the number of children who received the pentavalent vaccine dropped by 21 percent in Sierra Leone.<sup>75</sup> While Kambia and Bonthe reported the largest reductions (between 40 and 49 percent), other districts were also significantly affected. Alarming, during this period, several peripheral health units reported that no children had accessed them for the purpose of being immunized.<sup>76</sup>

When seasonal variation is accounted for, the number of children receiving the pentavalent vaccine dropped by 17 percent nationwide during the period October 2014 to January 2015. Similar to findings on maternal health, Port Loko and the Western Area recorded the sharpest drops in coverage (between 25 and 39 percent). Among least-affected districts, there were noteworthy variations. For instance, while the number of children receiving the pentavalent vaccine dropped by 23 percent in Bonthe, Pujehun actually recorded a 1 percent increase.<sup>77</sup> It is noteworthy that Bonthe, which was minimally affected by the Ebola outbreak, recorded some of the largest reductions in vaccine coverage throughout the outbreak and recorded similar reductions to the Western Area during the height of its epidemic. This may reflect the low levels of trust the population had in the health system prior to the outbreak being compounded by hearing the news of rising Ebola cases in neighboring districts.

There were, however, variations among districts, with some peripheral health units showing remarkable resilience. For instance, while Kailahun and Koinadugu recorded

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Outbreak and to Estimate Its Impact on Health Seeking Behaviour in Liberia,” *Economic Impacts of Ebola* 5, May 28, 2015, <http://www.theigc.org/wp-content/uploads/2015/06/Economic-impacts-of-Ebola-Bulletin-51.pdf>.

<sup>73</sup> Given that immunization services play a pivotal role in enabling access to other health services, they are a good way to assess whether children are accessing health services.

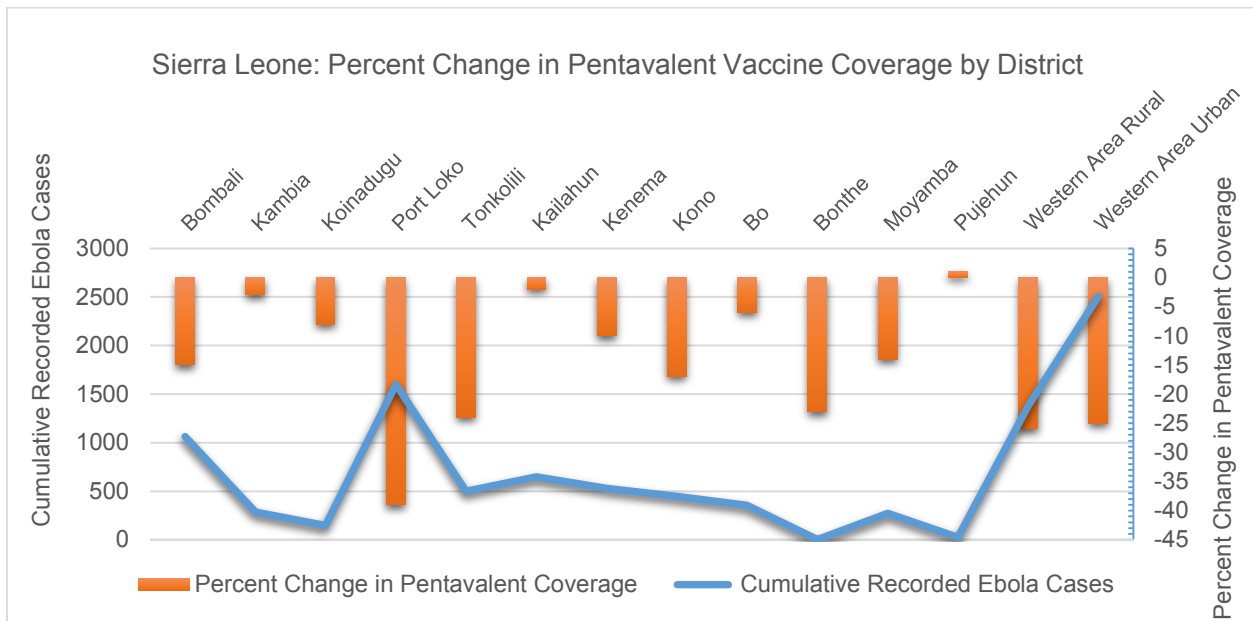
<sup>74</sup> Less than 20 percent of confirmed measles cases were among children who had been immunized against measles.

<sup>75</sup> The pentavalent vaccine is a combination of the following five vaccines: diphtheria, tetanus, whooping cough, hepatitis B, and Haemophilus influenzae type b. Because it requires repeat visits to a health facility, the third dose is used here as a proxy indicator for routine immunization coverage.

<sup>76</sup> UN Children’s Fund, “Sierra Leone Health Facility Survey 2014: Assessing the impact of the EVD outbreak on health systems in Sierra Leone.”

<sup>77</sup> Ministry of Health and Sanitation [Sierra Leone] and UN Children’s Fund, “Sierra Leone Health Facility Assessment 2015: Impact of the EVD Outbreak on Sierra Leone’s Primary Health Care System.”

reductions in the number of children receiving the pentavalent vaccine overall, 50 percent of peripheral health units located in these districts saw increases in the number of children who were immunized,<sup>78</sup> which suggests that even subnational data may obscure the reality on the ground and highlights the importance of individual communities in health utilization.



Note: Change in coverage: October-January 2013/14 to October-January 2014/15. Cumulative Ebola cases recorded between February 2014–July 2015.

Source: Ministry of Health and Sanitation [Sierra Leone] and UN Children’s Fund, “Sierra Leone Health Facility Assessment 2015: Impact of the EVD Outbreak on Sierra Leone’s Primary Health Care System.”

## Liberia

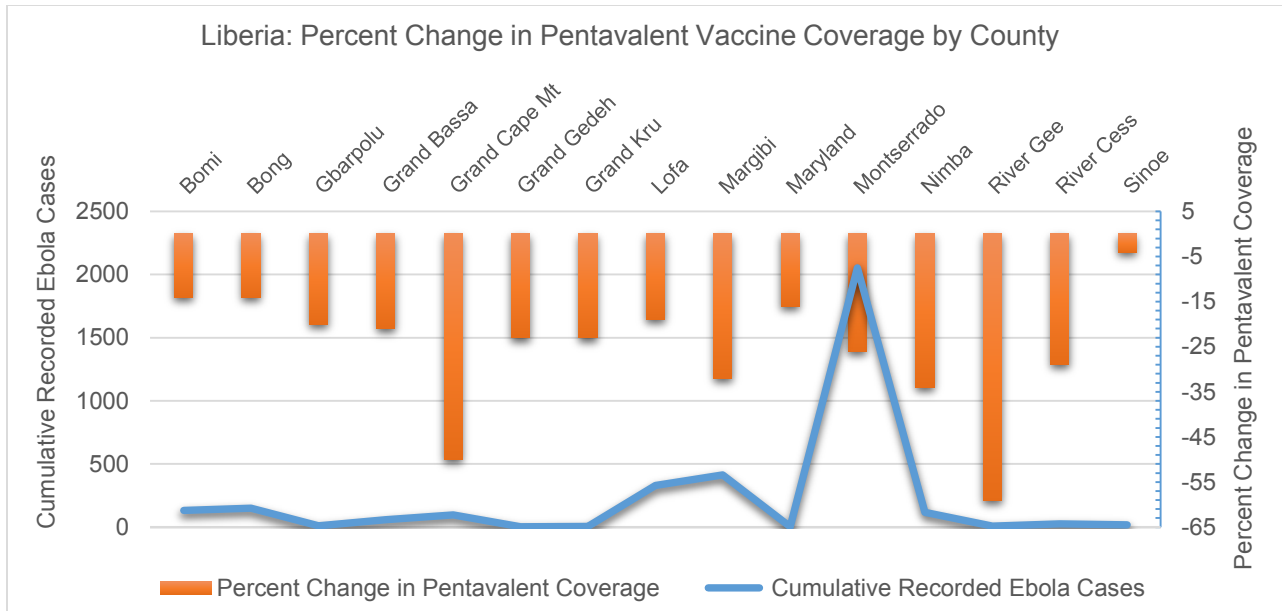
Between August and December 2014, the number of children receiving the measles vaccine and the diphtheria, pertussis, and tetanus vaccine dropped by 45 and 53 percent, respectively, compared to the same period the previous year in Liberia. The largest reductions were recorded in August 2014.<sup>79</sup>

Between 2013 and 2014, the number of children who received the pentavalent vaccine dropped by 25.6 percent in Liberia, with all 15 counties recording a decrease in pentavalent vaccine coverage.<sup>80</sup> However, this decrease was not closely associated with recorded Ebola cases. For instance, River Gee, which recorded only eight cases of Ebola throughout the outbreak, recorded the largest drop in pentavalent vaccine coverage. This may reflect disruptions to the national drugs supply chain.

<sup>78</sup> Ibid.

<sup>79</sup> Government of Liberia, “Investment Plan for Building a Resilient Health System 2015–2021.”

<sup>80</sup> Republic of Liberia Ministry of Health and Social Welfare, “Ministry of Health and Social Welfare Annual Report 2014”; Republic of Liberia Ministry of Health and Social Welfare, “Ministry of Health and Social Welfare Annual Report 2013,” <http://www.mohsw.gov.lr/documents/MOHSWAnnualReport2013.pdf>.



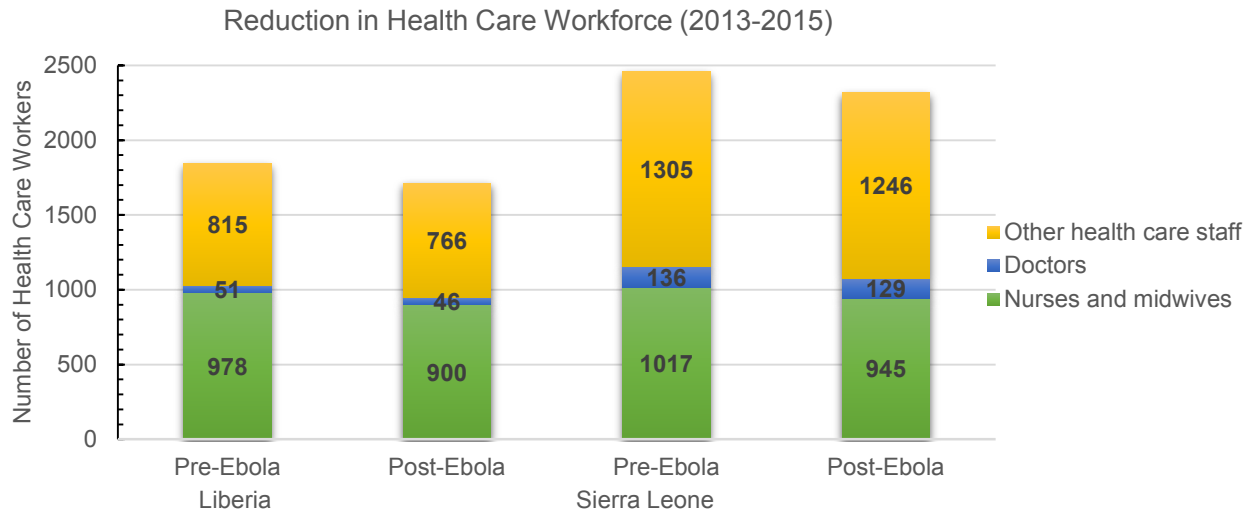
Note: Change in coverage: 2013–2014. Cumulative recorded Ebola cases measured February 2014–July 2015. Sources: Republic of Liberia Ministry of Health and Social Welfare, “Ministry of Health and Social Welfare Annual Report 2014”; Republic of Liberia Ministry of Health and Social Welfare, “Ministry of Health and Social Welfare Annual Report 2013.”

## The Situation Today

The impact of the Ebola outbreak appears to be mixed. Today, health systems in Liberia and Sierra Leone are weaker than they were prior to the outbreak, but there are new opportunities for strengthening health systems and improving health outcomes.

The acute shortage of skilled health workers worsened significantly during the Ebola outbreak. Due to uniquely high-exposure levels and the lack of both personal protective equipment and training in infection prevention and control, health workers were exceptionally vulnerable to the virus. As of September 23, 2015, 513 health workers lost their lives to Ebola in the two countries.<sup>81</sup> In addition, due to university closures, the countries lost a graduating class of skilled health workers. At present, there is no available data on either the number of national health workers who deserted their posts due to fear or the number who joined the health workforce to contribute to the Ebola response.

<sup>81</sup> WHO, “Ebola Situation Report—23 September 2015.” To put this in perspective, while 0.11 percent of the general population died from Ebola in Liberia, Liberia lost 7.16 percent of its health workers. Similarly, while 0.06 percent of the general population died from Ebola in Sierra Leone, Sierra Leone lost 5.61 percent of its health workers.



Note: Pre-Ebola: 2013. Post-Ebola: May 2015.  
 Source: Evans, “The Next Wave of Deaths from Ebola? The Impact of Health Care Worker Mortality.”

This loss of health workers will have a long-lasting negative impact on maternal and child health outcomes. A recent *Lancet* study estimates that this reduction in health personnel may increase maternal mortality by up to 74 percent in Sierra Leone and 111 percent in Liberia. Further, under-five mortality may increase by up to 19 percent in Sierra Leone and 28 percent in Liberia.<sup>82</sup>

Health worker strikes during the Ebola crisis brought the issue of health worker payment to the fore. At the start of the outbreak, both countries had health workers employed in the national health system who were not on the government payroll. For instance, in February 2015, Liberia estimated that this was the case for 41 percent of its health personnel.<sup>83</sup> Sierra Leone faced additional issues including fraudulent pay claims from “ghost workers” and a lack of distribution channels in place to pay health workers.<sup>84</sup> The World Bank Group and the African Development Bank eventually financed the hazard pay of frontline health workers in both countries and the United Nations Development Program (UNDP) managed a hazard pay database.<sup>85</sup> In December 2014, the UNDP further introduced the use of mobile money services to deliver health worker payments in Sierra Leone and worked to strengthen Liberia’s existing payment

<sup>82</sup> Evans, “The Next Wave of Deaths from Ebola? The Impact of Health Care Worker Mortality.”  
<sup>83</sup> Government of Liberia, “Investment Plan for Building a Resilient Health System 2015–2021.”  
<sup>84</sup> Amy Maxmen, “In Fight against Ebola, Front-Line Health Workers Risked Their Lives and Never Got Paid,” *Newsweek*, May 19, 2015, <http://www.newsweek.com/fight-against-ebola-front-line-health-workers-were-sidelined-funding-333436>.  
<sup>85</sup> Due to sustainability concerns, development partners are usually averse to paying salaries. For example, less than 2 percent of contributions to the Ebola response was reserved for national health workers.

systems.<sup>86</sup> In spite of these improvements, there continue to be reports of health workers who have still not been compensated, fully or at all, for their work.<sup>87</sup>

## Opportunities

The Ebola crisis has led to important new capacities in the two countries that can improve health outcomes if systematically built upon.

Liberia and Sierra Leone have developed new capacities in infection prevention and control. In Sierra Leone, 98 percent of peripheral health units now have screening and triage processes in place and 93 percent have at least two staff trained in infection prevention and control.<sup>88</sup> In Liberia, 65 percent of health facilities now meet infection prevention and control standards.<sup>89</sup> Liberia's new capacities were recently tested when the virus resurfaced at the end of June 2015. The Liberian Incident Management System was successful in containing the cluster of cases; they quickly activated a team that carefully monitored close to 200 contacts and identified five additional cases, all from the same chain of transmission.<sup>90</sup> These new capacities will be important if Ebola becomes endemic to the region and to better manage the countries' current infectious disease burden, which already includes Lassa fever.

Liberia and Sierra Leone now have trained social mobilizers who can spread health messages. In May 2015, the U.S. Centers for Disease Control and Prevention, in partnership with the World Health Organization, the Ministry of Health and Social Welfare, the United Nations Children's Fund, and other partners held a "catch-up" campaign at health facilities throughout Liberia. The purpose of the campaign was to reach 680,000 children under the age of five with an oral polio vaccine, a measles vaccine, and a deworming pill. An estimated 96 to 100 percent of the target population was reached. Trained social mobilizers were fundamental to this large success. Prior to the campaign, they shared information on the campaign with communities, and during the campaign, they monitored participation at health facilities. If they noticed that certain communities were not presenting at health facilities, they traveled to neighborhoods to alleviate concerns and dispel any rumors associated with the campaign.<sup>91</sup> In an environment where there is significant mistrust in government, social mobilizers can play a crucial role in reaching citizens.

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<sup>86</sup> UN Development Programme, "Payments Programme for Ebola Response Workers: Cash at the Front Lines of a Health Crisis."

<sup>87</sup> Jamie Hitchen, "A Year with Ebola: The Grievous Experience of Health Care Workers in Sierra Leone," Africa Research Institute, June 25, 2015, <http://www.africaresearchinstitute.org/blog/part-1-a-year-with-ebola-the-grievous-experience-of-health-care-workers-in-sierra-leone/>.

<sup>88</sup> This corresponds to a 2.6-fold increase in health workers trained in infection prevention and control nationwide (from 4,052 to 10,596). Ministry of Health and Sanitation [Sierra Leone] and UN Children's Fund, "Sierra Leone Health Facility Assessment 2015: Impact of the EVD Outbreak on Sierra Leone's Primary Health Care System."

<sup>89</sup> Government of Liberia, "Investment Plan for Building a Resilient Health System 2015–2021."

<sup>90</sup> WHO, "Recurrence of Ebola transmission in Liberia."

<sup>91</sup> Deblina Datta, U.S. Centers for Disease Control and Prevention, in discussion with the author, June 26, 2015. So far, in Sierra Leone, "catch-up" immunization campaigns have been door-to-door rather than in health facilities.

As a result of the outbreak, improved hygiene practices have been adopted in both countries. According to National Knowledge, Attitudes and Practices Study on Ebola, 83 percent of respondents in Liberia<sup>92</sup> and 80 percent in Sierra Leone now report that they have adopted regular hand washing. Even areas less affected by the outbreak report that they now value this behavior. For instance, in Kono and Port Loko, regular hand washing increased from 22 and 26 percent, respectively, to above 70 percent.<sup>93</sup> These improved hygiene practices can have long-lasting positive effects by preventing the transmission of other infectious diseases, including diarrhea, which is one of the leading causes of mortality among children under the age of five in both countries.

## Conclusion

While Liberia and Sierra Leone have prepared costed plans for the recovery of the health sector, there continue to be important gaps in the understanding of the indirect effects of the Ebola outbreak on maternal and child health. For instance, the ways in which national-level factors affected the subnational level remain unclear. Additionally, while there is anecdotal evidence of a rise in teenage pregnancies, no comprehensive data has been collected. Due to the preexisting weaknesses in the health systems and the wide variations in how Ebola impacted districts and counties over the course of the outbreak, smart, evidence-based investment decisions to support the recovery of the health sector require a careful analysis of the current state of health systems at the subnational level.

Several national priorities are, however, abundantly clear. Investing in health workforce development and developing strategies to attract and retain health workers in rural areas will be critical to mitigating the secondary effects of the loss of health skilled workforce. Both countries have identified this as a priority area in their recovery plans.

Moreover, it is now possible to build upon the new capabilities created during the response, such as a more-robust payroll mechanism for national health workers; referral processes between health facilities; improved surveillance systems and infection prevention and control processes; and the presence of trained social mobilizers. While the data presented in this paper is far from complete, it does suggest that the picture is more variable and complex than is widely assumed, and recovery plans need to better account for these complexities in order to be successful.

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<sup>92</sup> Government of Liberia, Ministry of Health, “National Knowledge, Attitudes and Practices (KAP) Study on Ebola Virus Disease in Liberia,” March 2015, <http://www.mohsw.gov.lr/documents/KAP%20Final.pdf>.

<sup>93</sup> Assessment Capacities Project, “WASH in Guinea, Liberia, and Sierra Leone: The Impact of Ebola,” May 19, 2015, <http://acaps.org/img/documents/t-acaps-bn-ebola-wash-19-may-2015.pdf>.







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