

REPORT

Family Planning During and After the West African Ebola Crisis

Kristin Bietsch , Jessica Williamson, and Margaret Reeves

The West African Ebola outbreak of 2013–2016 had the potential to devastate family planning programs in affected countries, which had made great progress in years prior. We examine monthly provision of family planning service statistics from government sources for Liberia and Sierra Leone from 6 months before the first Ebola case to 24 months after the last Ebola case to measure the impact during and after the epidemic. By calculating the couple-years of protection from service statistics, we find that family planning distribution declined by 65 percent in Liberia and 23 percent in Sierra Leone at the peak of the epidemic. Two years after Ebola, Liberia’s average monthly contraception distribution is 39 percent above precrisis levels, while distribution in Sierra Leone increased by 27 percent, findings echoed in data from the Demographic and Health Survey and Multiple Indicator Cluster Survey. Increased contraceptive use comes from implants in both countries, and injectables in Liberia. This study indicates that the family planning sector can recover, and continue to improve, following a significant disruption and is a lesson in resilience.

SIGNIFICANCE/BACKGROUND

The West African Ebola outbreak of 2013–2016 caused over 11,000 deaths (World Health Organization 2016a) and devastated the already fragile health systems of Liberia, Sierra Leone, and Guinea. During the crisis, staffing shortages, quarantines, interruptions to supply chain, health facility closures, and fear of health facilities and workers resulted in significant disruptions to the provision and utilization of a range of health services, including inpatient health services and surgery (Bolkan et al. 2014), malaria treatment (Plucinski et al. 2015), vaccinations (Barden-O’Fallon et al. 2015), obstetric care (Barden-O’Fallon et al. 2015; UNWomen 2014), and family planning (Barden-O’Fallon et al. 2015; UNWomen 2014; Camara et al. 2017).

The United Nations (UN) released a Gender Alert in February 2015 noting that reduced access to contraceptives as a result of the Ebola crisis would put women at an increased risk of unintended pregnancy (UN Women 2014). Given the risks of unintended pregnancy and the high rates of maternal and child mortality in the three affected countries prior to the Ebola crisis, the disruption of these services and potential gaps in contraceptive coverage risked

rollbacks in recent advances in contraceptive use and maternal and child health. A study of the impact of Ebola on reproductive health care in one district in Guinea found a 50 percent decline in family planning visits during the height of the crisis (Camara et al. 2017). Prior to the crisis, Liberia and Sierra Leone had seen gains in expanding contraceptive prevalence, rising from 12 to 21 percent of all women in Liberia between 2007 and 2013 (Liberia Institute of Statistics and Geo-Information Services 2008, 2014) and 8 to 21 percent in Sierra Leone between 2008 and 2013 (Statistics Sierra Leone 2009, 2014). Guinea's prevalence remained low and relatively constant (Institut National de la Statistique/Guinée and ICF International 2013), only increasing from 6.8 to 7.0 percent between 2005 and 2012. Because of the lack of digital government service statistics before and during the epidemic, we do not include Guinea in our analysis. Understanding the impact of the crisis on family planning provision is essential for future efforts to expand access to contraception in these countries and better safeguard against negative impacts of future crises.

Main Questions

Complex emergencies, like the West African Ebola crisis, can devastate a health system long after the immediate crisis ends. Our research sets out to answer two questions:

1. How much did family planning use decrease during the Ebola crisis?
2. Did the Ebola crisis have a lasting negative impact on family planning use?

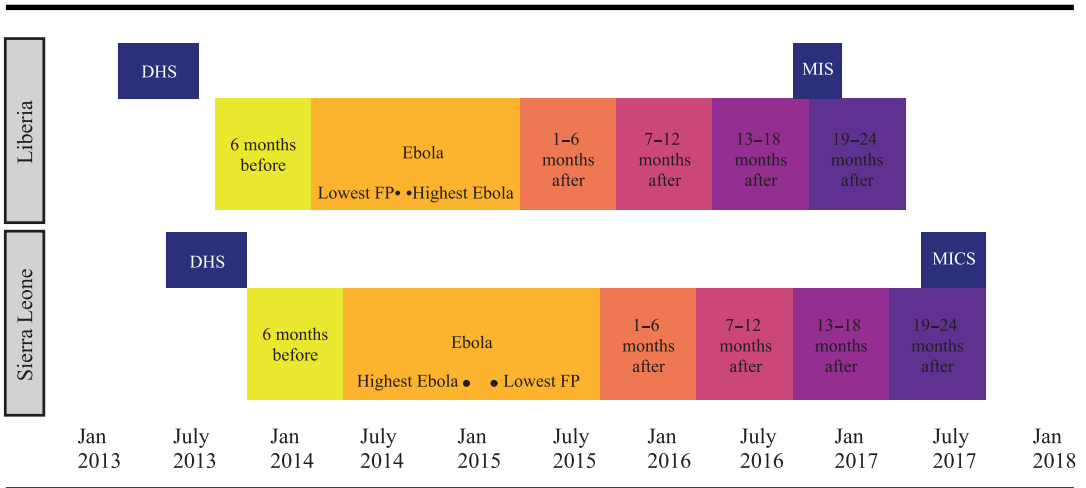
Data

To gain a full picture of family planning before, during, and after the Ebola crisis, we included data from several sources, including monthly data from service statistics which cover the entire period of interest, and survey data covering cross-sectional periods before and after the outbreaks. Including large, national surveys allows us to confirm trends seen in service statistics. The country-specific timelines below (Figure 1) illustrate the dates of service statistics and survey data used.

We examine monthly provision of family planning services from 6 months before the first Ebola case in Liberia and Sierra Leone to 24 months after the last case of the main outbreak¹ (Republic of Liberia 2018; Government of Sierra Leone 2018). Weekly numbers of new confirmed Ebola cases over the timeframe are taken from the World Health Organization (World Health Organization 2016b). Sierra Leone and Liberia collect electronic, routine data (henceforth referred to as service statistics) on family planning monthly. Both countries use the District Health Information System (DHIS2). Because Guinea's electronic routine data system was only implemented in 2015, and there have been challenges incorporating past data from paper records, we are unable to include data from Guinea in this analysis. Due to family planning data being available monthly, and Ebola data available weekly, we aggregate Ebola data by month. For weeks that span 2 months, we linearly interpolate based on the

¹ We focus on confirmed cases in this paper. Though there may have been cases of Ebola in Liberia and Sierra Leone before the first confirmed case, we do not find evidence that family planning provision was declining prior to the first Ebola case in each country. We choose to look at 6-month averages to smooth for potential data entry variation and irregular influxes of commodities.

FIGURE 1 Period of analysis before, during, and after main Ebola outbreak in Liberia and Sierra Leone



level of Ebola the week before and after, to estimate the Ebola cases on a particular day and distribute these cases to the appropriate month.

Comparison data comes from Demographic and Health Surveys (DHS), conducted in Sierra Leone and Liberia in 2013, Malaria Indicator Surveys (MIS), conducted in both countries in 2016 (though Sierra Leone’s did not include family planning questions), and Multiple Indicator Cluster Survey (MICS) conducted in Sierra Leone in 2017. Data of interest from surveys include modern contraceptive prevalence (mCP), prevalence of individual methods, and information on the source of family planning services.

METHODS

In the analysis of service statistics, we include contraceptive implants, injectables, oral contraceptive pills, and condoms, which make up more than 95 percent of contraceptive use in both countries.² To be able to discuss all methods simultaneously, and compare between them, we adjust for the duration of effectiveness of a single commodity or service by converting each service/commodity distribution number to couple-years of protection (CYPs) (USAID 2019). One implant is the equivalent of three CYPs, one injectable is 1/4 of a CYP, one pill pack is 1/15 of a CYP, and one condom is 1/120 of a CYP.³ We only report data that was entered into the DHIS2 system. Condoms and pills provided through shops and smaller, private providers are not included in this data.

To establish a baseline level of family planning provision prior to the Ebola crisis, we calculate the average method distribution and CYPs for the 6 months before the first Ebola case in each country. We then calculate the minimum monthly family planning service provision

2 Based on modern methods (excluding lactational amenorrhea) in the Liberia 2013 DHS and Sierra Leone 2013 DHS.

3 Note: Most injectables distributed are Depo Provera, thus the choice of four doses per CYP. We are unable to differentiate the type of implant, whose CYPs range between 2.5 and 3.8, and thus assume a CYP of 3 in our calculations

seen during the outbreak, as well as the average during the Ebola crisis. We also calculate 6 months averages for the 2 years following the last new case of Ebola. The months that make up the periods prior to, during, and following the Ebola crisis are country specific and shown in Figure 1.

Analysis is conducted using R.

Family Planning before Ebola

Prior to Ebola, according to both countries' 2013 DHS, most women received family planning services through a public source (64 percent in Liberia and 68 percent in Sierra Leone). In Liberia, 30 percent of contraceptive users went to a government hospital, 28 percent to a family planning clinic, 14 percent to a private hospital or clinic, and 10 percent to a pharmacy. In Sierra Leone, the most popular outlet to receive family planning was a government health center (34 percent), followed by a family planning clinic (15 percent), a pharmacy (14 percent), and a government hospital (13 percent).

In Liberia in 2013, less than half (44 percent) of primary-level service delivery points offered at least three modern methods of contraception (UNFPA 2014b). Family planning services were hindered by the low number of skilled health providers, and half of all workers were in Monrovia, the capital (Republic of Liberia 2010). Stock outs were also a problem; in 2013, 76 percent of service delivery points reported stockouts of contraceptives in the 6 months prior (UNFPA 2014b). Additionally, 29 percent of Liberians lived more than 5 kilometers from a health facility (Republic of Liberia 2015).

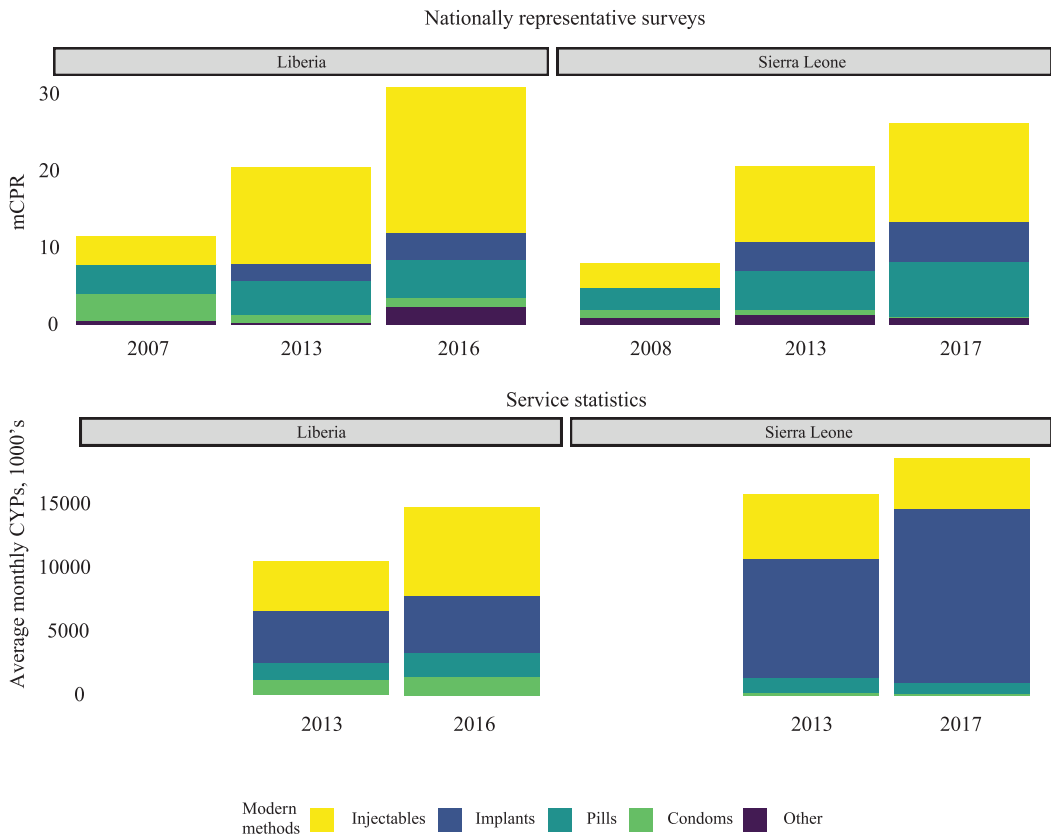
In Sierra Leone in 2011, 82 percent of health centers provided family planning services (UNFPA Sierra Leone 2012), with 81 percent of these centers offering at least three modern methods. UNFPA was the largest provider of contraception, offering services through government centers where commodities and services were intended to be delivered to clients at no cost. As in Liberia, stockouts of family planning methods were a persistent problem.

International Planned Parenthood Federation (IPPF) has a long history as an important provider of services in Sierra Leone (IPPF n.d. a), and even more so in Liberia (IPPF n.d. b). Marie Stopes Sierra Leone has also worked in distribution for family planning services for decades (Marie Stopes n.d.)

Surveys

Both Liberia and Sierra Leone had a DHS conducted in 2013. The percentage of all women of reproductive age using any modern method of contraception was 21 in both countries, with 19 percent of married women using a modern method in Liberia, compared to 16 percent in Sierra Leone. Among married women, more women were considered to have an unmet need for family planning than were using modern contraception, with 31 percent in Liberia and 25 percent in Sierra Leone. For sexually active, unmarried women mCP was 35 percent in Liberia and 56 percent in Sierra Leone. The 2013 DHS reflected mCP increases for both countries since the last survey, with Liberia increasing from 12 percent to 21 percent between 2007 and 2013 and Sierra Leone increasing from 8 percent to 21 percent between 2008 and 2013 (Figure 2).

FIGURE 2 Family planning before and after Ebola in Liberia and Sierra Leone



For married and unmarried, sexually active women in both countries, the most commonly used method was injectables. Injectable prevalence grew in both countries: from 4 percent of married Liberian women in 2007 to 11 percent in 2013, and 3 percent of married Sierra Leonean women in 2008 to 8 percent in 2013. For unmarried, sexually active women the growth in prevalence was even more striking: from 5 percent to 22 percent in Liberia and 7 percent to 26 percent in Sierra Leone. Implant use, which was not recorded in earlier surveys, was reported by 2 percent of married women in both countries in 2013, for unmarried women the numbers were even higher at 4 percent in Liberia and 12 percent in Sierra Leone. Pills were popular in both 2013 surveys: among married women, 5 percent of Liberian and 4 percent of Sierra Leonean women; and 6 percent and 14 percent, respectively, for unmarried, sexually active women. Condoms were used by 3 percent of unmarried, sexually active women in both countries.

Service Statistics

According to service statistics, from January to December 2013, the average monthly distribution of contraception, converted into CYPs, was 10,424 in Liberia, increasing by an average of 275 CYPs per month, and 15,794 in Sierra Leone (Figure 2), increasing by an average of

341 CYPs per month. Figure 2 shows the distribution of family planning methods as CYPs from service statistics compared to mCP for all women from surveys. Implants comprise a larger share in service statistics than in surveys because their CYPs are assigned to the year of insertion, while in the DHS they are looking at women currently using a method, regardless of time since insertion. Therefore, a woman who received an implant last year may be a user in the DHS, but is not in the 2013 service statistics. Conversely, clinics need to distribute four injectables for each CYP counted, while in the DHS a woman who just received her first injectable will count as a current user when calculating mCP. Even though the two data sources differ in terms of method allocation, we can see they are similar in terms of which methods are reported, and growth.

To determine the baseline level of family planning distribution before Ebola, we take the average distribution for the 6 months before the Ebola outbreak began, 11,539 CYPs in Liberia and 15,050 CYPs in Sierra Leone. Note that a higher CYP number does not indicate that mCP was higher in Sierra Leone, because there are approximately two-thirds more women of reproductive age in Sierra Leone than Liberia⁴ (United Nations, Department of Economic and Social Affairs 2017), therefore Sierra Leone must distribute more CYPs to have the same mCP as Liberia.

Ebola in Liberia and Sierra Leone

The WHO recorded over 3,000 confirmed cases of Ebola in Liberia (as well as an additional 7,000 probable or suspected cases) and almost 9,000 cases in Sierra Leone (as well as an additional 5,000 probable or suspected cases), resulting in a total of 8,761 deaths between the two countries (World Health Organization 2016c). The regions containing the capitals of each country saw the highest numbers of cases, 2,511 in Western Area Urban in Sierra Leone and 1,978 in Montserrado in Liberia. During the main outbreak covered in this analysis, Sierra Leone experienced cases of Ebola from May 2014 through August 2015, and Liberia from March 2014 through March 2015.

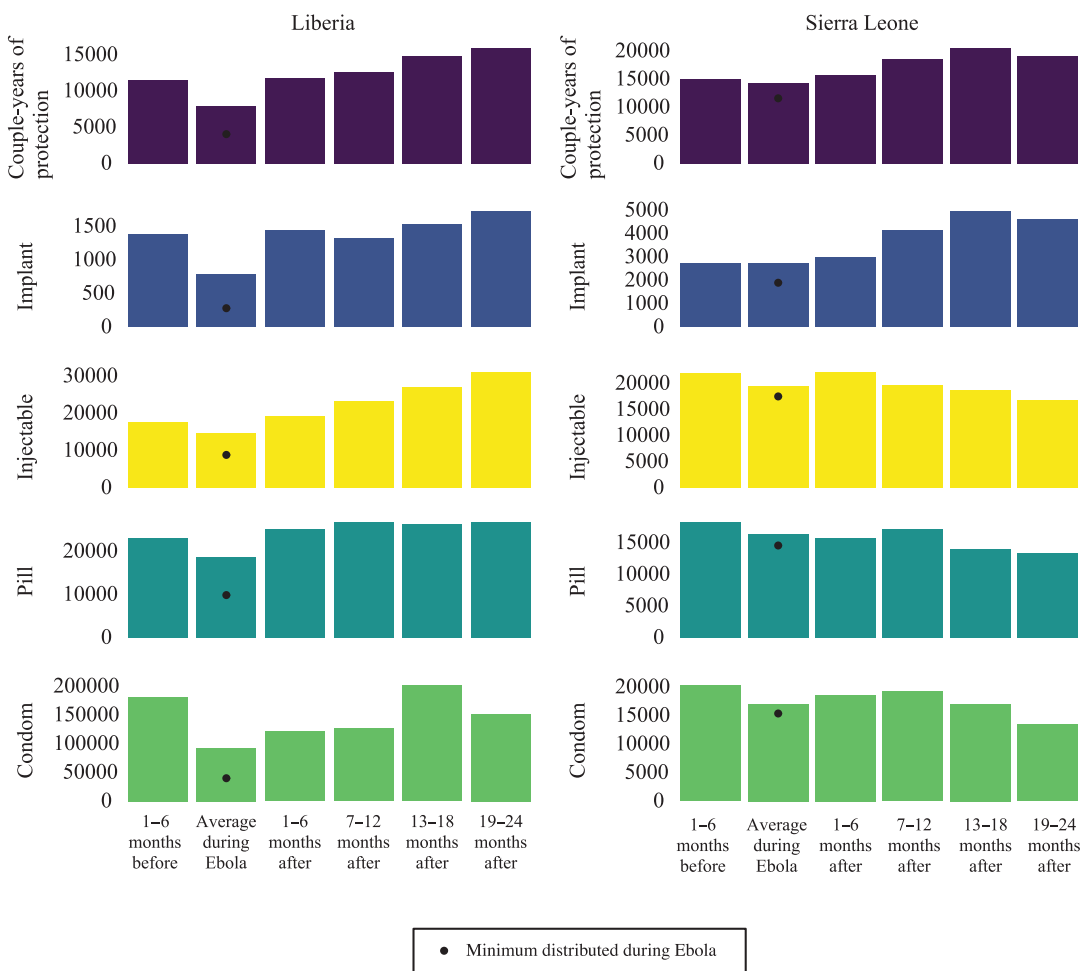
Family Planning during the Ebola Crisis

During the Ebola crisis in Liberia, August 2014 marked the lowest level of family planning service provision, with the equivalent of 4,054 CYPs distributed, a 65 percent reduction compared to the 6-month average before the first Ebola case. One month later, Ebola cases peaked in the country. Between June and July 2014 (when the number of Ebola cases increased from 78 to 193), CYPs declined by 33 percent, then from July to August CYPs declined another 44 percent, and the number of Ebola cases rose steeply to 874. On average, during the whole of the Ebola crisis in Liberia, there was a monthly distribution of 7,999 CYPs, a decline of 31 percent from the 6-month period prior (Figure 3).

In Sierra Leone, the lowest level of family planning service provision was seen in December 2014 (November 2014 saw the record number of Ebola cases), when 11,602 CYPs were distributed, a 23 percent decline from the 6-month period prior to the first case of Ebola. Over the 16 months of the Ebola epidemic in Sierra Leone, on average CYPs were only 5 percent

⁴ United Nations World Population Prospects estimates 1.0 million 15–49 year-old women in 2013 in Liberia, and 1.67 million in Sierra Leone.

FIGURE 3 Average monthly distribution of contraception: before, during, and after Ebola



lower than before the Ebola epidemic (Figure 3). This average decline is relatively small because family planning service provision returned to pre-Ebola levels by May 2015, 3 months before the last Ebola case was recorded.

Looking at individual methods, the largest decline in Liberia was seen in implants, which during their lowest month of distribution during the Ebola crisis fell to only 20 percent of pre-Ebola levels. On average, implant distribution was down 43 percent for the duration of the epidemic compared to pre-Ebola distribution. Similarly, male condom distribution fell to a minimum of 22 percent of pre-Ebola levels, and on average were just 51 percent of pre-Ebola levels throughout the epidemic. Pill distribution declined to 43 percent of pre-Ebola levels in its lowest month, but over the period of the epidemic averaged 81 percent of pre-epidemic levels. Injectables plummeted to half the pre-Ebola levels in their lowest month and averaged 83 percent of pre-Ebola levels over the course of the epidemic.

While all methods saw declines in distribution during the Ebola crisis in Sierra Leone, the declines were not as dramatic as those experienced in Liberia. Implants were the method with the sharpest decline, falling to a minimum of 70 percent of their pre-Ebola levels. However, due to an increase in the number of implants towards the end of the crisis, the average number of implants inserted throughout the crisis was nearly the same as the average distribution in the 6 months before the epidemic. Male condoms, pills, and injectables all declined to between 75–80 percent of their preepidemic levels, averaging 84–90 percent of preepidemic distribution over the course of the epidemic.

Family Planning Post-Ebola

To examine post-Ebola recovery in the family planning sector, we look up to 24 months following the last new confirmed Ebola case in each country during the main outbreak.

In Liberia, on average, 19–24 months following the last new case of Ebola, there was a 25 percent increase in implant distribution compared to the 6 months prior to the Ebola outbreak (Figure 3). For injectables and pills, there was also substantial growth in distribution, 77 percent and 16 percent, respectively, compared to pre-Ebola levels. Male condom distribution was 83 percent of the level seen prior to the outbreak. Altogether, prior to the Ebola outbreak, an average of 11,539 CYPs per month were distributed. During the crisis, CYPs fell to an average of 7,999 per month. After the Ebola crisis had ended, average monthly CYPs grew steadily from 11,794 in the first 6 months to 16,012 during months 19–24 postcrisis, 39 percent above precrisis levels. Figure 2 shows that the main drivers of change were growth in implants and injectables.

In Sierra Leone, distribution of male condoms, oral contraceptive pills, and injectables was lower on average 19–24 months post-Ebola compared to the average over the 6 months pre-Ebola. In contrast, implant insertions were up 70 percent at 19–24 months post-Ebola. Overall, an average of 15,050 CYPs per month were distributed during the 6 months prior to the outbreak of Ebola. CYPs then fell slightly during the crisis, to an average of 14,261 per month. Following the crisis, CYPs returned to pre-Ebola levels during the first 6 months (average of 15,693) and grew to 19,060 19–24 months after, an increase of 27 percent.⁵ Figure 2 shows that the only method which led to the increase in CYPs was implants.

Liberia had fewer cases of Ebola than Sierra Leone, though suffered a more severe impact to its family planning provisions. Both countries recovered quickly following the last Ebola cases, and while Liberia grew in each successive 6-month period, Sierra Leone saw declines in method provisions over time, and at 19–24 months distributed fewer CYPs than at 13–18 months.

Recovery in the 2016 Liberia Malaria Indicator Survey and 2017 Sierra Leone Multiple Indicator Cluster Survey

In 2016, both Liberia and Sierra Leone conducted Malaria Indicator Surveys (MIS) through the DHS. Only the Liberia MIS asks about contraception. In 2017, Sierra Leone conducted a Multiple Indicator Cluster Survey (MICS), which recorded contraceptive use.

⁵ Note that this growth would not translate into a 27 percent increase in mCP, as population grew by over 2 percent per year according to United Nations' Estimates.

In the 2013 Liberia DHS, 21 percent of all women were using a modern method of contraception, in the 2016 MIS this increased to 31 percent (National Malaria Control Program 2017) (Figure 2). The largest single change in methods was injectables, which grew from 12 percent to 19 percent. This large increase is corroborated by service statistics, which indicate a shift from the 2013 monthly average of 3,911 CYPs to 6,928 CYPs in 2016. Implant use, while still small, saw a statistically significant increase from 2 percent to 3 percent of women. Service statistics saw an increase in insertions from a 2013 monthly average of 4,034 CYPs to 4,518 CYPs in 2016 (the DHS is including implant users who had their implants inserted in years before the surveys and are still using, which may be the result of a decline in removal services during the outbreak). Additionally, more women in 2016 reported receiving their methods from public facilities (72 percent) than in 2013 (64 percent).

The 2013 Sierra Leone DHS saw 21 percent of all women using a modern method, which grew to 25 percent in the 2017 MICS (Statistics Sierra Leone 2018) (Figure 2). Implant use increased only from 4 percent to 5 percent between the surveys, compared to the CYPs for implants which grew from 9,365 a month on average in 2013 to 13,678 a month on average in 2017. The MICS survey reports 7 percent of all women were using pills in 2017, compared to 5 percent in the 2013 DHS. The service statistics data shows a decline in the CYPs distributed in terms of pills, from 1,214 per month in 2013 to 880 in 2017, but this may mask a change in the proportion of the population receiving pills from private providers.⁶ Injectable use grew between the 2013 DHS and 2017 MICS, from 10 percent to 13 percent, but the number recorded in service statistics declined from 5,040 to 3,988 CYPs per month.

Overall, the surveys collected after Ebola confirm the results found for service statistics: both Liberia and Sierra Leone have made progress in family planning commodity distribution, with Liberia growing at a faster pace than Sierra Leone.

DISCUSSION

This is one of the first studies using national service statistics to examine the immediate and long-term impact of the Ebola crisis on the provision of contraceptive services. Studies looking at family planning access during and after other disasters and instabilities have found mixed effects. Following hurricanes Katrina and Ike in the United States, studies found more women not using contraceptives or reporting trouble accessing birth control (Kissinger et al. 2007; Leyser-Whalen, Rahman, and Berenson 2011). Evidence after the 2010 earthquake in Haiti also saw declines in use of the most popular methods (Behrman and Weitzman 2016). The 2006 Yogyakarta earthquake in Indonesia saw changes in the method mix, where injectable and implant use decreased, and pill and coitus interruptus increased, accompanied by an increase in unplanned pregnancies (Hapsari et al. 2009). Though most studies found that the need for family planning rose after a crisis or instability, a recent study examining the multidecade conflicts in Colombia found a decrease in family planning with increased violence and attributed the decline to an increased desire for children (Svallfors and Billingsley 2019). In contrast, in a 10-year study of armed conflict and political instability in

6 The 2017 Sierra Leone MICS does not ask source of contraception, so we are unable to see if pill users were more likely to use private providers compared to the 2013 DHS.

Chitwan Valley, Nepal, authors found that contraceptive use rose during instances of instability, and was able to do so because Chitwan Valley was among the areas of the country with the best supply of family planning (Williams et al. 2012). While studies examining different emergencies that disrupt health service delivery, such as natural disasters and humanitarian crises, provide some insight, the infectious nature of Ebola sets the epidemic apart and introduced additional barriers to access related to fear and stigma (Barden-O'Fallon et al. 2015).

Our study of Liberia and Sierra Leone illustrates that family planning services, like other health care services, suffered during the crisis. While some of these declines may have been driven by health system failures (loss of health care providers to Ebola, understaffed and overwhelmed health care facilities, disruptions in supplies, etc.), other studies have identified Ebola stigma and fear and suspicion of healthcare providers as barriers to service utilization during and following the Ebola crisis (Barden-O'Fallon et al. 2015). In fact, a systematic review of the effects of the West Africa Ebola crisis on health care utilization proposed that while there were disruptions in service delivery across the affected countries, "to a large extent, it was not health service provision that failed, but rather the uptake of health services by the population that decreased after the onset of the Ebola outbreak" (Brolin Ribacke et al. 2016). The dramatic declines in service provision seen in Liberia, which experienced fewer cases of Ebola, may illustrate the power of this fear and stigma in reducing utilization of health care services, including family planning, during the crisis. Once the crisis was over and many of the barriers were removed, women quickly returned to accessing family planning through facilities, as evidenced by the immediate return to pre-Ebola levels of family planning distribution in the 6 months after the main Ebola outbreak ended.

While Ebola was a threat to all people, pregnant women and girls were particularly at risk. UNFPA Executive Director, Dr. Babatunde described this vulnerable group as, "facing a double threat—dying from Ebola and from pregnancy or childbirth, due to the devastating impact of Ebola on health workers and health systems." (UNFPA 2014a). The disruption to family planning services increased the likelihood of unintended pregnancies, exposing women to not only the routine risks related to pregnancy and childbirth in countries with high maternal and child mortality, but to additional risks faced in a setting where these services are further compromised.

Given that the data used in this analysis is based on service data available in national routine systems, it is important to note that declines in recorded provision may not fully capture declines in contraceptive use. The data does not include all sources of contraception in the country and given fears and stigma around health care facilities in the context of the crisis, it is possible women sought contraceptives methods like pills and condoms from other sources, such as shops and private pharmacies, or may have used nonmedical or traditional methods in the interim. In addition, increased distribution of condoms through response programs to prevent sexual transmission of Ebola may also have provided women with an alternative, more easily accessible contraceptive method (UNFPA West and Central Africa 2014). Qualitative research would provide additional understanding of if, and where, women sought family planning services during the crisis, what prompted their return to facilities after Ebola, and may help shed light on the full impact of the outbreak and the extent to which the trends seen here represent the full contraceptive market (McKay et al. 2018).

Encouraging in the results of this analysis was the rapid return of contraceptive services to pre-Ebola levels in most regions. During and immediately following the outbreak, there were concerns about the long-term impact of the crisis on provision of family planning services after the Ebola outbreak had ended. This study indicates that the family planning health sector can recover (and continue to improve) following a significant disruption and is a lesson in resilience. It is important to note that this recovery was not equal or sustained in all areas. In both countries, there was an immediate recovery of family planning services following the end of the outbreak. This rapid recovery of contraceptive distribution was possibly driven by emergency response and an influx of funding and effort, or the result of a rush of women back to healthcare facilities for family planning services once they were perceived as safe. However, this recovery was not sustained in Sierra Leone and could indicate deeper, longer lasting damage to service delivery systems or slower start up to post-Ebola recovery programs. Continued monitoring of family planning provision and accessibility along with sustained support for these services beyond the immediate emergency response is essential to ensuring women continue to be protected against unintended pregnancy and that gains made before the crisis are not lost.

Both countries saw an increase in injectables and implants post-Ebola. The increases seen in Liberia and Sierra Leone are likely a reflection of a larger global trend emerging prior to the outbreak aided by coordinated efforts by governments and donors to promote more effective methods as part of a comprehensive method mix. Sierra Leone increased the training of implant providers from 160 in 2015 (Government of Sierra Leone 2015) to 412 in 2016 (Government of Sierra Leone 2016), which signals an increase in long-acting reversible contraceptive training programs and availability. It should be noted that changes in methods available and how they are administered would likely impact how disruptive an epidemic would be to contraceptive access in the future. Long acting methods that would not necessitate regular contact with the formal health system could potentially mitigate disruption to family planning access in future emergencies.

Sierra Leone and Liberia began in similar positions before the epidemic, both having made significant strides in maternal and child health. Both country governments received significant aid during the epidemic, with U.N. Special Envoy on Ebola reporting that as of October 31, 2015, Sierra Leone had received \$419.44 million and Liberia \$513.40 million from across the 50 member nations. In this same time period, donors disbursed a total of \$4.67 billion for response and \$1.04 billion for recovery to the overall Ebola effort (United Nations, Office of the Special Envoy on Ebola 2015). Further, both countries put in place a similar set of social and economic recovery policies and clinical care guidelines for survivors.⁷ Yet Liberia's family planning program has seen more growth than Sierra Leone's during the 2-year recovery period examined here.

The availability of funding to maintain family planning services during the crises, and rebuild and grow services during recovery, may play a role in the different speeds at which family planning services have grown in the aftermath of the epidemic. Financial records indicate that Liberia has had access to more funding for family planning/reproductive health

7 Sierra Leone: The National Ebola Recovery Strategy (2015), Comprehensive Programme for Ebola Survivors (2015), Clinical Care for Survivors of EVD (2016); Liberia: Economic Stabilization and Recovery Plan (2015), The Republic of Liberia EVD Survivors Care and Support National Policy (2016), Liberia Ebola Survivors Clinical Care Guidelines (2016)

(FPRH) and basic healthcare than Sierra Leone. While not the only donor to support these countries, USAID disbursements in FY 2014–2017 indicate that Liberia received almost four times as much funding as Sierra Leone from the United States in the categories of maternal and child health/family planning (Liberia \$73 million, Sierra Leone \$25.5 million) and basic healthcare (Liberia \$58.5 million, Sierra Leone \$8.4 million). While these resources do not all directly fund family planning (between FY 2012 and FY 2015, Liberia received \$28 million from the U.S. Government (USG) for FPRH (\$7 million/year), while Sierra Leone received no FPRH funding from USG sources during this period), investments in maternal and child health and basic healthcare likely supported provision of family planning services in some way (ForeignAssistance.gov n.d.; USAID n.d.). While the United States contributed greatly to the Liberia response, the United Kingdom was a major donor for Sierra Leone, providing significant support during response (£427 million) and recovery (£240 million) (Government of the United Kingdom, n.d., 2016). It is unclear how these general funds were allocated across health and other response areas and family planning in particular.

Liberia was one of the Global Financing Facility's (GFF) second wave quick starter countries, receiving \$16 million through a GFF grant to catalyze investments in the health and nutrition of women, adolescents, and girls (World Bank 2017a). One of the priority areas included in both the Project Appraisal Document (PAD) (World Bank 2017b) and the final Reproductive, Maternal, Newborn, Child, and Adolescent Health (RMNCAH) Investment Case 2016–2020 (Republic of Liberia 2016) is supporting an adolescent-responsive health care system, with specific attention paid to family planning, such as supply-side interventions that integrate adolescent and youth friendly RMNCAH services at primary health centers and through community health assistants. Though announced as a GFF third wave country in 2016, Sierra Leone is early in the process with a completed investment case⁸ that focuses on RMNCAH, but does not explicitly mention family planning in the priorities, and no publicly available PAD. As of June 30, 2018, Sierra Leone has not received or been board approved for any GFF-related funding (Global Financing Facility 2018). This jumpstart in funding and attention on family planning that Liberia has received in advance of Sierra Leone may also be a factor in Liberia's advanced pace of growth.

The study period for this analysis ends 24 months postcrisis, when both countries still had significant donor resources that would not otherwise have been available to support their programming. Many of these emergency and recovery resources were invested in 3- to-5-year programs and initiatives, many of which will have ended at the time of this publication or will be ending in the near future. While optimistic that services returned to preepidemic levels or higher after 24 months, the true test will be whether these funds were invested in ways that promote program sustainability to ensure strengthened family planning services in the future.

Limitations

This analysis is based on survey and service statistic data and published findings related to factors that directly impacted family planning service provision. The authors acknowledge

8 Information on the priorities of the Sierra Leone GFF investment case are pulled from text in the GFF 2017–2018 Annual Report. The full investment case document is not available on the GFF site.

that there are numerous additional contextual and environmental factors that may have also impacted delivery and use of family planning services that are not covered in this analysis.

During the Ebola crisis, fewer clinics were reporting monthly numbers into the DHIS2 system. Liberia routinely had reporting rates above 80 percent before the Ebola crisis, closer to 100 percent if Montserrado, which has many private clinics, is excluded. During the Ebola crisis, reporting rates fell to around 80 percent in most counties, and around 60 percent in Montserrado and Margibi. While these can downwardly bias our distribution estimates, we also believe that the facilities not reporting were most likely to be the ones with the most Ebola cases, and lowest family planning distribution.

Sierra Leone maintained high reporting rates throughout the Ebola crisis and has seen reporting rates grow from 83 percent in 2013, to 86 percent in 2014, 94 percent in 2015, and 96 percent in 2016.

Data in DHIS2 is primarily from the public sector, though some private sector non-governmental organizations report into the system. Pharmacies do not report into the system, and therefore may undercount methods commonly purchased at pharmacies, such as condoms and pills. Finally, we identified two abnormal entries in Liberia's DHIS2 system from an aid organization. We contacted them and corrected the data points in our analysis. We are unable to guarantee that no other errors are present in DHIS2 data.

There were a small number of Ebola cases after the main outbreak of 2014–2015 in both countries. We do not include them in our analysis but recognize they may have slowed recovery of family planning uptake in the subnational areas where they occurred, as women may have been more hesitant to return to facilities. Both countries had strategies in place to identify and contain potential Ebola victims at the end of the main outbreaks; therefore, we do not believe these later Ebola cases posed a significant hindrance to the recovery of family planning programs on a national level.

CONCLUSION

Our analysis finds that compared to Sierra Leone, Liberia's family planning sector disproportionately suffered during the Ebola crisis, however, in the 2 years since it has made great strides towards restoring and growing contraceptive services. While Sierra Leone had a greater number of Ebola cases, its family planning distribution did not decline as dramatically as Liberia's. Based on service statistics and survey data, Sierra Leone has also experienced large growth in contraceptive use in the recovery period. The findings of this analysis demonstrate that family planning service provision in Liberia and Sierra Leone was impacted by the Ebola epidemic in the same way that broader reproductive health services were impacted. This extended disruption of family planning services not only increased the risk of unplanned pregnancies for women in the affected countries but also exposed more women to the risks of pregnancy and delivery in environments with high maternal and child mortality. Importantly, our analysis shows that family planning programs can be resilient and even return stronger postcrisis.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study come from numerous sources. The service statistics are provided by the Ministries of Health in Liberia and Sierra Leone and are not

publicly available. Survey data for the 2007 Liberia DHS, 2013 Liberia DHS, 2016 Liberia MIS, 2008 Sierra Leone DHS, and 2013 Sierra Leone DHS are available from the Demographic and Health Surveys Website: <https://www.dhsprogram.com/>. Survey data for the 2017 Sierra Leone MICS are available from the MICS Website: <http://mics.unicef.org/>.

REFERENCES

- Barden-O'Fallon, Janine, Mamadou Alimou Barry, Paul Brodish, and Jack Hazerjian. 2015. "Rapid Assessment of Ebola-Related Implications for Reproductive, Maternal, Newborn and Child Health Service Delivery and Utilization in Guinea." *PLoS Currents Outbreaks*. 2015 Aug 4. Edition 1. <https://doi.org/10.1371/currents.outbreaks.0b0ba06009dd091bc39ddb3c6d7b0826>.
- Behrman, Julia Andrea, and Abigail Weitzman. 2016. "Effects of the 2010 Haiti Earthquake on Women's Reproductive Health." *Studies in Family Planning* 47(1): 3-17. <https://doi.org/10.1111/j.1728-4465.2016.00045.x>.
- Bolkan, Håkon Angell, Donald Alpha Bash-Taqi, Mohammed Samai, Martin Gerdin, and Johan Von Schreeb. 2014. "Ebola and Indirect Effects on Health Service Function in Sierra Leone." *PLOS Currents Outbreaks* 2014 Dec 19. Edition 1. <https://doi.org/10.1371/currents.outbreaks.0307d588df619f9c9447f8ead5b72b2d>.
- Brolin Ribacke, Kim J., Dell D. Saulnier, Anneli Eriksson, and Johan Von Schreeb. 2016. "Effects of the West Africa Ebola Virus Disease on Health-Care Utilization—A Systematic Review." *Frontiers in Public Health* 4: 222. <https://doi.org/10.3389/fpubh.2016.00222>.
- Camara, Bienvenu S., Alexandre Delamou, Ermias Diro, Abdoul H. Béavogui, Alison M. El Ayadi, Sidikiba Sidibé, Fassou M. Grovogui, et al. 2017. "Effect of the 2014/2015 Ebola Outbreak on Reproductive Health Services in a Rural District of Guinea: an Ecological Study." *Transactions of the Royal Society of Tropical Medicine and Hygiene* 111(1): 22-29. <https://doi.org/10.1093/trstmh/trx009>.
- ForeignAssistance.gov. n.d. ForeignAssistance.gov (website). Custom data acquired via website. Accessed October 11, 2018. <https://www.foreignassistance.gov/>.
- Global Financing Facility. 2018. *2017–2018 Annual Report: The Global Financing Facility, Country-Powered Investments for Every Woman, Every Child and Every Adolescent*. Washington, DC: World Bank.
- Government of Sierra Leone. Ministry of Health and Sanitation. 2015. *Annual Health Sector Performance Report 2015*. Freetown, Sierra Leone: Ministry of Health and Sanitation.
- . 2016. *Annual Health Sector Performance Report 2016*. Freetown, Sierra Leone: Ministry of Health and Sanitation.
- . 2018. *Family Planning Service Statistics 2013–2017*. Freetown, Sierra Leone: Ministry of Health and Sanitation.
- Government of the United Kingdom. 2016. "The end of the Ebola epidemic." *Department for International Development*. Accessed January 16, 2019. <https://www.gov.uk/government/news/the-end-of-the-ebola-outbreak>.
- Hapsari, Elsi, Widyawati Widyawati, Wenny Nisman, Lely Lusmilasari, Rukmono Siswishanto, and Hiroya Matsuo. 2009. "Change in Contraceptive Methods Following the Yogyakarta Earthquake and Its Association with the Prevalence of Unplanned Pregnancy." *Contraception*. 79(4): 316-322. <https://doi.org/10.1016/j.contraception.2008.10.015>.
- Institut National de la Statistique/Guinée and ICF International. 2013. *Guinée Enquête Démographique et de Santé et à Indicateurs Multiples (EDS-MICS) 2012*. Rockville, MD: Institut National de la Statistique/Guinée et ICF International.
- IPPF. n.d.a. "Planned Parenthood Association of Sierra Leone." Accessed August 1, 2019. <https://www.ippf.org/about-us/member-associations/sierra-leone>.
- IPPF. n.d. b. "Planned Parenthood Association of Liberia." Accessed August 1, 2019. <https://www.ippf.org/about-us/member-associations/liberia>.
- Kissinger, Patricia, Norine Schmidt, Cheryl Sanders, and Nicole Liddon. 2007. "The Effect of the Hurricane Katrina Disaster on Sexual Behavior and Access to Reproductive Care for Young Women in New Orleans." *Sexually Transmitted Diseases* 34(11): 883-886. <https://doi.org/10.1097/OLQ.0b013e318074c5f8>.
- Leyser-Whalen, Ophta, Mahbubur Rahman, and Abbey B. Berenson. 2011. "Natural and Social Disasters: Racial Inequality in Access to Contraceptives after Hurricane Ike." *Journal of Women's Health* 20(12): 1861-1866. <https://doi.org/10.1089/hw.2010.2613>.

- Liberia Institute of Statistics and Geo-Information Services (LISGIS), Ministry of Health and Social Welfare/Liberia, National AIDS Control Program/Liberia, and Macro International Inc. 2008. *Liberia Demographic and Health Survey 2007*. Monrovia, Liberia: LISGIS and Macro International Inc.
- Liberia Institute of Statistics and Geo-Information Services - LISGIS, Ministry of Health and Social Welfare/Liberia, National AIDS Control Program/Liberia, and ICF International. 2014. *Liberia Demographic and Health Survey 2013*. Monrovia, Liberia: LISGIS and ICF International.
- Marie Stopes Sierra Leone. n.d. "Who We Are." Marie Stopes Sierra Leone (website). Accessed August 1, 2019. <https://www.mariestopes.org.sl/who-we-are/>.
- McKay, Gillian. Masarey Fofanah, Heidi Larson, and Shelley Lees. "Pregnancy Prevention in Crisis: Lessons from Sierra Leone's Ebola Outbreak." *Paper presented at the International Conference on Family Planning*, Kigali, Rwanda, November 2018.
- National Malaria Control Program - NMCP/Liberia, Ministry of Health/MOH, Liberia Institute of Statistics and Geo-Information Services - LISGIS, and ICF. 2017. *Liberia Malaria Indicator Survey 2016*. Monrovia, Liberia: MOH, LISGIS, and ICF.
- Plucinski, Mateusz M, Timothée Guilavogui, Sidibe Sidikiba, Nouman Diakitè, Souleymane Diakitè, Mohamed Dioubaté, Ibrahima Bah, Ian Hennessee, Jessica K Butts, Eric S Halsey, et al. 2015. "Effect of the Ebola-Virus-Disease Epidemic on Malaria Case Management in Guinea, 2014: a Cross-Sectional Survey of Health Facilities." *The Lancet Infectious Diseases* 15(9): 1017–1023. [https://doi.org/10.1016/s1473-3099\(15\)00061-4](https://doi.org/10.1016/s1473-3099(15)00061-4).
- Republic of Liberia. Ministry of Health and Social Welfare. 2010. *National Census of Health Workers in Liberia*. Monrovia, Liberia: Ministry of Health.
- . 2015. *Revised National Community Health Services Policy 2016–2021*. Monrovia, Liberia: Ministry of Health.
- Republic of Liberia. Ministry of Health. 2016. *Investment Case for Reproductive, Maternal, New-Born, Child, and Adolescent Health 2016–2020*. Monrovia, Liberia: Ministry of Health.
- . 2018. *Family Planning Service Statistics 2013–2017*. Monrovia, Liberia: Ministry of Health.
- Statistics Sierra Leone - SSL and ICF Macro. 2009. *Sierra Leone Demographic and Health Survey 2008*. Freetown, Sierra Leone: SSL and ICF Macro.
- Statistics Sierra Leone - SSL and ICF International. 2014. *Sierra Leone Demographic and Health Survey 2013*. Freetown, Sierra Leone: SSL and ICF International.
- Statistics Sierra Leone. 2018. *Sierra Leone Multiple Indicator Cluster Survey 2017, Survey Findings Report*. Freetown, Sierra Leone: Statistics Sierra Leone.
- Svallfors, Signe. and Sunnee Billingsley. 2019. "Conflict and Contraception in Colombia." *Studies in Family Planning*, 50: 87–112. <https://doi.org/10.1111/sifp.12087>
- United Nations, Department of Economic and Social Affairs, Population Division. 2017. "World Population Prospects: The 2017 Revision." Custom data acquired via website. Accessed January 16, 2019. <https://population.un.org/wpp/DataQuery/>.
- United Nations, Office of the Special Envoy on Ebola. 2015. "Resources for Results V. 1 September 2014 to 31 October 2015." Accessed January 16, 2019. https://ebolaresponse.un.org/sites/default/files/resources_for_results_v.pdf.
- UNFPA. 2014a. "Ebola Wiping Out Gains in Safe Motherhood." Press Release October 16, 2014. UNFPA (website). Accessed Aug 1, 2019. <https://www.unfpa.org/press/ebola-wiping-out-gains-safe-motherhood>.
- . 2014b. *The Global Programme to Enhance Reproductive Health Commodity Security Annual Report 2013*. New York: UNFPA.
- UNFPA Sierra Leone. 2012. "2011 Survey of Availability of Modern Contraceptives and Essential Life-Saving Maternal and Reproductive Health Medicines in Service Delivery Points in Sierra Leone: Analytical Reports and Tables." Accessed August 1, 2019. https://sierraleone.unfpa.org/sites/default/files/pub-pdf/2011_GPRHCS_Survey_Results.pdf.
- UNFPA West and Central Africa. 2014. "Ebola Prompts Efforts to Boost Condom Use in Liberia." Accessed August 1, 2019. <https://wcaro.unfpa.org/en/news/ebola-prompts-efforts-boost-condom-use-liberia>.
- UN Women. 2014. "Gender Alert Ebola West Africa." UN Women (website). September 26, 2014. <http://www.unwomen.org/en/news/stories/2014/9/gender-alert-ebola-west-africa>.
- USAID. 2019. "Couple Years of Protection (CYP)." Technical Resource. Last updated June 02, 2019. <https://www.usaid.gov/global-health/health-areas/family-planning/couple-years-protection-cyp>.

- USAID. n.d. "Foreign Aid Explorer: Dashboard." Custom data acquired via website. Accessed October 11, 2018. <https://explorer.usaid.gov/>.
- Williams, Nathalie E., Dirgha J. Ghimire, William G. Axinn, Elyse A. Jennings, and Meeta S. Pradhan. 2012 "A Micro-Level Event-Centered Approach to Investigating Armed Conflict and Population Responses." *Demography* 49: 1521–1546. <https://doi.org/10.1007/s13524-012-0134-8>.
- World Bank. 2017a. "Press Release: World Bank Approves \$16 Million to Support Reproductive, Maternal and Child Health in Liberia." The World Bank (website). Accessed October 11, 2018. <http://www.worldbank.org/en/news/press-release/2017/02/23/world-bank-approves-16-million-to-support-reproductive-maternal-and-child-health-in-liberia>.
- . 2017b. "Report No: PAD2240: International Development Association Restructuring Paper on a Proposed Project Restructuring for The Health Systems Strengthening Project Credit 5244-Lr And Grant Tf014432-Lr Approved On May 30, 2013 to The Republic Of Liberia and a Grant from The Global Financing Facility (GFF) In Support of Every Woman Every Child in The Amount Of US\$16 Million to The Republic Of Liberia". Washington, DC, USA: World Bank.
- World Health Organization. 2016a. "Ebola Outbreak 2014–2015." World Health Organization press release, December 23, 2016. Accessed October 11, 2018. <http://www.who.int/csr/disease/ebola/en/>.
- . 2016b. "Ebola Data and Statistics." Downloadable WHO Ebola data (website). Accessed January 16, 2019. <http://apps.who.int/gho/data/node.ebola-sitrep.quick-downloads?lang=en>.
- . 2016c. "Ebola Situation Report – 30 March 2016." WHO Ebola Operational Readiness and Preparedness (website). Accessed January 16, 2019. <http://apps.who.int/ebola/current-situation/ebola-situation-report-30-march-2016>.

ACKNOWLEDGMENTS

Special thanks to the Family Planning Units of the Ministries of Health of Liberia and Sierra Leone for access to their family planning provision data. The authors would like to also extend thanks to members of the Track20 project team, including Saskia Guerrier and Emily Sonneveldt, for their help in many aspects of this project. This paper was authored by the Track20 project, which is funded by the Bill and Melinda Gates Foundation.