Trends in Maternal Health Indicators in Sierra Leone, 2008-2013

DHS Further Analysis Reports No. 97
December 2015

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December 2015

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Acknowledgments: This Further Analysis Report was funded by the UNFPA Country Office in Freetown, Sierra Leone. The authors and The DHS Program also acknowledge direction provided by Bannet Ndyanabangi, and technical inputs by Aiah Sosokoeneh, of the UNFPA Office in Sierra Leone. Jean de Dieu Bizimana, of DHS, was instrumental in the development of the report.

Editor: Bryant Robey
Document Production: Natalie La Roche

This study was funded by the United Nations Population Fund (UNFPA) Country Office in Sierra Leone and prepared by The DHS Program.

The DHS Program assists countries worldwide in the collection and use of data to monitor and evaluate population, health, and nutrition programs. For additional information about The DHS Program, contact The DHS Program, ICF International, 530 Gaither Road, Suite 500, Rockville, MD 20850, USA; telephone: +1-301-407-6500; fax: +1-301-407-6501; email: reports@dhsprogram.com; Internet: www.dhsprogram.com.

Recommended citation:

Assaf, Shireen and Rebecca Winter. 2015. *Trends in Maternal Health Indicators in Sierra Leone, 2008-2013*. DHS Further Analysis Reports No. 97. Rockville, Maryland, USA: ICF International.

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Abstract

This report uses data from surveys conducted by The Demographic and Health Surveys (DHS) Program in Sierra Leone, in 2008 and 2013, to examine changes and improvements in maternal health indicators. The indicators for modern contraceptive use, four or more antenatal care visits, deliveries by a skilled birth attendant, deliveries in a facility, deliveries by Caesarean-section, and postnatal care visits all improved significantly between the two surveys. For some of these indicators, the improvements were not always equitable or significant for all subgroups of women. However, improvements in access to antenatal and postnatal care were successful in closing gaps between subgroups of women. Similar improvements in equity are needed for the remaining maternal health indicators. There were only small and mainly non-significant changes for women with high-risk fertility behavior, a finding that indicates the need to increase education and awareness among women and in communities on the dangers of risky childbearing behavior. Further improvements in infrastructure, availability of commodities, training in emergency obstetric care, and referral systems are required if Sierra Leone is to achieve better maternal health.

KEY WORDS: Maternal mortality, maternal health, Sierra Leone

Summary

This study examines key maternal health indicators in Sierra Leone, using data from two DHS surveys, conducted in 2008 and 2013. The indicators are the contraceptive prevalence rate (CPR), adolescent childbirth, antenatal care visits (ANC), births assisted by a skilled birth attendant (SBA), births delivered in a health facility, births delivered by Caesarean section, high-risk fertility behavior, and visits for postnatal care (PNC). The report assesses changes in each of the indicators between the two surveys, as a whole and by women's background characteristics.

Contraceptive Prevalence Rate:

- Overall, CPR increased significantly, from 7% in 2008 to 16% in 2013. The increase in CPR was mainly due to greater use of injectables.
- By women's age, the smallest increase in CPR was in the 15-17 age group, from 0% in 2008 to 5% in 2013. This is a high-risk fertility group, with greater risk of maternal morbidity and mortality associated with early childbearing.
- Increases were equitable by level of household wealth, but a large gap still remains between CPR in the lowest two household wealth quintiles (both 12%) compared with the highest wealth quintile (26%).
- The greatest increase in CPR between the two surveys was in the Eastern region, which had the lowest CPR in 2008.

Adolescent Childbirth:

- Adolescent childbearing decreased significantly, from 34% of young women age 15-19 in 2008 to 28% in 2013. The decreases in adolescent childbearing were primarily at age 16.
- By women's education, the decreases in adolescent childbearing were concentrated in women with no education; no significant change was observed for women with primary or secondary or higher education.
- Households in the lowest two wealth quintiles exhibited a significant decrease in adolescent childbearing between 2008 and 2013, while households in the highest three quintiles did not.
- The decreases in adolescent childbearing were concentrated in rural areas and in the Northern region. The Western region had the lowest rates of childbearing among young women age 15-19, at 18% in 2013.

Antenatal Care Visits:

- Overall, the percentage of women attending four or more ANC visits increased significantly between surveys, from 56% in 2008 to 76% in 2013.
- This improvement resulted in a reduction of the gaps between subgroups of women, because greater increases in the indicator occurred among groups with the lowest percentage of attending four or more ANC visits in the 2008 survey.
- Significant improvements were also observed for the ANC components of care—providing iron, having blood pressure checked, and being informed of pregnancy complications—during ANC visits for the most recent birth.

Deliveries by a Skilled Birth Attendant:

- Overall, the percentage of deliveries by an SBA (doctor, nurse, midwife, or MCH aide) increased significantly, from 42% in 2008 to 60% in 2013. The increase in SBA deliveries was mostly due to the increase in deliveries by a nurse or midwife.
- By women's education, household wealth, locality, and region, the largest increases in skilled delivery were found in subgroups that had the lowest percentage of SBA deliveries in 2008. This resulted in a reduction of the gaps between the subgroups of women in these variables.
- The Northern region had the lowest percentage of SBA deliveries in both years (27% in 2008 and 42% in 2013). The Eastern region had the second-lowest percentage in 2008 (50%), but this increased to 77% in 2013, making it the region with the highest percentage of SBA deliveries.

Deliveries in a Health Facility:

- Deliveries in a health facility increased between the surveys, from 25% in 2008 to 54% in 2013. The increase was mainly due to the increase in deliveries in a government health center.
- Increases were mostly equitable by women's background characteristics, except for region.
- For region, as with SBA deliveries, there was a large increase in facility births in the Eastern region, which resulted in a wider gap between regions in the percentage of facility births. The Northern region had the lowest percentage of facility births in 2013, with only 37% of deliveries occurring in a health facility.

Births Delivered by Caesarean Section:

- There was a small but significant increase in the percentage of births delivered by C-section between surveys, from 2% in 2008 to 3% in 2013. These very low rates of C-section delivery indicate a lack of access to emergency obstetric care in Sierra Leone. The WHO estimates that 10-15% of deliveries globally would require a C-section delivery.
- Increases were not significant for all subgroups of women. Women in the lowest age group—which is also the age group with the highest risk of obstructed labor—exhibited no significant increase in C-section rates.

High-risk Fertility Behavior:

- The study found no evidence of improvements in high-risk fertility behavior. High-risk fertility includes having a short preceding birth interval, young age at child's birth, older age at child's birth, and high parity.
- To the contrary, there was a significant increase in the percentage of births to young mothers, from 8% in 2008 to 9% in 2013, and a significant increase in the percentage of births to women in any of the high-risk groups, from 68% in 2008 to 69% in 2013.
- These findings suggest a need to focus on family planning programs, to ensure that women are aware of their fertility risks and have access to a range of contraceptive methods, should they choose to use family planning.

Postnatal Care Visits:

- Overall, the percentage of women making visits for PNC increased significantly between surveys, from 56% in 2008 to 72% in 2013.
- Larger increases occurred among women in groups that had the lowest percentage of PNC visits in 2008, which is evidence of a closing of the gaps in PNC between the groups of women.
- The Northern region had the greatest increase between surveys in the percentage of women making PNC visits, but was the region with the lowest percentage of PNC visits in both surveys.

Problems Accessing Health Care:

- The percentage of women reporting problems with accessing health care decreased, for problems related to obtaining money, distance to the health facility, and not wanting to go alone.
- The percentage of women reporting problems with accessing care, due to lack of permission, increased from 8% in 2008 to 18% in 2013.
- While not accessing care due to problems obtaining money decreased significantly, from 80% in 2008 to 67% in 2013, it remained the primary problem that women reported for not accessing health care.

1. Introduction and Rationale

The government of Sierra Leone faces many challenges in improving maternal health outcomes. The negative consequences of poverty, a largely rural population, poor infrastructure, discrimination against women and girls, and the civil war which ended in 2002 are reflected in the country's maternal health outcomes. Currently, Sierra Leone has one of the highest maternal mortality rates in the world. Despite recent improvements, Sierra Leone's persistent high fertility rates, low rates of modern contraceptive use, and low levels of education for women also adversely affect maternal health outcomes (Statistics Sierra Leone (SSL) and ICF International 2014). Many initiatives have been undertaken to improve these outcomes, including the National Population Policy, launched by the government of Sierra Leone in 2009, the National Health Sector Strategic Plan for 2010-2015, and the Free Health Care Initiative, introduced in 2010 (Statistics Sierra Leone (SSL) and ICF International 2014). In light of these recent initiatives, there is a need to assess whether maternal health outcomes are improving and whether improvements are equitable for all groups of women.

To make this assessment, the current report uses data from two Demographic and Health Surveys (DHS) conducted in Sierra Leone in 2008 and 2013. The surveys are nationally representative and contain information on key maternal health indicators. The maternal health indicators examined in this report are mainly related to access, such as the percentage of women using a modern contraceptive method, percentage of women that have had four or more antenatal care (ANC) visits, percentage of births delivered by a skilled birth attendant (SBA) or in a facility, percentage of births delivered by Caesarean section, and percentage of women who have had a postnatal care (PNC) checkup. Other indicators identify women in high-risk groups for maternal mortality or morbidity. The analysis will look at these indicators by women's background characteristics—age, education, household wealth, locality, and region—to examine whether the changes were equitable for all subgroups of women and to highlight the most vulnerable groups.

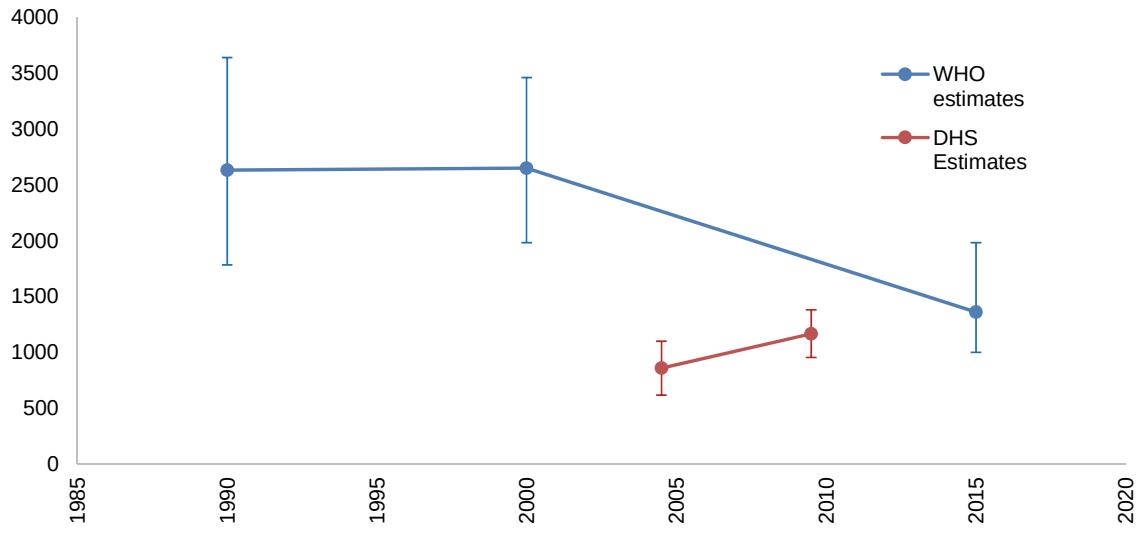
1.1. Literature Review

1.1.1. Maternal Mortality and Risk

Maternal mortality in Sierra Leone is among the highest in the world. Figure 1 shows the latest available estimates of the maternal mortality ratio (MMR) from the World Health Organization (WHO) and the DHS for the period 1990-2015. According to WHO, the MMR in Sierra Leone was estimated to be 1,360 (C.I.: 999,1980) in 2015, compared with an estimate of 2,630 in 1990 (C.I.: 1780, 2640) (Alkema et al. 2015). In other words, for approximately every 73 live births in Sierra Leone in 2015, one woman died due to maternal causes (either during pregnancy or childbirth, or within two months of the birth or pregnancy termination), with an estimated 3,100 total maternal deaths in 2015. Although it appears from Figure 1, according to the WHO estimates, that the MMR decreased between 2000 and 2015, the wide and overlapping confidence bands indicate that the decrease is not significant.

Using a different estimation method, the 2013 Sierra Leone DHS estimated the MMR in the last seven years before the survey to be 1,165 maternal deaths per 100,000 live births (CI: 615-1,099), compared with 857 maternal deaths per 100,000 live births in the 2008 DHS. Again, as the overlapping confidence bands around the estimates in Figure 1 show, it is not possible to conclude that the MMR changed between the surveys. In summary, while the methods used to estimate the MMR differ, we can still conclude that maternal mortality in Sierra Leone remains quite high.

Figure 1. Maternal mortality ratio estimates for Sierra Leone



Note: DHS estimates the maternal mortality ratio for the seven years before the survey; therefore, the DHS estimates are shown to lie 3.5 years before each survey as an approximation.

Many factors contribute to the high numbers of maternal deaths in Sierra Leone, including the high fertility rate and the large proportion of women in high-risk fertility groups for maternal morbidity and mortality. According to the main report on the 2013 survey, there was a slight decline in the Total Fertility Rate (TFR), from 5.1 in the three years before the 2008 survey to 4.9 in the three years before the 2013 survey. However, this evidence of a slight decline depends very much on the length of the reference period. For many indicators in this report, the reference period is five years rather than three years. Re-calculation of the TFR shows that the TFR was 5.0 during the five years before the 2008 survey and 5.1 during the five years before the 2013 survey, implying a slight increase, rather than decrease. It appears that from approximately 2003 to 2013 the level of fertility was fluctuating, mostly in a range from 4.8 to 5.2, but essentially remaining flat at about 5.0 children per woman.

Four maternal characteristics—a short preceding birth interval, young maternal age, older maternal age, and high parity—are associated with elevated risk for maternal morbidity and mortality (Rutstein and Winter 2015). A recent study using data from 45 countries, including Sierra Leone, found that, if levels of contraceptive use increased so that all births to women in these four risk categories were eliminated, as much as 70% of all projected maternal deaths in the 45 study countries could be averted in 2015 due to the effects of fewer births and lower risk. According to that study, roughly three-fourths of non-pregnant women in the 2008 Sierra Leone DHS were in at least one of these risk categories (Rutstein and Winter 2015). These findings highlight the importance of the high-risk fertility categories and underscore the potential for family planning efforts in Sierra Leone to reduce the level of maternal mortality.

1.1.2. Challenges for Maternal Health

Two important problems that contribute to adverse maternal health outcomes are poor infrastructure and an insufficient number of trained medical staff. The unavailability of trained staff and lack of infrastructure and medicines can cause delays in treatment (Amnesty International 2009; Witter, Wurie, and Bertone 2015)—one of the three types of delay that can lead to maternal death (delay in seeking care, delay in getting to care, delay in receiving treatment) (Pacagnella et al. 2012).

A survey conducted in 2008 on health facilities in Sierra Leone offering delivery services found that no facilities offered basic emergency obstetric care (BEmOC)[1] and only 14 of Sierra Leone's 38 hospitals qualified as having comprehensive emergency obstetric care (CEmOC).[2] Furthermore, the 14 hospitals with CEmOC services available were poorly distributed across the country (Oyerinde et al. 2011). Six of Sierra Leone's 13 districts had no obstetric care services at all (Amnesty International 2009; Oyerinde et al. 2011). The emergency obstetric care (EmOC) coverage for Sierra Leone was estimated to be 1.2 facilities per 500,000 population, which is far below the recommendation of five EmOC facilities per 500,000 population, in the UN Guidelines for Monitoring the Availability and Use of Obstetric Services (Oyerinde et al. 2011).

There are few trained medical staff and health workers. Many health workers left the country due to the civil war that began in 1991 and lasted 10 years (Bertone et al. 2014). Those who remained preferred to work with NGOs and in the Western region, near the capital city, which left the public sector understaffed, especially in other regions and in rural areas (Bertone et al. 2014; Sierra Leone MoHS 2009). The Sierra Leone Ministry of Health and Sanitation (MoHS) has estimated that staff shortages range from 40% to 100% of required staff by area of specialization—for instance, an estimated 68% shortage of practicing midwives and a 45% shortage of MCH aides (Sierra Leone MoHS 2009). Shortages in physicians were even greater, with only five gynecologists found in all of Sierra Leone (Groen et al. 2013; Sierra Leone MoHS 2009). An assessment of health-worker policies by Witter, Wurie, and Bertone (2015) found that remaining challenges include promotion of rural services, more effective recruitment of health worker staff, and measures to ensure good quality of care.

Women who deliver at home or with a non-skilled birth attendant, such as a traditional birth attendant (TBA), have an increased risk of maternal health complications, including dying in childbirth. The Sierra Leone MoHS has reported heavy reliance on TBAs and traditional healers for health care (Sierra Leone MoHS 2009). Many women deliver at home or with a non-skilled provider not only because of the lack of facilities or trained staff, but also because they cannot afford the costs or face delays in obtaining money to pay for services, factors that place them at risk, especially if birth complications arise (Amnesty International 2009; Donnelly 2011). In addition to the health facility costs, health workers have usually charged patients for services to compensate for their low salaries (Amnesty International 2009).

In 2010, the President of Sierra Leone initiated the Free Health Care Initiative (FHCI), which provides free health care services to pregnant women, mothers who are breastfeeding, and children younger than age 5 (Donnelly 2011). The effect of the FHCI was initially felt with large increases in the use of services as well as a considerable increase in the health worker's salaries (Donnelly 2011; Oyerinde et al. 2011; Witter, Wurie, and Bertone 2015). However, the increases in the percentage of births delivered in health facilities have stalled, estimated at 54% in both 2010 and 2013, well below the government target of 90% by 2015 (Treacy and Sagbakken 2015). Other researchers report a slowing of the initial momentum in health care reform created by the FHCI (Bertone et al. 2014; Witter, Wurie, and Bertone 2015).

Thus, while the FHCI is an important policy that has increased women's access to health care, other barriers to obtaining modern medical care remain. Women may not need to pay for some services, but paying for transportation to reach the services can be a financial burden (Amnesty International 2009). A study that occurred after the FHCI found that financial problems remain among the main reasons for not seeking modern care that have led to maternal deaths (Groen et al. 2013). Another study found that in most clinics women and children still pay for health services even if they are entitled to free services (Pieterse and Lodge 2015). Cultural reasons are another barrier to access. A qualitative study in rural Northern Sierra Leone

[1] BEmOC was defined as a facility that performs six of the eight total signal functions as recommended in the UN guidelines for monitoring the availability and use of obstetric services.

[2] CEmOC was defined as a facility that performs all of the eight signal functions as recommended in the UN guidelines for monitoring the availability and use of obstetric services.

found decision-making during childbirth to be complex. It often involves a number of persons such as TBAs and older female family members, and even after the FHCI reform a normal delivery was still seen as one that occurs within the village, rather than at a health facility (Treacy and Sagbakken 2015).

Efforts are underway to improve health care delivery in Sierra Leone. The government's 2008 Reproductive and Child Health Strategic Plan to reduce maternal, under-five, and infant mortality rates by 30% between 2005 and 2015 includes increasing the number of trained health staff, ensuring that facilities have essential functioning equipment, and increasing the use of reproductive and child services, among other elements (Amnesty International 2009). The main objectives of the 2010-2015 National Health Sector Strategic Plan are to improve access to health services, improve the quality of health services, increase equity, increase efficiency of service delivery, and achieve inclusiveness (Sierra Leone MoHS 2009). While these goals are important to improving maternal health, they need to be coupled with interventions aimed at women, including increasing modern contraceptive use, eliminating early marriages and early pregnancies, and raising education levels.

2. Data and Methods

2.1. Data

This study uses data from the 2008 and 2013 Sierra Leone DHS surveys. These are nationally representative, population-based household surveys that monitor demographic trends, reproductive health behaviors, attitudes, and outcomes, and socio-demographic characteristics of women and men of reproductive age. A standard core questionnaire is included in each survey, enabling comparisons over time and across countries. Like all DHS surveys, those in Sierra Leone adopted a two-stage cluster sampling design. In the first stage, primary sampling units (clusters) were defined based on the most recent national census and sampled using probability proportional to estimated population size. In the second stage, a random selection of roughly 30 households per cluster was conducted. All women age 15-49 in selected households were eligible for interview. In total, 7,373 women were interviewed in the 2008 survey and 16,658 women were interviewed in the 2013 survey.

2.2. Methods

2.2.1. Indicators

The study examines trends in the key indicators of maternal health in Sierra Leone. Due to the diverse range of maternal health indicators—for example, the indicators range from modern contraceptive use, which is calculated among all currently married and in-union women, to postnatal care for the mother, which is calculated only among women with a live birth in the five years preceding the survey—Table 1 provides information on the population that was used to calculate each indicator, the weighted sample size, and the definition of the indicator. While information on delivery care was collected for all live births in the five-year reference period, information on antenatal and postnatal care was collected only for women's most recent live birth in the five years preceding the survey, so some indicators are restricted to this population.

In the report, the maternal health indicators listed in Table 1 are examined across the following background characteristics: women's current age (15-17, 18-34, 35-39, 40-49), women's parity (0, 1, 2-3, 4 or higher), women's education (none, primary, secondary or higher), DHS household wealth quintile (lowest, second, middle, fourth, highest), locality (urban, rural), and region (Eastern, Northern, Southern, Western). For indicators related to pregnancy and childbearing, the woman's age at the child's birth is used instead of her current age. The age intervals used in the report are intended to identify women with higher age-related fertility risk, as women who give birth at very young ages (i.e. under age 18) and at older ages (i.e. 35-39 years, and particularly 40-49 years) are known to have an elevated risk for adverse maternal and child health outcomes (Rutstein and Winter 2014; Rutstein and Winter 2015). For one indicator, adolescent childbearing, we use a different age interval (young women age 15-19) in order to align with Sierra Leone's goal of reducing childbearing for all adolescents age 10-19 years.

Trends in the indicators are presented graphically in figures throughout the report. For indicators that are calculated for births in the five years preceding the survey, an argument could be made for using the mid-point of this interval as the time point for the indicator (i.e. 2.5 years preceding the survey). However, for the sake of simplicity all indicators are graphed using the survey label, "2008 DHS" or "2013 DHS."

Table 1. Maternal health indicators included in the study

Indicator	Definition	Population base	Sample size	
			2008 DHS	2013 DHS
Contraceptive prevalence rate (CPR)	Percentage of women currently using modern contraception	women age 15-49 married and in-union	5525	10903
Adolescent childbearing	Percentage of women age 15-19 who have had a live birth or are currently pregnant	women age 15-19	628	2,319
Four or more antenatal care visits (ANC)	Percentage of women with four or more antenatal care visits for their most recent pregnancy	women age 15-49 with a live birth in the five years preceding the survey	4,103	8,647
Mother was given iron syrup/tablets during pregnancy	Percentage of women who were given iron syrup/tablets during their most recent pregnancy	women age 15-49 with a live birth in the five years preceding the survey	4,103	8,647
Blood pressure checked during ANC	Percentage of women who had their blood pressure checked during an ANC visit during their most recent pregnancy	women age 15-49 with a live birth in the five years preceding the survey who had at least one ANC visit	3,829	8,483
Informed of pregnancy complications during ANC	Percentage of women who were informed of pregnancy complications during an ANC visit during their most recent pregnancy	women age 15-49 with a live birth in the five years preceding the survey who had at least one ANC visit	3,829	8,483
Births assisted by a skilled birth attendant (SBA)	Percentage of births that were assisted by an SBA	children born in the five years preceding the survey	5,811	12,198
Birth delivered in a facility	Percentage of births that were delivered in a facility	children born in the five years preceding the survey	5,811	12,198
Births delivered by Caesarean section	Percentage of births that were delivered by caesarean section	children born in the five years preceding the survey	5,811	12,198
Fertility risk: young maternal age at child's birth	Percentage of births to women under age 18	children born in the five years preceding the survey	5,811	12,198
Fertility risk: older maternal age at child's birth	Percentage of births to women age 40-49	children born in the five years preceding the survey	5,811	12,198
Fertility risk: short preceding birth interval	Percentage of births with a preceding birth interval of less than three years	children born in the five years preceding the survey	5,811	12,198
Fertility risk: high parity	Percentage of births to women with high parity (four or more)	children born in the five years preceding the survey	5,811	12,198
Postnatal care for the mother	Percentage of women who received a postnatal check-up within two days of delivering their most recent child	women age 15-49 with a live birth in the five years preceding the survey	4,103	8,647
Problems in accessing health care	Percentage of women who reported that they have serious problems in accessing health care for themselves when they are sick	women age 15-49	7374	16,658

2.2.2. Analysis

In order to describe recent trends in maternal health in Sierra Leone, this report uses data from both the 2008 DHS survey and the 2013 DHS survey. Statistical testing of differences in proportions determined whether differences in indicators between surveys (both nationally and within subgroups) were statistically significant. In addition, tests of association were conducted to determine the statistical significance of differences across socioeconomic characteristics within each survey. All statistical testing was adjusted for the DHS sample design and weights. Stata 14 was used to make all calculations.

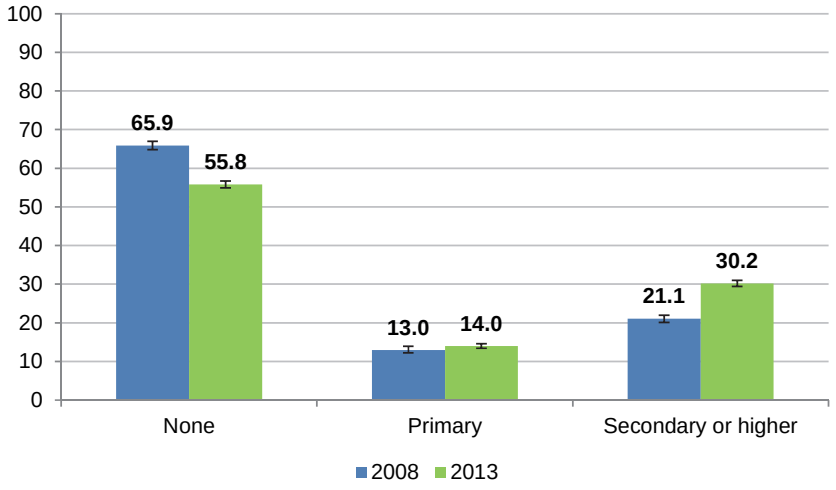
3. Results and Discussion

3.1. Description of Women Age 15-49

The study includes 7,474 women age 15-49 who were interviewed in the 2008 DHS and 16,658 women interviewed in the 2013 DHS. Appendix Table 1 shows the distribution of these women across background characteristics. In both surveys, nearly two-thirds of women live in rural households (64%). According to the 2013 survey more than half of women have no education (56%), but this percentage represents a large decrease since 2008, when 66% of women had no education. Figure 2 highlights the recent improvements in women's educational attainment.

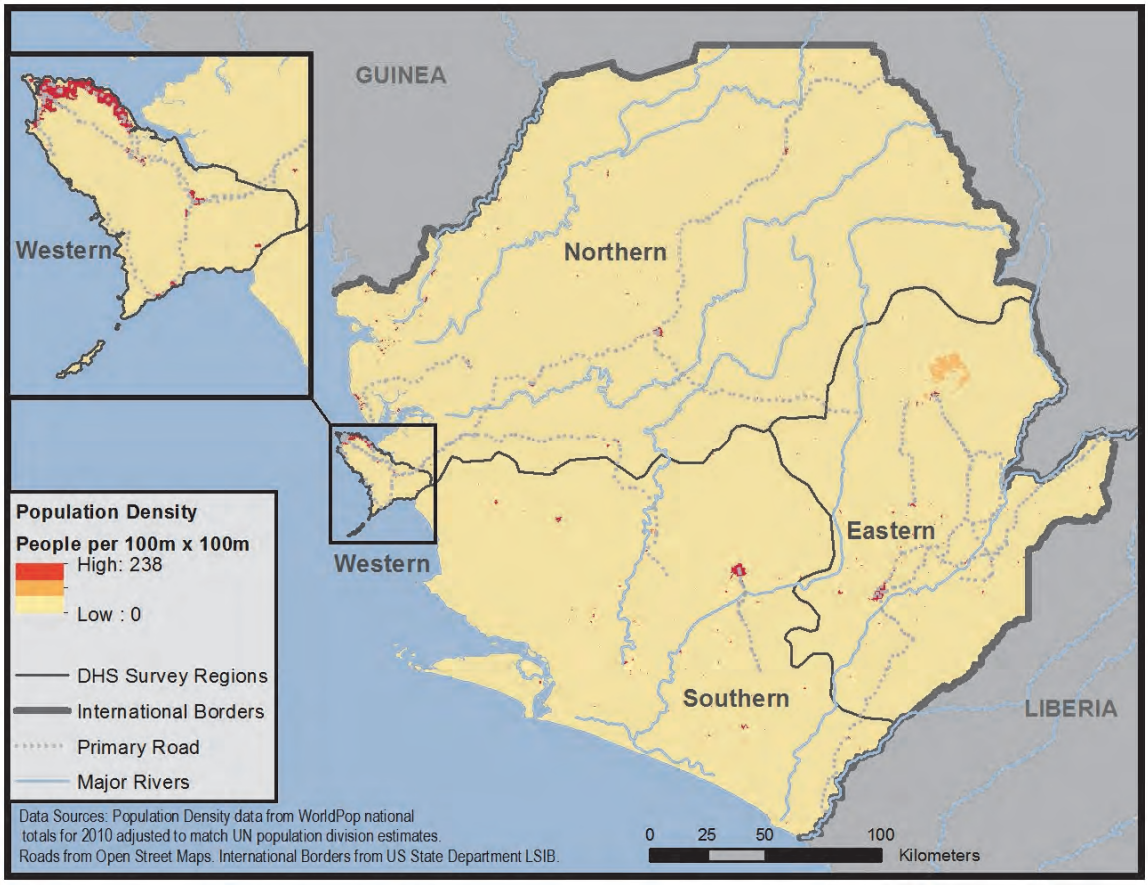
With the exception of women's education, the distribution of background characteristics is roughly similar in both surveys. According to the 2013 survey, the majority of women are age 18-34 (56%), 14% are age 15-17, and 30% are age 35-49. Roughly two-fifths of women have no children or just one child, one-fourth have two or three children, and more than one-third have four or more children (37%). Women are fairly equally distributed across the five household wealth quintiles, with a slightly larger percentage (24% in 2013) in the highest quintile.

Figure 2. Trend in educational attainment of women age 15-49, Sierra Leone 2008 and 2013 DHS



The population is concentrated in the Northern region (38% in 2013), which, as Figure 3 shows, is primarily rural with a low population density. Roughly 20% of women live in each of the remaining three regions, the Eastern, Southern, and densely-populated Western regions. As Figure 3 also shows, urban clusters are mainly found in the Western, Southern, and Eastern regions. Few primary roads run through Sierra Leone, reducing women's access to services.

Figure 3. Map of Sierra Leone

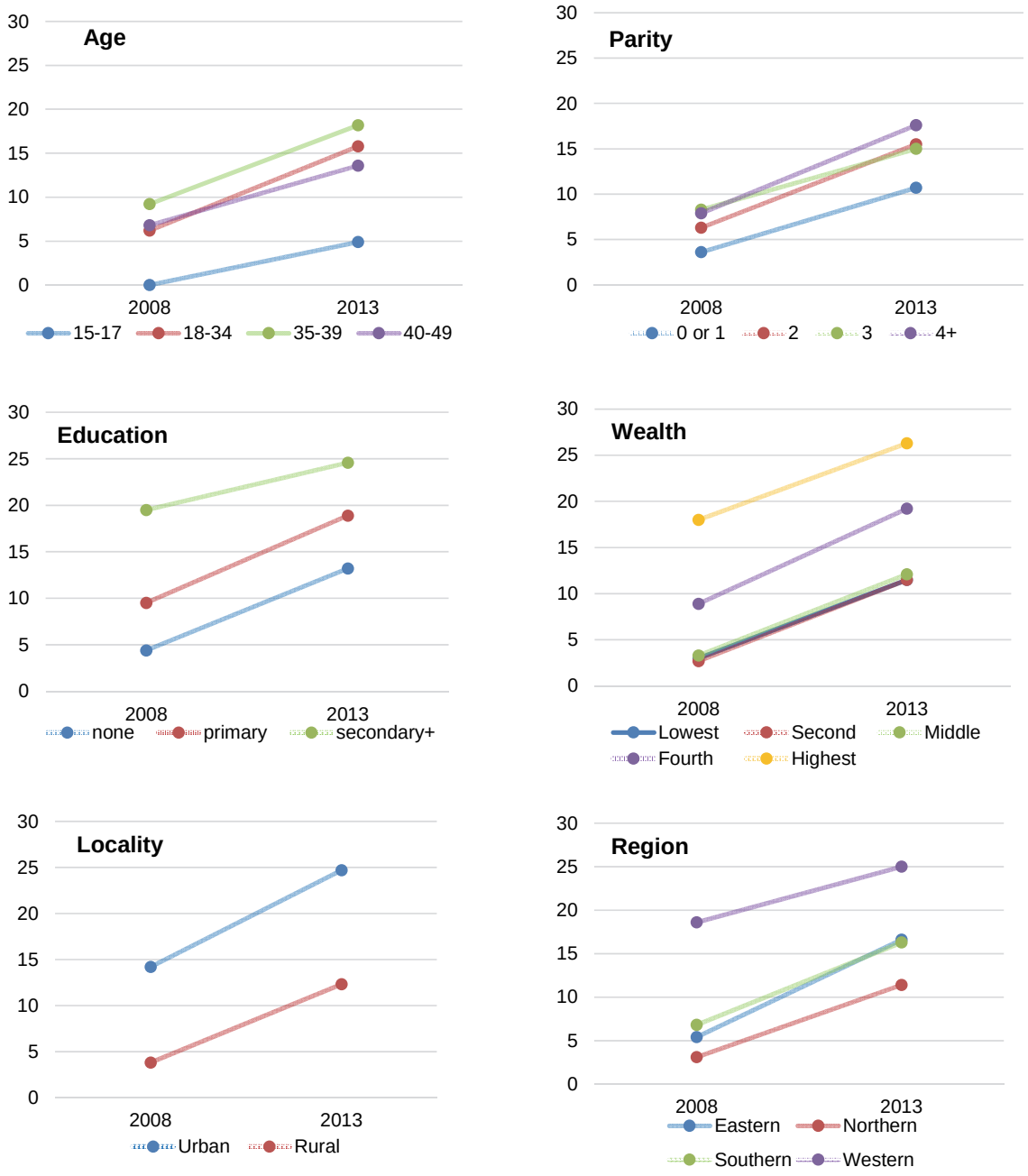


3.2. Contraceptive Prevalence Rate

In 2008, only 7% of women in a union were currently using a modern contraceptive method. While the contraceptive prevalence rate (CPR) significantly increased between surveys, to 16% in 2013, it remains relatively low. Further increases would be required to ensure that the goals set for improving maternal health in Sierra Leone can be achieved. As Appendix Table 2 shows, the CPR distribution differs by the women's background characteristics in both survey years. In general, modern CPR is lowest for women in the youngest age group, with the lowest parity, with no education, in the lowest two household wealth quintiles, in rural areas, and in the Northern region. In 2008, of the 100 women in a union age 15-17 in the sample, not one used a modern contraceptive method.

Significant increases in modern CPR between the two DHS surveys were found in all subgroups of women. These increases were not all of the same magnitude, as Appendix Table 2 shows. For instance, while we see increases in modern CPR for all age groups (Figure 4), the increase was small for women age 15-17. Since childbearing for women under age 18 is considered at high risk for negative maternal health outcomes, contraceptive use is especially important for this group, and a substantial improvement in CPR is needed. Figure 4 also shows that the dispersion between the age categories increased somewhat in 2013.

Figure 4. Percentage of women currently using modern contraception among women age 15-49 in a union, by background characteristics, Sierra Leone 2008 and 2013 DHS

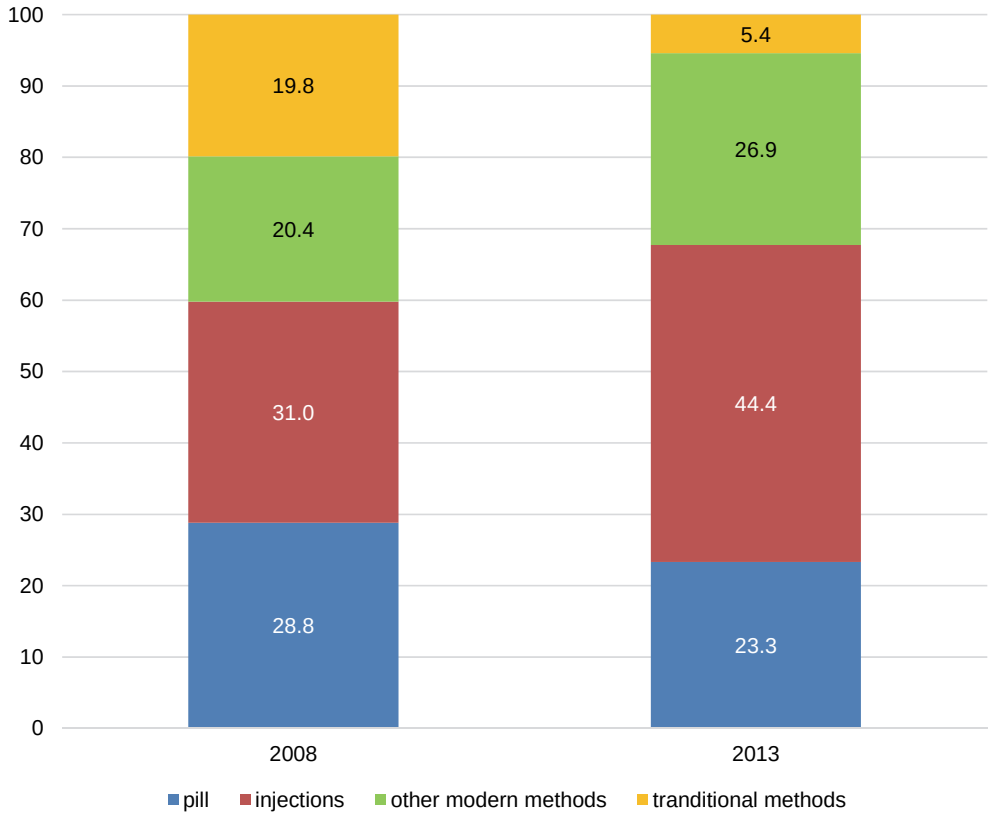


Note: All changes were statistically significant

The increase in CPR was more equitable by household wealth, in that the significant increase was approximately the same, 8 to 10 percentage points for each quintile. However, the difference in the proportions in contraceptive use for women in the highest wealth quintile (26%) compared with the lowest and second wealth quintiles (both 12%) remained large in 2013, and perhaps more targeted efforts are required to reduce these gaps. By region, the increase was the highest in the Eastern region, at 11 percentage points. This region also had the second lowest CPR in 2008. The Northern region had the lowest modern CPR in both surveys.

Figure 5 presents the percent distribution of users of any contraceptive method, by method type used. In both surveys, the most used methods were pills and injectables. In 2008, the shares of women currently using other modern methods or using traditional methods were approximately the same. Comparing the surveys, while the share of women users currently using the pill decreased between 2008 and 2013, the share currently using injections and other modern methods increased significantly, and the share currently using traditional methods decreased.

Figure 5. Percent distribution of method used by women currently using any contraceptive method, among women age 15-49 in a union, Sierra Leone 2008 and 2013 DHS



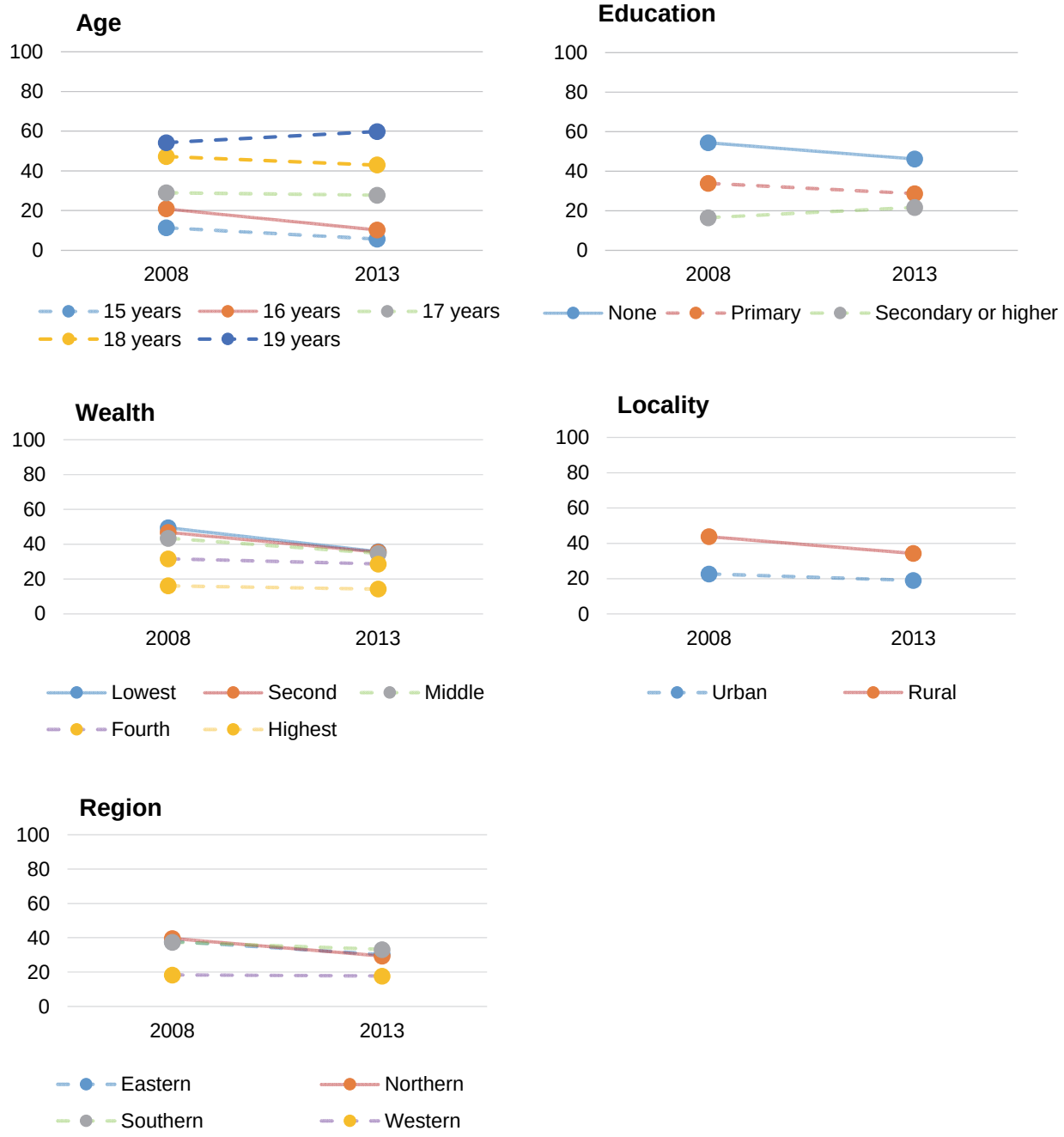
3.3. Adolescent Childbirth

The government of Sierra Leone has identified adolescent girls, defined as young women age 10-19 years, as the most vulnerable segment of the population. It is committed to reducing the level of teenage pregnancy (Republic of Sierra Leone 2013). DHS surveys do not obtain fertility information from girls age 10-14 at the time of the survey, so we restrict the indicator to current age 15-19. According to the 2008 DHS survey, 34% of women age 15-19 had ever given birth or were currently pregnant. This percentage decreased significantly in the 2013 survey, to 28% of women age 15-19. Among these young women, 20% were pregnant with their first child, 66% had given birth to one child, and 14% had given birth to two or more children. As these data demonstrate, adolescent childbearing remains widespread in Sierra Leone, posing serious health risks to young women and their children.

As Appendix Table 3 shows, in both surveys the level of adolescent childbearing varied significantly by women's background characteristics. Overall, adolescent childbearing is highest among women with no education and among women in rural areas, and is lowest among women with secondary or higher education, women in the highest wealth quintile, urban residents, and women in the Western region. As expected, adolescent childbearing is strongly associated with women's age. While just 6% of women age 15 in the 2013 survey had begun childbearing, 60% of women age 19 had already given birth or were pregnant with their first child.

The reductions in adolescent childbearing between surveys were not equally distributed across the subgroups (see Figure 6). For example, the reductions in adolescent childbearing by women's education were concentrated in women with no education, which has resulted in improved equity in adolescent childbearing across levels of women's education, although large gaps still remain. By wealth, statistically significant improvements in adolescent childbearing occurred only in the lowest two wealth quintiles. The spread in this indicator across levels of wealth narrowed somewhat between surveys, but adolescent childbearing remains least common among women in the highest wealth quintile (see Figure 6). Reductions in adolescent childbearing were also concentrated in the Northern region, and in rural areas. By women's age, significant reductions in adolescent childbearing were observed only in women age 16.

Figure 6. Percentage of women age 15-19 who have already begun childbearing, by background characteristics, Sierra Leone 2008 and 2013 DHS



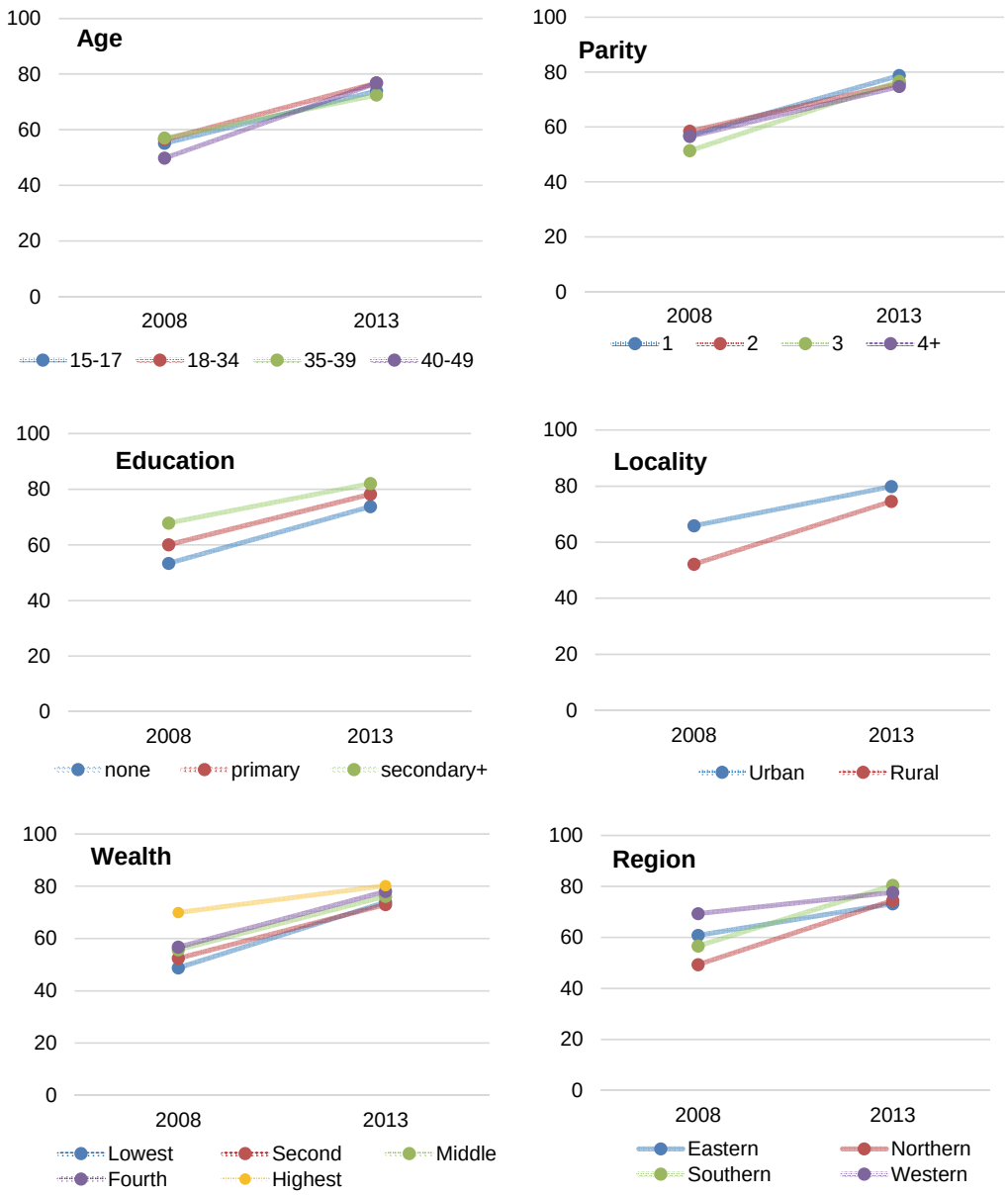
Note: A solid line indicates a significant change between surveys, while a dotted line indicates no significant change.

3.4. Antenatal Care Visits and Components

More than half (56%) of women with a live birth in the last five years before the 2008 survey attended at least four visits for antenatal care (ANC). This increased significantly in 2013 to 76%. In both years the distribution of women who had the recommended four or more ANC visits while pregnant did not differ significantly by their age or parity at the child's birth (see Appendix Table 4). However, in both years this indicator did differ by education, household wealth, locality, and region. In general, in both survey years the percentage of women attending four or more ANC visits was higher as levels of education and household wealth were higher. In addition, women in urban areas had a higher proportion of four or more ANC visits compared with rural women.

There were significant increases for all subgroups of women in the proportions attending four or more ANC visits. The changes between the surveys were greater for groups with lower percentages of ANC visits in 2008, which demonstrates an effort to close the gaps and increase equity between groups. The greatest increases between the surveys were among women with no education, in the lowest wealth quintile, in rural areas, and in the regions with the lowest percentage of women with four or more ANC visits in 2008. This increase in equity is illustrated by Figure 7, which shows that the dispersion of the categories decreased for all background variables (shown by the clustering of the dots in 2013), but especially for women's education, locality, household wealth, and region. For instance, the difference in this indicator between urban and rural women in 2008 was 14 percentage points, while in 2013 it was 5 percentage points. This was due to a larger increase between the surveys for rural women (an increase of 22 percentage points between 2008 and 2013) compared with urban women (14 percentage points), as Appendix Table 4 shows.

Figure 7. Percentage of women age 15-49 who had four or more antenatal care visits for their most recent pregnancy in the five years preceding the survey, by background characteristics, Sierra Leone 2008 and 2013 DHS



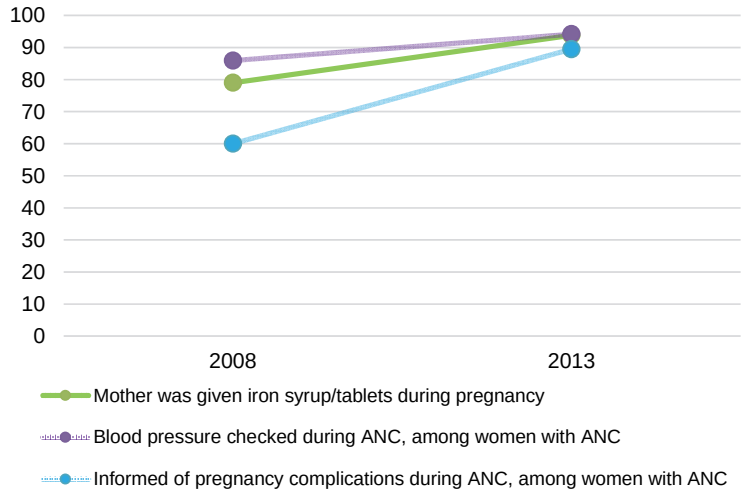
Note: All changes were statistically significant

In addition to the number of antenatal visits, we examine three indicators that assess the content of care received by women during their most recent pregnancy: the percentage of women who were given iron syrup or tablets during the pregnancy; the percentage who had their blood pressure checked during an ANC visit; and the percentage who were informed of pregnancy complications during an ANC visit.

Anemia during pregnancy is an important risk factor for maternal morbidity and mortality, because it increases women's risk of dying from hemorrhage, which is a leading cause of maternal death (The Partnership for Maternal Newborn and Child Health 2006). Iron and folic acid supplementation is one key strategy for controlling anemia in pregnancy. As Figure 8 shows, the percentage of women who received iron syrup or tablets during their most recent pregnancy in the last five years increased significantly between

surveys, from 79% in 2008 to 94% in 2013. Significant improvements were also observed in the other two indicators—having blood pressure checked and being informed of pregnancy complications during an ANC visit. The percentage of women who had their blood pressure checked during an ANC visit increased from 86% in 2008 to 94% in 2013, and the percentage of women who were informed of the symptoms of pregnancy complications or warning signs during an ANC visit increased substantially, from 60% to 90% (see Figure 8).

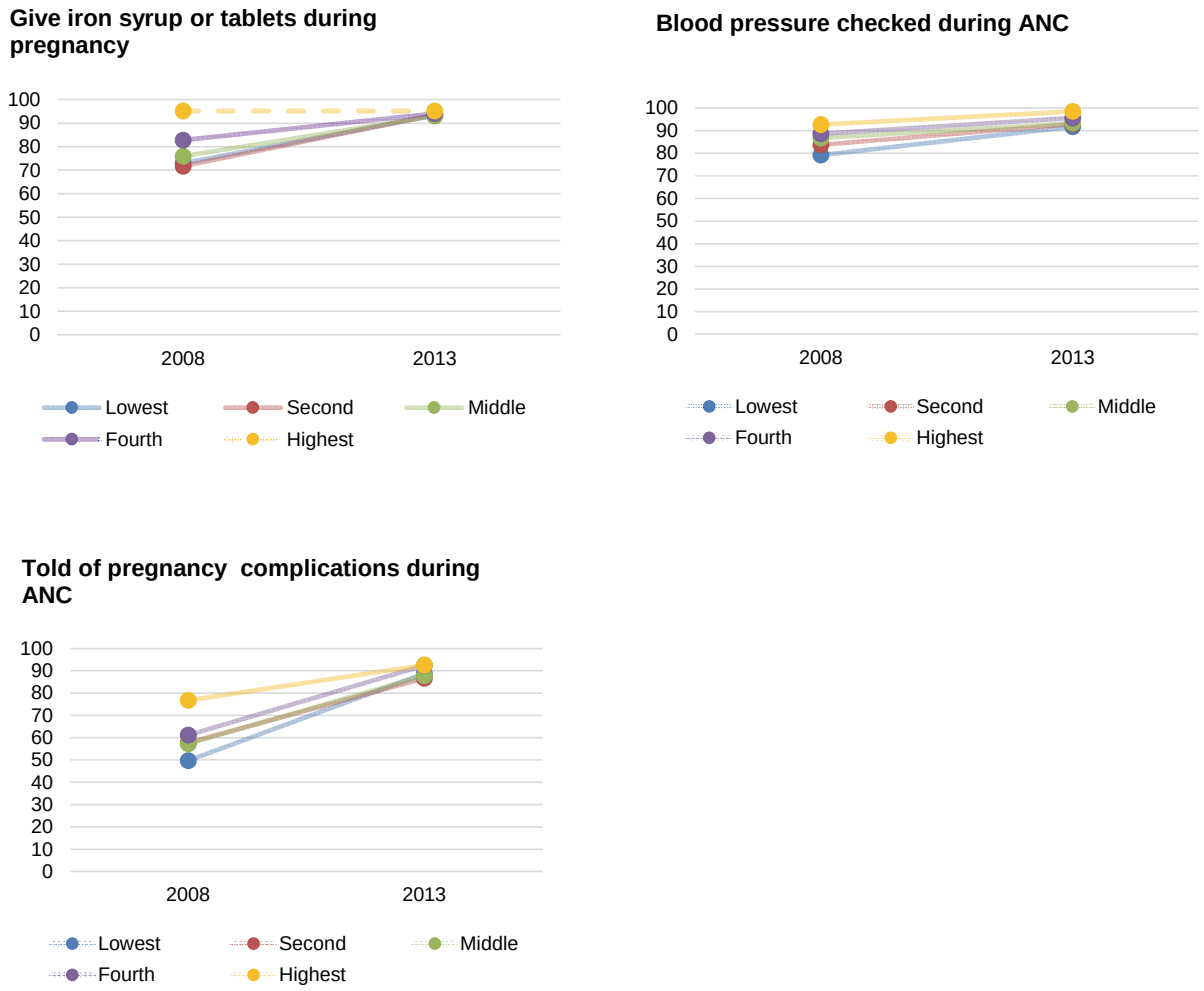
Figure 8. Indicators of care received during women's most recent pregnancy in the five years preceding the survey, Sierra Leone 2008 and 2013 DHS



The three indicators of ANC content did not differ meaningfully by women's age or parity. However, in both survey years each indicator differed by women's level of education, household wealth, locality, and region (see Appendix Table 5). In general, in both years women's coverage of each component of care was greater with higher levels of education and household wealth, and women in urban areas had higher coverage than rural women.

While significant improvements in these indicators were observed in nearly every subgroup, the greatest improvements were found in the groups with the lowest coverage in 2008: women with no education, those in lower wealth quintiles, and those in rural areas. The concentration of improvements within these groups has narrowed the equity gaps in coverage of these key components of antenatal care by women's education, household wealth, and locality. While some differences in coverage by these characteristics remain, they have narrowed considerably. Figure 9 highlights the success in closing the wealth equity gap in the quality of care received during pregnancy.

Figure 9. Percentage of women who were given iron supplementation during pregnancy (top left panel), had their blood pressure checked during an ANC visit (top right panel) and who were told of pregnancy complications during an ANC visit (bottom left panel), by household wealth quintile, Sierra Leone 2008 and 2013 DHS



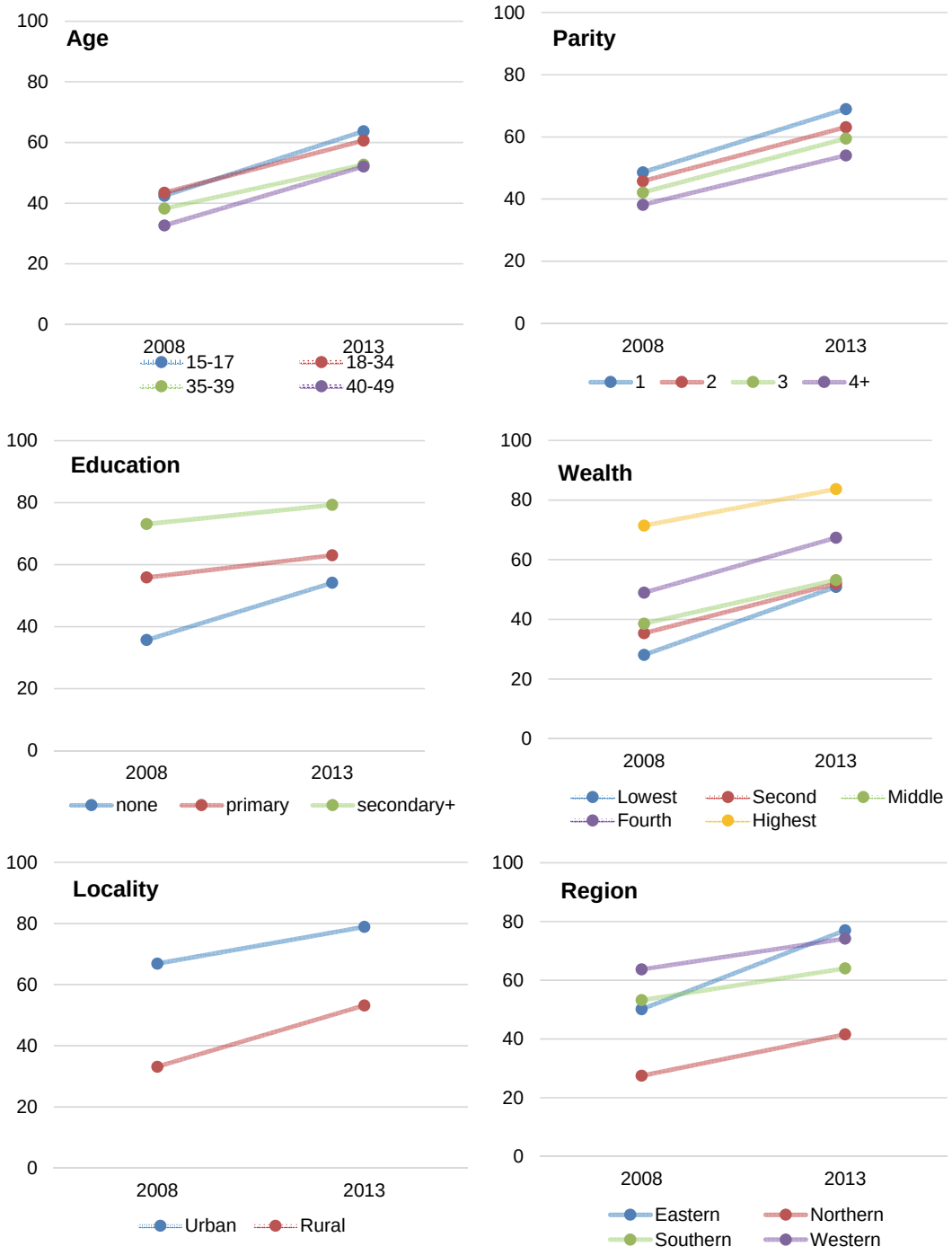
Note: A solid line indicates a significant change between surveys, while a dotted line indicates no significant change.

3.5. Skilled Birth Attendants and Place of Delivery

In Sierra Leone, a skilled birth attendant (SBA) is defined as a doctor, a nurse, a midwife or an MCH aide. In 2008, less than half of births (42%) in the five years before the survey were assisted by a skilled birth attendant. This percentage increased significantly to 60% in 2013. The indicator also differed by women's characteristics, with the lowest proportions of births assisted by an SBA found among women in the oldest age group, with the highest parity, with no education, in the lowest wealth quintile, in rural areas, and in the Northern region.

As Appendix Table 6 shows, the increase in births assisted by an SBA was significant for all subgroups of women. There were also greater increases for women of lower socioeconomic status (i.e. women with no education, women in the lowest wealth quintile, and rural women), indicating a closing of the socioeconomic gaps in SBA coverage. Figure 10 illustrates these changes. For example, there was an increase of 19 percentage points in births assisted by an SBA for mothers with no education compared with an increase of 6-7 points for women in the higher education categories. In addition, there was an increase of 20 percentage points in SBA coverage for rural births compared with 12 for urban births. There was a large difference in the increase between the lowest and highest wealth quintiles (23 versus 12 percentage points). In the Eastern region, births assisted by a SBA increased by 27 percentage points between surveys, more than in any other region—an increase that moved this region from having the second lowest percentage of births assisted by an SBA in 2008 to having the highest proportion in 2013. However, as Appendix Table 6 shows, there remain large gaps in SBA coverage by region, and the percentage of births assisted by an SBA remains relatively low in the Northern region, at less than half (42%).

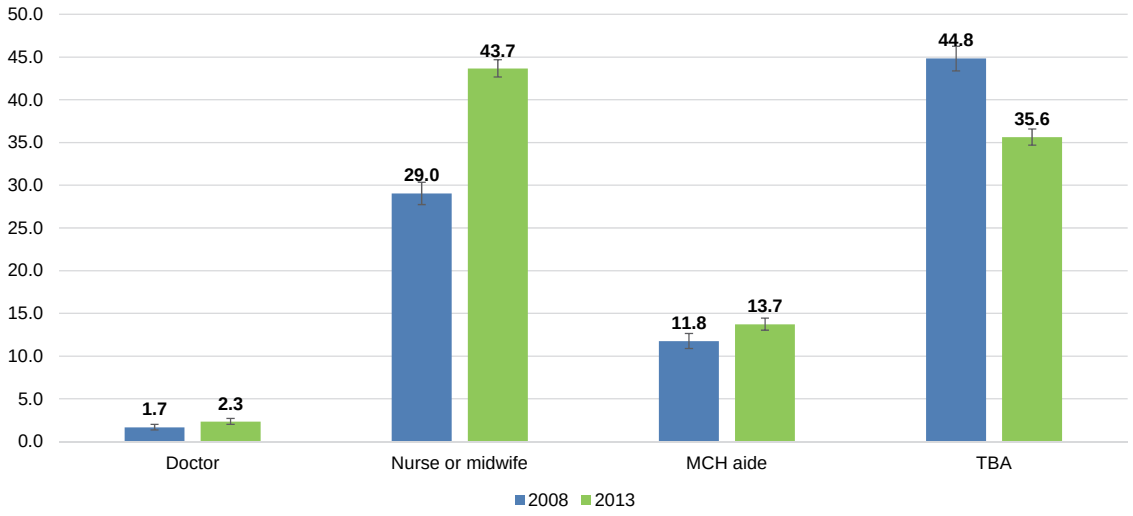
Figure 10. Percentage of births that were assisted by a skilled birth attendant, among children born in the five years preceding the survey, by background characteristics, Sierra Leone 2008 and 2013 DHS



Note: All changes were statistically significant

Figure 11 gives a further description of the person providing assistance during delivery, including traditional birth attendants (TBAs), who are not considered to be SBAs. In both years, doctors only assisted approximately 2% of births. The next largest category, MCH aides, assisted 12% of births in 2008 and 14% in 2013. The greatest change was in the proportion of births assisted by nurses or midwives, versus TBAs. The percentage of births assisted by a nurse or midwife significantly increased from 29% in 2008 to 44% in 2013, while the percentage assisted by a TBA declined from 45% to 36%. Therefore, the increase in the percentage of births assisted by an SBA is mainly due to the increase in births assisted by a nurse or a midwife.

Figure 11. Assistance during delivery by type among birth in the last five years, Sierra Leone 2008 and 2013 DHS



Note: A women could report more than one type of provider that assisted during delivery

Corresponding to the increase in the percentage of births assisted by a SBA is the increase in the percentage of births in the last five years delivered in a health facility. The percentage more than doubled between the surveys, from 25% in 2008 to 54% in 2013. As for births assisted by an SBA, facility births occurred less often for mothers who were older, with higher parity, with no education, in the lowest wealth quintile, in rural areas, and in the Northern region.

The increases in facility births between the surveys were significant across all background variables. The increases appeared to be more or less equitable across the variables; however, as with the births assisted by an SBA, there was a large increase in facility births in the Eastern region, at 44 percentage points compared with an increase of 22-26 percentage points in the other regions. As a result, as Figure 12 shows, the gaps between the regions in the proportion of facility births have grown wider. Although in the Northern region the percentage of facility births increased by 22 percentage points between surveys, in 2013 only 37% of births in this region were delivered in a health facility, and perhaps more efforts are required to increase facility births in this region.

Figure 12. Percentage of births that were delivered in a facility among children born in the five years preceding the survey, by region, Sierra Leone 2008 and 2013 DHS

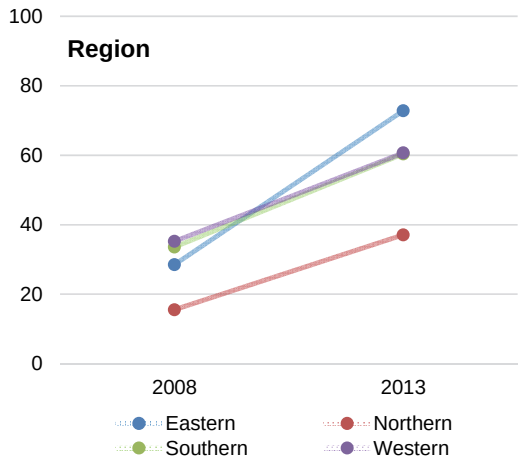
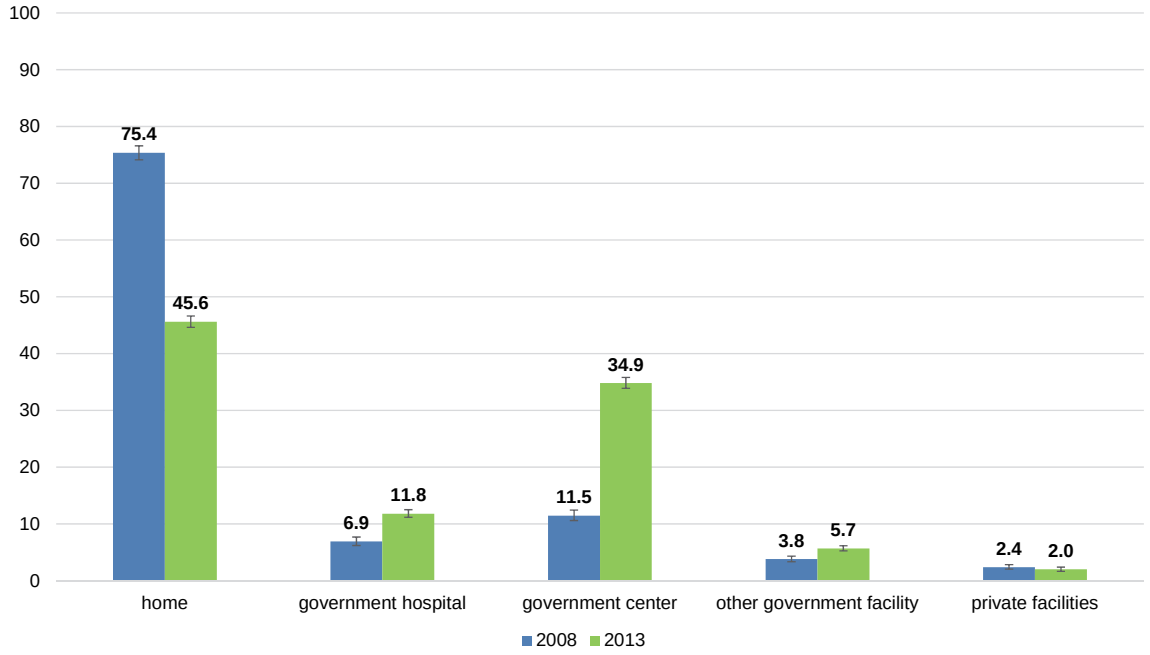


Figure 13 presents a more detailed analysis of place of delivery for births in the five years before the survey. As the figure shows, the significant increase in births delivered in a health facility is mostly due to a large increase in births delivered in a government health center, from 12% in 2008 to 35% in 2013. In both survey years, other government facilities (such as health posts) and private facilities were the least used places of delivery.

Figure 13. Percent distribution of the place of delivery by type among births in the last five years, Sierra Leone 2008 and 2013 DHS

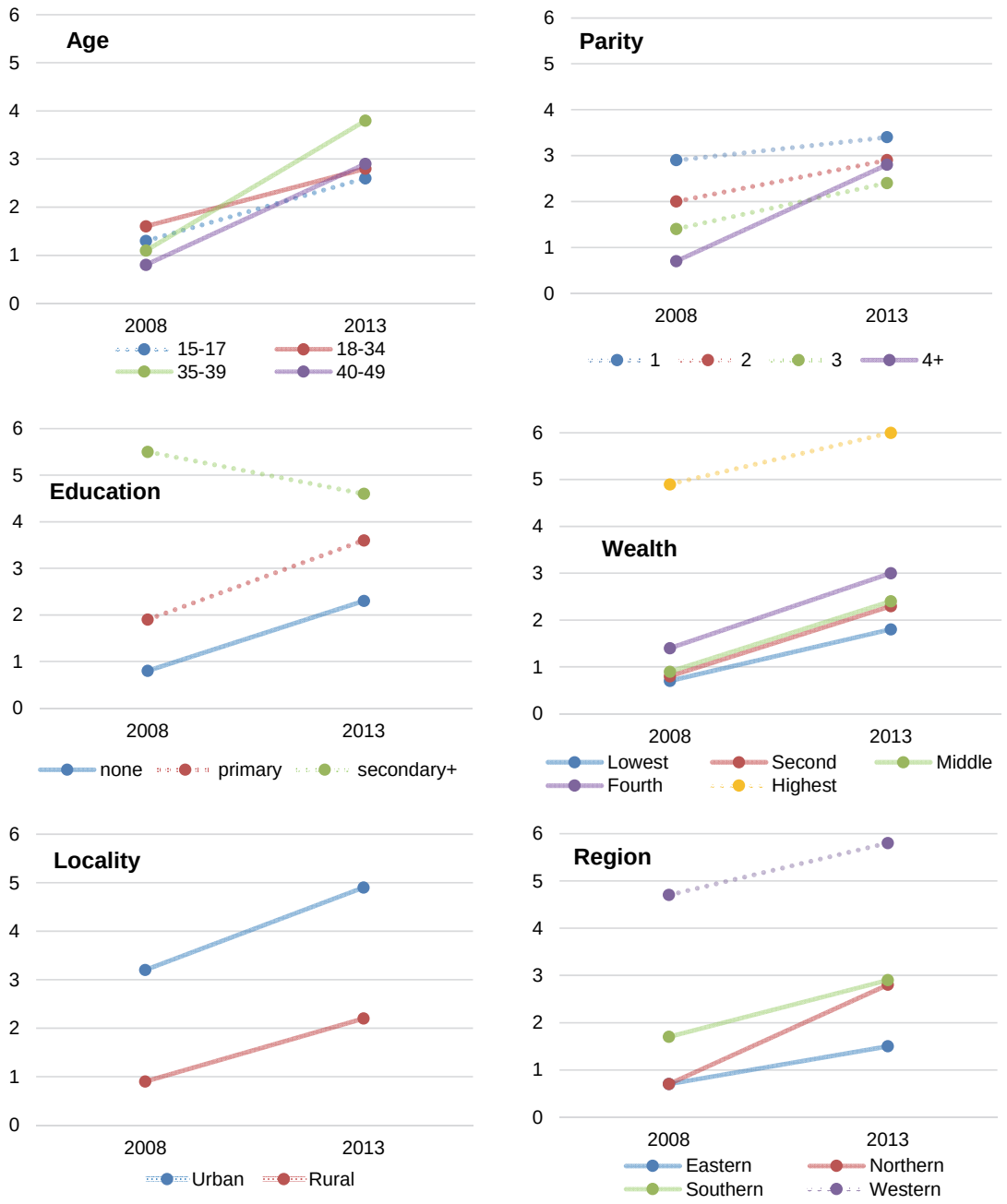


3.6. Caesarean Section Rates

According to WHO, ideal Caesarean section (C-section) rates are between 10% and 15% of births (Gibbons et al. 2010). Rates below 10% suggest underuse and a need for greater access to C-sections, while rates over 15% indicate overuse. Access to C-section deliveries can save lives, for both the mother and her child, especially when complications, such as obstructed labor, arise. In Sierra Leone, only 1.5% of births in 2008 were delivered by C-section, and while this significantly increased to 3% in 2013, the percentage remains far below the WHO ideal, indicating a need and lack of access to facilities or SBAs able to perform C-sections. This lack places women at risk of maternal morbidity and mortality if complications arise during delivery. Appendix Table 7 shows that the distribution of births delivered by C-section did not differ by the mother's age at child's birth in both years, and by the mother's parity in 2013. In 2008, however, the percentage of births by C-section did differ by mother's parity, with a larger percentage of births by C-section among mothers of lower parity. Births by C-section were unequally distributed by mother's education, wealth, and residence; they were higher for mothers with more education, higher wealth, in urban areas, and in the Western region.

The increase in the percentage of births by C-section was not always significant for all subgroups of women, and in general the increases were small. For mothers in the youngest age group, under age 18—the group with the most likely need for C-section delivery, due to a high risk of obstructed labor—the percentage of births delivered by C-section did not increase significantly. There were also no significant increases in C-section births for mothers with one to three children, although there was a significant but small increase (2 percentage points) for mothers with four or more children. There were no significant increases for mothers with primary or more education. In addition, for women in the wealthiest households and those residing in the Western region, the percentage of C-section births did not show a significant increase between the surveys. Figure 14 illustrates these changes, where the dotted lines indicate a non-significant increase. It is important to note that the scale of the y-axes in the figures below is very small and the increases are in fact very small, only 1 to 2 percentage points.

Figure 14. Percentage of births that were delivered by Caesarean section among children born in the five years preceding the survey, by background characteristics, Sierra Leone 2008 and 2013 DHS



Note: A solid line indicates a significant change between surveys, while a dotted line indicates no significant change.

3.7. High-risk Fertility Behavior

Four maternal characteristics—a short preceding birth interval, young maternal age, older maternal age, and high parity—are associated with elevated risk for maternal morbidity and mortality. Avoiding births among women with these risk characteristics can greatly reduce the number of maternal deaths (Rutstein and Winter 2015). In this section, we examine the percentage of births that occur in the four risk categories in the 2013 survey, and changes in these percentages since the 2008 survey.

Short preceding birth interval

Short preceding birth intervals are associated with increased risk of several complications, including premature membrane rupture and uteroplacental bleeding disorders, since insufficient recovery time between pregnancies can worsen the mother's nutritional status (Conde-Agudelo, Rosas-Bermúdez, and Kafury-Goeta 2007). In both the 2008 and 2013 surveys, roughly 40% of births in the last five years had a preceding birth interval shorter than the recommended three years (see Figure 15); no statistically significant change was observed between the surveys.

According to the 2008 survey, the prevalence of short birth intervals differed significantly by the mother's level of education, household wealth, locality, and region, and these differentials persisted in the 2013 survey (see Appendix Table 8). Short preceding birth intervals are most common among women with less education, women in lower wealth quintile households, and in rural areas. Only one subgroup showed a significant improvement in this indicator: among women in the Northern region, the prevalence of short birth spacing decreased significantly between surveys, from 41% in 2008 to 37% in 2013.

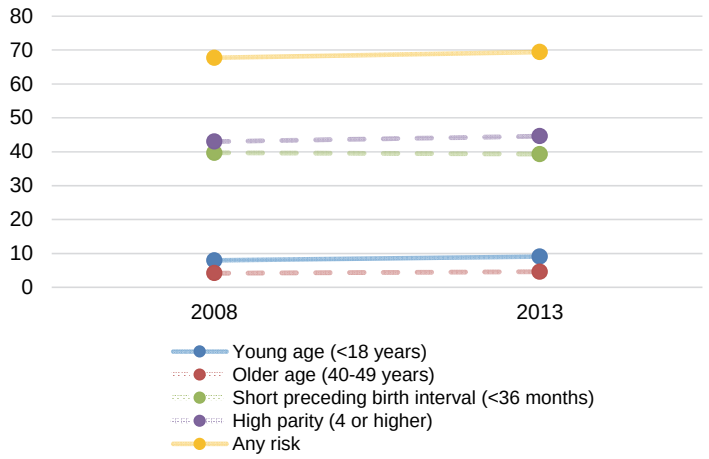
Young age at the child's birth

Giving birth at a young age (under age 18) is associated with elevated maternal risk, because young mothers have often not yet reached full physiological and reproductive maturity, thus increasing their risk of complications during pregnancy and childbirth. In 2008, 8% of births in the five years preceding the survey were to women under age 18. Despite a strong commitment in Sierra Leone to reducing the rate of adolescent pregnancy, this percentage increased significantly to 9% in the 2013 survey. The percentage of births to women under age 18 did not differ by wealth, locality, or region in 2013 (see Appendix Table 8). Contrary to expectation, the percentage of births to women under age 18 is higher with higher levels of education, and is highest among women with a secondary education or more (20% in the 2013 survey). The small but significant increase in the percentage of women who have begun childbearing by age 18 highlights the importance of the government's 2013 initiative to reduce the rate of teenage pregnancy.

Older age at the child's birth

The biological influences of aging in older women are also believed to influence their reproductive health and elevate the risk of childbearing (Nortman 1974). In the 2013 survey, 5% of births in the last five years were to women age 40-49, and this percentage had not changed significantly since the 2008 survey (see Figure 15). In both surveys, the prevalence of births to women age 40-49 differed by women's education, household wealth, locality, and region. Births to older women age 40-49 were most common among women with no education, women in the lowest wealth quintile, and those residing in rural areas (see Appendix Table 8). Efforts are needed to inform women of the risks associated with childbearing at older ages as well as under age 18, and to ensure that family planning methods are accessible.

Figure 15. High-risk fertility characteristics among birth in the five years preceding the survey, Sierra Leone 2008 and 2013 DHS



High parity

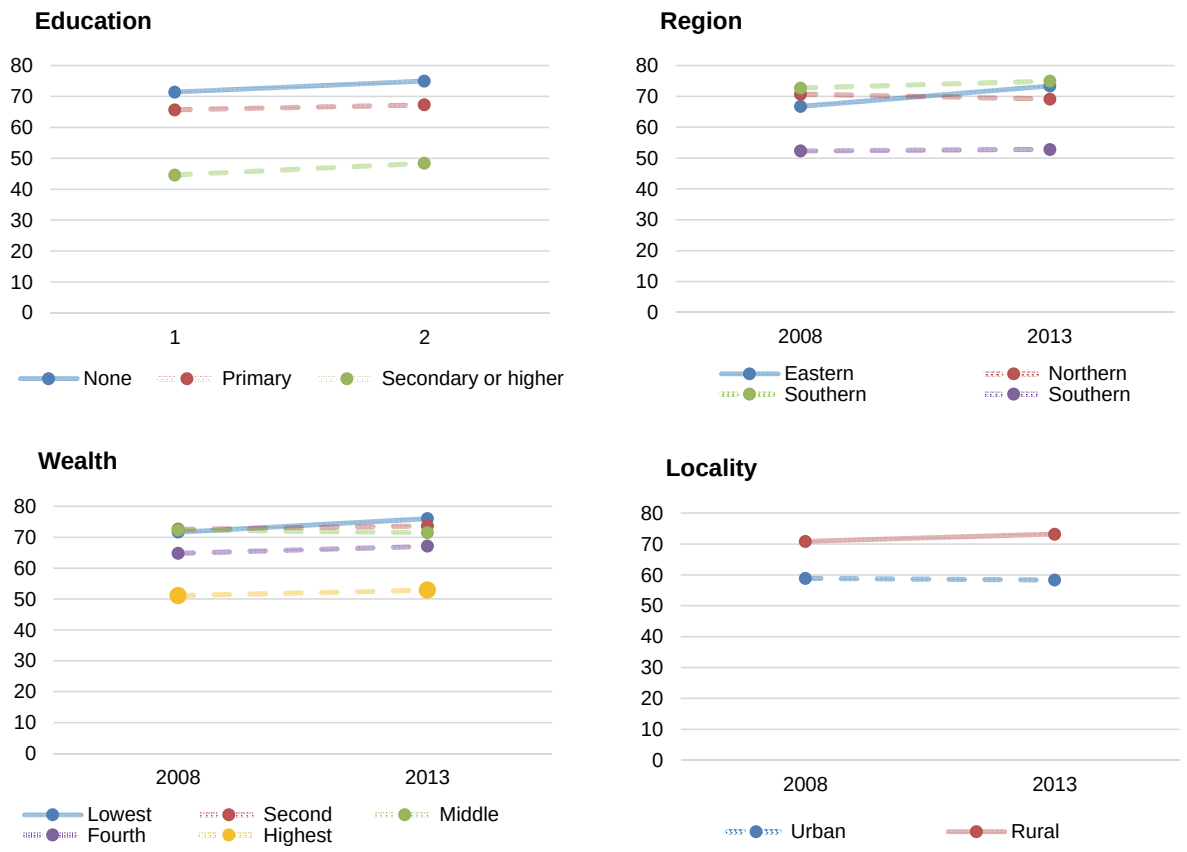
Women are at higher risk for adverse maternal outcomes during their first birth and for high-parity births. At high parity, women's health may be compromised from the cumulative experience of childbirth and lactation, while the first birth may be riskier because the woman's body is undergoing childbirth for the first time (Trussell and Pebley 1984). According to the 2013 survey, 45% of births in the last five years in Sierra Leone were to women with four or more previous births. This percentage had not changed significantly since the 2008 survey. In both surveys, the prevalence of high-parity births differed by women's education, household wealth, locality, and region. High-parity births were most common among women with no education, in the lower wealth quintiles, and in rural areas (see Appendix Table 8).

Any risk

The percentage of births in one or more of the four higher-risk categories increased slightly (but significantly) between surveys, from 68% in 2008 to 69% in 2013. Figure 16 shows the trend in this summary indicator across women's background characteristics. Significant increases in the percentage of high-risk births were observed among women with no education, in the lowest wealth quintile, in rural areas, and in the Eastern region.

In summary, in contrast to the impressive trends in coverage of key components of maternal care, there have not been comparable improvements in the fertility risk profile of births. Furthermore, the increases in fertility risk have been most pronounced in the subgroups with the highest initial levels of risk—no improvements in equity were observed. These findings point to the importance of family planning, and the need to ensure that high-quality services, contraceptive commodities, and information are available to all women, so that they are aware of their risks and are empowered to make informed family planning decisions.

Figure 16. Percentage of births to women in any high-risk category among births in the five years preceding the survey, by background characteristics, Sierra Leone 2008 and 2013 DHS



Note: A solid line indicates a significant change between surveys, while a dotted line indicates no significant change.

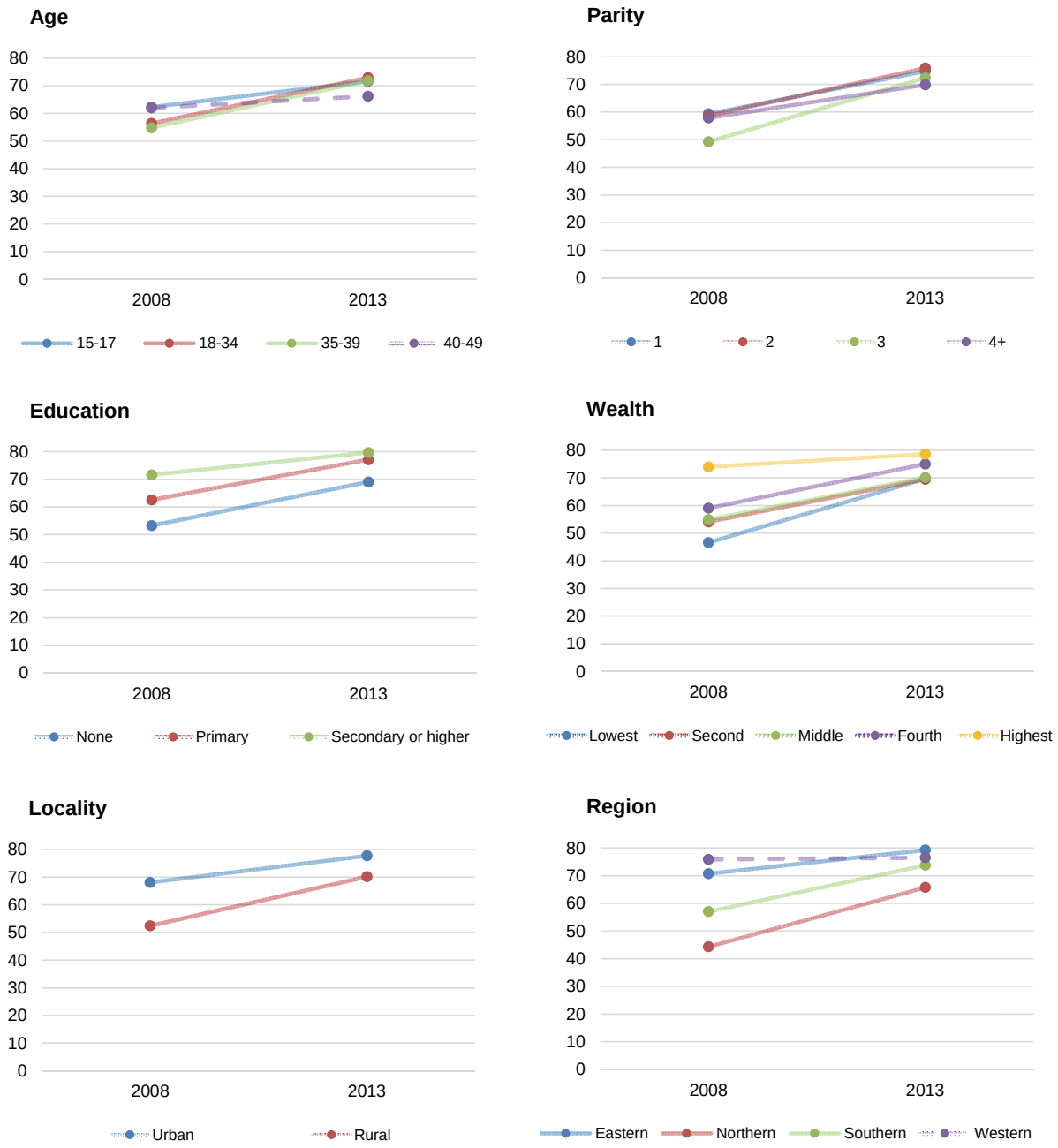
3.8. Postnatal Care for Women

While interventions along the full continuum of care from preconception through infancy are important to maternal survival, the mother and newborn are at highest risk for morbidity and mortality during the period directly surrounding the delivery, during labor, childbirth, and the first days of life (WHO 2014). The WHO recommendation for postnatal care (PNC) is for the mother and the newborn to have close observation for 24 hours and three additional postnatal contacts in the six weeks following delivery (WHO 2014). To assess the trend in PNC in Sierra Leone, we examine the percentage of women who had a PNC visit (to check on her own health) within two days of delivery, among women with a live birth in the five years preceding the survey. This indicator includes all women, whether they delivered at home or at a health facility.

Coverage of postnatal care for the mother improved substantially between the 2008 and 2013 surveys, from 56% to 72% nationally. In 2008, the level of PNC coverage differed significantly across levels of the mother's parity, education, household wealth, locality, and region, with the lowest levels of coverage among women with no education, those in the poorest wealth quintile, those in rural households, and those in the Northern region (see Appendix Table 9). Significant improvements were observed in nearly all subgroups, with greater improvements among the groups with lowest coverage in 2008, so that the disparities in coverage across subgroups narrowed in 2013 compared with 2008. The closing of the equity gap between subgroups, shown visually in Figure 17, is particularly strong for wealth, locality, and region. While the disparities are less pronounced in 2013, coverage of PNC remains lower in the same subgroups (women in

rural areas, lower wealth quintiles, those with no education, and those in the Northern provinces). Continued efforts focused especially on these subgroups are needed to close the gap and to provide all women with access to essential postnatal care services.

Figure 17. Percentage of women age 15-49 who received a postnatal check-up within two days of delivering their most recent child in the five years preceding the survey, by background characteristics, Sierra Leone 2008 and 2013 DHS

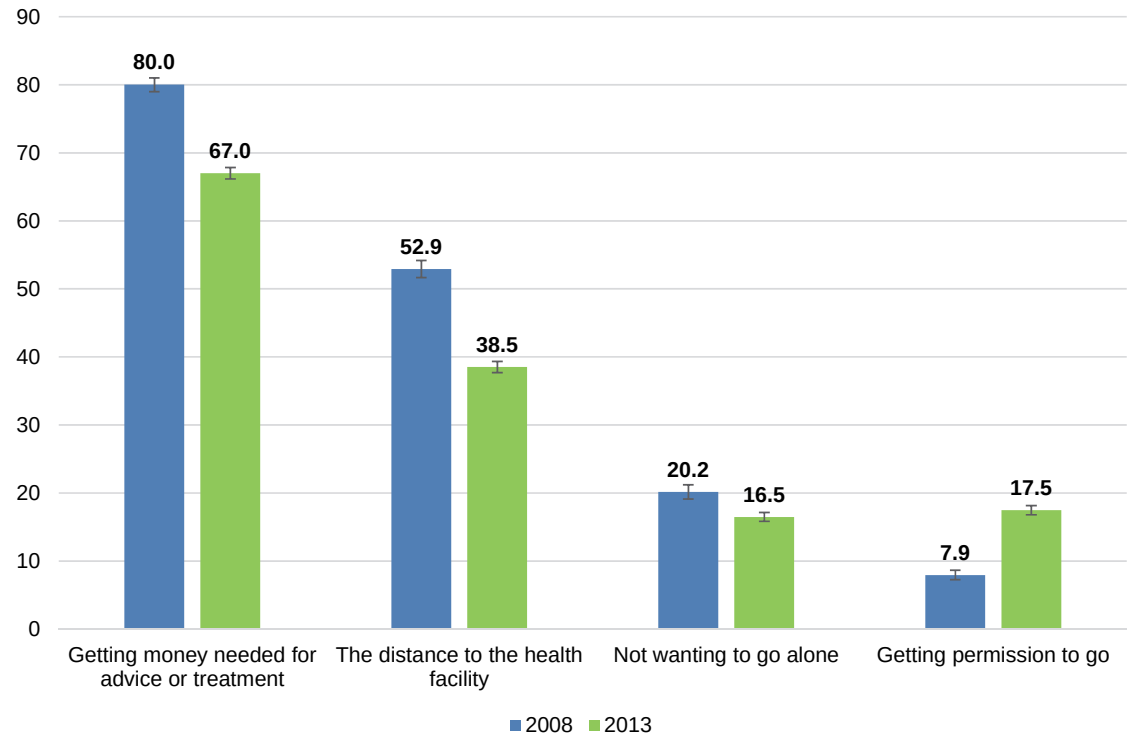


Note: A solid line indicates a significant change between surveys, while a dotted line indicates no significant change.

3.9. Problems Accessing Health Care

The Sierra Leone DHS surveys in 2008 and 2013 also asked women if they had problems with accessing health care for themselves when they were sick or required treatment. Although this information is not specific to seeking care for maternal health problems, it can give a general indication of access issues that women face. Figure 18 shows the percentage of women who reported specific types of problems in accessing health care in each of the two survey years. In both years, obtaining the money needed for advice or treatment was the most frequently reported problem, although there was a significant decrease of 13 percentage points between surveys. This implies that, even though the free health care reform was put into place in 2010, 67% of the women interviewed in 2013 still reported that money posed a problem for accessing health care. The problems of distance to health facility and not wanting to go alone also decreased between the two surveys. The problem of getting permission to go to the facility significantly increased, by approximately 10 percentage points between the two surveys. Further analysis by subgroups shows that the problems of permission to go for health care were reported most by women in the youngest age group in 2008, and for both the youngest and oldest age groups in 2013 (see Appendix Table 11). Since delays in the decision to go to a health facility can place mothers at risk if medical complications should arise, this increase is of particular concern since it disproportionately affects women in the high-risk age groups.

Figure 18. Percentage of women age 15-49 who reported that they have serious problems in accessing health care for themselves when they are sick, by type of problem, Sierra Leone 2008 and 2013 DHS



4. Conclusions

This analysis has shown considerable and significant improvements in many maternal health indicators between 2008 and 2013. The indicators for CPR, ANC visits and components of care, SBA deliveries, health facility deliveries, Caesarean section deliveries, and PNC visits all improved significantly between the two surveys. Furthermore, the majority of these indicators improved significantly for all subgroups of women, including the most vulnerable.

Ideally, we would like to see larger improvements concentrated in disadvantaged groups, so that these groups reach the same levels of coverage received by more advantaged groups, such as women with more education and wealthier women. The study did find some evidence that the equity gap for maternal health has been closing. For example, it appears that improvements in access to ANC and PNC were greater for disadvantaged groups, thus reducing the gaps between subgroups of women. Similar improvements are needed for modern contraceptive use, deliveries assisted by an SBA and in a health facility, and C-section deliveries. Special effort is needed to close the remaining gaps between subgroups of women. Emphasis should be placed on promoting and ensuring access to services for the most vulnerable groups—including the youngest women, women in rural areas, women in the Northern region, and those in the poorest households—where coverage of indicators included in this study is consistently lower than among other groups of women. Additionally, for a few indicators, such as the prevalence of C-sections and adolescent childbearing, the improvements within certain subgroups of women were not significant. These subgroups should also be the focus of special program efforts.

In contrast to the rapid improvements in the indicators of coverage of maternal care, the study found no evidence of improvements in the percentages of births in the four high-fertility risk categories—short preceding birth interval, young maternal age, older maternal age, and high parity. This suggests a need to focus on family planning programs, to ensure that women are aware of their fertility risks and have access to family planning methods, should they prefer to use them.

Generally, the most successful programs aimed at improving maternal outcomes are those that integrate several interventions (Nyamtema, Urassa, and van Roosmalen 2011). Therefore, in addition to the FHCI, some of the interventions required in Sierra Leone include further improvements in infrastructure and referral systems, wider availability of commodities, and more training in emergency obstetric care, especially for women in the most vulnerable groups and in remote areas. Further increases in women's education and greater awareness of the dangers of childbirth for high-risk fertility groups and for home deliveries are essential.

The Ebola virus outbreak in Sierra Leone in 2014 created another obstacle for maternal health. During the epidemic, resources were necessarily shifted to combat the outbreak, leaving fewer resources available for other health care needs, including maternal health (Jain, Brown, and Johnson 2015). Despite the many obstacles, it is important for Sierra Leone to maintain the momentum observed in this analysis, in order to continue improving women's survival and well-being.

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Appendices

Appendix Table 1. Characteristics of women

Distribution of women age 15-49 according to background characteristics, Sierra Leone 2008 and 2013 DHS

	2008		2013	
	%	CI	%	CI
Current age				
15-17	8.5	[7.8,9.3]	13.9	[13.3,14.6]
18-34	60.3	[59.0,61.5]	56.3	[55.4,57.2]
35-39	15.3	[14.4,16.3]	13.6	[13.0,14.2]
40-49	15.9	[15.0,16.9]	16.2	[15.6,16.9]
Parity				
0 or 1	34.1	[32.9,35.3]	39.3	[38.4,40.2]
2	16.1	[15.2,17.1]	12.5	[11.9,13.1]
3	13.4	[12.5,14.3]	11.1	[10.6,11.7]
4+	36.4	[35.2,37.7]	37.1	[36.2,37.9]
Education				
None	65.9	[64.8,67.0]	55.8	[54.9,56.7]
Primary	13.0	[12.2,13.9]	14.0	[13.4,14.6]
Secondary or higher	21.1	[20.1,22.0]	30.2	[29.4,31.0]
Region				
Eastern	18.0	[17.4,18.6]	21.7	[21.3,22.1]
Northern	40.7	[39.7,41.7]	37.8	[37.3,38.2]
Southern	20.9	[20.2,21.6]	21.1	[20.7,21.5]
Western	20.4	[19.8,21.1]	19.4	[19.0,19.9]
Locality				
Urban	36.0	[35.2,36.9]	35.6	[35.1,36.1]
Rural	64.0	[63.1,64.8]	64.4	[63.9,64.9]
Household wealth				
Lowest	18.7	[17.8,19.7]	18.5	[17.9,19.2]
Second	18.6	[17.6,19.6]	18.3	[17.6,19.0]
Middle	19.4	[18.3,20.4]	18.8	[18.2,19.5]
Fourth	20.0	[19.0,21.0]	20.3	[19.7,21.0]
Highest	23.4	[22.5,24.3]	24.0	[23.4,24.6]
Total	100.0	7,374	100.0	16,658

Appendix Table 2. Modern contraceptive use

Percentage of women currently using modern contraception among married and in-union women age 15-49, according to background characteristics, Sierra Leone 2008 and 2013 DHS

	2008			2013			
	%	CI	p-value[1]	%	CI	p-value[1]	Difference[2]
Total	6.7	[6.1,7.5]		15.6	[14.8,16.4]		8.9***
Current age			**0.002**			**<0.001**	
15-17	0.0	-		4.9	[2.4,9.8]		4.9**
18-34	6.2	[5.4,7.1]		15.8	[14.8,16.9]		9.6***
35-39	9.2	[7.3,11.6]		18.2	[16.3,20.3]		9.0***
40-49	6.8	[5.2,8.8]		13.6	[11.9,15.4]		6.8***
Parity			**<0.001**			**<0.001**	
0 or 1	3.6	[2.6,4.9]		10.7	[9.1,12.5]		7.1***
2	6.3	[4.9,8.1]		15.5	[13.5,17.8]		9.2***
3	8.3	[6.5,10.4]		15.0	[13.1,17.1]		6.7***
4+	7.9	[6.7,9.2]		17.6	[16.4,18.8]		9.7***
Education			**<0.001**			**<0.001**	
None	4.4	[3.8,5.2]		13.2	[12.3,14.1]		8.8***
Primary	9.5	[7.1,12.5]		18.9	[16.6,21.5]		9.4***
Secondary+	19.5	[16.5,23.1]		24.6	[22.1,27.3]		5.1*
Household wealth			**<0.001**			**<0.001**	
Lowest	3.0	[2.1,4.1]		11.5	[10.1,13.0]		8.5***
Second	2.7	[1.9,4.0]		11.5	[10.0,13.1]		8.8***
Middle	3.3	[2.4,4.5]		12.1	[10.6,13.8]		8.8***
Fourth	8.9	[7.2,10.9]		19.2	[17.3,21.3]		10.3***
Highest	18.0	[15.3,20.9]		26.3	[23.8,29.0]		8.3***
Locality			**<0.001**			**<0.001**	
Urban	14.2	[12.4,16.3]		24.7	[22.9,26.7]		10.5***
Rural	3.8	[3.2,4.5]		12.3	[11.4,13.1]		8.5***
Region			**<0.001**			**<0.001**	
Eastern	5.4	[4.3,6.7]		16.6	[14.9,18.4]		11.2***
Northern	3.1	[2.3,4.1]		11.4	[10.3,12.5]		8.3***
Southern	6.8	[5.6,8.4]		16.3	[14.8,18.0]		9.5***
Western	18.6	[15.8,21.8]		25.0	[22.1,28.2]		6.4**

[1] p-value of association test for each year. [2] Percentage point difference between 2013 and 2008 with significant tests for the difference in proportions.
p-values *<0.05, **<0.01, ***<0.001

Appendix Table 3. Adolescent childbearing

Percentage of women age 15-19 who have had a live birth or are currently pregnant, according to background characteristics, Sierra Leone 2008 and 2013 DHS

	2008			2013			
	%	CI	p-value[1]	%	CI	p-value[1]	Difference[2]
Total	34.0	[30.6,37.6]		27.9	[25.9,30.0]		-6.1**
Current age			**<0.001**			**<0.001**	
15 years	11.3	[7.3,17.2]		5.6	[4.0,7.7]		-5.7
16 years	20.8	[15.6,27.2]		10.2	[8.0,12.9]		-10.6**
17 years	28.9	[21.5,37.5]		27.7	[23.8,31.9]		-1.2
18 years	47.2	[41.0,53.4]		42.9	[38.3,47.7]		-4.3
19 years	54.2	[46.7,61.5]		59.8	[55.2,64.3]		5.6
Education			**<0.001**			**<0.001**	
None	54.4	[48.1,60.5]		46.2	[42.2,50.2]		-8.2*
Primary	33.9	[28.1,40.2]		28.7	[24.8,32.9]		-5.2
Secondary or higher	16.5	[12.5,21.6]		21.7	[19.4,24.1]		5.2
Household wealth			**<0.001**			**<0.001**	
Lowest	49.4	[39.9,59.0]		35.7	[31.4,40.2]		-13.7*
Second	46.8	[37.8,56.0]		35.5	[31.0,40.2]		-11.3*
Middle	43.4	[35.0,52.2]		34.7	[30.5,39.1]		-8.7
Fourth	31.6	[24.0,40.4]		28.6	[24.6,32.9]		-3
Highest	16.1	[12.5,20.5]		14.2	[11.9,16.8]		-1.9
Locality			**<0.001**			**<0.001**	
Urban	22.6	[18.7,27.0]		18.9	[16.3,21.8]		-3.7
Rural	43.8	[38.5,49.3]		34.2	[31.5,37.0]		-9.6**
Region			**<0.001**			**<0.001**	
Eastern	37.9	[31.5,44.8]		30.3	[26.1,34.9]		-7.6
Northern	39.6	[33.6,45.8]		29.4	[25.8,33.3]		-10.2**
Southern	37.4	[29.6,45.9]		33.2	[29.6,37.1]		-4.2
Western	18.4	[13.8,24.0]		17.7	[14.3,21.7]		-0.7

[1] p-value of association test for each year. [2] Percentage point difference between 2013 and 2008 with significant tests for the difference in proportions.
p-values *<0.05, **<0.01, ***<0.001

Appendix Table 4. Antenatal care

Percentage of women with four or more antenatal care visits for their most recent pregnancy among women age 15-49 with a live birth in the last five years, according to background characteristics, Sierra Leone 2008 and 2013 DHS

	2008			2013			
	%	CI	p-value[1]	%	CI	p-value[1]	Difference[2]
Total	56.1	[54.4,57.9]		76.0	[74.9,77.1]		19.9***
Age at the child's birth			0.461			0.056	
15-17	55.1	[48.5,61.6]		73.9	[70.0,77.5]		18.8***
18-34	56.5	[54.5,58.5]		76.8	[75.5,78.0]		20.3***
35-39	57.0	[51.6,62.3]		72.4	[69.0,75.7]		15.4***
40-49	49.8	[41.6,58.1]		76.8	[71.8,81.1]		27.0***
Parity at the child's birth			0.095			0.054	
1	56.9	[53.0,60.8]		78.7	[76.4,80.9]		21.8***
2	58.4	[54.5,62.3]		75.8	[73.0,78.4]		17.4***
3	51.3	[46.8,55.7]		76.6	[73.6,79.3]		25.3***
4+	56.5	[53.8,59.2]		74.7	[73.0,76.3]		18.2***
Education			**<0.001**			**<0.001**	
None	53.4	[51.3,55.4]		73.8	[72.4,75.1]		20.4***
Primary	60.1	[55.0,65.0]		78.2	[75.2,80.9]		18.1***
Secondary+	67.9	[63.4,72.1]		82.1	[79.7,84.2]		14.2***
Household wealth			**<0.001**			**<0.001**	
Lowest	48.8	[45.1,52.6]		73.9	[71.5,76.2]		25.1***
Second	52.4	[48.4,56.4]		73.0	[70.4,75.3]		20.6***
Middle	55.7	[51.8,59.6]		76.1	[73.6,78.4]		20.4***
Fourth	56.7	[52.6,60.7]		78.0	[75.6,80.2]		21.3***
Highest	70.0	[66.1,73.7]		80.2	[77.4,82.8]		10.2***
Locality			**<0.001**			**<0.001**	
Urban	65.9	[62.8,68.8]		79.9	[77.8,81.8]		14.0***
Rural	52.2	[50.1,54.3]		74.6	[73.2,75.8]		22.4***
Region			**<0.001**			**<0.001**	
Eastern	60.8	[57.5,64.0]		73.2	[70.8,75.5]		12.4***
Northern	49.3	[46.4,52.3]		74.5	[72.8,76.2]		25.2***
Southern	56.6	[53.0,60.2]		80.4	[78.4,82.3]		23.8***
Western	69.3	[65.4,73.0]		77.6	[74.2,80.7]		8.3**

[1] p-value of association test for each year. [2] Percentage point difference between 2013 and 2008 with significant tests for the difference in proportions.
p-values *<0.05, **<0.01, ***<0.001

Appendix Table 5. Components of care during pregnancy

Percentage of women who received key components of care during pregnancy, among women age 15-49 with a live birth in the last five years, according to background characteristics, Sierra Leone 2008 and 2013 DHS

	Mother was given iron syrup/tablets during pregnancy							Blood pressure checked during ANC, among women with ANC							Informed of pregnancy complications during ANC, among women with ANC						
	2008			2013				2008			2013				2008			2013			
	%	CI	p-value[1]	%	CI	p-value[1]	Difference[2]	%	CI	p-value[1]	%	CI	p-value[1]	Difference[2]	%	CI	p-value[1]	%	CI	p-value[1]	Difference[2]
Total	79.0	[77.5,80.3]		93.8	[93.2,94.3]		14.8***	85.9	[84.6,87.2]		94.2	[93.5,94.8]		8.3***	60.0	[58.2,61.8]		89.5	[88.7,90.2]		29.5***
Age at the child's birth			0.663			0.945				0.159			0.493				0.765				0.172	
15-17	81.2	[75.2,86.0]		93.9	[91.5,95.6]		12.7***	80.8	[74.7,85.7]		94.8	[92.4,96.5]		14.0***	57.3	[50.6,63.8]		90.7	[88.0,92.9]		33.4***
18-34	78.6	[76.9,80.2]		93.7	[93.0,94.3]		15.1***	86.4	[84.9,87.7]		94.4	[93.6,95.0]		8.0***	60.0	[58.0,62.1]		89.2	[88.3,90.0]		29.2***
35-39	80.6	[75.9,84.5]		94.2	[92.5,95.6]		13.6***	86.9	[82.7,90.2]		93.1	[90.8,94.9]		6.2**	60.4	[54.7,65.7]		89.0	[86.5,91.1]		28.6***
40-49	77.1	[69.1,83.5]		93.7	[90.8,95.7]		16.6***	85.4	[78.0,90.6]		93.1	[89.3,95.6]		7.7*	63.0	[54.4,70.8]		92.6	[89.4,94.8]		29.6***
Parity at the child's birth			0.256			0.151				0.235			**0.022**				0.064				**0.020**	
1	81.3	[77.9,84.3]		94.6	[93.3,95.6]		13.3***	83.7	[80.4,86.6]		95.0	[93.6,96.1]		11.3***	62.3	[58.3,66.1]		91.4	[89.8,92.9]		29.1***
2	77.6	[74.2,80.7]		93.2	[91.4,94.6]		15.6***	87.9	[85.1,90.2]		95.0	[93.5,96.2]		7.1***	62.9	[59.0,66.7]		90.2	[88.2,91.8]		27.3***
3	76.8	[72.8,80.3]		92.5	[90.7,94.0]		15.7***	85.4	[81.8,88.4]		95.3	[93.7,96.5]		9.9***	55.7	[51.0,60.3]		89.5	[87.3,91.3]		33.8***
4+	79.4	[77.1,81.5]		94.1	[93.2,94.8]		14.7***	86.2	[84.1,88.0]		93.2	[92.1,94.1]		7.0***	59.2	[56.4,61.9]		88.3	[87.1,89.4]		29.1***
Education			**<0.001**			**0.004**				**<0.001**			**<0.001**				**<0.001**				**<0.001**	
None	75.7	[73.9,77.4]		93.1	[92.3,93.8]		17.4***	84.2	[82.5,85.7]		93.0	[92.1,93.8]		8.8***	57.0	[54.8,59.1]		87.7	[86.7,88.6]		30.7***
Primary	86.0	[82.2,89.1]		94.6	[92.8,95.9]		8.6***	87.5	[83.7,90.5]		95.7	[94.1,96.9]		8.2***	63.9	[58.9,68.6]		91.4	[89.2,93.2]		27.5***
Secondary or higher	90.8	[87.3,93.4]		95.6	[94.3,96.7]		4.8***	93.9	[91.1,95.8]		97.3	[96.1,98.1]		3.4**	72.3	[67.9,76.3]		94.1	[92.5,95.4]		21.8***
Household wealth			**<0.001**			0.213				**<0.001**			**<0.001**				**<0.001**				**<0.001**	
Lowest	72.9	[69.4,76.1]		93.3	[92.0,94.4]		20.4***	79.2	[75.7,82.3]		91.7	[90.0,93.1]		12.5***	49.7	[45.8,53.7]		88.7	[87.1,90.2]		39.0***
Second	71.7	[68.0,75.1]		93.5	[92.1,94.6]		21.8***	83.7	[80.3,86.5]		92.9	[91.3,94.3]		9.2***	57.7	[53.5,61.8]		86.6	[84.7,88.4]		28.9***
Middle	76.0	[72.5,79.3]		93.1	[91.7,94.3]		17.1***	86.7	[83.7,89.2]		93.2	[91.7,94.6]		6.5***	57.2	[53.1,61.2]		87.8	[85.9,89.5]		30.6***
Fourth	82.8	[79.3,85.8]		94.1	[92.6,95.3]		11.3***	88.6	[85.6,91.1]		95.6	[94.2,96.7]		7.0***	61.2	[57.1,65.1]		92.4	[90.9,93.8]		31.2***
Highest	95.2	[93.2,96.6]		95.2	[93.7,96.4]		0.0	92.6	[90.2,94.5]		98.5	[97.4,99.1]		5.9***	76.7	[73.0,80.0]		92.5	[90.4,94.2]		15.8***
Locality			**<0.001**			**0.010**				**<0.001**			**<0.001**				**<0.001**				**<0.001**	
Urban	89.0	[86.8,90.8]		95.1	[93.9,96.1]		6.1***	90.6	[88.6,92.4]		96.7	[95.8,97.5]		6.1***	70.9	[67.8,73.7]		92.3	[90.9,93.6]		21.4***
Rural	74.9	[73.0,76.6]		93.3	[92.6,93.9]		18.4***	83.9	[82.2,85.5]		93.2	[92.4,94.0]		9.3***	55.3	[53.0,57.4]		88.4	[87.4,89.2]		33.1***
Region			**<0.001**			**<0.001**				**<0.001**			**<0.001**				**<0.001**				**<0.001**	
Eastern	86.8	[84.4,88.9]		98.1	[97.3,98.7]		11.3***	86.5	[84.1,88.7]		93.4	[91.8,94.7]		6.9***	60.8	[57.4,64.0]		90.0	[88.4,91.5]		29.2***
Northern	69.2	[66.5,71.8]		90.7	[89.6,91.7]		21.5***	82.1	[79.6,84.4]		93.1	[92.0,94.1]		11.0***	58.1	[54.9,61.2]		84.8	[83.4,86.1]		26.7***
Southern	81.0	[78.2,83.6]		95.5	[94.4,96.4]		14.5***	87.6	[84.9,89.9]		94.4	[93.0,95.4]		6.8***	46.8	[43.1,50.5]		95.0	[93.9,95.9]		48.2***
Western	94.8	[92.8,96.3]		92.2	[89.9,94.0]		-2.6*	93.1	[90.5,95.0]		98.1	[96.7,99.0]		5.0***	80.3	[76.6,83.5]		92.2	[89.7,94.1]		11.9***

[1] p-value of association test for each year. [2] Percentage point difference between 2013 and 2008 with significant tests for the difference in proportions.
p-values *<0.05, **<0.01, ***<0.001

Appendix Table 6. Assistance during delivery and facility delivery

Percentage of births that were assisted by a skilled birth attendant or delivered in a health facility, among children born in the five years preceding the survey, according to background characteristics, Sierra Leone 2008 and 2013 DHS

	Skilled birth attendant							Facility births						
	2008			2013				2008			2013			
	%	CI	p-value[1]	%	CI	p-value[1]	Differ-ence[2]	%	CI	p-value[1]	%	CI	p-value[1]	Differ-ence[2]
Total	42.4	[41.0,43.8]		59.7	[58.7,60.7]		17.3***	24.6	[23.4,25.9]		54.4	[53.4,55.4]		29.8***
Age at the child's birth			**0.009**			**<0.001**				0.116			**0.003**	
15-17	42.5	[37.4,47.7]		63.7	[60.4,66.9]		21.2***	25.2	[20.9,29.9]		56.3	[52.9,59.7]		31.1***
18-34	43.5	[41.9,45.1]		60.7	[59.5,61.8]		17.2***	25.2	[23.9,26.7]		55.0	[53.8,56.2]		29.8***
35-39	38.2	[33.7,42.9]		52.7	[49.4,55.9]		14.5***	20.6	[17.2,24.6]		50.8	[47.6,54.1]		30.2***
40-49	32.7	[26.2,39.9]		52.1	[47.2,57.0]		19.4***	21.2	[16.0,27.5]		47.8	[42.9,52.7]		26.6***
Parity at the child's birth			**<0.001**			**<0.001**				**<0.001**			**<0.001**	
1	48.6	[45.4,51.8]		69.0	[66.9,71.0]		20.4***	30.4	[27.6,33.4]		62.3	[60.1,64.5]		31.9***
2	45.8	[42.6,49.1]		63.1	[60.7,65.4]		17.3***	25.6	[22.9,28.5]		57.3	[54.8,59.7]		31.7***
3	42.1	[38.6,45.8]		59.5	[56.9,62.1]		17.4***	25.2	[22.2,28.5]		54.7	[52.0,57.4]		29.5***
4+	38.1	[35.9,40.3]		54.0	[52.5,55.5]		15.9***	21.2	[19.5,23.1]		49.3	[47.7,50.8]		28.1***
Education			**<0.001**			**<0.001**				**<0.001**			**<0.001**	
None	35.7	[34.2,37.4]		54.2	[53.0,55.4]		18.5***	19.9	[18.6,21.3]		49.4	[48.2,50.7]		29.5***
Primary	55.9	[51.7,60.1]		63.0	[60.2,65.7]		7.1**	33.7	[29.8,37.9]		57.5	[54.6,60.3]		23.8***
Secondary+	73.1	[69.2,76.7]		79.3	[77.1,81.3]		6.2**	46.5	[42.5,50.6]		71.7	[69.3,74.0]		25.2***
Household wealth			**<0.001**			**<0.001**				**<0.001**			**<0.001**	
Lowest	28.1	[25.4,30.8]		50.9	[48.8,52.9]		22.8***	16.9	[14.8,19.3]		48.4	[46.4,50.5]		31.5***
Second	35.4	[32.3,38.6]		52.0	[49.8,54.2]		16.6***	21.2	[18.7,24.0]		49.8	[47.6,52.1]		28.6***
Middle	38.6	[35.5,41.8]		53.2	[51.0,55.5]		14.6***	23.2	[20.6,26.0]		49.2	[47.0,51.5]		26.0***
Fourth	49.0	[45.6,52.5]		67.4	[65.1,69.6]		18.4***	27.6	[24.7,30.7]		60.0	[57.6,62.3]		32.4***
Highest	71.4	[68.0,74.6]		83.7	[81.3,85.9]		12.3***	39.3	[35.9,42.7]		70.1	[67.2,72.9]		30.8***
Locality			**<0.001**			**<0.001**				**<0.001**			**<0.001**	
Urban	66.9	[64.3,69.5]		78.9	[77.0,80.6]		12.0***	39.5	[36.8,42.2]		68.1	[66.0,70.1]		28.6***
Rural	33.2	[31.7,34.9]		53.2	[52.0,54.3]		20.0***	19.0	[17.7,20.4]		49.7	[48.5,50.8]		30.7***
Region			**<0.001**			**<0.001**				**<0.001**			**<0.001**	
Eastern	50.1	[47.5,52.8]		77.0	[75.1,78.7]		26.9***	28.5	[26.1,30.9]		72.8	[70.9,74.6]		44.3***
Northern	27.4	[25.3,29.7]		41.5	[39.9,43.1]		14.1***	15.5	[13.7,17.4]		37.1	[35.5,38.7]		21.6***
Southern	53.2	[50.2,56.1]		64.0	[62.1,65.8]		10.8***	33.6	[30.9,36.4]		60.4	[58.5,62.2]		26.8***
Western	63.7	[60.2,67.0]		74.2	[71.1,77.1]		10.5***	35.2	[31.9,38.7]		60.7	[57.2,64.0]		25.5***

[1] p-value of association test for each year. [2] Percentage point difference between 2013 and 2008 with significant tests for the difference in proportions.
p-values *<0.05, **<0.01, ***<0.001

Appendix Table 7. Caesarean section delivery

Percentage of births that were delivered by Caesarean section among children born in the five years preceding the survey, according to background characteristics, Sierra Leone 2008 and 2013 DHS

	2008			2013			
	%	CI	p-value[1]	%	CI	p-value[1]	Difference[2]
Total	1.5	[1.2,1.9]		2.9	[2.5,3.3]		1.4***
Age at the child's birth			0.588			0.399	
15-17	1.3	[0.6,2.7]		2.6	[1.6,4.0]		1.3
18-34	1.6	[1.2,2.1]		2.8	[2.4,3.2]		1.2***
35-39	1.1	[0.4,2.8]		3.8	[2.7,5.2]		2.7**
40-49	0.8	[0.3,2.5]		2.9	[1.7,4.8]		2.1*
Parity at the child's birth			**<0.001**			0.486	
1	2.9	[2.0,4.2]		3.4	[2.6,4.3]		0.4
2	2.0	[1.3,3.0]		2.9	[2.1,3.8]		0.9
3	1.4	[0.6,3.1]		2.4	[1.7,3.4]		1.0
4+	0.7	[0.4,1.1]		2.8	[2.4,3.4]		2.1***
Education			**<0.001**			**<0.001**	
None	0.8	[0.6,1.2]		2.3	[2.0,2.7]		1.5***
Primary	1.9	[0.9,3.8]		3.6	[2.6,4.9]		1.7
Secondary+	5.5	[3.9,7.6]		4.6	[3.7,5.9]		-0.9
Household wealth			**<0.001**			**<0.001**	
Lowest	0.7	[0.3,1.5]		1.8	[1.3,2.4]		1.1**
Second	0.8	[0.3,1.9]		2.3	[1.7,3.2]		1.5**
Middle	0.9	[0.5,1.6]		2.4	[1.8,3.1]		1.5***
Fourth	1.4	[0.7,2.7]		3.0	[2.3,3.8]		1.6*
Highest	4.9	[3.6,6.6]		6.0	[4.7,7.6]		1.1
Locality			**<0.001**			**<0.001**	
Urban	3.2	[2.4,4.3]		4.9	[4.0,5.9]		1.7*
Rural	0.9	[0.6,1.3]		2.2	[1.9,2.6]		1.3***
Region			**<0.001**			**<0.001**	
Eastern	0.7	[0.4,1.4]		1.5	[1.1,2.0]		0.7*
Northern	0.7	[0.4,1.4]		2.8	[2.3,3.4]		2.1***
Southern	1.7	[1.0,2.7]		2.9	[2.3,3.7]		1.2*
Western	4.7	[3.4,6.5]		5.8	[4.4,7.6]		1.1

[1] p-value of association test for each year. [2] Percentage point difference between 2013 and 2008 with significant tests for the difference in proportions.
p-values *<0.05, **<0.01, ***<0.001

Appendix Table 8. High-risk fertility

Percentage of births with maternal fertility risk among children born in the five years preceding the survey, according to background characteristics, Sierra Leone 2008 and 2013 DHS

	Young age (<18 years)							Older age (40-49 years)							Short preceding birth interval (<36 months)						
	2008			2013				2008			2013				2008			2013			
	%	CI	p-value[1]	%	CI	p-value[1]	Difference[2]	%	CI	p-value[1]	%	CI	p-value[1]	Difference[2]	%	CI	p-value[1]	%	CI	p-value[1]	Difference[2]
Total	8.0	[7.2,8.8]		9.1	[8.5,9.7]		1.1*	4.2	[3.6,4.9]		4.6	[4.2,5.0]		0.4	39.7	[38.2,41.2]		39.3	[38.3,40.4]		-0.4
Education			**<0.001**			**<0.001**				**<0.001**			**<0.001**				**<0.001**			**<0.001**	
None	6.8	[6.0,7.7]		5.5	[4.9,6.1]		-1.3**	5.0	[4.3,5.8]		6.0	[5.4,6.6]		1.0	43.1	[41.4,44.8]		43.5	[42.2,44.7]		0.4
Primary	14.9	[11.9,18.3]		13.7	[11.8,15.7]		-1.2	0.9	[0.4,2.2]		2.0	[1.4,2.8]		1.1*	36.0	[31.9,40.3]		39.5	[36.7,42.3]		3.5
Secondary or higher	8.3	[6.3,11.0]		20.0	[18.0,22.1]		11.7***	2.2	[1.2,4.0]		1.1	[0.7,1.8]		-1.1	20.9	[17.9,24.3]		22.6	[20.5,24.9]		1.7
Household wealth			0.805			0.103				**<0.001**			**0.003**				**<0.001**			**<0.001**	
Lowest	8.4	[6.8,10.4]		8.9	[7.8,10.2]		0.5	5.4	[4.2,7.0]		5.4	[4.5,6.5]		0.0	45.1	[42.0,48.2]		47.5	[45.4,49.6]		2.4
Second	7.9	[6.3,10.0]		9.3	[8.1,10.7]		1.4	4.9	[3.5,6.7]		5.0	[4.1,6.2]		0.1	43.9	[40.6,47.2]		42.0	[39.8,44.3]		-1.9
Middle	8.6	[7.0,10.5]		8.3	[7.2,9.7]		-0.3	4.0	[2.9,5.4]		4.7	[3.8,5.7]		0.7	43.0	[39.8,46.3]		39.5	[37.3,41.8]		-3.5
Fourth	7.4	[5.7,9.5]		10.7	[9.3,12.2]		3.3**	4.6	[3.4,6.2]		4.5	[3.6,5.7]		-0.1	37.0	[33.7,40.5]		35.7	[33.4,38.0]		-1.3
Highest	7.3	[5.8,9.2]		8.2	[6.8,9.9]		0.9	1.2	[0.7,2.1]		2.5	[1.8,3.6]		1.3*	24.3	[21.3,27.6]		27.4	[24.7,30.2]		3.1
Locality			0.756			0.776				**<0.001**			**0.001**				**<0.001**			**<0.001**	
Urban	8.2	[6.8,9.8]		9.2	[8.2,10.5]		1.0	2.3	[1.7,3.1]		3.3	[2.6,4.1]		1.0	30.6	[28.0,33.3]		30.6	[28.6,32.6]		0.0
Rural	7.9	[7.0,8.9]		9.1	[8.4,9.8]		1.2	4.9	[4.2,5.8]		5.0	[4.5,5.6]		0.1	43.1	[41.4,44.9]		42.3	[41.2,43.6]		-0.8
Region			**0.012**			0.229				**<0.001**			**0.005**				**<0.001**			**<0.001**	
Eastern	7.8	[6.4,9.4]		9.8	[8.5,11.2]		2.0	3.0	[2.2,4.2]		5.4	[4.4,6.5]		2.4**	40.8	[38.1,43.6]		41.3	[39.1,43.5]		0.5
Northern	7.6	[6.3,9.0]		9.2	[8.3,10.2]		1.6	5.6	[4.6,6.9]		4.8	[4.2,5.5]		-0.8	41.4	[38.9,43.9]		37.4	[35.8,39.0]		-4.0**
Southern	10.3	[8.6,12.4]		9.2	[8.1,10.3]		-1.1	3.5	[2.6,4.7]		4.5	[3.7,5.5]		1.0	44.5	[41.6,47.6]		46.5	[44.5,48.5]		2.0
Western	6.2	[4.8,8.1]		7.6	[6.0,9.4]		1.4	2.3	[1.5,3.6]		2.6	[1.7,3.8]		0.3	25.9	[22.9,29.1]		28.6	[25.5,31.9]		2.7

	High parity (4 or higher)							Any risk						
	2008			2013				2008			2013			
	%	CI	p-value[1]	%	CI	p-value[1]	Difference[2]	%	CI	p-value[1]	%	CI	p-value[1]	Difference[2]
Total	43.0	[41.5,44.5]		44.6	[43.5,45.6]		1.6	67.7	[66.3,69.0]		69.4	[68.4,70.3]		1.7*
Education			**<0.001**			**<0.001**				**<0.001**			**<0.001**	
None	47.2	[45.5,49.0]		54.5	[53.2,55.8]		7.3***	71.4	[69.8,72.9]		75.0	[73.9,76.1]		3.6***
Primary	33.6	[29.7,37.8]		34.4	[31.7,37.2]		0.8	65.7	[61.5,69.6]		67.3	[64.6,69.9]		1.6
Secondary or higher	24.3	[20.9,28.1]		12.8	[11.2,14.6]		-11.5***	44.6	[40.6,48.7]		48.4	[45.8,51.1]		3.8
Household wealth			**<0.001**			**<0.001**				**<0.001**			**<0.001**	
Lowest	45.5	[42.4,48.6]		49.7	[47.5,51.8]		4.2*	71.7	[68.9,74.4]		76	[74.1,77.7]		4.3*
Second	47.9	[44.6,51.3]		50.3	[48.0,52.5]		2.4	72.6	[69.6,75.4]		73.7	[71.6,75.6]		1.1
Middle	46.3	[43.0,49.6]		47.8	[45.5,50.0]		1.5	72.4	[69.4,75.2]		71.5	[69.4,73.5]		-0.9
Fourth	41.0	[37.7,44.5]		41.2	[38.9,43.6]		0.2	64.8	[61.5,68.0]		67.1	[64.9,69.3]		2.3
Highest	29.8	[26.6,33.3]		28.3	[25.7,31.1]		-1.5	51.1	[47.5,54.7]		52.9	[49.9,56.0]		1.8
Locality			**<0.001**			**<0.001**				**<0.001**			**<0.001**	
Urban	35.6	[32.9,38.3]		33.5	[31.5,35.6]		-2.1	58.9	[56.2,61.6]		58.4	[56.2,60.5]		-0.5
Rural	45.7	[44.0,47.5]		48.3	[47.1,49.6]		2.6*	70.9	[69.3,72.5]		73.2	[72.1,74.2]		2.3*
Region			**<0.001**			**<0.001**				**<0.001**			**<0.001**	
Eastern	40.0	[37.3,42.8]		47.4	[45.2,49.6]		7.4***	66.7	[64.0,69.2]		73.4	[71.5,75.3]		6.7***
Northern	46.9	[44.4,49.4]		45.4	[43.8,47.1]		-1.5	70.7	[68.3,72.9]		69.1	[67.5,70.6]		-1.6
Southern	45.1	[42.1,48.1]		48.5	[46.5,50.5]		3.4	72.7	[70.0,75.3]		74.9	[73.2,76.6]		2.2
Western	31.7	[28.4,35.2]		29.6	[26.5,32.8]		-2.1	52.3	[48.7,55.8]		52.8	[49.3,56.2]		0.5

[1] p-value of association test for each year. [2] Percentage point difference between 2013 and 2008 with significant tests for the difference in proportions.
p-values *<0.05, **<0.01, ***<0.001

Appendix Table 9. Postnatal care for the mother

Percentage of women who received a postnatal check-up within two days of delivering their most recent child among women age 15-49 with a live birth in the five years preceding the survey, according to background characteristics, Sierra Leone 2008 and 2013 DHS

	2008			2013			
	%	CI	p-value[1]	%	CI	p-value[1]	Difference[2]
Total	56.9	[55.2,58.6]		72.3	[71.2,73.4]		15.4***
Age at the child's birth			0.178			0.071	
15-17	62.3	[55.7,68.5]		71.6	[67.7,75.2]		9.3*
18-34	56.4	[54.4,58.3]		72.9	[71.6,74.1]		16.5***
35-39	54.8	[49.3,60.1]		71.8	[68.4,75.0]		17.0***
40-49	62.0	[53.6,69.6]		66.2	[60.9,71.2]		4.2
Parity at the child's birth			**0.002**			**<0.001**	
1	59.4	[55.5,63.2]		74.7	[72.4,77.0]		15.3***
2	58.6	[54.7,62.4]		75.9	[73.3,78.4]		17.3***
3	49.2	[44.7,53.7]		72.3	[69.2,75.1]		23.1***
4+	57.9	[55.2,60.5]		69.8	[68.1,71.5]		11.9***
Education			**<0.001**			**<0.001**	
None	53.3	[51.3,55.4]		69.1	[67.7,70.5]		15.8***
Primary	62.6	[57.6,67.4]		77.1	[74.2,79.9]		14.5***
Secondary or higher	71.6	[67.2,75.6]		79.7	[77.3,81.9]		8.1**
Household wealth			**<0.001**			**<0.001**	
Lowest	46.6	[42.9,50.3]		69.7	[67.3,72.0]		23.1***
Second	54.1	[50.1,58.0]		69.5	[67.0,72.0]		15.4***
Middle	54.9	[50.9,58.8]		70.1	[67.5,72.5]		15.2***
Fourth	59.1	[55.1,63.0]		75.0	[72.5,77.3]		15.9***
Highest	73.9	[70.1,77.3]		78.6	[75.8,81.3]		4.7*
Locality	68.1	[65.0,71.0]	**<0.001**	77.7	[75.6,79.7]	**<0.001**	9.6***
Urban	52.4	[50.3,54.4]		70.2	[68.9,71.5]		17.8***
Rural							
Region			**<0.001**			**<0.001**	
Eastern	70.7	[67.6,73.7]		79.3	[77.1,81.3]		8.6***
Northern	44.3	[41.4,47.3]		65.7	[63.8,67.5]		21.4***
Southern	57.0	[53.5,60.4]		73.8	[71.6,75.9]		16.8***
Western	75.9	[72.2,79.3]		76.5	[73.1,79.6]		0.6

[1] p-value of association test for each year. [2] Percentage point difference between 2013 and 2008 with significant tests for the difference in proportions.
p-values *<0.05, **<0.01, ***<0.001

Appendix Table 10. Problems accessing care

Percentage of women age 15-49 who reported that they have serious problems in accessing health care for themselves when they are sick, by type of problem, according to background characteristics, Sierra Leone 2008 and 2013 DHS

	Getting permission to go							Getting money needed for advice or treatment						
	2008			2013				2008			2013			
	%	CI	p-value[1]	%	CI	p-value[1]	Difference[2]	%	CI	p-value[1]	%	CI	p-value[1]	Difference[2]
Total	7.9	[7.2,8.6]		17.5	[16.8,18.1]		9.6***	80.0	[79.0,81.0]		67.0	[66.1,67.8]		-13.0***
Current age			**<0.001**			**0.021**				**0.009**			**0.008**	
15-17	13.8	[11.1,17.1]		18.7	[16.9,20.7]		4.9**	75.5	[71.4,79.1]		65.4	[63.0,67.6]		-10.1***
18-34	8.1	[7.3,9.1]		16.7	[15.8,17.6]		8.6***	79.7	[78.4,81.0]		66.2	[65.0,67.3]		-13.5***
35-39	6.6	[5.1,8.5]		17.0	[15.3,18.9]		10.4***	82.8	[80.3,85.1]		68.6	[66.1,70.9]		-14.2***
40-49	5.2	[4.0,6.8]		19.4	[17.7,21.2]		14.2***	80.9	[78.2,83.2]		69.8	[67.7,71.9]		-11.1***
Parity			**<0.001**			**0.007**				**<0.001**			**<0.001**	
0 or 1	10.7	[9.4,12.1]		16.7	[15.6,17.8]		6.0***	74.3	[72.3,76.1]		62.9	[61.5,64.3]		-11.4***
2	7.8	[6.2,9.9]		15.9	[14.1,17.8]		8.1***	80.4	[77.8,82.7]		64.6	[62.0,67.1]		-15.8***
3	7.2	[5.6,9.1]		16.8	[14.9,19.0]		9.6***	81.7	[78.8,84.3]		67.0	[64.3,69.6]		-14.7***
4+	5.6	[4.7,6.7]		19.0	[17.9,20.2]		13.4***	84.6	[83.0,86.1]		72.1	[70.8,73.5]		-12.5***
Education			0.302			**<0.001**				**<0.001**			**<0.001**	
None	7.6	[6.8,8.5]		18.8	[17.9,19.8]		11.2***	85.5	[84.4,86.6]		72.0	[70.9,73.0]		-13.5***
Primary	9.3	[7.5,11.5]		18.3	[16.6,20.3]		9.0***	80.1	[77.1,82.9]		68.1	[65.7,70.3]		-12.0***
Secondary+	7.9	[6.5,9.6]		14.5	[13.4,15.8]		6.6***	62.6	[60.0,65.3]		57.3	[55.6,59.0]		-5.3**
Household wealth			0.385			**<0.001**				**<0.001**			**<0.001**	
Lowest	8.3	[6.9,9.9]		22.2	[20.5,23.9]		13.9***	89.5	[87.6,91.1]		76.5	[74.8,78.1]		-13.0***
Second	8.4	[6.9,10.3]		21.1	[19.5,22.9]		12.7***	87.5	[85.4,89.4]		73.7	[71.8,75.5]		-13.8***
Middle	6.5	[5.2,8.2]		15.5	[14.1,17.0]		9.0***	87.0	[84.8,88.9]		71.6	[69.7,73.5]		-15.4***
Fourth	8.6	[7.0,10.5]		15.6	[14.3,17.1]		7.0***	80.7	[78.3,82.9]		66.1	[64.2,67.8]		-14.6***
Highest	7.8	[6.5,9.4]		14.1	[12.7,15.6]		6.3***	60.1	[57.5,62.7]		51.7	[49.6,53.8]		-8.4***
Locality			0.626			**0.001**				**<0.001**			**<0.001**	
Urban	8.2	[7.0,9.5]		15.9	[14.8,17.1]		7.7***	68.2	[66.2,70.1]		58.3	[56.7,59.9]		-9.9***
Rural	7.8	[7.0,8.7]		18.3	[17.5,19.1]		10.5***	86.7	[85.6,87.7]		71.8	[70.8,72.7]		-14.9***
Region			**<0.001**			**<0.001**				**<0.001**			**<0.001**	
Eastern	10.8	[9.3,12.5]		35.7	[33.9,37.5]		24.9***	83.8	[81.9,85.6]		79.0	[77.4,80.6]		-4.8***
Northern	6.1	[5.1,7.4]		12.0	[11.1,12.9]		5.9***	88.0	[86.3,89.4]		68.1	[66.8,69.4]		-19.9***
Southern	8.5	[7.2,10.0]		10.9	[9.9,12.0]		2.4**	79.9	[77.9,81.9]		66.9	[65.3,68.4]		-13.0***
Western	8.4	[7.0,10.0]		15.0	[13.3,16.8]		6.6***	60.9	[58.2,63.5]		51.5	[49.0,54.0]		-9.4***

Continued…

Appendix Table 10. – *Continued*

Percentage of women age 15-49 who reported that they have serious problems in accessing health care for themselves when they are sick, by type of problem, according to background characteristics, Sierra Leone 2008 and 2013 DHS

	The distance to the health facility							Not wanting to go alone						
	2008			2013				2008			2013			
	%	CI	p-value[1]	%	CI	p-value[1]	Difference[2]	%	CI	p-value[1]	%	CI	p-value[1]	Difference[2]
Total	52.9	[51.6,54.2]		38.5	[37.7,39.3]		-14.4***	20.2	[19.1,21.2]		16.5	[15.8,17.1]		-3.7***
Current age			**0.022**			**<0.001**				**<0.001**			**<0.001**	
15-17	46.4	[42.0,50.8]		36.1	[33.9,38.4]		-10.3***	27.9	[24.0,32.3]		15.1	[13.4,16.9]		-12.8***
18-34	53.8	[52.1,55.4]		37.7	[36.6,38.8]		-16.1***	20.1	[18.8,21.5]		15.8	[15.0,16.7]		-4.3***
35-39	53.9	[50.5,57.2]		40.3	[38.0,42.7]		-13.6***	18.1	[15.7,20.8]		16.8	[15.1,18.6]		-1.3
40-49	52.4	[49.1,55.6]		42.0	[39.8,44.2]		-10.4***	18.1	[15.8,20.6]		19.6	[17.9,21.3]		1.5
Parity			**<0.001**			**<0.001**				**0.044**			**<0.001**	
0 or 1	48.4	[46.2,50.6]		33.4	[32.1,34.7]		-15.0***	22.1	[20.3,24.0]		13.9	[13.0,14.9]		-8.2***
2	54.4	[51.2,57.6]		35.7	[33.3,38.2]		-18.7***	19.6	[17.2,22.4]		14.4	[12.7,16.2]		-5.2**
3	54.9	[51.3,58.5]		38.0	[35.4,40.7]		-16.9***	20.4	[17.6,23.5]		16.8	[14.9,18.9]		-3.6*
4+	55.8	[53.6,57.9]		45.0	[43.6,46.5]		-10.8***	18.5	[16.8,20.2]		19.8	[18.7,20.9]		1.3
Education			**<0.001**			**<0.001**				**0.022**			**<0.001**	
None	59.5	[57.9,61.1]		45.6	[44.4,46.8]		-13.9***	20.7	[19.5,22.1]		19.6	[18.7,20.6]		-1.1
Primary	44.9	[41.3,48.5]		40.6	[38.2,42.9]		-4.3*	21.9	[18.9,25.2]		17	[15.3,18.9]		-4.9**
Secondary+	37.3	[34.7,40.0]		24.5	[23.1,25.9]		-12.8***	17.3	[15.3,19.6]		10.3	[9.4,11.4]		-7.0***
Household wealth			**<0.001**			**<0.001**				**<0.001**			**<0.001**	
Lowest	68.0	[65.2,70.7]		58.6	[56.6,60.5]		-9.4***	26.3	[23.8,28.9]		24.6	[23.0,26.4]		-1.7
Second	61.1	[58.0,64.1]		53.2	[51.1,55.3]		-7.9***	20	[17.7,22.5]		21.5	[19.8,23.2]		1.5
Middle	59.6	[56.6,62.6]		47.2	[45.2,49.3]		-12.4***	19.6	[17.2,22.1]		19.1	[17.6,20.8]		-0.5
Fourth	46.8	[43.9,49.7]		30.9	[29.2,32.7]		-15.9***	20.3	[17.9,22.8]		13.4	[12.2,14.7]		-6.9***
Highest	34.1	[31.6,36.7]		11.4	[10.3,12.7]		-22.7***	15.8	[13.9,17.9]		6.8	[5.9,7.9]		-9.0***
Locality			**<0.001**			**<0.001**				**<0.001**			**<0.001**	
Urban	36.9	[34.9,39.0]		15.8	[14.8,16.9]		-21.1***	17.4	[15.8,19.1]		8	[7.2,8.8]		-9.4***
Rural	61.9	[60.3,63.5]		51.1	[50.0,52.2]		-10.8***	21.7	[20.4,23.1]		21.2	[20.3,22.1]		-0.5
Region			**<0.001**			**<0.001**				**<0.001**			**<0.001**	
Eastern	58.4	[55.9,60.8]		42.0	[40.2,43.9]		-16.4***	25.6	[23.3,28.0]		21.5	[19.9,23.1]		-4.1**
Northern	59.7	[57.4,61.9]		48.1	[46.7,49.5]		-11.6***	17.9	[16.2,19.8]		18.2	[17.1,19.3]		0.3
Southern	51.8	[49.3,54.3]		42.7	[41.1,44.3]		-9.1***	24.2	[22.1,26.5]		18	[16.8,19.4]		-6.2***
Western	35.7	[33.1,38.5]		11.4	[10.1,12.9]		-24.3***	15.6	[13.7,17.8]		5.8	[4.8,7.0]		-9.8***

[1] p-value of association test for each year. [2] Percentage point difference between 2013 and 2008 with significant tests for the difference in proportions.
p-values *<0.05, **<0.01, ***<0.001