Trends in Maternal Health in Nigeria, 2003-2013

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Abstract

This study uses data from Demographic and Health Surveys (DHS) conducted in Nigeria in 2003, 2008, and 2013 to assess levels and trends in maternal health indicators. The analysis focuses on four areas of indicators directly related to the risk of maternal mortality and morbidity: antenatal care and its components; birth assistance and place of delivery; postnatal care; and high-risk fertility behaviors. The study examines associations with socio-demographic characteristics to assess differentials in maternal health indicators across population sub-groups. Substantial disparities in maternal health indicators by wealth, education, and between Northern and Southern geopolitical zones were identified.

Analysis of trends shows significant changes between the 2003 and 2013 surveys in some but not all maternal health indicators. Generally, significant improvements are concentrated between the 2008 and 2013 surveys. Apparent stagnation or modest improvement in some indicators between 2003 and 2013 masks a general pattern of deterioration before 2008 followed by significant recovery between 2008 and 2013. All four antenatal care indicators—four or more antenatal care visits, antenatal care by four months of pregnancy, iron supplementation, and tetanus toxoid immunization—showed significant improvements between 2008 and 2013. By contrast, there were no overall improvements over the study period in delivery care (facility-based delivery, skilled attendance at birth, cesarean section rates), postnatal care (postnatal check-up within two days after childbirth), or high-risk fertility (young or older maternal age, high-parity births, and short birth intervals).

Executive Summary

This study describes levels and trends in use of maternal health care in Nigeria, using three national Demographic and Health Surveys (DHS) conducted in 2003, 2008, and 2013. The analysis focuses on four areas of indicators directly related to the risk of maternal mortality and morbidity: antenatal care (ANC) and its components, birth assistance and place of delivery, postnatal care, and high-risk fertility behaviors. Maternal health indicators are analyzed by socio-demographic characteristics, including women's age at the time of child's birth, parity at child's birth, maternal education level, household wealth quintile, type of residence (urban-rural), and geopolitical zone. Large disparities in all maternal health indicators exist across socio-demographic characteristics and are especially notable by wealth quintile, residence, education, and geopolitical zone. Disparities generally have not narrowed over the survey period, and in some cases have widened.

Antenatal Care and Its Components

- All four ANC indicators—four or more ANC visits, receiving ANC by four months of pregnancy, iron supplementation, and tetanus toxoid (TT) immunization—showed significant improvements between 2008 and 2013. However, only iron supplementation and TT coverage improved over the full decade from 2003 to 2013.

- Just over half of women have four or more ANC visits (51%). Marked disparities by wealth (68 percentage point differential) and education (52 percentage point differential) and between the North West and South West geopolitical zones (30% versus 87%), among other characteristics, remain unchanged over time. Some improvements are observed for the middle age groups and wealth quintiles and for first births.

- Nearly one in five women have their first ANC visit within the first four months of pregnancy. Sizable disparities exist, with the least advantaged women receiving care later in their pregnancies. Disparities are most notable by wealth (25 percentage points in 2013).

- More advantaged groups of women receive more components of ANC during their pregnancies. Differences are significant for all socio-demographic characteristics. Disparities have widened over time across wealth categories for most components of care and, by parity, for blood pressure checks and counseling of complications during pregnancy.

- Iron supplementation increased between 2003 and 2013, from 58% to 63%, and specifically among the middle age groups (from 59% to 65%), women of lower parity (60% to 68%), women with primary education (69% to 74%), women in urban areas (78% to 84%), and women in the North Central zone (59% to 71%).

- Blood pressure checks among women getting ANC increased steadily from 81% in 2003 to 91% in 2013. Similarly, counseling of pregnancy complications increased from 55% to 67%, with widespread improvement across all population sub-groups, except among women in the lowest wealth quintile and in some zones of the country.

- Tetanus Toxoid immunization increased over time, but not equally among sub-groups. The largest disparities are in wealth, where there is a differential of 65 percentage points between women in the poorest and the richest wealth quintiles.

Birth and Delivery

- There were no overall improvements in indicators for facility-based delivery, having a skilled attendant at birth, or cesarean section rates over the study period.

- Most births occur at home. Slight apparent increases in facility-based births (from 33% in 2003 to 36% in 2013) are not statistically significant.

- Within facilities, more deliveries occur at public facilities (23%) than at private facilities (13%) and there have been significant increases in deliveries at public facilities (5 percentage points).

- Disparities in facility-based delivery persist by geopolitical zone, wealth, and other characteristics. Disparities by wealth have widened because of significant improvements for the middle and fourth wealth quintiles and significant declines for the lowest wealth quintile. Only 6% of births to women in the poorest wealth quintile occur in a facility versus 80% of births in the richest wealth quintile.

- There have been no meaningful increases in skilled attendance at birth over the survey period, at about four women in every ten in 2008 and 2013.

- As with facility-based delivery, disparities exist in skilled birth attendance across all population sub-groups.

- The proportion of births delivered by cesarean section is very low, at levels that suggest inadequate care. The cesarean rate has remained steady over the survey period at 2% of births.

- There are significant disparities in cesarean births by wealth and geopolitical zone, with a higher proportion of births delivered by cesarean section in Southern zones (4-5%) than in Northern zones (1-2%).

Postnatal Care

- In 2013, about 40% of women had a postnatal exam within two days of delivery. There was no apparent increase in this percentage between 2008 and 2013.

- Some increase is observed for women's first births (from 46% to 49%) and for women having a daughter (from 38% to 41%).

- Significant differentials in postnatal care are found across all women's characteristics. Notably, proportions receiving postnatal care within two days of delivery are highest among women in the highest wealth quintile (75%), in sharp contrast to the lowest wealth quintile (12%), and are higher among women in Southern zones compared with Northern zones (60%-74% versus 18%-47%).

- Disparities by wealth (63 percentage points) and geopolitical zone (56 percentage points) widened between 2008 and 2013.

High-Risk Fertility Behavior

- High-risk fertility behaviors include young maternal age (below age 18), older maternal age (above age 34), a short preceding birth interval (less than 24 months), and high parity (four births or more). Nearly two-thirds of births in the five years preceding each survey were to women with at least one high-risk characteristic.

- There was no change in high-risk fertility between 2003 and 2013. Births to high parity women, the most common risk factor, remained just under half of births over the survey period. Births occurring after a short interval and births to women of older maternal age remained steady, less than 20% each. The proportion of births to young women declined by 2 percentage points—a small but significant decline—between 2003 and 2008 and then remained unchanged at 7%.

- Differentials are large and significant by wealth and education. Improvements (declines) in high-risk fertility have been concentrated among women in the middle and high wealth quintiles, urban residents, and women with primary education, leading to widening disparities by wealth, residence, and education.

Glossary of Terms

ANC	Antenatal care
ANC4+	At least four ANC visits
DHS	Demographic and Health Surveys
FMoH	Federal Ministry of Health [Nigeria]
IFA	Iron and folic acid
IMNCH	Integrated maternal, newborn, and child health program
ITNs	Insecticide treated nets
MCH	Maternal and child health
MDGs	Millennium Development Goals
MHS	Maternal health services
MMR	Maternal mortality ratio
MSS	Midwife service schemes
NARHS Plus II	National HIV/AIDS and Reproductive Health Survey
NDHS	The Nigeria Demographic and Health Surveys
NPC	National Population Commission [Nigeria]
PHCs	Primary health centers
PMTCT	Prevention of mother-to-child transmission (of HIV)
PNC	Postnatal care
USAID	United States Agency for International Development
WHO	World Health Organization

1. Introduction

In 2000, the United Nations set eight Millennium Development Goals (MDGs) designed to end poverty, hunger, and illiteracy, to be achieved by 2015, including improving maternal health (MDG 5) with a goal of reducing maternal deaths by three-quarters from the 1990 estimate. This goal has not been reached, but there has been significant progress in reducing maternal mortality at the global level. In Nigeria, not enough progress was made to achieve MDG 5 by the target date of 2015 (FMOH 2011).

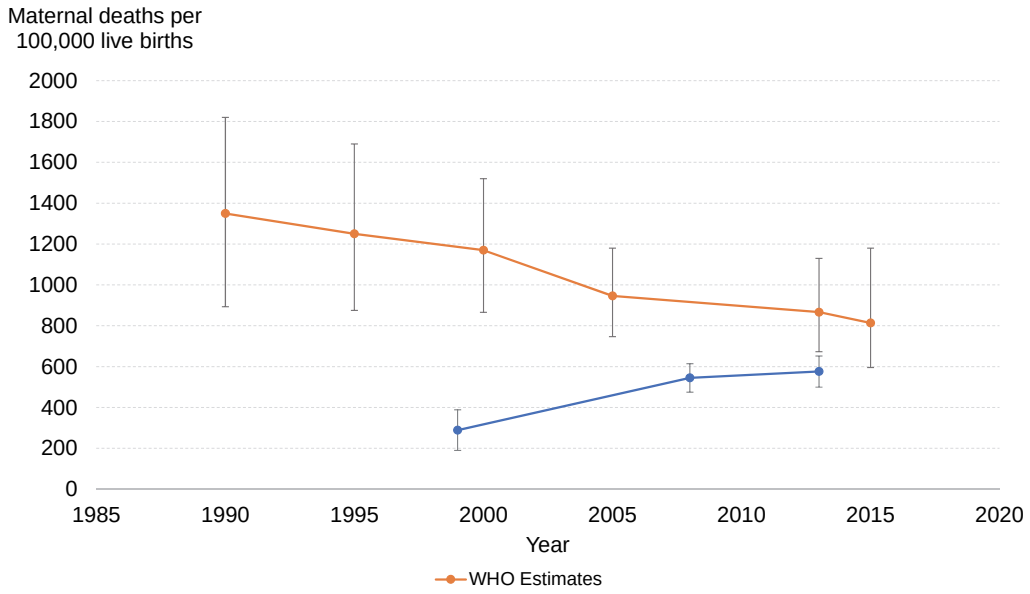
Nigeria's population in 2015 is estimated to be 2% of the global total but it accounts for 19% of all maternal deaths. That is, nearly one in every five maternal deaths worldwide is in Nigeria. Nigerian women have a lifetime risk of maternal death of 1 in 22, third highest after Sierra Leone and Chad (MMEIG 2015). Nigeria ranks 168th in Save the Children's 16th annual Mothers' Index, which evaluates the well-being of mothers and children in 179 countries (Save the Children 2015)[1].

The World Health Organization (WHO) estimates that the Maternal Mortality Ratio (MMR) in Nigeria fell from approximately 1,350 maternal deaths per 100,000 live births in 1990 to 814 maternal deaths per 100,000 live births in 2015. The MMR declined, but because of population growth the number of maternal deaths per year increased from 52,000 to 58,000 (WHO 1996; MMEIG 2015). The WHO estimates are based on a synthesis of all available sources, not just the DHS surveys, and include various statistical adjustments, and therefore differ from the DHS estimates. The published estimate of the MMR from the most recent Nigeria Demographic and Health Survey (NDHS) in 2013 is 576 maternal deaths per 100,000 live births [National Population Commission (NPC) 2014]. This estimate is based on reported deaths to sisters of the DHS respondents during a seven-year interval prior to the survey, and does not refer specifically to calendar year 2013, but for simplicity it is assigned to 2013. Figure 1 shows Nigeria's MMR over time, as calculated by both the DHS and WHO, ignoring the different synchronization of these estimates. The DHS estimates are much lower than the WHO estimates, especially for the earlier years, probably reflecting DHS under-reporting of sisters' deaths, a gradual improvement in DHS estimates, and demonstrating the value of the WHO adjustments. The national average does not capture wide variations with respect to such characteristics as place of residence (urban-rural), geopolitical zone (six zones), household wealth level, and maternal education. Studies in Nigeria have found elevated levels of maternal mortality in Northern states (Doctor et al. 2012) and in rural areas (Idris, Tyoden, et al. 2010).

Strategies to reduce maternal deaths require improving coverage of key interventions or "pillars" that have been found to be effective, as in the Safe Motherhood Initiative. These include antenatal care (ANC), safe delivery, and postnatal care (WHO 1994). The role of ANC in improving maternal health has long been demonstrated. ANC clinics provide an avenue for which both preventive and curative interventions are provided to pregnant women to improve the overall status of maternal health. These include prevention, detection and treatment of anemia in pregnancy; infections such as urinary tract infection, malaria, syphilis, HIV, gonorrhea; pregnancy-induced hypertension; pregnancy-induced diabetes; and maternal tetanus and neonatal tetanus (WHO 2006). Various components of ANC can be provided during clinic visits, such as giving information about healthy maternal behaviors and potential danger signs, partner involvement, birth preparation, and delivery, as well as providing advice for pregnancy complications and care seeking for post-delivery complications (Sugathan, Mishra, and Retherford 2001; Ram and Singh 2006).

[1] The Mothers' Index is a composite of five indicators related maternal well-being: lifetime risk of maternal death, under-five mortality rate, expected number of years of formal schooling, gross national income per capita, and percentage of seats held in national government by women (Save the Children 2015).

Figure 1. Maternal Mortality Ratio, Nigeria 1990-2015



Following a multi-country study, WHO recommended focused ANC consisting of at least four visits for low-risk pregnant women (Villar, Ba'aqeel, and Piaggio 2001). Additionally, early initiation of the first ANC visit is desirable since it gives enough time for women to receive as many services as possible (Magadi, Madise, et al. 2000). The converse is also true: late entry into ANC is associated with adverse pregnancy outcomes such as low birth weight, premature delivery, and increased need for intervention during childbirth (Heaman, Newburn-Cook, et al. 2008). It is recommended that pregnant women begin ANC as early as possible and preferably within the first 12 weeks of gestation, with the subsequent three visits at about 26, 32, and 36–38 weeks of pregnancy (WHO 2002).

Ensuring a clean and safe environment as well as skilled attendance at delivery can reduce both maternal and neonatal deaths; it is an important intervention that has been promoted by WHO and other agencies for over two decades (WHO 2004; Starrs 1997; WHO 2006). An important benefit of ANC is its association with delivery in a health facility and assisted by a skilled birth attendant. In a multi-country study, women who had at least four ANC visits were estimated to be 11% more likely to give birth with medical assistance, and this effect depended largely on the content and number of ANC visits (Adjiwanou and Legrand 2013).

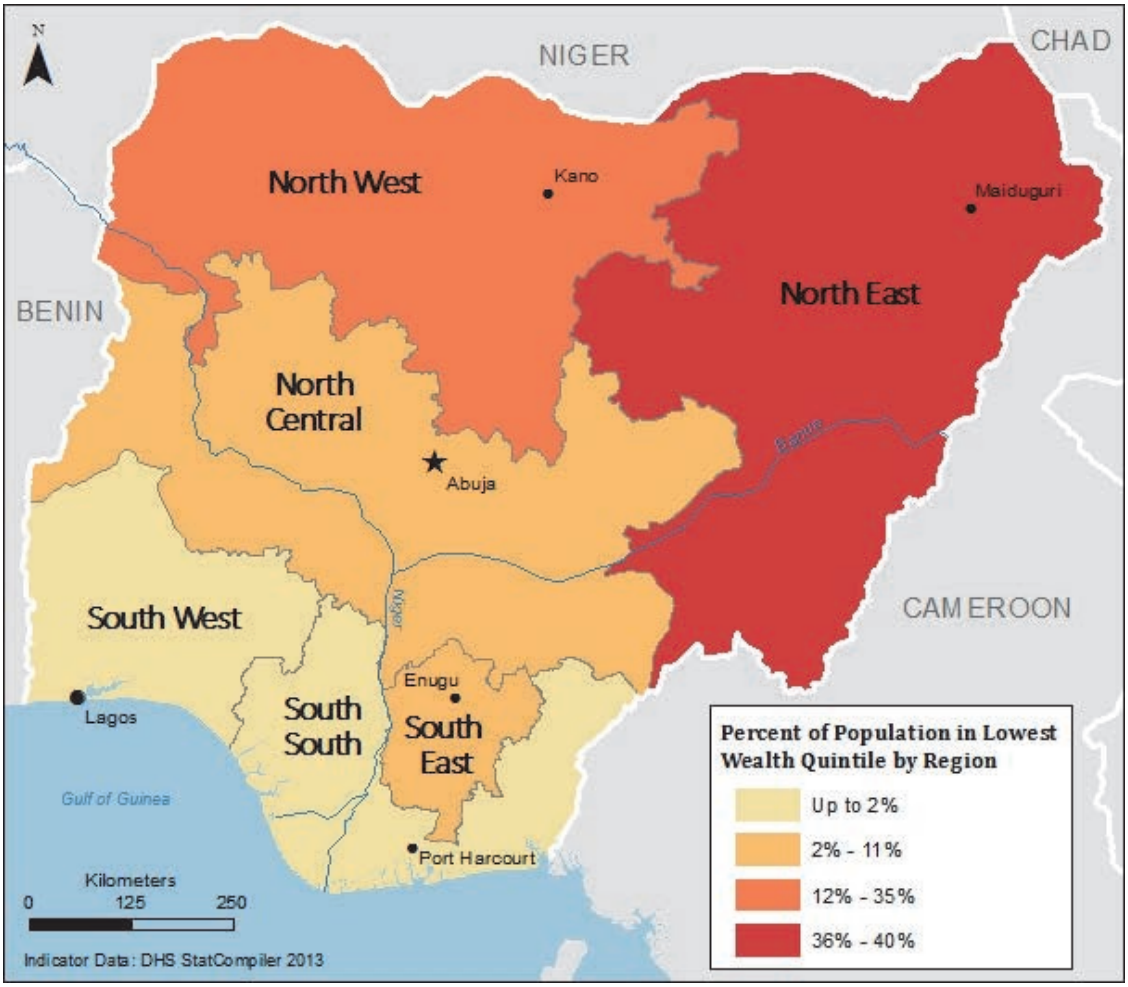
Postnatal care is essential in ensuring the health of the mother and her newborn. More than two-thirds of neonatal deaths occur in the first seven days of life, and of these, more than half occur within the first 24 hours (Yinger 2003). Similarly, two-thirds of maternal deaths occur in the postnatal period (48 hours) or within 42 days after delivery (Ronsman and Graham 2006). WHO recommends initial postnatal care within the first 24 hours after delivery and a minimum of three additional visits at 48–72 hours, 7–14 days, and six weeks after delivery (WHO 2014).

High-risk fertility behaviors include young maternal age (below age 18), older maternal age (above age 34), a short preceding birth interval (less than 24 months), and high parity (four births or more). Adolescent pregnancy carries substantial health risk for both the mother and newborn. Adolescent mothers have increased risk of maternal complications, with complications for infants such as premature birth, low birth weight, perinatal mortality, and infant mortality. Moreover, early childbearing has consequences for subsequent use of health care. A study of 21 African countries found that teenage mothers generally started ANC late and made fewer ANC visits, compared particularly with mothers age 20–30 (Magadi, Agwanda, and Obare 2007).

Data from DHS surveys as well as other research show that indicators of maternal health and usage of maternal health care services in Nigeria vary by demographic factors, in particular wealth and region,

where the Southern regions fare better than the North (Adamu 2011; National Population Commission and ICF International 2014; National Population Commission and ICF International 2009; National Population Commission and ICF International 2004). Figure 2 shows the percentage of the population in the lowest wealth group in each region in 2013, demonstrating that high proportions of the populations in the North West and North East geopolitical zones are in the lowest wealth quintile. In the North East zone 36-40% of the populations are in the lowest wealth quintile, compared with less than 2% in the South West and South South zones.

Figure 2. Percent of population in Nigeria in the lowest wealth quintile by region, 2013



The challenges facing Nigeria's health care system can be divided into three main categories: resources, structure, and access. Although Nigeria has a large pool of human resources, at around 350,000 health workers, it is still one of the 57 countries in the world facing a human resources health care crisis (WHO AFRO 2016). Currently there are an estimated 41 doctors, 161 nurses and midwives, 15 laboratory personnel, 13 community health workers, and 11 pharmaceutical personnel per 100,000 people in Nigeria (WHO 2015). There is an inequitable distribution of health professionals by rural-urban areas and geopolitical zones. Inadequate remuneration, poor working conditions, irregular payment of staff salaries, lack of supplies and equipment, lack of training and prospects for career progression, as well as lack of supportive supervision and monitoring are described as reasons for the crisis in the health sector (Federal Ministry of Health [FMOH] 2010). As a consequence, access to basic maternal health services, as well as emergency obstetric care service, has become compromised, leading to little use and poor health outcomes.

Barriers to access include the location of health facilities (Okoronkwo, Onwujekwe, and Ani 2012; Onwujekwe 2005; Okeke and Okeibunor 2010), cultural or religious unacceptability (Antai 2009;

Nwakoby 1994), financial constraints, including inability to pay for transportation (Moore, Alex-Hart, and George 2014) or to pay service fees (Odetola 2015). These in combination with background socio-demographic inequalities have resulted in differentials in maternal health status at sub-national levels. Recently, the insurgencies in the North East have added another dimension to access to health care (Global Conflict Tracker 2016). Displacement of people and destruction of public infrastructure, including schools and health facilities, often mean that services are non-existent.

The Nigerian government through the FMOH has developed and implemented policies and programs to address the poor state of health, particularly maternal and child health. A review indicates that between 1988 and 2014 there have been 34 policies, programs, and strategies directed at improving maternal, neonatal, and child health in Nigeria: 15 child, 9 neonatal, and 10 maternal health programs, including adoption of an integrated maternal, newborn and child health program (IMNCH) in 2007 (FMOH 2011; Kana, Doctor, et al. 2015). The midwife service scheme (MSS) program was initiated in 2009 in response to disparities in the distribution of skilled birth attendants, especially in rural areas (Okoli, Abdullahi, et al. 2012). An evaluation concluded that the program contributed to an increase of only 7 percentage points in ANC use, however, with a smaller than anticipated impact on maternal health outcomes (Okeke, Glick, et al. 2015).

Despite proven cost-effective interventions, programs, and policies to improve maternal health, maternal mortality remains a public health challenge in Nigeria. The health system has not been able to respond adequately to this and other public health challenges, such as child health. The status of maternal health in Nigeria has remained essentially the same over the past 25 years. The poor outcomes of program and policy implementation can be traced back to the complex nature of Nigeria's health system, which is based on a three-tier approach with poor coordination between the three tiers—federal, state, and local government. Typically, health policies, programs, or interventions are implemented in a phased manner starting from the Ministry of Health at the top and then gradually adopted at the state and local levels. This approach results in differences in speed and intensity of adoption, with wide variations in implementation and health outcomes among states and local areas (Wollum, Burstein, et al. 2015).

Several state governments in Nigeria have begun to offer free maternal health services as an initial response to poor maternal health care. In 2007, the Northern Governors' Forum Summit pledged to end preventable maternal deaths, most notably in Northern Nigeria. As a consequence, about 17 states in the country launched free maternal health services. An assessment of the impact of free maternal health services in nine selected states was conducted but was unable to reach definitive conclusions (Oloriegbe, Saka, et al. 2009).

While studies have provided insights into the impacts of programs and policies on the levels, trends, and determinants of maternal health care use, they have largely focused on sub-national and state levels. To provide overall estimates of trends of indicators, a nationally representative study is needed. The present analysis of DHS data is an attempt to assess levels and trends in selected key indicators of maternal health and to examine differentials across demographic and socioeconomic characteristics.

2. Data and Methods

2.1. Data

This study uses data from three DHS surveys conducted in Nigeria in 2003, 2008, and 2013. These surveys include standardized questions that can be used to measure trends in demographic, maternal, and reproductive health-related behaviors and outcomes. The surveys are implemented based on a multistage cluster sampling design to acquire a nationally representative sample in each round. More specific information on the sampling design is available in each of the final reports (NPC 2004; NPC 2009; NPC 2014). The respondents for this study include women age 15-49 with a live birth in the five years preceding the survey: 3,911 women in 2003; 17,635 in 2008; and 20,467 in 2013.

2.2. Methods

2.2.1. Indicators

The key indicators describe use of maternal health care and delivery services and are standardized across the three surveys. Some information was not collected uniformly across all the surveys. In 2003, for example, postnatal care was only measured for women whose last live birth in the five years preceding the interview was not delivered in a facility. Thus, the sample from 2003 potentially contains a significantly different population compared with all women or with women who had a facility-delivered live birth in the past five years. Also, not all of the components necessary to calculate the comprehensive definition of tetanus protection[2] were included in the 2003 survey. Therefore, two different measures of tetanus coverage are given in this report: one measure for two tetanus injections during most recent pregnancy which resulted in a live birth in the last five years (available for all survey years), and another measure for full protection against tetanus (available for 2008 and 2013 only).

Table 1 presents the definition of each indicator and the corresponding population base, i.e., the weighted sample size. Certain indicators are restricted to smaller samples, based on whether information was collected for either the most recent birth or all live births in the five years preceding the survey.

[2] Full protection includes mothers with two injections during the pregnancy for her last live birth, or two or more injections (the last within three years of the last live birth), or three or more injections (the last within five years of the last birth), or four or more injections (the last within ten years of the last live birth), or five or more injections prior to the last birth.

Table 1. Maternal health indicators included in the study

Indicator	Definition	Population Base	Sample Size		
			2003 DHS	2008 DHS	2013 DHS
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	3,911	17,635	20,467
Timing of first ANC	Percentage of women who received ANC in the first four months of pregnancy	Women age 15-49 with a live birth in the five years preceding the survey	3,911	17,635	20,467
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	3,911	17,635	20,467
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	2,462	11,158	13,477
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	2,462	11,158	13,477
Two or more injections during last pregnancy	Percentage of women receiving two or more injections during their most recent pregnancy	Women age 15-49 with a live birth in the five years preceding the survey	3,911	17,635	20,467
Fully protected against neonatal tetanus	Percentage of women whose last birth was fully protected against neonatal tetanus	Women age 15-49 with a live birth in the five years preceding the survey	3,911	17,635	20,467
Birth delivered in a facility	Percentage of births that were delivered in a facility	Children born in the five years preceding the survey	6,219	28,100	31,828
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	6,219	28,100	31,828
Births delivered by cesarean section	Percentage of births that were delivered by cesarean section	Children born in the five years preceding the survey	6,219	28,100	31,828
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	6,219	28,100	31,828
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	6,219	28,100	31,828
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	6,219	28,100	31,828
Fertility risk: high parity	Percentage of births to women with high parity (four or more)	Children born in the five years preceding the survey	6,219	28,100	31,828
Fertility risk: any high-risk behavior	Percentage of births to women who have at least one high-risk behavior	Children born in the five years preceding the survey	6,219	28,100	31,828
Postnatal care for the mother	Percentage of women who received a postnatal check-up within two days of delivering their most recent birth	Women age 15-49 with a live birth in the five years preceding the survey	3,911	17,635	20,467

2.2.2. Analysis

We compare data from the three most recent surveys in Nigeria to assess changes over time in key maternal health indicators. Chi square tests of independence measured statistical associations between indicators and socio-demographic variables within each survey. These socio-demographic variables include maternal age at birth, parity, education, household wealth quintile, urban-rural locality, and region/geopolitical zone. Further tests of associations determined whether the differences between surveys, both nationally and stratified by sub-groups, were statistically significant. All estimates are weighted and all statistical tests are adjusted for the clustering and stratification in the DHS sample design. Stata 14 was used to make all calculations.

3. Results

3.1. Sample Characteristics

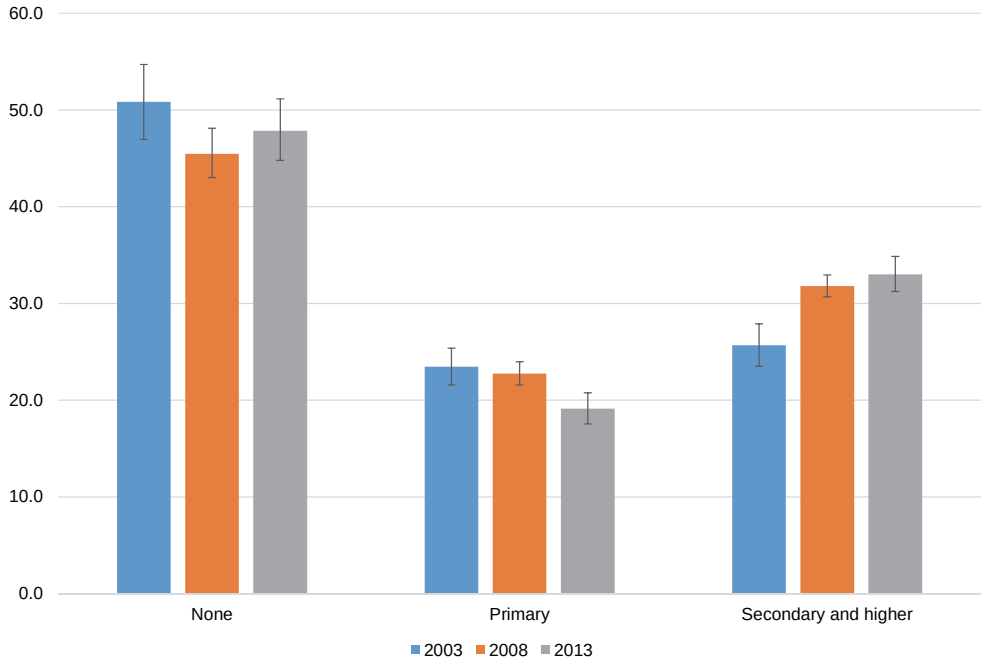
Table 2 shows the distribution of background characteristics among women in each survey who had a birth in the past five years. In all three surveys, the largest proportions of women are age 18-34, have no education, live in rural areas, and are in the North West geopolitical zone.

Table 2. Distribution of women age 15-49 with a live birth in the 5 years preceding the survey according to background characteristics, Nigeria 2003, 2008, and 2013

	2003		2008		2013	
Background characteristic	%	CI	%	CI	%	CI
Age at the child's birth						
Less than 18	8.0	6.76 - 9.36	5.8	5.42 - 6.26	5.9	5.43 - 6.45
18-34	74.7	72.71 - 76.60	75.7	74.90 - 76.43	75.6	74.79 - 76.44
35 or older	17.3	15.73 - 19.05	18.5	17.81 - 19.22	18.5	17.72 - 19.21
Parity at the child's birth						
1	20.5	18.88 - 22.28	17.3	16.69 - 17.95	17.9	17.31 - 18.58
2-3	28.2	26.40 - 30.01	31.9	31.11 - 32.77	31.3	30.49 - 32.21
4-5	22.4	20.88 - 23.88	24.2	23.48 - 24.89	24.0	23.29 - 24.75
6+	29.0	27.01 - 30.97	26.6	25.69 - 27.49	26.7	25.83 - 27.61
Education						
None	50.9	46.97 - 54.72	45.5	43.56 - 47.37	47.9	45.66 - 50.06
Primary	23.5	21.02 - 26.12	22.8	21.58 - 23.97	19.1	18.02 - 20.29
Secondary or higher	25.7	22.63 - 28.99	31.8	30.20 - 33.42	33.0	31.24 - 34.85
Household wealth						
Lowest	21.8	18.40 - 25.59	23.1	21.30 - 25.00	23.0	20.77 - 25.31
Second	21.6	18.96 - 24.55	22.2	20.76 - 23.72	22.4	20.88 - 24.03
Middle	20.7	17.76 - 23.91	19.0	17.62 - 20.46	19.1	17.66 - 20.55
Fourth	18.8	16.25 - 21.65	18.2	16.87 - 19.54	18.0	16.63 - 19.36
Highest	17.1	14.10 - 20.64	17.5	15.98 - 19.19	17.6	16.12 - 19.20
Locality						
Urban	29.3	25.82 - 32.96	30.2	28.94 - 31.54	35.6	33.67 - 37.50
Rural	70.7	67.04 - 74.18	69.8	68.46 - 71.06	64.4	62.50 - 66.33
Zone						
North Central	14.7	12.19 - 17.64	14.3	13.35 - 15.35	14.1	12.86 - 15.47
North East	22.1	18.95 - 25.50	15.6	14.64 - 16.61	16.8	15.31 - 18.35
North West	34.3	30.09 - 38.73	30.5	29.06 - 31.90	36.4	34.49 - 38.31
South East	5.7	3.47 - 9.17	9.1	8.46 - 9.76	8.4	7.27 - 9.68
South	13.9	11.02 - 17.38	13.1	12.26 - 13.98	9.8	8.80 - 10.86
South West	9.4	7.84 - 11.19	17.4	16.26 - 18.68	14.6	13.20 - 16.01
Total number of women	3,911		17,635		20,467	

Figure 3 highlights the changes in education from 2003 to 2013. Among women who had a birth in the past five years, the proportion of women with secondary and higher education increased over the span of the three surveys.

Figure 3. Distribution of level of education among women with a live birth in the 5 years preceding each survey by survey year, Nigeria 2003, 2008, and 2013

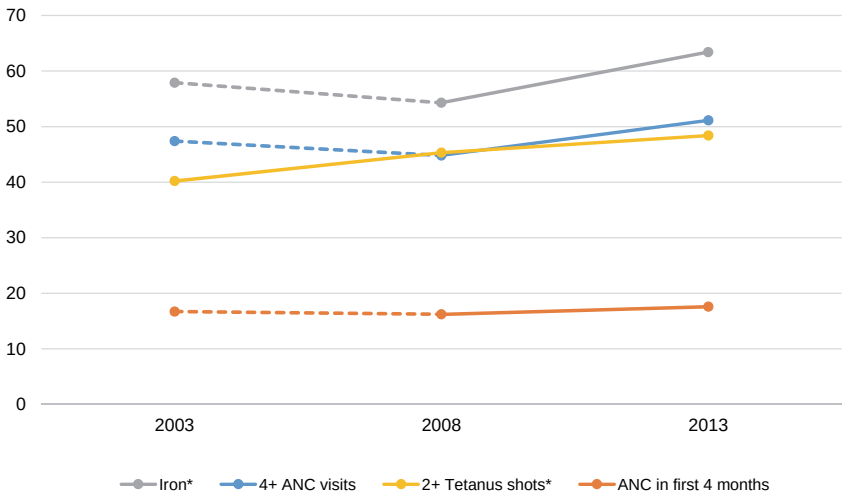


Note: Among women with a live birth in the last 5 years

3.2. Antenatal Care and Its Components

Figure 4 shows an overview of trends in ANC. Iron supplementation, attending four or more ANC visits, or attending ANC within the first four months of pregnancy did not significantly change from 2003 to 2008. All four ANC indicators showed significant improvement from 2008 to 2013; however, only iron supplementation and protection against tetanus increased significantly overall from 2003 to 2013. By 2013, over half of women received four or more ANC visits during their most recent pregnancy, but less than 20% initiated ANC within the first four months of pregnancy. Over 60% received iron supplementation and just under half received two or more tetanus shots.

Figure 4. Indicators of antenatal care for the most recent birth of women with a live birth in the 5 years preceding the survey, Nigeria 2003, 2008, and 2013



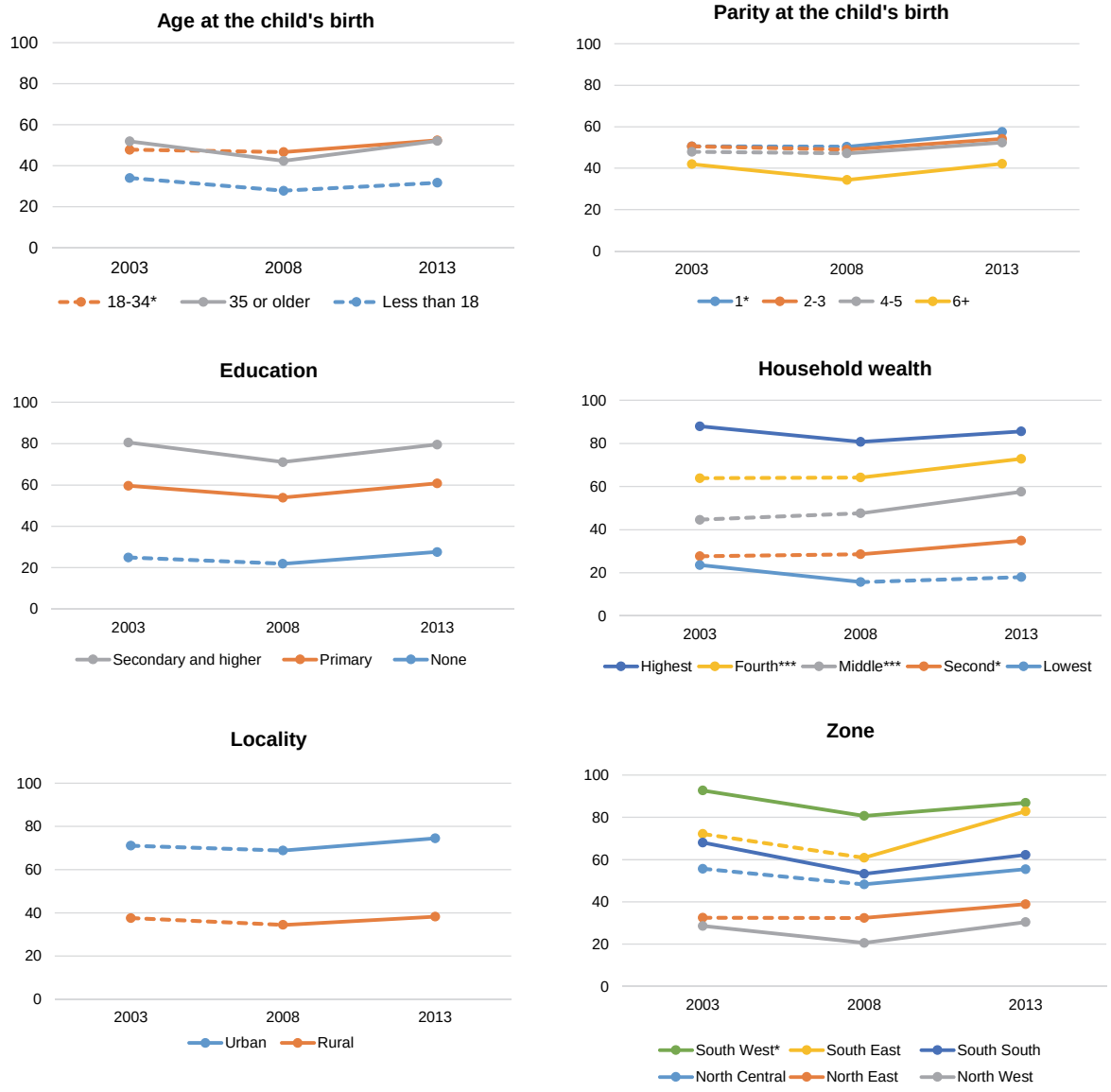
Note: A solid line indicates a significant change between either 2003 and 2008 or 2008 and 2013, while a dotted line indicates no significant change. Significant change between 2003 and 2013 is indicated with asterisks in the legend for each sub-category, which represent the p-value: *<0.05, **<0.01, ***<0.001

Four or more ANC visits

Women who had at least four ANC visits during their most recent pregnancy in the five years preceding each survey were stratified by sub-group. Overall, 51% of women attended at least four ANC visits during their last pregnancy. Significant differences exist within every background characteristic of age, parity, education, wealth, locality, and geopolitical zone (Appendix Table 1). Smaller proportions of the disadvantaged groups (younger, poorer, rural, less education, in Northern geopolitical zones) had at least four ANC visits compared with the more advantaged groups in each category. In 2013, similar to the previous survey years, the largest disparities were between the lowest wealth quintile (18%) and the highest wealth quintile (86%), between having no education (28%) and having secondary or higher education (80%), and between the Northern and Southern geopolitical zones. Thirty percent of women in the North West zone attended four or more ANC visits for the most recent pregnancy in the last five years, while 87% of women in the South West zone had at least four visits. Disparities are also apparent between the youngest and oldest age groups of women, at highest and lowest parity, and by rural-urban locality, although these differences are smaller.

For most background characteristics, as with the whole sample of women, the change over time was largely non-significant. As Figure 5 shows, several sub-groups made significant improvements from 2008 to 2013. However, this was preceded by some decrease, often non-significant, from 2003 to 2008, rendering the changes over the full ten years non-significant. Some significant increases occurred from 2003 to 2013 among women age 18-34, first births, and the middle three wealth groups.

Figure 5. Percentage of women age 15-49 with a live birth in the 5 years preceding the survey with 4 or more antenatal care visits during pregnancy for the last live birth, according to background characteristics, Nigeria 2003, 2008, and 2013



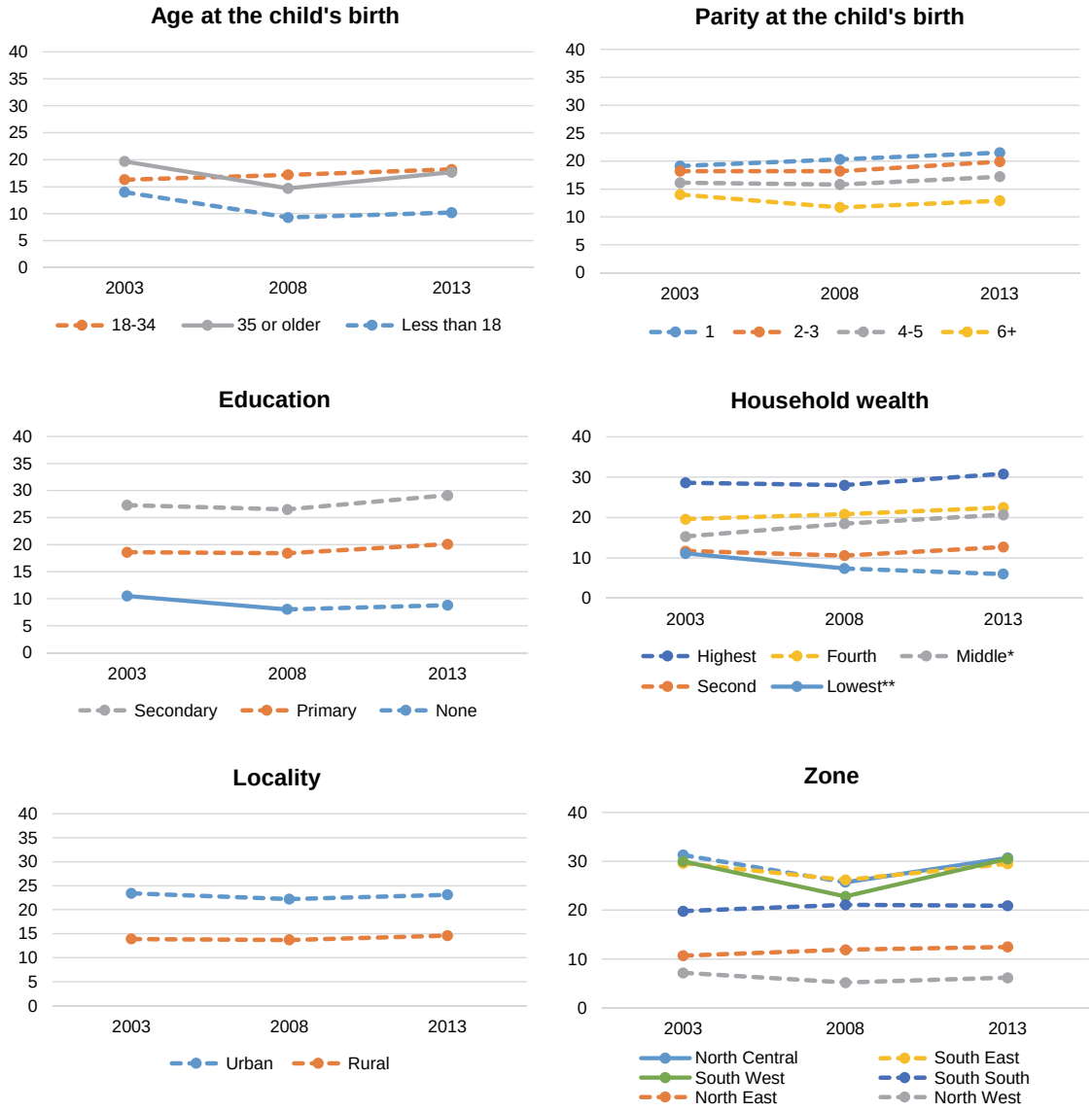
Note: A solid line indicates a significant change between either 2003 and 2008 or 2008 and 2013, while a dotted line indicates no significant change. Significant change between 2003 and 2013 is indicated with asterisks in the legend for each sub-category, which represent the p-value: *<0.05, **<0.01, ***<0.001

ANC timing

As Figure 6 shows, attending ANC within the first four months of pregnancy did not significantly change from 2003 (17%) to 2013 (18%), despite a small significant increase from 2008 to 2013. Appendix Table 2 shows the percentages and significant differences within the sub-groups, as well as changes over time. Again, there are highly significant differences within each characteristic, with the most vulnerable groups not receiving timely care in equitable proportions. The largest percentage point differences were by wealth quintiles and geopolitical zones. In the lowest wealth quintile and in the North West zone, only 6% of women in the 2013 survey received ANC within the first four months of pregnancy, compared with 31% of women in the highest wealth quintile and in the South West and North Central zones, and 30% in the South East zone.

In some sub-groups the disparities have widened over time. For example, the lowest wealth group showed a significant decrease from 2003 to 2013 in receiving ANC before four months of pregnancy. Only one other sub-group showed a significant change from 2003 to 2013—the middle wealth quintile, with an increase of 5 percentage points.

Figure 6. Percentage of women whose first ANC visit for the last pregnancy was before 4 months pregnant, among women age 15-49 with a live birth in the last 5 years, according to background characteristics, Nigeria 2003, 2008, and 2013



Note: A solid line indicates a significant change between either 2003 and 2008 or 2008 and 2013, while a dotted line indicates no significant change. Significant change between 2003 and 2013 is indicated with asterisks in the legend for each sub-category, which represent the p-value: *<0.05, **<0.01, ***<0.001

Components of ANC

Selected components of ANC include consumption of iron tablets or syrup, blood pressure measurement, receiving information on complications of pregnancy, and receipt of the tetanus toxoid vaccine (Appendix Tables 3 and 4). The proportion of women who received two or more tetanus injections were calculated for all three surveys, while the proportion of women who were fully protected against tetanus was only examined for 2008 and 2013, as the 2003 survey did not include the necessary questions to calculate this variable. Tetanus protection (48% receiving two TT vaccines, 53% having full coverage in 2013) and iron supplementation (63%) were measured for the most recent birth for all

women with a live birth in the five years preceding each survey, whereas blood pressure measurement (91%) and pregnancy complication counseling (67%) were only obtained for women who received ANC during their last pregnancy in the five years preceding the survey. For each indicator in 2013, more than one-half of women received the particular ANC service.

There are significant disparities by women's background characteristics for all components of ANC. Overall, women in older age groups, with more education, greater wealth, in urban areas, and in Southern geopolitical zones received more ANC interventions than younger, less educated, poorer, rural, and Northern women. In 2003, there were no apparent differences among the four parity categories of women with at least one ANC visit for blood pressure measurement and complications counseling. The differences became significant in both the 2008 and 2013 surveys, although the percentage point differences between the highest and lowest provision of blood pressure measurement and complications counseling were virtually the same across all three surveys, at 3 to 4 percentage points for blood pressure and 10 percentage points for complications. The emergence of significant differences in the later surveys may be due to larger sample sizes. Widening gaps are also visible among the wealth quintiles for most of these components, where significant improvements have been made in the higher wealth quintiles, while the lowest quintile remained unchanged from 2003 to 2013.

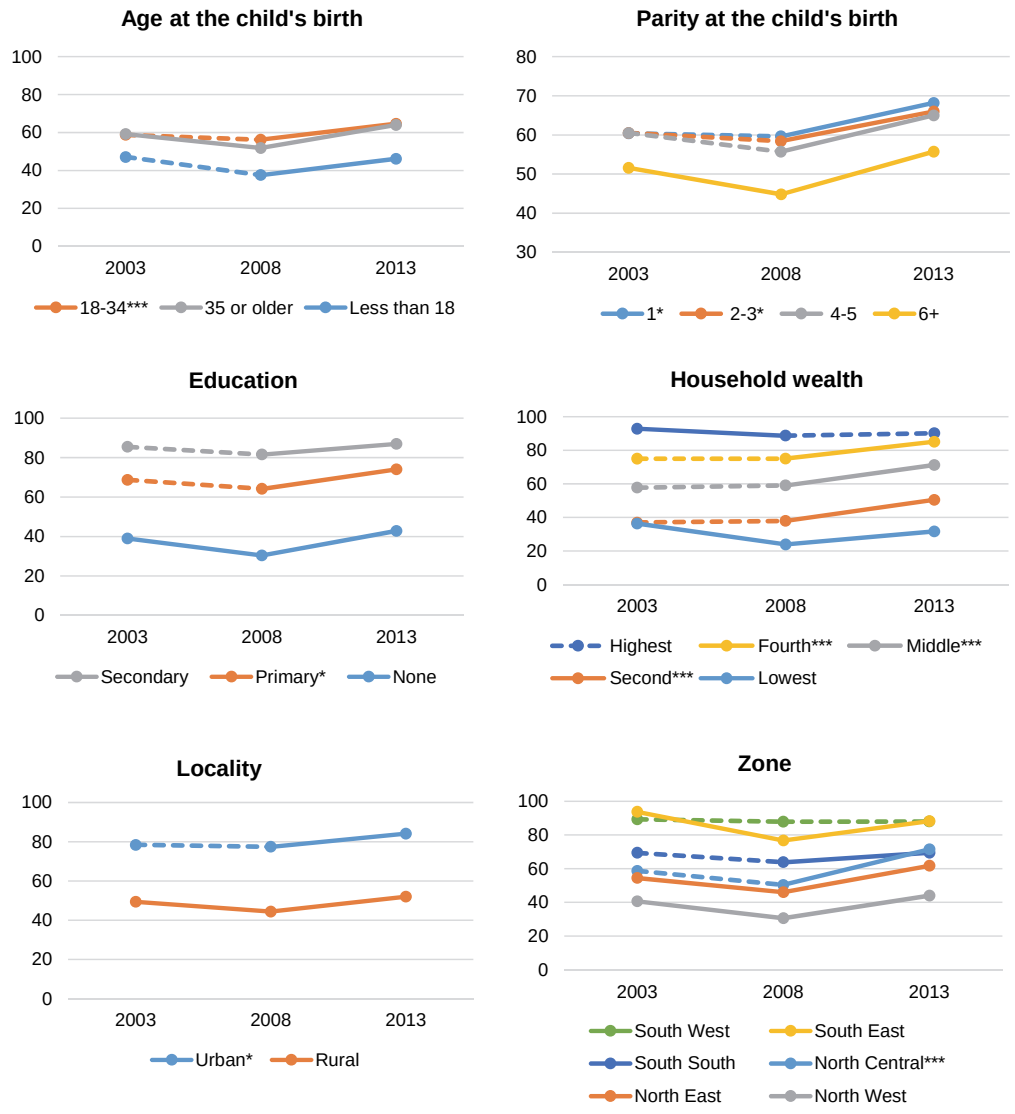
Figure 7 shows the changes over time for the components of ANC by women's background characteristics. Iron supplementation significantly increased by 5 percentage points from 2003 to 2013 (from 58% to 63%), with a non-significant decrease from 2003 to 2008 and a significant increase from 2008 to 2013. Other significant increases over the ten-year period occurred among women age 18-34 (6 percentage points), women with one child or 2-3 children (8 percentage points), women with primary education (5 percentage points), women in urban areas (6 percentage points), and women in the North Central zone (13 percentage points).

High proportions of women received blood pressure measurement during ANC for their most recent pregnancy, and this proportion increased significantly and steadily from 81% in 2003 to 85% in 2008 and 91% in 2013. Almost every sub-group had significant improvements as well, with the exception of women in the lowest wealth quintile and women in some geopolitical zones. Large significant increases in blood pressure measurement occurred in the North West and South South zones, with 21 and 14 percentage point increases, respectively, over the ten-year period.

Similar increases were seen in pregnancy complication counseling, although the proportion of women receiving this component of care during ANC was lower than the proportion of women receiving blood pressure measurement (in 2013, 67% for counseling versus 91% for blood pressure). The results show continued and significant increases, from 55% in 2003 to 61% in 2008 and 67% in 2013. Again, most sub-groups significantly improved in this component of care, except for the lowest wealth quintile and geopolitical zones other than North Central, where there was no significant change over the ten-year period.

Figure 7. Percentage of women who received key components of care during pregnancy, among women age 15-49 with a live birth in the 5 years preceding each survey, according to background characteristics, Nigeria 2003, 2008, and 2013

Mother took iron syrup/tablets during pregnancy

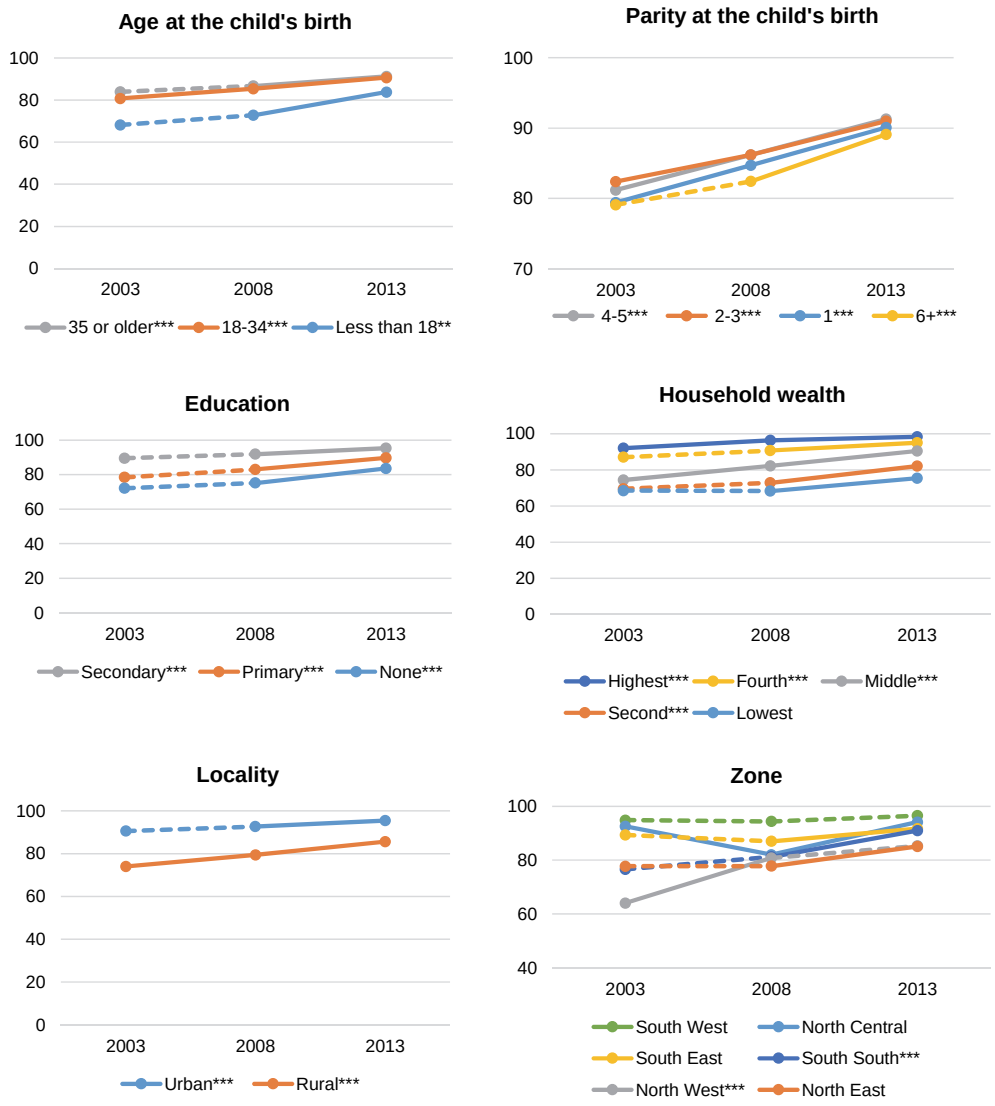


Note: A solid line indicates a significant change between either 2003 and 2008 or 2008 and 2013, while a dotted line indicates no significant change. Significant change between 2003 and 2013 is indicated with asterisks in the legend for each sub-category, which represent the p-value: *<0.05, **<0.01, ***<0.001

Continues

Figure 7. − *Continued*

Blood pressure checked during ANC, among women with ANC

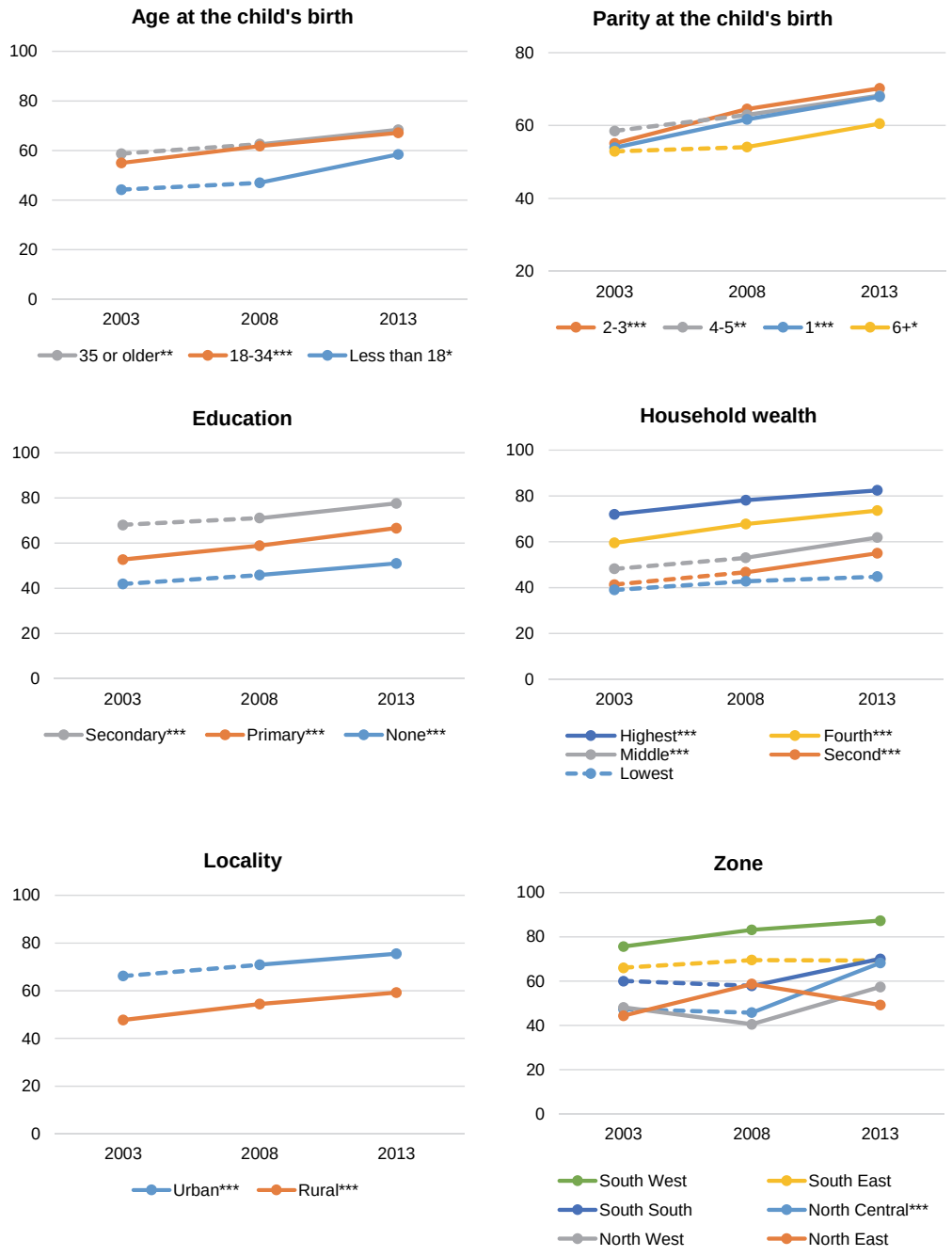


Note: A solid line indicates a significant change between either 2003 and 2008 or 2008 and 2013, while a dotted line indicates no significant change. Significant change between 2003 and 2013 is indicated with asterisks in the legend for each sub-category, which represent the p-value: *<0.05, **<0.01, ***<0.001

Continues

Figure 7. − *Continued*

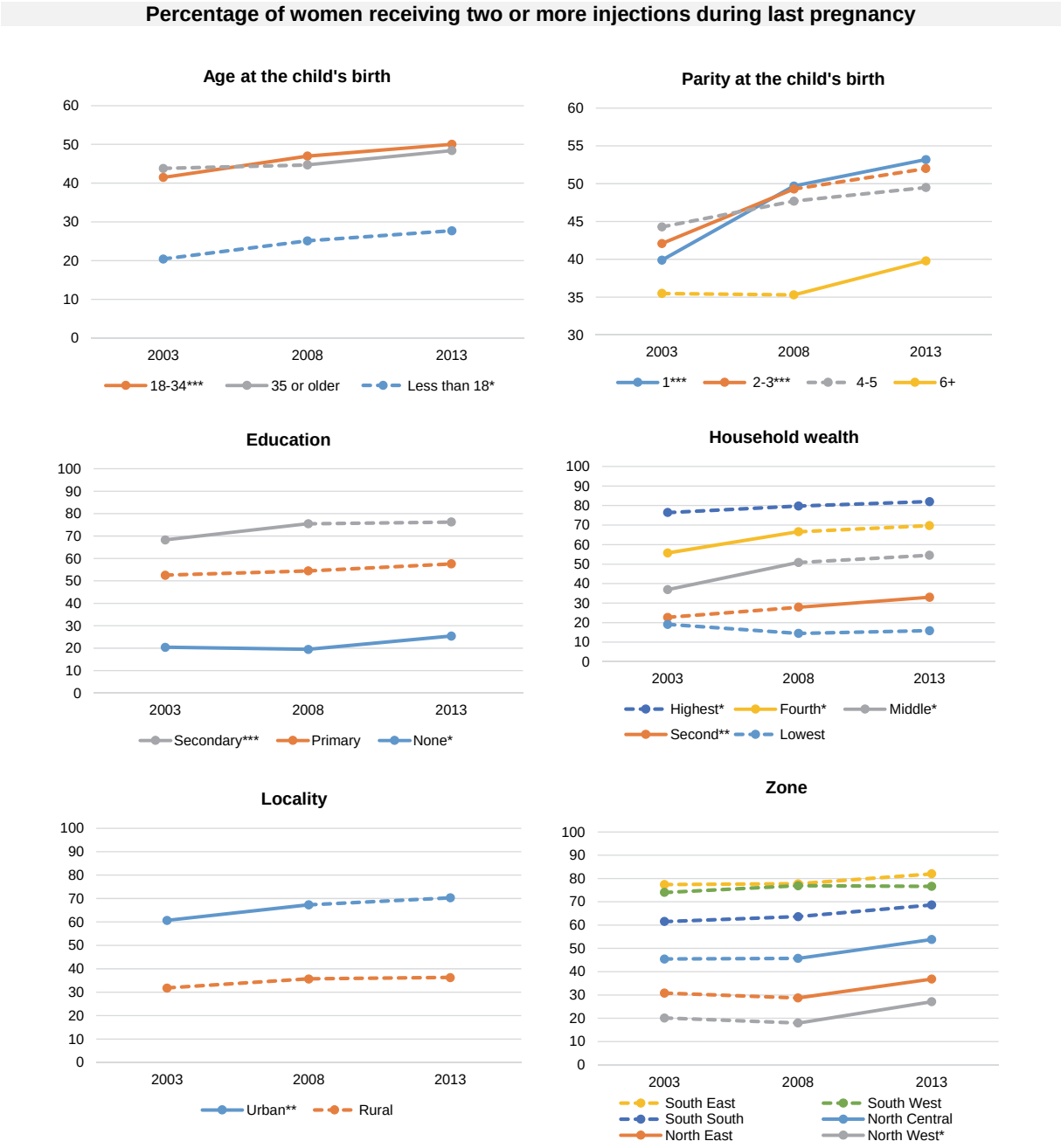
Informed of pregnancy complications during ANC, among women with ANC



Note: A solid line indicates a significant change between either 2003 and 2008 or 2008 and 2013, while a dotted line indicates no significant change. Significant change between 2003 and 2013 is indicated with asterisks in the legend for each sub-category, which represent the p-value: *<0.05, **<0.01, ***<0.001

Although tetanus coverage increased significantly from 2003 to 2013, both for two or more injections during the last pregnancy and full tetanus protection (2008 to 2013 only), the increases were not equally distributed or consistent across all characteristics (Figure 8). Receiving two or more tetanus vaccines increased by 8 percentage points from 2003 to 2013, and full coverage of tetanus vaccination increased by 5 percentage points. Within sub-groups for two or more tetanus vaccinations, the largest significant increases of 10 percentage points or more occurred among primaparous women and women with two to three children (13 and 10 percentage points, respectively), the middle wealth quintile (18 percentage points), and urban women (10 percentage points). For full coverage, the largest increases were among women in the oldest age group and highest parity (7 percentage points), women with no education (8 percentage points), the second wealth quintile (7 percentage points), and women in the North East and North West geopolitical zones (11 and 13 percentage points, respectively). However, for both measures of tetanus protection, the largest disparity is among wealth groups, with a difference of over 65 percentage points between the lowest and highest wealth quintiles for each measure.

Figure 8. Among mothers age 15-49 with a live birth in the 5 years preceding the survey, the percentage whose last live birth was protected against neonatal tetanus, according to background characteristics, Nigeria 2003, 2008, and 2013

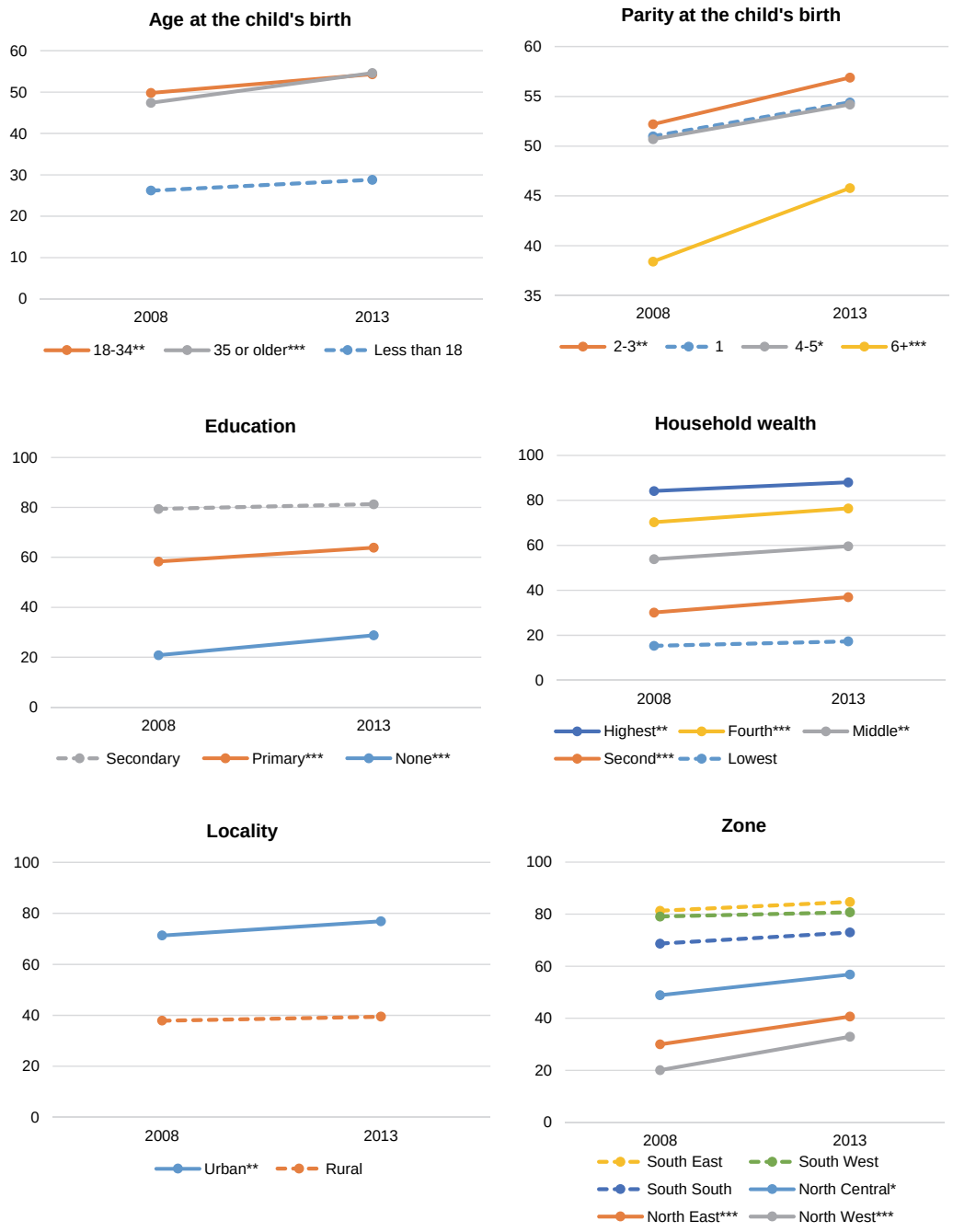


Note: A solid line indicates a significant change between either 2003 and 2008 or 2008 and 2013, while a dotted line indicates no significant change. Significant change between 2003 and 2013 is indicated with asterisks in the legend for each sub-category, which represent the p-value: *<0.05, **<0.01, ***<0.001

Continues

Figure 8. − *Continued*

Percentage of women whose last birth was fully protected against neonatal tetanus among women with a live birth in the 5 years preceding the survey

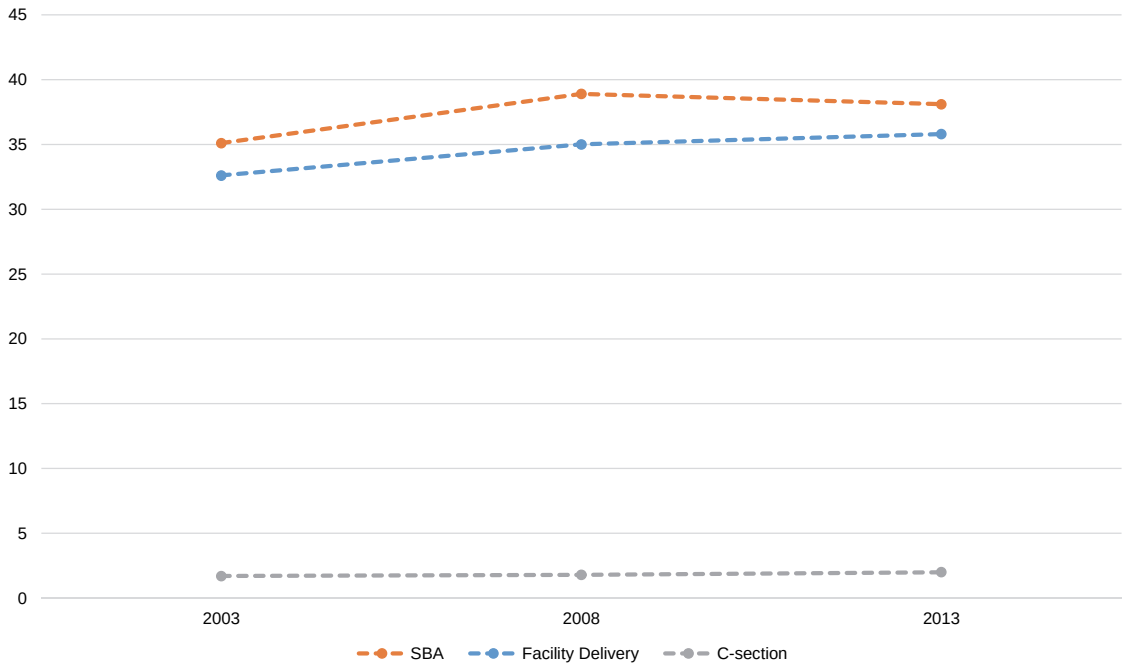


Note: A solid line indicates a significant change between either 2003 and 2008 or 2008 and 2013, while a dotted line indicates no significant change. Significant change between 2003 and 2013 is indicated with asterisks in the legend for each sub-category, which represent the p-value: *<0.05, **<0.01, ***<0.001

3.3. Birth and Delivery

Figure 9 shows the trends in indicators related to birth and delivery. Overall, there was no significant increase in facility-based delivery, having a skilled attendant at birth, or having a cesarean section (C-section). In 2013 overall, 36% of women delivered in a health facility and with a skilled birth attendant, while 2% of women received a C-section.

Figure 9. Indicators of delivery among all live births to women age 15-49 in the 5 years preceding the survey, Nigeria 2003, 2008, and 2013

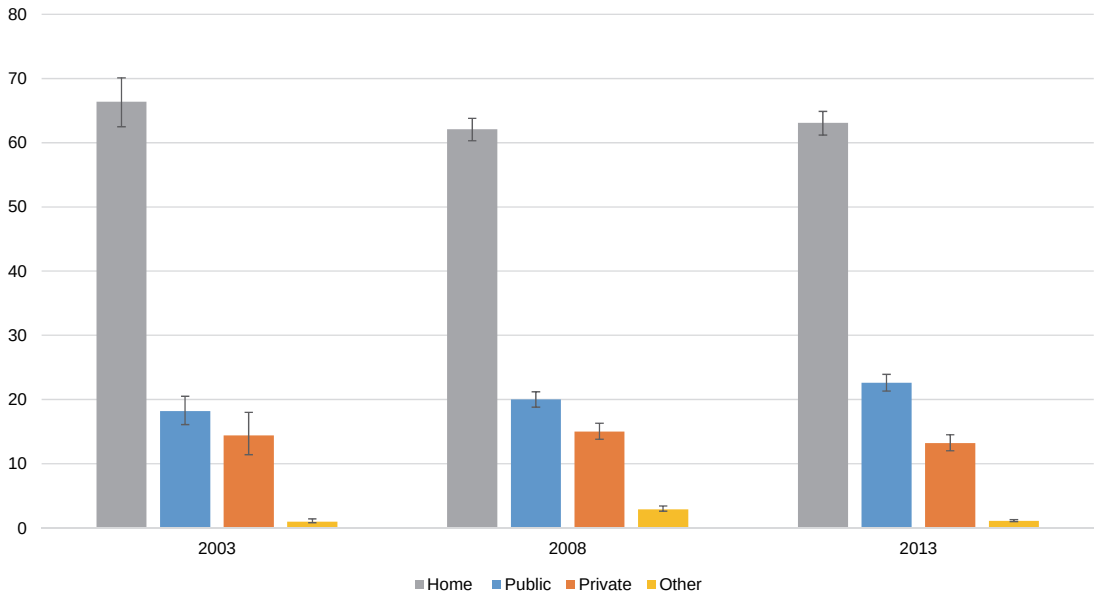


Note: The dotted line indicated non-significant changes between surveys.

Place of delivery

As Figure 10 shows, most women deliver at home—over 60% in each survey year. In 2013, more women delivered in a public facility than in a private facility, 23% and 13%, respectively. Public facility use increased slightly but significantly by 5 percentage points between 2003 to 2013, while private facility use decreased slightly (Appendix Table 5).

Figure 10. Percentage of live births in the 5 years preceding the survey by place of delivery, Nigeria 2003, 2008, and 2013

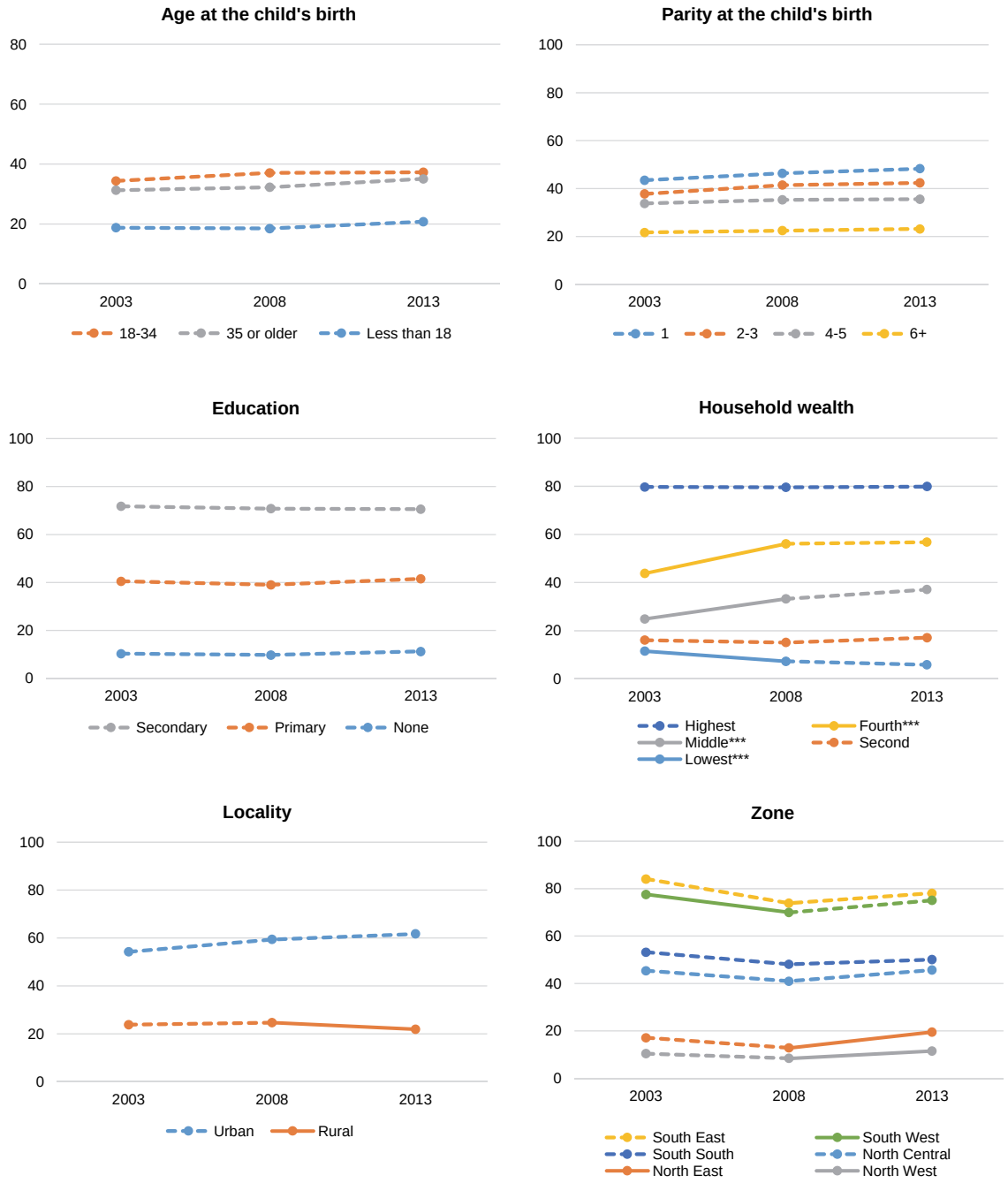


Note: Other also contains missing cases

The overall proportion of births delivered in a health facility in the five years preceding each survey rose from 33% to 36% over the survey period. Figure 11 shows the trends stratified by women's characteristics. The only significant changes over time are among births within the lowest, middle, and fourth wealth quintiles. The middle and fourth wealth groups significantly increased in facility delivery from 2003 to 2013, but the lowest wealth group showed a significant decrease.

There are disparities in place of delivery by women's characteristics. A higher proportion of births in the five years preceding the surveys occurred in facilities among the most advantaged groups. The differences are highly significant (Appendix Table 6). In 2013, only 6% of births in the lowest wealth quintile were delivered in a facility, compared with 80% in the highest wealth quintile. This gap has increased. In 2003 there was a difference of 68 percentage points between the two extremes; the gap was 74 percentage points in 2013. There is a similar gap between the Southern and Northern geopolitical zones. In the Southern zones a higher proportion of births occur in facilities compared with Northern zones. This gap persists throughout the three surveys. In 2013, only 12% of births in the five years preceding the survey in the North West zone occurred in a health facility compared with 78% percent of births in the South East zone.

Figure 11. Percentage of live births in the 5 years preceding the survey delivered in a health facility, according to background characteristics, Nigeria 2003, 2008, and 2013

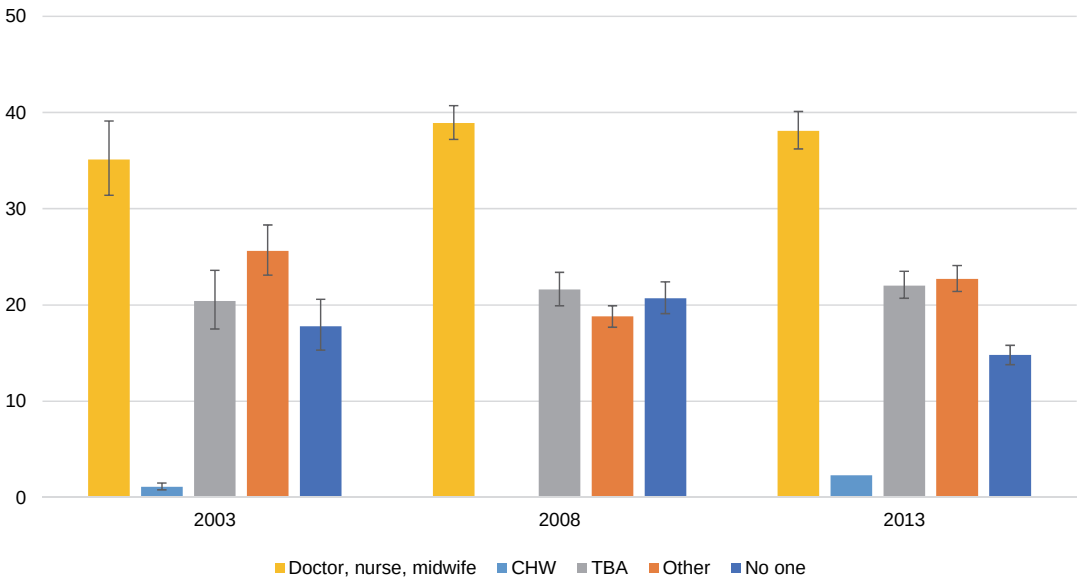


Note: A solid line indicates a significant change between either 2003 and 2008 or 2008 and 2013, while a dotted line indicates no significant change. Significant change between 2003 and 2013 is indicated with asterisks in the legend for each sub-category, which represent the p-value: *<0.05, **<0.01, ***<0.001

Skilled birth attendance

Figure 12 shows the distribution of type of assistance at birth among births in the last five years by survey year. Appendix Table 7 shows the corresponding confidence intervals, stratification by sub-group, and p-values. In all three years, births assisted by skilled attendants (doctors, nurses, and midwives) were higher than any other single category of assistance, and by 2013, the number of births with no assistant present dropped to under 15%. The 2003 and 2013 surveys also included a response option for delivery assistance by a community health worker, although few women cited this resource as the primary birth attendant (1% and 2% of births in 2003 and 2013, respectively).

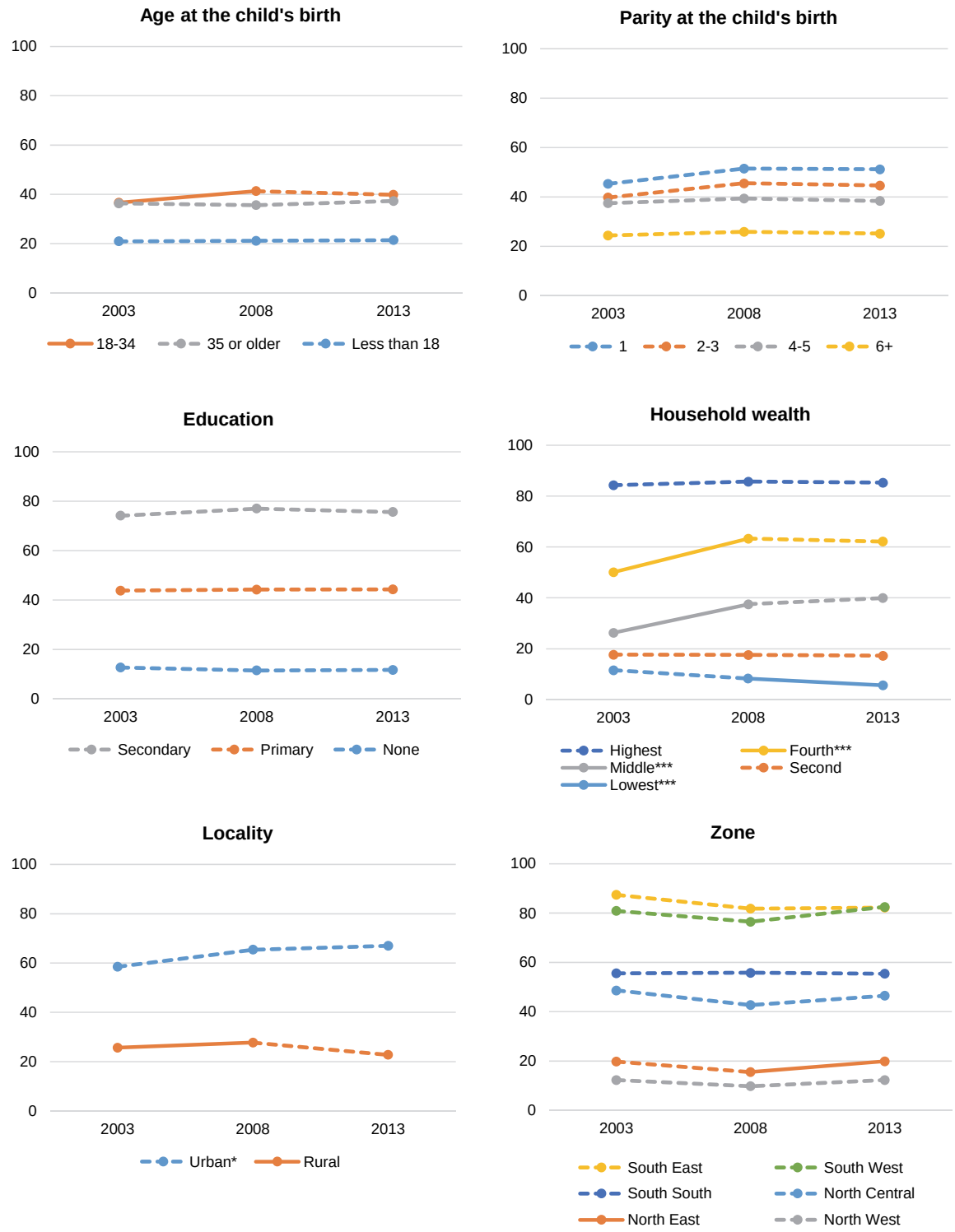
Figure 12. Percentage of live births in the 5 years preceding the survey by type of assistance at birth, according to background characteristics, Nigeria 2003, 2008, and 2013



Note: No one, other, also contain missing cases. Community health workers were not included in the 2008 survey.

Because facility-based delivery and skilled birth attendance are intricately linked, the overall percentages of births in each category are similar, as well as the disparities within sub-groups and changes over the three surveys. Trends in skilled birth attendance from 2003 to 2013 are presented in Figure 13 and Appendix Table 8.

Figure 13. Percentage of births that were assisted by a skilled birth attendant, among all births in the 5 years preceding the survey to women age 15-49, according to background characteristics, Nigeria 2003, 2008, and 2013



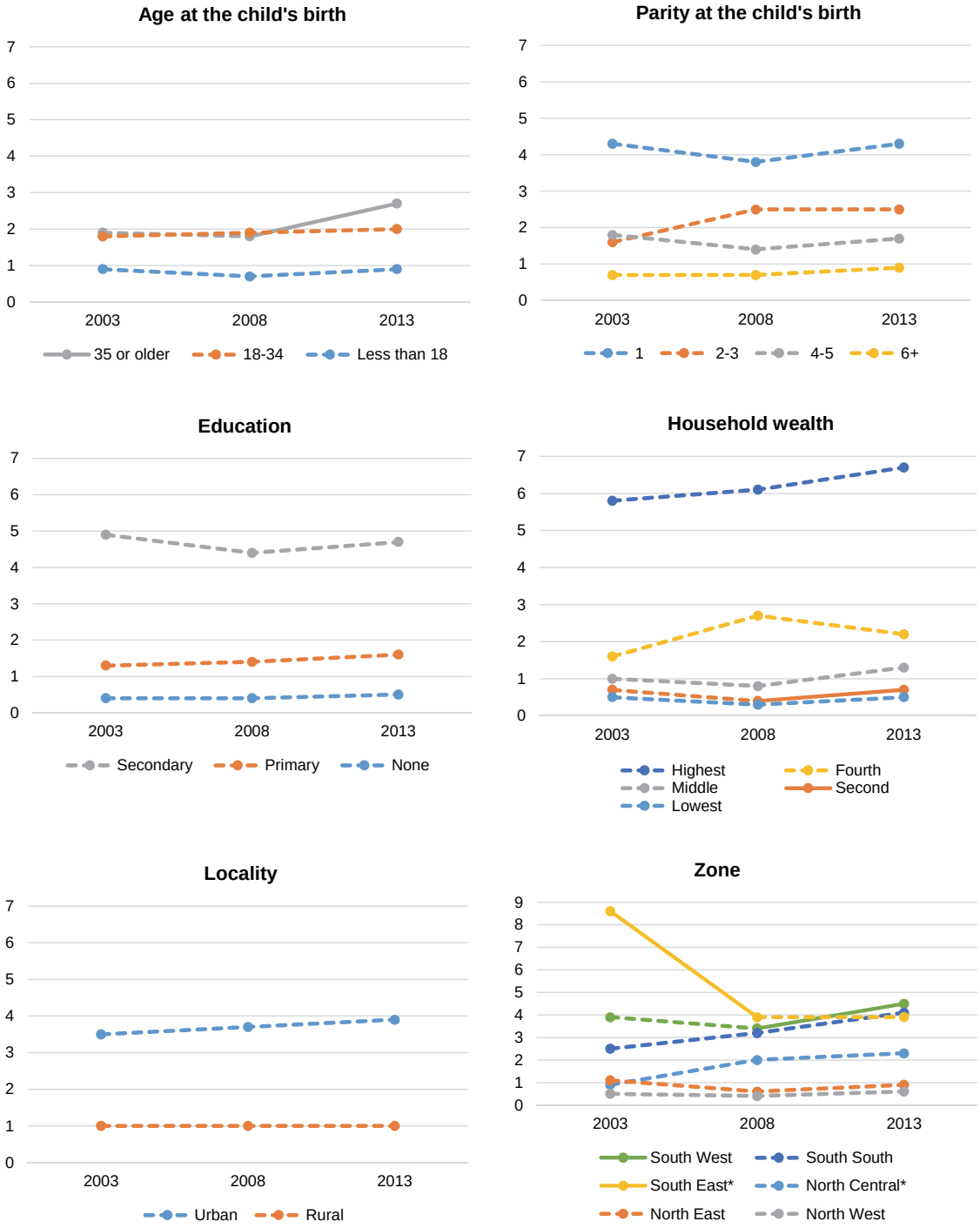
Note: A solid line indicates a significant change between either 2003 and 2008 or 2008 and 2013, while a dotted line indicates no significant change. Significant change between 2003 and 2013 is indicated with asterisks in the legend for each sub-category, which represent the p-value: *<0.05, **<0.01, ***<0.001

Cesarean section

WHO suggests that a C-section delivery is a necessity for approximately 10% to 15% of births in order to save the lives of women and children when there are complications before or during delivery (Gibbons, Belizan, et al. 2010). C-section rates below 10% indicate insufficient use of the procedure, and rates above 15% indicate excessive use. Overall, as Figure 14 shows, the percentage of births delivered by C-section is very low in Nigeria, and has remained at approximately 2% in each survey year.

Although the percentages are small, there are significant disparities in C-section delivery among women's characteristics for each category except age at the mother's age at birth in 2003 (Appendix Table 9). The highest wealth quintile consistently reported the highest proportions of C-sections across the three surveys, except for one geopolitical zone. In 2013, in the lowest wealth quintile only half a percent of births in the five years preceding the survey were delivered by C-section, compared with almost 7% of births in the highest wealth quintile. In the South East zone almost 9% of all births in the five years preceding the 2003 survey were delivered by C-section, decreasing significantly to 4% in 2013. The only other significant change over the survey period was in the North Central zone, doubling from 1% in 2003 to 2% in 2013. Overall, the proportion of births delivered by C-section is higher in the three Southern geopolitical zones than in the three Northern zones.

Figure 14. Percentage of births that were delivered by cesarean section among children born in the 5 years preceding the survey, according to background characteristics, Nigeria 2003, 2008, and 2013



Note: A solid line indicates a significant change between either 2003 and 2008 or 2008 and 2013, while a dotted line indicates no significant change. Significant change between 2003 and 2013 is indicated with asterisks in the legend for each sub-category, which represent the p-value: *<0.05, **<0.01, ***<0.001

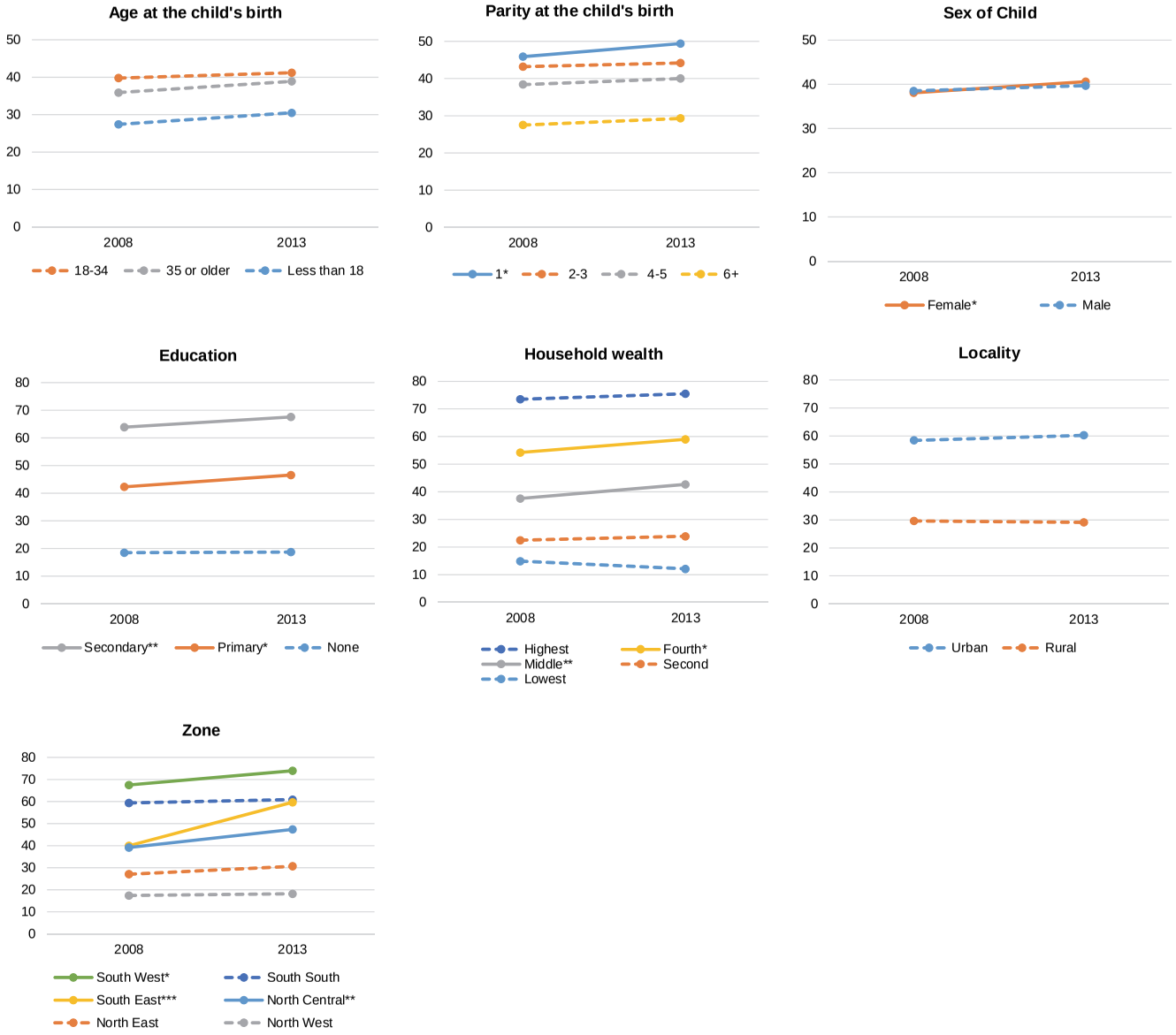
3.4. Postnatal Care

Overall, there has been no apparent increase in the proportion of women receiving a postnatal check-up, with about four in every ten women having an exam within two days of delivery. Figure 15 presents trends in the proportion of women who received a postnatal check-up within two days of delivery, according to background characteristics. The data are for 2008 and 2013; 2003 is excluded because that survey did not ask all women with a live birth in the five years preceding the survey about their postnatal care. Appendix Table 10 contains the results of tests of association between postnatal care and background characteristics, as well as details of trends between 2008 and 2013.

As Figure 15 shows, women in rural areas receive postnatal care at half the rate of women in urban areas. Similarly, the proportion of women under age 18 who receive a postnatal check-up lags behind that of women age 18 and over. There has been no change over time either by age group or locality. There has been a significant increase in postnatal care among primaparous women, however, from 46% of women receiving a postnatal exam in 2008 to 49% in 2013, although there was no change among women at higher parities. There is little difference in postnatal care by sex of the child. However, there has been a slight (2.5 percentage points) but statistically significant increase between 2008 and 2013 in the proportion of mothers of female children receiving a postnatal check-up. Significant increases are seen in postnatal check-ups among women with primary education (from 42% to 47%) and women with secondary or higher education (from 64% to 68%) between 2008 and 2013.

Differentials are even greater by household wealth quintile and geopolitical zone. Only 12% of women in the lowest wealth category received a postnatal exam within two days of delivery compared with 76% of women in the highest wealth category. The proportion of women receiving a postnatal check-up has significantly increased only among the middle and fourth wealth quintiles. Rates of postnatal care are lower in the three Northern zones than in the three Southern zones. The proportion of women receiving a postnatal check-up within two days of delivery increased significantly, by 6.5 percentage points in the South West zone, by just over 8 percentage points in the North Central zone, and, most notably, by nearly 20 percentage points in the South East zone.

Figure 15. Percentage of women who received a postnatal check-up within 2 days of delivering their most recent child among women age 15-49 with a live birth in the 5 years preceding the survey, according to background characteristics, Nigeria 2008 and 2013



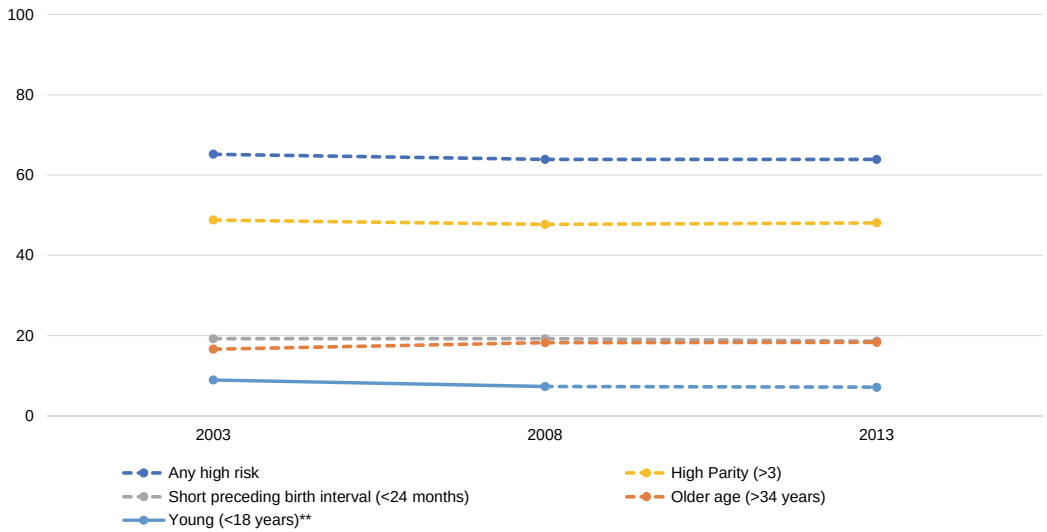
Note: A solid line indicates a significant change between either 2003 and 2008 or 2008 and 2013, while a dotted line indicates no significant change. Significant change between 2003 and 2013 is indicated with asterisks in the legend for each sub-category, which represent the p-value: *<0.05, **<0.01, ***<0.001

3.5. High-risk Fertility Behavior

Four maternal characteristics are associated with higher risk for maternal morbidity and mortality. These are young age (below age 18) at the time of the child's birth, older age (age 35 and older), a short preceding birth interval (less than 24 months), and high parity (4 or higher). Fewer births in these categories can reduce the risk of maternal mortality (Rutstein and Winter 2015).

Figure 16 shows trends in high-risk fertility from 2003 to 2013. Specifically, it shows the percentage of births in the five years preceding the survey to women in each of the high-risk categories and to women with any high-risk characteristic.

Figure 16. Percentage of births in the 5 years preceding the survey to women in high-risk categories



Note: A solid line indicates a significant change between either 2003 and 2008 or 2008 and 2013, while a dotted line indicates no significant change. Significant change between 2003 and 2013 is indicated with asterisks in the legend for each sub-category, which represent the p-value: *<0.05, **<0.01, ***<0.001

In 2013, 64% of births were to women with some high-risk characteristic. There has been no discernable reduction in high-risk fertility behavior between 2003 and 2013. The proportion of births to high-parity women, the most common risk behavior, has remained level at about 48%. The proportions of births marked by a short preceding birth interval and births to women of older maternal age are unchanged, 18% and 19%, respectively. The proportion of births to women under age 18 decreased from 9% in 2003 to 7% in 2008, a significant decline, and has remained at 7% since 2008.

Figure 17 presents the percentage of births in the five years preceding the survey to women with any maternal fertility risk by background characteristics. There is a statistically significant association between high-risk fertility and education, household wealth, locality, and geopolitical zone in all three surveys (Appendix Table 11).

Figure 17. Percentage of births with maternal fertility risk among children born in the 5 years preceding the survey, according to background characteristics, Nigeria 2003, 2008, and 2013

Note: A solid line indicates a significant change between either 2003 and 2008 or 2008 and 2013, while a dotted line indicates no significant change. Significant change between 2003 and 2013 is indicated with asterisks in the legend for each sub-category, which represent the p-value: *<0.05, **<0.01, ***<0.001

There was no change over time in high-risk fertility within any education category. The large disparity between women with secondary or higher education and women with either no education or only a primary education has persisted over the survey period. The fourth highest household wealth quintile had a decline in high-risk fertility of 4 percentage points, concentrated between 2003 and 2008. There was a small but significant increase in risk in the lowest wealth quintile, nearly 3 percentage points between 2008 and 2013, increasing the gap between the extremes of the wealth distribution.

The proportion of births with any maternal risk fell in urban areas, from 60% of births in 2003 to 56% of births in 2008, but no subsequent declines were observed. Because there was no improvement in rural areas over this period, the urban-rural differential increased to 9 percentage points in 2013.

Recent declines in high-risk fertility behavior of 3 percentage points occurred in the North East and North Central zones. Improvements are not seen in any other geopolitical zones. The North West and North East zones continue to have a burden of high-risk fertility above the national average.

Improvements (declines) in the proportion of births to women under age 18 are concentrated among women in the middle to highest wealth quintiles, women in urban areas, and women with a primary education. There have also been significant declines in early births in the North West zone. Despite overall improvements in this indicator, there are indications of increasing disparities. Appendix Table 11 provides details of the differentials by education, wealth, urban-rural locality, and geopolitical zone, and of trends between 2003 and 2013 for each of the high-risk fertility categories.

4. Discussion

This study analyzed levels and trends in use of maternal health care services based on data from the three most recent Nigeria DHS surveys. The surveys were conducted in 2003, 2008, and 2013, and the reference periods for the births are the five years before each survey. The analysis focused on four broad coverage indicators directly related to the risk of maternal mortality—ANC and its components, birth and place of delivery, postnatal care, and high-risk fertility behavior—and on their association with selected socio-demographic characteristics of women. These include women's age and parity at the child's birth, educational level, household wealth quintile, residence (urban-rural), and geopolitical zone. The analysis found large and persistent disparities by women's characteristics, especially by wealth, residence, education, and geopolitical zone.

Generally, the most significant changes in these indicators and their components occurred between 2008 and 2013, with only a few significant changes across the full interval from 2003 to 2013. Few improvements occurred between the 2003 and 2008 surveys, and a few indicators declined during that interval, so most improvements from 2008 to 2013 were simply a recovery to the 2003 levels. Other research has shown similar stagnation in health indicators in Nigeria (Wollum, Burstein, et al. 2015).

4.1. Antenatal Care and Components

Despite the many benefits associated with ANC in improving both maternal and neonatal death, levels of ANC use remain low in Nigeria. The percentage of women who made at least four visits for ANC for their most recent pregnancy increased only 5 percentage points over the decade, from 47% in 2003, declining to 45% in 2008, and then rising to 52% in 2013.

Many economic, social, cultural, individual, family, and service delivery factors hinder ANC use in Nigeria, particularly among the most disadvantaged groups (Fagbamigbe and Idemudia 2015). In general, factors that influence ANC use include maternal education, husband's education, marital status, availability, cost, household wealth, women's employment, media exposure, history of obstetric complications, cultural beliefs, ideas about pregnancy, and parity (Simkhada , Van Teijlingen, et al. 2008). Neighborhood and contextual factors also play a role (Ononokpono, Odimegwu, et al. 2013).

While the number of ANC visits is important, the timing of first visit is equally important. In all three surveys, less than 20% of women initiated ANC within the first four months of pregnancy, with large inequalities with respect to women's education, household wealth, place of residence, and geopolitical zone. This is similar to a finding by Bbaale (2011) in Uganda, using data from the 2006 Uganda DHS, where only 17% of women began ANC visits by the fourth month of pregnancy. A range of factors have been reported to be responsible for late initiation of ANC, including perceptions of pregnancy risk or of the need for ANC, maternal age, ethnicity, maternal education, religion, clinical need for care, associated cost, place of residence, perceived quality of care, and women's decision-making power (Al-Nadhedh 1995; Magadi, Agwanda, and Obare 2007; Pallikadavath, Foss, and Stones 2004). In Kenya, a study found that women desiring large families tended to start ANC visits later in pregnancy, while use of modern family planning methods was associated with an early start of ANC (Magadi, Madise, and Rodrigues 2000). Similarly, our analysis indicated that, across all three Nigerian surveys, women pregnant with their first child are more likely to have their first ANC visit within the first four months compared with women with six and more children.

Concerning the components of care during ANC visits, our analysis showed that iron supplementation, blood pressure measurement, and information on danger signs all improved significantly across the surveys. Blood pressure measurement appears to be one of the most widely provided elements of ANC (increasing from 81% in 2003 to 91% in 2013) followed by iron supplements and information on danger signs. An assessment in 2012 of health facilities providing routine ANC services showed that, while 97% of the facilities provided some element of ANC services, provision of specific elements was low, implying gaps in service availability and offering a potential explanation for low uptake of these services (Okoli, Abdullahi, et al. 2012).

4.2. Birth and Delivery

Our analysis showed higher rates of ANC use than of facility delivery and skilled attendance at birth. The rate of facility delivery in Nigeria increased marginally from 33% in 2003 to 35% in 2008 and 36% in 2013. Similarly, rates of skilled birth attendance increased from 35% in 2003 to 39% in 2008, before declining to 38% in 2013. There are significant differentials in facility delivery within several sub-categories: women in the lowest wealth quintile, rural women, and women in the North West and North East zones are less likely to deliver in a health facility. The low rates of facility delivery documented in the three Nigeria DHS surveys are unacceptable compared with other countries with fewer resources than Nigeria. In Ghana, for instance, rates of facility delivery climbed steadily from 46% in the 2003 DHS survey to 73% in the 2014 survey. Similarly, in Zambia the increase was from 44% in 2001/2002 to 67% in 2013/2014 (The DHS Program, 2016). Similar increases are observed in Egypt, Indonesia, and Rwanda, countries with comparable or fewer resources (DHS STATcompiler 2016).

By its nature, facility delivery occurs in a medical environment and thus can reduce adverse pregnancy outcomes. Additionally, skilled medical personnel can provide immediate life-saving intervention in the event of delivery complications. Thus, skilled attendance at delivery in a medical environment has been demonstrated to reduce not only maternal deaths but also neonatal deaths (Darmstadt, Lee, and Cousens 2009). The complementarity of health-facility delivery and skilled attendance at birth has been well demonstrated (Titaley, Dibley, and Roberts 2012). The research has also demonstrated that home delivery with skilled assistance does not necessarily leads to better pregnancy outcomes; institutional delivery and better referral systems might be required. In this report, rates of skilled attendance at birth have remained essentially within a narrow range between 35% and 40%.

4.3. Postnatal Care

Use of postnatal care increased by a statistically non-significant 2 percentage points, from 38% to 40%, between the 2008 and 2013 DHS surveys. As with the other coverage indicators, there are significant differentials in postnatal care by maternal education, wealth quintile, rural-urban residence, and geopolitical zone. Other studies in the Nigerian context confirm that use of postnatal care is significantly associated with mother's age at birth, socioeconomic status, religion, and urban residence (Adamu 2011; Galadanci, Ejembi, and Iliyasu 2007), with maternal and husband's education, place of residence, wealth, and parity, as well as with ANC and institutional delivery (Dahiru and Mansur 2014), and with distance from services, education, place of delivery, region, and wealth status (Somefun and Ibisomi 2016). Ononokpono, Odimegwu, et al. (2013) found that women's place of residence is the single most important factor in receiving postnatal care and that this factor is modified by the level of maternal education and facility delivery in the community.

4.4. High-risk Fertility Behavior

This report also examined levels and trends in high-risk fertility behavior: young age (under age 18); older age (over age 34); short birth interval (less than 24 months), and high parity (four or more children). Overall, the proportion of women with any of these risk factors changed little between 2003 and 2013, remaining between 65% in 2003 and 64% in both 2008 and 2013. The proportion of women with any of these high-risk behaviors also showed virtually no change between surveys. Again, there are differentials by socio-economic characteristics in the proportion of women with high risk.

5. Conclusion

In summary, few significant changes in the coverage indicators analyzed in this report occurred over the ten-year period between 2003 and 2013. At the national level, significant improvements were seen only for iron supplementation, two or more tetanus vaccinations, counseling on pregnancy complications, and births at a young age. More significant changes occurred in the five-year period between the 2008 and 2013 surveys, including increases in four or more ANC visits and attending ANC within the first four months of pregnancy, as well as iron supplementation and two or more tetanus shots. However, there were no significant changes between surveys in skilled birth attendance, delivery in a health facility, C-section delivery, postnatal care, and high-risk fertility. A potential reason for earlier lags and more recent improvements in maternal care after 2008 involves the political history in Nigeria. The current democratic government transitioned from military rule in the 1990s, when the US government imposed restrictions on assistance to the country. The effect of liberation and the lifting of sanctions may have lagged until around 2008.

Our analysis showed that use of ANC is more widespread than delivery in a health facility, which in turn is more widespread than skilled attendance at birth. This is a pattern that previous studies also have demonstrated.

When these coverage indicators were examined against the background of socio-demographic factors, the indicators differed consistently by maternal education, household wealth quintile, place of residence, and geopolitical zone, with the most advantaged groups receiving more ANC, skilled delivery assistance, and post-delivery care. Improvements over the survey period in some areas of maternal health have accrued disproportionately to more advantaged groups, exacerbating rather than attenuating disparities.

The analysis revealed areas where improvements in Nigeria's maternal health indicators are needed, including ANC coverage, facility delivery, skilled birth attendance, postnatal care, and high-risk pregnancy. While most of these indicators could be improved, the greatest attention should be given to reducing the obstacles that prevent women with less education, poorer women, women in rural areas, and women in the Northern geopolitical zones from seeking maternal care, and by targeting health services better to reach these underserved groups.

References

Adamu, H. S. 2011. “Utilization of Maternal Health Care Services in Nigeria: An Analysis of Regional Differences in the Patterns and Determinants of Maternal Health Care Use” (Thesis, The University of Liverpool).

Adjiwanou, V. and LeGrand, T. 2013. “Does Antenatal Care Matter in the Use of Skilled Birth Attendance in Rural Africa: A Multi-Country Analysis,” *Social Science & Medicine* 86: 26-34.

Al-Nadhedh, N. N. A. 1995. “Factors Affecting the Choice of Maternal and Child Health Services in a Rural Area of Saudi Arabia,” *Eastern Mediterranean Health Journal* 1: 261-269.

Antai, D. 2009. “Faith and Child Survival: The Role of Religion in Childhood Immunization in Nigeria,” *Journal of Biosocial Science* 41: 57-76.

Bbaale, E. 2011. “Factors Influencing Timing and Frequency of Antenatal Care in Uganda,” *Australian Medical Journal* 4(8): 431-438, http//dx.doi.org/10.4066/AMJ.2011.729.

Dahiru, T. and Mansur, O. O. 2015. “Determinants of Antenatal Care, Institutional Delivery and Postnatal Care Services Utilization in Nigeria,” *Pan African Medical Journal* 21: 321, doi:10.11604/pamj.2015.21.321.6527.

Darmstadt, G. L., Lee, A. C., and Cousens, S. 2009. “60 Million Non-facility Births: Who Can Deliver in Community Settings to Reduce Intrapartum-related Deaths?” *International Journal of Gynecology & Obstetrics* 107: S89-S112.

The Demographic and Health Surveys (DHS) Program: STATcompiler, accessed March 8, 2016, http://beta.statcompiler.com/.

Doctor, H. V., Findley, S. E., and Afenyadu, G. Y. 2012. “Estimating Maternal Mortality Level in Rural Northern Nigeria by the Sisterhood Method,” *International Journal of Population Research* e464657.

Fagbamigbe, A. F. and Idemudia, E. S. 2015. “Barriers to Antenatal Care Use in Nigeria: Evidences from Non-users and Implications for Maternal Health Programming,” *BMC Pregnancy and Childbirth* 15: 95, doi: 10.1186/s12884-015-0527-y.

Federal Ministry of Health of Nigeria (FMOH). 2010. *National Strategic Health Development Plan (NSHDP) 2010–2015.* Abuja: FMOH.

Federal Ministry of Health. 2011. *Saving Newborn Lives in Nigeria: Newborn Health in the Context of the Integrated Maternal, Newborn and Child Health Strategy.* 2nd edition. Abuja: Federal Ministry of Health, Save the Children, JHPIEGO.

Forte, A., Kothari, M., and Abderrahim, N. 2006. *Postpartum Care: Levels and Determinants in Developing Countries.* DHS Comparative Reports No. 15. Calverton, MD: Macro International.

Galadanci, H., Ejembi, C. L., Iliyasu, Z., Alagh, B., and Umar, U. S. 2007. “Maternal Health in Northern Nigeria—A Far Cry from Ideal,” *BJOG: An International Journal of Obstetrics & Gynaecology* 114, 4: 448-452.

Gibbons, L., Belizán, J. M., Lauer, J. A., Betrán, A. P., Merialdi, M., and Althabe, F. 2010. “The Global Numbers and Costs of Additionally Needed and Unnecessary Cesarean Sections Performed per Year: Overuse as a Barrier to Universal Coverage,” *World Health Report* 30: 1-31.

Global Conflict Tracker, accessed February 6, 2016, http://www.cfr.org/global/global-conflict-tracker/p32137#!/conflict/boko-haram-in-nigeria.

Heaman, M. I., Newburn-Cook, C. V., Green, C. G., Elliott, L. J., and Helewa, M. E. 2008. "Inadequate Prenatal Care and Its Association with Adverse Pregnancy Outcomes: A Comparison of Indice," *BMC Pregnancy and Childbirth* 8: 15.

Idris, H., Tyoden, C., Ejembi, C., and Taylor, K. 2010. "Estimation of Maternal Mortality Using the Indirect Sisterhood Method in Three Communities in Kaduna State, Northern Nigeria," *African Journal of Reproductive Health* 14(3): 77-81.

Kana, M. A., Doctor, H. V., Peleteiro, B., Lunet, N., and Barros, H. 2015. "Maternal and Child Health Interventions in Nigeria: A Systematic Review of Published Studies from 1990 to 2014," *BMC Public Health* 15: 334.

Magadi, M. A., Madise, N. J., and Rodrigues, R. N. 2000. "Frequency and Timing of Antenatal Care in Kenya: Explaining the Variations between Women of Different Communities," *Social Science & Medicine* 51: 551-561.

Magadi, M. A., Agwanda, A. O., and Obare, F. O. 2007. "A Comparative Analysis of the Use of Maternal Health Services between Teenagers and Older Mothers in sub-Saharan Africa: Evidence from Demographic and Health Surveys (DHS)," *Social Science & Medicine* 64: 1311-1325.

Maternal Mortality Estimation Inter-Agency Group (MMEIG). 2015. *Trends in Maternal Mortality: 1990 to 2015: Estimates by WHO, UNICEF, UNFPA, World Bank Group and the United Nations Population Division.* Geneva: World Health Organization.

Moore, B. M., Alex-Hart, B. A., and George, I. O. 2014. "Utilization of Health Care Services by Pregnant Mothers during Delivery: A Community Based Study in Nigeria," *East African Journal of Public Health* 8: 48-50.

National Population Commission (NPC) [Nigeria] and ICF International. 2014. *Nigeria Demographic and Health Survey 2013.* Abuja, Nigeria, and Rockville, Maryland, USA: NPC and ICF International.

National Population Commission (NPC) [Nigeria] and ICF International. 2009. *Nigeria Demographic and Health Survey 2008.* Abuja, Nigeria, and Rockville, Maryland, USA: NPC and ICF International.

National Population Commission (NPC) [Nigeria] and ICF International. 2004. *Nigeria Demographic and Health Survey 2003.* Abuja, Nigeria, and Rockville, Maryland, USA: NPC and ICF International.

Nwakoby, B. N. 1994. "Use of Obstetric Services in Rural Nigeria," *Journal of the Royal Society for the Promotion of Health* 114: 132-136.

Odetola, T. D. 2015. "Health Care Utilization among Rural Women of Child-bearing Age: A Nigerian Experience," *Pan African Medical Journal* 20.

Okeke, E. N., Glick, P., Abubakar, I. S., Chari, A. V., Pitchforth, E., Exley, J., Bashir, U., Setodji, C. M., Gu, K., and Onwujekwe, O. 2015. *The Better Obstetrics in Rural Nigeria (BORN) Study: An Impact Evaluation of the Nigerian Midwives Service Scheme.* Santa Monica, CA: RAND Corporation, http://www.rand.org/pubs/research_reports/RR1215.html.

Okeke, T. A., and Okeibunor J. C. 2010. "Rural–urban Differences in Health-seeking for the Treatment of Childhood Malaria in south-east Nigeria," *Health Policy* 95: 62-68.

Okoli, U., Abdullahi, M. J., Pate, M. A., Abubakar, I. S., Aniebue, N., and West, C. 2012. "Prenatal Care and Basic Emergency Obstetric Care Services Provided at Primary Healthcare Facilities in Rural Nigeria," *International Journal of Gynecology and Obstetrics* 117: 61-65.

Okoronkwo, I. L., Onwujekwe, O. E., and Ani, F. O. 2014. "The Long Walk to Universal Health Coverage: Patterns of Inequities in the Use of Primary Healthcare Services in Enugu, Southeast Nigeria," *BMC Health Services Research* 14: 132.

Oloriegbe, I., Saka, M. J., Zubair, I., Ibrahim, T. et al. 2009. *Report on the Assessment of Free Maternal Health Services in Nigeria.* Herfon, OXFAM Nigeria.

Onwujekwe, O. 2005. "Inequities in Healthcare Seeking in the Treatment of Communicable Endemic Diseases in Southeast Nigeria," *Social Science & Medicine* 61: 455-463.

Ononokpono, D. N., Odimegwu, C. O., Imasiku, E. N. S., and Adedini, S. A. 2013. "Does it Really Matter Where Women Live? A Multilevel Analysis of the Determinants of Postnatal Care in Nigeria," *Maternal and Child Health Journal* 18: 950-959, doi: 10.1007/s10995-013-1323-9.

Pallikadavath, S., Foss, M., and Stones, R. W. 2004. "Antenatal Care: Provision and Inequality in Rural North India," *Social Science & Medicine* 59: 1147-1158.

Ram, F. and Singh, A. 2006. "Is Antenatal Care Effective in Improving Maternal Health In Rural Uttar Pradesh? Evidence from a District Level Household Survey," *Journal of Biosocial Science* 38: 433-448, doi: 10.1017/S0021932005026453.

Ronsman, C. and Graham, W. J. 2006. "Maternal Mortality: Who, When, Where, and Why?" *The Lancet Maternal Survival Series* 13-23.

Rutstein, S. and Winter, R. 2015. *Contraception Needed to Avoid High-Fertility-Risk Births, and Maternal and Child Deaths that Would be Averted.* DHS Analytical Studies No. 50. Rockville, Maryland, USA: ICF International, http://dhsprogram.com/pubs/ pdf/AS50/AS50.pdf.

Save the Children. 2015. *State of the World's Mothers 2015.* Fairfield, CT: Save the Children.

Simkhada, B., Van Teijlingen, E. R., Porter, M., and Simkhada, P. 2008. "Factors Affecting the Utilization of Antenatal Care in Developing Countries: Systematic Review of the Literature," *Journal of Advanced Nursing* 61(3): 244-260, doi: 10.1111/j.1365-2648.2007.04532.x.

Somefun, D. O. and Ibisomi, L. 2016. "Determinants of Postnatal Care Non−utilization among Women in Nigeria," *BMC Research Notes* 9: 21, doi: 10.1186/s13104-015-1823-3.

Starrs, A. 1997. *The Safe Motherhood Action Agenda: Priorities for the Next Decade*. New York: Inter-Agency Group for Safe Motherhood and Family Care International.

Sugathan, K. S., Mishra, V., and Retherford, R. D. 2001. *Promoting Institutional Deliveries in Rural India: The Role of Antenatal Care Services.* National Family Health Survey Subject Report No. 20, International Institute for Population Sciences and East-West Centre.

Titaley, C. R., Dibley, M. J., and Roberts, C. L. 2012. "Type of Delivery Attendant, Place of Delivery and Risk of Early Neonatal Mortality: Analyses of the 1994–2007 Indonesia Demographic and Health Surveys," *Health Policy and Planning* 27: 405-416, doi:10.1093/heapol/czr053.

Villar, J., Ba'aqeel, H., Piaggio, G., Lumbiganon, P., Belizan, J. M., Farnot, U., et al. 2001. "WHO Antenatal Care Randomized Trial for the Evaluation of A New Model of Routine Antenatal Care," *The Lancet* 357: 1551-1564.

WHO. 2015. World Health Statistics 2015. Geneva: World Health Organization.

WHO. 2014. WHO Recommendations on Postnatal Care of the Mother and Newborn. WHO, Geneva.

WHO. 2006. *Birth and Emergency Preparedness in Antenatal Care. Integrated Management of Pregnancy and Childbirth (IMPAC).* Department of Making Pregnancy Safer. Geneva: WHO.

WHO. 2004. *Making Pregnancy Safer: The Importance of the Skilled Birth Attendant; A Joint Statement by WHO, ACM, and FIGO.* Geneva: World Health Organization.

WHO. 2002. *WHO Antenatal Care Randomized Trial: Manual for Implementation of the New Model. Document* WHO/RHR/01.30. Geneva: World Health Organization.

WHO. 1996. *Revised 1990 Estimates of Maternal Mortality: A New Approach by WHO and UNICEF*. WHO/FRH/MSM/96.11, Geneva: World Health Organization.

WHO. 1994. *Mother-Baby Package: Implementing Safe Motherhood in Countries. Practical Guide.* Maternal Health and Safe Motherhood Program, Division of Family Health, World Health Organization, Geneva.

WHO AFRO. 2008. Human Resources for Health Country Profile – Nigeria, accessed February 6, 2016, http://www.hrh-observatory.afro.who.int/images/Document_Centre/nigeria_country_ profile.pdf.

Wollum, A., Burstein, R., Fullman, N., Dwyer-Lindgren, L., and Gakidou, E. 2015. "Benchmarking Health System Performance across States in Nigeria: A Systematic Analysis of Levels and Trends in Key Maternal and Child Health Interventions and Outcomes, 2000–2013," *BMC Medicine* 13: 208, doi: 10.1186/s12916-015-0438-9.

Yinger, N. V. and Ransom, E. I. 2003. *Why Invest in Newborn Health? Policy Perspectives on Newborn Health.* Washington, DC: Save the Children and Population Reference Bureau.

Appendix

Appendix Table 1. 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 5 years, according to background characteristics, Nigeria 2003, 2008, and 2013

Background characteristic	2003			2008			2013					
	%	CI	p-value[1]	%	CI	p-value[1]	%	CI	p-value[1]	Difference 2003-2008[2]	Difference 2008-2013[2]	Difference 2003-2013[2]
Total	47.4	44.1 - 50.8		44.8	43.2 - 46.5		51.1	49.1 - 53.1		-2.6	6.3***	3.7
Age at the child's birth			<0.001			<0.001			<0.001			
Less than 18	34.0	26.5 - 42.5		27.8	24.7 - 31.1		31.7	28.0 - 35.6		-6.2	3.9	-2.3
18-34	47.8	44.3 - 51.3		46.7	45.0 - 48.5		52.4	50.3 - 54.4		-1.1	5.7***	4.6*
35 or older	51.9	46.0 - 57.7		42.4	40.2 - 44.7		52.1	49.5 - 54.7		-9.5**	9.7***	0.2
Parity at the child's birth			0.011			<0.001			<0.001			
1	50.5	45.7 - 55.3		50.3	47.9 - 52.7		57.5	54.8 - 60.1		-0.2	7.2***	7.0*
2-3	50.5	46.1 - 54.9		48.9	46.9 - 50.9		54.1	51.7 - 56.6		-1.6	5.2**	3.6
4-5	47.9	43.0 - 52.8		47.1	44.8 - 49.3		52.3	49.8 - 54.8		-0.8	5.2**	4.4
6+	41.9	37.3 - 46.6		34.3	32.2 - 36.5		42.1	39.8 - 44.5		-7.6**	7.8***	0.2
Education			<0.001			<0.001			<0.001			
None	25.0	21.7 - 28.6		21.9	20.0 - 23.9		27.6	25.3 - 29.9		-3.1	5.7***	2.6
Primary	59.7	55.3 - 63.8		53.9	51.5 - 56.3		60.8	58.2 - 63.4		-5.8*	6.9***	1.1
Secondary or higher	80.6	76.6 - 84.0		71.1	69.2 - 73.0		79.6	78.0 - 81.1		-9.5***	8.5***	-1.0
Household wealth			<0.001			<0.001			<0.001			
Lowest	23.6	18.8 - 29.1		15.7	13.7 - 17.9		18.0	15.5 - 20.8		-7.9**	2.3	-5.6
Second	27.7	22.9 - 33.1		28.6	26.1 - 31.2		34.9	32.1 - 37.8		0.9	6.3**	7.2*
Middle	44.6	39.8 - 49.5		47.6	44.9 - 50.4		57.6	54.8 - 60.4		3.0	10.0***	13.0***
Fourth	63.9	59.2 - 68.3		64.2	61.5 - 66.7		72.9	70.4 - 75.4		0.3	8.7***	9.0***
Highest	88.0	82.1 - 92.2		80.7	77.9 - 83.1		85.6	83.8 - 87.2		-7.3*	4.9**	-2.4
Locality			<0.001			<0.001			<0.001			
Urban	71.1	65.5 - 76.1		68.8	66.1 - 71.4		74.5	71.9 - 76.9		-2.3	5.7**	3.4
Rural	37.6	33.9 - 41.5		34.4	32.6 - 36.3		38.2	35.8 - 40.7		-3.2	3.8*	0.6
Zone			<0.001			<0.001			<0.001			
North Central	55.7	49.1 - 62.0		48.3	44.1 - 52.5		55.5	50.2 - 60.6		-7.4	7.2*	-0.2
North East	32.5	26.9 - 38.7		32.4	28.5 - 36.6		38.9	34.5 - 43.3		-0.1	6.5*	6.4
North West	28.6	23.3 - 34.4		20.6	17.8 - 23.7		30.4	27.2 - 33.7		-8.0**	9.8***	1.8
South East	72.2	57.1 - 83.4		60.9	56.1 - 65.6		82.9	79.3 - 86.0		-11.3	22.0***	10.7
South South	68.1	60.6 - 74.7		53.3	49.4 - 57.1		62.3	59.0 - 65.4		-14.8**	9.0***	-5.8
South West	92.8	89.7 - 95.1		80.7	77.1 - 83.9		86.9	82.5 - 90.4		-12.1***	6.2*	-5.9*

[1] p-value of association test for each year. [2] Percentage point difference between 2008 and 2003, 2013 and 2008, and 2013 and 2003 with significant tests for the difference in proportions.
p-values *<0.05, **<0.01, ***<0.001

Appendix Table 2. Percentage of women whose first ANC visit for the last pregnancy was before 4 months pregnant, among women age 15-49 with a live birth in the last 5 years, according to background characteristics, Nigeria 2003, 2008, and 2013

	2003			2008			2013			Difference	Difference	Difference
Background characteristic	%	CI	p-value[1]	%	CI	p-value[1]	%	CI	p-value[1]	2003-2008[2]	2008-2013[2]	2003-2013[2]
Total	16.7	14.7 - 18.8		16.2	15.4 - 17.1		17.6	16.7 - 18.7		-0.5	1.4*	0.9
Age at the child's birth			<0.001			<0.001			<0.001			
Less than 18	14.0	9.6 - 19.8		9.3	7.6 - 11.3		10.2	8.4 - 12.3		-4.7	0.9	-3.8
18-34	16.3	14.3 - 18.5		17.2	16.2 - 18.1		18.2	17.2 - 19.3		0.9	1.0	1.9
35 or older	19.7	16.2 - 23.7		14.7	13.3 - 16.3		17.7	16.1 - 19.5		-5.0**	3.0**	-2.0
Parity at the child's birth			0.013			<0.001			<0.001			
1	19.1	15.9 - 22.8		20.3	18.6 - 22.0		21.5	19.8 - 23.3		1.2	1.2	2.4
2-3	18.2	15.4 - 21.3		18.2	16.9 - 19.5		19.9	18.4 - 21.4		0.0	1.7	1.7
4-5	16.1	12.2 - 21.0		15.8	14.5 - 17.1		17.2	15.8 - 18.6		-0.3	1.4	1.1
6+	14.0	11.2 - 17.3		11.7	10.7 - 12.9		12.9	11.6 - 14.3		-2.3	1.2	-1.1
Education			<0.001			<0.001			<0.001			
None	10.5	8.6 - 12.7		8.0	7.2 - 9.0		8.8	7.7 - 10.0		-2.5*	0.8	-1.7
Primary	18.6	15.5 - 22.1		18.4	16.8 - 20.1		20.1	18.4 - 22.0		-0.2	1.7	1.5
Secondary	27.3	22.6 - 32.5		26.5	25.0 - 28.0		29.1	27.5 - 30.6		-0.8	2.6	1.8
Household wealth			<0.001			<0.001			<0.001			
Lowest	11.1	8.1 - 14.9		7.4	6.3 - 8.6		6.0	5.0 - 7.1		-3.7*	-1.4	-5.1**
Second	11.7	9.1 - 14.9		10.6	9.3 - 12.0		12.7	11.3 - 14.3		-1.1	2.1	1.0
Middle	15.3	12.0 - 19.3		18.5	16.7 - 20.4		20.7	18.6 - 22.9		3.2	2.2	5.4*
Fourth	19.6	16.0 - 23.9		20.8	19.1 - 22.6		22.5	20.2 - 24.9		1.2	1.7	2.9
Highest	28.6	22.6 - 35.5		28.0	25.8 - 30.2		30.8	28.8 - 33.0		-0.6	2.8	2.2
Locality			<0.001			<0.001			<0.001			
Urban	23.4	19.5 - 27.9		22.2	20.5 - 23.9		23.1	21.6 - 24.8		-1.2	0.9	-0.3
Rural	13.9	11.9 - 16.2		13.7	12.8 - 14.7		14.6	13.4 - 15.9		-0.2	0.9	0.7
Zone			<0.001			<0.001			<0.001			
North Central	31.3	26.7 - 36.3		25.7	23.2 - 28.4		30.7	27.3 - 34.4		-5.6	5.0*	-0.6
North East	10.7	7.8 - 14.5		11.9	10.2 - 13.9		12.5	11.0 - 14.3		1.2	0.6	1.8
North West	7.2	5.1 - 10.0		5.2	4.2 - 6.4		6.2	5.1 - 7.3		-2.0	1.0	-1.0
South East	29.6	15.7 - 48.7		26.2	23.2 - 29.4		29.5	26.9 - 32.2		-3.4	3.3	-0.1
South South	19.8	14.6 - 26.3		21.1	18.9 - 23.5		20.9	18.5 - 23.5		1.3	-0.2	1.1
South West	30.0	25.7 - 34.8		22.8	20.6 - 25.3		30.5	27.5 - 33.6		-7.2**	7.7***	0.5

[1] p-value of association test for each year. [2] Percentage point difference between 2008 and 2003, 2013 and 2008, and 2013 and 2003 with significant tests for the difference in proportions.
p-values *<0.05, **<0.01, ***<0.001

Appendix Table 3. Percentage of women who received key components of care during pregnancy, among women age 15-49 with a live birth in the last 5 years, according to background characteristics, Nigeria 2003, 2008, and 2013

	Mother took iron syrup/tablets during pregnancy											
	2003			2008			2013			Difference	Difference	Difference
Background characteristic	%	CI	p-value[1]	%	CI	p-value[1]	%	CI	p-value[1]	2003-2008[2]	2008-2013[2]	2003-2013[2]
Total	57.9	54.2 - 61.5		54.3	52.6 - 56.1		63.4	61.3 - 65.4		-3.6	9.1***	5.5**
Age at the child's birth			0.012			<0.001			<0.001			
Less than 18	47.1	38.0 - 56.5		37.5	33.9 - 41.3		46.2	41.8 - 50.6		-9.6	8.7**	-0.9
18-34	58.8	54.8 - 62.6		56.2	54.4 - 58.1		64.6	62.6 - 66.6		-2.6	8.4***	5.8**
35 or older	59.2	53.8 - 64.3		51.8	49.3 - 54.2		64.0	61.3 - 66.6		-7.4*	12.2***	4.8
Parity at the child's birth			0.01			<0.001			<0.001			
1	60.4	54.4 - 66.1		59.6	57.2 - 61.9		68.2	65.5 - 70.7		-0.8	8.6***	7.8*
2-3	60.5	55.8 - 65.0		58.4	56.3 - 60.5		66.0	63.7 - 68.3		-2.1	7.6***	5.5*
4-5	60.5	55.1 - 65.7		55.7	53.5 - 58.0		65.0	62.4 - 67.6		-4.8	9.3***	4.5
6+	51.6	46.8 - 56.4		44.8	42.4 - 47.1		55.7	53.0 - 58.3		-6.8*	10.9***	4.1
Education			<0.001			<0.001			<0.001			
None	39.0	34.7 - 43.6		30.4	28.1 - 32.9		42.9	40.1 - 45.7		-8.6***	12.5***	3.9
Primary	68.7	63.9 - 73.1		64.1	61.8 - 66.3		74.0	71.6 - 76.3		-4.6	9.9***	5.3*
Secondary	85.4	81.4 - 88.6		81.5	80.1 - 82.9		87.0	85.8 - 88.0		-3.9	5.5***	1.6
Household wealth			<0.001			<0.001			<0.001			
Lowest	36.4	30.6 - 42.7		24.0	21.6 - 26.5		31.7	28.2 - 35.5		-12.4***	7.7**	-4.7
Second	37.0	30.9 - 43.7		37.9	35.1 - 40.9		50.5	47.7 - 53.4		0.9	12.6***	13.5***
Middle	57.8	52.9 - 62.5		59.0	55.9 - 62.0		71.3	68.8 - 73.7		1.2	12.3***	13.5***
Fourth	75.0	69.5 - 79.7		75.0	72.7 - 77.0		85.2	83.3 - 86.9		0.0	10.2***	10.2***
Highest	92.9	89.8 - 95.2		88.7	86.9 - 90.3		90.2	88.8 - 91.5		-4.2*	1.5	-2.7
Locality			<0.001			<0.001			<0.001			
Urban	78.4	73.7 - 82.5		77.4	74.7 - 79.8		84.1	81.8 - 86.1		-1.0	6.7***	5.7*
Rural	49.4	44.9 - 54.0		44.4	42.2 - 46.5		52.0	49.3 - 54.6		-5.0*	7.6***	2.6
Zone			<0.001			<0.001			<0.001			
North Central	58.7	51.0 - 65.9		50.3	46.1 - 54.4		71.4	66.3 - 76.1		-8.4	21.1***	12.7**
North East	54.4	47.8 - 60.9		46.0	41.7 - 50.3		61.7	56.5 - 66.6		-8.4*	15.7***	7.3
North West	40.6	33.4 - 48.2		30.6	26.7 - 34.8		43.9	40.1 - 47.7		-10.0*	13.3***	3.3
South East	93.7	88.2 - 96.8		76.7	71.9 - 80.8		88.2	85.3 - 90.5		-17.0***	11.5***	-5.5
South South	69.4	61.4 - 76.5		63.8	60.3 - 67.2		69.4	65.8 - 72.8		-5.6	5.6*	0.0
South West	89.2	85.3 - 92.2		87.8	85.2 - 90.1		88.0	83.9 - 91.2		-1.4	0.2	-1.2

[1] p-value of association test for each year. [2] Percentage point difference between 2008 and 2003, 2013 and 2008, and 2013 and 2003 with significant tests for the difference in proportions.
p-values *<0.05, **<0.01, ***<0.001

Continues

Appendix Table 3. − *Continued*

Background characteristic	Blood pressure checked during ANC, among women with ANC											
	2003			2008			2013			Difference 2003-2008[2]	Difference 2008-2013[2]	Difference 2003-2013[2]
	%	CI	p-value[1]	%	CI	p-value[1]	%	CI	p-value[1]			
Total	80.6	77.9 - 83.1		85.1	83.7 - 86.3		90.5	89.4 - 91.4		4.5**	5.4***	9.9***
Age at the child's birth			0.007			<0.001			<0.001			
Less than 18	68.2	57.0 - 77.6		72.7	67.7 - 77.2		83.8	79.6 - 87.2		4.5	11.1**	15.6**
18-34	80.8	77.7 - 83.6		85.4	84.0 - 86.7		90.6	89.5 - 91.7		4.6**	5.2***	9.8***
35 or older	83.9	79.1 - 87.8		86.6	84.5 - 88.4		91.2	89.6 - 92.6		2.7	4.6***	7.3***
Parity at the child's birth			0.574			0.001			0.030			
1	79.4	74.9 - 83.3		84.7	82.6 - 86.5		90.1	88.5 - 91.6		5.3*	5.4***	10.7***
2-3	82.4	78.3 - 85.8		86.2	84.5 - 87.6		91.0	89.7 - 92.1		3.8*	4.8***	8.6***
4-5	81.2	76.2 - 85.4		86.2	84.4 - 87.9		91.3	90.0 - 92.5		5.0*	5.1***	10.1***
6+	79.1	74.1 - 83.4		82.4	80.3 - 84.4		89.1	87.3 - 90.6		3.3	6.7***	10.0***
Education			<0.001			<0.001			<0.001			
None	72.2	67.4 - 76.6		75.1	72.3 - 77.7		83.6	81.1 - 85.8		2.9	8.5***	11.4***
Primary	78.5	73.8 - 82.6		83.0	80.9 - 84.9		89.7	88.1 - 91.1		4.5	6.7***	11.2***
Secondary	89.5	86.3 - 92.0		91.8	90.7 - 92.8		95.3	94.5 - 96.1		2.3	3.5***	5.8***
Household wealth			<0.001			<0.001			<0.001			
Lowest	68.5	60.7 - 75.3		68.2	64.1 - 72.0		75.4	71.2 - 79.1		-0.3	7.2*	6.9
Second	69.5	62.9 - 75.4		72.8	69.7 - 75.7		82.0	79.4 - 84.3		3.3	9.2***	12.5***
Middle	74.3	67.9 - 79.8		82.2	79.8 - 84.4		90.4	88.8 - 91.9		7.9**	8.2***	16.1***
Fourth	87.0	82.8 - 90.2		90.6	88.6 - 92.2		95.0	93.8 - 96.0		3.6	4.4***	8.0***
Highest	92.0	88.6 - 94.5		96.3	95.2 - 97.2		98.2	97.4 - 98.7		4.3**	1.9**	6.2***
Locality			<0.001			<0.001			<0.001			
Urban	90.6	87.8 - 92.8		92.7	90.8 - 94.3		95.5	94.5 - 96.4		2.1	2.8**	4.9***
Rural	74.1	70.1 - 77.7		79.5	77.6 - 81.3		85.7	84.0 - 87.4		5.4**	6.2***	11.6***
Zone			<0.001			<0.001			<0.001			
North Central	92.6	87.9 - 95.6		82.1	79.3 - 84.5		94.2	91.8 - 95.9		-10.5***	12.1***	1.6
North East	77.8	69.7 - 84.3		77.8	72.9 - 82.1		85.1	81.7 - 87.9		0.0	7.3**	7.3
North West	64.1	57.8 - 69.9		80.8	76.1 - 84.8		85.3	82.1 - 88.0		16.7***	4.5	21.2***
South East	89.4	82.5 - 93.8		87.0	83.4 - 90.0		91.7	89.5 - 93.6		-2.4	4.7*	2.3
South South	76.6	70.3 - 81.9		81.2	77.5 - 84.3		91.0	88.5 - 93.0		4.6	9.8***	14.4***
South West	94.9	92.2 - 96.7		94.4	92.3 - 95.9		96.5	95.0 - 97.6		-0.5	2.1	1.6

[1] p-value of association test for each year. [2] Percentage point difference between 2008 and 2003, 2013 and 2008, and 2013 and 2003 with significant tests for the difference in proportions.
p-values *<0.05, **<0.01, ***<0.001

Continues

Appendix Table 3. − *Continued*

	Informed of pregnancy complications during ANC, among women with ANC											
	2003			2008			2013			Difference	Difference	Difference
Background characteristic	%	CI	p-value[1]	%	CI	p-value[1]	%	CI	p-value[1]	2003-2008[2]	2008-2013[2]	2003-2013[2]
Total	55.0	51.7 - 58.3		61.3	59.4 - 63.1		67.0	65.4 - 68.6		6.3**	5.7***	12.0***
Age at the child's birth			0.068			<0.001			0.001			
Less than 18	44.2	33.5 - 55.6		47.0	42.0 - 52.0		58.4	53.3 - 63.3		2.8	11.4**	14.2*
18-34	55.0	51.7 - 58.4		61.8	59.8 - 63.7		67.1	65.4 - 68.8		6.8***	5.3***	12.1***
35 or older	58.7	52.0 - 65.1		62.5	59.8 - 65.2		68.4	65.8 - 70.9		3.8	5.9**	9.7**
Parity at the child's birth			0.483			<0.001			<0.001			
1	53.9	48.3 - 59.4		61.7	58.9 - 64.5		67.9	65.5 - 70.3		7.8*	6.2***	14.0***
2-3	55.1	49.8 - 60.3		64.5	62.2 - 66.7		70.2	68.0 - 72.2		9.4**	5.7***	15.1***
4-5	58.5	52.4 - 64.3		62.9	60.3 - 65.5		68.2	65.8 - 70.5		4.4	5.3**	9.7**
6+	52.9	47.4 - 58.4		54.1	51.4 - 56.8		60.5	58.0 - 63.0		1.2	6.4***	7.6*
Education			<0.001			<0.001			<0.001			
None	42.0	37.7 - 46.5		45.9	43.0 - 48.9		51.1	48.6 - 53.7		3.9	5.2*	9.1***
Primary	52.8	47.4 - 58.1		58.9	56.1 - 61.6		66.7	63.9 - 69.3		6.1*	7.8***	13.9***
Secondary	68.1	63.8 - 72.1		71.1	68.9 - 73.2		77.6	75.7 - 79.5		3.0	6.5***	9.5***
Household wealth			<0.001			<0.001			<0.001			
Lowest	39.0	32.0 - 46.5		42.8	38.8 - 46.9		44.8	40.8 - 48.8		3.8	2.0	5.8
Second	41.3	35.0 - 47.9		46.7	43.3 - 50.2		55.0	52.1 - 57.9		5.4	8.3***	13.7***
Middle	48.2	41.6 - 54.9		53.0	49.8 - 56.3		61.9	58.7 - 65.0		4.8	8.9***	13.7***
Fourth	59.5	53.9 - 64.8		67.7	64.8 - 70.4		73.6	70.8 - 76.2		8.2**	5.9**	14.1***
Highest	72.0	67.1 - 76.5		78.1	75.0 - 80.9		82.4	79.7 - 84.8		6.1*	4.3*	10.4***
Locality			<0.001			<0.001			<0.001			
Urban	66.2	62.0 - 70.2		70.9	67.9 - 73.7		75.5	73.1 - 77.7		4.7	4.6*	9.3***
Rural	47.8	43.5 - 52.1		54.4	52.0 - 56.7		59.2	57.0 - 61.3		6.6**	4.8**	11.4***
Zone			<0.001			<0.001			<0.001			
North Central	47.3	39.5 - 55.3		45.7	41.5 - 49.9		68.2	64.3 - 71.9		-1.6	22.5***	20.9***
North East	44.4	36.5 - 52.6		58.6	53.1 - 63.8		49.2	45.8 - 52.5		14.2**	-9.4**	4.8
North West	48.1	42.6 - 53.6		40.5	36.3 - 44.8		57.4	53.5 - 61.2		-7.6*	16.9***	9.3
South East	66.0	54.1 - 76.2		69.5	64.6 - 74.0		69.3	65.5 - 72.8		3.5	-0.2	3.3
South South	60.0	51.7 - 67.7		57.8	53.1 - 62.4		70.0	66.2 - 73.6		-2.2	12.2***	10.0
South West	75.6	69.5 - 80.9		83.1	80.4 - 85.4		87.3	84.8 - 89.4		7.5*	4.2*	11.7

[1] p-value of association test for each year. [2] Percentage point difference between 2008 and 2003, 2013 and 2008, and 2013 and 2003 with significant tests for the difference in proportions.
p-values *<0.05, **<0.01, ***<0.001

Appendix Table 4. Among mothers age 15-49 with a live birth in the 5 years preceding the survey, the percentage whose last live birth was protected against neonatal tetanus, according to background characteristics, Nigeria 2003, 2008, and 2013[4]

	Percentage of women receiving two or more injections during last pregnancy												Percentage of women whose last birth was fully protected against neonatal tetanus[3]						
	2003			2008			2013						2008			2013			
Background characteristic	%	CI	p-value[1]	%	CI	p-value[1]	%	CI	p-value[1]	Difference 2003-2008[2]	Difference 2008-2013[2]	Difference 2003-2013[2]	%	CI	p-value[1]	%	CI	p-value[1]	Difference 2008-2013[2]
Total	40.2	36.8 - 43.8		45.3	43.7 - 46.9		48.4	46.5 - 50.2		5.1*	3.1*	8.2***	48.0	46.3 - 49.6		52.8	50.8 - 54.8		4.8***
Age at the child's birth			<0.001			<0.001			<0.001						<0.001			<0.001	
Less than 18	20.4	15.7 - 26.1		25.1	22.0 - 28.5		27.7	24.3 - 31.3		4.7	2.6	7.3*	26.2	23.0 - 29.6		28.8	25.4 - 32.5		2.6
18-34	41.5	37.6 - 45.5		47.0	45.3 - 48.7		50.0	48.1 - 51.9		5.5*	3.0*	8.5***	49.8	48.1 - 51.5		54.3	52.2 - 56.3		4.5**
35 or older	43.8	38.5 - 49.2		44.7	42.4 - 47.0		48.4	45.9 - 50.9		0.9	3.7*	4.6	47.4	45.1 - 49.7		54.6	51.9 - 57.3		7.2***
Parity at the child's birth			0.011			<0.001			<0.001						<0.001			<0.001	
1	39.9	34.8 - 45.3		49.7	47.3 - 52.0		53.2	50.8 - 55.7		9.8**	3.5*	13.3***	51.0	48.6 - 53.4		54.4	51.9 - 56.9		3.4
2-3	42.1	37.4 - 47.0		49.3	47.3 - 51.3		52.0	49.7 - 54.3		7.2**	2.7	9.9***	52.2	50.2 - 54.2		56.9	54.4 - 59.3		4.7**
4-5	44.3	39.1 - 49.7		47.7	45.5 - 49.9		49.5	47.2 - 51.9		3.4	1.8	5.2	50.7	48.5 - 53.0		54.2	51.8 - 56.7		3.5*
6+	35.5	31.4 - 39.8		35.3	33.2 - 37.5		39.8	37.5 - 42.1		-0.2	4.5**	4.3	38.4	36.2 - 40.7		45.8	43.1 - 48.4		7.4***
Education			<0.001			<0.001			<0.001						<0.001			<0.001	
None	20.4	17.4 - 23.7		19.5	17.9 - 21.3		25.4	23.3 - 27.6		-0.9	5.9***	5.0*	20.8	19.1 - 22.7		28.8	26.4 - 31.2		8.0***
Primary	52.6	48.0 - 57.2		54.5	52.1 - 56.9		57.6	55.2 - 60.0		1.9	3.1	5.0	58.3	55.9 - 60.6		63.9	61.5 - 66.3		5.6***
Secondary or higher	68.3	63.8 - 72.5		75.5	73.9 - 77.0		76.3	74.7 - 77.8		7.2**	0.8	8.0***	79.4	77.9 - 80.8		81.3	79.8 - 82.7		1.9
Household wealth			<0.001			<0.001			<0.001						<0.001			<0.001	
Lowest	19.1	15.1 - 23.9		14.5	12.7 - 16.6		15.9	13.8 - 18.2		-4.6	1.4	-3.2	15.3	13.4 - 17.5		17.3	15.1 - 19.9		2.0
Second	22.7	18.5 - 27.5		27.9	25.4 - 30.5		33.0	30.5 - 35.5		5.2	5.1**	10.3***	30.1	27.5 - 32.8		36.9	34.2 - 39.6		6.8***
Middle	36.9	31.6 - 42.5		50.8	47.9 - 53.7		54.5	51.7 - 57.2		13.9***	3.7	17.6***	53.8	50.8 - 56.7		59.6	56.8 - 62.4		5.8**
Fourth	55.7	49.4 - 61.8		66.6	64.2 - 68.9		69.7	67.3 - 72.0		10.9***	3.1	14.0***	70.3	67.9 - 72.5		76.4	74.2 - 78.5		6.1***
Highest	76.4	71.5 - 80.6		79.7	77.5 - 81.7		82.0	80.1 - 83.7		3.3	2.3	5.6*	84.2	82.4 - 85.9		88.0	86.6 - 89.3		3.8**
Locality			<0.001			<0.001			<0.001						<0.001			<0.001	
Urban	60.7	54.8 - 66.3		67.3	64.8 - 69.7		70.3	67.8 - 72.6		6.6*	3.0	9.6**	71.3	68.8 - 73.7		76.9	74.4 - 79.3		5.6**
Rural	31.8	28.0 - 35.9		35.7	33.8 - 37.7		36.3	34.1 - 38.5		3.9	0.6	4.5	37.9	35.9 - 39.9		39.5	37.1 - 42.0		1.6
Zone			<0.001			<0.001			<0.001						<0.001			<0.001	
North Central	45.4	38.6 - 52.5		45.7	41.1 - 50.3		53.8	49.0 - 58.6		0.3	8.1*	8.4	48.9	44.3 - 53.5		56.8	51.9 - 61.7		7.9*
North East	30.8	24.4 - 38.0		28.7	25.2 - 32.5		36.8	32.5 - 41.2		-2.1	8.1**	6.0	30.0	26.4 - 34.0		40.7	36.1 - 45.5		10.7***
North West	20.1	15.5 - 25.6		17.9	15.4 - 20.8		27.1	24.3 - 30.1		-2.2	9.2***	7.0*	20.1	17.2 - 23.2		32.9	29.5 - 36.5		12.8***
South East	77.4	70.0 - 83.5		77.7	73.7 - 81.2		82.0	78.7 - 84.9		0.3	4.3	4.6	81.3	77.3 - 84.7		84.7	81.2 - 87.7		3.4
South South	61.5	52.0 - 70.2		63.6	59.6 - 67.3		68.6	65.0 - 72.0		2.1	5.0	7.1	68.7	64.8 - 72.4		73.0	69.4 - 76.3		4.3
South West	74.0	68.5 - 78.8		76.9	73.5 - 79.9		76.6	72.4 - 80.3		2.9	-0.3	2.6	79.1	75.8 - 82.1		80.7	76.4 - 84.4		1.6

[1] p-value of association test for each year. [2] Percentage point difference between 2008 and 2003, 2013 and 2008, and 2013 and 2003 with significant tests for the difference in proportions. [3] Full protection includes mothers with two injections during the pregnancy for her last live birth, or two or more injections (the last within 3 years of the last live birth), or three or more injections (the last within 5 years of the last birth), or four or more injections (the last within ten years of the last live birth), or five or more injections prior to the last birth. [4] Full protection was not calculated for 2003 because the survey did not collect the necessary information.

p-values *<0.05, **<0.01, ***<0.001

Appendix Table 5. Percentage of live births in the 5 years preceding the survey by place of delivery, according to background characteristics, Nigeria 2003, 2008, and 2013

	Public									Private								
	2003			2008			2013			2003			2008			2013		
Background characteristic	%	CI	p-value[1]	%	CI	p-value[1]	%	CI	p-value[1]	%	CI	p-value[1]	%	CI	p-value[1]	%	CI	p-value[1]
Total	18.2	16.1 - 20.5		20.0	18.8 - 21.2		22.6	21.3 - 23.9		14.4	11.4 - 18.0		15.0	13.8 - 16.3		13.2	12.0 - 14.5	
Age at the child's birth			<0.001			<0.001			<0.001			<0.001			<0.001			<0.001
Less than 18	14.3	10.8 - 18.8		12.7	11.0 - 14.6		16.9	14.6 - 19.4		4.4	2.5 - 7.7		5.8	4.7 - 7.3		3.9	2.9 - 5.2	
18-34	18.6	16.2 - 21.2		20.9	19.7 - 22.2		23.0	21.7 - 24.5		15.8	12.5 - 19.8		16.2	14.8 - 17.6		14.2	12.9 - 15.7	
35 or older	18.5	15.2 - 22.3		19.0	17.3 - 20.9		22.7	20.8 - 24.6		12.8	9.4 - 17.2		13.3	11.7 - 15.0		12.4	10.9 - 14.0	
Parity at the child's birth			<0.001			<0.001			<0.001			<0.001			<0.001			<0.001
1	24.8	20.4 - 29.9		27.1	25.1 - 29.2		31.4	29.1 - 33.8		18.7	14.5 - 23.8		19.3	17.5 - 21.3		16.9	15.0 - 19.0	
2-3	20.0	16.8 - 23.7		22.2	20.7 - 23.8		25.3	23.6 - 27.1		17.8	13.4 - 23.2		19.4	17.5 - 21.3		17.1	15.3 - 19.2	
4-5	18.4	15.3 - 22.0		19.6	18.0 - 21.3		21.9	20.1 - 23.7		15.4	11.2 - 20.8		15.7	14.0 - 17.5		13.7	12.1 - 15.6	
6+	13.4	11.1 - 16.2		15.1	13.7 - 16.6		16.5	15.0 - 18.0		8.3	6.4 - 10.7		7.4	6.4 - 8.6		6.7	5.8 - 7.7	
Education			<0.001			<0.001			<0.001			<0.001			<0.001			<0.001
None	7.1	5.5 - 9.1		7.5	6.7 - 8.4		9.5	8.5 - 10.7		3.2	2.2 - 4.7		2.2	1.8 - 2.8		1.7	1.4 - 2.1	
Primary	22.7	19.3 - 26.5		23.4	21.4 - 25.5		26.4	24.3 - 28.6		17.9	14.2 - 22.2		15.6	13.8 - 17.6		15.1	13.3 - 17.1	
Secondary or higher	37.3	31.8 - 43.1		36.7	34.5 - 38.9		40.5	38.2 - 42.8		34.5	26.7 - 43.3		34.2	31.6 - 36.8		30.1	27.3 - 32.9	
Household wealth			<0.001			<0.001			<0.001			<0.001			<0.001			<0.001
Lowest	7.5	5.4 - 10.3		4.8	4.0 - 5.9		4.6	3.9 - 5.5		4.0	2.5 - 6.5		2.4	1.7 - 3.5		1.2	0.8 - 1.8	
Second	10.5	7.8 - 14.1		10.4	9.0 - 12.1		12.6	11.1 - 14.3		5.6	3.9 - 7.9		4.7	3.7 - 5.9		4.5	3.6 - 5.7	
Middle	15.6	11.7 - 20.6		21.0	18.9 - 23.2		25.6	23.3 - 28.1		9.3	6.6 - 13.1		12.2	10.5 - 14.1		11.5	9.8 - 13.5	
Fourth	28.1	23.8 - 32.9		34.7	32.4 - 37.1		38.5	35.8 - 41.3		15.7	11.8 - 20.6		21.4	19.1 - 23.9		18.2	16.2 - 20.5	
Highest	34.9	28.0 - 42.5		37.2	34.2 - 40.3		41.1	37.7 - 44.6		44.8	34.6 - 55.6		42.4	38.8 - 46.1		38.8	34.7 - 43.1	
Locality			<0.001			<0.001			<0.001			<0.001			<0.001			<0.001
Urban	28.5	24.2 - 33.3		30.9	28.4 - 33.5		35.1	32.5 - 37.8		25.6	18.9 - 33.7		28.5	25.6 - 31.6		26.5	23.7 - 29.5	
Rural	14.0	11.7 - 16.7		15.4	14.2 - 16.7		15.8	14.4 - 17.3		9.8	7.0 - 13.6		9.3	8.2 - 10.4		6.1	5.2 - 7.0	
Zone			<0.001			<0.001			<0.001			<0.001			<0.001			<0.001
North Central	27.0	21.2 - 33.7		27.0	23.3 - 31.1		30.0	26.9 - 33.3		18.4	12.8 - 25.8		13.9	11.3 - 17.0		15.7	13.3 - 18.4	
North East	14.5	10.9 - 19.0		12.0	9.6 - 14.8		18.4	15.4 - 21.7		2.6	1.4 - 4.6		0.8	0.4 - 1.4		1.2	0.7 - 1.9	
North West	8.8	6.3 - 12.2		7.6	6.3 - 9.2		11.0	9.2 - 13.1		1.6	0.9 - 2.8		0.8	0.5 - 1.3		0.5	0.3 - 1.1	
South East	19.9	11.6 - 32.1		25.3	21.3 - 29.7		33.9	29.1 - 39.1		64.1	42.6 - 81.1		48.6	43.1 - 54.2		44.2	38.6 - 49.9	
South South	29.5	23.2 - 36.7		30.0	26.5 - 33.8		35.7	32.0 - 39.6		23.7	18.3 - 30.0		18.1	14.8 - 21.9		14.3	11.5 - 17.7	
South West	33.7	27.1 - 40.9		35.0	31.2 - 39.0		35.4	31.6 - 39.5		43.9	35.8 - 52.3		35.0	30.9 - 39.3		39.6	35.3 - 44.1	

[1] p-value of association test for each year

Continues

Appendix Table 5. − *Continued*

Background characteristic	Home									Other[2]								
	2003			2008			2013			2003			2008			2013		
	%	CI	p-value[1]	%	CI	p-value[1]	%	CI	p-value[1]	%	CI	p-value[1]	%	CI	p-value[1]	%	CI	p-value[1]
Total	66.4	62.5 - 70.1		62.1	60.3 - 63.8		63.1	61.2 - 64.9		1.0	0.8 - 1.4		2.9	2.6 - 3.4		1.1	1.0 - 1.3	
Age at the child's birth			<0.001			<0.001			<0.001			<0.001			<0.001			<0.001
Less than 18	79.2	73.9 - 83.7		79.2	76.9 - 81.4		77.9	75.1 - 80.5		2.0	0.8 - 5.2		2.3	1.6 - 3.2		1.3	0.9 - 2.0	
18-34	64.7	60.6 - 68.6		59.9	58.1 - 61.7		61.6	59.7 - 63.5		0.9	0.6 - 1.3		3.0	2.6 - 3.4		1.1	1.0 - 1.3	
35 or older	67.6	61.9 - 72.8		64.6	62.2 - 67.0		63.8	61.3 - 66.2		1.2	0.6 - 2.1		3.1	2.4 - 4.0		1.2	0.8 - 1.8	
Parity at the child's birth			<0.001			<0.001			<0.001			<0.001			<0.001			<0.001
1	55.1	49.2 - 60.9		50.5	48.0 - 52.9		51.5	48.9 - 54.2		1.4	0.5 - 3.7		3.1	2.3 - 4.1		0.2	0.1 - 0.3	
2-3	61.3	55.9 - 66.6		55.4	53.2 - 57.6		56.4	53.9 - 58.8		0.9	0.5 - 1.6		3.0	2.5 - 3.7		1.2	1.0 - 1.5	
4-5	64.9	59.9 - 69.6		61.5	59.3 - 63.8		63.3	61.0 - 65.6		1.3	0.8 - 2.2		3.1	2.5 - 3.9		1.1	0.8 - 1.4	
6+	77.4	73.8 - 80.6		74.9	72.9 - 76.8		75.3	73.5 - 77.1		0.9	0.5 - 1.5		2.6	2.1 - 3.2		1.5	1.2 - 1.9	
Education			<0.001			<0.001			<0.001			<0.001			<0.001			<0.001
None	88.8	86.4 - 90.8		88.7	87.6 - 89.8		87.7	86.3 - 88.9		0.9	0.5 - 1.5		1.6	1.3 - 2.0		1.1	0.9 - 1.4	
Primary	58.0	52.8 - 62.9		57.2	54.4 - 60.0		57.3	54.5 - 60.1		1.5	0.9 - 2.4		3.8	3.1 - 4.6		1.2	0.9 - 1.6	
Secondary or higher	27.2	21.7 - 33.6		24.8	22.8 - 26.9		28.3	26.3 - 30.4		0.9	0.5 - 1.8		4.4	3.6 - 5.4		1.2	0.9 - 1.5	
Household wealth			<0.001			<0.001			<0.001			<0.001			<0.001			<0.001
Lowest	87.1	83.0 - 90.3		91.3	89.5 - 92.8		93.1	92.0 - 94.2		1.4	0.8 - 2.5		1.4	1.0 - 2.1		1.0	0.8 - 1.4	
Second	82.8	78.7 - 86.3		82.6	80.4 - 84.6		81.5	79.3 - 83.5		1.1	0.7 - 1.8		2.3	1.8 - 2.9		1.4	1.1 - 1.8	
Middle	74.5	68.3 - 79.8		64.1	61.1 - 67.1		61.7	58.7 - 64.6		0.6	0.2 - 2.1		2.7	2.1 - 3.4		1.2	0.9 - 1.6	
Fourth	55.2	48.8 - 61.4		40.0	37.1 - 42.9		42.1	39.0 - 45.3		1.0	0.4 - 2.4		3.9	3.2 - 4.9		1.1	0.8 - 1.6	
Highest	19.2	14.0 - 25.8		15.2	13.3 - 17.3		19.1	16.8 - 21.7		1.0	0.5 - 2.1		5.2	3.9 - 6.9		0.9	0.6 - 1.5	
Locality			<0.001			<0.001			<0.001			<0.001			<0.001			<0.001
Urban	44.8	37.8 - 52.1		35.9	33.0 - 39.0		37.4	34.2 - 40.8		1.0	0.6 - 1.7		4.7	3.8 - 5.8		0.9	0.7 - 1.2	
Rural	75.1	70.9 - 78.9		73.1	71.2 - 74.9		76.9	74.9 - 78.7		1.1	0.7 - 1.6		2.2	1.9 - 2.6		1.3	1.1 - 1.5	
Zone			<0.001			<0.001			<0.001			<0.001			<0.001			<0.001
North Central	54.6	47.0 - 61.9		57.3	52.1 - 62.4		52.9	48.6 - 57.3		0.0			1.7	1.2 - 2.4		1.4	1.0 - 2.0	
North East	82.2	76.8 - 86.6		86.6	83.7 - 89.0		79.3	75.8 - 82.5		0.7	0.3 - 1.5		0.6	0.4 - 1.0		1.1	0.8 - 1.6	
North West	88.6	84.9 - 91.6		90.1	88.3 - 91.6		87.5	85.3 - 89.4		1.0	0.5 - 1.8		1.5	1.1 - 2.0		1.0	0.8 - 1.3	
South East	13.2	6.1 - 26.2		21.1	16.4 - 26.8		19.9	16.4 - 24.1		2.8	1.3 - 5.9		5.0	3.7 - 6.6		2.0	1.3 - 3.0	
South South	45.0	35.2 - 55.1		48.5	43.5 - 53.6		48.7	44.2 - 53.2		1.8	0.8 - 4.1		3.4	2.5 - 4.5		1.3	0.9 - 1.8	
South West	20.8	16.2 - 26.2		22.5	18.8 - 26.8		24.2	19.9 - 29.1		1.7	0.8 - 3.6		7.5	5.8 - 9.7		0.7	0.5 - 1.1	

[1] p-value of association test for each year. [2] Includes missing

Appendix Table 6. Percentage of live births in the 5 years preceding the survey delivered in a health facility, according to background characteristics, Nigeria 2003, 2008, and 2013

	2003			2008			2013			Difference	Difference	Difference
Background characteristic	%	CI	p-value[1]	%	CI	p-value[1]	%	CI	p-value[1]	2003-2008[2]	2008-2013[2]	2003-2013[2]
Total	32.6	28.9 - 36.5		35.0	33.3 - 36.7		35.8	34.0 - 37.6		2.4	0.8	3.2
Age at the child's birth			<0.001			<0.001			<0.001			
Less than 18	18.8	14.7 - 23.7		18.5	16.4 - 20.8		20.8	18.2 - 23.6		-0.3	2.3	2.0
18-34	34.4	30.4 - 38.6		37.1	35.3 - 38.9		37.3	35.4 - 39.2		2.7	0.2	2.9
35 or older	31.3	26.1 - 36.9		32.3	30.0 - 34.6		35.1	32.8 - 37.5		1.0	2.8	3.8
Parity at the child's birth			<0.001			<0.001			<0.001			
1	43.5	37.7 - 49.4		46.4	44.0 - 48.9		48.3	45.7 - 51.0		2.9	1.9	4.8
2-3	37.8	32.6 - 43.3		41.5	39.3 - 43.7		42.4	40.0 - 44.9		3.7	0.9	4.6
4-5	33.8	29.1 - 38.9		35.3	33.2 - 37.5		35.6	33.3 - 37.9		1.5	0.3	1.8
6+	21.7	18.5 - 25.4		22.5	20.7 - 24.5		23.2	21.4 - 25.0		0.8	0.7	1.5
Education			<0.001			<0.001			<0.001			
None	10.3	8.3 - 12.7		9.7	8.7 - 10.8		11.2	10.0 - 12.5		-0.6	1.5	0.9
Primary	40.5	35.6 - 45.7		39.0	36.4 - 41.7		41.5	38.7 - 44.3		-1.5	2.5	1.0
Secondary or higher	71.8	65.4 - 77.5		70.8	68.7 - 72.9		70.6	68.4 - 72.6		-1.0	-0.2	-1.2
Household wealth			<0.001			<0.001			<0.001			
Lowest	11.5	8.6 - 15.3		7.3	5.9 - 8.9		5.8	4.9 - 7.0		-4.2*	-1.5	-5.7***
Second	16.1	12.6 - 20.2		15.1	13.2 - 17.2		17.1	15.2 - 19.3		-1.0	2.0	1.0
Middle	24.9	19.7 - 31.0		33.2	30.3 - 36.2		37.1	34.2 - 40.1		8.3*	3.9	12.2***
Fourth	43.8	37.6 - 50.2		56.1	53.2 - 58.9		56.8	53.6 - 59.9		12.3***	0.7	13.0***
Highest	79.7	73.1 - 85.1		79.6	77.2 - 81.9		79.9	77.3 - 82.2		-0.1	0.3	0.2
Locality			<0.001			<0.001			<0.001			
Urban	54.2	46.9 - 61.2		59.4	56.3 - 62.4		61.7	58.3 - 64.9		5.2	2.3	7.5
Rural	23.8	20.0 - 28.1		24.7	22.9 - 26.6		21.9	20.1 - 23.8		0.9	-2.8*	-1.9
Zone			<0.001			<0.001			<0.001			
North Central	45.4	38.1 - 53.0		41.0	35.8 - 46.3		45.7	41.4 - 50.0		-4.4	4.7	0.3
North East	17.1	12.8 - 22.4		12.8	10.3 - 15.7		19.5	16.4 - 23.1		-4.3	6.7**	2.4
North West	10.4	7.5 - 14.2		8.4	7.0 - 10.2		11.5	9.6 - 13.7		-2.0	3.1*	1.1
South East	84.1	69.5 - 92.4		73.9	67.9 - 79.1		78.1	73.9 - 81.8		-10.2	4.2	-6.0
South South	53.2	43.2 - 62.9		48.1	43.1 - 53.1		50.1	45.5 - 54.6		-5.1	2.0	-3.1
South West	77.6	72.1 - 82.2		70.0	65.8 - 73.9		75.0	70.2 - 79.4		-7.6*	5.0	-2.6

[1] p-value of association test for each year. [2] Percentage point difference between 2008 and 2003, 2013 and 2008, and 2013 and 2003 with significant tests for the difference in proportions.
p-values *<0.05, **<0.01, ***<0.001

Appendix Table 7. Percentage of live births in the five years preceding the survey by type of assistance at birth, according to background characteristics, Nigeria 2003, 2008, and 2013

Background characteristic	Doctor, nurse, midwife									Community Health Worker						TBA								
	2003			2008			2013			2003			2013			2003			2008			2013		
	%	CI	p-value[1]	%	CI	p-value[1]	%	CI	p-value[1]	%	CI	p-value[1]	%	CI	p-value[1]	%	CI	p-value[1]	%	CI	p-value[1]	%	CI	p-value[1]
Total	35.1	31.4 - 39.1		38.9	37.2 - 40.7		38.1	36.2 - 40.1		1.1	0.8 - 1.5		2.3	2.0 - 2.7		20.4	17.5 - 23.6		21.6	19.9 - 23.4		22.0	20.7 - 23.5	
Age at the child's birth			<0.001			<0.001			<0.001			<0.001			<0.001			<0.001			<0.001			<0.001
Less than 18	20.9	16.7 - 25.8		21.1	18.9 - 23.6		21.4	18.7 - 24.3		1.8	0.8 - 4.0		3.6	2.7 - 4.8		26.8	21.6 - 32.7		29.6	26.4 - 33.0		31.5	28.6 - 34.5	
18-34	36.6	32.6 - 40.8		41.3	39.4 - 43.2		39.8	37.8 - 41.9		1.0	0.7 - 1.5		2.2	1.9 - 2.6		19.8	16.8 - 23.2		21.0	19.3 - 22.8		21.3	19.9 - 22.8	
35 or older	36.3	30.7 - 42.3		35.6	33.2 - 38.0		37.3	34.9 - 39.8		1.0	0.4 - 2.1		2.3	1.8 - 3.0		19.4	14.8 - 25.0		20.7	18.5 - 23.0		21.2	19.3 - 23.3	
Parity at the child's birth			<0.001			<0.001			<0.001			<0.001			<0.001			<0.001			<0.001			<0.001
1	45.3	39.4 - 51.4		51.5	49.0 - 54.0		51.2	48.5 - 54.0		2.4	1.3 - 4.2		2.8	2.3 - 3.5		18.6	14.5 - 23.4		21.7	19.7 - 23.8		21.4	19.4 - 23.6	
2-3	39.8	34.5 - 45.4		45.5	43.2 - 47.7		44.6	42.1 - 47.1		0.7	0.4 - 1.4		2.1	1.7 - 2.6		19.8	16.1 - 24.0		20.1	18.2 - 22.0		20.0	18.3 - 21.7	
4-5	37.5	32.4 - 42.8		39.4	37.1 - 41.7		38.4	35.9 - 41.0		0.8	0.3 - 1.8		2.7	2.2 - 3.3		19.6	16.0 - 23.7		21.7	19.8 - 23.8		21.1	19.2 - 23.1	
6+	24.4	20.5 - 28.7		25.9	23.9 - 27.9		25.2	23.3 - 27.1		1.1	0.6 - 2.1		2.1	1.7 - 2.6		22.4	18.2 - 27.3		23.3	21.0 - 25.8		25.5	23.7 - 27.4	
Education			<0.001			<0.001			<0.001			<0.001			<0.001			<0.001			<0.001			<0.001
None	12.7	10.3 - 15.5		11.5	10.4 - 12.7		11.7	10.4 - 13.2		1.2	0.8 - 1.8		2.3	1.9 - 2.8		26.3	22.4 - 30.5		27.9	25.3 - 30.8		31.7	29.5 - 33.9	
Primary	43.8	38.5 - 49.4		44.2	41.4 - 47.0		44.3	41.3 - 47.3		1.1	0.6 - 2.3		3.2	2.6 - 4.1		19.6	15.8 - 24.1		22.6	20.3 - 25.1		18.4	16.6 - 20.4	
Secondary or higher	74.1	67.8 - 79.5		77.0	74.9 - 79.0		75.6	73.5 - 77.5		0.8	0.3 - 1.9		1.8	1.4 - 2.3		8.7	5.8 - 13.0		11.1	9.8 - 12.6		9.2	8.1 - 10.3	
Household wealth			<0.001			<0.001			<0.001			<0.001			<0.001			<0.001			<0.001			<0.001
Lowest	11.6	8.6 - 15.3		8.3	6.9 - 10.0		5.7	4.7 - 6.8		1.4	0.8 - 2.6		1.7	1.2 - 2.5		31.6	25.6 - 38.3		26.2	23.0 - 29.6		33.4	30.1 - 36.9	
Second	17.7	14.3 - 21.7		17.6	15.5 - 19.8		17.3	15.2 - 19.5		1.3	0.7 - 2.5		3.2	2.5 - 4.0		25.4	20.2 - 31.3		28.8	25.8 - 32.0		29.5	27.0 - 32.2	
Middle	26.3	20.6 - 32.9		37.5	34.6 - 40.6		39.9	36.7 - 43.2		1.3	0.6 - 2.6		3.5	2.8 - 4.3		21.7	17.4 - 26.8		26.5	23.7 - 29.6		20.0	17.8 - 22.3	
Fourth	50.1	43.8 - 56.5		63.3	60.2 - 66.2		62.1	58.8 - 65.2		1.0	0.3 - 2.7		2.2	1.7 - 2.9		13.8	10.3 - 18.2		15.9	13.8 - 18.3		14.6	12.8 - 16.7	
Highest	84.3	78.3 - 88.9		85.7	83.5 - 87.6		85.3	83.0 - 87.4		0.2	0.0 - 0.8		0.9	0.6 - 1.4		4.3	2.8 - 6.5		6.0	4.8 - 7.5		5.7	4.7 - 6.9	
Locality			<0.001			<0.001			<0.001			<0.001			<0.001			<0.001			<0.001			<0.001
Urban	58.5	51.4 - 65.2		65.4	62.4 - 68.3		67.0	63.7 - 70.1		0.3	0.1 - 0.7		1.2	0.9 - 1.7		11.6	8.8 - 15.2		13.1	11.1 - 15.5		11.8	10.3 - 13.5	
Rural	25.7	21.7 - 30.2		27.7	25.8 - 29.7		22.7	20.7 - 24.8		1.4	0.9 - 2.0		2.9	2.5 - 3.4		23.9	20.2 - 28.2		25.2	23.0 - 27.5		27.5	25.6 - 29.5	
Zone			<0.001			<0.001			<0.001			<0.001			<0.001			<0.001			<0.001			<0.001
North Central	48.6	40.4 - 56.9		42.7	37.6 - 48.0		46.5	42.2 - 50.9		1.5	0.6 - 3.3		6.0	4.8 - 7.5		6.1	4.4 - 8.6		9.5	7.5 - 11.9		3.6	2.8 - 4.6	
North East	19.8	14.7 - 26.2		15.5	12.9 - 18.5		19.9	16.7 - 23.5		2.2	1.3 - 3.6		3.9	2.9 - 5.2		25.4	19.5 - 32.4		33.6	28.6 - 39.1		26.0	22.3 - 30.0	
North West	12.3	9.2 - 16.5		9.8	8.2 - 11.6		12.3	10.3 - 14.7		0.7	0.3 - 1.6		0.8	0.6 - 1.2		24.3	18.8 - 30.8		25.9	22.2 - 30.0		34.0	31.4 - 36.6	
South East	87.4	74.7 - 94.3		81.8	75.8 - 86.6		82.2	78.0 - 85.8		0.2	0.0 - 0.9		2.1	1.3 - 3.5		3.0	1.1 - 8.1		8.4	6.1 - 11.4		7.4	5.3 - 10.2	
South South	55.6	45.5 - 65.3		55.8	50.4 - 61.0		55.4	50.5 - 60.2		0.2	0.1 - 1.1		2.0	1.3 - 3.1		32.2	24.0 - 41.8		32.9	28.4 - 37.6		29.7	25.8 - 34.0	
South West	80.9	75.5 - 85.2		76.5	72.1 - 80.4		82.5	77.3 - 86.8		0.7	0.3 - 1.8		1.2	0.8 - 1.8		9.0	6.1 - 13.2		10.2	7.6 - 13.6		7.4	5.4 - 10.1	

[1] p-value of association test for each year

Continues

Appendix Table 7. − *Continued*

Background characteristic	Other[2]									No one								
	2003			2008			2013			2003			2008			2013		
	%	CI	p-value[1]	%	CI	p-value[1]	%	CI	p-value[1]	%	CI	p-value[1]	%	CI	p-value[1]	%	CI	p-value[1]
Total	25.6	23.1 - 28.3		18.8	17.7 - 19.9		22.7	21.4 - 24.1		17.8	15.3 - 20.6		20.7	19.1 - 22.4		14.8	13.8 - 15.8	
Age at the child's birth			<0.001			<0.001			<0.001			<0.001			<0.001			<0.001
Less than 18	35.3	29.7 - 41.2		27.7	25.2 - 30.4		32.2	29.3 - 35.4		15.2	11.4 - 20.0		21.5	18.8 - 24.5		11.3	9.7 - 13.2	
18-34	25.0	22.3 - 27.8		18.2	17.1 - 19.4		22.5	21.1 - 23.9		17.6	15.0 - 20.6		19.5	17.9 - 21.2		14.1	13.2 - 15.1	
35 or older	23.1	19.0 - 27.8		17.3	15.6 - 19.1		19.5	17.6 - 21.7		20.3	15.3 - 26.3		26.5	24.1 - 29.1		19.6	17.9 - 21.4	
Parity at the child's birth			<0.001			<0.001			<0.001			<0.001			<0.001			<0.001
1	27.2	23.1 - 31.7		17.6	16.0 - 19.3		20.1	18.3 - 22.1		6.5	4.0 - 10.4		9.2	7.9 - 10.8		4.4	3.6 - 5.3	
2-3	25.5	21.8 - 29.7		19.0	17.6 - 20.5		23.0	21.3 - 24.9		14.2	11.8 - 17.0		15.5	14.0 - 17.1		10.3	9.3 - 11.4	
4-5	24.6	21.3 - 28.3		18.0	16.5 - 19.6		22.9	21.1 - 24.7		17.6	14.0 - 21.8		20.9	19.0 - 23.0		14.9	13.6 - 16.4	
6+	25.8	22.5 - 29.4		19.7	18.0 - 21.4		23.3	21.5 - 25.1		26.2	21.8 - 31.1		31.1	28.6 - 33.8		24.0	22.4 - 25.6	
Education			<0.001			<0.001			<0.001			<0.001			<0.001			<0.001
None	32.1	28.6 - 35.9		24.8	23.1 - 26.6		30.9	28.9 - 32.9		27.7	24.0 - 31.8		35.7	33.1 - 38.5		23.4	21.9 - 25.0	
Primary	24.3	20.1 - 29.0		21.3	19.5 - 23.2		23.1	21.0 - 25.3		11.1	8.5 - 14.4		11.9	10.1 - 14.0		10.9	9.5 - 12.5	
Secondary or higher	13.2	9.7 - 17.5		7.6	6.7 - 8.6		9.8	8.6 - 11.1		3.2	1.8 - 5.5		4.3	3.6 - 5.2		3.6	3.0 - 4.4	
Household wealth			<0.001			<0.001			<0.001			<0.001			<0.001			<0.001
Lowest	34.3	28.7 - 40.4		29.7	27.3 - 32.2		32.3	29.2 - 35.5		21.1	17.1 - 25.8		35.9	32.8 - 39.1		26.9	24.2 - 29.8	
Second	31.1	26.7 - 35.9		24.1	22.1 - 26.3		30.7	28.5 - 32.9		24.5	20.3 - 29.3		29.5	26.3 - 32.9		19.4	17.8 - 21.1	
Middle	29.5	24.6 - 34.9		18.3	16.6 - 20.2		24.2	21.9 - 26.7		21.2	16.8 - 26.4		17.6	15.2 - 20.4		12.3	10.8 - 14.1	
Fourth	20.5	16.2 - 25.5		11.8	10.2 - 13.5		14.5	12.6 - 16.5		14.6	11.3 - 18.7		9.1	7.4 - 11.0		6.6	5.4 - 8.1	
Highest	7.5	5.1 - 11.0		4.5	3.6 - 5.6		5.4	4.3 - 6.7		3.7	1.5 - 8.8		3.8	2.9 - 5.2		2.7	2.0 - 3.7	
Locality			<0.001			<0.001			<0.001			<0.001			<0.001			<0.001
Urban	17.9	14.3 - 22.2		11.2	9.7 - 12.9		12.5	11.1 - 14.2		11.7	8.8 - 15.2		10.3	8.6 - 12.3		7.4	6.3 - 8.8	
Rural	28.7	25.5 - 32.2		22.0	20.5 - 23.5		28.2	26.4 - 30.1		20.3	17.1 - 23.8		25.1	23.0 - 27.3		18.7	17.5 - 20.0	
Zone			<0.001			<0.001			<0.001			<0.001			<0.001			<0.001
North Central	34.7	26.6 - 43.8		36.1	32.4 - 39.9		35.4	31.2 - 39.8		9.1	5.9 - 13.8		11.8	9.6 - 14.4		8.5	6.9 - 10.4	
North East	31.7	26.4 - 37.7		31.0	27.4 - 34.8		39.0	35.9 - 42.2		20.8	15.9 - 26.7		19.9	17.0 - 23.1		11.2	9.7 - 13.0	
North West	31.0	26.9 - 35.4		18.5	16.7 - 20.5		23.6	21.7 - 25.7		31.7	27.0 - 36.7		45.8	41.9 - 49.8		29.2	27.3 - 31.1	
South East	6.2	2.8 - 13.5		5.5	3.8 - 7.9		5.1	3.8 - 6.8		3.1	1.5 - 6.3		4.3	2.8 - 6.4		3.1	2.3 - 4.2	
South South	9.8	6.7 - 14.1		7.6	6.0 - 9.6		9.6	6.7 - 13.4		2.1	1.0 - 4.3		3.8	2.8 - 5.1		3.3	2.3 - 4.7	
South West	8.4	5.6 - 12.4		9.3	7.1 - 12.1		7.1	4.0 - 12.3		1.0	0.4 - 2.9		4.0	2.6 - 6.0		1.8	1.4 - 2.4	

[1] p-value of association test for each year. [2] Includes missing

Appendix Table 8. Percentage of births that were assisted by a skilled birth attendant (doctor, nurse, or midwife), among children born in the 5 years preceding the survey, according to background characteristics, Nigeria 2003, 2008, and 2013

	2003			2008			2013			Difference	Difference	Difference
Background characteristic	%	CI	p-value[1]	%	CI	p-value[1]	%	CI	p-value[1]	2003-2008[2]	2008-2013[2]	2003-2013[2]
Total	35.1	31.4 - 39.1		38.9	37.2 - 40.7		38.1	36.2 - 40.1		3.8	-0.8	3.0
Age at the child's birth			<0.001			<0.001			<0.001			
Less than 18	20.9	16.7 - 25.8		21.1	18.9 - 23.6		21.4	18.7 - 24.3		0.2	0.3	0.5
18-34	36.6	32.6 - 40.8		41.3	39.4 - 43.2		39.8	37.8 - 41.9		4.7*	-1.5	3.2
35 or older	36.3	30.7 - 42.3		35.6	33.2 - 38.0		37.3	34.9 - 39.8		-0.7	1.7	1.0
Parity at the child's birth			<0.001			<0.001			<0.001			
1	45.3	39.4 - 51.4		51.5	49.0 - 54.0		51.2	48.5 - 54.0		6.2	-0.3	5.9
2-3	39.8	34.5 - 45.4		45.5	43.2 - 47.7		44.6	42.1 - 47.1		5.7	-0.9	4.8
4-5	37.5	32.4 - 42.8		39.4	37.1 - 41.7		38.4	35.9 - 41.0		1.9	-1.0	0.9
6+	24.4	20.5 - 28.7		25.9	23.9 - 27.9		25.2	23.3 - 27.1		1.5	-0.7	0.8
Education			<0.001			<0.001			<0.001			
None	12.7	10.3 - 15.5		11.5	10.4 - 12.7		11.7	10.4 - 13.2		-1.2	0.2	-1.0
Primary	43.8	38.5 - 49.4		44.2	41.4 - 47.0		44.3	41.3 - 47.3		0.4	0.1	0.5
Secondary or higher	74.1	67.8 - 79.5		77.0	74.9 - 79.0		75.6	73.5 - 77.5		2.9	-1.4	1.5
Household wealth			<0.001			<0.001			<0.001			
Lowest	11.6	8.6 - 15.3		8.3	6.9 - 10.0		5.7	4.7 - 6.8		-3.3	-2.6**	-5.9***
Second	17.7	14.3 - 21.7		17.6	15.5 - 19.8		17.3	15.2 - 19.5		-0.1	-0.3	-0.4
Middle	26.3	20.6 - 32.9		37.5	34.6 - 40.6		39.9	36.7 - 43.2		11.2**	2.4	13.6***
Fourth	50.1	43.8 - 56.5		63.3	60.2 - 66.2		62.1	58.8 - 65.2		13.2***	-1.2	12.0***
Highest	84.3	78.3 - 88.9		85.7	83.5 - 87.6		85.3	83.0 - 87.4		1.4	-0.4	1.0
Locality			<0.001			<0.001			<0.001			
Urban	58.5	51.4 - 65.2		65.4	62.4 - 68.3		67.0	63.7 - 70.1		6.9	1.6	8.5*
Rural	25.7	21.7 - 30.2		27.7	25.8 - 29.7		22.7	20.7 - 24.8		2.0	-5.0***	-3.0
Zone			<0.001			<0.001			<0.001			
North Central	48.6	40.4 - 56.9		42.7	37.6 - 48.0		46.5	42.2 - 50.9		-5.9	3.8	-2.1
North East	19.8	14.7 - 26.2		15.5	12.9 - 18.5		19.9	16.7 - 23.5		-4.3	4.4*	0.1
North West	12.3	9.2 - 16.5		9.8	8.2 - 11.6		12.3	10.3 - 14.7		-2.5	2.5	0.0
South East	87.4	74.7 - 94.3		81.8	75.8 - 86.6		82.2	78.0 - 85.8		-5.6	0.4	-5.2
South South	55.6	45.5 - 65.3		55.8	50.4 - 61.0		55.4	50.5 - 60.2		0.2	-0.4	-0.2
South West	80.9	75.5 - 85.2		76.5	72.1 - 80.4		82.5	77.3 - 86.8		-4.4	6.0	1.6

[1] p-value of association test for each year. [2] Percentage point difference between 2008 and 2003, 2013 and 2008, and 2013 and 2003 with significant tests for the difference in proportions.
p-values *<0.05, **<0.01, ***<0.001

Appendix Table 9. Percentage of births that were delivered by cesarean section among children born in the 5 years preceding the survey, according to background characteristics, Nigeria 2003, 2008, and 2013

Background characteristic	2003			2008			2013			Difference 2003-2008[2]	Difference 2008-2013[2]	Difference 2003-2013[2]
	%		p-value[1]	%	CI	p-value[1]	%		p-value[1]			
Total	1.7	1.2 - 2.5		1.8	1.6 - 2.1		2.0	1.8 - 2.3		0.1	0.2	0.3
Age at the child's birth			0.09			0.003			<0.001			
Less than 18	0.9	0.4 - 2.3		0.7	0.4 - 1.2		0.9	0.5 - 1.5		-0.2	0.2	0.0
18-34	1.8	1.2 - 2.6		1.9	1.7 - 2.2		2.0	1.7 - 2.3		0.1	0.1	0.2
35 or older	1.9	0.8 - 4.4		1.8	1.3 - 2.3		2.7	2.2 - 3.5		-0.1	0.9*	0.8
Parity at the child's birth			0.004			<0.001			<0.001			
1	4.3	2.6 - 7.2		3.8	3.0 - 4.7		4.3	3.6 - 5.2		-0.5	0.5	0.0
2-3	1.6	1.0 - 2.5		2.5	2.1 - 3.0		2.5	2.0 - 3.0		0.9	0.0	0.9
4-5	1.8	0.8 - 4.3		1.4	1.1 - 1.7		1.7	1.3 - 2.2		-0.4	0.3	-0.1
6+	0.7	0.3 - 1.5		0.7	0.5 - 1.0		0.9	0.7 - 1.3		0.0	0.2	0.2
Education			<0.001			<0.001			<0.001			
None	0.4	0.2 - 0.8		0.4	0.3 - 0.5		0.5	0.3 - 0.6		0.0	0.1	0.1
Primary	1.3	0.8 - 2.3		1.4	1.0 - 1.8		1.6	1.3 - 2.0		0.1	0.2	0.3
Secondary or higher	4.9	3.2 - 7.5		4.4	3.8 - 5.1		4.7	4.1 - 5.5		-0.5	0.3	-0.2
Household wealth			<0.001			<0.001			<0.001			
Lowest	0.5	0.2 - 1.2		0.3	0.2 - 0.4		0.5	0.3 - 0.8		-0.2	0.2	0.0
Second	0.7	0.3 - 1.7		0.4	0.3 - 0.6		0.7	0.5 - 1.0		-0.3	0.3*	0.0
Middle	1.0	0.5 - 2.2		0.8	0.6 - 1.2		1.3	0.9 - 1.7		-0.2	0.5	0.3
Fourth	1.6	0.7 - 3.3		2.7	2.1 - 3.4		2.2	1.7 - 2.8		1.1	-0.5	0.6
Highest	5.8	3.6 - 9.2		6.1	5.1 - 7.2		6.7	5.7 - 8.0		0.3	0.6	0.9
Locality			0.001			<0.001			<0.001			
Urban	3.5	2.1 - 5.9		3.7	3.1 - 4.4		3.9	3.4 - 4.6		0.2	0.2	0.4
Rural	1.0	0.6 - 1.6		1.0	0.8 - 1.3		1.0	0.8 - 1.2		0.0	0.0	0.0
Zone			<0.001			<0.001			<0.001			
North Central	0.9	0.4 - 2.0		2.0	1.6 - 2.5		2.3	1.7 - 3.0		1.1	0.3	1.4*
North East	1.1	0.4 - 2.9		0.6	0.3 - 1.0		0.9	0.7 - 1.3		-0.5	0.3	-0.2
North West	0.5	0.2 - 1.0		0.4	0.2 - 0.6		0.6	0.4 - 0.9		-0.1	0.2	0.1
South East	8.6	4.4 - 16.1		3.9	2.9 - 5.4		3.9	3.1 - 4.8		-4.7*	0.0	-4.7*
South South	2.5	1.3 - 4.7		3.2	2.3 - 4.3		4.1	2.8 - 5.9		0.7	0.9	1.6
South West	3.9	2.4 - 6.5		3.4	2.7 - 4.2		4.5	3.6 - 5.5		-0.5	1.1*	0.6

[1] p-value of association test for each year. [2] Percentage point difference between 2008 and 2003, 2013 and 2008, and 2013 and 2003 with significant tests for the difference in proportions.
p-values *<0.05, **<0.01, ***<0.001

Appendix Table 10. Percentage of women who received a postnatal check-up within 2 days of delivering their most recent child among women age 15-49 with a live birth in the 5 years preceding the survey, according to background characteristics, Nigeria 2008 and 2013[3]

Background characteristic	2008			2013			Difference 2008-2013[2]
	%	CI	p-value[1]	%	CI	p-value[1]	
Total	38.3	36.8 - 39.9		40.2	38.6 - 41.8		1.9
Age at the child's birth			<0.001			<0.001	
Less than 18	27.4	24.2 - 30.8		30.5	27.0 - 34.1		3.1
18-34	39.8	38.2 - 41.4		41.2	39.6 - 42.9		1.4
35 or older	35.9	33.6 - 38.2		38.9	36.8 - 41.2		3.0
Parity at the child's birth			<0.001			<0.001	
1	45.9	43.4 - 48.3		49.4	46.9 - 51.9		3.5*
2-3	43.2	41.2 - 45.3		44.2	42.1 - 46.4		1.0
4-5	38.4	36.3 - 40.5		40.0	37.9 - 42.2		1.6
6+	27.5	25.7 - 29.4		29.3	27.6 - 31.1		1.8
Sex of child			0.681			0.006	
Male	38.5	36.8 - 40.3		39.7	38.0 - 41.5		1.2
Female	38.1	36.4 - 39.9		40.6	38.9 - 42.4		2.5*
Education			<0.001			<0.001	
None	18.5	16.8 - 20.2		18.7	17.2 - 20.3		0.2
Primary	42.3	40.1 - 44.6		46.6	44.2 - 49.0		4.3*
Secondary or higher	63.9	61.9 - 65.8		67.6	65.7 - 69.5		3.7**
Household wealth			<0.001			<0.001	
Lowest	14.9	13.1 - 17.0		12.1	10.6 - 13.9		-2.8
Second	22.5	20.3 - 25.0		23.9	21.9 - 26.0		1.4
Middle	37.6	35.1 - 40.1		42.7	40.0 - 45.5		5.1**
Fourth	54.2	51.6 - 56.8		59.0	55.9 - 62.0		4.8*
Highest	73.5	71.2 - 75.7		75.5	72.7 - 78.1		2.0
Locality			<0.001			<0.001	
Urban	58.4	55.8 - 61.1		60.2	57.5 - 62.9		1.8
Rural	29.6	27.8 - 31.5		29.1	27.4 - 30.9		-0.5
Zone			<0.001			<0.001	
North Central	39.2	35.2 - 43.4		47.4	43.4 - 51.4		8.2**
North East	27.1	24.0 - 30.5		30.7	27.6 - 33.9		3.6
North West	17.4	14.9 - 20.2		18.2	16.0 - 20.5		0.8
South East	40.0	35.9 - 44.3		59.7	55.9 - 63.4		19.7***
South South	59.4	56.1 - 62.5		60.9	57.3 - 64.4		1.5
South West	67.5	64.0 - 70.9		74.0	70.0 - 77.6		6.5*

[1] p-value of association test for each year. [2] Percentage point difference between 2008 and 2013 with significant tests for the difference in proportions. [3] 2003 not included because PNC was not asked of all women with a live birth in the last five years.
p-values *<0.05, **<0.01, ***<0.001

Appendix Table 11. Percentage of births with maternal fertility risk among children born in the 5 years preceding the survey, according to background characteristics, Nigeria 2003, 2008, and 2013

	Young age (<18 years)												Older age (>34 years)											
	2003			2008			2013						2003			2008			2013					
Background characteristic	%	CI	p-value[1]	%	CI	p-value[1]	%	CI	p-value[1]	Difference 2003-2008[2]	Difference 2008-2013[2]	Difference 2003-2013[2]	%	CI	p-value[1]	%	CI	p-value[1]	%	CI	p-value[1]	Difference 2003-2008[2]	Difference 2008-2013[2]	Difference 2003-2013[2]
Total	8.9	7.8 - 10.1		7.3	6.9 - 7.7		7.1	6.6 - 7.6		-1.6**	-0.2	-1.8**	16.6	15.2 - 18.2		18.2	17.5 - 18.9		18.3	17.6 - 19.0		1.6	0.1	1.7
Education			<0.001			<0.001			<0.001						<0.001			<0.001			<0.001			
None	11.2	9.6 - 13.1		10.3	9.6 - 11.1		9.6	8.8 - 10.4		-0.9	-0.7	-1.6	18.4	16.1 - 20.9		20.0	19.1 - 21.0		19.7	18.6 - 20.7		1.6	-0.3	1.3
Primary	8.2	6.3 - 10.5		5.8	5.1 - 6.6		5.8	5.1 - 6.7		-2.4*	0.0	-2.4*	18.7	15.9 - 22.0		19.8	18.4 - 21.3		22.2	20.6 - 24.0		1.1	2.4*	3.5
Secondary or higher	4.5	3.4 - 6.1		3.8	3.3 - 4.3		3.9	3.4 - 4.4		-0.7	0.1	-0.6	11.0	8.8 - 13.6		14.1	13.1 - 15.3		13.9	12.8 - 15.0		3.1*	-0.2	2.9*
Household wealth			<0.001			<0.001			<0.001						0.749			0.005			0.042			
Lowest	9.7	7.8 - 12.0		10.8	9.8 - 11.8		10.3	9.2 - 11.4		1.1	-0.5	0.6	17.0	14.0 - 20.4		19.6	18.3 - 21.0		20.1	18.8 - 21.6		2.6	0.5	3.1
Second	10.3	8.2 - 12.9		9.7	8.8 - 10.7		9.5	8.6 - 10.6		-0.6	-0.2	-0.8	17.5	14.4 - 21.1		19.1	17.8 - 20.5		17.2	15.9 - 18.7		1.6	-1.9	-0.3
Middle	10.9	8.4 - 14.1		7.0	6.2 - 7.9		7.2	6.3 - 8.3		-3.9**	0.2	-3.7**	17.2	14.1 - 20.8		18.5	17.1 - 20.0		18.2	16.9 - 19.6		1.3	-0.3	1.0
Fourth	8.5	6.4 - 11.1		5.3	4.6 - 6.1		4.3	3.6 - 5.2		-3.2**	-1.0	-4.2***	16.5	13.6 - 19.8		16.4	14.9 - 18.0		18.0	16.4 - 19.8		-0.1	1.6	1.5
Highest	3.8	2.6 - 5.5		1.7	1.3 - 2.2		1.8	1.4 - 2.3		-2.1**	0.1	-2.0**	14.5	11.5 - 18.2		16.5	14.8 - 18.4		17.7	16.1 - 19.5		2.0	1.2	3.2
Locality			0.04			<0.001			<0.001						0.781			<0.001			0.091			
Urban	7.0	5.3 - 9.2		4.1	3.5 - 4.8		3.6	3.1 - 4.2		-2.9**	-0.5	-3.4***	16.9	14.6 - 19.6		16.4	15.2 - 17.7		19.2	17.9 - 20.6		-0.5	2.8**	2.3
Rural	9.6	8.3 - 11.1		8.6	8.1 - 9.2		8.9	8.2 - 9.6		-1.0	0.3	-0.7	16.5	14.7 - 18.5		18.9	18.1 - 19.7		17.9	17.0 - 18.7		2.4*	-1.0	1.4
Zone			<0.001			<0.001			<0.001						0.149			0.408			0.001			
North Central	5.3	3.8 - 7.3		7.1	6.2 - 8.3		6.4	5.2 - 7.9		1.8	-0.7	1.1	15.5	12.3 - 19.5		18.5	17.0 - 20.1		16.5	14.9 - 18.3		3.0	-2.0	1.0
North East	11.4	8.7 - 14.9		10.5	9.4 - 11.7		9.6	8.5 - 10.9		-0.9	-0.9	-1.8	15.8	12.7 - 19.5		17.0	15.7 - 18.4		16.1	14.7 - 17.7		1.2	-0.9	0.3
North West	12.4	10.6 - 14.5		10.6	9.8 - 11.6		9.5	8.5 - 10.5		-1.8	-1.1	-2.9**	15.2	12.8 - 18.1		18.5	17.3 - 19.7		18.8	17.6 - 20.1		3.3*	0.3	3.6*
South East	2.8	1.3 - 6.1		2.7	2.1 - 3.4		2.3	1.6 - 3.3		-0.1	-0.4	-0.5	21.3	16.9 - 26.5		19.1	17.0 - 21.5		21.1	18.8 - 23.6		-2.2	2.0	-0.2
South South	5.9	3.9 - 8.8		4.2	3.5 - 5.1		5.0	4.2 - 6.1		-1.7	0.8	-0.9	20.4	16.2 - 25.3		17.1	15.3 - 19.0		20.3	18.4 - 22.4		-3.3	3.2*	-0.1
South West	2.1	1.1 - 3.9		2.9	2.3 - 3.7		2.3	1.8 - 2.9		0.8	-0.6	0.2	17.8	14.3 - 21.9		18.8	16.9 - 21.0		18.3	16.4 - 20.5		1.0	-0.5	0.5

[1] p-value of association test for each year. [2] Percentage point difference between 2008 and 2003, 2013 and 2008, and 2013 and 2003 with significant tests for the difference in proportions.
p-values *<0.05, **<0.01, ***<0.001

Continues

Appendix Table 11. − *Continued*

Background characteristic	Short preceding birth interval (<24 months)												High parity (4 or higher)										
	2003			2008			2013			Difference 2003-2008[2]	Difference 2008-2013[2]	Difference 2003-2013[2]	2003			2008			2013			Difference 2003-2008[2]	Difference 2008-2013[2]	Difference 2003-2013[2]
	%	CI	p-value[1]	%	CI	p-value[1]	%	CI	p-value[1]				%	CI	p-value[1]	%	CI	p-value[1]	%	CI	p-value[1]			
Total	19.2	17.7 - 20.8		19.2	18.6 - 19.9		18.6	18.1 - 19.2		0.0	-0.6	-0.6	48.8	46.7 - 50.8		47.7	46.7 - 48.6		48.1	47.1 - 49.1		-1.1	0.4	-0.7
Education			0.050			<0.001			<0.001						<0.001			<0.001			<0.001			
None	21.2	19.3 - 23.2		20.4	19.5 - 21.4		20.2	19.3 - 21.1		-0.8	-0.2	-1.0	54.9	51.9 - 57.9		56.4	55.3 - 57.5		57.2	55.8 - 58.6		1.5	0.8	2.3
Primary	18.0	15.7 - 20.5		19.1	18.0 - 20.3		18.0	16.8 - 19.3		1.1	-1.1	0.0	51.9	48.2 - 55.6		53.5	51.6 - 55.5		55.8	53.7 - 57.8		1.6	2.3	3.9
Secondary or higher	16.2	12.5 - 20.8		17.4	16.3 - 18.6		16.7	15.7 - 17.7		1.2	-0.7	0.5	32.8	28.9 - 37.0		29.8	28.3 - 31.2		29.3	27.9 - 30.7		-3.0	-0.5	-3.5
Household wealth			0.172			0.036			<0.001						<0.001			<0.001			<0.001			
Lowest	21.7	18.8 - 24.8		19.4	18.2 - 20.7		19.6	18.4 - 20.9		-2.3	0.2	-2.1	55.6	51.7 - 59.4		54.4	52.8 - 56.1		58.1	56.4 - 59.9		-1.2	3.7**	2.5
Second	20.7	17.9 - 23.8		20.6	19.4 - 21.9		20.8	19.6 - 22.0		-0.1	0.2	0.1	54.2	50.2 - 58.2		54.4	52.7 - 56.1		52.2	50.4 - 53.9		0.2	-2.2	-2.0
Middle	19.4	16.2 - 22.9		19.5	18.2 - 20.8		17.8	16.6 - 19.1		0.1	-1.7	-1.6	48.8	44.3 - 53.3		50.5	48.6 - 52.3		49.1	47.2 - 51.1		1.7	-1.4	0.3
Fourth	16.1	13.6 - 18.9		17.9	16.5 - 19.3		17.5	16.2 - 18.9		1.8	-0.4	1.4	46.5	42.0 - 51.0		42.7	40.7 - 44.7		43.5	41.5 - 45.6		-3.8	0.8	-3.0
Highest	17.2	12.4 - 23.3		18.2	16.7 - 19.8		16.5	15.0 - 18.1		1.0	-1.7	-0.7	34.7	30.4 - 39.4		31.4	29.3 - 33.7		32.2	30.3 - 34.2		-3.3	0.8	-2.5
Locality			0.230			0.163			0.028						0.010			<0.001			<0.001			
Urban	17.5	14.3 - 21.2		18.5	17.3 - 19.7		17.7	16.7 - 18.8		1.0	-0.8	0.2	44.5	40.6 - 48.4		39.9	38.1 - 41.7		42.5	40.8 - 44.3		-4.6*	2.6*	-2.0
Rural	19.9	18.2 - 21.7		19.5	18.7 - 20.3		19.1	18.4 - 19.9		-0.4	-0.4	-0.8	50.5	48.1 - 52.9		51.0	49.9 - 52.0		51.1	50.0 - 52.3		0.5	0.1	0.6
Zone			<0.001			<0.001			<0.001						<0.001			<0.001			<0.001			
North Central	15.9	13.3 - 18.9		15.9	14.5 - 17.4		15.3	14.1 - 16.4		0.0	-0.6	-0.6	44.7	39.9 - 49.5		46.5	44.2 - 48.8		43.5	40.8 - 46.2		1.8	-3.0	-1.2
North East	23.3	20.8 - 26.0		21.2	19.8 - 22.7		21.4	20.2 - 22.8		-2.1	0.2	-1.9	54.9	51.4 - 58.3		56.2	54.4 - 58.0		52.5	50.4 - 54.6		1.3	-3.7**	-2.4
North West	20.0	17.3 - 22.9		20.6	19.3 - 21.9		19.6	18.6 - 20.7		0.6	-1.0	-0.4	51.5	47.7 - 55.4		54.3	53.0 - 55.6		55.9	54.4 - 57.4		2.8	1.6	4.4*
South East	26.4	17.9 - 37.1		26.8	24.5 - 29.2		23.5	21.6 - 25.5		0.4	-3.3*	-2.9	43.2	32.5 - 54.6		43.1	39.8 - 46.3		41.9	38.9 - 45.0		-0.1	-1.2	-1.3
South South	15.5	12.0 - 19.8		19.6	17.9 - 21.4		17.2	16.0 - 18.4		4.1	-2.4*	1.7	46.7	41.5 - 51.9		42.0	39.0 - 45.1		40.7	38.2 - 43.2		-4.7	-1.3	-6.0*
South West	10.8	7.9 - 14.6		12.3	11.1 - 13.7		13.6	11.9 - 15.6		1.5	1.3	2.8	34.3	29.9 - 39.0		34.6	32.3 - 36.9		35.1	32.4 - 37.9		0.3	0.5	0.8

[1] p-value of association test for each year. [2] Percentage point difference between 2008 and 2003, 2013 and 2008, and 2013 and 2003 with significant tests for the difference in proportions.
p-values *<0.05, **<0.01, ***<0.001

Continues

Appendix Table 11. – *Continued*

Background characteristic	Any risk											
	2003			2008			2013			Difference 2003-2008[2]	Difference 2008-2013[2]	Difference 2003-2013[2]
	%	CI	p-value[1]	%	CI	p-value[1]	%	CI	p-value[1]			
Total	65.2	63.5 - 66.9		63.9	63.0 - 64.8		63.9	63.1 - 64.8		-1.3	0.0	-1.3
Education			<0.001			<0.001			<0.001			
None	73.2	71.1 - 75.2		73.0	72.1 - 74.0		73.0	72.0 - 74.0		-0.2	0.0	-0.2
Primary	65.6	62.4 - 68.6		67.0	65.3 - 68.7		68.8	67.1 - 70.5		1.4	1.8	3.2
Secondary or higher	48.2	44.5 - 51.8		47.4	46.0 - 48.9		46.9	45.5 - 48.3		-0.8	-0.5	-1.3
Household wealth			<0.001			<0.001			<0.001			
Lowest	72.1	68.7 - 75.2		71.2	69.7 - 72.6		73.8	72.4 - 75.2		-0.9	2.6*	1.7
Second	71.2	68.1 - 74.1		70.6	69.1 - 72.0		69.1	67.6 - 70.6		-0.6	-1.5	-2.1
Middle	66.0	62.7 - 69.2		66.2	64.5 - 67.8		64.4	62.7 - 66.0		0.2	-1.8	-1.6
Fourth	62.2	58.4 - 65.9		57.8	55.9 - 59.8		57.8	55.9 - 59.7		-4.4*	0.0	-4.4*
Highest	50.6	46.3 - 54.9		48.7	46.6 - 50.7		48.9	46.8 - 50.9		-1.9	0.2	-1.7
Locality			<0.001			<0.001			<0.001			
Urban	60.2	57.5 - 63.0		56.1	54.4 - 57.8		57.7	56.1 - 59.2		-4.1*	1.6	-2.5
Rural	67.3	65.2 - 69.3		67.2	66.2 - 68.2		67.3	66.3 - 68.3		-0.1	0.1	0.0
Zone			<0.001			<0.001			<0.001			
North Central	58.1	54.2 - 61.9		61.6	59.3 - 63.9		58.2	55.8 - 60.7		3.5	-3.4*	0.1
North East	73.2	70.4 - 75.9		72.8	71.1 - 74.4		69.5	67.9 - 71.0		-0.4	-3.3**	-3.7*
North West	70.7	67.8 - 73.4		71.5	70.2 - 72.7		71.5	70.3 - 72.8		0.8	0.0	0.8
South East	60.3	52.3 - 67.9		62.6	60.0 - 65.2		60.1	57.3 - 62.9		2.3	-2.5	-0.2
South South	59.2	54.3 - 64.0		57.6	55.0 - 60.1		57.0	54.6 - 59.4		-1.6	-0.6	-2.2
South West	45.3	40.2 - 50.4		48.0	45.8 - 50.2		49.1	46.5 - 51.7		2.7	1.1	3.8

[1] p-value of association test for each year. [2] Percentage point difference between 2008 and 2003, 2013 and 2008, and 2013 and 2003 with significant tests for the difference in proportions.
p-values *<0.05, **<0.01, ***<0.001