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MEASURE DHS assists countries worldwide in the collection and use of data to monitor and evaluate population, health, and nutrition programs. Additional information about the MEASURE DHS project can be obtained by contacting MEASURE DHS, ICF International, 11785 Beltsville Drive, Suite 300, Calverton, MD 20705 (telephone: 301-572-0200; fax: 301-572-0999; e-mail: reports@measuredhs.com; internet: www.measuredhs.com).

ABSTRACT

This study examines the relationship between the utilization of maternal health care and the postpartum use of contraception in Nigeria.

Method: The analysis was based on the data from the Women's Questionnaire and the calendar data from the 2008 Nigeria Demographic and Health Survey (NDHS). Postpartum contraceptive use was analyzed from calendar data among postpartum women whose most recent birth was between January 2003 and one full year before the date of interview in 2008. [1] The study employed the bivariate (nonparametric test) and multivariate (logistic regression model) methods to investigate the association between the outcome variable (postpartum use of contraception) and several independent variables reflecting use of maternal health care services (number of antenatal care visits, delivery in a health facility, and timing of the first postnatal check-up).

Results: Overall, 8 percent of women used a modern method of contraception during the postpartum period. Almost half of the postpartum women (43 percent) made the WHO-recommended minimum number of four antenatal care visits. Only 35 percent of postpartum women delivered in a health facility. Just 40 percent of the women received a postnatal check-up within six weeks after last childbirth.

The use of maternal health services (ANC visits and timing of postnatal check-up) is significantly associated with the use of a modern method of contraception during the postpartum period. Other significant predictors of the use of a modern method in the postpartum period include region, education, the household wealth index, and exposure to family planning messages.

The findings suggest that contraceptive use among postpartum women will increase substantially if more women use maternal health care services, especially for antenatal care and postnatal care.

Keywords: postpartum, contraceptive use, maternal health care

[1] The NDHS was fielded from June to October 2008, and women were asked questions about maternal healthcare only about their most recent birth since January of 2003. In order to obtain a full year's worth of postpartum family planning information, only women whose most recent birth took place between January 2003 and at least one full year before the date of interview were included.

INTRODUCTION

Postpartum family planning (PPFP) has long been recognized as an important component of maternal health care. Through birth spacing and prevention of high-risk and unwanted pregnancies, PPFP helps women who have recently delivered to avoid exposure to the risks of maternal death. Likewise, the importance of the interplay between maternal health services and use of contraception in the postpartum period has been recognized for decades. For instance, in 1966 the Population Council launched an International Postpartum Program (IPP) to integrate family planning and maternal and child health services in certain countries (Ringheim 2011). Although the IPP was successful, the Population Council's proposed global plan for integration of maternal and child health services with family planning (Taylor and Berelson 1971) was not realized.

After decades of relegation to the back line in international health priorities, postpartum family planning has again come to the fore of international attention. For example, the London Summit on Family Planning in July 2012 emphasized international prioritization of PPFP. Major stakeholders at the meeting, including the United States Agency for International Development (USAID), the United Nations Population Fund (UNFPA), the World Bank, Save the Children, and the Bill and Melinda Gates Foundation, to mention only a few, issued a joint statement urging collective action for postpartum family planning. Also, Millennium Development Goal (MDG) 5(b) emphasizes universal access to reproductive health care, with the aim of increasing the contraceptive prevalence rate, increasing antenatal care coverage, and reducing unmet need for family planning, which includes unmet need among postpartum women.[2]

Many women in the postpartum period do not start to use contraception until the return of menstruation, but they become fecund before menstruation returns, and, thus, they are at risk of unwanted pregnancy if sexual activity has resumed (Borda et al. 2010). Unintended pregnancy is a global occurrence, and it is identified as the root cause of abortion worldwide, particularly in the developing world.

An estimated 215 million women in the developing countries have an unmet need for family planning, and 82 percent of unintended pregnancies in the developing countries occur

[2] Available at http://unstats.un.org/unsd/mdg/host.aspx?content=indicators/officiallist.htm

among women with unmet need (Guttmacher 2012). Typically, women's level of unmet need is particularly high in the postpartum period (Ross and Winfrey 2001).

The linkage between the use of maternal health care during pregnancy and the uptake of contraception in the postpartum period has been studied previously. For instance, a study on the relationship between use of antenatal care and use of modern contraception in Bolivia, Egypt, and Thailand found that women's use of health care services during the antenatal and postpartum stages offers an opportunity to counsel them on contraception and to make services available to them. The authors' hypothesis that that early exposure to pregnancy-related services can increase a woman's propensity to use modern contraceptives in the postpartum period was also validated by their findings (Zerai and Tsui 2001).

This paper examines the use of modern contraception in the postpartum period in Nigeria and relates it to women's use of maternal health care. We seek to assess whether women's interactions with health service providers during pregnancy, childbirth, and the postnatal period have influenced their use of a modern method of family planning.

Rationale for Postpartum Family Planning

Globally, more than 90 percent of women during the first year postpartum want to either delay or avoid future pregnancies (Ross and Winfrey 2001). An increase in contraceptive use during the postpartum period should substantially reduce rates of maternal and infant mortality by preventing unplanned and unwanted pregnancies and by spacing new pregnancies at least two years after the previous birth (Vernon 2009). Laukaran and Winikoff (1985) laid out the rationale for postpartum contraception: First, women in the postpartum period may be most motivated to avoid pregnancy and thus to use contraception. Second, if women do not initiate contraception immediately after childbirth, they may become pregnant before their next encounter with a health or family planning provider.

Furthermore, integrating family planning into antenatal and postpartum care offers a number of potential benefits—broader cultural acceptability of family planning when presented as a component of maternal and child health services, the fact that women who receive counseling during a facility stay for delivery are more likely to use contraceptives in the

postpartum period, and the improved ability of providers to make a more comprehensive assessment of women's reproductive health needs and to respond to those needs and so improve health outcomes.

Based on this rationale and the fact that there is strong evidence of the health risks for mother and baby related to short birth intervals, intensive family planning programs need to be directed toward supplying contraceptives to women during hospitalization for maternity care (Laukaran and Winikoff 1985). Similarly, there is need to focus on the postpartum period for supplying contraceptives to women.

The Nigerian Situation

Nigeria came into existence as a geographic/political entity in 1914, following the amalgamation of the Northern and Southern Protectorates by the British colonial authorities. The country obtained independence from British colonial rule in 1960 and has since passed through various political and economic metamorphoses. The Nigerian Federation presently comprises 36 states and the Federal Capital Territory; the states are in turn grouped into six zones, namely, the North East, North West, North Central, South East, South West, and South South (see Figure 1).

Nigeria is Africa's most populous country and has the second largest economy on the continent, behind South Africa. The 2006 Population and Housing Census put the country's population at 140 million, with a growth rate of 3.2 percent per annum. The news media in Nigeria, quoting the National Population Commission, have widely reported that the country's population is now more than 167 million; a senior politician, who chairs the Senate Committee on Population and National Identity, confirmed the figure in his speech to mark the 7 billion world population day (Lawan 2012; Lawrence 2011; Olokor 2012). Nigeria is among the world's 10 countries with the largest populations, and its policy-makers are becoming increasingly concerned about its demographic profile and population dynamics.

Figure 1. Map of Nigeria

With only three years left to attain MDG 5, statistics on contraceptive prevalence, antenatal care, and unmet need for contraception in Nigeria suggest that the country may not meet the goal. The 2008 NDHS shows that only 10 percent of women are using modern methods; just 58 percent of women received antenatal care from skilled providers; and skilled providers assisted only 39 percent of deliveries (NPC and ICF International 2009).

In Nigeria, about 11 percent of pregnancies are unplanned. NPC and ORC Macro (2009) reported that overall, 4 percent of births were unwanted, while 7 percent were mistimed (wanted later) and estimated that if all unwanted births were prevented, the total fertility rate will marginally decline to 5.3 instead of 5.7. The NDHS reports in 2003 and 2008 show that the total fertility rate in Nigeria stagnated at 5.7.

Levels of contraceptive use are low in Nigeria. Although in the 2008 NDHS 72 percent of all women and 90 percent of all men knew at least one contraceptive method, only 29 percent of

currently married women had ever used a family planning method. At the time of the survey, just 15 percent of currently married women were using any contraceptive method, and only 10 percent were using a modern method—3 percent using injectable, 2 percent each using condoms and the pill, and 3 percent using various other methods. Current use of contraception in Nigeria has increased from 6 percent of currently married women in 1990 to 13 percent in 2003 and 15 percent in 2008. There has been a corresponding increase in the use of modern contraceptive methods, from 4 percent in 1990 to 8 percent in 2003 to 10 percent in 2008.

According to the 2008 NDHS, somewhat more than half of women (58 percent) received antenatal care during their most recent pregnancy from a health professional—23 percent from a doctor, 30 percent from a nurse or midwife, and 5 percent from an auxiliary nurse or midwife. Some 36 percent did not receiving any antenatal care. Slightly more than one-third (35 percent) delivered in a health facility. Twenty percent of deliveries occurred in public health facilities, and 15 percent, in private health facilities. Overall, 42 percent of mothers received a postnatal check-up, with 38 percent having the first check-up within two days of delivery (NPC and ICF International 2009). Although the use of maternal health services is relatively low, increasing family planning counseling and services addressed to the women who use these services could increase the use of modern methods in the postpartum period. One objective of this paper is to assess whether there is any linkage between use of maternal health care and postpartum contraceptive use.

Obeisat et al. (2012), in a study entitled "Postpartum learning needs: perceptions of Jordanian mothers and nurses", concluded that health care providers should plan and implement postpartum teaching programs that are culturally sensitive to mothers' needs for holistic maternal care, because the postpartum period is a time of transition, in which new mothers face numerous challenges. This study could provide some inferential evidence on whether healthcare providers are taking effective advantage of women's use of maternal health services to provide family planning information and services.

Objectives and Research Question

This study seeks to determine the proportion of women in the postpartum period using a contraceptive method, to examine the timing of initiation of postpartum contraception, and to relate the utilization of maternal health services to contraceptive use in the 12 months following childbirth. The study seeks to answer the research question: Is women's postpartum contraceptive use associated with their use of maternal health care?

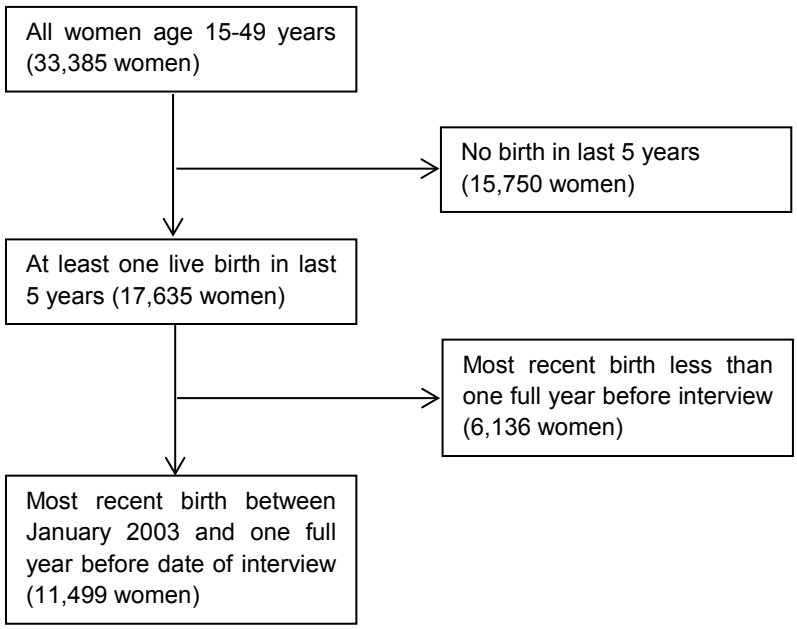
METHODOLOGY

Data

The data for this analysis come from the 2008 Nigeria Demographic and Health Survey (NDHS). The survey is a nationally representative sample of 36,800 households. All women of reproductive age (15-49 years) in these households were interviewed, and all men age 15-59 in half of the sampled households were interviewed. This analysis uses only the women's individual recode dataset.

The full women's dataset comprises interviews with 33,385 women age 15-49 years. Women were asked about receipt of maternal health care services during their most recent birth only. Therefore, in our analysis women who did not have a live birth in the five years before the survey were excluded from the sample. Also, women whose most recent birth was less than one full year before the date of interview were excluded. This ensures that all women included in the analysis have completed the full 12 months of the postpartum period, and their contraceptive behavior over the period, as detailed in the calendar data, is been taken into account. A sample of 11,499 women was thus generated and used for the analysis presented in this paper (see Figure 2).

Figure 2. Derivation of study population



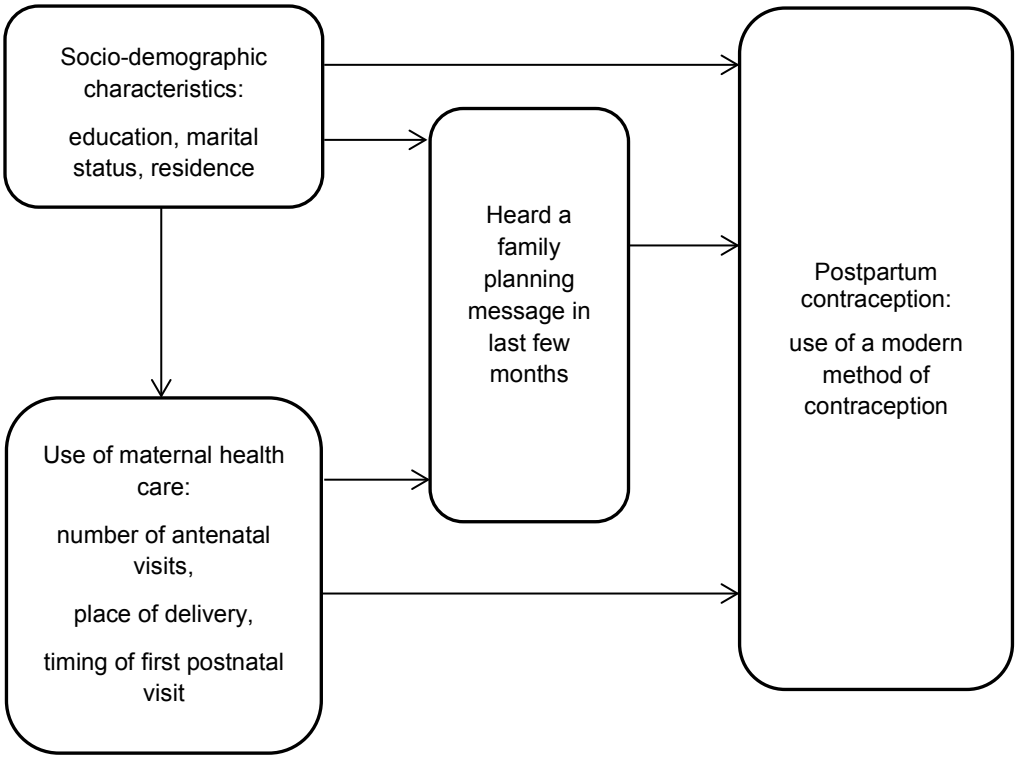
Key Variables and Measurements

The outcome variable for the study is use of postpartum family planning ("PPFP"). This is defined as a woman's use of any modern method of contraception during the 12 months following her most recent childbirth, if the birth occurred between January 2003 (base month for collection of calendar data) and at least one full year prior to her interview. Only the most recent birth was considered, even if a woman delivered more than once during the reference period, because the DHS collects some maternal health care information (on antenatal, delivery, and postnatal care) for only the most recent birth. PPFP is dichotomized into 1 and 0; PPFP is coded 1 if a woman used any modern method of contraception (pill, IUD, injection, diaphragm, condom (male or female), sterilization (male or female), implant, or foam/jelly), and coded 0 if otherwise. The Lactational Amenorrhea Method (LAM) was excluded from the modern contraception category, as it is intended for only the first six months after childbirth; its use for the entire 12-month postpartum period is not advisable.

We identified, as the independent variables, four main variables indicating use of maternal health care. These are number of antenatal care visits ("ANC"), whether the woman delivered in a health facility (place of delivery, or "POD"), delivery by a skilled birth attendant ("SBA"), and postnatal care within six weeks of delivery ("PNC"). In addition, a number of control variables were included in the multivariate models; these are mother's age at last childbirth, woman's level of education, household wealth status (measured by the wealth index), place of residence (rural or urban), marital status, region, birth order of the last child, and whether the woman had heard a family planning message in the last few months (see conceptual framework, Figure 3).

To take into account the differences in the probability of selection as well as to adjust for nonresponse, all tabulations are weighted using the women's sample weight. In addition, to account for the complex sampling design used in DHS data collection, the STATA survey command (svy) was applied in the analysis.

Figure 3. Conceptual framework of the relationship between women's use of maternal health care and postpartum use of modern contraception



Checking a set of data for the presence of multi-collinearity is recommended as a first step in any multiple regression analysis (Mansfield and Helms 1982). While high degrees of correlation between two or more predictor variables in a statistical model may not necessarily reduce the predictive power of the model as a whole (Arceneaux and Huber 2007), collinearity can still pose a problem when estimating the influence of each of the predictor variables on the outcome variable. Such problems include misleading P values, very wide confidence intervals, and the possibility of a false conclusion that there is no linear relationship between a specific predictor and the outcome variable.

We used the "collin" command, a STATA collinearity diagnostic program (Ender 2010), to test for collinearity among the predictor variables in the multiple logistic models. The results are shown in Appendices 1 and 2. A high degree of collinearity was found between POD and SBA; the variance inflation factors (VIF) are 5.68 and 6.13, respectively. However, the VIFs are 1.94 and 1.79, respectively, when either POD or SBA is not included in the model. Therefore, we

include POD in the model, but omitted SBA.[3] Appendix III presents the logistic regression results of including SBA in the model (and excluding POD); the result is similar to keeping POD (and excluding SBA) in the model. Appendix IV shows the logistic regression results of including both POD and SBA in the model.

Data Limitations

This paper is based on data obtained from a cross-sectional survey and is thus subject to the general limitations associated with cross-sectional data, especially that the data cannot be used as a basis for establishing causality among the variables and that recall bias may be associated with the retrospective collection of data. Since the outcome variable in this paper was determined using calendar data obtained at the point of interview in 2008 but dating back as far as January 2003, the possibility of recall errors cannot be ruled out. Furthermore, the control variables, including education and marital status, were current status measures in 2008 (date of interview), but were used as controls for postpartum periods stretching from January 2003 up to one full year prior to the date of interview. Additional checks were performed to mitigate the effects of these limitations arising from the nature of the data used. For marital status, we re-classified a currently married woman as never married if her date of first marriage is after her date of last birth (used to determine her postpartum status). The limitation remains that for women who are currently divorced or widowed, it is not known whether they were married at the time of the birth; however these women comprise less than 5 percent of the final sample. Concerning education, only 6 percent of the women in the sample delivered before age 18, hence we think it is reasonable to assume that the current educational status of women with no education, only primary education, or only secondary education was the same at interview as when they gave birth. The most likely change in educational status since the date of the last birth would be among women whose current educational level is post-secondary (7 percent), but this cannot be verified without dates of school attendance, which are not part of the DHS.

[3] Although delivery care by a skilled birth attendant is an essential component of maternal health care, care by an SBA may not be as important a factor in the use of PPFP as delivery in a health facility (POD).

RESULTS

Selected Background Characteristics of Respondents

This section presents selected background characteristics for postpartum women, that is, women who had their most recent birth between January 2003 and one full year before the date of interview; only the characteristics used as control variables in the multivariate model are described.

The age of the postpartum women at the time that they had their last delivery is shown in Table 1. About three of every four women (74 percent) delivered within the age range 18-34 years. The remaining one-quarter delivered at high-risk ages: 6 percent were under 18 years old when they delivered, while one-fifth (20 percent) delivered after their 35th birthdays.

A high proportion of the women (45 percent) had no formal education, while 23 percent had attended only primary school. One in every four (25 percent) had a secondary school education. Only 7 percent had post-secondary education.

As measured by the DHS 5-quintile wealth index, 23 percent of the women were in households in the lowest quintile, and about the same proportion (22 percent) were in the second quintile. Close to one-fifth (19 percent) were in the middle quintile, while about 18 percent each were in the fourth and highest quintiles.

A large majority of the women (93 percent) were married, while a small proportion (4 percent) were previously married but no longer in union due to divorce, widowhood, or separation. The remaining 3 percent were never married. This underlines the fact that childbearing in Nigeria occurs almost entirely within marital unions.

More than two-thirds (69 percent) of the postpartum women were interviewed in rural areas, while the remaining 31 percent were interviewed in the urban areas. The regional distribution of the respondents indicates that 60 percent were in the northern part of the country and 40 percent were in the southern part. The largest number of women (30 percent) were in the North West Zone.

Table 1. Background characteristics of respondents

Percent distribution of postpartum women age 15-49 in the five years preceding the survey whose most recent birth was at least one full year preceding the survey, by selected background characteristics, NDHS 2008

Background characteristic	Number of women	Percentage
Mother's age at last childbirth		
<18 years	679	5.9
18-34	8,473	73.7
35-49	2,347	20.4
Education		
No formal education	5,205	45.3
Primary	2,648	23.0
Secondary	2,904	25.2
Post-secondary	744	6.5
Place of residence		
Urban	3,513	30.6
Rural	7,986	69.4
Wealth quintile		
Lowest	2,607	22.7
Second	2,508	21.8
Middle	2,208	19.2
Fourth	2,099	18.3
Highest	2,077	18.1
Marital status		
Never married	374	3.3
Currently married	10,641	92.5
Previously married	484	4.2
Region		
North Central	1,698	14.7
North East	1,703	14.8
North West	3,490	30.4
South East	1,025	8.9
South South	1,503	13.1
South West	2,080	18.1
Birth order		
1	1,815	15.8
2-3	3,591	31.2
4-5	2,904	25.3
6+	3,190	27.7
Total	11,499	100.0

* Here and throughout the tables, women who were currently married at the time of interview in 2008, but who had their most recent birth before the date of their first marriage were re-classified as never-married.

As for the birth order of their last delivery within the study period, 16 percent of births were first-order births; 31 percent of the women were having their second or third births; while more than one-quarter of the women were giving birth to at least their sixth child, underlying the high fertility level in the country.

Use of Maternal Health Care

Table 2 shows the percent distribution of the postpartum women by their use of maternal health care—number of antenatal care visits, delivery at a health facility, and receiving postnatal care within six weeks of delivery.

Table 2. Use of maternal health care, exposure to family planning messages, and contraception

Percent distribution of postpartum women age 15-49 in the five years preceding the survey whose most recent birth was at least one full year preceding the survey, by use of maternal health care, NDHS 2008

Health care services and contraception	Number of women	Percentage
Number of ANC visits		
No visit	5,525	48.1
1-3	991	8.6
4+	4,983	43.3
Delivered at a health facility		
No	7,456	64.8
Yes	4,043	35.2
Timing of postnatal check-up		
No PNC	6,893	59.9
Within 2 days after delivery	4,255	37.0
Between 3 days and 6 weeks after delivery	351	3.1
Heard at least one family planning message in the last few months		
No	6,644	57.8
Yes	4,855	42.2
Total	11,499	100.0

ANC=antenatal care; PNC=postnatal care

Noting the importance of the various interventions provided as components of antenatal services, including tetanus toxoid vaccination, screening and treatment of infections, and identifying warning signs of pregnancy complications, the WHO recommends that a woman

make at least four antenatal care visits during pregnancy. Disaggregating the postpartum women by the number of antenatal care visits made, we find that less than half of these women (43 percent) made the recommended minimum number of four antenatal care visits during their most recent pregnancy. Another 9 percent made one to three antenatal care visits. Almost half (48 percent) reported having no antenatal care visits during their last pregnancy. Only 35 percent of postpartum women whose most recent birth was between January 2003 and one full year before the interview had delivered in a health facility.

The third main independent variable examined is the timing of postnatal care. Postnatal care is an essential component of maternal health care, as most maternal deaths occur within the first few hours of the postnatal period. It is therefore crucial that routine PNC for all mothers take place immediately after childbirth and at least in the first six weeks. In addition to checking for complications that could result in maternal deaths and morbidity, an essential component of routine PNC is counseling and the offer of a wide range of family planning services. Modifying the WHO's 6-6-6-6 model on the timing of first postnatal visits (six to 12 hours after birth, three to six days, six weeks, and six months) (Sines et al. 2007), this study categorizes timing of PNC visits into three groups: no PNC, PNC two days or less after delivery, and PNC from three days to six weeks after delivery. About three in every five postpartum women (60 percent) did not receive PNC at all, 37 percent were examined two days or less after delivery, while the remaining 3 percent had their first PNC visit three days to six weeks after delivery.

Finally, for women in our sample who had had at least two births (N=9,684), we looked at the timing between most recent and earlier birth. One-quarter of the women (25 percent) had delivered within 24 months of the previous birth.

Bivariate Results

Use of Postpartum Family Planning

Overall, the calendar data reveal that, over the five years before the survey, only 8.45 percent of the postpartum women had used any modern method of family planning (see Table 2). Figures 4a and 4b show the number of different modern contraceptive methods and the type of method used by women in the postpartum period. Of the 8.45 percent who had used a method,

almost all (8.32 percent) had used just one method over the period of 12 months following last childbirth. Male condoms were the most widely used method (3 percent). About 2 percent each relied on injections and the pill, and about 1 percent used IUDs.

Figure 4a. Number of FP methods used by women in the postpartum period (%)

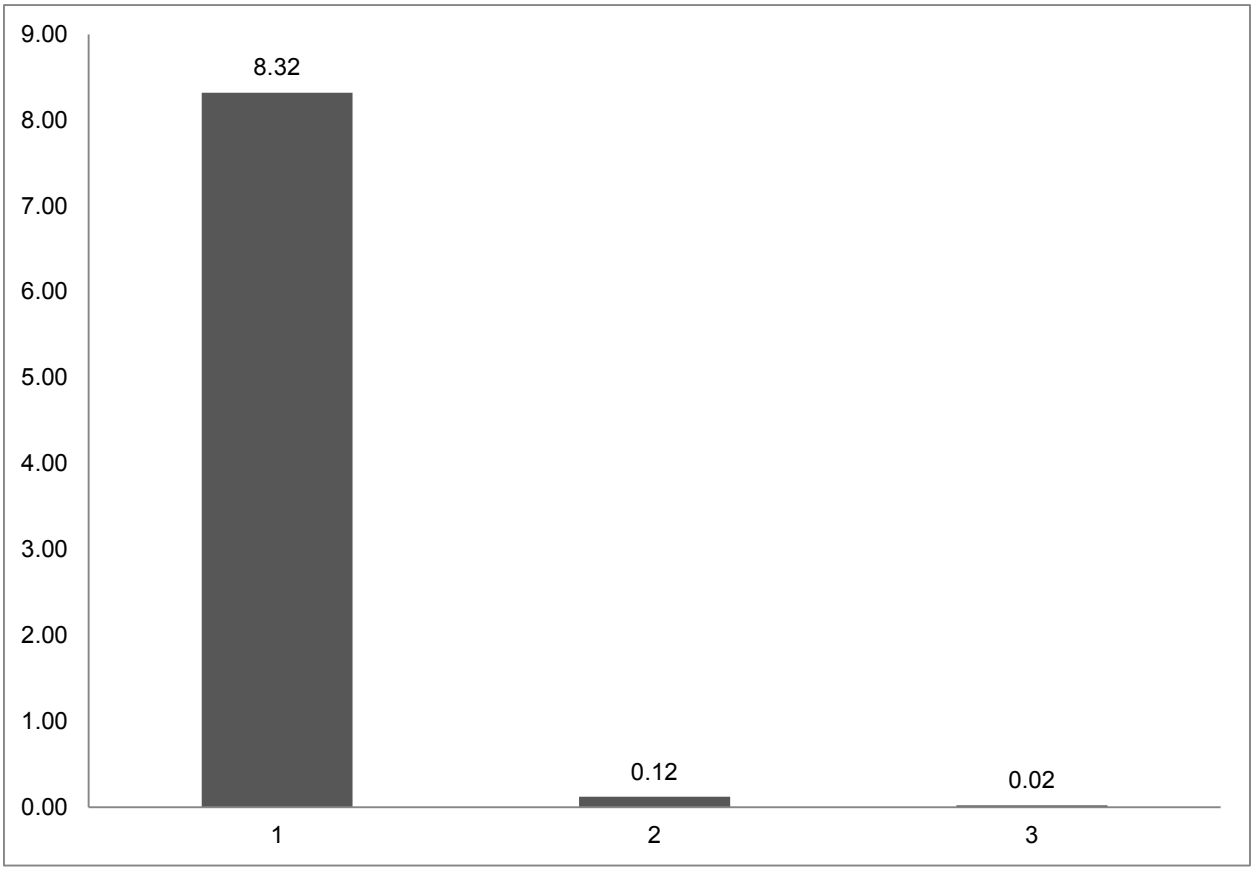


Figure 4b. Types of modern FP methods used by women in the postpartum period (%)

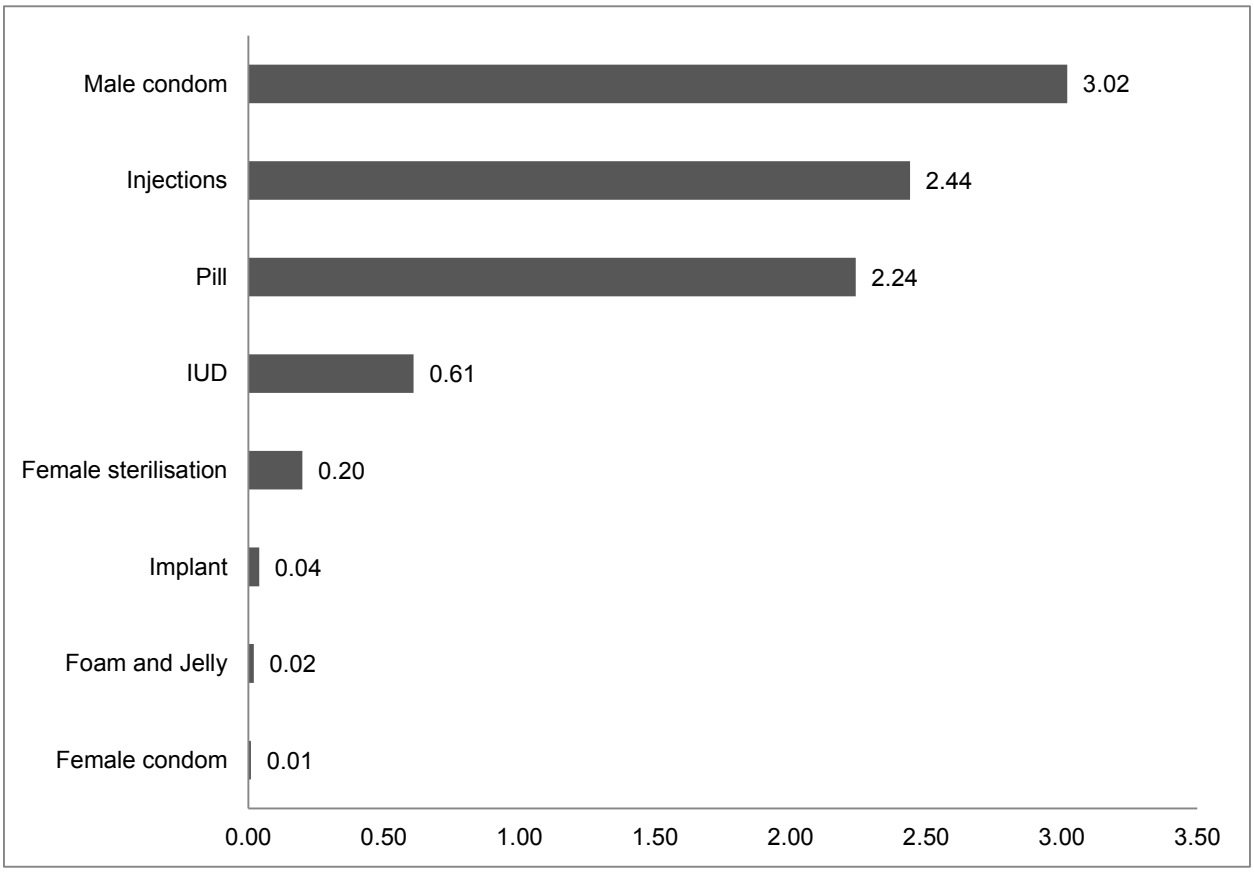


Table 3 shows the percentage of women who used a method of modern family planning in the postpartum period disaggregated by background characteristics. About the same proportion of women age 18-34 and 35-49 had used a modern method (9 percent and 8 percent, respectively), but only 3 percent of women under 18 years of age had used a modern method. Education is directly related to the use of contraception. Only 1 percent of women with no education had used modern contraceptives postpartum compared with 9 percent of those with primary education and 16 percent of those with secondary education, while one in every four women with post-secondary education (26 percent) had used modern contraception postpartum.

Table 3. Used modern method within 12 months following birth, by background characteristics

Among postpartum women age 15-49 in the five years preceding the survey, the percentage who used contraception, by background characteristics, NDHS 2008

Background characteristic	Percent using	Number of women
Mother's age at last birth		
<18 years	2.7	679
18–34	9.2	8,473
35–49	7.5	2,347
Education		
No formal education	1.4	5,205
Primary	9.2	2,648
Secondary	16.0	2,902
Post-secondary	25.6	744
Place of residence		
Urban	15.1	3,513
Rural	5.5	7,986
Wealth quintile		
Lowest	1.5	2,607
Second	3.1	2,508
Middle	6.0	2,208
Fourth	12.4	2,099
Highest	22.4	2,077
Marital status		
Never married	12.3	374
Married	8.3	10,641
Previously married	8.0	484
Region		
North Central	8.0	1,698
North East	2.4	1,703
North West	2.8	3,490
South East	11.1	1,025
South South	13.8	1,503
South West	18.1	2,080
Birth order		
1	9.8	1,815
2-3	9.5	3,591
4-5	9.8	2,904
6+	5.3	3,190
Total	8.4	11,499

As for percent distribution by place and region, 15 percent of the women who were interviewed in urban areas had used modern methods postpartum, compared with 6 percent of those interviewed in rural areas. Postpartum use of modern methods of contraception was lower in the northern regions than in the southern regions. For instance, only 2 percent of postpartum women in the North East and 3 percent in the North West had used a modern method, and fewer than one in every 10 (8 percent) of postpartum women in the North Central region had used modern methods of contraception postpartum. In contrast, more than one in every 10 postpartum women in each of the southern regions had used modern contraception: 11 percent in the South East, 14 percent in the South South, and 18 percent in the South West.

As to other characteristics, a higher proportion of never-married postpartum women ad used modern methods of contraception (12 percent) than of currently married and of formerly married women (8 percent each). Household wealth, measured by the DHS Wealth Index, is directly related to the use of modern contraception postpartum. Much smaller percentages of postpartum women in the lower wealth quintiles had used modern contraception than those in the higher wealth quintiles. The birth order of the last birth, however, does not appear to be related to use of modern contraception, although the use of modern contraception was relatively low among women whose last childbirth was a sixth or higher birth order.

Use of Maternal Health Care and Postpartum Contraception

We used chi-square tests to gauge the association between the each of the three main independent variables and use of modern contraception by postpartum women. Table 4 presents the findings.

The number of antenatal care visits is significantly related to the use of modern contraception ($p<0.01$); as the number of antenatal care visits increases, the percentage using modern methods of contraception also increases. Only 4 percent of postpartum women who did not have any antenatal care visits during their last pregnancy had used a modern method of contraception postpartum, compared with 7 percent of those with one to three antenatal care visits and 14 percent of those with four or more antenatal care visits.

Table 4. Used modern methods within 12 months following birth, by use of health care services

Among postpartum women age 15-49 in the five years preceding the survey, the percentage who used contraception, by use of health care services, NDHS 2008

Health care services	Percent using	Number of women
Number of ANC visits		
No visit	3.8	5,525
1-3	7.4	991
4+	13.8	4,983
χ^2=347.44, df=2, p-value=0.0001, significant		
Delivered at a health facility		
No	4.7	7,456
Yes	15.3	4,043
χ^2=391.64, df=1, p-value=0.0001, significant		
Timing of postnatal check-up		
No postnatal check-up	4.6	6,893
Within 2 days after delivery	14.0	4,255
Between 3 days and 6 weeks after delivery	16.4	351
χ^2 = 337.12, df = 2, p-value = 0.0001, significant		

ANC=antenatal care; PNC=postnatal care

Also, the chi-square result suggests that delivery in a health facility is a statistically significant predictor of modern contraceptive use ($p<0.01$). Among women who delivered in a health facility, the percentage using a modern method of contraception during the postpartum period (15 percent) is thrice the percentage among women who did not deliver in a health facility (5 percent).

Similarly, the use and timing of postnatal check-ups is significantly related to the use of modern contraception postpartum ($p<0.01$). Only 5 percent of women who had no PNC after their last birth had used a modern method of contraception during the postpartum period. Postpartum use of a modern method was about three times as great among women whose first PNC took place within two days of delivery or less of giving birth (14 percent) or between three days and six weeks after delivery (16 percent).

In addition, we tested the bivariate association between the selected control variables (mother's age at birth, marital status, place of residence, region, education, wealth index, birth order, and exposure to family planning messages) and the use of modern method of contraception (outcome variable) among postpartum women. Table 5 summarizes the results of the chi-square tests. Each of the control variables is significantly related to the ANC, POD, PNC and PPFP variables at the bivariate level.

Table 5. Summary of chi-square tests

Characteristic	ANC	POD	PNC	PPFP
Mother's age at last birth	***	***	***	***
Marital status	**	***	**	*
Place of residence	***	***	***	***
Region	***	***	***	***
Education	***	***	***	***
Wealth Index	***	***	***	***
Birth order	***	***	***	***
Exposure to family planning messages	***	***	***	***

Level of significance: * p<0.05, ** p<0.01, *** p<0.001

ANC=antenatal care visits; POD=place of delivery; PNC=postnatal care; PPFP=postpartum family planning

Multivariate Results

Tables 6 through 9 present the adjusted odds ratios from the multivariate logistic regression analysis of the key independent variables (antenatal care visits, delivered at a heath facility, and postnatal care) on the dependent variable (postpartum use of modern contraception). The model controls for the effects of educational level, wealth index, place of residence, birth order, marital status, region, and exposure to family planning messages on the outcome variable.

Table 6. Odds of using a modern method of contraception during the postpartum period, by number of ANC visits

Variables	Odds ratio	Standard error	95% CI
Number of ANC visits			
No visit	0.71**	0.074	0.580-0.872
1-3	1.06	0.153	0.798-1.409
4+	RC		
Exposure to family planning messages*			
No	RC		
Yes	1.72**	0.179	1.403-2.110
Mother's age at last birth			
<18 years	RC		
18-34 years	1.68	0.481	0.960-2.950
35-49 years	1.46	0.441	0.807-2.641
Education			
No education	RC		
Primary	3.47**	0.620	2.447-4.931
Secondary	4.30**	0.815	2.961-6.235
Post-secondary	5.81**	1.229	3.834-8.800
Wealth Index			
Lowest	RC		
Second	1.35	0.292	0.882-2.062
Middle	1.73**	0.347	1.165-2.564
Fourth	2.45**	0.509	1.628-3.684
Highest	3.33**	0.737	2.159-5.144
Place of residence			
Urban	RC		
Rural	0.96	0.108	0.770-1.197
Birth order			
1	RC		
2-3	1.02	0.126	0.797-1.295
4-5	1.21	0.162	0.932-1.575
6+	1.24	0.189	0.917-1.671
Marital status			
Never married	RC		
Married	0.84	0.165	0.570-1.234
Previously married	0.79	0.217	0.459-1.352
Region			
North Central	RC		
North East	0.54**	0.105	0.371-0.794
North West	0.60*	0.151	0.366-0.981
South East	0.66*	0.115	0.469-0.930
South South	0.95	0.144	0.707-1.280
South West	1.01	0.147	0.757-1.343

* Heard at least one family planning message in the last few months

CI=confidence interval; RC=reference category; ANC=antenatal care

Level of significance: * p<0.05; ** p<0.001

This section presents the results of four logistic regression models. Table 6 shows the results of the first model, in which the number of ANC visits was the only key independent variable included (alongside all the selected control variables). Relative to postpartum women who did not have any ANC visits for their last pregnancy (reference category), the odds of using modern methods of contraception are significantly higher among women who made at least one antenatal care visit. Relative to who had four or more antenatal care visits, the adjusted odds of using a modern method of contraception was not significantly different (1.06) for women who had one to three antenatal care visits; however, among women who had no antenatal care visits, the adjusted odds ratio of using a modern method of contraception is significantly lower (0.71, $p \leq 0.001$) than among women who had four or more ANC visits.

Table 7 presents the results of the second logistic regression model, in which only the place of delivery (POD) was included as a key independent variable. After adjusting for the effects of the selected control variables, POD ceased to be a significant predictor of postpartum modern contraceptive use.

However, among the control variables, education levels are still significant predictors of the use of modern contraception by women in the postpartum period. Women with primary or higher education are at least four times as likely to use modern contraception postpartum as the reference group, postpartum women with no education. Another variable that significantly predicts the use of modern methods of contraception postpartum is the wealth quintile of the woman's household, as measured by the wealth index. The odds of using modern methods increase consistently with higher wealth quintiles.

Table 7. Odds of using a modern method of contraception during the postpartum period, by place of delivery

Variables	Odds ratio	Standard error	95% CI
Place of delivery			
Outside health facility	RC		
In health facility	1.04	0.102	0.862-1.265
Exposure to family planning messages*			
No	RC		
Yes	1.75**	0.181	1.427-2.144
Mother's age at last birth			
<18 years	RC		
18-34 years	1.68	0.481	0.957-2.944
35-49 years	1.44	0.436	0.796-2.609
Education			
No education	RC		
Primary	3.69**	0.658	2.599-5.235
Secondary	4.58**	0.875	3.146-6.663
Post-secondary	6.17**	1.313	4.066-9.372
Wealth Index			
Lowest	RC		
Second	1.39	0.302	0.911-2.131
Middle	1.81**	0.367	1.223-2.702
Fourth	2.57**	0.538	1.707-3.879
Highest	3.50**	0.778	2.264-5.416
Place of residence			
Urban	RC		
Rural	0.95	0.107	0.761-1.184
Birth order			
1	RC		
2-3	1.01	0.125	0.789-1.283
4-5	1.20	0.161	0.923-1.562
6+	1.22	0.187	0.905-1.651
Marital status			
Never married	RC		
Married	0.86	0.167	0.588-1.271
Previously married	0.80	0.221	0.466-1.376
Region			
North Central	RC		
North East	0.54**	0.107	0.369-0.801
North West	0.56*	0.141	0.338-0.917
South East	0.63**	0.110	0.445-0.887
South South	0.90	0.137	0.671-1.218
South West	0.99	0.145	0.745-1.561

* Heard at least one family planning message in the last few months
CI=confidence interval; RC=reference category
Level of significance: * p<0.05; ** p<0.001

Another key independent variable influencing use of modern contraceptives methods postpartum is postnatal care within six weeks of childbirth (PNC). Table 8 presents these results from the third logistic regression model. First receiving postnatal care sometime between three days and six weeks after delivery is significantly related to the postpartum use of modern methods of contraception. The adjusted odds of using a modern method of contraception in the postpartum period are 1.7 times higher among women who received PNC between three days and six weeks after their last delivery, relative to those who did not receive any PNC (reference category). The odds are 1.2 times higher among women who received PNC within two days of their last delivery, but this difference is not statistically significant. Among the control variables exposure to family planning messages, education, the wealth index, and region are significant predictors of postpartum use of modern contraception.

Table 8. Odds of using a modern method of contraception during the postpartum period, by postnatal care

Variables	Odds ratio	Standard error	95% CI
Postnatal care			
No PNC	RC		
Within 2 days	1.20	0.121	0.982-1.461
Between 3 days and 6 weeks	1.73**	0.311	1.218-2.464
Exposure to family planning messages*			
No	RC		
Yes	1.71**	0.178	1.397-2.099
Mother's age at last birth			
<18 years	RC		
18-34 years	1.69	0.486	0.962-2.974
35-49 years	1.45	0..441	0.800-2.636
Education			
No education	RC		
Primary	3.63**	0.645	2.565-5.148
Secondary	4.50**	0.852	3.100-6.524
Post-secondary	6.04**	1.273	3.990-9.132
Wealth Index			
Lowest	RC		
Second	1.38	0.299	0.903-2.111
Middle	1.78**	0.360	1.196-2.644
Fourth	2.50**	0.523	1.660-3.772
Highest	3.38**	0.752	2.187-5.232
Place of residence			
Urban	RC		
Rural	0.95	0.106	0.763-1.184
Birth order			
1	RC		
2-3	1.01	0.127	0.796-1.297
4-5	1.21	0.164	0.932-1.582
6+	1.24	0.191	0.921-1.682
Marital status			
Never married	RC		
Married	0.86	0.168	0.585-1.261
Previously married	0.80	0.221	0.464-1.373
Region			
North Central	RC		
North East	0.54**	0.106	0.370-0.796
North West	0.57*	0.142	0.349-0.929
South East	0.64*	0.113	0.451-0.905
South South	0.89	0.135	0.663-1.201
South West	0.98	0.144	0.739-1.312

* Heard at least one family planning message in the last few months

CI=confidence interval; RC=reference category; ANC=antenatal care; PNC=postnatal care

Level of significance: * p<0.05; ** p<0.001

In the fourth model all three key independent variables—antenatal care visits, delivered at a health facility and receiving postnatal care within six weeks of delivery—are combined to predict the use of modern contraception during the postpartum period. Table 9 presents the results. The control variables remain the same (education, wealth index, place of residence, birth order of the last child, marital status, region, and exposure to family planning messages).

Table 9. Odds of using a modern method of contraception during the postpartum period, by health services: number of ANC visits, place of delivery, and timing of postnatal care

Variables	Odds ratio	Standard error	95% CI
Number of ANC visits			
No visit	0.74**	0.077	0.600-0.905
1-3 visits	1.07	0.155	0.806-1.423
4+ visits	RC		
Place of delivery			
No	RC		
Yes	0.94	0.100	0.766-1.161
Timing of postnatal check-up			
No PNC	RC		
Within 2 days	1.14	0.124	0.922-1.411
Between 3 days and 6 weeks	1.60**	0.285	1.131-2.271
Exposure to family planning messages*			
No	RC		
Yes	1.70**	0.176	1.385-2.083
Mother's age at last birth			
<18 years	RC		
18-34 years	1.70	0.488	0.964-2.982
35-49 years	1.47	0.446	0.810-2.667
Education			
No education	RC		
Primary	3.47**	0.612	2.454-4.905
Secondary	4.29**	0.803	2.976-6.198
Post-secondary	5.81**	1.213	3.862-.756
Wealth Index			
Lowest	RC		
Second	1.35	0.292	0.883-2.063
Middle	1.72**	0.346	1.157-2.551
Fourth	2.44**	0.507	1.618-3.666
Highest	3.31**	0.739	2.134-5.127
Place of residence			
Urban	RC		
Rural	0.96	0.108	0.770-1.196

Cont'd..

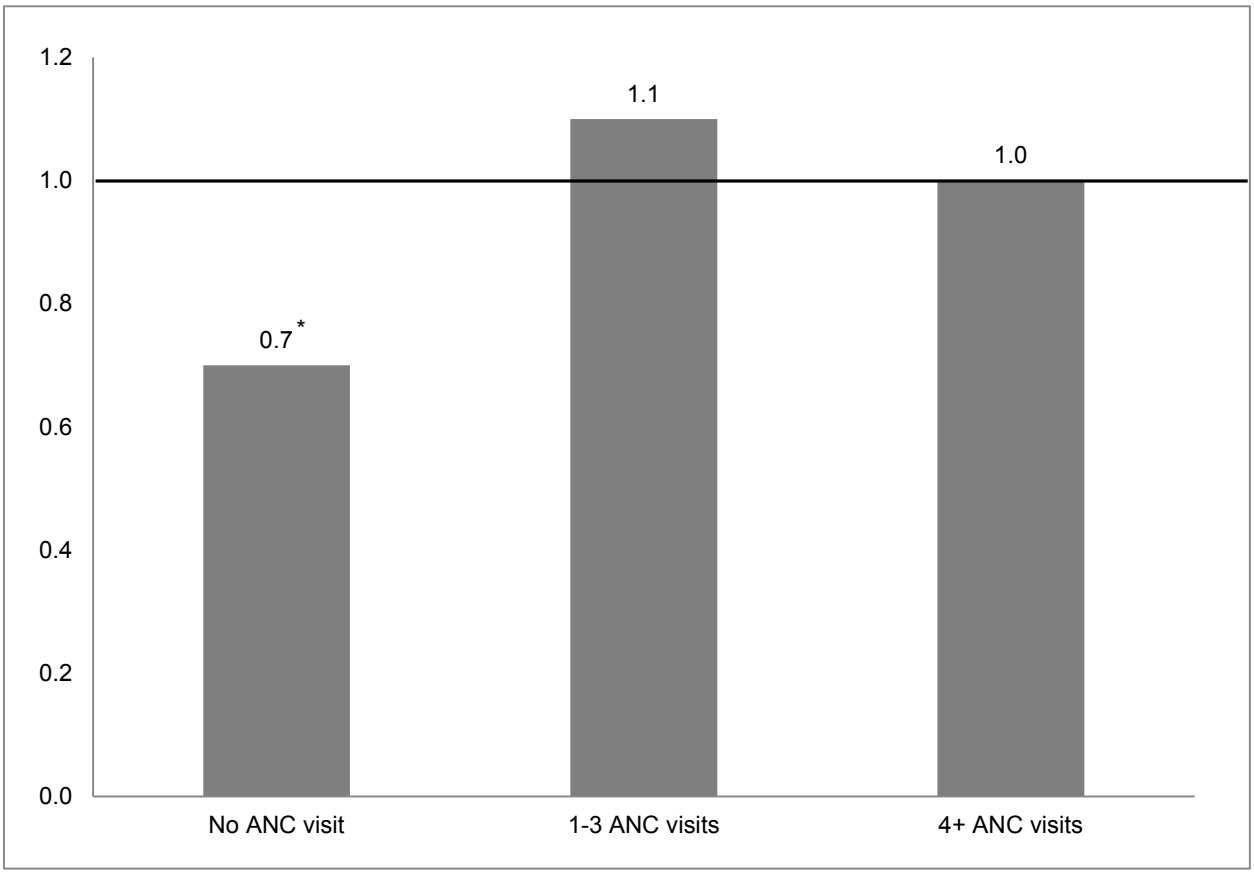
Table 9. Cont'd

Variables	Odds ratio	Standard error	95% CI
Birth order			
1	RC		
2-3	1.02	0.128	0.801-1.307
4-5	1.22	0.164	0.936-1.588
6+	1.25	0.193	0.926-1.693
Marital status			
Never married	RC		
Married	0.84	0.166	0.571-1.240
Previously married	0.79	0.218	0.460-1.360
Region			
North Central	RC		
North East	0.54**	0.105	0.367-0.791
North West	0.60*	0.153	0.364-0.990
South East	0.67*	0.120	0.470-0.948
South South	0.93	0.140	0.695-1.253
South West	1.00	0.146	0.752-1.330

* Heard at least one family planning message in the last few months
CI=confidence interval; RC=reference category; ANC=antenatal care; PNC=postnatal care
Level of significance: * p<0.05; ** p<0.001

In this model ANC remains a significant predictor of the use of modern contraception postpartum. Relative to women who made four or more antenatal care visits during their last pregnancy, the odds of using modern contraception in the postpartum period are significantly lower for women who did not make any antenatal care visits during their last pregnancy (see Figure 5).

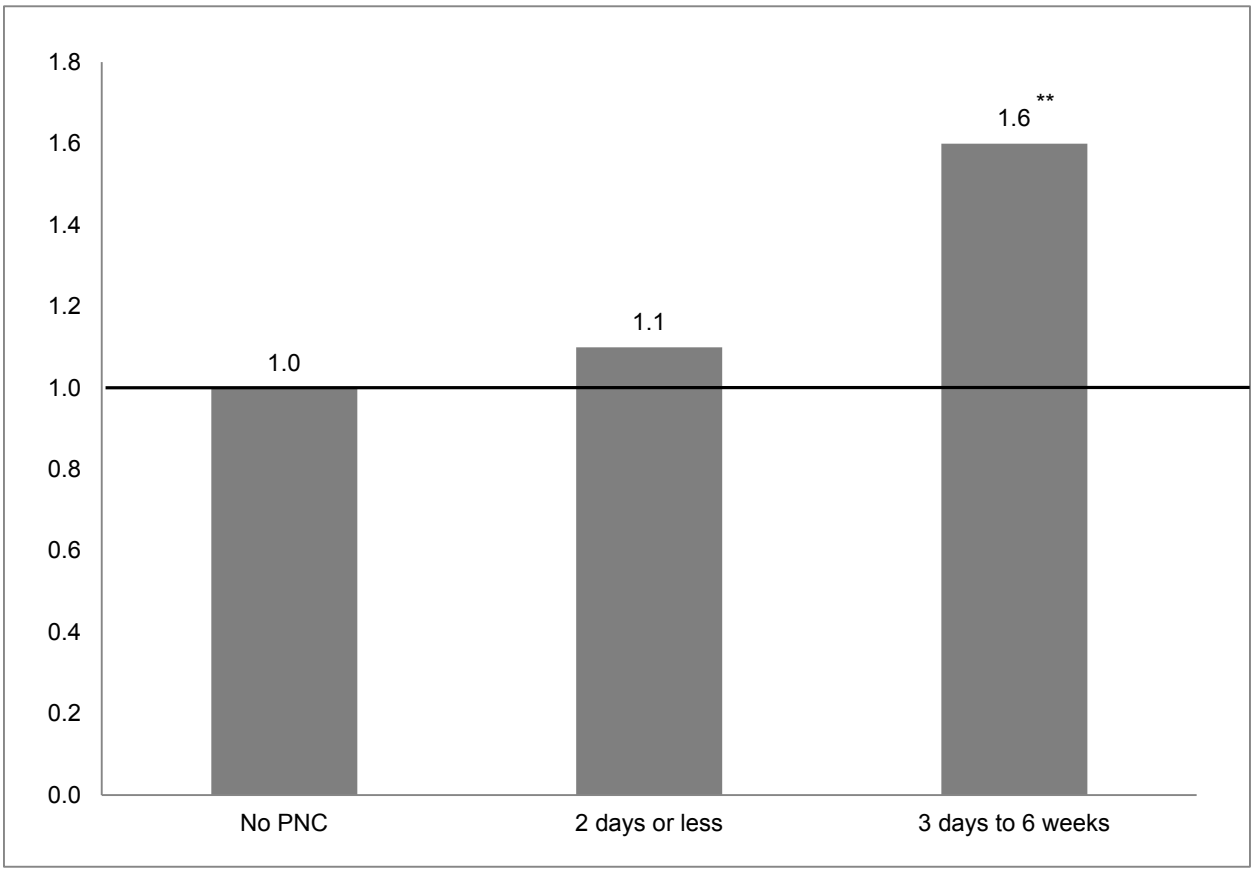
Figure 5. Adjusted odds of using postpartum contraception, by number of ANC visits



Level of significance: * p<0.01

Similarly, receiving PNC is a significant predictor of postpartum contraception (see Figure 6). Receiving PNC between three days and six weeks after delivery is significantly related to postpartum use of modern contraception when compared with women who had no PNC check-up after their last delivery.

Figure 6. Adjusted odds of using postpartum contraception, by timing of postnatal check-up



Level of significance: ** p<0.001

DISCUSSION AND CONCLUSIONS

This study examines the effect of maternal health care (ANC visits, delivery in health facilities, and timing of the first postnatal check-up) on use of modern methods of contraception in the postpartum period. Slightly more than two-fifths of the postpartum women (43 percent) had the WHO-recommended four or more antenatal care visits for their most recent birth. More than one-third (35 percent) delivered in a health facility. Only 40 percent of the women received a postnatal check-up within six weeks after last childbirth. The proportion of postpartum women who used a modern method of contraception within the 12 months following last delivery was very low (8 percent). Among users of modern contraceptives, 3 percent had used male condoms, 2 percent each had used pills and injectables, and about 1 percent had used IUDs or female sterilization. A sizeable proportion of births in the country in the five years before the survey were high-risk births; more than one-quarter of the most recent births were the sixth or more. One-quarter of the births occurred within 24 months of the previous birth. This suggests that one-quarter of the women had become pregnant again about a year after giving birth. For Nigeria, a country with the second highest number of maternal deaths in the world (WHO 2010), the combination of low contraceptive use, high-risk pregnancies, and many women's lack of maternal health care poses a considerable challenge to realization of the MDG 5 goals of improving maternal health.

The findings show that the use of a modern method of contraception during the postpartum period is significantly associated with use of maternal health services (ANC visits and timing of postnatal check-up), even after controlling for other factors associated with the use of family planning. This relationship is consistent with findings reported by other studies (Hotchkiss et al. 2005; Barber 2007). The findings suggest that antenatal and postnatal services remain important windows of opportunity to provide access to family planning messages and to offer women various contraceptive methods. Although DHS data cannot show the extent of integration between family planning services and maternal healthcare, it is likely that further integration of these services would help increase the uptake of modern family planning during the critical postpartum period.

Apart from the maternal health services, other significant predictors of the use of contraception in the postpartum period include region, education, the wealth index, and exposure

to family planning messages. The findings show that the odds of using a modern method of contraception are relatively low in northern regions compared with the southern regions. This is not surprising, as the northern part of the country is conservative and looks at initiatives that are associated with the Western world with suspicion. Modern methods of contraception, as was the case with polio vaccines, are viewed with suspicion and, even among the elite, are considered population control measures rather than efforts to save the lives of women and children. Programs and policies must devise means of making family planning acceptable in these regions.

Also, the findings that education and wealth index are significant predictors of postpartum contraceptive use highlight the need to empower women through education and economic opportunities to be able to make informed choices. These findings are not novel, as research has consistently shown that better educated, wealthier women, women who live in urban areas, and women who were regularly exposed to the media are all more likely to use contraception in the postpartum period (Gebreselassie et al. 2008; Do and Hotchkiss 2011).

The place of delivery was not found to be a significant predictor of the use of modern contraception in the postpartum period. This finding contrasts with those of some similar research in Mexico, which reported that women who delivered in government or private facilities were more likely to use a contraceptive method postpartum than those who delivered at home (Barber 2007).

In spite of the very low rate of contraceptive use in the country, a recently published study estimates that contraceptive use averted about 1.4 million births in Nigeria in 2008 and an estimated 17,227 maternal deaths. But for contraception, maternal deaths in Nigeria would have been around 66,099 rather than the estimated 48,872 deaths that year (Ahmed et al. 2012).

The findings presented in this study suggest that contraceptive use among postpartum women will significantly increase if more women use maternal health care services, especially for antenatal care and postnatal care. In addition to the documented benefits of antenatal care and postnatal check-ups on maternal and child health, they appear to also increase the use of post-partum family planning. We recommend that family planning services be fully integrated into maternal health care services.

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APPENDICES

Appendix 1

Table A1. Test of collinearity among independent variables in the logistic model

Variable	VIF	SQRT VIF	Tolerance	R-Squared
ANC	1.48	1.22	0.6768	0.3232
PNC	1.46	1.21	0.6845	0.3155
Delivered in health facility	**5.68**	2.38	**0.1760**	0.8240
SBA	**6.13**	2.48	**0.1632**	0.8368
mother's age at last birth	1.49	1.22	0.6707	0.3293
Education	1.95	1.40	0.5126	0.4874
Wealth Index	2.33	1.53	0.4291	0.5709
Place of residence	1.45	1.20	0.6914	0.3086
Marital status	1.03	1.01	0.9719	0.0281
Region	1.27	1.13	0.7860	0.2140
Birth order	1.59	1.26	0.6302	0.3698
Exposure to family planning messages*	1.41	1.19	0.7094	0.2906

* Heard at least one family planning message in the last few months

ANC – number of antenatal care visits, PNC – postnatal checkup, POD– delivered at a health facility, SBA– assisted by a skilled birth attendant at last delivery

bold indicates that the Variance Inflation Factor (VIF) is higher than the statistically acceptable threshold of 5.0 and the Tolerance is below the minimum threshold of 2.0

Appendix 2

Table A2. Collinearity test results after excluding POD and SBA from the model

Variable	VIF	SQRT VIF	Tolerance	R-Squared
SBA	1.94	1.39	0.5159	0.4841
POD	1.79	1.34	0.5578	0.4422

SBA– assisted by a skilled birth attendant at last delivery, POD– delivered at a health facility

Appendix 3

Table A3. Odds of using a modern method of contraception during the postpartum period, by skilled birth attendance (SBA) at delivery

Variables	Odds ratio	Standard error	95% CI
Number of ANC visits			
No visit	0.69**	0.078	0.552-0.861
1-3	1.09	0.158	0.821-1.449
4+	RC		
Skilled birth attendant at delivery			
No	RC		
Yes	1.20	0.166	0.916-1.574
Postnatal care			
No PNC	RC		
Within 2 days	1.11	0.126	0.889-1.389
Between 3 days and 6 weeks	1.68**	0.305	1.181-2.405
Mother's age at last birth			
<18 years	RC		
18-34 years	1.55	0.446	0.878-2.724
35-49 years	1.32	0.403	0.727-2.403
Education			
No education	RC		
Primary	3.29**	0.588	2.312-4.668
Secondary	3.75**	0.696	2.606-5.398
Post-secondary	5.44**	1.145	3.598-8.224
Wealth Index			
Lowest	RC		
Second	1.35	0.297	0.880-2.083
Middle	1.67*	0.344	1.118-2.506
Fourth	2.34**	0.500	1.541-3.561
Highest	3.08**	0.698	1.974-4.806
Place of residence			
Urban	RC		
Rural	0.95	0.105	0.761-1.177
Marital status			
Never married	RC		
Currently married	0.87	0.189	0.565-1.330
Previously married	0.84	0.250	0.469-1.508

Cont'd..

Table A3. Cont'd

Variables	Odds ratio	Standard error	95% CI
Region			
North East	RC		
North Central	1.76**	0.355	1.188-2.617
North West	1.13	0.288	0.684-1.862
South East	1.19	0.263	0.768-1.831
South South	1.76**	0.334	1.210-2.551
South West	1.73**	0.323	1.196-2.492
Birth order			
1	RC		
2-3	1.07	0.134	0.836-1.367
4-5	1.21	0.168	0.926-1.594
6+	1.32	0.207	0.974-1.800
Exposure to family planning messages*			
No	RC		
Yes	1.68**	0.179	1.366-2.073

* Heard at least one family planning message in the last few months
CI=confidence interval; RC=reference category; ANC=antenatal care; PNC=postnatal care
Level of significance: * p<0.05; ** p<0.001

Appendix 4

Table A4. Odds of using a modern method of contraception during the postpartum period, by skilled birth attendance (SBA) at delivery and place of delivery

Variables	Odds ratio	Standard error	95% CI
Number of ANC visits			
No visit	0.69**	0.077	0.551-0.857
1–3	1.08	0.156	0.811-1.430
4+	RC		
Place of delivery			
No	RC		
Yes	0.75	0.119	0.549-1.022
Skilled birth attendant at delivery			
No	RC		
Yes	1.51*	0.306	1.017-2.250
Timing of postnatal check-up			
No PNC	RC		
Within 2 days	1.14	0.128	0.913-1.418
Between 3 days and 6 weeks	1.67**	0.303	1.170-2.385

Cont'd..

Table A4. Cont'd

Variables	Odds ratio	Standard error	95% CI
Mother's age at last birth			
<18 years	RC		
18-34 years	1.56	0.449	0.884-2.742
35-49 years	1.33	0.407	0.734-2.427
Education			
No education	RC		
Primary	3.31**	0.593	2.327-4.705
Secondary	3.77**	0.699	2.621-5.426
Post-secondary	5.54**	1.167	3.665-8.379
Wealth Index			
Lowest	RC		
Second	1.35	0.297	0.880-2.083
Middle	1.66*	0.343	1.109-2.491
Fourth	2.33**	0.498	1.535-3.548
Highest	3.08**	0.698	1.974-4.805
Place of residence			
Urban	RC		
Rural	0.95	0.104	0.762-1.174
Marital status			
Never married	RC		
Currently married	0.86	0.188	0.562-1.324
Previously married	0.83	0.248	0.463-1.495
Region			
North East	RC		
North Central	1.79**	0.361	1.208-2.662
North West	1.13	0.289	0.685-1.867
South East	1.21	0.268	0.787-1.873
South South	1.76**	0.334	1.212-2.555
South West	1.74**	0.325	1.202-2.506
Birth order			
1	RC		
2-3	1.07	0.134	0.832-1.363
4-5	1.21	0.167	0.923-1.588
6+	1.32	0.206	0.968-1.790
Exposure to family planning messages*			
No	RC		
Yes	1.68**	0.179	1.364-2.074

* Heard at least one family planning message in the last few months
CI=confidence interval; RC=reference category; ANC=antenatal care; PNC=postnatal care
Level of significance: * p<0.05; ** p<0.001