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Geographic variation in characteristics of postpartum women using female sterilization

Kari White, Ph.D., M.P.H.,

University of Alabama at Birmingham, Health Care Organization & Policy, kariwhite@uab.edu

Joseph E. Potter, Ph.D., and

University of Texas at Austin, Population Research Center, joe@prc.utexas.edu

Nikki Zite, M.D.

University of Tennessee, Graduate School of Medicine, nzite@mc.utmck.edu

Abstract

Background—Southern states have higher rates of female sterilization compared to other areas of the United States, and the reasons for this are not well understood. We examined whether low-income and racial/ethnic minority women, who were previous targets of coercive practices, disproportionately report using sterilization in the South.

Methods—We used data from 12 states participating in the Pregnancy Risk Assessment Monitoring System that collected information on women's contraceptive method use between 2006–2009. We categorized states according to geographic region: South, Midwest/West and Northeast. Within each region, we computed the percentage of women using sterilization according to their demographic and obstetric characteristics and estimated multivariable-adjusted prevalence ratios to evaluate whether the same characteristics were associated with sterilization use.

Findings—The percentage of postpartum women using sterilization ranged from 5.0–9.9% in the Northeast, 8.9–10.6% in the Midwest/West and 11.6–22.4% in the South. Women in nearly all sub-groups in Southern states were more likely to use sterilization than women in the Northeast. After multivariable adjustment, there were no significant differences in the prevalence of sterilization for Blacks compared to Whites in the Northeast (0.76 [95% CI: 0.55–1.06]), Midwest/West (0.91 [95% CI: 0.80–1.04]) and South (0.96 [95% CI: 0.85–1.07]). Women with Medicaid-paid deliveries (versus private insurance) had a higher prevalence of sterilization in all regions ($p < 0.05$).

Conclusions—These findings do not indicate that low-income and racial/ethnic minority women in the South use sterilization at disproportionately higher rates compared to other regions,

Corresponding Author: Kari White, Ph.D., M.P.H., University of Alabama at Birmingham, Health Care Organization & Policy, 1720 2nd Avenue South, RPHB 320, Birmingham, AL 35294, Phone: (205) 934-6713, kariwhite@uab.edu.

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and suggest that other differences, such as social norms and family planning policies, may contribute to this geographic variation.

Keywords

postpartum contraception; female sterilization; PRAMS

Introduction

Female sterilization is one of the most widely used contraceptives in the United States (US) (Jones, Mosher, & Daniel, 2012), but there is considerable geographic variation in women's use of this method. Southern states have significantly higher rates of sterilization use compared to other parts of the US (Chan & Westhoff, 2010; MacKay, Kieke, Koonin, & Beattie, 2001; Whiteman et al., 2012). A recent study of postpartum women found that the rate of female sterilization was 988 per 10,000 deliveries in the South compared to 683 per 10,000 in the West, the region with the next highest rate of use (Whiteman et al., 2012).

The reasons for this variation are not well understood, and previous studies have had limited ability to examine potential underlying sources of variation due to small sample size or incomplete patient data (Borrero et al., 2007; Chan & Westhoff, 2010; MacKay et al., 2001). One possibility that has led to concern is that higher rates of female sterilization in the South may be due to the persistence of coercive practices targeting low-income and racial/ethnic minority women who are pressured into getting sterilized during labor and delivery, not informed that the procedure is permanent, or told they will not receive public benefits or medical care if they do not agree to be sterilized (Bass & Warehime, 2009; Kluchin, 2009; Schoen, 2005). However, the most recent documented case of women being coerced into sterilization occurred in California, not the South (Center for Investigative Reporting, 2013). Instead, others have argued that geographic variation in sterilization, along with use of other contraceptive methods, is due to women's preferences, provider attitudes toward the procedure, and differences in health care delivery (Bumpass, Thomson, & Godecker, 2000; Chan & Westhoff, 2010; White, Potter, Hopkins, & Grossman, 2014). For example, women in the South may prefer a method that provides long-term protection against pregnancy due to earlier ages at childbearing, and, prior to the 2012 implementation of the Affordable Care Act (ACA), fewer Southern states had insurance coverage mandates for reversible contraceptive methods, and some of these existing plans may still be exempt from contraceptive coverage requirements (Chan & Westhoff, 2010; Guttmacher Institute, 2015).

In this analysis, we use data from the Pregnancy Risk Assessment Monitoring System (PRAMS) to further investigate hypotheses put forward in previous studies on variation in female sterilization. Specifically, we assess whether women in socially disadvantaged subgroups in the South report disproportionately higher use of sterilization and examine the extent to which demographic and obstetric characteristics of women relying on female sterilization postpartum varies across region. The more detailed information on the potential sources of geographic variation in women's postpartum contraceptive practice that this analysis provides can identify areas for future research that would inform the development

and implementation of programs and policies addressing contraceptive use in the months following delivery.

Materials and Methods

The PRAMS is a survey of a representative sample of women delivering a live born infant each year in 41 reporting areas in the US (i.e., 40 states and New York City). Two to four months following delivery, postpartum women in each reporting area are mailed a self-administered survey inquiring about their socioeconomic and demographic characteristics and health behaviors before, during and after pregnancy; those who do not respond are contacted via telephone (Centers for Disease Control and Prevention & Division of Reproductive Health, 2012). The survey for all reporting areas includes a question asking women if they are currently using a contraceptive method, but only a subset of reporting areas include an optional question about the specific method women are using.

For this analysis, we used data from 2006–2009 (prior to the ACA) for the 12 reporting areas that included the question on the specific postpartum method used and that achieved the minimum response rate required for public release of the data (70% in 2006; 65% between 2007 to 2009): Arkansas, Colorado, Michigan, Mississippi, Nebraska, New York state, New York City, North Carolina, Oregon, Rhode Island, South Carolina, and West Virginia. This sample included 44,984 women age 20 years and older with information on postpartum contraceptive use. Since we were interested in assessing use of sterilization among low-income women, we only wanted to include those who met the minimum age requirement (21 years old) to have the procedure paid for by Medicaid. However, we included women age 20 in our sample since the public use data set only included age categories (rather than women's specific age) and women age 20 were grouped with those between 21–24 years old.

In addition to age, other variables that we included in our analysis were women's parity at the time of delivery, educational attainment, race/ethnicity, and payment source for delivery (i.e., private insurance, Medicaid), which have been associated with use of sterilization in other studies (Bass & Warehime, 2009; Borrero et al., 2007; Bumpass et al., 2000; Lunde, Rankin, Harwood, & Chavez, 2013; White & Potter, 2014). Women's chances of undergoing sterilization also have been associated with her type of delivery and Body Mass Index (BMI), with women who have a Caesarian section (C-section) being more likely to get the procedure and obese women, particularly those having vaginal deliveries, being less likely to get sterilized (Allen, Desimone, & Boardman, 2013; Whiteman et al., 2012). Therefore, we created a composite variable using information on delivery type and BMI: C-section, vaginal delivery with BMI ≥ 29.9 kg/m², and vaginal delivery with BMI ≥ 30.0 kg/m².

As a first step in our analysis, we categorized reporting areas according to geographic region: South (Arkansas, Mississippi, North Carolina, South Carolina, West Virginia), Midwest/West (Colorado, Michigan, Nebraska, Oregon) and Northeast (New York state, New York City, Rhode Island). We combined states in the Midwest and West since there were few states in each region, and previous studies have reported similar rates of

sterilization in these areas (Chandra, Martinez, Mosher, Abma, & Jones, 2005; Whiteman et al., 2012). We excluded women who reported their delivery was paid by a source other than private insurance or Medicaid (n=1,656) due to small sample sizes within each region. We also excluded women who were missing information on parity, educational attainment, type of delivery or BMI (n=2,253), yielding a final sample of 41,075 postpartum women.

Within each region, we computed the distribution of postpartum women's demographic and obstetric characteristics. Next, we calculated the percentage of women reporting sterilization as their current method for each demographic and obstetric characteristic within region; for each characteristic, the statistical significance of differences between regions in the percentage of women using sterilization was determined using Poisson regression. Finally, we calculated prevalence ratios for use of sterilization versus other contraceptive methods or no method to evaluate whether the same characteristics were associated with postpartum sterilization in each region, after adjusting for other factors. Prevalence ratios were calculated using Poisson regression models, stratified by region that included all variables simultaneously. Differences in the associations of demographic and obstetric characteristics with sterilization across region was determined with multivariable-adjusted Poisson models that included all reporting areas and interaction terms between women's characteristics and region (e.g., Black race * Midwest/West and Black race * South). The results of this analysis would indicate, for example, whether Black women were more likely to be sterilized than White women if they lived in the South than if they lived in the Northeast.

Using Stata 13.0, we weighted all analyses to account for the complex sampling design and non-response in the PRAMS. The first author's university Institutional Review Board determined this research was exempt from human subjects review.

Results

Overall, 5,328 postpartum women (11.0%) reported using female sterilization at the time of the survey. In PRAMS reporting areas in the Northeast, the percentage of postpartum women who relied on female sterilization ranged from 5.0% in New York City to 9.9% in Rhode Island (Figure 1). Among Midwest/West reporting areas, the percentage using female sterilization was lowest in Colorado (8.9%) and highest in Oregon (10.6%). The percentage of postpartum women using female sterilization in the South ranged from 11.6% in North Carolina to 22.4% in Mississippi.

A larger percentage of postpartum women in the South were < 30 years of age than women in the Northeast and Midwest/West (Table 1). A higher percentage of all respondents in the South were Black, while a higher percentage of respondents in Midwest/West states were White and a higher percentage in the Northeast were Latina or from other racial/ethnic groups. In Southern states, a larger percentage of postpartum women had deliveries paid by Medicaid than women in other regions. Approximately one-third of women in all regions had a C-section, but the percentage was somewhat lower among those in the Midwest/West.

In comparing the prevalence of sterilization according to women's characteristics, almost all sub-groups of women in Midwest/West reporting areas were more likely to use sterilization

postpartum than women in the Northeast, but use in these two regions was similar for women with one child, who had less than a high school education, and were Latina (Table 2). For all sub-groups, except Latinas, women living in reporting areas in the South were more likely to have been sterilized compared to women living in the Northeast. The prevalence of sterilization among Latinas was 9.3%, 11.1%, and 11.7% for those living in the South, Northeast, and Midwest/West, respectively.

After multivariable adjustment, within each region, women age 35 and who had three or more children were more likely, and those 24 and who had one child were less likely, respectively, to use sterilization compared to women 30–34 and who have two children (Table 3). The association between higher educational attainment and being sterilized was also similar across regions with college-educated women being less likely to use sterilization than those with a high school diploma/some college. In all regions, Black women were as likely to use sterilization as Whites. There were no differences in sterilization use between Latinas and Whites in the Northeast, but Latinas in the Midwest/West and South were less likely than Whites to use sterilization. Additionally, women from other racial/ethnic groups living in the Northeast were less likely to use sterilization than Whites, but this association was not present in the Midwest/West and South. Women with deliveries paid by Medicaid (versus private insurance) were more likely to use sterilization postpartum in all regions, and this association was stronger in the Midwest/West versus the Northeast and South (p-value for interaction <0.05). Compared to non-obese women having vaginal deliveries, women who had C-sections were more likely to use sterilization, with a stronger association in the Northeast and Midwest/West versus the South.

Discussion

Similar to other studies using nationally representative samples of reproductive aged women and hospital discharge data (Chan & Westhoff, 2010; MacKay et al., 2001; Whiteman et al., 2012), we found a higher percentage of postpartum women relying on female sterilization in the South. Of the 12 PRAMS reporting areas with information on postpartum contraceptive use, the states with the highest percentage of women using female sterilization were all in the South, with >15% of women in most of these states relying on sterilization for their postpartum method. However, unlike previous research, we were able to examine more closely how women's use of sterilization varied according to their demographic and obstetric characteristics in order to identify whether there was disproportionately higher use among certain sub-groups across locations.

When comparing characteristics of women who were sterilized following delivery across regions, there were significantly more women of every age, parity, educational level, insurance, and delivery type relying on sterilization in the South. Although we cannot ascertain the specific reasons for these differences from the data, the findings suggest that patient contraceptive preferences and provider norms likely play an important role, as others have suggested (Bumpass et al., 2000; White et al., 2014). Notably, there were no Black:White differences in postpartum sterilization use in the multivariable regression models. Additionally, Latinas in the Midwest/West and South and women from other racial/ethnic groups in the Northeast were less likely than Whites to be sterilized, after controlling

for other characteristics. These findings do not indicate that racial/ethnic minority women are being sterilized at disproportionately higher rates in the South, and instead are more consistent with results reported elsewhere that they may face barriers to obtaining a sterilization following delivery (Borrero et al., 2009; Potter et al., 2012; White & Potter, 2014; Zite, Wuellner, & Gilliam, 2005). For Latinas specifically, the lower percentage of women using sterilization could reflect, in part, women's inability to pay the high out-of-pocket costs for the procedure since programs that pay for pregnancy-related care for those who have not been legal residents for more than five years (e.g., the Children's Health Insurance Program) often do not cover postpartum contraception.

We also found that use of postpartum sterilization was higher among women with Medicaid-paid deliveries across all reporting areas, and the association was similar after adjusting for women's demographic and obstetric characteristics. This is consistent with other studies (Baldwin, Rodriguez, & Edelman, 2012; Borrero et al., 2007; White et al., 2014) and points to potentially broader issues in women's access to effective contraception. For example, a limited number of states permit postpartum insertion of long-acting reversible methods to be billed separately from the Medicaid global delivery fee (Aiken, Creinin, Kaunitz, Nelson, & Trussell, 2014), and low-income women may have inconsistent access to contraception following delivery; therefore, women might be more likely to choose sterilization while they still have contraceptive coverage through pregnancy-related Medicaid. Greater use of sterilization among low-income women also may be the result of limited coverage for vasectomy and lack of providers trained to perform the procedure at publicly funded clinics (Finer, Darroch, & Frost, 2003; Frost, Gold, Frohwirth, & Blades, 2012; Guttmacher Institute, 2013).

Although we did not identify disproportionately higher use of postpartum sterilization among low-income and racial/ethnic minority women in the South, we did find a higher percentage of women using sterilization in these areas who were less than age 30 and had fewer children. In other studies (Borrero et al., 2009; Potter et al., 2012; Zite et al., 2005), younger and less parous women have reported being unable to obtain a desired sterilization because their providers do not consider them to be appropriate candidates for the procedure, since these characteristics have been associated with increased risk of regret in large prospective studies of sterilization (Jamieson et al., 2002). It may be that providers in the South have less stringent criteria surrounding age and parity for women who wish to undergo sterilization (Kluchin, 2009). Additional research on provider attitudes is needed in order to more fully understand our observed findings; it also would be important to assess whether women in the South are more likely to experience regret following sterilization.

Our study has several limitations. We did not have the ability to compare regions of the US as completely as we would have liked because not all states participating in the PRAMS ask women about their specific postpartum contraceptive method or meet the minimum response rate required to obtain reliable estimates. Although we had more detailed data on women's characteristics than other studies assessing geographic variation in sterilization, there was not sufficient information to determine the extent to which the differences we observed are related to patient choice, provider counseling, and social norms, and some respondents were excluded from our analyses because they had missing data or their delivery was not paid by

Medicaid or private insurance. We also did not have detailed information on family planning programs and policies, such as procedures for enrollment in Medicaid family planning waivers following delivery and the percentage of eligible women enrolled or who had contraceptive coverage through private insurance, which might influence variation across regions, as well as between reporting areas within region. Finally, since the surveys were completed between two and nine months postpartum, we cannot accurately determine whether women had an immediate postpartum sterilization or interval procedure. This may explain our finding that obese women with vaginal deliveries were not less likely to be sterilized than non-obese women, which has been reported in other studies of immediate postpartum sterilization (Allen et al., 2013).

Implications for Policies and Practice

Our results from this very large sample of postpartum women indicate that there is not disproportionate use of sterilization among low-income and racial/ethnic minority women in the South, and that the higher prevalence of sterilization in this area reflects greater use of the method by women in all groups. This may indicate greater demand for the procedure due to earlier ages at childbearing (Mathews & Hamilton, 2009) and women's need for longer protection from pregnancy during their reproductive years, as well as influence from social networks that likely have larger numbers of women who rely on sterilization. Additionally, knowledge sharing within women's social networks, combined with provider experience and norms, such as helping women meet the requirements for documenting informed consent and performing sterilization during a C-section regardless of insurance coverage, may facilitate women's ability to navigate the health system and funding mechanisms in order to obtain the procedure. This calls attention to the need for further research to better understand how contraceptive preferences are shaped by women's reproductive life course experiences and the extent to which preferences and provider norms vary across place.

It is also important for future studies to examine how geographic differences in sterilization may be affected by how access to reproductive health services and changes in coverage and funding for family planning interact with variation in norms and preferences to shape postpartum method use. For example, it may be that women in the South opt for permanent contraceptive methods to avoid unintended pregnancy due to restricted access to and lower acceptance of abortion in this area (Jones & Jerman, 2014; Pew Research Center, 2013), as well as more limited availability of affordable long-acting reversible methods (Fowler, Gable, & Wang, 2014; Xu, Macaluso, Ouyang, Kulczycki, & Grosse, 2012). Although use of sterilization has remained relatively stable over the last decade despite shifts in use of long-acting and other reversible methods (Finer, Jerman, & Kavanaugh, 2012; White et al., 2014), this may change as more women gain access to health insurance coverage and can obtain a range of methods without cost sharing. However, uneven expansion of Medicaid coverage under the ACA, employer exemptions for the contraceptive mandate and threats to funding streams that have supported family planning (Gold & Sonfield, 2011) may contribute to the persistence of geographic variation in sterilization use as women and providers continue to rely on familiar, accessible methods.

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Biographies

Kari White, PhD MPH is an Assistant Professor in Health Care Organization and Policy at the University of Alabama at Birmingham. Her research focuses on women's reproductive health, with an emphasis on contraceptive attitudes and access.

Joseph E. Potter, PhD is a Professor of Sociology and Faculty Research Associate at the Population Research Center, University of Texas at Austin. His work focuses on issues related to population and reproductive health in the US and Latin America.

Nikki Zite, MD is an Associate Professor in Obstetrics and Gynecology at the University of Tennessee Graduate School of Medicine. Her research addresses female sterilization barriers and intrauterine contraception.

Figure 1.
Percentage of postpartum women using female sterilization, by region and PRAMS reporting area

Table 1Characteristics of postpartum women, according to region^{1, 2}

	Northeast	Midwest/West	South
	(n=8,963)	(n=17,535)	(n=14,577)
Age group (years)			
20 – 24	21.1	25.2	32.2
25 – 29	28.5	33.0	33.1
30 – 34	28.8	26.4	22.3
35	21.5	15.5	12.4
Parity			
1	41.1	36.6	35.9
2	33.6	35.2	35.0
3	25.3	28.3	29.1
Education			
< High school	12.7	13.9	14.5
High school/ some college	49.8	53.9	56.1
College degree	37.5	32.1	29.4
Race/ethnicity			
White	56.8	74.5	65.3
Black	14.8	9.7	23.6
Latina	19.3	10.0	7.8
Other	9.1	5.8	3.3
Payment source for delivery			
Private	58.6	57.5	46.1
Medicaid	41.4	42.5	53.9
Delivery type & Body Mass Index			
C-section	34.2	30.1	35.9
Vaginal, BMI 29.9 kg/m ²	54.2	54.0	49.2
Vaginal, BMI 30.0 kg/m ²	11.6	15.9	14.9

Data source: PRAMS AR 2006–2009; CO 2009; MI 2006–2009; MS 2006, 2008; NE 2006–2009; NY 2006–2008; NYC 2006–2007; NC 2007–2008; OR 2006–2009; RI 2006–2009; SC 2006–2007; WV 2006–2008

¹ Northeast: New York (state), New York City, Rhode Island; Midwest/West: Colorado, Michigan, Nebraska, Oregon; South: Arkansas, Mississippi, North Carolina, South Carolina, West Virginia

² Data are column percentages and weighted to reflect the sampling design and non-response in the PRAMS.

Table 2Percentage of postpartum women using female sterilization, according to women's characteristics^{1, 2}

	Region of residence		
	Northeast	Midwest/West	South
Age group (years)			
20 – 24	3.7	6.1*	9.7 [†]
25 – 29	5.6	9.7*	16.9 [†]
30 – 34	7.1	10.3*	17.7 [†]
35	11.4	19.1*	26.0 [†]
Parity			
1	0.7	0.8	1.6 [†]
2	6.0	8.9*	16.8 [†]
3	18.1	24.7*	32.5 [†]
Education			
< High school	13.9	16.1	20.8 [†]
High school/ some college	7.6	12.0*	18.3 [†]
College degree	3.6	5.3*	8.8 [†]
Race/ethnicity			
White	6.1	9.9*	15.0 [†]
Black	7.0	13.9*	20.8 [†]
Latina	11.1	11.7	9.3
Other	2.8	9.2*	13.1 [†]
Payment source for delivery			
Private	5.4	6.9*	11.1 [†]
Medicaid	9.0	15.1*	20.0 [†]
Delivery type & Body Mass Index			
C-section	12.1	17.9*	24.0 [†]
Vaginal, BMI 29.9 kg/m ²	3.4	5.9*	9.9 [†]
Vaginal, BMI 30.0 kg/m ²	7.6	11.7*	16.3 [†]

Data source: PRAMS AR 2006–2009; CO 2009; MI 2006–2009; MS 2006, 2008; NE 2006–2009; NY 2006–2008; NYC 2006–2007; NC 2007–2008; OR 2006–2009; RI 2006–2009; SC 2006–2007; WV 2006–2008

¹ Northeast: New York (state), New York City, Rhode Island; Midwest/West: Colorado, Michigan, Nebraska, Oregon; South: Arkansas, Mississippi, North Carolina, South Carolina, West Virginia

² Data are percentages and weighted to reflect the sampling design and non-response in the PRAMS.

* p<0.05, comparing the Midwest/West to the Northeast in unadjusted Poisson regression models

[†] p<0.05, comparing the South to the Northeast in unadjusted Poisson regression models

Table 3
Multivariable adjusted prevalence ratios (95% confidence intervals) for use of female sterilization among postpartum women

	Northeast	Midwest/ West	South	p-value Midwest/West vs Northeast	p-value South vs Northeast	p-value Midwest/West vs South
Age group (years)						
20 – 24	0.64 (0.42–0.98)	0.70 (0.57–0.85)	0.62 (0.53–0.73)	0.717	0.889	0.352
25 – 29	0.76 (0.56–1.04)	0.96 (0.82–1.12)	0.92 (0.80–1.06)	0.184	0.262	0.707
30 – 34	1.00 (ref)	1.00 (ref)	1.00 (ref)	--	--	--
35	1.29 (0.99–1.68)	1.56 (1.34–1.82)	1.30 (1.12–1.53)	0.216	0.932	0.105
Parity						
1	0.13 (0.07–0.24)	0.10 (0.06–0.15)	0.11 (0.08–0.15)	0.373	0.496	0.729
2	1.00 (ref)	1.00 (ref)	1.00 (ref)	--	--	--
3	2.52 (1.95–3.26)	2.36 (2.05–2.70)	1.69 (1.51–1.89)	0.647	0.005	<0.001
Education						
< High school	1.30 (0.98–1.71)	1.16 (0.99–1.35)	0.86 (0.75–0.99)	0.468	0.008	0.004
High school/ some college	1.00 (ref)	1.00 (ref)	1.00 (ref)	--	--	--
College degree	0.63 (0.47–0.85)	0.59 (0.49–0.69)	0.64 (0.55–0.75)	0.648	0.918	0.393
Race/ethnicity						
White	1.00 (ref)	1.00 (ref)	1.00 (ref)	--	--	--
Black	0.76 (0.55–1.06)	0.91 (0.80–1.04)	0.96 (0.85–1.07)	0.312	0.205	0.615
Latina	1.04 (0.81–1.35)	0.69 (0.57–0.82)	0.37 (0.27–0.50)	0.007	<0.001	<0.001
Other	0.51 (0.28–0.93)	0.93 (0.71–1.21)	0.93 (0.63–1.37)	0.075	0.102	0.991
Insurance						
Private	1.00 (ref)	1.00 (ref)	1.00 (ref)	--	--	--
Medicaid	1.38 (1.09–1.75)	1.83 (1.60–2.09)	1.45 (1.28–1.65)	0.031	0.696	0.006
Delivery type & Body Mass Index						
C-section	3.45 (2.63–4.51)	3.03 (2.64–3.48)	2.36 (2.10–2.66)	0.404	0.012	0.007
Vaginal, BMI 29.9	1.00 (ref)	1.00 (ref)	1.00 (ref)	--	--	--
Vaginal, BMI 30.0	1.58 (1.06–2.35)	1.53 (1.27–1.85)	1.24 (1.04–1.48)	0.896	0.280	0.109

Data source: PRAMS AR 2006–2009; CO 2009; MI 2006–2009; MS 2006, 2008; NE 2006–2009; NY 2006–2008; NC 2007–2008; OR 2006–2009; RI 2006–2009; SC 2006–2007; WV 2006–2008

Northeast: New York (state), New York City, Rhode Island; Midwest/West: Colorado, Michigan, Nebraska, Oregon; South: Arkansas, Mississippi, North Carolina, South Carolina, West Virginia.

Prevalence ratios obtained from Poisson regression models for using female sterilization versus other contraceptive methods or no method postpartum.

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