GYNECOLOGY

Factors associated with postpartum use of long-acting reversible contraception

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BACKGROUND: Contraception use among postpartum women is important to prevent unintended pregnancies and optimize birth spacing. Long-acting reversible contraception, including intrauterine devices and implants, is highly effective, yet compared to less effective methods utilization rates are low.

OBJECTIVES: We sought to estimate prevalence of long-acting reversible contraception use among postpartum women and examine factors associated with long-acting reversible contraception use among those using any reversible contraception.

STUDY DESIGN: We analyzed 2012−2015 data from the Pregnancy Risk Assessment Monitoring System, a population-based survey among women with recent live births. We included data from 37 sites that achieved the minimum overall response rate threshold for data release. We estimated the prevalence of long-acting reversible contraception use in our sample (n = 143,335). We examined maternal factors associated with long-acting reversible contraception use among women using reversible contraception (n = 97,013) using multivariable logistic regression (long-acting reversible contraception vs other type of reversible contraception) and multinomial regression (long-acting reversible contraception vs other hormonal contraception and long-acting reversible contraception vs other nonhormonal contraception).

RESULTS: The prevalence of long-acting reversible contraception use overall was 15.3%. Among postpartum women using reversible contraception, 22.5% reported long-acting reversible contraception use, which varied by site, ranging from 11.2% in New Jersey to 37.6% in Alaska. Factors associated with postpartum long-acting reversible contraception use vs use of another reversible contraceptive method included age ≤24 years (adjusted odds ratio = 1.43; 95% confidence interval = 1.33−1.54) and ≥35 years (adjusted odds ratio = 0.87; 95% confidence interval = 0.80−0.96) vs 25−34 years; public insurance (adjusted odds ratio = 1.15; 95% confidence interval = 1.08−1.24) and no insurance (adjusted odds ratio = 0.73; 95% confidence interval = 0.55−0.96) vs private insurance at delivery; having a recent unintended pregnancy (adjusted odds ratio = 1.44; 95% confidence interval = 1.34−1.54) or being unsure about the recent pregnancy (adjusted odds ratio = 1.29; 95% confidence interval = 1.18−1.40) vs recent pregnancy intended; having ≥1 previous live birth (adjusted odds ratio = 1.40; 95% confidence interval = 1.31−1.48); and having a postpartum check-up after recent live birth (adjusted odds ratio = 2.70; 95% confidence interval = 2.35−3.11). Hispanic and non-Hispanic black postpartum women had a higher rate of long-acting reversible contraception use (26.6% and 23.4%, respectively) compared to non-Hispanic white women (21.5%), and there was significant race/ethnicity interaction with educational level.

CONCLUSION: Nearly 1 in 6 (15.3%) postpartum women with a recent live birth and nearly 1 in 4 (22.5%) postpartum women using reversible contraception reported long-acting reversible contraception use. Our analysis suggests that factors such as age, race/ethnicity, education, insurance, parity, intendedness of recent pregnancy, and postpartum visit attendance may be associated with postpartum long-acting reversible contraception use. Ensuring all postpartum women have access to the full range of contraceptive methods, including long-acting reversible contraception, is important to prevent unintended pregnancy and optimize birth spacing. Contraceptive access may be improved by public health efforts and programs that address barriers in the postpartum period, including increasing awareness of the availability, effectiveness, and safety of long-acting reversible contraception (and other methods), as well as providing full reimbursement for contraceptive services and removal of administrative and logistical barriers.

Key words: LARC, long-acting reversible contraception, postpartum, PRAMS, short interpregnancy interval, unintended pregnancy

Postpartum contraception use is an important strategy to prevent unintended pregnancy and optimize birth spacing. In the United States, about half of pregnancies each year are unintended (defined as mistimed or unwanted),[1] and about 36% are conceived within 18 months of a previous live birth.[2] Both unintended pregnancies and short interpregnancy intervals are associated with adverse maternal and infant health outcomes.[3−6] Unintended pregnancies also result in substantial public expenditures; in 2010, public insurance programs spent $21 billion on unintended pregnancies.[7]

Most postpartum women use some form of contraception;[8,9] however, all contraceptive methods are not equally effective. Long-acting reversible contraception (LARC), which includes intrauterine devices (IUDs) and implants, are the most effective reversible methods with typical use.[10] LARC methods have annual failure rates less than 1%, largely because once in place they require no user action and are effective for 3−10 years[11] compared to other reversible methods, which have failure rates ranging from 4% to 21%.

The postpartum period is a unique and important time for women to make the decision to initiate contraception, including LARC. LARC methods are safe to use among postpartum women,[12,13] and initiation in the

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AJOG at a Glance

Why was this study conducted?

To estimate prevalence of long-acting reversible contraception use among postpartum women and examine factors associated with long-acting reversible contraception use among those using any reversible contraception.

Key findings

Overall prevalence of postpartum long-acting reversible contraception use was 15.3% and it varied by state of residence. Several factors were associated with its use postpartum, including demographics and postpartum visit attendance.

What does this add to what is known?

An increasing percentage of postpartum women use long-acting reversible contraception.

hospital before discharge after delivery can be performed and is convenient, since women are already within the health care system and some women may not return for follow-up postpartum visits.[14]

Many states have implemented state-specific funding, policies, and programs to address barriers to LARC use, particularly in the postpartum period. LARC use overall has increased over recent years, with notable increase in the postpartum period;[15–17] 2013 estimates of LARC use among women 2–6 months postpartum in 28 states ranged from 7% to 31%.[17] Although several contextual factors have been suggested to be barriers to LARC use,[18] including lack of consumer awareness, lack of provider knowledge and training, stocking, logistic and administrative obstacles, and cost, limited studies have evaluated the maternal characteristics associated with LARC intent and use postpartum.[19,20] Contraceptive access may be improved by public health efforts, policies, and programs that take into account these factors. A small number of studies show that age, marital status, pregnancy intention, parity, and insurance status are associated with LARC use postpartum; however, these studies are limited owing to small sizes and lack of generalizability.

Using data from a large population-based survey of postpartum women, this analysis sought to examine the maternal characteristics associated with LARC use among postpartum women using reversible contraception.

Materials and Methods

The Pregnancy Risk Assessment Monitoring System (PRAMS) is an ongoing surveillance system of the Centers for Disease Control and Prevention and participating sites. It uses a standardized mixed-mode mail and phone survey to obtain information from a population-based sample of women with recent live births. PRAMS captures information about maternal behaviors and experiences around the time of pregnancy. Women are randomly sampled from birth certificates 2–6 months postpartum, and each site samples between 1000 and 3000 women per year. Women not responding to any of 3 mailed survey attempts receive telephone follow-up. Data are weighted for sample design, nonresponse, and noncoverage to produce data representative of state birth populations. Details about the PRAMS methodology have been published previously[21] and are also available on the PRAMS website (http://www.cdc.gov/prams).

We analyzed 2012–2015 PRAMS data from 37 sites that achieved the minimum overall response rate threshold for data release (2012–2014: ≥60%; 2015: ≥55%). Data were included for 2012–2013 for Georgia and Minnesota; 2012–2014 for Rhode Island; 2012–2015 for Alaska, Delaware, Hawaii, Illinois, Massachusetts, Maryland, Maine, Missouri, Nebraska, New Jersey, New Mexico, New York City, Oklahoma, Pennsylvania, Tennessee, Utah, Vermont, Washington, Wisconsin, West Virginia, and Wyoming; 2013–2015 for Iowa, New Hampshire, and New York; 2014–2015 for Alabama and Connecticut; 2012 and 2014–2015 for Ohio; 2012, 2013, and 2015 for Arkansas, Colorado, Michigan, and Oregon; and 2015 for Louisiana, Texas, and Virginia. The annual weighted response rates for these reporting areas during 2012–2015 ranged from 55% to 79%. Institutional Review Board (IRB) approval was not needed for this analysis of deidentified data available upon request, but PRAMS data collection is approved by the IRB of the Centers for Disease Control and Prevention and the local IRB of record in each participating PRAMS site.

To measure postpartum contraception use, women were asked "Are you or your husband or partner doing anything now to keep from getting pregnant?" Respondents who answered "yes" were asked "What kind of birth control are you or your husband or partner using now to keep from getting pregnant?" This question included 10 specific contraceptive methods, "not having sex (abstinence)," and "other." Respondents answering "other" were given the opportunity to write in a response; when possible, some responses were recoded into existing method options or were recoded as new method options (eg, spermicide). Respondents who answered "no" to the first question were asked "What are your reasons or your husband's or partner's reasons for not doing anything to keep from getting pregnant now?" This question included 10 response options for specific reasons, including the use of permanent sterilization, current pregnancy, and "other." Respondents answering "other" were given the opportunity to write in a response and when possible, responses were recoded. Respondents who answered "no" to the first question and had no responses that could be recoded into existing contraceptive options were classified as using no method.

Postpartum contraception use was grouped into 6 categories: sterilization, which included tubal sterilization and vasectomy; LARC, which included IUDs and implants; other hormonal contraception, which included shots, pills, patch, and vaginal ring; other nonhormonal contraception, which included condoms, diaphragm, withdrawal, natural family planning including rhythm method, and spermicide; and no method. Women who reported *not having sex* were coded as not using contraception, and those who reported more than 1 contraceptive method were categorized by the most effective method they reported.

There were 147,747 women with recent live births who responded to the PRAMS survey. To obtain our analytic sample, we excluded women who reported being currently pregnant (n = 857) or having a past hysterectomy, having a past bilateral oophorectomy, or being menopausal (n = 258). We also excluded women with missing data on current contraception use (n = 2123) and those who answered "yes" to current contraception use but either did not respond to the follow-up question about type of current contraception (n = 1073) or responded "other" but the write-in response could not be recoded (n = 101); this resulted in an analytic sample of 143,335 postpartum women with a recent live birth. We examined factors associated with LARC use among women using reversible contraceptive methods. For these analyses, we also excluded women who reported female or male sterilization (n = 16,777) and noncontraception users (n = 29,545), resulting in a sample size of 97,013 reversible contraception users.

We created 2 postpartum contraception use outcome variables. The first had 2 levels: LARC or any other reversible contraception (other hormonal and nonhormonal). The second had 3 levels: LARC, other hormonal contraception, or other nonhormonal contraception. Covariates of interest were sociodemographic characteristics (ie, age, race/ethnicity, education, marital status, type

TABLE 1
Selected characteristics of postpartum women with a recent live birth,[a] Pregnancy Risk Assessment Monitoring System, 37 sites,[b] 2012–2015

Characteristics	Postpartum women with a recent live birth (N = 143,335)		Postpartum women with a recent live birth using reversible contraception (N = 97,013)	
	n[c]	%[c]	n[c]	%[c]
Age group, years				
<24	40,126	26.6	30,627	29.9
25–34	80,538	57.4	54,620	58.0
≥35	22,667	16.0	11,763	12.1
Race/ethnicity				
Non-Hispanic white	70, 229	59.9	47,942	60.4
Non-Hispanic black	22,996	13.1	14,984	12.6
Hispanic	23,743	17.2	16,712	17.7
Non-Hispanic other	21,930	9.2	14,201	8.6
Education, years				
≤12	55,454	37.2	37,110	36.5
13–15	40,838	27.7	27,536	27.8
≥16	45,333	34.2	31,258	34.9
Married	85,058	61.5	56,996	60.8
Type of insurance at delivery				
None	2912	2.3	1913	2.2
Medicaid/other public health insurance	55,917	39.2	37,344	38.7
Private	62,875	50.1	43,351	50.9
Other	1371	1.3	921	1.2
≥1 previous live birth	84,199	59.5	52,554	55.2
Most recent pregnancy intention				
Unintended	41,730	28.7	28,658	29.4
Intended	76,858	55.2	52,673	55.9
Unsure	21,935	14.2	13,937	13.1
Number of prenatal visits				
≤8	30,026	17.4	19,574	16.8
9–11	43,049	30.6	29,179	30.5
≥12	64,991	48.3	44,752	49.1
Vaginal delivery	95,626	69.3	67,811	72.5
Term birth (≥37 weeks gestation)	115,881	91.5	79,276	92.0
Currently breastfeeding	68,607	48.9	46,744	48.9
Smoking during the last 3 months of pregnancy or currently	23,388	14.5	14,528	13.5

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TABLE 1
Selected characteristics of postpartum women with a recent live birth,[a] Pregnancy Risk Assessment Monitoring System, 37 sites,[b] 2012–2015
(continued)

Characteristics	Postpartum women with a recent live birth (N = 143,335)		Postpartum women with a recent live birth using reversible contraception (N = 97,013)	
	n[c]	%[c]	n[c]	%[c]
Prepregnancy BMI, kg/m^2				
Underweight <18.5	5965	3.8	4085	3.8
Normal 18.5–24.9	65,866	46.8	45,846	48.2
Overweight 25.0–29.9	33,204	23.3	22,471	23.1
Obese ≥30.0	32,054	21.5	20,460	20.4
Chronic hypertension	12,954	6.6	8550	6.5
Chronic diabetes	8646	5.6	5304	5.0
Attended a postpartum visit	127,727	90.3	88,433	92.2
Current contraceptive use				
Sterilization[d]	16,777	11.3	N/A	–
Long-acting reversible contraception[e]	24,221	15.3	24,221	22.5
Other hormonal methods[f]	39,641	27.9	39,641	41.0
Other nonhormonal methods[g]	33,151	24.8	33,151	36.5
No method	29,545	20.8	N/A	–

BMI, body mass index; *LARC*, long-acting reversible contraception; *N/A*, not applicable.

[a] Excludes women pregnant at the time of survey or reporting hysterectomy, bilateral oophorectomy, or menopause; [b] Alabama, Alaska, Arkansas, Colorado, Connecticut, Delaware, Georgia, Hawaii, Illinois, Iowa, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Nebraska, New Hampshire, New Jersey, New Mexico, New York, New York City, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, Tennessee, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, and Wyoming; [c] Unweighted n, weighted percentage; sum of percentages may not equal 100% because of missing data; [d] Includes tubal ligation and vasectomy; [e] Includes intrauterine device and implants; [f] Includes shots, pills, patch, and vaginal ring; [g] Includes condoms, diaphragm, natural family planning/rhythm method, withdrawal, and spermicide.

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of insurance at delivery, and state of residence), pregnancy-related characteristics (ie, previous live birth, pregnancy intention of most recent pregnancy, number of prenatal visits, delivery mode, gestational age at delivery, current breastfeeding status, and postpartum visit attendance), and risk behaviors and medical characteristics (ie, smoking during last 3 months of pregnancy or currently, prepregnancy body mass index, chronic hypertension, and chronic diabetes). Most covariates of interest were obtained from the birth certificate; however, type of insurance at delivery (only for states without these data on the birth certificate), pregnancy intention of most recent pregnancy, current breastfeeding status, and postpartum visit attendance were obtained from the PRAMS survey (https://www.cdc.gov/prams/pdf/questionnaire/Phase-7-Topics-Reference_508tagged.pdf). Pregnancy intention was assessed based on the question "Thinking back to just before you got pregnant with your new baby, how did you feel about becoming pregnant?" Women who responded that they wanted to be pregnant then or sooner were categorized as having an intended pregnancy, women who stated that they wanted to be pregnant later or who stated they did not want to get pregnant then or any time in the future were categorized as unintended, and those who reported they were not sure what they wanted were categorized as unsure. Current breastfeeding was assessed by asking if the woman was currently breastfeeding or feeding pumped milk to her new baby at the time of the interview, while postpartum visit attendance was assessed by asking if the woman had a postpartum checkup about 4–6 weeks after birth.

We described sample characteristics and estimated LARC use among our analytic sample of postpartum women with a recent live birth. Among the subset of reversible contraception users, χ^2 tests were used to determine if the prevalence of LARC use differed by each covariate. In modeling, factors of interest were selected a priori based on previous literature[19,20] and univariate associations that significantly ($P < .05$) associated with LARC use. Multivariable logistic regression was used to determine factors significantly ($P < .05$) associated with LARC use (vs other type of reversible contraception). Based on previous literature,[22,23] we also examined whether the effect of race/ethnicity was modified by education by testing interaction terms added to full models. Where significant effect modification was detected, stratum-specific estimates were calculated using contrast statements in a single model. Multinomial regression using the 3-level outcome variable was used to further explore factors significantly associated with LARC use.

Variance inflation factors were examined and multicollinearity between covariates was ruled out. All analyses were performed on weighted data using SAS-callable SUDAAN (RTI International, Research Triangle Park, NC) to account for the complex survey design of PRAMS.

Results

Among our analytic sample of postpartum women with a recent live birth (n = 143,335), the majority (>50%) were aged 25–34 years, were

non-Hispanic white, were married, had >12 years of education, and had private insurance at delivery (Table 1). Fewer than half reported that their most recent pregnancy was unintended (28.7%) or expressed uncertainty about recent pregnancy intentions (14.2%). Most women (79.2%) reported currently using some method of contraception, with 11.3% reporting sterilization, 15.3% reporting LARC (11.7% IUDs and 3.5% implants), 27.9% using other hormonal methods (most commonly pills), and 24.8% using other nonhormonal methods (most commonly condoms) (Table 1).

Among reversible contraception users (n = 97,013), the distribution of characteristics was similar to the distribution among our sample of postpartum women with a recent live birth (Table 1). Among this subgroup of women, 22.5% reported using LARC methods (17.3% IUDs and 5.2% implants), 41.0% reported using other hormonal contraception (most commonly pills), and 36.5% reported using other nonhormonal contraception (most commonly condoms).

Among women currently using reversible contraception, contraceptive method use differed significantly ($P < .05$) by all characteristics examined except number of prenatal visits attended (Table 2). The prevalence of LARC use was highest among women aged ≤24 years (29.0%), women reporting their most recent pregnancy as unintended (28.1%), and unmarried women (27.8%). The prevalence of LARC use was lowest among women with ≥16 years of education (16.8%), women with no health insurance at delivery (16.0%), and women who did not attend a postpartum visit (12.9%). LARC use also varied by site of residence, with Alaska having the highest prevalence (37.6%), followed by Oregon (37.5%) and New Mexico (35.2%); New Jersey had the lowest prevalence (11.2%), followed by New York City (16.1%) and Pennsylvania (16.6%).

For our 2-level outcome variable (postpartum LARC use vs other types of reversible contraception), factors statistically significantly associated with higher odds of LARC use included age

TABLE 2
Contraceptive method use among postpartum women using reversible contraception[a] by select characteristics, Pregnancy Risk Assessment Monitoring System, 37 sites,[b] 2012–2015

Characteristics	Contraceptive method, %[c]		
	LARC[d] %	Other hormonal contraception[e] %	Other nonhormonal contraception[f] %
Total	22.5	41.0	36.5
Age group, years[g]			
≤24	29.0	47.5	23.5
25–34	20.2	39.4	40.4
≥35	17.5	32.7	49.8
Race/ethnicity[g]			
Non-Hispanic white	21.5	41.0	37.5
Non-Hispanic black	23.4	52.3	24.3
Hispanic	26.6	38.1	35.4
Non-Hispanic other	19.5	31.5	49.0
Education, years[g]			
≤12	25.2	45.6	29.2
13–15	26.2	41.8	32.0
≥16	16.8	35.7	47.6
Married[g]			
Yes	19.1	36.2	44.7
No	27.8	48.6	23.7
Type of insurance at delivery[g]			
None	16.0	25.2	58.8
Medicaid/other public health insurance	27.1	44.0	28.9
Private	19.3	39.2	41.4
Other	18.5	42.2	39.3
Previous live births[g]			
0	20.6	44.5	34.9
≥1	24.0	38.2	37.7
Most recent pregnancy intention[g]			
Unintended	28.1	44.2	27.7
Intended	18.8	38.7	42.4
Ambivalent	25.6	43.9	30.5
Number of prenatal visits			
≤8	21.7	42.5	35.8
9–11	22.6	40.4	37.0
≥12	22.8	40.8	36.4
Vaginal delivery[g]			
Yes	23.2	40.1	36.7
No	20.6	43.6	35.8

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TABLE 2
Contraceptive method use among postpartum women using reversible contraception[a] by select characteristics, Pregnancy Risk Assessment Monitoring System, 37 sites,[b] 2012–2015 *(continued)*

Characteristics	Contraceptive method, %[c] LARC[d] %	Other hormonal contraception[e] %	Other nonhormonal contraception[f] %
Term birth (≥37weeks gestation)[g]			
Yes	22.5	40.7	36.8
No	23.3	44.8	31.9
Currently breastfeeding[g]			
Yes	20.8	32.6	46.6
No	24.3	49.2	26.5
Smoking during or after pregnancy[g]			
Yes	27.6	47.8	24.5
No	21.7	39.9	38.3
Prepregnancy BMI, kg/m^2[g]			
Underweight <18.5	21.3	41.3	37.4
Normal 18.5–24.9	20.1	40.6	39.3
Overweight 25.0–29.9	24.0	41.4	34.6
Obese ≥30.0	27.5	41.3	31.2
Chronic hypertension[g]			
Yes	24.9	43.1	32.0
No	22.4	40.9	36.7
Chronic diabetes[h]			
Yes	22.7	38.0	39.3
No	22.5	41.2	36.3
Attended a postpartum visit[g]			
Yes	23.3	41.6	35.0
No	12.9	33.8	53.3
Sites[g]			
Alabama	21.4	54.4	24.2
Alaska	37.6	27.0	35.4
Arkansas	19.4	49.3	31.2
Colorado	32.1	33.2	34.6
Connecticut	24.6	35.8	39.6
Delaware	18.9	47.7	33.4
Georgia	20.6	51.2	28.2
Hawaii	23.2	46.2	30.7
Illinois	20.9	40.4	38.7
Iowa	25.8	44.5	29.6
Louisiana	18.6	52.3	29.1

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≤24 (adjusted odds ratio [AOR] = 1.43, 95% confidence interval [CI] = 1.33–1.54) vs 25–34 years, having Medicaid or other public health insurance (AOR = 1.15, CI = 1.08–1.24) vs private insurance at delivery, having ≥1 previous live birth (AOR = 1.40, CI = 1.31–1.48) vs none, reporting their intention for most recent pregnancy as unintended (AOR = 1.44, CI = 1.34–1.54) or unsure (AOR = 1.29, CI = 1.18–1.40) vs intended, being overweight (AOR = 1.21, CI = 1.13–1.29) or obese (AOR = 1.38, CI = 1.29–1.49) vs normal weight based on prepregnancy body mass index, reporting postpartum visit attendance (AOR = 2.70, CI = 2.35–3.11), smoking during or after pregnancy (AOR = 1.11, CI = 1.02–1.21), and chronic hypertension (AOR = 1.12, CI = 1.01–1.25) (Table 3). Factors associated with significantly lower odds of LARC use included age ≥35 years (AOR = 0.87, CI = 0.80–0.96) vs 25–34 years, being married (AOR = 0.76, CI = 0.71–0.82) vs unmarried, and having no insurance (AOR = 0.73, CI = 0.55–0.96) vs private insurance at delivery.

Significant effect modification (P interaction <.001) between education and race/ethnicity was detected in the analysis using the 2-level outcome variable (postpartum LARC use vs other type of reversible contraception). Among women with ≤12 years of education, non-Hispanic black women had significantly lower odds of LARC use (AOR = 0.77, CI = 0.67–0.88) compared with non-Hispanic white women; however, among women with ≥16 years of education, non-Hispanic black women had higher odds of LARC use (AOR = 1.45, CI = 1.21–1.73). Hispanic women had a higher odds of LARC use across all levels of education, which was statistically significant among women with ≤12 (AOR = 1.19, CI = 1.05–1.35) and ≥16 (AOR = 1.26, CI = 1.02–1.56) years of education.

Results were generally similar when examining our 3-level outcome variable (postpartum LARC use, other hormonal contraception, other nonhormonal contraception) (Table 3). Women who were aged ≥35 years, who were married,

or who reported no insurance at delivery did not show significantly lower LARC use compared with other hormonal methods; however, association remained between LARC and other nonhormonal methods. Women who were currently breastfeeding had significantly higher odds of LARC use vs a hormonal method (AOR = 1.35, CI = 1.26−1.44) but significantly lower odds of LARC use vs other nonhormonal methods (AOR = 0.63, CI = 0.59−0.68). Although women who reported postpartum visit attendance had a higher odds of LARC use compared to other types of reversible contraception (AOR 2.70, CI = 2.35−3.11), the magnitude of association was higher for LARC use compared to other nonhormonal contraception (AOR = 4.81, CI = 4.13−5.61).

Discussion

In our analysis, current LARC use was reported by nearly 1 in 6 (15.3%) postpartum women with a recent live birth and nearly 1 in 4 (22.5%) postpartum women using reversible contraception. These estimates are higher than older estimates of 1−3% of postpartum LARC use among postpartum women from 2000 PRAMS data[15] but consistent with more recent estimates.[17] In addition, consistent with another report of state-level data,[15] our analysis showed wide variation in postpartum LARC use across included states, ranging from 11.2% in New Jersey to 37.6% in Alaska among reversible contraception users.

A multitude of factors have been suggested to be barriers to LARC use, including lack of consumer awareness, lack of provider knowledge and training, stocking, logistic and administrative obstacles, and cost.[18] To address some of these barriers, many states have implemented state-specific funding, policies, and programs that might explain the variation of postpartum LARC use across states.[24−26] For example, with support and collaboration from organizations such as the Association of State and Territorial Health Officials (ASTHO) and American College of Obstetricians and Gynecologists (ACOG), about 40 jurisdictions currently have a Medicaid policy that

TABLE 2
Contraceptive method use among postpartum women using reversible contraception[a] by select characteristics, Pregnancy Risk Assessment Monitoring System, 37 sites,[b] 2012−2015 *(continued)*

Characteristics	Contraceptive method, %[c]		
	LARC[d] %	Other hormonal contraception[e] %	Other nonhormonal contraception[f] %
Maine	32.1	37.7	30.2
Maryland	18.2	43.4	38.5
Massachusetts	26.3	36.5	37.1
Michigan	21.9	42.4	35.7
Minnesota	23.8	38.0	38.2
Missouri	24.3	43.4	32.3
Nebraska	23.4	38.7	37.9
New Hampshire	31.9	34.7	33.4
New Jersey	11.2	40.0	48.8
New Mexico	35.2	38.5	26.3
New York	17.9	42.4	39.7
New York City	16.1	35.5	48.4
Ohio	17.5	47.5	35.0
Oklahoma	23.0	46.0	31.0
Oregon	37.5	30.4	32.1
Pennsylvania	16.6	44.1	39.3
Rhode Island	30.2	38.5	31.4
Tennessee	21.3	47.9	30.7
Texas	23.9	39.7	36.5
Utah	34.7	29.8	35.4
Vermont	30.4	35.4	34.2
Virginia	21.2	42.2	36.6
Washington	31.1	31.8	37.1
West Virginia	22.3	50.8	26.9
Wisconsin	24.0	41.1	34.9
Wyoming	30.0	41.7	28.3
Reporting year[h]			
2012	21.4	41.3	37.3
2013	22.4	42.0	35.7
2014	22.0	40.9	37.1
2015	23.8	40.2	36.0

BMI, body mass index; *LARC*, long-acting reversible contraception.

[a] Excludes women pregnant at the time of survey or reporting hysterectomy, bilateral oophorectomy, menopause, sterilization, or not using contraception; [b] Alabama, Alaska, Arkansas, Colorado, Connecticut, Delaware, Georgia, Hawaii, Illinois, Iowa, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Nebraska, New Hampshire, New Jersey, New Mexico, New York, New York City, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, Tennessee, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, and Wyoming; [c] Weighted percentage; sum of percentages may not equal 100 because of missing data; [d] Includes intrauterine device and implants; [e] Includes shots, pills, patch, and vaginal ring; [f] Includes condoms, diaphragm, natural family planning/rhythm method, withdrawal, and spermicide; [g] $P < .001$; [h] $P \leq .05$.

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TABLE 3
Adjusted odds of long-acting reversible contraception use among postpartum women using reversible contraception,[a] Pregnancy Risk Assessment Monitoring System, 37 sites,[b] 2012–2015

Characteristics	LARC[c] vs other hormonal[d] or nonhormonal contraception[e]		LARC vs other hormonal contraception		LARC vs other nonhormonal contraception	
	aOR[f]	95% CI	aOR[f]	95% CI	aOR[f]	95% CI
Age group, year						
≤24	1.43	1.33–1.54	1.33	1.23–1.45	1.66	1.52–1.82
25–34	1.00	Referent	1.00	Referent	1.00	Referent
≥35	0.87	0.80–0.96	1.03	0.93–1.15	0.76	0.69–0.84
Marital status						
Married	0.76	0.71–0.82	0.93	0.86–1.01	0.57	0.52–0.62
Not married	1.00	Referent	1.00	Referent	1.00	Referent
Type of insurance at delivery						
None	0.73	0.55–0.96	1.23	0.91–1.68	0.48	0.36–0.64
Medicaid/other public health insurance	1.15	1.08–1.24	1.19	1.10–1.28	1.12	1.03–1.21
Private	1.00	Referent	1.00	Referent	1.00	Referent
Other	0.95	0.69–1.33	1.01	0.71–1.44	0.87	0.59–1.27
Education and race/ethnicity interaction						
≤12 years						
Non-Hispanic, white	1.00	Referent	1.00	Referent	1.00	Referent
Non-Hispanic, black	0.77	0.67–0.88	0.70	0.61–0.81	1.01	0.85–1.20
Hispanic	1.19	1.05–1.35	1.24	1.08–1.42	1.08	0.92–1.25
Non-Hispanic, other	0.94	0.80–1.11	1.14	0.95–1.37	0.71	0.59–0.85
13–15 years						
Non-Hispanic, white	1.00	Referent	1.00	Referent	1.00	Referent
Non-Hispanic, black	0.95	0.83–1.08	0.87	0.75–1.00	1.13	0.96–1.34
Hispanic	1.07	0.91–1.24	1.10	0.92–1.31	1.01	0.84–1.21
Non-Hispanic, other	0.96	0.80–1.14	1.05	0.86–1.28	0.85	0.70–1.04
≥16 years						
Non-Hispanic, white	1.00	Referent	1.00	Referent	1.00	Referent
Non-Hispanic, black	1.45	1.21–1.73	1.32	1.08–1.60	1.59	1.30–1.94
Hispanic	1.26	1.02–1.56	1.45	1.14–1.84	1.11	0.89–1.40
Non-Hispanic, other	0.75	0.64–0.88	1.25	1.04–1.50	0.57	0.48–0.67
Previous live births						
0	1.00	Referent	1.00	Referent	1.00	Referent
≥1	1.40	1.31–1.48	1.45	1.36–1.55	1.32	1.23–1.41
Pregnancy intention						
Intended	1.00	Referent	1.00	Referent	1.00	Referent
Unintended	1.44	1.34–1.54	1.34	1.24–1.44	1.60	1.47–1.73
Unsure	1.29	1.18–1.40	1.24	1.13–1.36	1.34	1.20–1.48

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(continued)

TABLE 3
Adjusted odds of long-acting reversible contraception use among postpartum women using reversible contraception,[a] Pregnancy Risk Assessment Monitoring System, 37 sites,[b] 2012–2015 *(continued)*

Characteristics	LARC[c] vs other hormonal[d] or nonhormonal contraception[e]		LARC vs other hormonal contraception		LARC vs other nonhormonal contraception	
	aOR[f]	95% CI	aOR[f]	95% CI	aOR[f]	95% CI
Current breastfeeding						
Yes	0.97	0.91–1.03	1.35	1.26–1.44	0.63	0.59–0.68
No	1.00	Referent	1.00	Referent	1.00	Referent
Prepregnancy BMI, kg/m^2						
Underweight <18.5	0.96	0.83–1.12	0.98	0.84–1.15	0.93	0.79–1.10
Normal 18.5–24.9	1.00	Referent	1.00	Referent	1.00	Referent
Overweight 25.0–29.9	1.21	1.13–1.29	1.16	1.08–1.25	1.27	1.17–1.37
Obese ≥30.0	1.38	1.29–1.49	1.38	1.27–1.49	1.37	1.26–1.50
Attended a postpartum visit						
Yes	2.70	2.35–3.11	1.63	1.40–1.90	4.81	4.13–5.61
No	1.00	Referent	1.00	Referent	1.00	Referent
Smoking during or after pregnancy						
Yes	1.11	1.02–1.21	1.07	0.98–1.17	1.21	1.09–1.35
No	1.00	Referent	1.00	Referent	1.00	Referent
Chronic hypertension						
Yes	1.12	1.01–1.25	1.09	0.97–1.23	1.17	1.03–1.32
No	1.00	Referent	1.00	Referent	1.00	Referent

aOR, adjusted odds ratio; *BMI*, body mass index; *CI*, confidence interval; *LARC*, long-acting reversible contraception.

[a] Excludes women pregnant at the time of survey or reporting hysterectomy or bilateral oophorectomy, or menopausal; [b] Alabama, Alaska, Arkansas, Colorado, Connecticut, Delaware, Georgia, Hawaii, Illinois, Iowa, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Nebraska, New Hampshire, New Jersey, New Mexico, New York, New York City, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, Tennessee, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, and Wyoming; [c] Includes intrauterine device and implants; [d] Includes shots, pills, patch, and vaginal ring; [e] Includes condoms, diaphragm, natural family planning/rhythm method, withdrawal, and spermicide; [f] Adjusted for all other variables listed, site, and year.

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allows providers and health facilities to bill for LARC devices and insertion procedures separate from global delivery fees.[27] The increased odds of LARC use among women with Medicaid at delivery compared to those with private insurance in our analysis might also be related to limitations of pregnancy-related Medicaid coverage, which often ends 60 days after delivery unless states have expansions extending coverage.[28] Women who expect to lose pregnancy-related income eligibility for Medicaid may opt for contraceptive methods such as LARC that do not require regular contact with the health care system[29] and have a longer duration of effectiveness. Additionally, providers may recommend LARC differentially to women, based on socioeconomic status or race/ethnicity; one study suggests that providers may be more likely to recommend IUDs to black and Hispanic women of low socioeconomic status.[22]

Although we found a higher rate of LARC use among non-Hispanic black vs white postpartum women, it varied by level of education. Non-Hispanic black vs white women had higher odds of LARC use among women with greater years of education but lower odds of LARC use among women with fewer years of education, whereas Hispanic women had higher odds of LARC use across all education levels. Studies show that women of color may perceive more provider pressure to use LARC,[30,31] raising concerns about disparities in access to care and inappropriate LARC promotion.[32] Despite the lack of difference in the association between education or income and LARC use by race/ethnicity shown by a study that examined the 2011–2015 National Survey of Family Growth data using a multiple race-interactions model,[33] it is important that an individual's autonomy, culture, values, and preferences be taken into account when selecting a contraceptive method.[34] Increased efforts to educate all women, regardless of education levels or race/ethnicity about the full range of contraceptive methods, is critical in ensuring that women have access to all methods.

Several other sociodemographic factors were associated with LARC use,

including age and marital status. The increased odds of LARC use by women of younger reproductive age (≤24 years old) may in part reflect the efforts to prioritize adolescents in pregnancy prevention programs[35] because they are a subpopulation at increased risk for unintended pregnancy[36] and short interpregnancy intervals.[37–39] In addition, national and professional organization guidelines and publications have included or highlighted adolescent-specific recommendations related to family planning and specifically LARC use.[40–43] Consistent with other studies that examined LARC use by age, older women had lower LARC use compared to younger women,[44-46] specifically when compared to use of other nonhormonal methods. Potential reasons for this pattern of use may include ambivalence about a subsequent pregnancy, perceived sub-fertility, or the desire to avoid hormonal methods owing to concerns about thromboembolism or other potential risks.[47,48]

Consistent with other studies, pregnancy-related characteristics including a recent unintended pregnancy and multiparity were associated with higher odds of LARC use.[20,45,49–51] These women may have increased motivation to avoid another pregnancy in the near future and choose methods with the highest effectiveness. Among women currently breastfeeding, we found greater LARC use compared with other hormonal methods, but lower LARC use compared with other nonhormonal methods. These findings may be related to concerns about the effects of early initiation of hormonal methods on breastfeeding success,[41] as well as concerns about increased risk of uterine perforation.[52]

Similar to other studies,[53,54] this study shows a beneficial impact of postpartum visit attendance on greater use of contraception, specifically highly effective contraceptive methods. The postpartum visit offers the opportunity for health care providers to provide the necessary counseling, as well as the contraception, if desired by the patient. In recognition of the importance of postpartum care in optimizing the health of women, ACOG recommends that new mothers be seen within the first 3 weeks postpartum and end with a comprehensive visit no later than 12 weeks postpartum.[55]

Strengths of this analysis include the examination of a large, population-based sample of women from 37 sites and a broad range of potential factors associated with postpartum LARC use. However, our findings should be interpreted in the context of several limitations. PRAMS is a cross-sectional survey with self-reported data and is potentially subject to social desirability bias and recall errors. In addition, the results may only be generalizable to women residing in the 37 sites included in the analysis. Last, because the survey does not report timing of contraceptive initiation, insurance status at delivery may not reflect insurance status at time of contraceptive initiation.

In conclusion, LARC use was reported by almost 1 in 6 postpartum women using reversible contraception, but rates varied substantially by site and certain characteristics. Contraceptive access may be improved by public health efforts, policies, and programs that address barriers in the postpartum period, including increasing awareness of the availability, effectiveness, and safety of LARC and other methods, as well as by providing full reimbursement for contraceptive services, provider training, and removal of administrative and logistic barriers. Access to the full range of contraceptive methods, including LARC, is important to decrease rates of unintended pregnancy and to optimize birth spacing. ■

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