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Potential benefits of increased access to doula support during childbirth

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Abstract

Objective—The annual costs of U.S. maternity-related hospitalizations exceed \$27 billion. Continuous labor support from a trained doula is associated with improved outcomes and potential cost savings. This study aimed to document the relationship between doula support, desire for doula support and cesarean delivery, distinguishing cesarean deliveries without a definitive medical indication.

Study Design—Retrospective analysis of a nationally-representative survey of women who delivered a singleton baby in a U.S. hospital in 2011–2012 ($N=2400$).

Methods—Multivariable logistic regression analysis of characteristics associated with doula support and desire for doula support; similar models examine the relationship between doula support, desire for doula support, and 1) any cesarean or 2) non-indicated cesarean

Results—Six percent of women reported doula care during childbirth. Characteristics associated with desiring but not having doula support were black race (vs. white; adjusted odds ratio (AOR)=1.77, 95% CI [1.03, 3.03]), and publicly-insured or uninsured (vs. privately-insured; AOR=1.83 [1.17, 2.85];2.01 [1.07, 3.77], respectively). Doula-supported women had lower odds of cesarean overall (AOR=0.41 [0.18, 0.96]; and AOR=0.31 [0.13, 0.74]) and non-indicated cesarean (AOR=0.17 [0.07, 0.39]; and AOR=0.11 [0.03, 0.36]) compared to those without doula support and compared to those who desired but did not have doula support.

Conclusion—Women with doula support have lower odds of non-indicated cesareans than those who did not have a doula as well as those who desired but did not have doula support. Increasing awareness of doula care and access to support from a doula may facilitate decreases in non-indicated cesarean rates.

Keywords

childbirth; cesarean; maternity; doula; health insurance

Introduction

Four million infants are born each year in the U.S., and the associated healthcare costs are substantial. In 2009, 7.6% of all hospital costs were attributable to maternity and newborn care, totaling over \$27 billion.¹ Almost half of childbirth-related hospital stays (47%) were covered by private health insurance; 45% of stays were billed to Medicaid programs.¹ Maternity and newborn care is the top expenditure category for payments made to hospitals by both public payers and private health insurance companies.² The average total costs of maternity (prenatal, labor and delivery, and postpartum) and newborn care for commercial payers was \$27,866 for a cesarean delivery and \$18,329 for a vaginal delivery in 2009.³ While payments by Medicaid programs were less overall, cesareans are about 50% more costly than vaginal deliveries at \$13,590 for a cesarean delivery and \$9,131 for a vaginal delivery.³ Ensuring access to evidence-based, high-value care during childbirth is a clinical and financial imperative for health care providers, health care delivery systems, and health insurers.

A growing evidence base suggests that continuous labor support confers measurable clinical benefits to both mother and baby.⁴⁻⁶ Continuous labor support is the care, guidance, and encouragement provided by those who are with a pregnant woman in labor that aims to support labor physiology and mothers' feelings of control and participation in decision-making during childbirth.⁴ In a meta-analysis of randomized controlled trials, women who received continuous labor support reported greater satisfaction,^{7,8} had higher rates of spontaneous vaginal birth,⁹⁻¹¹ higher infant Apgar scores,⁸ shorter labors,^{7,8} and lower rates of regional anesthesia (e.g., epidural),¹² cesarean deliveries,^{7,12} and forceps or vacuum deliveries.^{4,11,13} While many different individuals can and commonly do provide continuous labor support (including obstetric nurses, husbands and partners, close friends, and family members), the strongest results were achieved when continuous labor support was provided by someone who was not part of the woman's family or social network or employed by the hospital.⁴

Doulas are trained professionals who provide continuous, one-on-one emotional and informational support during the perinatal period. They are not medical professionals and do not provide medical services, but work alongside nurses, obstetricians, midwives and other health care providers. A core function of the work of a doula is the provision of continuous labor support.¹⁴ Use of doula care is rising in the United States,^{4,15,16} but remains low: approximately 6% of women who gave birth in 2011 and 2012 reported receiving care from a doula.¹⁷ There are substantial barriers to access to doula care, especially for low-income women and communities of color.^{5,6,15} The cost of birth doula services varies widely, but averages between \$300-\$1200 and may include one or more prenatal or postpartum visits in addition to support during labor and birth.^{18,19} As health insurance programs do not typically offer coverage for these services,¹⁵ many women who would benefit from doula

care are unable to access it.^{5,15,20} In addition, with a few notable exceptions (e.g. HealthConnect One, International Center for Traditional Childbearing, and Everyday Miracles), most doulas are white upper-middle class women serving other white upper-middle class women.¹⁵ The lack of diversity in the doula workforce is likely exacerbated by lack of third-party reimbursement and payment for doula care, further disadvantaging under-represented groups who may be best served by a doula who shares their language, culture, or background.²⁰

Women of color and low-income women are at greater risk of delivery-related complications and have higher rates of adverse birth outcomes than white, privately-insured women.²¹ However, when low-income, diverse women have access to doula care, they experience better outcomes than Medicaid recipients in general, with lower cesarean delivery rates and higher breastfeeding initiation rates.^{5,6} Recent research on the potential benefits of doula care, especially among low-income women, has ignited discussion regarding reimbursement of doula care by health insurance programs, including Medicaid programs. The state of Oregon has implemented a program for Medicaid coverage of birth doulas, and Minnesota passed legislation in May 2013 that lays the groundwork for Medicaid reimbursement for trained doulas starting July 1, 2014.^{22,23}

The goal of this study was to characterize women who used doula services and those who desired but could not access doula support among a representative sample of U.S. childbearing women. We also explored the relationship between doula support, desire for doula support, and cesarean delivery, distinguishing non-indicated cesareans. If desire for doula services is related to higher rates of non-indicated procedures, this could serve to identify opportunities to better serve at-risk women who may benefit from access to continuous labor support.

Methods

Data

Data are from the Listening to Mothers III survey, a nationally-representative sample of women who gave birth to a single infant in a U.S. hospital between July 1, 2011 and June 30, 2012 ($N=2,400$). The survey was commissioned by Childbirth Connection, funded by the Kellogg Foundation, and conducted online by Harris Interactive using validated procedures.^{17,24} Women ages 18–45 that were participating in one of several online panels maintained by Harris Interactive, formed the pool of potential respondents, with checks to ensure that each respondent only participated once. After data collection was complete, responses were weighted by propensity to be online as well as several demographic variables to enhance comparability with the national population of women who gave birth in 2010, the most recent year for which birth certificate data was available for this purpose.¹⁷ The Listening to Mothers surveys are the only nationally-representative samples of childbearing women that contain information about doula care alongside self-reported clinical experiences, perceptions, and decisions about childbirth. In addition to asking whether a woman had support from a doula, the survey also asked about awareness of and level of familiarity with this type of care, and whether women who knew about doula care would

have wanted to have type of care. The latter question is particularly useful as it may help at least partially address selection issues in who chooses to have a doula.

Variable measurement

The two main predictors of interest were having doula support and, among those who did not have doula support but had a clear understanding of what a doula is, desire for doula support. Women were categorized as having doula support if they reported receiving supportive care during labor from a “doula or trained labor assistant.” Those who did not use doula support during labor were asked if they had heard of doulas and whether they had a clear understanding of this type of caregiver. Those with a clear understanding of doulas were then asked whether they would like to have had doula support during their most recent birth; those who responded affirmatively were categorized as reporting “desire for doula support” in this analysis.

Measurement of cesarean birth was based on self-reported mode of delivery (vaginal or cesarean). Women with cesarean deliveries were asked to provide the main reason for the cesarean, which we categorized as a definitive medical indication for this procedure or a non-definitive indication. We based these categorizations on professional standards used for accreditation measures²⁵ and confirmation by our clinician co-author (DG). The following reported reasons for cesarean were considered definitive medical indications: baby being in the wrong position for birth, problems with the placenta, fetal monitor showing fetal distress during labor, and maternal health condition that called for cesarean delivery. All other reasons cited were categorized as being potential reasons, but not definitive medical indications for cesarean; these included prior cesarean, labor taking too long, provider concern regarding the size of the baby, fear of labor and vaginal delivery, being past the due date (for women whose pregnancies are <41.5 weeks gestation at delivery), having a narrow pelvis, or citing no medical reason for their cesarean. The term non-indicated cesarean refers throughout the manuscript to this type of delivery. We conducted multiple sensitivity analyses around the classification of reasons for cesarean as medical indications, and results were substantively unchanged when we categorized any combination of the following reasons as definitive indications: labor taking too long, provider concern regarding the size of the baby, and having a narrow pelvis.

Socio-demographic covariates included age, race/ethnicity (white, black, Hispanic or other/multiple race), education (high school or less, some college or Associate’s degree, 4-year college degree, graduate education/degree), four-category census region (Northeast, Midwest, South, West), nativity (foreign- or U.S.-born), partnership status at the time of the LTM3 survey (unmarried without partner, unmarried with partner, or married). Pregnancy characteristics included parity (first-time vs. experienced mother), pregnancy intention (unintended pregnancy or not), agreement with the statement “birth is a natural process that should not be interfered with unless medically necessary,” and primary payer for maternity services (private, public (i.e. Medicaid or other government programs), or none reported). We also conducted sensitivity analyses around the inclusion of control variables for labor support from a partner, spouse, family member, or friend, and results were robust to these specifications.

Analysis

We first examined the descriptive statistics for the overall sample ($N=2400$) with one-way tabulation. We also explored doula care and desire for doula care (among those without access) by socio-demographic and pregnancy characteristics, using two-way tabulation with chi-square tests to identify significant differences. We then conducted multivariate logistic regression analyses to identify characteristics predicting use of and desire for doula care, and to estimate the adjusted odds of cesarean delivery overall (vs. vaginal birth) and non-indicated cesarean delivery (vs. vaginal birth) by use of doula support and desire for doula care. We built three models to test these relationships: 1) comparing women with doula support to those who did not have doula support, 2) comparing women with doula support to those who expressed a desire for doula care but did not have a doula, and 3) among women who did not have doula support but did have a comprehensive understanding of this type of caregiver, comparing women who had an expressed desire for doula support with those who did not. All analyses were conducted using Stata v.12 and weighted to be nationally representative. This study was granted exemption from review by the University of Minnesota Institutional Review Board (Study Number 1011E92983).

Results

Characteristics of the study population are reported in Table 1. Approximately 6% of women in the sample gave birth with doula support. Among those without doula support, 59% were aware of doula care; among women aware of doula care, 27% reported wanting a doula, but did not have one. Just over 30% of women in the sample had a cesarean delivery, and 10% of women with no definitive medical indication for a cesarean reported that they delivered via cesarean. Nearly half the sample had private health insurance coverage for their birth (45.5%). Other characteristics are broadly representative of the U.S. childbearing population.

Table 2 reports doula support and desire for doula support by socio-demographic and pregnancy characteristics. A higher percentage of younger women (age 18–25) reported doula care, compared with women 35 and older (9.5% vs. 1.9%). Younger mothers were also more likely to desire doula support, with 37.1% of women age 18–24 expressing this view, compared with 22.5% of women over 35. Having doula support did not differ significantly by race/ethnicity, but there were strong racial/ethnic variations in desire for doula support, with 21.6% of white women, 38.8% of black women, 29.8% of Hispanic women, and 43.5% of other/mixed race women reporting that they would like to have had doula support. First-time mothers (vs. experienced mothers) had higher rates of both doula support (8.8% vs. 4.0%) and desire for doula support (33.5% vs. 22.5%). While there were no differences in doula support by primary payer, there were significant differences in desire for doula support, with 39.3% of uninsured women and 32.6% of women with public coverage wanting doula support, vs. 21.1% of privately-insured women.

Multivariate logistic regression results for doula support and desire for doula care by socio-demographic and pregnancy characteristics are shown in Table 3. Adjusted odds largely reflect similar patterns as the crude estimates presented in Table 2. Women with lower odds of doula support included: age 25–29 and over 35 years (vs. 18–24 years) (Adjusted Odds

Ratio (AOR) = 0.47 95% CI [0.24, 0.91] and AOR= 0.19, 95% CI [0.07, 0.48]), experienced mothers (vs. first-time mothers) (AOR = 0.57, 95% CI [0.34, 0.98]), and women whose pregnancies were unintended (AOR = 0.53, 95% CI [0.28, 0.99]). Similar patterns emerged in predictors of desire for doula support: women age 30–34 (vs. women age 18–24) had lower odds of desiring doula care (AOR = 0.49, 95% CI [0.28, 0.84]), as did experienced mothers (vs. first-time mothers) (AOR = 0.67, 95% CI [0.46, 0.98]). Factors associated with higher odds of desire for doula support were black race (vs. white) (AOR = 1.77, 95% CI [1.03, 3.03]), public or no health insurance coverage (vs. private coverage) (AOR = 1.83, 95% CI [1.17, 2.85] and AOR=2.01, 95% CI [1.07, 3.77]), having a college degree (vs. high school or less) (AOR=1.79, 95% CI [1.02, 3.16]), and having a planned cesarean delivery (AOR = 1.83, 95% CI [1.14, 2.93]).

Table 4 presents the unadjusted (crude) and adjusted odds of cesarean delivery and cesarean without definitive medical indication by doula support and desire for doula support, controlling for socio-demographic and pregnancy-related characteristics. In each comparison, unadjusted results were similar in direction and magnitude to results from the adjusted models. Doula support was associated with a nearly 60% reduction in odds of cesarean delivery (AOR = 0.41, 95% CI [0.18, 0.96]) and 80% lower odds of non-indicated cesarean delivery (AOR=0.17, 95% CI [0.07, 0.39]), compared with not having doula support. When comparing women who had doula support with those who indicated a desire for doula support but did not have it, women who had doula support had substantially lower odds of cesarean delivery overall (AOR=0.31, 95% CI [0.06, 0.33]) and of non-indicated cesarean delivery (AOR=0.11, 95% CI [0.03, 0.36]), compared with those who expressed a desire for doula care. Additionally, women who wanted doula support but did not have it had higher odds of cesarean delivery (AOR=1.48, 95% CI [1.00, 2.19]) and non-indicated cesarean delivery (AOR=1.73, 95% CI [1.10, 2.73]), compared with women who did not express a desire for doula support.

Discussion

This analysis found that, among a nationally-representative sample of U.S. women who gave birth in 2011–2012, women with doula support had substantially lower chances of having a cesarean delivery and even lower rates of non-indicated cesarean, compared with women without support from a birth doula. This is consistent with prior research.^{4,5,26} However, prior observational research has noted the challenge of selection bias; that is, disentangling the desire for doula care from birth outcomes, given that measured and unmeasured characteristics associated with choosing a doula may also impact choices about delivery mode.^{27,28}

A unique contribution of this analysis is that we are able to distinguish that doula support during labor and birth, not the desire for doula support, is associated with lower odds of non-indicated cesarean, compared with non-supported births. Two key findings support this contribution: First, women who desired but did not have doula support had almost 50% greater chances of delivering via cesarean and more than 70% higher odds of having a non-indicated cesarean delivery, compared with women who did not desire doula care. This indicates that women who would like to have had a doula are not necessarily those who have

fewer obstetric interventions, but that they may benefit from greater counseling and support before and during labor about the use of these interventions, especially when there is no definitive medical indication. Secondly, we show that the association between doula care and reduced chances of cesarean delivery and non-indicated cesarean delivery was relatively stable when comparing women with doula care to women who wanted but did not have doula care, who may be a more similar comparison group than women without doula care overall. Given the current clinical and policy focus on the potential maternal and neonatal risks of non-definitively indicated cesarean deliveries,^{29,30} these findings have immediate and actionable implications.

There is a large unmet demand for doula care among American women, many of whom would likely benefit substantially from the evidence-based benefits associated with continuous labor support.^{4,15} Only 6% of women reported having support from a doula when they gave birth in 2011 or 2012, up from 3% of women in 2005.¹⁶ However, our findings indicate that over 40% of women are not aware of doula care, which translates into approximately 1.6 million women of the four million U.S. women who give birth each year. Of those who are aware of what a doula is and the type of care they provide, 27% indicated that they would definitely want this type of support – or an additional one million U.S. women using doulas each year. If these women's odds of non-definitively indicated cesarean were lowered by 80% rather than elevated by 70%, the result could be an improvement in quality, safety, and a decrease in costs of childbirth.

Identifying barriers to doula access is a crucial step in addressing this unmet need. While the survey data used in this analysis did not contain details on why women who wanted a doula did not have access to this service, prior research indicates several potential barriers and challenges; the most salient of which is concern about the out-of-pocket expense.^{5,15,20,22} Especially for families with low incomes or limited savings, doula services, at costs ranging from several hundred to several thousand dollars,¹⁸ may be perceived as unaffordable in the context of other expenses related to childbirth and infant care (e.g. car seats, diapers, feeding supplies) as well as changes such as loss of income during unpaid maternity leave.^{18,20} Additional barriers might include logistical challenges, such as distance from a doula for rural women, objections from husbands/partners or family members, or cultural issues, such as seeking but not finding a doula with a similar heritage or linguistic background.^{5,15,20}

This analysis shows that 10% of women with no definitive medical indication for cesarean delivered by cesarean, representing potentially modifiable risks and costs. Cesarean delivery is more costly than vaginal birth (approximately \$28,000 vs. \$18,000 for commercial payers), and 31.3% of U.S. births in 2009–2011 were via cesarean delivery.³¹ From the perspective of a payer, including doula care as a covered benefit would require an investment in professional doula services, and the financial impact would depend on cesarean rates and risk factors in the covered population as well as reimbursement rates related to these services. However, the potential value for this investment is substantial. For example, while fees for doula care vary widely, they average around \$1000, and with an approximate \$10,000 mean difference between the cost of a vaginal and cesarean delivery, the decision to cover 10 doula-supported births would be cost neutral if one non-indicated cesarean was avoided among these. Of course, continuous labor support is important for women who have

cesarean deliveries and offers quantifiable benefits to these women as well.⁴ Further, the positive outcomes associated with doula support may accrue over time, so the financial rationale for insurance coverage of doula care is strong, especially since cost is a known barrier to access.^{5,15}

Women who report that they would like to have doula care are the same women who stand to benefit most from the known effects of continuous labor support.^{4,5} Black women (vs. white women), women with public health insurance (Medicaid and other government-funded programs which primarily serve low-income women, vs. private insurance), and women without health insurance (vs. those with private insurance) have higher risks of adverse birth outcomes, but are often least able to afford doula care or access culturally competent care.²⁰ Our findings show that these same groups of women are more likely to report desiring but not having access to doula care, with limited resources being a likely explanation (although this is not directly assessed). While the associations identified in this analysis cannot be interpreted causally, our findings indicated that women who reported wanting a doula but not having one experienced higher cesarean rates than women who did not report wanting doula care and lower rates than women who had a doula. This suggests that the association between doula support and lower cesarean rates is unlikely due to selection bias (i.e., the idea that women who choose to have doulas are those who would have had lower rates of cesarean anyway), which is consistent with findings from randomized controlled trials.⁴ Our study extends these findings to a broader, nationally-representative population. However, more and better data are needed to replicate these findings in a community and policy context. Facilitating access to doula care through health insurance benefits or coverage policies may be an opportunity for research on this topic, by utilizing randomization or staggered starts in implementation.

Not surprisingly, a majority of certified doulas (89.4%) believed that doula care should be reimbursed through health insurance,¹⁵ but there are real barriers to a wide implementation of reimbursement to a new category of services, especially services that are provided in a medical context but not by a health care professional. The state of Oregon has addressed this challenge by adapting language about reimbursement for non-traditional health workers to include trained, certified doulas.²²

Our findings must be considered in light of limitations. First, the retrospective nature of the self-reported results carries the risk of recall and social desirability bias, particularly when women were asked whether they would have liked to have had a doula in their recent birth. Women's actual birth experiences may have influenced their response to this question; also, the reasons that women desired but did not have a doula are not directly assessed. Second, while the Listening to Mothers Survey contains unique information about doulas and childbirth for a nationally-representative sample of women, it is based on self-report, and does not include diagnostic or clinical data. As such, our categorization of medically indicated versus non-indicated cesarean sections was not confirmed by medical record data. However, we conducted extensive sensitivity analyses around these definitions, all of which produced consistent results. The survey was conducted online, though it uses validated methodologies and the weighted sample is consistent with data on the US childbearing population.¹⁷ Future prospective studies may help to examine this issue more fully. Finally,

sample size was limited, inhibiting our ability to detect smaller differences between groups. For example, the impacts of doula care for minority populations (e.g. Native American or Asian women) or on less frequent outcomes (e.g. preterm birth) could not be assessed in this sample because only several women may fall into these categories, which is not enough data to generate stable estimates. Nonetheless, this analysis provides the first nationally-representative data comparing a quality of care outcome (cesarean without definitive medical indication) based on access to and reported desire for doula care.

In summary, we found that women with doula support had lower odds of non-indicated cesareans compared to women without doula support and compared to women who desired but did not have doula support. Additionally, women who desired but did not have doula support had a higher odds of cesarean without definitive medical indication, compared with those who did not desire doula care. These results, which should be confirmed by future prospective studies, suggest that increasing access to doula care for at-risk women who desire intrapartum doula support (e.g., black, uninsured or publicly-insured women) may facilitate decreases in rates of non-indicated cesareans.

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Appendix 1. Reasons for cesarean delivery

	%
<i>Women with a prior cesarean (n=296)</i>	
No medical reason	2.5
Prior cesarean	60.6
Prolonged labor	2.4
Fetal position	2.7
Fetal distress	3.4
Fetal size	2.3
Problem with placenta	2.4
Maternal health condition	12.5
Past due date	0.6
Failed induction	3.1
Fear of vaginal delivery	0.2
Pelvis too narrow	1.9
Other / missing	5.3
<i>Women without a prior cesarean (n=370)</i>	
No medical reason	4.4
Prolonged labor	7.0
Fetal position	15.7
Fetal distress	11.1
Fetal size	8.5
Problem with placenta	8.3
Maternal health condition	9.9
Past due date	3.4
Failed induction	7.6
Fear of vaginal delivery	2.8
Pelvis too narrow	9.8
Other / missing	11.5

Take-Away Points

Responses from a nationally-representative survey of women who gave birth in 2011–2012 show:

- 6% of women reported doula support during childbirth.
- Black and publicly-insured women were almost twice as likely as white, privately-insured women to report wanting but not having doula care.
- Women with doula-supported births had substantially lower odds of non-indicated cesarean compared with those who did not have doula support and compared with women who desired but did not have doula support.
- Increasing access to continuous labor support from a doula may facilitate decreases in non-indicated cesarean rates among women who desire doula care.

Table 1

Characteristics of sample (n=2400)

	%
<i>Doula care</i>	
Had a doula	5.9
Aware of doula care (among those who did not have a doula, N=2288)	58.9
Wanted but did not have a doula (among those who were aware of doula care, N=1824)	27.3
<i>Delivery mode</i>	
Cesarean delivery	31.0
Non-indicated cesarean (among those with no defined medical indication for cesarean, N=2175)	10.2
<i>Socio-demographic characteristics</i>	
Age category	
18–24	31.8
25–29	28.3
30–34	24.8
35+	15.1
Race	
White	54.5
Black	15.3
Hispanic	23.1
Other/multiple race	7.0
Marital status at time of birth	
Not married, no partner reported	7.9
Unmarried with partner	31.6
Married	60.4
Education	
H.S. or less	42.3
Some college/Associate's degree	28.5
Bachelor's degree	17.8
Graduate education/degree	11.4
Region	
Northeast	15.2
Midwest	22.7
South	39.7
West	22.5
Foreign born (vs. US born)	7.1
<i>Pregnancy Characteristics</i>	
Experienced mother (vs. first time mother)	59.3
Unintended pregnancy (vs. intended pregnancy)	35.4
Belief that childbirth is a process that should only be interfered with if medically necessary	58.4
<i>Primary payer for childbirth</i>	
Private	45.5

	%
Public	46.6
Out-of-pocket	8.0

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Table 2

Characteristics of sample (N=2400) based on doula support, doula awareness, and doula demand.

	Had doula support		Wanted doula support but did not have it		p-value
	Yes (n=112)	No (n=2288)	Yes (n=345)	No (n=1081)	
	N=2400		N=1426		
<i>Socio-demographic characteristics</i>					
Age category					0.001
18–24	9.5	90.5	37.1	62.9	
25–29	4.6	95.4	26.1	73.9	
30–34	5.4	94.6	20.2	79.8	
35+	1.9	98.1	22.5	77.5	
Race					<0.001
White	4.6	95.4	21.6	78.4	
Black	8.8	91.2	38.8	61.2	
Hispanic	5.7	94.3	29.8	70.2	
Other/multiple race	10.7	89.3	43.5	56.5	
Marital status					0.032
Not married, no partner reported	7.8	92.2	43.54	56.46	
Unmarried with partner	5.7	94.3	29.48	70.52	
Married	5.8	94.2	24.85	75.15	
Education					0.392
H.S. or less	6.9	93.1	26.4	73.6	
Some college/Associate's degree	5.5	94.5	28.8	71.2	
Bachelor's degree	4.0	96.0	28.1	71.9	
Graduate education/degree	6.6	93.4	25.1	74.9	
Region					0.141
Northeast	5.6	94.4	28.6	71.4	
Midwest	3.4	96.6	24.0	76.1	
South	7.7	92.3	31.9	68.1	
West	5.7	94.4	21.3	78.7	

	Had doula support			Wanted doula support but did not have it		
	Yes (n=112)	No (n=2288)	p-value	Yes (n=345)	No (n=1081)	p-value
Foreign born	5.2	94.8	0.774	31.7	68.3	0.570
US-born	6.0	94.0		27.1	72.9	
<i>Pregnancy Characteristics</i>						
Experienced mother	4.0	96.0	0.002	22.5	77.5	0.001
Frist-time mother	8.8	91.2		33.5	66.6	
Unintended pregnancy	4.5	95.5	0.176	29.5	70.5	0.394
Intended pregnancy	6.7	93.3		26.3	73.7	
Belief that childbirth is a process that should only be interfered with if medically necessary	5.1	95.0	0.166	27.6	72.4	0.851
<i>Primary payer for childbirth</i>						
Private	5.9	94.1	0.995	21.1	78.9	0.001
Public	5.9	94.1		32.6	67.4	
Out-of-pocket	6.2	93.8		39.3	60.7	

Table 3

Logistic regression of odds of doula support and desire for doula support, by women's characteristics

	Had doula support		Wanted doula support but did not have it	
	N=2400		N=1426	
	AOR	95%CI	AOR	95%CI
<i>Socio-Demographic Characteristics</i>				
Age category (Ref=18–24)				
25–29	0.47*	(0.24, 0.91)	0.64	(0.4, 1.03)
30–34	0.60	(0.29, 1.25)	0.49*	(0.28, 0.84)
35+	0.19***	(0.07, 0.48)	0.57	(0.32, 1.03)
Race (Ref=white)				
Black	2.11	(0.94, 4.74)	1.77*	(1.03, 3.03)
Hispanic	1.18	(0.57, 2.43)	1.34	(0.83, 2.15)
Marital status (Ref=unmarried, no partner)				
Unmarried with partner	0.87	(0.32, 2.36)	0.59	(0.28, 1.24)
Married	1.36	(0.51, 3.65)	0.73	(0.35, 1.5)
Education (Ref=H.S. or less)				
Some college/Associate's degree	0.71	(0.38, 1.31)	1.33	(0.82, 2.18)
Bachelor's degree	0.52	(0.25, 1.09)	1.79*	(1.02, 3.16)
Graduate education/degree	0.88	(0.39, 2.02)	1.59	(0.85, 2.98)
Region (Ref=Northeast)				
Midwest	0.60	(0.24, 1.5)	0.93	(0.54, 1.61)
South	1.28	(0.62, 2.63)	1.09	(0.66, 1.81)
West	0.89	(0.4, 1.98)	0.66	(0.38, 1.15)
Foreign born	0.80	(0.26, 2.44)	0.94	(0.43, 2.08)
<i>Pregnancy Characteristics</i>				
Planned cesarean	0.62	(0.21, 1.86)	1.83*	(1.14, 2.93)
Experienced mother (Ref=first time mother)	0.57*	(0.34, 0.98)	0.67*	(0.46, 0.98)
Unintended pregnancy	0.53*	(0.28, 0.99)	0.87	(0.6, 1.27)
Belief in birth as a natural process	0.64	(0.38, 1.09)	1.01	(0.7, 1.45)
<i>Primary payer for childbirth (Ref=private)</i>				
Public insurance	0.76	(0.4, 1.43)	1.83**	(1.17, 2.85)
Out-of-pocket	0.54	(0.18, 1.61)	2.01*	(1.07, 3.77)

Note: Other/multiple race is also controlled, but not shown due to small sample size.

p<0.001,**
p<0.01,*
p<0.05.

Table 4

Adjusted odds of cesarean delivery and non-indicated cesarean delivery, based on support from a doula and desire for doula support

	Cesarean delivery				Non-indicated cesarean delivery					
	N=2400		N=2175		N=457		N=413			
	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted		
OR	95% CI	AOR	95% CI	OR	95% CI	AOR	95% CI	OR	95% CI	
Doula support (vs. no doula support)	0.35*	(0.15, 0.81)	0.41*	(0.18, 0.96)	0.14**	(0.07, 0.31)	0.17**	(0.07, 0.39)		
Doula support (vs. desire for but not having doula support)	0.33*	(0.13, 0.81)	0.31**	(0.13, 0.74)	0.14**	(0.06, 0.33)	0.11**	(0.03, 0.36)		
Among those without doula support, desire for doula support (vs. no stated desire for doula support)	1.20	(0.83, 1.77)	1.48	(1.00, 2.19)	1.31	(0.83, 2.05)	1.75**	(1.10, 2.73)		

Note: Models control for maternal age, race, marital status, education, region, nativity, pregnancy characteristics, and primary payer, results are weighted to be nationally representative.

*** p<0.01,

* p<0.05