

# How do pregnant women use quality measures when choosing their obstetric provider?

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## Abstract

**Background:** Given increased public reporting of the wide variation in hospital obstetric quality, we sought to understand how women incorporate quality measures into their selection of an obstetric hospital.

**Methods:** We surveyed 6141 women through Ovia Pregnancy, an application used by women to track their pregnancy. We used *t* tests and chi-square tests to compare response patterns by age, parity, and risk status.

**Results:** Most respondents (73.2%) emphasized their choice of obstetrician/midwife over their choice of hospital. Over half of respondents (55.1%) did not believe that their choice of hospital would affect their likelihood of having a cesarean delivery. While most respondents (74.9%) understood that quality of care varied across hospitals, few prioritized reported hospital quality metrics. Younger women and nulliparous women were more likely to be unfamiliar with quality metrics. When offered a choice, only 43.6% of respondents reported that they would be willing to travel 20 additional miles farther from their home to deliver at a hospital with a 20 percentage point lower cesarean delivery rate.

**Discussion:** Women's lack of interest in available quality metrics is driven by differences in how women and clinicians/researchers conceptualize obstetric quality. Quality metrics are reported at the hospital level, but women care more about their choice of obstetrician and the quality of their outpatient prenatal care. Additionally, many women do not believe that a hospital's quality score influences the care they will receive. Presentations of hospital quality data should more clearly convey how hospital-level characteristics can affect women's experiences, including the fact that their chosen obstetrician/midwife may not deliver their baby.

## KEYWORDS

cesarean delivery rates, obstetric quality, provider selection, survey

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## 1 | INTRODUCTION

Quality measurement has become a key concern of hospital obstetric units as payers, regulators, and other parties

hold hospitals accountable for performance.<sup>1</sup> Quality of obstetric care varies widely among hospitals across the United States. Rates of major obstetric complications vary almost fivefold even after accounting for differences in patient populations.<sup>2,3</sup> Cesarean delivery rates vary tenfold, and have been on the rise, driven by an increase in first-birth cesarean deliveries performed during labor, a practice with great variation in frequency across clinical settings.<sup>4–6</sup>

Some private and public payers are using hospital performance on these obstetric quality measures as a basis for value-based payment.<sup>7,8</sup> Increasingly, performance on these measures is also being publicly reported so that women can use these data when selecting an obstetric hospital.<sup>9,10</sup> For example, Consumers Union and the Leapfrog Group publicly report hospital cesarean delivery rates, episiotomy rates, and early elective delivery rates.<sup>11</sup> Despite increasing availability of these data, few women appear to use the data to choose an obstetric hospital.<sup>10</sup> Most women report that quality information is important; however, a majority are not aware of how quality is measured or where it is reported.<sup>10</sup>

The fact that few women use obstetric quality data is unexpected given how deeply women value the quality of the obstetric care they receive and the health of their baby.<sup>10,12</sup> Our goal in this study was to understand this gap: women are engaged in their care, quality data is available, and yet few women consult these data when choosing their obstetric hospital. Specifically, we sought to understand how women choose their obstetric provider and how they factor quality information into this choice. Using an online platform, we surveyed pregnant women about their awareness of quality variation; their understanding of the relationship between selecting an obstetrician/midwife and selecting a hospital; their use of specific quality metrics, including cesarean delivery rates, to compare hospital quality; and how women balance quality and convenience in making a choice of provider.

## 2 | METHODS

Ovia Pregnancy is a mobile phone application used by 1 044 602 women in the United States, as of January 14, 2016 when the survey was administered. Women use the application to track their pregnancy and learn about what to expect as their pregnancy progresses. The Ovia Community is a feature of the application available to over 230 000 women using a phone with the Android operating system. In this forum, women pose questions to their peers and respond to others about pregnancy, childbirth, and motherhood.

Over a period of 5 weeks, we posed a series of questions to the Ovia Community. The questions were informed by previously validated survey instruments.<sup>12</sup> Questions were tailored

to fit the phrasing and tone of questions typically posed by the Ovia Community (e.g., “Hi! When you chose your hospital, did you look at the c-section rates? How important are c-section rates in picking the hospital you chose?” See Tables 2–4 for the text of the 18 analyzed survey questions). The survey questions were of varied format, including the Likert scale and multiple choice. All questions allowed for optional free-text responses. Because free-text answers were not required from each respondent, we use select quotes as illustrative context for the primary survey data in our discussion rather than including these responses as part of our analysis.

Because the Ovia Community format is built to ask one new question at a time, each question was posed for users to answer until there were 1000 responses, at which point it was taken down and a new question was posted. After fielding the first two-thirds of the questions, we noted that the distribution of responses remained unchanged after several hundred responses; the remaining questions were posted until they had at least 350 responses. All questions reached their targeted response level within 1 day. Responding to questions was optional and Ovia Community users were resampled for each question. Any Ovia Community member could answer as many or as few questions as she chose, but could not respond more than once to any individual question.

Ovia users voluntarily self-report demographic information on signing up for the application and we examined variation in responses by age, parity, and whether the respondent's pregnancy was high risk. Ovia identifies users with high-risk pregnancies on the basis of age, BMI, multiple births, and a comprehensive assessment of self-reported medical history. All analyses were conducted in Stata version 13.1.<sup>13</sup> All users of the Ovia application consent to participation in research as part of the application's terms of use. Our study protocol was determined as exempt by Harvard Medical School's Institutional Review Board.

## 3 | RESULTS

There were 14 246 responses to our 18 analyzed questions across 6141 individuals. Most respondents answered either one ( $n=3461$ ; 56.4% of respondents), two ( $n=1097$ ; 17.9% of respondents), or three ( $n=502$ ; 8.2% of respondents) questions. No demographic group was more likely to answer multiple questions.

A majority of respondents were under 29 years old (72.9%), 20-week gestational age or less (60.7%), and were not identified as having high-risk pregnancies (64.0%) (Table 1). Compared with the demographics for all pregnant women in the United States, our sample is younger, less likely to be high risk, more likely to be obese, and more likely to be nulliparous (Table 1).

**TABLE 1** Demographic characteristics of smartphone application survey respondents (2016; n=6141), compared with nationwide population of pregnant women

Demographic characteristics	Survey respondents n (%)	Nationwide population of pregnant women (%)
Age <sup>21</sup>		
18-28	4473 (72.8)	68.8
29-34	1192 (19.4)	21.1
35+	280 (4.6)	9.1
Missing	196 (3.2)	n/a
Region <sup>22</sup>		
Northeast	716 (11.7)	15.9
Southeast	1893 (30.8)	27.2
Midwest	1430 (23.3)	21.0
Southwest	884 (14.4)	14.2
West	1079 (17.6)	21.6
Missing	139 (2.3)	n/a
Parity <sup>23</sup>		
Nulliparous	3323 (54.1)	40.0
Parous	2586 (42.1)	60.0
Missing	232 (3.8)	n/a
Body mass index (BMI) <sup>24</sup>		
Underweight (<18.5)	255 (4.2)	4.1
Normal weight (18.5-24.9)	2303 (37.5)	50.9
Overweight (25.0-29.9)	1414 (23.0)	24.3
Obese (30 and greater)	2169 (35.3)	20.7
Pregnancy risk characteristics		
High-risk pregnancy <sup>a,24,27</sup>	2212 (36.0)	42.0
Previous miscarriage <sup>24</sup>	1868 (30.4)	11.8
Current smoker <sup>25</sup>	168 (2.7)	8.4
Occupational plans postpartum <sup>b,26</sup>		
Stay at home	2849 (46.4)	45.8
Work part time	1092 (17.7)	14.9
Work full time	1861 (30.3)	39.3
Missing	339 (5.5)	n/a
Gestational age (weeks)		
0-10	1337 (21.8)	n/a
11-20	2393 (39.0)	n/a
21-30	1307 (21.3)	n/a
31+	1104 (18.0)	n/a

<sup>a</sup>Ovia identifies users with high-risk pregnancies on the basis of age, BMI, multiple births, and a comprehensive assessment of self-reported medical history. To most closely replicate Ovia's method of classifying high-risk pregnancies, we summed the prevalence of high blood pressure, preeclampsia, gestational diabetes, obesity, multiple births, and ages 40–44 among pregnant women in the United States.<sup>24,27</sup> Where a range of estimates was provided, we used the midpoint of the range in our summation. This methodology likely yields an overestimate as a result of co-occurrence of conditions among pregnant women.

<sup>b</sup>The nationwide data capture the occupational breakdown of mothers with children under 1 year old.

### 3.1 | Choosing a hospital or obstetrician/midwife

Most respondents (73.2%) report they chose their obstetrician/midwife first compared with just 17.4% who selected their hospital first (Table 2). When asked whether the choice of obstetrician/midwife or hospital is more important, over half (56.5%) said their obstetrician/midwife is more important and only 6.8% said their hospital is more important. Most respondents expected that the obstetrician/midwife they selected for their prenatal care would deliver their baby (66.5%), and only 12.0% expected that another obstetrician/midwife would deliver their baby.

### 3.2 | Understanding obstetric quality measures

Three-fourths of respondents (74.9%) reported that quality of care was somewhat or very different across hospitals and 22.2% of respondents were not sure whether there is quality variation. When asked about specific quality measures, respondents reported that they did not know much about or would give a low priority to the quality metrics that we included in our survey: unexpected injury rate (63.9%), maternal trauma rate (80.0%), obstetrical infection rate (68.3%), neonatal trauma rate (65.7%), episiotomy rate (78.6%), and hospital infection rate (46.2%) (Table 3).

### 3.3 | Cesarean delivery rates

Three-quarters (76.6%) of respondents indicated that they would prefer not to have a cesarean delivery if it was not medically indicated. Most of our respondents (55.1%) did not believe that the hospital they chose would affect their chances of getting a cesarean delivery (Table 4). About one-half of respondents considered cesarean delivery rates to be a low priority factor in their choice of hospitals, and 26.4% reported that they did not know how to factor cesarean delivery rates into their choice. Over half of respondents reported that they did not know what cesarean delivery rate would be considered too high (56.2%).

When asked about how large of a differential in cesarean delivery rates between two hospitals would influence their choice, most respondents answered that no differential would be large enough to matter (74.9%). Ovia users were given a choice between two fictitious hospitals, one 10 miles from their home with a higher cesarean delivery rate and another 30 miles from their home with a lower cesarean delivery rate. For a differential of 20 percentage points, the majority of respondents (56.4%) reported that they would go to the hospital with a lower cesarean delivery rate that is farther. When the cesarean delivery differential decreased to 10 percentage points, only 34.7% of respondents were willing to travel farther to the hospital with a lower cesarean delivery rate.

**TABLE 2** Responses to smartphone application survey about selection of obstetric provider, 2016

	All respondents (%)	Age		Parity	
		18-28 years (%)	29+ years (%)	Nulliparous (%)	Parous (%)
I just got pregnant, and don't know if I should choose my doctor/midwife first or my hospital first. What did everyone else do? n=1001. <i>Response pattern was statistically different by parity (P=.014)</i>					
Doctor/midwife first	73.2	72.2	76.4	75.3	72.4
Hospital first	17.4	18.1	16.0	18.7	16.3
Doesn't matter	9.4	9.7	7.6	6.0	11.3
I just got pregnant, and am looking to decide if I should choose my doctor or my hospital first. What is more important to everyone else? n=844					
Doctor	56.5	56.0	56.2	55.7	56.9
Hospital	6.8	6.3	7.8	7.3	6.6
Both/neither/I don't know	36.8	37.7	35.9	37.0	36.5
Do you expect that the doctor/midwife that you see in the office for prenatal care will be the doctor/midwife that delivers your baby? n=1003					
Yes	66.5	67.5	64.4	69.8	64.1
No	12.0	12.4	10.9	12.4	11.9
I am not sure	21.5	20.1	24.7	17.8	24.0
How different are hospitals when it comes to quality of care? n=1000. <i>Response pattern was statistically different by parity (P=.003)</i>					
Not different	2.9	3.4	1.4	4.1	2.0
Different	74.9	73.4	78.3	78.3	72.4
I am not sure	22.2	23.2	20.3	17.6	25.7

Statistical significance of response patterns across age and parity was determined using chi-square test.

### 3.4 | Variations by age and parity

Compared with parous respondents, nulliparous respondents were less likely to think that quality is very different across hospitals (72.4% vs 78.3%,  $P = .003$ ) and that it does not matter whether you select your obstetrician/midwife or your hospital first (11.3% vs 6.0%,  $P = .014$ ). Nulliparous respondents were also more likely to report that they did not know whether their choice of hospital would affect their chances of having a cesarean delivery (18.8% vs 12.7%,  $P = .003$ ).

Younger respondents (ages 18-28) were more likely to report a preference to avoid an unnecessary cesarean delivery than respondents 29 and older (77.9% vs 73.9%) ( $p = .012$ ). Younger respondents were more likely to report that they did not know much about, or would give a low priority to, other quality metrics, including cesarean delivery rates and obstetrical infection rates. There were no significant differences in response patterns between respondents with high- or low-risk pregnancies (results not shown).

## 4 | DISCUSSION

While women put great importance on receiving high-quality obstetric care, there is a clear gap between how women interpret quality information and how quality is currently

reported. This gap may stem from several possible root causes.

Most obstetric quality metrics are reported at the hospital level, not the individual clinician level where many women appear to focus their attention. While the clinical community has largely embraced a systems perspective of health care quality, the interplay between the obstetrician/midwife and hospital in determining quality outcomes may be unclear to the general public. Our results indicate that pregnant women believe their obstetrician/midwife is the key driver of the care they receive and most expect that their prenatal obstetrician/midwife will also deliver their baby, though previous research has shown that this is often not the case.<sup>14</sup> In the optional free-text response field of the survey women stressed the importance of trusting your obstetrician/midwife, and how “when you love your obstetrician...it's totally worth it.” Another woman shared “the [cesarean delivery] rates shouldn't matter...your [obstetrician/midwife] will be the one performing the [delivery,] not the hospital.”

This high degree of trust may be because many women value the quality of care they receive throughout the duration of their pregnancy, not just during delivery. This is another gap between quality measures currently reported—which focus on delivery—and women's perception of quality. For example, one respondent said “I chose [my] OB first because I care a lot about my prenatal and postnatal care, more than [I

**TABLE 3** Responses to smartphone application survey about the importance of obstetric quality metrics, 2016

	Age			Parity	
	All respondents (%)	18-28 years (%)	29+ years (%)	Nulliparous (%)	Parous (%)
How much does the unexpected injury rate during childbirth (for both moms & babies) of the hospital you will be delivering at matter to you? n=852					
Medium/high priority	36.2	36.2	35.9	36.3	35.5
Low priority/I do not know	63.9	63.8	64.1	63.7	64.5
Does anyone know anything about maternal birth trauma rates in hospitals? How important are these? n=972. <i>Response pattern was statistically different by age (P=.028)</i>					
Important	20.0	18.0	24.6	20.1	20.1
Not important/ I do not know	80.0	82.0	75.4	79.9	79.9
Did anyone look at the obstetrical infection rates in hospitals? They are available to the public. How important are they? n=897. <i>Response pattern was statistically different by age (P=.035)</i>					
Very/somewhat important	31.7	29.7	37.6	34.1	29.7
Not important/I do not know	68.3	70.3	62.4	65.9	70.3
I have been reading a lot recently about neonatal birth trauma rates in hospitals. Does anyone pay attention to this stuff? Is it important? n=914. <i>Response pattern was statistically different by parity (P=.004)</i>					
Very/somewhat important	34.4	33.1	40.0	39.1	30.0
Not important/I do not know	65.7	66.9	60.0	60.9	70.0
How much does the rate of episiotomy (cut to enlarge vaginal opening) at the hospital you will be delivering at matter to you? n=1002. <i>Response pattern was statistically different by parity (P=.010)</i>					
Medium/high/essential priority	21.4	20.2	24.5	17.4	24.3
Not a priority/low priority/I do not know	78.6	79.8	75.5	82.6	75.7
How much does the infection rate of the hospital you will be delivering at matter to you? n=372					
Medium/high/essential priority	53.8	53.0	55.7	54.2	53.6
Not a priority/low priority/I do not know	46.2	47.0	44.3	45.8	46.4

Statistical significance of response patterns across age and parity was determined using two-sided *t* tests.

care] about which hospital [I deliver at],” and another noted that “you are spending more time with your [obstetrician/midwife] than you will at the hospital.”

Another such gap exists between how the clinical community measures quality and how women describe quality. The clinical community is focused on quantitative measures of cesarean delivery and complications. Pregnant women did not appear to understand or value these measures. The free-text responses highlight that women appear to think of quality in more holistic ways. For example, one woman explained that she “looked for the doctor that treated [her] the best and made [her] feel the most comfortable,” and another stressed the value in feeling “comfortable, safe, [and] heard” by her obstetrician/midwife. Many women provided anecdotes of their own, or friends’ or family members’ previous birth experiences, which other research has shown to be prioritized sources of information for women making maternity care decisions.<sup>10</sup>

Another disconnect between the clinical community and pregnant women is the degree to which women believe they can influence the course of their care. On one end of the spectrum, some women believe they can dictate how their baby or babies are born. Women shared messages encouraging others to “stick to your guns” and believe that “it’s your baby, it’s your birth plan,” often emphasizing that “you HAVE to have a birth plan and you HAVE to have support from [your partner] or doula.” Women expect their birth experiences to be unique and dependent on their individual circumstances, and that “just because some patients had bad experiences [at a particular hospital,] doesn’t mean I will.”

On the opposite extreme, other women may feel a lack of agency in determining the course of their care, or believe for other reasons that clinicians should take the lead in acting in their best interest. As such, they perceive variation in outcomes as a reflection of clinical circumstances and patient

**TABLE 4** Smartphone application survey responses about beliefs about cesarean delivery, 2016

	All respondents (%)	Age		Parity	
		18-28 years (%)	29+ years (%)	Nulliparous (%)	Parous (%)
If you had no medical reasons for a cesarean, and could decide for yourself, how likely would you be to have your next baby by a cesarean? n=1004. Response pattern was statistically different by age ( $P = .012$ ) and parity ( $P < .001$ )					
Not likely	76.6	77.9	73.9	77.5	76.1
Likely	13.6	11.9	18.9	16.3	11.4
Not sure	9.8	10.2	7.2	6.2	12.5
Do you think the hospital you choose will affect your chances of getting a cesarean? n=1003. Response pattern was statistically different by parity ( $P = .003$ )					
Not likely	76.6	54.7	73.9	59.1	53.6
Likely	13.6	27.6	18.9	29.3	27.6
Not sure	9.8	17.6	7.2	12.7	18.8
How much does the cesarean rate of the hospital you will be delivering at matter to you? n=561					
Not a priority/I don't know	75.4	76.6	70.4	74.7	77.0
Medium to high priority	24.6	23.4	29.6	25.3	23.0
What hospital cesarean rate do you think is too high? n=610					
20% or less	14.6	12.9	20.0	16.8	12.8
21-40%	29.2	29.0	31.5	28.0	30.6
I don't know	56.2	58.1	48.5	55.2	56.6
What hospital cesarean rate do you think is too low? n=556. Response pattern was statistically different by age ( $P = .032$ )					
<35%	7.2	6.7	7.5	4.9	7.9
<15%	8.3	7.5	11.2	9.4	6.5
Nothing is too low	34.4	32.6	42.5	36.6	32.9
How big would the difference in cesarean rates between two hospitals need to be for it to matter to you? n=609					
I don't know	50.2	53.2	38.8	49.2	52.7
2-5 pct points	9.2	9.5	9.2	10.6	8.3
10-20 pct points	15.9	14.3	21.1	14.1	16.8
Doesn't matter	74.9	76.3	69.7	75.4	74.9
Which hospital would you choose if these were the only two hospitals in your community and otherwise they were similar? n=1001. Response pattern was statistically different by parity ( $P = .008$ )					
35% cesarean rate, 10 miles	43.6	43.7	43.5	48.8	40.3
15% cesarean rate, 30 miles	56.4	56.3	56.5	51.3	59.7
Which hospital would you choose if these were the only two hospitals in your community and otherwise they were similar? n=1006					
30% cesarean rate, 10 miles	65.3	65.5	64.6	65.7	65.0
20% cesarean rate, 30 miles	34.7	34.5	35.4	34.3	35.0

Statistical significance of response patterns across age and parity was determined using chi-square test for all items except for the last two rows, which used two-sided  $t$  tests.

need, rather than differences in hospital quality. Of cesarean delivery rates, one woman said “you can’t just look at [a hospital’s cesarean delivery rate], you have to know why the [cesarean] delivery happened, [which may be due to] previous [cesarean] sections, emergency, multiples, big babies. [It’s not just up to] the hospital or the obstetrician...[it’s] for the best interest of the baby and mom.” This deference to the obstetrician’s judgment may help explain our finding that women do not typically focus on quality metrics, despite their awareness of quality variation. Other women may intentionally disengage with quality metrics because they prefer not to dwell or focus on risks associated with unnecessary procedures and childbirth. Some shared that they avoid looking at quality metrics because they do not want to “drive [themselves] crazy” or become a “nervous wreck.”

Encouraging women to use hospital-level quality metrics in choosing their childbirth hospital will require new ways to frame and disseminate hospital-level obstetric quality data. We believe there are several steps that can be taken. First, presentations of quality data must clearly convey why and how hospital-level outcomes can affect the individual woman’s experience of care. Closing this gap in patient knowledge is essential to having women value and use hospital-level quality data.

Second, information should emphasize that a patient’s chosen obstetrician/midwife may not ultimately deliver her baby. As such, hospital-level quality metrics—which capture the performance of other providers likely to be involved in their delivery—may be more important determinants of quality of care than many women seem to understand. One way to more effectively convey this message could be to solicit testimonials from women whose chosen obstetrician/midwife did not deliver their baby, and who could perhaps also speak to the related importance of selecting a high-quality hospital. An online or application-based forum, like the one used in this study, could be an effective way to reach many women with this message.

Third, to temper expectations among women with a high sense of agency, obstetricians/midwives should explain the circumstances under which a woman’s birth plan may need to be altered. Previous work has found that many women report negative feelings or lack of control of their birth experience, and other research has shown that patient experiences of control during childbirth strongly predict birth satisfaction.<sup>14–16</sup>

Our results must be interpreted in the context of our study design. The views of women in our sample may not be representative of all pregnant women. Compared with the nationwide childbearing population, our sample comprised more nulliparous women, younger women, and fewer high-risk women. In addition, we were not able to collect complete data on key demographic variables like race/ethnicity, education level, income level, insurance status, and rural/urban status, which limits our ability to compare our sample to the overall childbearing population. We rely on women to self-report their use and understanding of quality metrics, which may not

always reflect the way in which women truly make decisions on maternity care. However, since women answered questions anonymously and electronically, any social desirability bias should have been minimized. Our unique sampling platform also adds nuance to the interpretation of our results. While our survey questions were informed by previously validated instruments, we rephrased them to better match users’ normal interactions with the community feature of the Ovia Health application and therefore there may have been differences in the way they were interpreted among women. Because we resampled women with each question, our ability to compare responses by the same woman across questions was limited.

Our findings add to the broader literature documenting that, across a wide variety of medical domains and presentation formats, few patients seek out quality information or incorporate it into their process of selecting a provider.<sup>17,18</sup> Future research should investigate whether our findings on the disconnects between how quality is reported and how it is understood by patients may be applicable to other areas of health care. These gaps add to the literature which has identified a variety of barriers to using quality information, including awareness of the information, understanding the language and quality measures used in the reports, and trusting the information provided.<sup>10,18–20</sup>

Despite great clinical and policy interest, surprisingly few pregnant women use available quality data to choose their obstetric hospital. Our findings begin to explain why. More broadly, the findings may help to explain the well-documented challenge of using existing quality measures to influence hospital choice.

## CONFLICT OF INTEREST

No author has any conflict of interest to report. Melinda Karp is an employee of Blue Cross Blue Shield of Massachusetts, which has an equity share in Ovia Health, the platform we used to survey women in this study. Rebecca A. Gourevitch, Ateev Mehrotra, Grace Galvin, Avery Plough, and Neel T. Shah have no financial disclosures to report.

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