A Pilot Study of the Perceptions of Actively Practicing Obstetricians in Puerto Rico: Factors that Influence Decision Making in Cesarean Delivery

Alberto M. Carrera, MD*; Elizabeth A. Sternke, PhD†‡; Juana I. Rivera-Viñas, MD*

Objective: The reported cesarean delivery (CD) rate for 2012 in Puerto Rico was higher than that of the United States (48.5% and 32.8%, respectively). Multiple reasons for and consequences of the high rates of CD exist. The decision to perform a CD is based on multiple factors, some of which are not obstetrical. In order to better understand those factors, the pilot study described in this manuscript analyzed data collected from obstetricians themselves.

Methods: During 2011, convenience sampling was used to collect data from active obstetric practitioners attending the Caribe Gyn 2011 conference in Ponce, Puerto Rico. A self-administered survey was piloted and analyzed using formative content analysis. Obstetricians were asked to name factors that contribute to their decision to perform a CD and factors they felt influence other obstetricians to make that decision.

Results: In general, common maternal and fetal causes for choosing CD were noted. Hypertensive disorders (60%) and abnormal intrapartum fetal tracing (83%) were highly rated, as were non-obstetrical factors, including physician convenience (52%) and concern for medical liability for vaginal delivery (50%).

Conclusion: According to the participating obstetricians, many factors associated with the standard practice of obstetrics influence the decision to perform a CD. However, non-obstetrical reasons were also found. Future studies using a larger sample of Puerto Rican obstetricians are required to fully understand these factors in order to both address them through educational interventions for patients, physicians, administrators, and insurers, and inform public policy. [*P R Health Sci J 2017;36:17-23*]

Key words: Cesarean Delivery, Obstetrics, Epidemiology, Decision Making, Public Health Policy, Puerto Rico

The health implications of cesarean birth are significant because the mode of delivery impacts future reproductive capacity and can lead to birth-related fetal and maternal complications. Cesarean delivery is associated with increased risk for thromboembolic disease, abnormal placentation, bladder injury (1), and peripartum hysterectomy (2). Secondary or multiple cesarean deliveries (CDs) include an increased risk for complicated surgeries (partially due to scar tissue) and increased blood loss (3).

CD also correlates with an increased risk of pregnancy-related death (4–6). A US study by Clark et al. (2008) demonstrated that approximately 2 in 100,000 cesareans result in maternal death, regardless of the prior health status of the mother (7). Similarly, Solheim et al. (2011) concluded that if cesarean rates continue to rise as they have in recent years, by 2020 placenta accreta cases will rise by 4,504 cases and 130 additional annual maternal deaths will occur as a consequence of the pregnancy, delivery, or management of the two (8). Therefore, it is fair to say that any protective factor from CD loses its effect as the rate of CD rises (7, 8).

Moreover, comparisons demonstrate that high rates of CD do not necessarily translate into better perinatal outcomes. The risks to the fetus in CD are well documented. They include high levels of respiratory morbidity (9) and pulmonary hypertension, (10), particularly in CDs at less than 39 weeks of gestation (11). There are also well-known long-term negative health outcomes

*Department of Obstetrics and Gynecology, School of Medicine, University of Puerto Rico Medical Sciences Campus, San Juan, PR; †Post-doctoral Master of Science in Clinical and Translational Research Program (MSc), School of Health Professions, University of Puerto Rico Medical Sciences Campus,San Juan, PR ‡Press Ganey Associates, Inc., South Bend, Indiana

The author/s has/have no conflict/s of interest to disclose.

Address correspondence to: Alberto M. Carrera, MD, University of Puerto Rico Medical Sciences Campus, School of Medicine, Department of Obstetrics and Gynecology, PO Box 365067, San Juan, PR 00936. Email: alberto.carrera@upr.edu

for children born by CD. These children are at higher risk for developing asthma, allergies, type 1 diabetes, compromised immune function, and obesity (12).

Based on large-scale epidemiological studies, in 1985 the World Health Organization (WHO) issued a consensus statement suggesting that CD rates above 15% are unacceptable and have a negative effect on maternal and fetal health worldwide (13). In a 2015 update to this statement, the WHO released a report based on the findings of 2 extensive research studies; the report called for standardizing the classification of CD, proposing that the Robson model be used, in order to more accurately assess and compare rates across levels of analysis (14). According to the Pan-American Health Organization's Latin American Center for Perinatology, Women, and Reproductive Health (Centro Latinoamericano de Perinatologia, Salud de la Mujer y Reproductiva: CLAP), nearly 4 in 10 births in the Americas is by CD—far from the universally accepted 1 in 10 "ideal" (15).

To date, few interventions or advocacy efforts aimed at reducing the number of CDs and their associated negative consequences for maternal and fetal health have been effective across organizations, institutions, regions, or countries (13). Not only does performing a medically unnecessary CD adversely affect maternal and fetal health but also the intemperate use of this delivery method consumes resources that might better be reserved for other, more urgent medical procedures (13). The implementation of a standardized system of classification will, it is hoped, provide highly accurate data that can be used to focus on the characteristics of CD, which can then be utilized to effectively target interventions to decrease CD rates in specific ways.

According to the National Vital Statistics Report for 2012, the total rate of CDs per 100 live births in Puerto Rico was 48, compared to 32.8 for the United States in the same year. From 1992 and 2002 Puerto Rico had a rise of 44% in the CD rate (16–18). The steep rise in CD in general, and in Puerto Rico in particular, has caused many researchers and activists in Puerto Rico, and around the world, to identify the marked increases in CD rates as indications of an "epidemic" (for examples, see19-21). Jose Vázquez-Calzada, the noted Puerto Rican demographer, documented and denounced the unacceptable cesarean rates in Puerto Rico. He also referred to the high rates of CD in Puerto Rico and their upward trend as an indication of an "epidemic"—a serious public health problem—so referring in publications from 1983 through 1996 (22. 23). However, we believe that this steep rise in CD rates for Puerto Ricans living on the island is based on common risk factors as well as on changes occurring in the contemporary practice of obstetrics. In order to understand the factors contributing to the decision-making process concerning CD in Puerto Rico, this pilot study sought to understand Puerto Rican obstetricians' attitudes about the factors that influence their decision-making process in recommending CD for their patients.

Materials and Methods

Participants

A convenience sample was drawn from a population of practitioners holding active obstetric practices and who attended the 2011 Annual Caribe Gyn meeting in Ponce, Puerto Rico. The inclusion criterion was being an obstetrician in attendance who was in active practice at the time the survey was deployed. Those excluded from the study included non-obstetrical practitioners, retired obstetricians, and obstetricians who were not in active obstetrical practice at the time of the survey.

Recruitment

Physicians at the meeting were approached by a member of the research team at the registration booth, who explained the study and asked for their participation in completing the survey. Confidentiality and the voluntary nature of participation were explained at this time, and this information also appeared on the survey instrument itself.

Measures

Demographics

Obstetricians were asked to provide a number of demographic data points to provide context for the sample population and for use in comparative analytics, if possible. The items included on the survey included gender identity, age, years in clinical obstetric practice, type of practice (i.e., private or public), and the location on the island of said practice.

Survey development

The research team developed a cluster of open questions about the beliefs and practices of obstetricians regarding CD. Reasons for performing a CD that pertain to maternal and fetal health as well as those that influence the general population of practicing obstetricians were explored. Finally, we examined participants' attitudes and beliefs on other determinants that influence the decision-making process regarding whether to perform a CD. Every participant was allowed to assign up to 6 factors for each item that he or she considered to be the most important in terms of influencing the decision to proceed with the cesarean event. Baseline data on the characteristics of each participating physician's practice, as well as that individual's age and sex, were obtained in order to create an overall profile of the sample group.

In an attempt to overcome social desirability bias (24), the questions were divided into 2 parts: First, participants were asked to reply to a question about their own beliefs or practices. Second, they were asked the same question but were asked to reply as a hypothetical projective respondent (25).

Testing

The questionnaire was pilot tested with a sample of 7 attending Ob/Gin physicians and 12 residents in hospital practice for clarity and comprehension. The questionnaire was

finalized when both validity and reliability across the questions were reached.

Deployment

A self-administered survey was given to each assenting participant to complete at his or her own pace over the course of the conference. Once the questionnaire was completed, each respondent returned it in a closed envelope to University of Puerto Rico, Medical Sciences Campus, personnel.

Analysis

Descriptive statistics were used to analyze the quantitative data developed through a formative content analysis of the qualitative data. For each question, we calculated the frequency of "same" responses to determine allotted the factors that influence obstetricians in their decision to perform a CD. To stratify the results in order of importance, frequencies were interpreted as the percent rate for each influencing factor (in deciding to perform a CD) by using the number of responders per given question as the denominator. The results were then categorized in descending order to display the obstetricians' selection of the most influential determinants leading to a CD event.

Individual informed consent statements were not required for this study, as approved by the Institutional Review Board of the University of Puerto Rico, Medical Sciences Campus (A2650111).

Results

Approximately 365 obstetricians and gynecologists attended the 2011 Annual Caribe Gyn meeting. Of those self-identified obstetricians in attendance, 105 (29%) accepted the survey packet at registration, and 62 (59%) of those who accepted the packet completed the enclosed survey and returned it, representing 27% of the estimated 229 actively practicing obstetricians in Puerto Rico (at the time of the survey). Although we estimate that most of the practicing obstetricians attending the conference participated in the survey, we did not have access to the data to calculate the actual proportion of practicing obstetricians in attendance against the total number of meeting attendees.

The participant profile showed that a higher percentage of men (72%) than women (28%) took part in the survey, with a ratio of 3:1. The majority of the participants were relatively young, with a mean age of 46 years (range, 31–61 years). An average of 15 years of clinical experience was reported. Although the vast majority of respondents worked in the private sector (98%), half of them (51%) reported having worked in a public setting at some point in their careers (see Table 1). The geographical distribution of obstetricians across the island is an important demographic characteristic, as structural support for practitioners and micro-cultural norms on childbirth may vary across the regions that are represented. Although the areas of the island having the highest concentrations of practitioners were in the San Juan metro area (29.31%) and northeast (20.69%), all the regions of the island were represented in the sample (see Table 1).

Table 1. Average participant profile

Variable	Mean
Mean age	46
Female (%)	28%
Male (%)	72%
Active obstetrical practice (%)	100%
Years in obstetrical practice	15
Public service experience (%)	51%
Private practice experience (%)	98%
Geographic distribution (%)	
San Juan Metro Area 29.31	
Northeast 20.69	
North Central 6.9	
Northwest 3.45	
Southeast 15.52	
South Central 3.45	
Southwest 13.79	
Not Reported 6.9	
N = 62	

When asked about the most important maternal-health-related factors influencing the decision to perform a CD, responses were (in descending order) the mother is suffering from a hypertensive disorder (60%), the labor is abnormal or arrested (54%), mother had a previous CD (33%), and the head of the fetus is abnormally large in relation to the size of the mother's pelvis (cephalopelvic disproportion) (33%); though not specifically health related, another factor that must be taken into consideration is when the mother requests a cesarean (32%). (See Table 2).

Table 2. Self-Ratings of most important maternal reasons in decision making for CS delivery

#	Reason	n	%
1	Hypertensive disorders	34	60%
2	Abnormal labor pattern or arrest in progress of labor	31	54%
3	Previous cesarean section	19	33%
4	Cephalopelvic disproportion	19	33%
5	Maternal request	18	32%
6	Maternal complications	12	21%
7	Malpresentation of Fetus	12	21%
8	Diabetes mellitus	11	19%
9	Abnormal fetal well-being parameters	11	19%
10	Fetal macrosomia	6	11%
	Other causes	46	81%
	Missing	5	9%
	Total	57	100%

In terms of fetal health, the highest-rated reasons given for performing a CD were an abnormal intrapartum fetal heart rate tracing (83%), malpresentation (60%), suspected macrosomia (43%), and intrauterine growth restriction (24%) (See Table 3).

Table 3. Self-Ratings of most important fetal reasons in decision making for CS delivery

#	Reason	n	%
1	Abnormal fetal heart tracing	48	83%
2	Malpresentation of fetus	35	60%
3	Fetal Macrosomia	25	43%
4	Intrauterine growth restriction (IUGR)	25	24%
5	Fetal distress	14	21%
6	Fetal anomalies	11	19%
7	Arrest in progress of labor	9	16%
8	Oligohydramnios	8	14%
9	Meconium	7	12%
10	Multiple pregnancy	6	10%
	Other causes	23	40%
	Missing	4	6%
	Total	62	100%

However, when participants were queried about what they felt were reasons influencing other obstetricians in the decision to perform a CD, the top 2 participant responses were physician's personal convenience and obstetrical indications (both at 52%). Fear of a bad outcome coupled with malpractice liability (aka concern regarding medical liability) was rated at 50%. A maternal/familial request and/or the pressure to perform a cesarean was rated at 23%. Other important, though lower-rated, determinants influencing providers in the decision to perform CDs are shown in Table 4.

Table 4. Factors important to other obstetricians in decision making for CS delivery

#	Reason	n	%
1	Physician's convenience	27	52%
2	Obstetrical indication	27	52%
3	Concern regarding medical liability	26	50%
4	Maternal complications	18	35%
5	Maternal request	12	35%
6	Previous cesarean section	11	21%
7	Abnormal fetal heart rate tracing	11	21%
8	Low payment from medical insurers	4	8%
9	Lack of hospital services	3	6%
10	Restrained anesthesia services	3	6%
11	Poor medical insurance coverage	3	6%
12	High-risk pregnancy	3	6%
	Other causes	13	21%
	Missing	21	51%
	Total	62	100%

Finally, participants were asked about their attitudes and beliefs regarding factors that most influence the high rate of cesareans in Puerto Rico. We received a low number of responses to this question (n = 12); however, we feel that the results are worth reporting. Those who did respond stated that malpractice-related issues, including the malpractice laws in Puerto Rico, frivolous malpractice claims, and inadequate court proceedings, were the number one reason for the high rate of CD in Puerto Rico (25%).The second reason given was medical malpractice insurance policy costs (17%). Other explanations included maternal unwillingness to endure a full-term spontaneous delivery and a subsequent demand for a CD (17%) and the unscrupulousness of a given obstetrician and his or her unwillingness to invest time in a full-term labor (17) (see Table 5).

Table 5. Participant's belief as to causes of the high rate of cesareans in PR

#	Reason	n	%
1	Malpractice laws in PR, frivolous malpractice claims, inadequate court proceedings	3	25
2	Medical malpractice insurance policy costs	2	17
3	Maternal request, maternal fear & anxiety	2	17
4	Unscrupulous obs or obs unwilling to invest time in labor	2	17
5	Maternal overweight	2	17
6	No strategic problem-solving attitude	2	17
7	Social circumstances (not defined)	1	8
8	Maternal noncompliance with prenatal care 1	1	8
9	No VBAC policy	1	8
	Missing	50	81
	Total	62	100%

Discussion

There is no question that cesarean birth rates in Puerto Rico are exceedingly high and that cesarean rate trends do not seem to reflect national efforts to significantly impact CD incidence. It is evident that the cesarean dilemma is a complex one which requires the clear identification and understanding of specific determinants influencing the decision process involved in the cesarean event in order to delineate real successful solutions that would ultimately influence (i.e., lower) cesarean rates. In some situations, the need for a CD is very clear and unquestionable. In others its need is subject to ongoing debate, as is the case of performing a CD on a woman in labor who has had a previous cesarean—instead of allowing a vaginal birth (VBAC). As identified in the literature and as illustrated by the information derived from this study, it is clearly evident, however, that countless non-medical parameters, beyond the known fetal, maternal, and obstetrical considerations, are also important contributors to the high rates of cesarean births. Geographic, institutional, personal, and even social factors are among the multiple determinants that may affect the attitudes of obstetric care providers in their decision to recommend a cesarean. There are other emergent factors influencing the rates of primary CD that may contribute to the increasing number of such procedures conducted in Puerto Rico. One of the important factors recently noted is the rising occurrence of elective CDs upon maternal request (CDMR), and many physicians are acceding to this demand (27). The benefits and risks of providing a CD on maternal request rather than performing a vaginal delivery cannot be evaluated because of the still insufficient evidence. The decision to perform a CDMR should be made based on

the specific needs of the patient and consistent with ethical principles (28). Obstetricians should be able to inform patients regarding the procedure, the benefits of a spontaneous vaginal delivery, and the potential consequences of the aforementioned medical procedure (29-31).

In this study, corresponding to the leading indications for CD reported in the literature cited previously, obstetricians in Puerto Rico cited standard practice measures as indicators for cesareans. Participants also consistently indicated that a cesarean would likely be recommended to a mother suffering from a hypertensive disorder.. Interestingly, none of the participants mentioned the very high incidence of elective labor induction reported on the island. Failed inductions did not feature prominently among the cited causes of the high CD rate. This latter agrees with official PR statistics for the years 2000 to 2010, in which such inductions followed a stable horizontal trend along with a slightly decreasing trend in primary cesareans (18). Comparing the results obtained from this study with this same kind of statistical report on the indications for CD (using data obtained from birth certificates) yields widely different results; thus, such comparisons should be interpreted with caution. Because many of the indicators of CD risk can be found only in hospital-derived data, the use of linked data (birth certificate-hospital discharge data) is recommended as it is more likely to provide an accurate estimate of such risk (32). Therefore, it must be considered that vital statistics alone may not be identifying the true determinants for the alarmingly high CD rates in Puerto Rico.

As the authors of the cesarean events, the obstetricians in this study cited other important, unconventional predisposing determinants as well. Particular consideration was given to factors related to the professional practice, to the litigation process and its outcomes, and also to personal factors that surround and impact the birthing scenario and which have an influential role both in the incidence of cesarean birth and in the cesarean rates. It has been well documented that the liability environment influences the choice of delivery method in obstetrics and negatively affects the national aim of increasing VBAC and decreasing the rate of repeat elective cesareans (33). However, it seems likely that to reduce the elective cesarean rates, by promoting VBAC, a concrete, and organized effort is required on the part of patients, physicians, and hospitals (34). It is evident that the risk considerations regarding bad obstetrical outcomes, taking place as they do under an uncertain, arbitrary, hostile, and non-supportive litigation environment, can adversely affect the obstetrician and the obstetrical practice. Thus, obstetricians may often be compelled to anticipate the cesarean event by incorporating the aforementioned non-clinical elements into the decision-making process involved in ascertaining whether to perform a cesarean, not necessarily to reduce the risk of harm to the fetus and the mother but to reduce a potential threat to the professional practices of those physicians. Although we reported a low response rate to the question regarding beliefs about what causes the high rate of CD in Puerto Rico, our findings are similar to those of other publications, in which obstetricians reported often opting to proceed with a CD because of the fear of litigation (31). This situation may be tilting the balance in favor of using non-clinical determinants in the decision as to whether or not to perform a cesarean section. Thus, reduced litigation pressure would likely lead to decreases in both the total number of CDs and total delivery costs (33). In all cases, adequate patient counseling and discussion of the process of spontaneous vaginal delivery, especially from the very beginning of prenatal care, is important and may reduce the rate of CD by maternal request; the consideration of non-medical indications when deciding on whether to perform a CD is important, as well (29-30).

Conclusions

There is no doubt that Puerto Rico faces a serious public health dilemma in terms of the overuse of CD, which overuse must be formally and diligently addressed with meticulous care and discernment. To tackle the high rates and upward trend of cesareans in Puerto Rico, we must not only make efforts to reduce clinical complications during pregnancy and labor, increase patient education, and establish control mechanisms. We must also give due attention to other multiple influencing factors, such as social factors, hospital facilities, health insurance organizations, and the litigation environment, all of which stifle the obstetrician in the birthing scenario. Although obstetricians bear responsibility for the cesarean rates, and strategies must be implemented to control unnecessary cesareans, it is important to address other essential elements that place undue pressure on the obstetrician—both the health professional and the human being.

The study described herein is -to our knowledge- the first in Puerto Rico to explore the specific points of view of practicing obstetricians in order to ascertain and describe the decision-making process prior to performing a CD. Two significant features that underscore the novelty of this study are that 1) the value of open-labeled questions in providing measurable information on influential factors for cesareans from the clinicians who stand behind and directly influence cesarean rates is clearly demonstrated; and 2) information obtained from obstetricians themselves is instrumental in determining elements (that would not otherwise be known) that impact the problem of the cesarean rate.

The main limitation of this study is that it is based on a small convenience sample: Participation was limited to practicing obstetricians who attended the 2011 Annual Caribe Gyn meeting in Ponce, Puerto Rico. Nevertheless, along this research pathway a feasible means of defining the root of the present cesarean dilemma can be proposed, thereby leading the way to the development of a well-targeted prevention plan for the improvement of the health of the women in Puerto Rico and for the reduction of cesarean rates.

Further efforts, in the form of a unified endeavor undertaken by all the relevant parties, must be made to acquire more knowledge about this public health situation. With the design of well-targeted population-based surveys of Puerto Rican obstetricians, we expect to be able to further identify the determinants influencing the decision to perform a CD and to evaluate the relative impact of this procedure. Multiple, logistic, and multivariate multiple regression should help to establish the added effect of a combination of factors and the relative weight of the non-clinical elements predisposing the cesarean event. Linking the data with hospital and other records will provide a more expansive understanding of the high CD rate in Puerto Rico, from which understanding clinical interventions and education trials can be planned.

Resumen

Objetivo: Puerto Rico (PR) posee la tasa de nacimientos por cesárea (CD) más alta documentada al compararse con los Estados Unidos para el 2012; 48.5% de los nacimientos en PR fueron por cesárea comparada con la tasa promedio nacional de 32.8%. Existen múltiples razones y consecuencias como resultado de la alta tasa de CD. La decisión para optar por un CD depende de múltiples factores, algunos de los cuales no son obstétricos. Para comprender estos factores, este estudio piloto se diseñó para recopilar y analizar datos provistos por los mismos obstetras. Métodos: Durante el 2011 se utilizó una muestra por conveniencia para recopilar datos de obstetras activos en la práctica que asistieron al "Caribe Gyn 2011 " en Ponce, PR. Se utilizó una encuesta auto administrada la cual fue examinada mediante un análisis formativo de contenido. Los obstetras fueron encuestados sobre los factores que contribuyen a su decisión para optar por un CD y también sobre los factores que ellos entienden influencian a otros obstetras. Resultados: En general se observaron los factores maternos y fetales comunes como causas para optar por un CD. Desordenes hipertensivos (60%) y trazados fetales (83%) fueron altamente catalogados. Igualmente lo fueron factores no obstétricos incluyendo conveniencia del médico (52%) y preocupación por el riesgo médico-legal de un parto vaginal (50%). Conclusión: Muchos de los factores que en la práctica estándar de la obstetricia influencian la decisión para CD fueron señalados. No obstante, razones no obstétricas fueron también señaladas. Estudios futuros con una muestra mayor de obstetras practicantes en PR son requeridos para plenamente comprender estos factores y atender a estos mediante intervenciones educativas a pacientes, médicos, administradores y aseguradoras, y para informar políticas públicas de salud.

Acknowledgments

The authors wish to thank Rosa A. Martinez Vasquez, MD, Ronald Lopez-Cepero, MD, and Ruben A. Bráz for their early contributions to this manuscript and the Post-doctoral Master of Science in Clinical and Translational Research Program (MSc)/Hispanic Clinical and Translational Research Education and Career Development Program (HCTRECD). Award number R25MD007607 provided partial support for the preparation of this manuscript for publication. Funding: The study on which this manuscript is based was supported by the UPR School of Medicine Endowed Health Services Research Center, grants 5S21MD000242 and 5S21MD000138, from the National Center for Minority Health and Health Disparities, National Institutes of Health (NCMHD-NIH). The contents of this manuscript are solely the responsibility of the authors and do not necessarily represent the official views of NCMHD-NIH.

References

1. Phipps MG, Watabe B, Clemons JL, Weitzen S, Myers DL. Risk Factors for Bladder Injury during Cesarean Delivery. Obstet Gynecol 2005;105: 156–60.
2. Knight M, Kurinczuk JJ, Spark P, Brocklehurst P; United Kingdom Obstetric Surveillance System Steering Committee. Cesarean Delivery and Peripartum Hysterectomy. Obstet Gynecol 2008;111:97–105.
3. Nisenblat V, Barak S, Griness OB, Degani S, Ohel G, Gonen R. Maternal Complications Associated With Multiple Cesarean Deliveries. Obstet Gynecol 2006;108:21–6.
4. American College of Obstetricians and Gynecologists; Society for Maternal-Fetal Medicine. Obstetric Care Consensus No. 1: Safe prevention of the primary cesarean delivery. Obstet Gynecol 2014;123:693–711.
5. Gregory KD, Jackson S, Korst L, Fridman M. Cesarean versus vaginal delivery: whose risks? Whose benefits? Am J Perinatol 2012;29:7–18.
6. Silver RM, Landon MB, Rouse DJ, et al.; National Institute of Child Health and Human Development Maternal-Fetal Medicine Units Network. Maternal morbidity associated with multiple repeat cesarean deliveries. Obstet Gynecol 2006;107:1226–32.
7. Clark SL, Belfort MA, Dildy GA, Herbst MA, Meyers JA, Hankins GD. Maternal death in the 21st century: causes, prevention, and relationship to cesarean delivery. Am J Obstet Gynecol 2008;199:36.e1–5.
8. Solheim KN, Esakoff TF, Little SE, Cheng YW, Sparks TN, Caughey AB. The effect of cesarean delivery rates on the future incidence of placenta previa, placenta accreta, and maternal mortality. J Matern Fetal Neonatal Med 2011;24:1341–6.
9. Hansen AK, Wisborg K, Uldbjerg N, Henriksen TB. Risk of respiratory morbidity in term infants delivered by elective caesarean section: cohort study. BMJ 2008;12; 336:85–7.
10. Levine E, Ghai V, Barton JJ, Strom CM. Mode of delivery and risk of respiratory diseases in newborns. Obstet Gynecol 2001;97:439–42.
11. Leveno KJ. Rising Cesarean Delivery and Preterm Birth Rates: Are They Related? Obstet Gynecol. 2008;111:810–1.
12. Cho CE, Norman M. Cesarean section and development of the immune system in the offspring. Am J Obstet Gynecol 2013;208:249–54.
13. World Health Organization. Appropriate technology for birth. Lancet 1985;2:436–7.
14. World Health Organization. WHO Statement on Caesarean Section Rates. April 2015:1-8. Available at: Url: http://www.who.int/reproductivehealth/publications/maternal_perinatal_health/cs-statement/en/. Accessed March 15, 2016.
15. Pan American Health Organization. Caesarean sections should only be performed when medically necessary. April 2015. Available at: Url: http://www.paho.org/clap/index.php?option=com_content&view=article&id=283-caesarean-sections-should-only-be-performed-when-medically-necessary&catid=387&Itemid=354&lang=en. Accessed March 15, 2016.
16. Farr SL, Jamieson DJ, Rivera HV, Ahmed Y, Heilig CM. Risk factors for cesarean delivery among Puerto Rican women. Obstet Gynecol 2007;109:1351–7.

17. Centers for Disease Control and Prevention (CDC). Rates of cesarean delivery among Puerto Rican women—Puerto Rico and the U.S. mainland, 1992-2002. MMWR Morb Mortal Wkly Rep 2006;55:68–71.
18. Martin JA, Hamilton BE, Osterman MJ, Curtin SC, Matthews TJ. Births: final data for 2012. Natl Vital Stat Rep 2013;62:1–68.
19. Irion O, Morales MA, Faltin D, Boulvain M. The epidemic of cesarean sections: a necessary evil [in French]? Rev Med Suisse. 2005;1:2566–9.
20. Villarreal Peral C, Olvera Gracida L. The epidemics has reached us [in Spanish]. Ginecol Obstet Mex 2005;73:464–5.
21. Savage W. The caesarean section epidemic. J Obstet Gynaecol 2000;20:223–5.
22. Vázquez Calzada JL, Velasco E, Morales Z, Ramírez de Arellano AB. Cesarean childbirth in Puerto Rico: a world record. P R Health Sci J 1983;2:59–64.
23. Vázquez Calzada JL. Cesarean childbirth in Puerto Rico: the facts. P R Health Sci J 1997;16:395–400.
24. Fisher RJ. Social Desirability Bias and the Validity of Indirect Questioning. J Consum Res 1993;20:303–15.
25. Krumpal I. Determinants of social desirability bias in sensitive surveys: a literature review. Qual Quant 2011;47:2025–47.
26. Bettes BA, Coleman VH, Zinberg S, et al. Cesarean delivery on maternal request: obstetrician-gynecologists' knowledge, perception, and practice patterns. Obstet Gynecol 2007;109:57–66.
27. Coleman VH, Lawrence H, Schulkin J. Rising cesarean delivery rates: the impact of cesarean delivery on maternal request. Obstet Gynecol Surv 2009;64:115–9.
28. Main EK, Morton CH, Hopkins D, Giuliani G, Melsop K, Gould JB. Cesarean Deliveries, Outcomes, and Opportunities for Change in California: Toward a Public Agenda for Maternity Care Safety and Quality [CMQCC Web site]. December 2011. Available at: Url: https://www.cmqcc.org/resource/cesarean-deliveries-outcomes-and-opportunities-change-california-toward-public-agenda. Accessed August 29, 2014.
29. Bergholt T, Østberg B, Legarth J, Weber T. Danish obstetricians' personal preference and general attitude to elective cesarean section on maternal request: A nation-wide postal survey. Acta Obstet Gynecol Scand 2004;83:262–6.
30. Gunnervik C, Sydsjö G, Sydsjö A, Selling KE, Josefsson A. Attitudes towards cesarean section in a nationwide sample of obstetricians and gynecologists. Acta Obstet Gynecol Scand 2008;87:438–44.
31. Arikan DC, Ozer A, Arikan I, Coskun A, Kiran H. Turkish obstetricians' personal preference for mode of delivery and attitude toward cesarean delivery on maternal request. Arch Gynecol Obstet 2011;284:543–9.
32. Kahn EB, Berg CJ, Callaghan WM. Cesarean delivery among women with low-risk pregnancies: A comparison of birth certificates and hospital discharge data. Obstet Gynecol 2009;113:33–40.
33. Yang YT, Mello MM, Subramanian SV, Studdert DM. Relationship between Malpractice Litigation Pressure and Rates of Cesarean Section and Vaginal Birth after Cesarean Section. Med Care 2009;47:234–42.
34. Scott JR. Vaginal birth after cesarean delivery: a common-sense approach. Obstet Gynecol 2011;118:342–50.