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Mode of Childbirth in Low-Risk Pregnancies: Nicaraguan Physicians' Viewpoints

Mercedes Colomar · Maria Luisa Cafferata · Alicia Aleman · Graciela Castellano · Ezequiel Garcia Elorrio · Fernando Althabe · Susheela Engelbrecht

Abstract To explore attitudes of physicians attending births in the public and private sectors and at the managerial level toward cesarean birth in Nicaragua. A qualitative study was conducted consisting of four focus groups with 17 physicians and nine in-depth interviews with decision-makers. Although study participants listed many advantages of vaginal birth and disadvantages of cesarean birth, they perceived that the increase in the cesarean birth rate in Nicaragua has resulted in a reduction in perinatal morbidity and mortality. They ascribed high cesarean birth rates to a web of interrelated provider, patient, and health system factors. They identified five actions that would facilitate a reduction in the number of unnecessary cesarean operations: establishing standards and protocols; preparing women and their families for labor and childbirth; incorporating cesarean birth rate monitoring and audit systems into quality assurance activities at the facility level; strengthening the movement to humanize birth; and promoting community-based interventions to educate women and families about the benefits of vaginal birth. Study participants believe that by performing cesarean operations they are providing the best quality of care feasible within their context. They do not perceive problems with their current practice. The identified causes of unnecessary cesarean operations in Nicaragua are multifactorial, so it appears that a multi-layered strategy is needed to safely reduce cesarean birth rates. The recent Nicaraguan Ministry of Health guidance to promote *parto humanizado* ("humanization of childbirth") could serve as the basis for a collaborative effort among health care professionals, government, and consumer advocates to reduce the number of unnecessary cesarean births in Nicaragua.

Keywords Qualitative research · Health personnel · Mode of delivery · Cesarean section

Abbreviations

INSS	Nicaraguan Social Security Institute
MINSA	Ministry of Health/Ministerio de Salud
Ob/gyn	Obstetrics/gynecology
PATH	Program for Appropriate Technology in Health
USAID	United States Agency for International Development

Background

Cesarean birth is indicated to resolve maternal or fetal complications not amenable to vaginal birth, either for mechanical limitations or for maternal or fetal benefit. When cesarean operations are performed safely and for an appropriate obstetrical or medical indication, they are potentially life-saving procedures for women and their babies. However, if women undergo cesarean operations

M. Colomar (✉) · M. L. Cafferata · A. Aleman
Montevideo Clinical and Epidemiological Research Unit, UNICEM, Hosp Clinicas, Av Italia s/n, Montevideo, Uruguay
e-mail: mcolomar@unicem-web.org

G. Castellano
Department of Preventive Medicine and Hygiene, University of the Republic, Montevideo, Uruguay

E. G. Elorrio · F. Althabe
Institute for Clinical Effectiveness and Health Policy, Buenos Aires, Argentina

S. Engelbrecht
PATH, Seattle, WA, USA

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without an obstetrical or medical reason—e.g. women with low-risk, uncomplicated pregnancies—they are more likely than those who undergo normal vaginal birth to die or be admitted into intensive care units, require blood transfusions, or encounter complications that might lead to a hysterectomy [1]. Unfortunately, in many settings, women are increasingly undergoing cesarean operations without an obstetrical or medical indication for the procedure, contributing to the worldwide increase over the last 30 years in cesarean births [2–9]. Latin America is the region with the highest cesarean birth rates, with country rates ranging from 25 to 30 % of all births [10]. In Nicaragua, where there are geographic, socioeconomic, gender, and ethnic inequities in access to health services [11]; the birth rate is high (23.44 % in 2011) and the maternal mortality ratio is 100/100,000 live births [12]. The rate of cesarean births has quadrupled over the last two decades, rising from 7 % in 1992 to 31 % in 2004–2005, with significantly higher rates in the most urban settings [13, 14].

Over the last two decades, attempts have been made to align the rate of cesarean births with the optimal rates of 10–15 % that correlates with the best maternal and perinatal outcomes [15]. In Nicaragua, the *Ministerio de Salud* (Ministry of Health) of Nicaragua (MINSA) instituted a policy of *parto humanizado* ("humanization of childbirth") in 2010 to improve care during labor and childbirth and reduce unnecessary medical interventions [16]. The MINSA also has clinical guidelines in Nicaragua that provide recommendations for more judicious use of cesarean [17]. Why, then, are cesarean rates rising and what can be done to keep them at optimal rates?

Interventions to address provider factors that influence the decision to perform a cesarean, including audits, feedback, peer review, guidelines endorsed by local opinion leaders, and multifaceted strategies, or requiring a second opinion before performing surgery, have proved useful in reducing cesarean birth rates in some settings [18–22]. A study in Quebec found that the adoption of guidelines could be improved if local health care professional's perceptions are considered to make recommendations more acceptable and useful [23]. Therefore, to help in the design of interventions that address the root causes of high cesarean birth rates and improve the effectiveness of these interventions, it would be useful to fully understand physicians' opinions of the determinants of cesarean births, particularly in the case of a low-risk, uncomplicated pregnancy. "Low-risk pregnancy" is defined as a pregnancy occurring in a woman aged 18–35 who has no previous diagnosis of essential hypertension, diabetes, renal disease, autoimmune disease, liver disease, cardiovascular disease, or HIV/AIDS; is not obese; has no history of infertility treatment; does not smoke or consume alcohol; and has not, in this pregnancy, been diagnosed with placenta praevia, multiple gestation, intrauterine growth retardation, preeclampsia or eclampsia, gestational diabetes, premature rupture of membranes, or other condition that poses a high risk of poor pregnancy outcome [24].

The goal of this research was to develop useful recommendations for a plan to promote rational use of cesarean operations. The objectives were to assess physicians' and obstetric decision-makers' opinions of the determinants of the high rate of cesarean births in Nicaragua as well as possible barriers to and facilitators of optimal cesarean birth rates.

Methods

The study protocol was submitted to the Program for Appropriate Technologies in Health's (PATH) research determination committee. This committee determined that the activity did not meet the definition of research provided by the Office for Protection from Research Risks [45 CFR 46.102(f)] and satisfied the criteria to invoke the exemption for research (http://www.hhs.gov/ohrp/policy/exmpt-pb.html). The study protocol was therefore not submitted to other ethics committees for review or approval. Written informed consent was given by participants before participation in focus group discussions and in-depth interviews.

Study Design

This qualitative study was conducted to understand how practicing obstetrician/gynecologists and health care administrators in Nicaragua view determinants of cesarean births. A descriptive design was used and data were collected using focus group discussions and semi-structured interviews. This methodology was appropriate because we wanted to describe study participants' perceptions, opinions, and/or attitudes on the following topics: (1) Determinants of the decision to perform a cesarean, (2) advantages and disadvantages of vaginal and cesarean birth, (3) women's preferences for mode of childbirth, (4) cesarean birth rates in Nicaragua as compared with those in the rest of the world, and (5) interventions that could decrease the cesarean birth rate. We were not trying to make accurate predictions or to determine cause and effect or to have results that are generalizable. Moreover, the quality of the data is adequate for the purpose of developing a plan for Nicaragua to reduce the number of cesarean births conducted without a medical or obstetrical indication.

The study team conducted focus group discussions with obstetrician/gynecologists from public (MINSA) and Social Security Institute (INSS) hospitals which cover most of the more disadvantaged population (Table 1). MINSA

Table 1 Socio-demographic data on participating providers

	Ob/gyn physicians		Professional decision-makers at hospitals		Professional decision-makers from MINSA, SONIGOB, and INSS		Total	
	N	(%)	N	(%)	N	(%)	N	(%)
Gender								
Female	8	47	4	66.7	2	66.7	14	53.8
Male	9	53	2	33.3	1	33.3	12	46.2
Age								
<35	2	11.8	0	0	0	0	2	7.7
35–50	11	64.7	2	33.3	1	33.3	14	53.8
>50	4	23.5	4	66.7	2	66.7	10	38.5

INSS Nicaraguan Social Security Institute, *MINSA* Ministerio de Salud (Ministry of Health), *SONIGOB* Sociedad Nicaraguense de Ginecología y Obstetricia (Nicaraguan Society of Gynecology and Obstetrics)

leads the health sector and sets regulations for public and private health facilities and providers, covering 61.2 % of the population; and the Social Security Institute of Nicaragua (INSS) covers 16.5 % of the Nicaraguan population with health benefits under a "provisional" health care scheme [25]. The INSS subcontracts services from about 40 health care facilities across the country, mostly private providers, but also some public facilities) [26].

The discussions were conducted with a minimum of three and a maximum of six participants. All the obstetrician/gynecologists on staff at each hospital were invited to participate in the focus groups. The team also conducted in-depth interviews with health authorities at the local-level (maternity hospitals *and Sistema Local de Atención Integral en Salud*, or Integrated Departmental Health Care System) and professionals at the central-level (MINSA, Nicaraguan Society of Gynecology and Obstetrics, and INSS) who were involved in the management, development, and implementation of health policies and standards in maternal health (Table 1). Participants for the focus groups and in-depth interviews were recruited by study team members. The mix of participants was chosen based on the need for multiple points of view from physicians working in different sectors of the health care system, with different social and institutional realities.

Data Collection and Analysis

Interviews and focus group discussions were conducted by the study's research assistant. Both the focus group discussions and the in-depth interviews employed open-ended questions. Two guides were used, one for facilitating the focus group discussions and another for the in-depth interviews.

All focus group discussions and interviews were recorded for later transcription, categorization, and analysis. The principal investigator coded and categorized information from the transcripts using ATLAS.ti qualitative data analysis software (v5.0) (ATLAS.ti Scientific Software Development GmbH, Berlin, Germany). Coding and categorizing were followed by analysis of the information using a matrix for crossing data and reporting codes, correlating the different dimensions of participants' responses. Once all transcripts were analyzed, results were reviewed to describe findings that apply to the study as a whole. As hypotheses were generated, confirmation was sought by returning to the transcripts to find evidence to refute or support them. To ensure study rigor and reduce limitations, analysis triangulation was performed.

Results

Four focus groups and seven in-depth interviews were conducted, involving a total of 26 health care professionals. Characteristics of participants are shown in Table 1.

Focus groups were conducted in the following hospitals:

- Hospital Militar, Managua (MINSA and INSS)—four participants
- Hospital Bertha Calderón, Managua (MINSA)—three participants
- Hospital Alemán, Managua (MINSA)—four participants
- Hospital Heodra, León (MINSA).

In-depth interviews were conducted with six hospital authorities and three central authorities from MINSA and INSS.

The information collected from the discussions and interviews was organized into four categories: determinants of the decision to perform a cesarean; advantages, disadvantages, and impact of vaginal birth and cesarean birth; barriers to and facilitators of decreasing the rate of cesareans performed without medical or obstetrical indications; and opinions on an intervention to decrease the cesarean rate.

Determinants of the Decision to Perform a Cesarean Operation

Study participants identified both clinical and nonclinical factors that influence providers' decisions about women's mode of childbirth (Table 2; Fig. 1). The main *clinical factors* mentioned were fetal weight, presentation, and history of a previous cesarean birth. Some participants noted that cesarean birth should be the standard of care for women with a history of previous cesarean; most participants felt that a woman with a history of cesarean birth

Table 2 Determinants of the decision to perform a cesarean section and illustrative quotations

	Illustrative quotations
Clinical factors	
Previous cesarean operation	"A patient that had a cesarean… will have to have a repeat cesarean section only because she had a previous cesarean section, even if the birth occurs 5 years after the cesarean was performed, as we do not have defined protocols for vaginal birth after a previous cesarean section…"
	Interview with a central-level professional
Concomitant risk factors	"Studies have shown that vaginal birth after cesarean section (VBAC) is a good option, but these studies have been done in developed countries where educated people space their pregnancies for a period of 8–10 years…"
	Interview with central-level professional
Nonclinical factors	
Fear of legal actions due to malpractice	"[The] number one priority… is the fear of medico-legal problems because we didn't do a cesarean section, because there is always the probability that a patient may be upset and file a medico-legal complaint"
	Focus group with ob/gyn physician
Limited human and material resources	"If the patient is given enough time, she may have a normal delivery, but as the risk of a uterus rupture is present during labor and we need a blood bank available, we perform an elective surgery"
	Focus group with ob/gyn physician
Woman's preferences	"It is requested a lot (cesarean), it seems due to family pressure, so I think that influences in the final decision"
	Focus group with ob/gyn physician
Overburdened providers	"We know that cesarean section is not indicated in low-risk pregnancy, but to avoid the night pressure and the work during the night…"
	Interview with local-level professional
Perception of a lack of clear clinical guidelines/protocols	"Someone comes and tells me: I do not take the risk, this is natural because it is not documented in protocols"
	Interview with central-level professional
Limited geographic access to obstetric services	"Sending a patient home with a term pregnancy puts her at a higher risk of having a stillborn baby, so we evaluate all the factors, including that the patient didn't undergo all the medical exams and that she lives far away"
	Focus group with ob/gyn physician
Lack of knowledge about cesarean rates and outcomes	"The truth is that we do not have statistics regarding cesarean complications, which could show a fatal outcome or anything like that"
	Focus group with ob/gyn physician
Need for surgical experience	"The big women's and child[ren]'s hospitals are teaching hospitals, and are training sites for residents and specialists, and that is obviously going to increase the cesarean rate"
	Interview with central-level professional
Higher payment for cesarean birth	"The problem of doctors is that as long as they make money, they perform a cesarean section"
	Interview with a local professional
Lack of knowledge about the effects of cesarean on perinatal and maternal mortality	"In this company…we have a 60 or 65 % cesarean birth rate, but we must not only focus on the percentage of cesarean sections, but also on the percentage of children admitted to the neonatal intensive care unit; the perinatal mortality rate here is low (0–3 %), which justifies performing a cesarean section to avoid the delivery of an asphyxiated child with severe distress"
	Interview with a local-level professional

would be likely to have a vaginal birth only if she arrived in advanced labor. The decision to perform a repeat cesarean was also influenced by the presence of

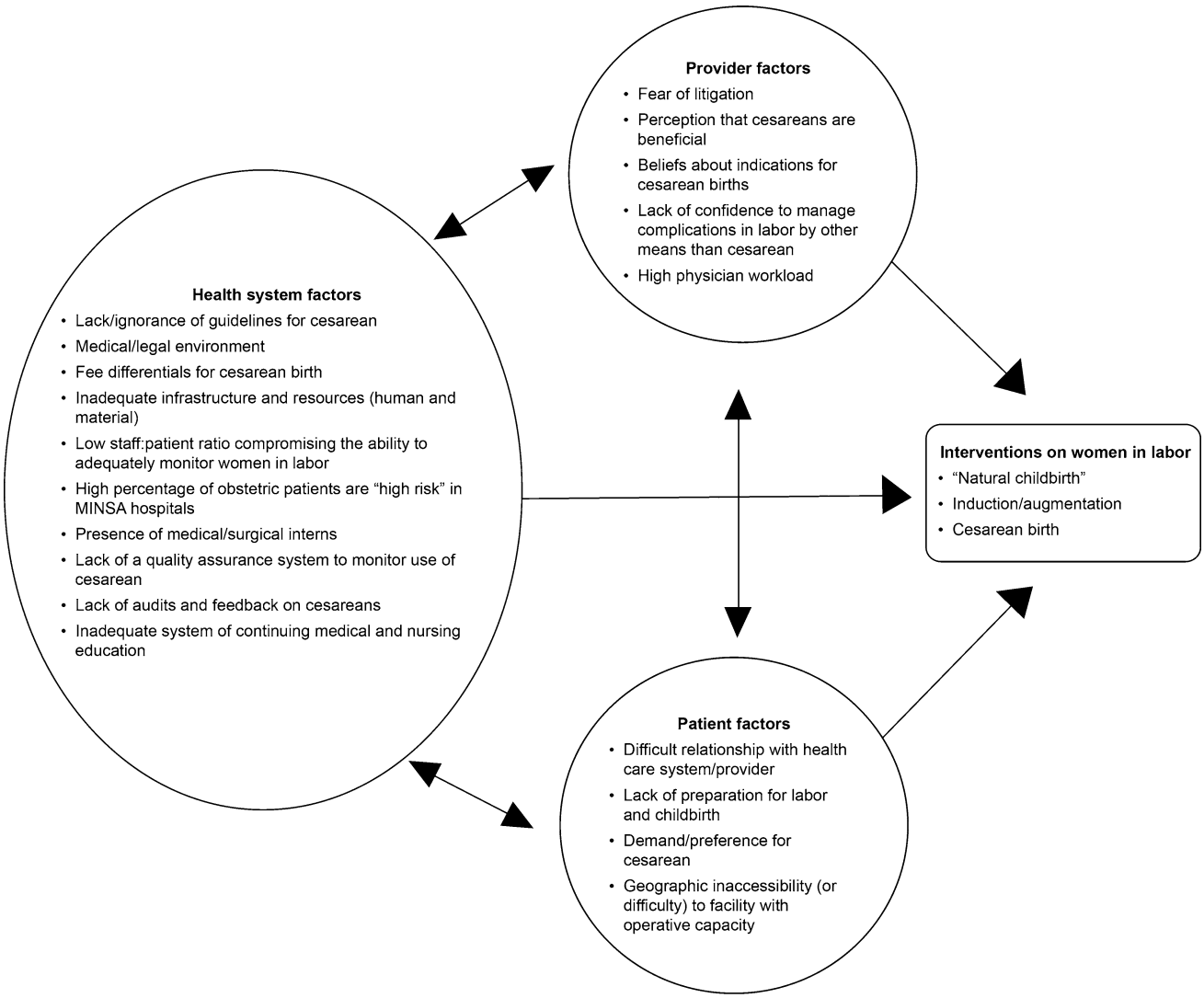

Fig. 1 Determinants affecting each mode of delivery

concomitant risk factors, including spacing of <18 months between births, malnutrition, and anemia. For women without a history of a previous cesarean birth, respondents considered the following conditions to be risk factors that would weigh in favor of cesarean birth: breech and transverse presentation, macrosomia, cephalopelvic disproportion, preterm pregnancy with rupture of membranes, threat of preterm labor without control, prolapsed cord, prolonged expulsive phase, underlying disease, gestational hypertensive disorder, and "abnormal" progress in labor.

It is interesting to note that practicing obstetrician/gynecologists were not aware of existing standards regarding indications for either a first cesarean or a repeat cesarean birth.

Many *nonclinical factors* that determine the mode of childbirth were also mentioned, reflecting the multidimensional nature of the problem. The nonclinical factors included the following provider-, patient-, and health system-related factors.

Provider-Related Factors

Providers believed that performing elective cesarean operations for women with a history of previous cesarean birth was beneficial for women and babies and that the high rate of cesarean births was beneficial overall for decreasing maternal and perinatal morbidity rates. They also believed that critics of high cesarean rates did not adequately consider the benefits for perinatal outcomes. Some physicians performed cesareans as defensive medicine, believing that it would reduce the chance of a lawsuit.

Practicing physicians felt that there was a lack of clear clinical protocols/guidelines on the indications for cesarean birth, particularly for a woman who has had a previous

cesarean. Decision-makers indicated that clinical guidelines do exist, so either the guidelines have not been widely disseminated or obstetrician/gynecologists simply do not feel adequately supported to apply them. Providers did, however, note that health care providers have already changed some of their behavior and the care they provide during labor and childbirth since the introduction of guidelines for *parto humanizado*.

Patient-Related Factors

Participants perceived that one reason for high rates of cesarean birth was increased demand among women and their families. Respondents noted that the woman's preference greatly influenced their decision about the mode of childbirth. There was also a perception that women and their families were inadequately or not prepared for labor and childbirth. When the patient and family were not adequately prepared for vaginal birth or when the situation was difficult to handle, some professionals chose to perform a cesarean as a way to take control of the situation.

Health System-Related Factors

Providers perceived that cesarean operations were one way to compensate for inadequate human and material resources (staff, equipment, blood, surgical block, emergency care facilities). Cesareans may therefore be performed for the convenience of the overburdened physician because of fatigue and overwork, or if there is a lack of emergency obstetric care in remote areas, a shortage of facility staff to adequately monitor labor, or inadequate materials and services at facilities. There also appears to be a perception that cesarean birth can reduce risk and prevent complications for women who live in isolated areas and lack access to specialists.

In addition to compensating for weaknesses in the system, participants perceived that higher reimbursements for cesarean births in the private sector led to higher rates of cesarean births and felt that teaching hospitals may have softer criteria for performing a cesarean operation because the surgery provides training opportunities for medical residents.

Finally, participants felt that their ability to keep up with current global medical thinking and evidence was hindered because MINSA did not allocate sufficient funds for ongoing medical education for physicians. This could result in continuing practices, such as routine cesarean for all women with a previous cesarean, that are based on old practice standards.

A summary of the clinical and nonclinical determinants of each mode of delivery is presented in Fig. 1. Table 2 lists the factors that were described by participants, illustrated by relevant quotations.

Perceived Advantages, Disadvantages, and Impact of Vaginal and Cesarean Births

Study participants cited several advantages to vaginal birth: increased speed of recovery, improved bond between mother and child, improved breastfeeding, shorter stays at the facility, quicker return to normal activities, and lower costs for the health system.

> The advantages of vaginal delivery are faster recovery, it is physiological, and neither the mother nor the child is exposed to anesthesia—*Decision-maker professional at local-level.*

The most commonly perceived disadvantages to vaginal birth included lack of control of events and increased risk of complications. In addition, respondents believed that MINSA would not protect them in case of litigation related to complications occurring during vaginal birth.

Participants unanimously noted that cesarean births are associated with a reduction in the incidence of neonatal asphyxia and a reduction in perinatal morbidity and mortality. Respondents indicated that, given limited human and material resources, it is preferable to perform a planned cesarean in any situation where there is a potential risk of complication. In addition, they mentioned the predictability of events and control of physicians' time as important advantages of cesarean births.

> I'm coming at 8:00 for a cesarean, and at 9:00 I'm done, so my family is happy and all has already happened—*Ob/gyn physician.*

Participants generally agreed that the disadvantages of cesarean births include the risk to the woman and the newborn of being under anesthesia, increased incidence of complications, increased recovery time for the woman, and increased health care costs. In spite of perceived disadvantages of cesarean birth, the perceived disadvantages of vaginal birth combined with perceived advantages of cesarean birth and fear of litigation lead to a tendency to favor cesarean birth rather than vaginal birth.

Barriers to and Facilitators of Decreasing the Rate of Cesareans Performed Without Medical or Obstetrical Indication

Respondents identified both internal (individual/group) and external (hospital, regulatory, environmental) barriers (Table 3). The perceived barriers to reducing the rate of cesarean births were consistent with the nonclinical patient-, provider-, and health system-related factors that

Table 3 Barriers to and facilitators of decreasing the cesarean section rate in Nicaragua and illustrative quotations

External barriers	Quotations
Lack of patient's labor preparation	"We need time to be able to approach the patients, and what we have in this hospital is lack of time; we are so overloaded that we usually give only 15 min per patient; to start to talk about this and set the psycho prophylaxis we need, above all we need time"
	Focus group with ob/gyn physician
Growing demand for cesarean section from patients	"The number one priority… is the fear that there will be a medical problem because we did not perform the cesarean section; always there is the possibility of an upset patient and a malpractice lawsuit"
	Focus group with ob/gyn physician
Higher payment for cesarean section	"In the private sector, providers are reimbursed approximately $700 for normal childbirth and $1,500 for cesarean section, so the doctor prefers to perform a cesarean"
	Interview with a local-level professional
Absence of audits and monitoring systems	"Despite being the directors of health we do not have much control over the private sector, and we have problems; even in overseeing our own units, we make a great effort but we have very few staff to monitor the private units"
	Interview with central-level professional
Lack of knowledge about clinical guidelines	"No, I would not risk it, and it is only natural because it is not clearly documented within the standards of care from the MINSA, and while it is not documented within the standards of care we don't have a defense"
	Interview with central-level professional
Inadequate human and material resources	"You must have… a hospital willing to have an operating room ready, a blood bank with the units ordered, that will be ready in 10 min. For example, no constraints, don't allow them to make excuses such as we have no forceps, we don't provide such services, etc."
	Focus group with ob/gyn physician
Internal barriers	
Lack of scientific update	"Going to a conference is expensive for us, and the institution cannot support us… nor the state. Our low wages mean we cannot pay for a conference, and the ministry doesn't even help"
	Focus group with ob/gyn physician
Ignorance of national cesarean section birth rates	"The truth is that we don't have statistics of cesarean complications that might negatively influence the decision to perform a cesarean, like fatal-deadly outcomes or anything like that"
	Interview with central-level professional
Facilitators	
Establishment of standards, protocols	"We are very clear on that… in Latin America and Central America the incidence [of cesarean births] decreased when a good protocol was established, with a requirement to try vaginal birth for a woman who has had a previous cesarean"
	Interview with local-level professional
Provision of prenatal classes to pregnant women	"It is a facilitating factor that the companions are already immersed in the process of prenatal care and, therefore, care in labor… they have knowledge on what prenatal care is and what care in labor is"
	Interview with central-level professional
Incorporation of monitoring systems	"There is no good planning from the management standpoint, such as power control, and for the hospital directors to make an effective reduction, where they have to strictly monitor this indicator"
	Interview with central-level professional
Introduction of rules to achieve a de-medicalized labor	"For us to change… at first it was hard, but… we have begun to accept, we try… when the patient decides to have a companion in labor, you give her one; if she does not want one, I respect her wish and try to accompany her myself or ask a colleague to"
	Focus group with ob/gyn physician
Implementation of community-based interventions	"There is a little more work to be done in primary care, with nursing assistants, with social workers, with the team dealing with community care, so that they don't only use the visit to track why the pregnant woman did not arrive to her visit, or if she already delivered, but also to create a little awareness of what a vaginal delivery is"
	Interview with central-level professional

contribute to the decision to perform a cesarean. Provider-related barriers cited by respondents included lack of feedback from audits on cesarean births (e.g. cesarean birth rates, indications for the decision to perform a caesarean operation, and prevalence of each indication), providers' lack of contact with current medical thinking, and lack of awareness of clinical guidelines on performing cesarean operations.

On the positive side, participants identified five actions that they felt could facilitate a reduction in the number of unnecessary cesarean operations:

- Establishing clear standards, protocols, and/or clinical guidelines for cesarean births (to support providers in changing their practice).
- Strengthening the preparation of pregnant women and their families for childbirth during antenatal care.
- Initiating systems to audit cesarean births (indications, outcomes, rates) at the hospital level.
- Initiating systems to monitor the cesarean birth rate at the national level.
- Strengthening the recent introduction of guidelines to "humanize" and "de-medicalize" birth (*parto humanizado*).
- Implementing community-based interventions, conducted by nurses and social workers, to help promote vaginal birth and reduce demands for unnecessary cesarean birth.

Table 3 lists the barriers and facilitators, illustrated by relevant quotations.

Opinions on an Intervention to Decrease the Cesarean Rate

Professionals with decision-making responsibility felt that a strategy combining training of facilitators/opinion leaders (selected by their peers), training of providers in clinical skills, and the use of feedback from audits of cesarean births would be effective in changing the behavior of health care professionals and reducing unnecessary cesarean operations. While they recommended ongoing training as part of this strategy, providers also expressed concern about the amount of time required to implement these new measures.

One participant suggested including a mass media communication module to reach the target population with information on the benefits of vaginal birth.

When asked to identify advocates for vaginal birth and potential allies for implementing an intervention to decrease the cesarean birth rate, participants did not clearly identify any institution. However, they noted that the midwives, nongovernmental organizations, and donors who support the *parto humanizado* movement could be partners in such an intervention, given their interest in de-medicalizing childbirth.

Conclusions and Discussion

The participants' perceptions that (1) women's request for cesareans and (2) liability pressure are driving cesarean rates up reflect common myths about reasons for the high rate of cesarean birth.

While the number of cesareans performed in Nicaragua based on maternal request was not corroborated, studies done in other countries have found that few women are requesting cesareans in the absence of clinical indications [27, 28]. Studies conducted in Northeastern England and the USA found that women wanted to avoid cesarean operation, but experienced pressure from a health care professional to undergo one [27–29]. Similarly, a study in Argentina found that most of the women preferred vaginal delivery due to cultural, personal, and social factors. Moreover, vaginal birth was viewed as normal and healthy: and in contrast, women viewed cesarean birth as a medical decision [30]. In contrast, a British study described the patient-initiated elective cesarean birth as an increasingly prevalent and emergent phenomenon and recommend providing adequate information so that the patient fully understands the risks and benefits of her decision while still ensuring patient autonomy [31]. Improving the preparation of pregnant women and their families for childbirth, including the risks and benefits of vaginal and cesarean births, could also have a beneficial effect on women's requests for a cesarean when no clear indication exists. Strengthening efforts to promote guidelines for *parto humanizado* may provide an impetus to reduce the number of cesarean births in Nicaragua. *Parto humanizado* champions birth as a fundamentally natural, not medical, process and seeks to increase a woman's control over her childbirth experience. At the same time, it promotes evidence-based medical practices and appropriate technologies. In addition, mass media, support from community-based health personnel, and childbirth preparation classes could help change the beliefs and preferences of pregnant women and their families.

Although fear of malpractice liability is frequently cited as a driver in the decision to perform a cesarean, a series of studies have examined the impact on cesarean birth rates and have concluded that the role of liability pressure can account for only a fraction of the steady rise [32]. In addition, use of defensive medicine has not been found to reduce the risk of lawsuits [33] and, in fact, leads to unnecessary medical interventions [34] not based on scientific evidence. However, given the participants' perceptions, tort reform and a stronger show of support for physicians by MINSA might help reassure practitioners.

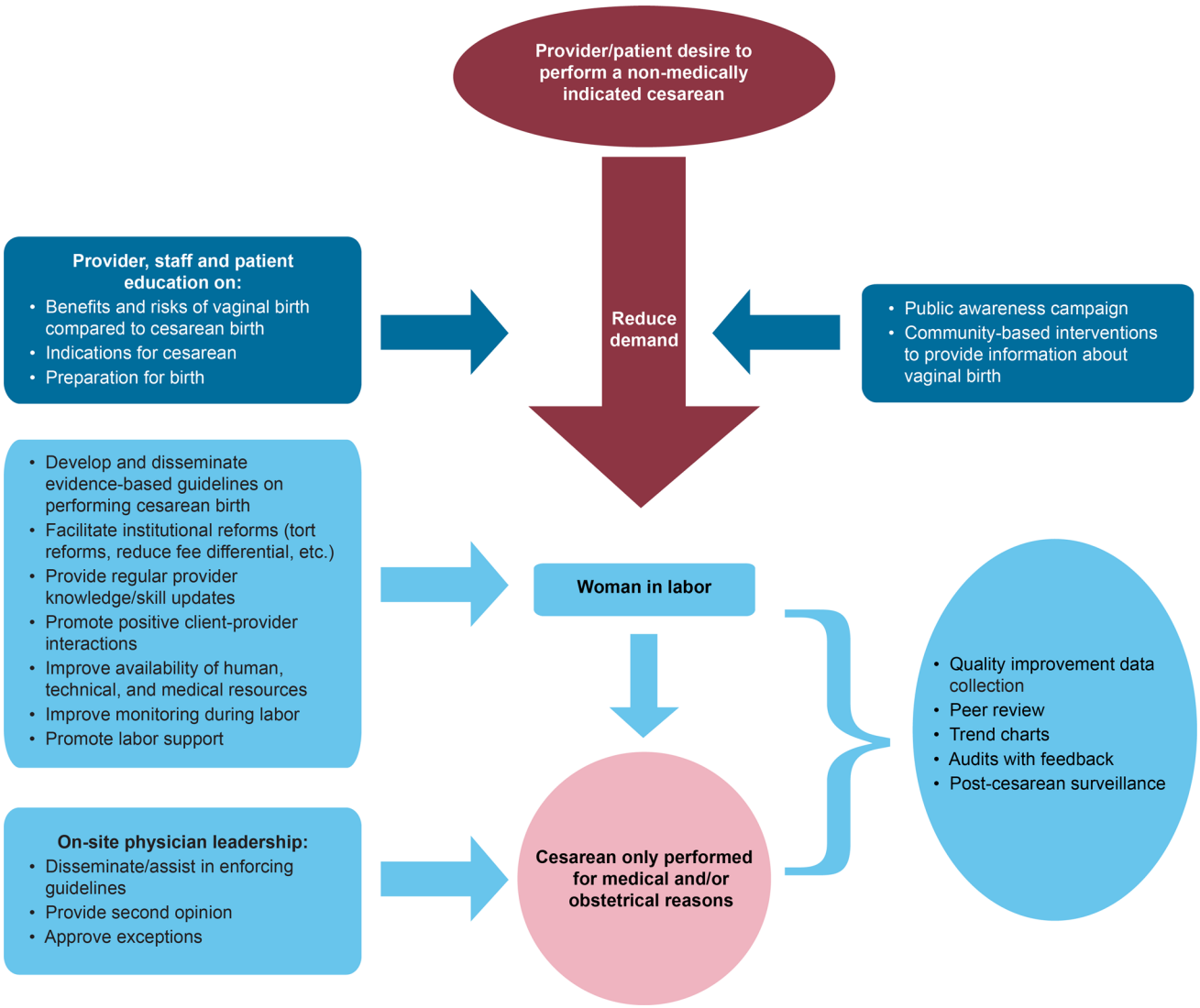

Fig. 2 Multifaceted to address reasons for cesareans performed for non-obstetrical reasons

Several other themes emerge from the opinions and views of the physicians and decision-makers who participated in this study. First, the high rate of cesarean births appears to reflect several provider information gaps. Second, providers clearly believe that their decision to perform a cesarean is in their patients' best interests, particularly in women with a history of previous cesarean birth or when they feel that weaknesses in the health care system result in poor maternal and perinatal outcomes with vaginal birth. Third, participants perceived that higher fees for cesarean births in the private sector lead to higher rates of cesarean births.

Based on findings from the formative research in Nicaragua and on findings from other interventions to reduce the cesarean birth rate, the study team feels that policy makers in Nicaragua should consider implementing a multi-layered and multidisciplinary approach using behavior change theories. The effect of the barriers should also be determined to help policy makers recognize the most effective interventional package. The following elements are required to change physician practice:

(1) Physicians require evidence. One layer of the intervention is implementation of evidence-based guidelines, including guidelines for *parto humanizado*. Guidelines appear to exist, but there is a clear need for active strategies to disseminate and implement them, such as educational outreach, feedback, reminder systems, and continuous quality improvement [35]. There is also a need for regular clinical updates as well as a system to disseminate new evidence and recommendations between revisions of the national guidelines.

(2) Physicians require more than the presentation of scientific evidence alone to change their behavior [36]. Physicians must believe that the guidelines and evidence being presented are valid, applicable to their practice setting, and feasible to implement [23]. Participants noted that health care providers have already changed some of their behavior and the care they provide during labor and childbirth since the introduction of guidelines for *parto humanizado*. Thus, it appears that there is openness among providers to accepting recommended changes in practice when clear guidelines exist and there is support for applying them. In addition, peer review activities championed by opinion leaders have been identified by obstetricians as the most suitable strategy to improve the use of the guidelines in their practices [23]. These activities should reflect physicians' perceptions [23] and consider other external pressures and the contingent, unique and often unanticipated features of each case [37].

(3) Physicians must be able to implement the guidelines. Advocacy efforts should therefore be promoted to address weaknesses in the health care system identified by the physicians interviewed. For example, there are only 1.4 midwives, nurses and doctors per 1,000 population [12] but the National Health Policy does not currently specify this as a priority. In addition, an attempt should be made to study the effect of fee differentials on decision to perform a cesarean. If this perception is corroborated by fact, eliminating fee differentials could potentially result in a reduction in the cesarean birth rate.

(4) Physicians must be able to objectively evaluate their practice. Metrics should be developed to follow cesarean birth rates and maternal and perinatal outcomes, by mode of childbirth. This would allow physicians to follow their own progress in achieving the national target. If appropriate, these metrics should be openly shared. Participants felt that incorporating monitoring systems and audits would also help to decrease the cesarean birth rate.

Considering these and our findings in Fig. 2 we have presented interventions that could be implemented to address this issue in Nicaragua.

This study has a number of limitations. As with all qualitative research, although the findings may not be generalizable to other populations, it probably depicts ideas that could be similar in different contexts. Only physicians were included, as they make the final decision to perform cesarean operations. Other providers, however, may influence how women perceive labor and how labor progresses, and could have an impact on the final decision for cesarean. In addition, no attempt was made to verify participants' observations/perceptions about inadequate human resources, equipment, and supplies; women's demand for cesareans and perceptions of maternity care; or the impact of fee differentials on rates of cesarean birth. A final limitation is that it is very difficult to prevent or detect researcher-induced bias in this type of research. However, validity standards were achieved. Data was jointly coded and categorized by two researchers to limit potential bias and inappropriate interpretation of transcripts, and the results were validated by representatives of the community of subjects who participated in the research.

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Conflict of interest The authors declare that they have no competing interests.

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