

## Implications of Cesarean Delivery for Breastfeeding Outcomes and Strategies to Support Breastfeeding

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### Summary of main points

1. Cesarean delivery rates are rapidly rising in many low- to middle-income countries.
2. Breastfeeding rates are lower following cesarean delivery than vaginal delivery.
3. Breastfeeding rates at 6 months are the same among mothers who initiate breastfeeding after cesarean delivery and mothers who initiate breastfeeding following vaginal delivery.
4. Interventions to improve breastfeeding initiation rates following cesarean delivery can improve overall breastfeeding rates.

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The Insight series of technical briefs addresses the continuum of care for good infant and young child feeding, from initiation of early and exclusive breastfeeding through complementary feeding in later infancy and the second year of life. Alive & Thrive aims to improve feeding practices during this critical period to save lives, prevent malnutrition, and promote optimal growth. Alive & Thrive is funded by the Bill & Melinda Gates Foundation and managed by FHI 360. Other members of the team include BRAC, GMMB, IFPRI, Save the Children, UC-Davis, and World Vision.

Breastfeeding is widely recognized for its unparalleled contribution to improving child and maternal health outcomes. Recent research estimates that sub-optimal breastfeeding is responsible for 11.6 percent of deaths of children under 5 years of age, the greatest share of preventable child deaths attributable to a single cause.<sup>1</sup> Coordinated efforts to improve rates of exclusive breastfeeding during the first 6 months of life have gained momentum.<sup>2</sup>

Cesarean delivery is a valuable tool for saving both maternal and infant lives in emergency obstetric situations.<sup>3</sup> Access to cesarean delivery has improved in many parts of the world, particularly in Latin America and countries in economic transition.<sup>4</sup> Improved access to medically indicated cesarean delivery is associated with reduced maternal and neonatal morbidity and mortality, and national cesarean delivery rates lower than 10 percent are typically indicative of unmet obstetric need. Population rates surpassing 15 percent of total births, however, may indicate excessive use of cesarean delivery.<sup>3,5</sup> A consensus statement recently released by the American College of Obstetricians and Gynecologists and the Society for Maternal-Fetal Medicine expresses concern about rapidly increasing rates of cesarean delivery in the United States and provides a series of recommendations for safe reduction of cesarean deliveries performed at the first birth.<sup>6</sup>

Cesarean delivery is associated with lower rates of breastfeeding initiation.<sup>7</sup> However, those who successfully initiate breastfeeding after cesarean delivery are as likely to practice exclusive breastfeeding at 6 months as mothers who give birth via vaginal delivery.<sup>7</sup> These relationships suggest the need for health facilities to 1) implement protocols that increase rates of early initiation of breastfeeding after cesarean delivery and 2) reduce the number of cesarean deliveries that are not medically indicated.

This brief addresses the breastfeeding support needs of healthy, full-term babies born via cesarean delivery to healthy mothers. It is beyond the scope of this brief to address the needs of mothers or infants who have special health care requirements.

### ASSOCIATION OF CESAREAN DELIVERY WITH REDUCED RATES OF INITIATION OF BREASTFEEDING

A recent review and meta-analysis of studies reporting breastfeeding outcomes by mode of delivery included 53 studies conducted in 33 countries (35 studies in high-income countries and 18 in low- and middle-income countries).<sup>7</sup> Rates of any breastfeeding and exclusive breastfeeding at 6 months were lower among mothers who had cesarean delivery compared to those who had vaginal delivery (pooled OR: 0.86; 95%

CI: 0.82, 0.91 and pooled OR: 0.81, 95% CI: 0.67, 0.98, respectively).

Alive & Thrive baseline data gathered in Viet Nam indicate that mothers whose babies were delivered by cesarean were much more likely to feed their infants formula in the first 3 days of life (OR: 5.64, 95% CI: 4.69–6.78).<sup>8</sup> In the meta-analysis, rates of initiation of breastfeeding (defined as breastfeeding at discharge from hospital postpartum or any report of breastfeeding initiation) were significantly lower after cesarean delivery (pooled odds ratio: 0.78; 95% CI: 0.76, 0.79).<sup>7</sup> However, mothers who initiated breastfeeding after cesarean delivery had rates of full and exclusive breastfeeding at 6 months that were not significantly different from those of mothers who initiated breastfeeding after vaginal delivery. These results corroborate decades-old findings from Mexico and other studies that have demonstrated a link between initiation of breastfeeding and exclusive breastfeeding. They suggest that lower early breastfeeding rates may be largely responsible for differences in breastfeeding rates between babies born by cesarean delivery and those born by vaginal delivery.<sup>9,10</sup>

Elective, pre-labor cesarean delivery is strongly associated with reduced rates of breastfeeding initiation, while emergency, intra-labor cesarean delivery is not associated with poor breastfeeding outcomes.<sup>7,11</sup> The physiological aspects of labor, including the release of the hormones oxytocin and prolactin (both of which are important for breastfeeding), facilitate the onset of lactation. Animal studies suggest that newborns that experience labor have improved appetite and suckling responses compared to those born by cesarean delivery.<sup>11</sup>

Several circumstances commonly associated with cesarean delivery may explain its association with lower rates of breastfeeding initiation, including separation of mother and infant, post-surgical pain and discomfort, and physiological and hormonal differences between the processes of cesarean and vaginal deliveries. In addition, women who choose to give birth by elective cesarean delivery may have lower breastfeeding intentions because they may be less comfortable with the biologically normal processes of childbirth and breastfeeding.<sup>7</sup> A review and meta-analysis of studies assessing maternal preference for cesarean delivery (23 from high-income countries and 15 from middle-income countries) showed that 15 percent of respondents preferred cesarean delivery.<sup>12</sup> If most of these respondents were less inclined to breastfeed, their numbers could have reduced significantly overall breastfeeding rates among cesarean delivery births. Studies that quantitatively investigate this relationship are lacking.

### RISING RATES OF CESAREAN DELIVERIES

Cesarean delivery rates are increasing in many low- to middle-income countries.<sup>4,13,14</sup> Globally, rates of cesarean delivery are highest in Brazil (40 percent) and China (~40-60 percent, based on multiple data sources) with the highest regional rates occurring in Latin America.<sup>15,16</sup> High rates are also found in many higher-income countries. For example, the United States has a rate of 32 percent.<sup>4,17</sup> The majority of the increase in cesarean delivery has occurred since 1980 when cesarean delivery rates were 16.5 percent in the United States and 19 percent in Brazil.<sup>4,17</sup>

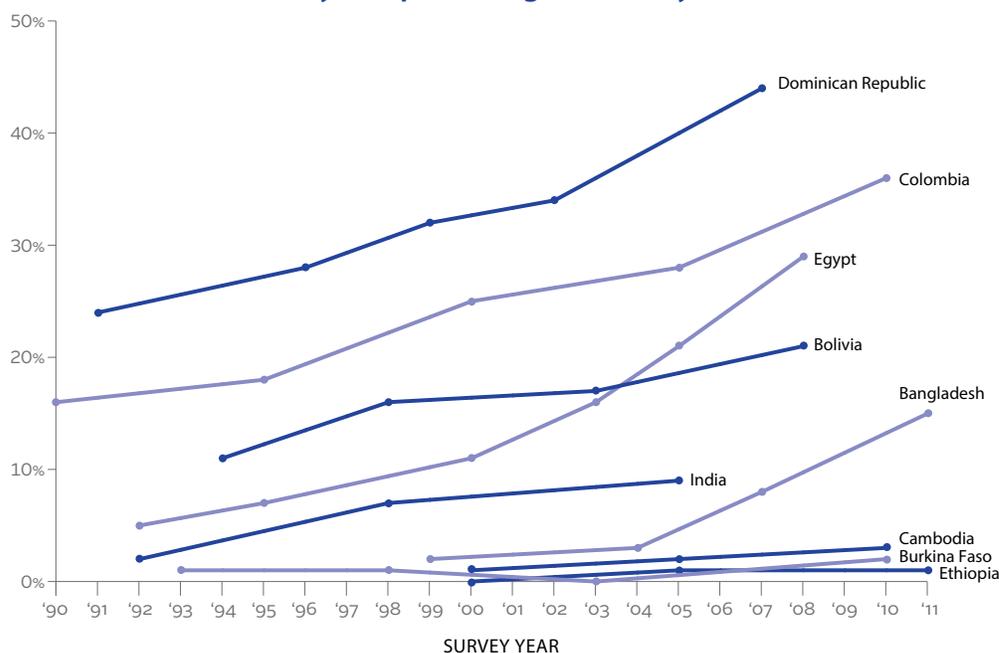
Other examples of countries in which increases in cesarean deliveries have

occurred include Bangladesh, Bolivia, Colombia, the Dominican Republic, and Egypt, reaching levels of about 30 to 45 percent for some countries (figure 1). Other countries (for example, Burkina Faso, Cambodia, and Ethiopia) have very low rates of cesarean deliveries, reflecting lack of access to emergency obstetric care. The countries in figure 1 include some Alive & Thrive countries as well as some of the low- and middle-income countries where cesarean deliveries have increased markedly.

A joint publication in 2009 on monitoring emergency obstetric care by the World Health Organization, UNICEF, United Nations Population Fund, and Averting Maternal Death and Disability notes that since 1985, WHO has recommended that the cesarean delivery rate should not exceed 10-15 percent, recognizing the lack of empirical evidence for an optimum percentage or range of percentages.<sup>3</sup> Meta-analysis of data from 119 countries confirmed findings of earlier work, demonstrating that cesarean delivery rates greater than 15 percent are not associated with improvements to maternal or neonatal mortality rates, and that rates less than 10 percent are associated with increased maternal and neonatal mortality.<sup>6,17,18</sup> Three-fourths of low-income countries included in the analysis had cesarean delivery rates less than 10 percent, and their maternal mortality rates were 5 times higher than those of countries with cesarean delivery rates above 10 percent.<sup>17</sup>

Country-level data should be interpreted with caution. In many low-income countries, cesarean delivery is accessed primarily by high-income mothers, in which case there still may be many cesarean deliveries that are not medically indicated even if

**Figure : Percentage of last births that were delivered by cesarean section in the five<sup>a</sup> years preceding the survey**



<sup>a</sup> The information presented is from national Demographic and Health Surveys. The time period was five years before the survey for most surveys with the exception of four years for the India 1992-93 survey and three years for the following surveys: Bolivia 1994, India 1998-99, and Nigeria 1999.

Source: Graph by Alive & Thrive Project (FHI 360), based on special tabulations by Shea O. Rutstein (Demographic and Health Surveys Program).

the country level rate does not seem excessive. Ronsmans et al. demonstrated that in many countries, the highest wealth quintile accesses the majority of cesarean deliveries performed in-country. In Viet Nam, the ratio between the richest and poorest quintiles is 7:1. The ratio is 123:1 in Bangladesh where cesarean delivery is virtually not accessed by the poorest quintile, and 18 percent of mothers in the wealthiest quintile give birth by cesarean delivery.<sup>19</sup>

Once the rate of cesarean delivery exceeds 15 percent, adverse maternal and neonatal outcomes become more prevalent.<sup>18</sup> Short-term adverse effects to infants include increased risk of reduced lung function/respiratory distress; reduced thermogenic response; feeding difficulties; and altered gut

microbiome, metabolism, blood pressure, and immune phenotype.<sup>11</sup> Long-term child outcomes associated with cesarean delivery include immune-related conditions, such as asthma, food allergies, and type I diabetes; high body mass index; and various other neurological and stress-related problems.<sup>11</sup> Mothers undergoing cesarean delivery are at greater risk of infection, blood clots, and severe hemorrhage, as well as uterine rupture in subsequent pregnancies. The likelihood of these events occurring increases with repeat cesarean delivery.<sup>20</sup> It is important to note that these risks are apparent when comparing full-term healthy babies born via cesarean delivery to full-term babies born via vaginal delivery.

## FACTORS RELATED TO RISING RATES OF CESAREAN DELIVERS

Various factors have contributed to this rise in cesarean deliveries, though our understanding of causality is limited because most of the published literature addressing these factors comes from the United States.

### Increased access to emergency obstetrical care

Some of the global rise in cesarean delivery is due to a concerted effort to improve emergency obstetrical care, which includes cesarean delivery when needed.<sup>4</sup> Efforts to improve access to obstetric care have been successful in increasing the number of births attended by trained professionals, but this has likely elevated the rate of cesarean deliveries that are not medically indicated as well. Some argue that there has been an “over-medicalization” of childbirth that has contributed to excessive use of cesarean delivery.<sup>21</sup>

### Maternal indications

Cesarean delivery is more prevalent among overweight and obese mothers than among those of normal weight.<sup>22</sup> Thus, the increasing global rate of obesity is another factor contributing to the increased need for cesarean delivery. Another risk factor that partially explains the rise in cesarean delivery rates is the proportion of mothers giving birth at older ages, particularly in higher income countries, as advanced maternal age increases the risk of pregnancy complications.<sup>13</sup>

### Failed inductions

Cesarean delivery rates increase substantially when labor is induced instead of spontaneous: a recent retrospective cohort study showed that

women who had labor induced had 3.4 greater odds of cesarean delivery than women who went into labor spontaneously.<sup>23</sup> Some hospitals have restricted induction to women with a favorable cervix (an indication of cervical ripening), an approach that reduces the likelihood that induction will lead to cesarean delivery.<sup>24</sup>

### Cultural norms and social acceptance of cesarean delivery

Some claim that mothers' demand for cesarean delivery is driving up cesarean delivery rates, but the previously referenced review of 38 studies on this topic suggests modest maternal preference.<sup>12</sup> The overall pooled preference of mothers for cesarean delivery was 16 percent, with the highest rate found among mothers with a previous cesarean delivery (30 percent). Women from middle-income countries were more likely to prefer cesarean delivery than women in low- and high-income countries. Regionally, the strongest preference was found in Latin America. Women who exchanged reproductive health information were less likely to give birth by cesarean delivery, possibly because such conversations address the negative implications of cesarean deliveries that are not medically indicated as well as the positive attributes of vaginal delivery.<sup>14</sup> Mothers may also share coping mechanisms for managing labor pain. Cultures that deem particular dates and hours to be auspicious may influence families to schedule cesarean delivery even when it is not medically indicated.<sup>25</sup>

### Physician preferences and hospital practices

Much of the variability in cesarean delivery rates may be explained by differences in hospital norms and policies

and individual practitioners' preferences. Elective, scheduled cesarean deliveries allow doctors to work regular daytime and weekday hours.<sup>14</sup> Among 1,050 U.S. hospitals, cesarean delivery rates ranged from 7 to 70 percent, and for low-risk deliveries (defined as singleton, full-term, regular presentation and no previous cesarean delivery), they ranged from 2 to 36 percent.<sup>26</sup>

### Financial interests

Cesarean delivery may be associated with a profit motive: in the United States, government-funded health insurance (Medicaid) reimbursement for cesarean delivery is lower than that provided by private insurance.<sup>27</sup> The predicted probability of cesarean delivery was 32 percent among mothers covered by Medicaid, compared to 36 percent among mothers with private insurance. Similarly, cesarean delivery rates were significantly higher among mothers with insurance that provided reimbursement for cesarean delivery than among those paying out-of-pocket in China, Brazil, and Lebanon.<sup>15,28,29</sup>

### Liability concerns

Increased rates of cesarean delivery may be partly attributable to liability concerns in countries where litigation is prevalent.<sup>6,13</sup> Some hospitals in the United States will not allow a mother to have a vaginal birth after cesarean delivery, despite the relative safety of this mode of delivery, because of a history of litigation in instances when trial of labor after previous cesarean delivery has resulted in uterine rupture.<sup>30</sup> Although the literature does not clarify whether liability concerns impede vaginal birth after cesarean delivery in low- and middle-income countries, maternal preference for cesarean delivery is highest among mothers with previous cesarean delivery.<sup>12</sup>

In the United States, more than 90 percent of multiparous women with previous cesarean delivery have repeat cesarean delivery, with the majority of these operations occurring before the onset of labor.<sup>27</sup> The 2010 Practice Bulletin of the American College of Obstetricians and Gynecologists presents guidelines for trial of labor after previous cesarean delivery, stating that the "preponderance of evidence suggests that most women with one previous cesarean delivery are candidates for and should be counseled about vaginal birth after cesarean and offered trial of labor."<sup>30</sup> However, some companies will not provide medical liability insurance to obstetricians providing vaginal birth after a cesarean.

## FIVE STRATEGIES TO INCREASE EARLY INITIATION OF BREASTFEEDING POST-CESAREAN DELIVERY

Five strategies can improve breastfeeding outcomes post cesarean delivery: 1) adoption of supportive hospital policies, 2) training of medical staff to support breastfeeding post cesarean delivery, 3) removal of physical barriers, 4) education about cesarean delivery and breastfeeding, and 5) reduction of cesarean deliveries that are not medically indicated.

### 1 Adoption of supportive hospital policies

Hospital policy is pivotal to ensuring early breastfeeding among cesarean delivery babies. Immediate skin-to-skin contact plays an important role in helping mothers to breastfeed successfully, among other positive outcomes.<sup>31</sup> Early breastfeeding is generally feasible post operatively and should be promoted. Practices vary widely from one hospital to another in providing immediate skin-to-skin

contact following cesarean delivery and promoting breastfeeding initiation.

### Skin-to-skin contact

The Academy of Breastfeeding Medicine Model Breastfeeding Policy recommends that babies delivered via cesarean “be encouraged to breastfeed as soon as possible, potentially in the operating room or recovery area.”<sup>32</sup> The feasibility of this recommendation has been demonstrated by Loma Linda University Medical Centers in Murrieta and Loma Linda, California, which follow an identical postpartum skin-to-skin protocol for cesarean and vaginal deliveries.<sup>33</sup> The protocol has been uniformly embraced by staff, partly because it was implemented in a way that valued their expertise and was not autocratic. Should any medical personnel in the delivery room have a concern that the mother or baby is unstable or that their wellbeing might be compromised by skin-to-skin contact in the operating room, staff have “veto power” and are thus assured that safety is of utmost importance.<sup>34</sup>

U.S. hospitals are increasingly adopting policies that support optimal breastfeeding outcomes, but results from the U.S. Centers for Disease Control Maternity Practices in Infant Nutrition and Care Survey demonstrate that there is still significant room for improvement.<sup>35</sup> This survey assessed hospitals’ adherence to best practices for promoting breastfeeding and included a section related to healthy, full-term breastfed babies born via uncomplicated cesarean delivery. Survey questions related to cesarean delivery are designed to measure the percentage of infants born at a particular institution for which a) routine procedures were conducted with the baby in the mother’s arms, b) skin-to-skin contact was initiated with the mother within 2 hours of birth, c) the

first feed was at the breast (as opposed to formula or sugar water), and d) mother and baby were kept together. Results from the 2011 survey indicate that the percentage of healthy breastfed infants who received breastmilk at their first feeding following cesarean delivery was at or above the target ( $\geq 90$  percent) in 68 percent of U.S. hospitals, compared to 75 percent for infants delivered vaginally. The ten steps of the Baby-friendly Hospital Initiative (BFHI) include best practices for ensuring optimal breastfeeding outcomes.<sup>36</sup> The steps are accompanied by indicators, called “Global Criteria,” which are used to assess hospitals’ breastfeeding support practices and eligibility for BFHI certification. BFHI Step 4, “Help mothers initiate breastfeeding within half-hour of birth,” includes the following Global Criteria that relate to skin-to-skin (STS) and cesarean delivery:

- For both vaginal delivery and cesarean delivery *without general anesthesia*, at least 80 percent of mothers should confirm skin-to-skin contact immediately after or within five minutes of birth, and that the contact was uninterrupted for an hour or more unless there were medically justifiable reasons.
- Among mothers administered general anesthesia, at least 50 percent should report that their babies were placed in skin-to-skin contact as soon as they were responsive and alert.

Hospital policies and practices that allow family members to attend cesarean delivery can facilitate early initiation of breastfeeding. The presence of the infant’s father in the operating room, for instance, can help allay anxiety that the mother might feel regarding the surgical delivery of her child.<sup>37</sup> While lower anxiety can positively impact lactogenesis, skin-

to-skin contact is best provided by mothers themselves. In a randomized trial of extended post-cesarean delivery skin-to-skin contact, breastfeeding outcomes were compared between babies randomly selected to be placed on mothers’ chests for approximately 25 minutes and those placed on fathers’ chests for the same time period.<sup>38</sup> Babies placed skin-to-skin with the mother established breastfeeding significantly earlier than those placed on the father. In situations where the mother is not available to perform skin-to-skin contact, placing the infant on the father’s chest is a second-best option with infants displaying rooting behavior and stabilized temperatures while skin-to-skin with fathers.<sup>38,39</sup> A pilot study conducted in Sri Lanka to assess the feasibility of early breastfeeding after cesarean delivery showed that 96 percent of the babies placed skin-to-skin during uterine closure suckled at the breast.<sup>40</sup>

### Presence of supportive companion at delivery

Although the body of evidence related to improving breastfeeding following cesarean delivery is expanding, there is an urgent need to pilot methods of increasing breastfeeding initiation rates after cesarean delivery and to demonstrate what is possible in diverse settings. These pilot studies should explore the roles and responsibilities for support people, including doulas, female friends and family members, and fathers where their participation is culturally acceptable in cesarean delivery operating room protocol.<sup>37</sup> Companionship in the form of doula support has been shown to reduce cesarean delivery rates and increase breastfeeding rates.<sup>6,41</sup> In a study in Israel among a multicultural sample of Muslim and Jewish mothers, culturally

appropriate early breastfeeding support was provided to mothers desiring skin-to-skin contact and intending to breastfeed following cesarean delivery by matching them with trained staff of their own cultural background.<sup>42</sup> Rates of breastfeeding initiation were significantly greater among intervention mothers in both cultural groups.

### **Administration of regional anesthesia**

A mother who has had regional anesthesia can initiate breastfeeding in the operating room or in the recovery room, and a mother who has had general anesthesia may breastfeed postoperatively as soon as she is alert enough to hold the infant and is not overly sedated. Most medications commonly used to control pain have not been shown to adversely affect breastfeeding infants, even in instances where the medications do pass into human milk.<sup>43</sup> The Academy of Breastfeeding Medicine provides Web access to a comprehensive list of analgesic and anesthetic drugs commonly used in labor and in cesarean delivery and their respective effects on breastmilk. Regional anesthesia should be used instead of general anesthesia whenever possible, and its use is already common practice in most places. Administration of general anesthesia will extend the time before a mother is responsive and able to bond with her child. Infant sucking reflex is strongest immediately after birth, and among cesarean delivery mothers administered local anesthesia, the immediate postoperative period is an ideal time to initiate breastfeeding because the mother is lucid and pain-free.

### **Post-surgery lactation support, encouragement, and information**

Mothers may complain of fatigue post-cesarean delivery and feel they need to recuperate before initiating breastfeeding. Mothers who give birth by cesarean may

have lower circulating levels of endorphins, which may make it more difficult for them to remain alert in the immediate postpartum period. Fatigue may be coupled with a misguided belief that bottle feeding while the mother is recovering from surgery will not affect breastfeeding success. These mothers need strong support and encouragement and may benefit from information regarding the benefits of breastfeeding and the critical window for breastfeeding initiation. Supplementing the infant with anything other than breastmilk may reduce the infant's suckling at the breast. Since suckling is critical to promoting a mother's milk production, supplementation can be particularly deleterious to a mother's breastmilk supply when it happens at the beginning of the breastfeeding relationship.<sup>44</sup> Many family members (including grandmothers) have misconceptions about colostrum's value, normal colostrum production, and the stomach capacity of a normal newborn. It may be helpful to educate families on the value of colostrum and the small stomach capacity of a newborn baby in order to change the perception that supplementation in the first day is essential.

## **2 Training of medical staff to support post-cesarean breastfeeding**

Given the important role that health systems play in either facilitating or obstructing breastfeeding after cesarean delivery, appropriate training of medical staff is essential. Staff can be equipped to support improved breastfeeding outcomes by learning how to respond to commonly voiced breastfeeding concerns, many of which are shared by mothers following both vaginal and cesarean delivery. The Baby-friendly Hospital Initiative 20-hour training course for maternity staff equips trainees with a strong foundation in providing breastfeeding support.<sup>45</sup> Provider encouragement for breastfeeding strongly influences breastfeeding success,

particularly among mothers from demographic groups traditionally less likely to breastfeed.<sup>46</sup> Additional support from specialized lactation consultants can further contribute to improved breastfeeding outcomes. Some mothers may find that the incision site is sore when they breastfeed their babies. In this case, health system staff can demonstrate alternative breastfeeding positions that are less likely to cause pain. Staff can assist mothers in controlling postoperative pain with the minimum amount of medication required to be fully effective.<sup>43</sup>

Many mothers find that the side-lying and "clutch" positions are more comfortable than the traditional cradle hold postoperatively. Placing the baby on properly positioned pillows can also relieve pressure from the incision site.<sup>47</sup> Lactation consultants, where available, are typically familiar with methods for encouraging and supporting breastfeeding mothers postoperatively. Counseling on early initiation of breastfeeding and exclusive breastfeeding should specifically target mothers planning a cesarean delivery and should be provided by the entire delivery team (obstetricians, nurses, lactation consultants, etc.). By establishing strong communication with parents prior to delivery, staff can convey the value of skin-to-skin contact and early initiation of breastfeeding and ensure that parents are empowered to request that their babies stay with them in low-risk situations.<sup>48</sup>

## **3 Removal of physical barriers in health facilities**

In addition to protocols, the physical structure of some hospitals can impede early skin-to-skin contact and early initiation of breastfeeding. A case study from a hospital in the United States details the logistical challenges encountered in developing a floor plan for a new hospital that would eliminate

mother-baby separation following surgical delivery.<sup>49</sup> For example, a plan to have babies room-in with mothers in the Adult Intensive Care Unit was rejected because allowing babies into this area would have violated hospital regulations. Staff also needed to be re-trained, as the presence of newborns in the recovery room meant that obstetrical nurses also needed to be certified in neonatal resuscitation. Rooms in the obstetric post-anesthesia care and labor and delivery units were designed to allow for rooming in. Although the new plan required staff to conduct a greater variety of tasks, they reported improved satisfaction once they integrated their work with that of other nursing units to reduce mother-infant separation. A similar case study also highlighted how supporting skin-to-skin contact required creative staffing solutions and the allocation of additional nursing support in the operating room.<sup>39</sup>

#### **4 Reduction of cesarean deliveries not medically indicated**

In addition to strategies to improve breastfeeding success post-cesarean delivery, reducing the rate of cesarean deliveries that are not medically indicated would have positive implications for breastfeeding outcomes. The few documented efforts to limit cesarean delivery to cases where it was medically indicated produced mixed results. A review of strategies to reduce cesarean delivery among low-risk women concluded that the “strength of evidence was low to insufficient for all strategies.”<sup>50</sup> However, promising results were found in a randomized controlled trial conducted in 36 Latin American hospitals in five countries that explored whether a mandatory second opinion before non-emergency cesarean delivery would reduce cesarean delivery rates.<sup>51</sup> The intervention resulted in a mean relative

rate reduction of 7.3 percent (95% CI 0.2-14.5), which was equivalent to 22 averted cesarean deliveries per 1,000 deliveries. In the United States, the entity responsible for health care accreditation (The Joint Commission) now includes a measure of hospitals’ rate of elective deliveries performed before 39 weeks gestation in its performance assessment.<sup>52</sup> The consensus statement recently released by the American College of Obstetricians and Gynecologists and the Society for Maternal-Fetal Medicine lists specific recommendations for safe reduction of cesarean delivery at the first birth.<sup>6</sup> One of the most common reasons for cesarean delivery is “arrest of labor;” however, this is often based on outdated definitions of the normal progress of labor. The consensus statement suggests that updating of these definitions could reduce the number of cesarean deliveries performed due to abnormal progress of labor. Similarly, policies to delay labor induction until the mother’s cervix has ripened can potentially reduce cesarean deliveries that are not medically indicated, because cesarean delivery rates are significantly higher when labor is induced before cervical ripening (32 percent vs. 18 percent).<sup>6,24</sup>

#### **5 Education about cesarean delivery and childbirth**

Interventions to educate obstetric care providers, parents, and the general public about the adverse implications of cesarean deliveries that are not medically indicated have not been adequately explored. Education can begin pre-conception, with frank discussions between providers and patients on the risks of cesarean delivery, including counseling for women who are overweight or obese to explain that their risk of cesarean delivery is elevated and to help them start pregnancy at a healthy weight and avoid excessive pregnancy weight gain.<sup>6,53</sup>

A team of obstetricians in the United States explored the sources of medical information accessed by consumers who used the internet and search engines like Google for birth-related information.<sup>54</sup> They conducted internet searches with terms related to birth and birth pathology (e.g. “epidural,” “cesarean section,” “forceps delivery”) and determined that lawyers sponsored the most pages (26 percent), whereas obstetricians/gynecologists sponsored 5 percent. These results suggest that misinformation may abound and that health professionals have not adequately used the internet to disseminate quality information related to childbirth. Information on vaginal birth after cesarean is also often limited and may lead patients to make decisions that contribute to more medically unindicated cesarean deliveries.<sup>55</sup>

#### **CONCLUSION**

The health transition underway in low- and middle-income countries is increasing access to cesarean delivery, an obstetric intervention that can avert maternal and neonatal death and prevent complications such as obstetric fistula.<sup>3</sup> Concomitantly, women might be at risk for experiencing cesarean deliveries that are not medically indicated. The breastfeeding implications of increased rates of cesarean delivery need to be considered, as cesarean delivery has been associated with reduced rates of breastfeeding initiation and breastfeeding at 6 months. Strategies to limit cesarean delivery to instances when it is medically indicated require further exploration. Interventions supporting breastfeeding and skin-to-skin contact shortly after surgical delivery are promising and need to be promoted among health care professionals to optimize infant feeding outcomes.

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