Comparing Maternal Health Outcomes of Caesarean Section and Vaginal Deliveries in Resource-Limited Settings: A Systematic Review

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ABSTRACT

Background: Given the associated complications with cesarean section, now alternative methods to shift the trajectory to encouraging normal labor are being considered. This systematic review aims to comprehensively synthesize the current evidence regarding the maternal health outcomes associated with cesarean section and vaginal deliveries.

Method: The electronic databases of PubMed, Scopus, and Web of Science were searched between 2014 to 2023. We included all research articles that evaluated health outcomes post each delivery mode- Cesarean or Vaginal delivery in the lower middle-income countries. The search string was restricted to look for research articles, while systematic reviews, abstracts, and conference proceedings were excluded.

Result: In total 476 articles were initially identified and based on the inclusion-exclusion criterion, a total of 34 studies were finally included in the review. While meta-analyses were not possible due to the nature of the heterogeneity, a narrative synthesis of the articles was conducted to summarise the findings of the included studies. The primary health outcomes following both vaginal and cesarean deliveries are discussed in detail.

Conclusion: Caesarean section deliveries have seen a surge in recent times, however Caesarean section cannot always be a safe option because of the related comorbidities that are associated with it. It still remains a challenge to strike a balance between concern for safety and the need to decrease caesarean section rates. The lack of emergency care for addressing obstetric complications like postpartum haemorrhage in facilities is a common challenge prevalent in low resource settings such as India.

Keywords: Systematic literature review, Caesarean Section, Vaginal Delivery, Maternal health outcomes, VBAC, TOLAC.

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I. INTRODUCTION

Cesarean section (C-section) is a vital surgical intervention that can prevent maternal and perinatal mortality in cases of complications such as obstructed labor or fetal distress. However, global C-section rates have risen significantly—from 7% in 1990 to 21% in 2021—with projections suggesting nearly 29% by 2030 (World Health Organization [WHO], 2021). In India, rates increased from 17.2% to 21.5% between 2015–16 and 2019–21 (NFHS-5).

While medically indicated C-sections are life-saving, non-medical factors—such as fear of labor pain, cultural beliefs, and patient demand—are increasingly contributing to their overuse (Zakerihamidi et al., 2015; Mohamad Beigi et al., 2019). This rising trend is concerning due to associated maternal risks, including infection, postpartum hemorrhage, delayed recovery, and complications in subsequent pregnancies (Ekanayake et al., 2021).

Alternatives such as Trial of Labor After Cesarean (TOLAC) and Vaginal Birth After Cesarean (VBAC) are supported by international guidelines due to their benefits—shorter hospital stays, less blood loss, and lower risk of complications compared to Elective Repeat Cesarean Sections (ERCS) (Kumari et al., 2021). Yet, TOLAC uptake remains low due to fear of uterine rupture, inadequate counseling, and systemic limitations in maternal care.

Despite growing research, existing studies on maternal health outcomes by delivery mode remain fragmented. This systematic review addresses that gap by synthesizing global evidence on the comparative outcomes of cesarean and vaginal deliveries in resource-limited settings, contributing to evidence-based maternal care policies.

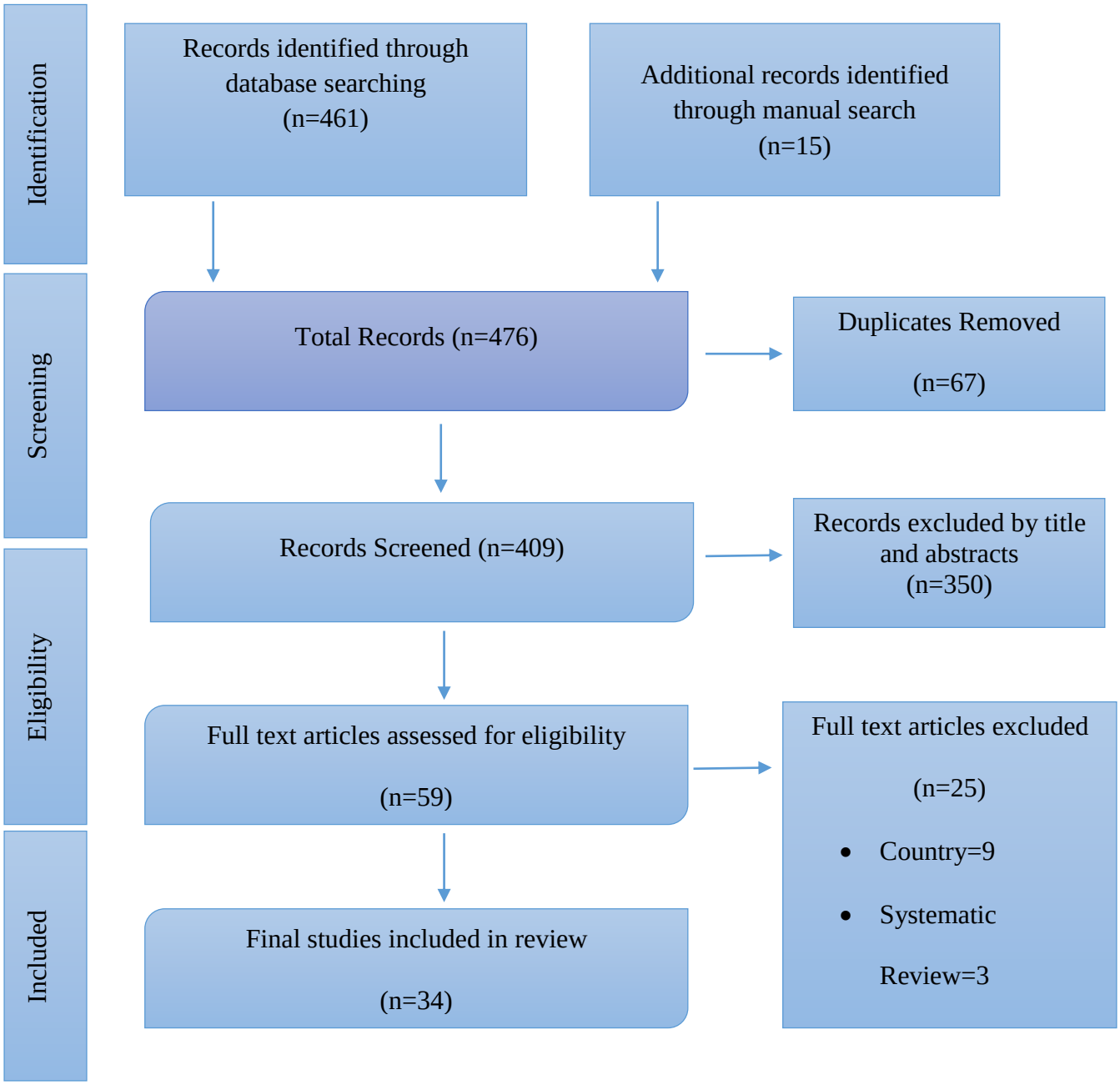
II. METHODS

A predefined protocol guided this systematic review, detailing objectives, inclusion criteria, and data extraction methods. Ethical approval and funding were not required.

We included peer-reviewed cross-sectional, longitudinal, and cohort studies published between 2014 and 2023 that examined maternal health outcomes following cesarean or vaginal deliveries in women aged 15–49 (WHO definition of reproductive age) from lower-middle-income countries (LMICs), as per the UNDP classification. Studies focused on neonate outcomes, systematic reviews, and publications from high-income countries were excluded.

A comprehensive search was conducted across PubMed, Scopus, and Web of Science, supplemented by manual reference checks. Keywords included “cesarean section,” “vaginal delivery,” “maternal morbidity,” and “postpartum hemorrhage,” in combination with country-specific filters. The search yielded 476 records—461 from databases and 15 through manual searches. After removing 67 duplicates, 409 articles were screened. Following title and abstract review by three independent reviewers, 59 studies were shortlisted. After full-text screening, 34 articles met inclusion criteria. A summary of the search process is illustrated in Fig. 1

Figure 1: PRISMA Flow Chart



The 34 included studies spanned 14 LMICs, with India contributing the most (n = 10), followed by Nepal and Nigeria (n = 4 each). Most were quantitative studies (n = 26), with varied designs including cross-sectional (n = 9), retrospective (n = 12), cohort (n = 5), and others (e.g., case studies, ethnographic, and observational research). Sample sizes ranged widely—from 3 participants in a case study to over 255,000 in a population-based cohort. Data sources included medical records (n = 20), interviews, questionnaires, proformas, and national databases.

Data extraction captured publication details, study design, sample characteristics, delivery mode, maternal morbidity and mortality outcomes, and type of analysis. Studies were grouped

into two categories: those focusing on Trial of Labor After Cesarean (TOLAC), Vaginal Birth After Cesarean (VBAC), and Uterine Rupture (UR); and those addressing broader maternal health outcomes.

A narrative synthesis was conducted to identify patterns and trends in maternal complications—such as infections, hemorrhage, eclampsia, anemia, and uterine atony—associated with cesarean and vaginal deliveries.

III. RESULTS

A: Trial of Labor After Cesarean (TOLAC) and Vaginal Birth After Cesarean (VBAC)

TOLAC and VBAC are related terms in the context of childbirth and delivery. TOLAC stands for "Trial of Labor After Cesarean." It refers to the attempt to have a vaginal delivery for a woman who has previously undergone a cesarean section (C-section) in a previous pregnancy. The term "trial" indicates that the labor process will be allowed to proceed naturally, and the medical team will closely monitor the progress to determine if a successful vaginal birth is possible.

VBAC stands for "Vaginal Birth After Cesarean." It is the successful delivery of a baby through the vaginal canal by a woman who has previously undergone one or more cesarean sections in previous pregnancies. Findings from studies were synthesized into themes and subthemes based on their reoccurrence. We discuss the main themes under TOLAC and VBAC first.

1. Success Rates and Predictive Factors

a. Success Rates of TOLAC/VBAC

Success rates for TOLAC ranged from 45% to over 80%, with higher rates observed in women younger than 35 years, with a prior vaginal birth, spontaneous labor, and favorable Bishop scores (Parveen et al.; Kabore et al.; Al-Wazzan, 2022; Siraneh et al., 2022). Short inter-delivery intervals (<18 months) were strongly associated with lower VBAC success and increased risks of scar dehiscence and emergency cesarean delivery (Mazhar et al., 2022). Maternal obesity was also identified as a risk factor for failed TOLAC and increased maternal morbidity (Hibbard et al., 2006; Xu et al., 2019). Higher BMI and short interpregnancy intervals (<18 months) were associated with increased failure and uterine rupture risk (Mazhar et al., 2022; Hibbard et al., 2006).

b. Predictive Factors of Success

Cervical dilation >4 cm, cervical effacement >50%, fetal station lower than –1, intact membranes, and birthweight <4000 g were significant predictors of successful TOLAC (Al-Wazzan, 2022). Scoring systems like the Grobman nomogram and FLAMM scale were effective in estimating individual probabilities of VBAC success (Patel et al., 2021). Inter-

pregnancy intervals of >18 months were found optimal for TOLAC outcomes (Mazhar et al., 2022). Increasing maternal age, and maternal weight were considered as discouraging factors for TOLAC *(Madaan et al. 2011; Thapsamuthdechakorn et al. 2018; Xu et al. 2019)*. The increasing BMI was directly associated with failed trial of labour after previous Caesarean delivery (15.2% versus 39.3%)and it was associated with a five–fold increased risk of uterine rupture/dehiscence, a two–fold increase in maternal morbidity *(Hibbard et al. 2006).* The only encouraging factor for successful TOLAC included favorable vaginal findings e.g. Bishop score > 4.

2. Maternal Morbidity and Safety

a. Adverse Outcomes in Failed TOLAC

The main reasons for failed TOLAC were fetal distress (49.7%) and prolonged labour (31.9%). 6.4% had scarred uteri and sustained maternal morbidity which was found to be higher among the ToL group than ERCS. Common complications of failed TOLAC included postpartum hemorrhage, uterine rupture, and scar dehiscence (Parveen et al.; Kalisa et al.; Kabore et al.). Uterine rupture was significantly higher in the TOLAC group than in ERCS, particularly among high-risk or poorly monitored patients (Kabore et al.). It remained a serious complication, especially among women with short interpregnancy intervals or multiple previous CSs (Savukyne et al., 2020; Singh & Shrivastava, 2015). However, hysterectomy rates remained low, even among women experiencing scar rupture (Parveen et al.).

b. Comparative Safety with ERCS

Studies concluded that, when performed in adequately equipped tertiary settings, VBAC carried no significantly greater risk of sepsis, transfusion, or hysterectomy compared to ERCS (Kalisa et al.; Kumari et al.; Jagannathan et al.). Maternal deaths reported in one multi-country study were attributed to lack of skilled care and referral delays, rather than TOLAC itself (Kabore et al.).

3. Institutional and Clinical Enablers

a. Role of Tertiary Facilities and Clinical Guidelines

VBAC success was linked to the availability of continuous intrapartum monitoring, emergency surgical facilities, and experienced healthcare professionals (Indirayani et al.; Jagannathan et al.; Kumari et al.). Intensive surveillance during labor, team-based practice, and 1:1 nursing support were cited as essential for safe TOLAC (Kumari et al.).

b. Process Design and Risk Stratification

Locally tailored clinical pathway tools, when implemented, improved VBAC outcomes and provider confidence. Risk stratification using standardized guidelines helped reduce unnecessary ERCS while optimizing safety for eligible candidates (Kumari et al.; Patel et al.).

4. Patient Preferences and Perceptions

a. Barriers to Acceptance

Despite clinical suitability, many women declined TOLAC due to fear of labor pain, concerns about uterine rupture, or misinformation about delivery options. For example, in one Nepalese study, 89% of eligible women opted for cesarean delivery, citing fear and lack of awareness (Khatri et al., 2020). Similar barriers were noted in studies from Ethiopia and Iran (Siraneh et al., 2022; Mirteymouri et al.).

b. Impact of Counselling and Education

Across multiple studies, antenatal counseling significantly increased VBAC acceptance and success rates (Kumari et al.; Khatri et al.; Jagannathan et al.). Counseling improved confidence and understanding of the safety profile of TOLAC, especially when coupled with continuity of care (Mirteymouri et al.; Al-Wazzan, 2022).

5. Cost and Recovery Outcomes

A cost-consequence analysis found that successful VBAC was associated with better quality-adjusted life years (QALYs) compared to ERCS, though complication rates influenced the cost-effectiveness (Ekanayake et al., 2021). Shorter hospital stays and faster recovery were generally reported for successful VBACs (Mirteymouri et al.; Jagannathan et al.), but failed VBACs were costlier than ERCS due to emergency interventions and extended hospitalization (Ekanayake et al.).

TOLAC and VBAC can be safe, effective, and cost-efficient alternatives to repeat cesarean sections in resource-constrained settings when supported by appropriate risk stratification, institutional readiness, and patient counseling. Success rates and safety outcomes are highly dependent on clinical infrastructure, maternal characteristics, and informed decision-making processes.

6. Advantages of VBAC

VBAC offered advantages beyond cost and safety. Breastfeeding rates were significantly higher in VBAC groups (95% vs. 42.9%) (Mirteymouri et al., 2020). VBAC is also the better option for mothers with multiple pregnancies. In placessuch as Iraq where there is a tendency towards large families, VBAC is advantageous to multiple ERCS which are associated with an expected rise in complications and difficulty in performing surgery. ERCS might also result in difficulties in conceiving a further child or the development of placenta praevia or accreta and increased chances of uterine rupture in future pregnancy.

7. Ensuring Safety and Increasing Uptake

Most studies found out that early intervention, counselling and presence of hospital resources and availability of expert obstetricians and nurses are a significant factor in instilling mothers with confidence to attempt TOLAC. One study even recorded a rise of 90% in mothers opting for a TOLAC after being given proper antenantal counselling

Most studies emphasized the need for strict candidate selection, early referral, and experienced medical supervision to ensure safety during TOLAC (Kalisa et al., 2017; Indirayani et al., 2023). Factors like parity 2–4, intact membranes, fetal station < -1, and fetal weight < 4000g were positively associated with success (Patel et al., 2018; Al-Wazzan, 2022).

B: Broader Comparative Maternal Outcomes

1. Cesarean vs. Vaginal Delivery Outcomes

Across studies, cesarean delivery was associated with higher maternal complications such as wound infection, surgical injury, and maternal death compared to vaginal delivery (Sharma & Dhakal, 2018).

In case of postpartum haemorrhage, caesarean section and vaginal delivery didn't show any significant difference, although the studies reviewed showed that there is a higher risk of severe PPH show that caesarean delivery is associated with a higher risk of severe PPH but it is difficult to determined.The case of prolonged labour was found to be higher among vaginal delivery. Cases of wound infection were found to be significantly higher among caesarean delivery. Surgical injury was also found to be significantly higher among caesarean delivery. Prevalence of birth trauma was also more for caesarean section.

Maternal deaths following caesarean sections in low- and middle-income countries are 100 times higher than in high-income countries. (World Health Organisation, 2019). Although cesarean delivery is usually a safe intervention, it remains an invasive surgical procedure with intrinsic adverse effects for women. Cesarean delivery is seen to be associated with a higher risk of severe acute maternal morbidity than vaginal delivery

2. Repeat Cesarean Section Risks

Compared with primary CS, multiple repeat caesarean sections (MRCS) are associated with additional risks including placenta previa, abnormal placental invasion and difficulties in surgical dissection (Biler, A. et al., 2017).
Three studies examined repeat caesarean section and its associated risks. In a study in Nepal, of 104 participants (Sharma, J et al. 2020), 73 (70.19%) of women wanted a repeat caesarean section in subsequent pregnancies instead of a trial of labour which was preferred by only 6 (5.76%) women. In contrast, in a study conducted in Nigeria (Iyoke, C. A. et al. 2014) among 435 women, 231 (53.2%) women with one previous caesarean section underwent VBAC.
This study also concluded that prenatal diagnosis of placenta praevia was 5 times more likely to occur in women with one previous caesarean compared with those without a previous

caesarean, which may be another reason to incentivise women to try for a trial of labour after cesarean section instead. In a retrospective study, the risk of injury to the bladder was seen to increase threefold in repeat caesarean section than in women who had caeserean section for the first time. (DSouza, R. J., 2018). Thus, although the agreeableness to undergoing a repeat cesarean showed no decisive trend, repeat caesarean section was found to have more maternal complications.

3. Peripartum Hysterectomy

Emergency peripartum hysterectomy (EPH) was mainly due to uterine rupture or atony. Incidence was higher in developing countries due to late referrals, lack of antenatal care, and resource constraints (Khanum, 2014; Nisar et al., 2009).

Although uterine rupture is a rare obstetric emergency in western countries, it is still alarmingly common in developed countries where it remains a major cause of maternal mortality and morbidity. It is one of the main indications for EPH in this study which coincides with results from other Pakistani studies. The majority of uterine rupture in the present study was caused by injudicious use of oxytocin, obstructed labour, late referral in case of prolonged labour, most of these patients were unbooked, multi and grand multigravida, labour in the absence of skilled birth attendant. In most cases, uterus ruptured before admission in hospital, they were in hospital and required massive blood transfusion.

4. Uterine Rupture

Risk factors for uterine rupture included maternal age >35, high parity, multiple CSs, and misuse of oxytocin (Singh & Shrivastava, 2015; Savukyne et al., 2020). Unbooked status and inadequate supervision were major contributors in LMICs.

The most significant risk factors of uterine rupture include uterine scarring and augmentation or epidural anaesthesia in patients with a uterine scar after caesarean delivery. Uterine rupture can fetal death, hysterectomy, or even maternal death due to massive bleeding. More frequent uterine ruptures have also been associated with hysteroscopy.

5. Maternal Complications After Delivery

Hypertensive disorders, infections, and PPH were leading causes of maternal morbidity and mortality in LMICs (Tukur et al., 2022). Cesarean delivery was associated with higher risks of postpartum complications compared to VBAC and vaginal delivery (Hung et al., 2016; Korb et al., 2019). In twin pregnancies, maternal complications were more frequent in cesarean deliveries than vaginal births (Jhaveri & Nadkarni, 2016; Kundariya et al., 2023).

6. Low-Resource Settings

Facility constraints—such as absence of surgical teams, blood transfusion services, and electronic monitoring—limit the safety and feasibility of TOLAC in many LMICs (Wakili et al., 2022; Kalisa et al., 2017).

Cesarean sections are often unaffordable for low-income populations. Cultural perceptions also play a role; in Senegal, for example, women prefer vaginal delivery due to fears of reproductive failure and medical interference (Adam et al.; Palencia et al.; Jhaveri & Nadkarni, 2016).

This thematic synthesis highlights the complex interplay between clinical, institutional, economic, and sociocultural factors shaping maternal health outcomes in resource-constrained settings. While VBAC can offer substantial advantages, its implementation requires context-sensitive strategies to ensure safety, equity, and informed choice.

IV. DISCUSSION

This systematic review synthesizes evidence on maternal health outcomes following cesarean section and vaginal deliveries in low-resource settings, with a particular focus on the safety and efficacy of Trial of Labor After Cesarean (TOLAC) and Vaginal Birth After Cesarean (VBAC). The findings confirm that while cesarean section is a crucial surgical intervention in obstetric care, its increasing prevalence—often without medical indication—raises concerns about maternal morbidity and healthcare burden (World Health Organization [WHO], 2019).

Consistent with earlier literature, our review finds that repeat cesarean sections are associated with increased risks of placenta previa, uterine rupture, surgical injury, and longer recovery times (Biler et al., 2017; D'Souza, 2018). Studies from this review and others have shown that VBAC, when performed under appropriate conditions, offers a safe and cost-effective alternative (Mirteymouri et al., 2020; Ekanayake et al., 2021). Increased breastfeeding rates, shorter hospital stays, and better maternal satisfaction further support VBAC as a viable choice (Hung et al., 2016; Mirteymouri et al., 2020).

However, successful VBAC depends heavily on context-specific factors such as facility preparedness, continuous monitoring, skilled birth attendance, and patient counseling. Our findings are in line with Korb et al. (2019), who highlighted that maternal morbidity post-cesarean is mediated by provider experience and institutional capacity. The studies included in our review also echo global concerns about uterine rupture in unsupervised or poorly equipped settings (Savukyne et al., 2020; Singh & Shrivastava, 2015).

Notably, the review underscores that informed decision-making, early screening, and counseling play a pivotal role in VBAC success (Patel et al., 2018; Kumari et al., 2020). This aligns with international recommendations that stress the role of patient education in reducing elective repeat cesareans (Guise et al., 2010).

The challenge, however, remains in balancing safety with the goal of reducing unnecessary cesarean sections. Low-resource settings are particularly vulnerable due to gaps in emergency

obstetric care, lack of trained personnel, and logistical barriers like delayed referrals and transport (Wakili et al., 2022; Kalisa et al., 2017). Our findings support recommendations by Adam et al. (2005) and Bhutta et al. (2010) that emphasize system-level improvements—including capacity building, emergency preparedness, and culturally sensitive patient education—to optimize maternal health outcomes.

Additionally, the sociocultural landscape cannot be ignored. Fear of labor, community beliefs, and resistance to medical interventions influence the choice of delivery mode (Jhaveri & Nadkarni, 2016). Hence, integrating sociocultural understanding with clinical practice is essential for improving VBAC acceptance and outcomes.

In summary, while cesarean sections remain essential in emergency obstetrics, they should be performed judiciously. VBAC presents a clinically and economically favorable alternative when backed by proper screening, monitoring, and institutional support. As maternal outcomes are closely tied to the quality of health systems, efforts must focus on strengthening infrastructure, enhancing training, and empowering women to make informed birth choices.

V. CONCLUSION

This review demonstrates that VBAC, under proper medical supervision and facility readiness, is a safe and effective alternative to elective repeat cesarean section in resource-constrained settings. The key to successful TOLAC lies in accurate risk assessment, individualized care planning, and consistent antenatal counseling.

Maternal complications were significantly lower in successful VBACs compared to failed TOLACs and repeat cesareans. However, adverse outcomes such as uterine rupture underscore the importance of stringent selection criteria, continuous intrapartum monitoring, and prompt access to emergency care.

Policy measures should prioritize training healthcare providers, ensuring emergency surgical capabilities, and implementing context-appropriate clinical pathways to support VBAC. Public health strategies must also include community education and culturally informed communication to address misconceptions around cesarean and vaginal deliveries.

Ultimately, the goal should be to restore cesarean section to its intended purpose—an essential, life-saving intervention—not a default delivery method. By addressing both medical and social dimensions, VBAC can become a transformative strategy for improving maternal health outcomes in low-resource settings.

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APPENDIX

Authors	Sample Size	Country of Study	Study Design	Method of Study	Reported Maternal Health Outcomes
Iyoke, C. A., Ugwu, G. O., Ezugwu, F. O. et al.	435	Nigeria	Prospective cohort study	Proforma based	Pre-eclampsia/ eclampsia, placenta praevia, blood transfusion, malaria, HIV
Savukyne, E., Bykovaite-Stankeviciene, R., Machtejeviene, E., et al.	51525	Lithuania	Retrospective single-centre study	Medical Records	Uterine rupture, uterine scar, blood transfusion, hysterecytomy
Singh A., Shrivastava C.	40	India	Prospective cross-sectional study	Medical records	Bladder injury, eclampsia, uterine rupture, blood transfusion.
Parveen, S., Rengaraj, S., & Chaturvedula, L.	1324	India	Retrospective cohort study	Self-administered questionnaire	Uterine rupture, uterine scar dehiscence, bladder injury
Kalisa R., Rulisa S., van Roosmalen J. et al.	4131	Rwanda	Retrospective cohort study	Medical records	Gestational diabetes, hypertension, scarred uterus, puerperal sepsis, postpartum hemorrhage, uterine rupture, hysterectomy
Kabore, C., Chaillet, N., Kouanda, S. et al.	9712	Senegal	Prospective cohort study	Medical records	Uterine rupture, maternal death, pre-eclampsia/ eclampsia, postpartum haemorrhage, postpartum infection,
Patel M.D., Maitra N., Patel P.K., Sheth T., Vaishnav P.	280	India	Prospective cohort study	Medical records	Scar dehiscence, uterine rupture, blood transfusion
Indirayani I., Nora H., Rusnaidi et al.	3	Indonesia	Case study	Patient Interviews	Uterine rupture
Wakili A.A., Aswat A., Timms R. et al.	38	Nigeria	Cross-sectional study	Questionnaire based	Postpartum haemorrhage, blood transfusion, aneamia

Opiyo, N., Bellizzi, S., Torloni, M. R. et al.	255227	26 LMICs	Cross-sectional study	Patient Interviews	Delay in breastfeeding, PLCS
Mooij, R., Mwampagatwa, I. H., van Dillen, J. et al.	2200	Tanzania	Retrospective cross-sectional study	Medical records	Adhesion, maternal morbidity
Quagliariello, C.	50	Senegal	Multi-sited ethnographic research	Participant observation & Interview	Anxiety, premature rupture, postpartum bleeding
Högberg, U., Claeson, C., Krebs, L. et al.	1655	Tanzania	Cross-sectional study	Participant observation & Interview	Haemorrhage, blood transfusion, hysterectomy, hypertension
Jagannathan S.P., Sunil H.M., Nalligounder P.	211	India	Cohort study	Patient Interviews	Uterine Rupture, postoperative infrection, scar hehiscence
Khatri R.A., Chand A., Thapa M. et al.	85	Nepal	Descriptive cross sectional Study	Patient Interview	Wound infection, PPH, Scar tenderness with deiscence
Kumari N., Jain N., Dhar R.S.G.	467	India	A pre- and post-implementation study	Medical Records	PPH, Third fourth degree perineal tear, Bladder injury, Scar dehiscence, Unterine rupture
Mazhar T., Ambareen A., Jabeen S.	120	Pakistan	Retrospective study	Observational	Scar Tenderness & Maternal Tachycardia, Fetal Distress, Failed Labour Progress, Vaginal Bleeding, Prolonged, Latent Phase,Failed Induction
Mirteymouri M., Ayati S., Pourali L. et al.	80	Iran	Cross-sectional study	Medical Records	Post-partum hemorrhage, Successful Breast feeding
Al-Wazzan, R. M.	23257	Iraq	Case study	Participant observation & Interview	Hypertensive disorder with pregnancy, Diabetes mellitus
Siraneh Y., Assefa F., & Tesfaye M.	169	South Ethiopia	Retrospective cross-sectional study	Medical Records	PPH Infection

Gupta N., De A., & Batra S.	111	India	Medical Records	Medical Records	Fever, UTI, gaped episiotomy, wound infection, scar dehiscence
Ekanayake C.D., Thangasamy S., Pathmeswaran A. et al.	225	Sri Lanka	Retrospective Observational Study	Medical Records	PPH, Postpartum fever, Wound infection, 3rd degree tear
Khanum, F., Sadaf, R., & Zahid, M.	51	Pakistan	Retrospective descriptive study	Medical records	Ruptured uterus, uterine atony, renal failure, febrile illness, wound infection, maternal mortality, placental abruption
Kundariya, K. R., Shah, J. M., Mewada, B. N. et al.	142	India	Retrospective observational study	Medical Records	Preterm, anemia, PIH, APH, PPH, GDM, polyhydramnios, oligohydramnios, eclampsia
Tiruneh, B., Fooladi, E., McLelland, G. et al.	1060	Northwest Ethiopia	Retrospective cohort study	Medical Records	Postpartum hemorrhage
Moodley, J., Pattinson, R. C., Fawcus, S. et al.	NA	South Africa	Review Study	Fourth triennial Saving mothers report for 2005-07	Uterine atony, uterine trauma, placental site bleeding
DSouza, R. J., Narayani, B. H., & Rao, S. B.	143	India	Retrospective study	Medical records	Placenta previa, chronic abdominal pain, scar tenderness, GDM, PIH, UTI, Fibroid uterus
Jhaveri, R. R., & Nadkarni, T. K.	93	India	Observational study	Hospital birth records	Maternal complication seen to be high in women undergone C-section with twins
Sharma, J., Tiwari, S., Padhye, S. M. et al.	104	Nepal	Descriptive cross-sectional study	Medical Records	Cephalocervic disproportion, Fetal distress, Prelabour rupture of membrane, malpresentation, antepartum hemorrhage

Tukur, J., Lavin, T., Adanikin, A. et al.	76,563	Nigeria	Cross-sectional study	Medical records	Hypertensive disorders of pregnancy, pregnancy related infections, postpartum hemorrhage, eclampsia, puerperal sepsis
Lilungulu, A., Matovelo, D., Kihunrwa, A., & Gumodoka, B.	450	Tanzania	Cohort study	Questionnaire	Anemia, failure of trial of scar, postpartum hemorrhage,premature rupture of membranes
Véronique Filippi, Rasmané Ganaba, Clara Calvert, et al	1014	Burkina Faso	Cohort study	Medical Records	Depression, hypertension, anemia, haemorrhage, dystocia, infection
Sharma, S., & Dhakal, I	550	Nepal	Descriptive Cross Sectional Study	Pretested Proforma and interview	PPH, Prolonged labor, Wound infection, Vaginal tear, Mal presentation, surgical injury, and maternal death
Lafon, J. Y., Buga, E. C., & Nethathe, G. D.	54	South Africa	Retrospective Review	Medical Records	Maternal Sepsis