Supplementary appendix Table: CERQual Summary of evidence profile

Review finding	Studies contributing to review finding	Methodological Limitations	Coherence	Adequacy	Relevance	CERQual Assessment	Explanation of confidence in the evidence assessment
Beliefs about birth: Across HIC and MICs health professionals reported varying beliefs about birth. These included a common approach to birth shared by obstetricians and midwives who valued the physiological process and worked effectively as a team to make it happen (recognising it as an empowering process for women and only intervening when medically necessary), to labour and vaginal birth as a fatally flawed physiological process with CS the preferable means to an end. This dichotomy of beliefs reflected competing ideologies of birth and shaped the importance individuals attached to CS rate reduction. In MIC, while some obstetricians who preferred CS made reference to perinatal mortality and morbidity gains, this was not the experience of the few female, Chinese obstetricians who actually had CDMR, nor the preference of Iranian obstetricians who expressed concerns about having to deal with co-morbidities caused by previous CSs. Beliefs were influenced by professional training, personal experience, and practice setting.	1,3,5-12,14-16	Minor concerns regarding methodological limitations in 8 studies and moderate to significant concerns in 5 of 13 studies predominantly from MICs.	Minor concerns about coherence, with higher confidence in HIC and MIC, with no data reported to support this review finding in LICs.	Minor concerns regarding adequacy with rich data from Iran, China, Nicaragua, USA, Canada, Finland, Sweden, The Netherlands, Germany, Italy, Ireland, Australia and UK.	Moderate concerns regarding relevance with 7 studies from HIC, 6 MIC, and none from LIC contributing to this review finding.	Moderate confidence	13 studies with minor to significant methodological limitations. Rich data from 14 countries across 4 geographical regions, high- and middle- income levels, and high and low CS rates. Reasonable level of coherence with uncertain confidence in low-income countries.
Beliefs about what constitutes necessary and unnecessary CS: Some health professionals reported CS rates as determined by factors beyond their control (i.e. uncertain obstetric history, unfolding obstetric circumstance and clinical indications), but between health professionals there was no clear consensus as to what they believed to be clinical indications across time (i.e. breech), place (i.e. availability and access) and parity (i.e. women with a previous CS). Some senior doctors and midwives expressed concerns that less experienced staff are more likely to perform CS based on vague indications and spoke favourably about wanting junior staff to consult them more for a second opinion. Other senior staff suggested second opinion policies only work where both doctors are in attendance at the hospital. While some residents also reported wanting improved communication, they feared seeking a second opinion would negatively impact their clinical credibility and career.	1-2, 4-5,13,17	Minor concerns regarding methodological limitations in 4 studies and moderate concerns in 2 of 6 studies from across resource settings.	Major concerns about coherence with contradictions in available data. It is unclear as to what extent this is because the nature and extent of life-threatening clinical indications actually differs.	Major concerns regarding adequacy with limited, thin data from different resource settings.	Minor concerns regarding relevance with 3 studies from HIC, 1 MIC and 2 LICs.	Low confidence	6 studies with minor to moderate methodological limitations. Thin data, with major concerns about coherence across settings.
Beliefs about the evidence-base surrounding caesarean section: Health professionals' views about research evidence varied. Most health professionals recognised that guidelines represent the national or international evidence-base, which sensitised them to reflect on their practice, providing a potential mechanism for change. Most health professionals wanted more evidence of transferability to their own practice context, particularly in MIC and LIC contexts, where audit was not common. Not all health professionals believed available evidence to be valid, applicable to their practice, or feasible to implement, and spoke about keeping-up-to-date with the latest evidence as challenging. Across resource settings obstetricians and midwives expressed concerns about evidence of risks associated with CS as incomplete. Some health professionals who valued guidelines were also	1-2, 4-5, 9-11, 14-15, 17	Minor concerns regarding methodological limitations in 6 studies and moderate concerns in 4 studies.	Minor concerns about coherence with clear patterns identified across studies. Less confidence in LICs.	Moderate concerns regarding adequacy with thick data from HICs and MICs, but very thin, limited data from LICs.	Moderate concerns regarding relevance with 6 studies from HIC, 3 from MIC, and only one 1 study from LICs contributing to this review finding.	Moderate confidence	10 studies with minor to moderate methodological limitations. Rich data from across 3 geographical regions but limited data from LICs. High coherence across HICs and MICs. Uncertain confidence in LICs.

very clear they took other factors into account in actual decision-making (i.e. interpersonal relationships, patient's unique characteristics).							
Fear of blame and recrimination (including medico-legal concerns): Across HIC, MIC and LICs health professionals reported fear of litigation as an important influence on their low threshold for performing CS (although no-one had actual experience of litigation in LIC). Predominantly in North America health professionals described medico-legal concerns as an underlying factor in non-compliance to guideline recommendations. Across urban and rural settings with or without 24-hour obstetrical and anaesthesia coverage, obstetricians and midwives weighed up the balance of professional identity risk with not intervening, a poor outcome ensuing and a medico-legal case against them. Also in North America some obstetricians were opposed to second-opinion policies because of the difficulties in medico-legal responsibilities that could ensue. In North America, some European countries and Africa, midwives and obstetricians expressed concerns about threats to their professional identity and career prospects posed by internal audit and feedback. A few health professionals welcomed guidelines as providing a defendable basis for their practice, while other midwives and obstetricians were undeterred in their commitment to intervene only when necessary.	1-2, 5-7, 11,13,15	No concerns regarding methodological limitations in 6 studies and minor to moderate concerns in 2 studies.	Moderate concerns about coherence as fear of blame is a cogent finding across studies but the influence of actual experience of litigation on preference for CS is unclear in MICs and HICs, and no actual experience in LIC.	Moderate concerns regarding adequacy with fairly thick data from USA, UK, Iran, Nicaragua, and Tanzania.	Moderate concerns regarding relevance with 8 studies from HIC (4), MIC (3), and LIC (1) contributing to this review finding.	Moderate confidence	8 studies, with no to moderate methodological limitations. Rich data from 5 countries. Moderate coherence.
Value attached to financial rewards associated with CS: Some health professionals were outspoken about the economic incentives for CSs, particularly in private healthcare facilities. This included doctors in Tanzania, Iran, China and Nicaragua, as well as midwives in Iran and the USA. Some doctors considered CS to involve more work, which justified the payment; others blamed the system, while others still reported personally valuing this extra income. Some doctors, and midwives, were critical of insufficient monetary reward to staff labour and vaginal birth by comparison.	2,5-7,10-11, 13,17	Minor concerns regarding methodological limitations in 5 studies and moderate concerns in 3 studies.	No or very minor concerns regarding coherence. Data similar within and across countries, setting, and resource context.	Moderate concerns regarding adequacy with adequate data from 5 countries and thick data from 2 countries, both MIC.	Minor concerns regarding relevance with 8 studies from 3 HICs, 4 MICs and 1 LIC.	Moderate confidence	8 studies with minor to moderate methodological limitations. Rich data predominantly from middle-income countries. High coherence.
Preferences for CS as convenient: Health professionals valued both the scheduling CS offers and the lesser time commitment it entails compared with labour and vaginal birth. Some health professionals described how CS was convenience for women too (for the same reasons), although others recognised while CS might be more convenient for them, it is not what every woman wants.	5-6, 8-11, 13	Minor concerns regarding methodological limitations in 4 studies and moderate concerns in 3 studies.	Minor concerns regarding coherence with data similar within and across countries, setting, and resource context.	Moderate concerns regarding adequacy with adequate data from 5 studies and rich data from 2 studies.	Moderate concerns regarding relevance with 2 studies from HICs, 4 from MICs and 1 from a LIC.	Moderate confidence	7 studies with minor to moderate methodological limitations. Fairly rich data from 2 studies and convenience a theme in a third. High coherence.
Beliefs about women: Across the world, health professionals reported women's demand for a particular birth method as an important factor influencing rates of CS, NVD and VBAC. Some health professionals believed women now value CS as a consumer choice (available in public and private healthcare settings), others attributed increasing rates to women's lower threshold for CS during labour. In HIC, MICs and one LIC (Tanzania), a few health professionals spoke about women's innate ability to labour and birth as being diminished by rising BMIs, advanced maternal age, sedentary lifestyles and "western diseases". Health professionals also perceived women as lacking in antenatal education, being influenced by their	1-2,4-11,13-17	Minor concerns regarding methodological limitations in 9 studies and moderate concerns in 6 studies.	Minor concerns regarding coherence with data similar within and across countries, setting, and resource context.	Minor concerns regarding adequacy with thick data, from studies across 5 world regions, HIC, MIC and LIC resource settings.	Minor concerns regarding relevance with studies of health professionals from HICs, MICs and LICs, with a range of CS rates.	High confidence	15 studies with no to moderate methodological limitations. Thick data from 15 countries, across 5 world regions, high-, middle- and low-income settings with high CSRs. High coherence.

families, and the plethora of information about birth available in the media and on-line.							
Beliefs about need for high-level infrastructures: Health professionals in HICs who were supportive of VBAC were flexible in their interpretation of guidelines and used them and available technologies in a facilitative way. Other health professionals, predominantly from MICs and LICs, but some from HICs, expressed concerns that a lack of human and technological resource made guideline recommendations unworkable in practice. In HICs where 24-hour obstetrical and anaesthesia cover was available, some health professionals reported women were still refused a trial of labour.	1-2,4-6,9-17	No or minor concerns regarding methodological limitations in 10 studies and moderate concerns in 4 of 14 studies.	Moderate concerns regarding coherence. Variations in the data apparent within and between resource settings.	Moderate concerns regarding adequacy. Data from 5 world regions, including 17 countries, with thick data from 10 studies in HICs and MICs. Thin data from LICs.	Minor concerns regarding relevance. (No studies from China contributed to the finding but population policy 1979-2016 means not relevant)	Moderate confidence	14 studies with no to moderate methodological limitations. Thick data from HICs and MICs. The finding may have higher confidence in settings where the level of resource is sufficient to sustain necessary CS.
Beliefs about the clinical encounter and autonomous decision-making: Obstetricians and midwives views varied as to who they thought should have the final say in the decision to perform a CS. Some health professionals accepted a woman's right to choose CS, many thought the decision should be shared, while others believed the decision could only be made by health professionals qualified to do so. Some health professionals expressed concern time constraints in practice limited their opportunities to facilitate informed decision-making. Where teams had a shared approach they reported informed decision-making did happen and irrespective of who made the final decision everyone involved was reassured by the process.	1-3,5-9,11-14,16-17	No or minor concerns regarding methodological limitations in 9 studies and moderate to significant concerns in 5 of 14 studies.	Minor concerns regarding coherence.	Moderate concerns regarding adequacy. Thick data from 5 world regions, across 8 HICs, 5 MICs and one LIC.	Moderate concerns regarding relevance with only one study from a LIC (Tanzania).	Moderate confidence	14 studies with no to significant methodological limitations. Thick data from HICs, MICs and one LIC. High coherence.
Organisation of care: Across the world, health professionals perceived the maternity care system as insufficiently resourced (human and material). Midwives and Obstetricians reported where CS was an important source of revenue operating facilities were a priority, and facilities for labouring women were poor and inadequately staffed.	2,4-6,9,11-13,15,17	No or minor concerns regarding methodological limitations in 7 studies and moderate concerns in 3 of 10 studies.	Minor concerns regarding coherence.	Moderate concerns regarding adequacy. Thin data from 4 world regions, across predominantly HICs.	Moderate concerns regarding relevance.	Moderate confidence	10 studies with no to moderate methodological limitations. Thin data from 13 countries, and thick data from Iran. High coherence.
Belief in need to reduce unnecessary CS and receptiveness to change: Across resource settings health professionals reported concerns about high CS rates and associated morbidity. In Iran and Tanzania some health professionals spoke about colleagues who performed CS for non-medical reasons as contravening medicines underlying ethical principle to do no harm. In European settings, health professionals experienced interventions targeted to reduce unnecessary CS as most acceptable where this vision was shared within and between multi-disciplinary groups. In the UK and Scandinavia, health professionals from organisations that achieved success in reducing rates had positive attitudes towards critical self-reflection (including audit, second opinion and continuing medical education) and felt supported by colleagues and opinion leaders. Across resource settings health professionals acknowledged concerted action to reduce unnecessary CS as	1-2,5-6,9,11-14	No or minor concerns regarding methodological limitations in 7 studies and moderate concerns in 2 of 9 studies.	Minor concerns regarding coherence with similar data across studies.	Moderate concerns regarding adequacy. Thick data from 3 world regions, and thin data from African region (1 study).	Moderate concerns regarding relevance with no included studies from China.	Moderate confidence	9 studies with no to moderate methodological limitations. Thick data from Europe. Only one study from African region contributed to this finding. High coherence.

challenging, but achievable and intrinsically rewarding where there was respect, accountability, and shared responsibility to support women achieve a vaginal birth.							
Views about the format, content and delivery of interventions: A few health professionals spoke about the importance of the tone of guidance as facilitative of reflection, not dictatorial, judgemental or threatening, at the same time as being clear about the need for change by avoiding the use of words such as 'should', 'developmental' or 'pilot.' Some health professionals described how important it was for local opinion leaders to endorse projects, and where external facilitators were involved they are 'credible' and 'grounded', exercised cultural humility, and understand the challenges within specific practice settings. In some HICs, health professionals talked about multi-disciplinary /inter-professional team involvement meaning representatives from medicine (obstetrics, anaesthesia, paediatrics), nursing and midwifery, allied health professionals, quality, health records, and scheduling in secondary care.	2,5,9,11-13	No or minor concerns regarding methodological limitations in 4 studies and moderate to significant concerns in 2 studies of 6 total studies	Moderate concerns about coherence with similarities and contradictions in available data.	Major concerns regarding adequacy with thick data from one UK study. Data from 4 regions and across resource settings is thin.	Minor concerns regarding relevance with 3 studies from HICs, 2 MICs and 1 LIC.	Low confidence	6 studies with minor to significant methodological limitations. Thick data from one study. Extent of coherence unclear.
Reluctance to change based on lack of training, skills or experience: Some health professionals spoke about how pre-and post-registration training has ill-equipped the next generation for a reduction in CS rates as they have little experience, competency or confidence in normal labour and vaginal birth. Others reported wanting specific training on recommendations to make them more acceptable in practice. Reasons for many health professionals lack of buy-in was multifactorial - see also Organisation of care; Beliefs about need for complex infrastructure; and Beliefs about the clinical encounter and autonomous decision-making.	2,4-5,7,9,11,15-17	No or minor concerns regarding methodological limitations in 5 studies and moderate concerns in 4 studies of 9 total studies.	Moderate concerns regarding coherence with similar, but thin data across studies, and overlap with other emergent themes.	Major concerns regarding adequacy with thick data from one Iranian study. Data from 5 regions and across resource settings is thin.	Minor concerns regarding relevance with 5 studies from HICs, 3 MICs and 1 LIC.	Low confidence	9 studies with minor to significant methodological limitations. Thick data from one study. Extent of coherence unclear.
Dysfunctional teamwork, within the medical profession and including the marginalization of midwives: Health professionals reported dysfunctional teamwork within and between professionals as an important barrier to reducing unnecessary CS rates. Medicine's entrenched hierarchies, lack of communication between maternity and theatre staff, and difficult relationships between obstetricians, midwives and family doctors were all spoken about. Some midwives and obstetricians spoke passionately about the marginalization of midwives and their exclusion from birth as counterproductive.	2,4-6,9-13, 15,17	No or minor concerns regarding methodological limitations in 7 studies and moderate concerns in 4 studies of 11 total studies.	Minor concerns regarding coherence with similar data across studies.	Moderate concerns regarding adequacy with thin data from 8 studies and rich data from 3 studies across resource settings (UK, Iran and Tanzania).	Minor concerns regarding relevance with 6 studies from HICs, 3 MICs and 2 LIC.	Moderate confidence	11 studies with minor to moderate methodological limitations. Thick data from across resource settings. High coherence.

References

1. Kamal P, Dixon-Woods M, Kurinczuk JJ, Oppenheimer C, Squire P, Waugh J. Factors influencing repeat caesarean section: qualitative exploratory study of obstetricians' and midwives' accounts. BJOG, 2005, 112: 1054-1060.
2. Chaillet N, Dube E, Dugas M, Francoeur D, Dube J, Gagon S, Poitras, Dumont A. Identifying barriers and facilitators towards implementing guidelines to reduce caesarean section rates in Quebec. Bulletin of the World Health Organization.2007 85;10:791-797.
3. Chen Y, Lu W, Zhang YF. Informed choice and autonomy of decision making on caesarean section in China. Maternal and Child Health Care of China 2008; 23: 89-92. (Chinese).
4. Wanyonyi SZ, Mukaindo AM, Stones W. Perspectives on the practice of vaginal birth after caesarean section in East Africa. East African Medical Journal. 2010, 87 (8): 335-339.
5. Yazdizadeh B, Nedjat S, Mohammad K, Rashidian A, Changizi N, Majdzadeh R. Cesarean section rate in Iran, multidimensional approaches for behavioral change of providers: a qualitative study. BMC Health Services Research 2011, 11:159.
6. Cox KJ. Providers' perspectives on the vaginal birth after cesarean guidelines in Florida, United States: a qualitative study. BMC Pregnancy and Childbirth 2011, 11:72.
7. Liu L, Tao FB, Huang K. Qualitative study on affecting factors of continuing increasing in caesarean section rate in rural area. Modern Preventive Medicine 2010 37(20):3865-9. (Chinese).
8. Wang N, Ding Y. Reasons for obstetric medial staff choosing cesarean section for themselves in the absence of medical indications: a qualitative study. Journal of Nursing Science 2013; 28(6): 39-41. (Chinese).
9. Dunn S, Sprague AE, Fell DB, Dy J, Harrold JA, Lamontagne B, Walker M. The Use of a Quality Indicator to Reduce Elective Repeat Caesarean Section for Low-Risk Women Before 39 Weeks' Gestation: The Eastern Ontario Experience. J Obstet Gynaecol Can 2013;35(4):306–316.
10. Lotfi R, Tehrani FR, Dovom MR, Torkestani F, Abedini M, Sajedinejad S. Development of strategies to reduce cesarean delivery rates in Iran 2012-2014: a mixed methods study. Int J Prev Med 2014, 5 (12):1552-1556.
11. Colomar M, Cafferata ML, Aleman A, Castellano G, Elorrio EG, Althabe F, Engelbrecht S. Mode of Childbirth in Low-Risk Pregnancies: Nicaraguan Physicians' Viewpoints. Matern Child Health J. 2014, 18:2382–2392.
12. Marshall JL, Spilby H, McCormick F. Evaluating the 'Focus on Normal Birth and Reducing Caesarean section Rates Rapid Improvement Programme': A mixed method study in England. Midwifery. 2015, 31: 332–340.
13. Litorp H, Mgaya A, Mbekenga CK, Kidanto HL, Johnsdotter S, Essen B. Fear, blame and transparency: obstetric caregivers' rationale for high caesarean section rates in low-resource setting. Soc Sci Med. 2015. 143:232-240.
14. Lundgren I, Limbeek E, Vehvilainen-Julkunen, Nilsson C. Clinicians' views of factors of importance for improving the rate of VBAC (vaginal birth after caesarean section): a qualitative study from countries with high VBAC rates. BMC Pregnancy and Childbirth. 2015,15:196.
15. Lungren I, Healy P, Carroll M, Begley C, Matterne A, Gross MM, Grylka-Baeschlin S, Nicoletti J, Morano S, Nilsson, Lalor J. Clinicians' views of factors of importance for improving the rate of VBAC (vaginal birth after caesarean section): a study from countries with low VBAC rates. BMC Pregnancy and childbirth. 2016, 16:350.
16. Foureur M, Turkmani S, Clack DS, Davis DL, Mollart L, Leiser B, Homer CSE. Caring for women wanting a vaginal birth after previous caesarean section: A qualitative study of the experiences of midwives and obstetricians. Women and Birth 2017, 30:3-8.
17. Melman S, Schreurs RHP, Dirksen CD, Kwee A, Nijhuis JG, Smeets NAC, Scheepers HCJ, Hermens RPMG. Identification of barriers and facilitators for optimal cesarean section care: perspective of professionals. BMC Pregnancy and Childbirth. 2017, 17:230.