Materno-fetal and neonatal outcomes associated with caesarean section delivery in private and public hospitals in low- and middle-income countries: a systematic review

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Abstract

Background: Advancement in medicine has improved birth assistance. As a result, caesarean section delivery (CSD) has become the most commonly performed surgical procedure. The exponential growth has now skewed toward low- and middle-income countries (LMICs) despite the well-established morbimortality risk and extra costs associated to this procedure. The expansion of private healthcare sector may be playing a significant role. The objective of this review synthesizes knowledge and investigates the difference in materno-fetal and neonatal outcomes of CSD in the perinatal period, between private and public hospitals.

Methods: Medline, Embase, Cinhal, Cochrane Database, LILACS, and HINARI were screened for peer-reviewed published studies in English and French, from 1990 to 2019, in human subjects and supplemented by manual searches. The studies included were prospective and retrospective cohort studies, cross-sectional and Delphi studies comparing perinatal outcomes of women whose neonates were delivered by caesarean section and by vaginal delivery in public and private hospitals. In total, the searches yielded 7,762 studies, assessed independently by two assessors. Of these, 26 quantitative studies were included which risk of bias was considered fairly low.

Results: Elective or not, CSD is associated with a variety of outcomes, including death for both the mother and the neonate. Low quality of life, postpartum depression, infections, and scars were burdens attributable to CSD in both sectors. CSD is associated with less urinary incontinence compared to vaginal delivery but no difference exists in early skin-to-skin contact or in early breastfeeding introduction. Finally, across continents, Africa leads in terms of adverse consequences.

Discussion/Conclusion: Private facilities surpassed public ones in CSD rate but were associated with the least severe materno-neonatal outcomes. Countries like China are succeeding through robust policies interventions formulation to contain the CSD epidemic and the health issues associated thereto.

Background

Caesarean (from *caesare* in Latin, meaning “to cut”) as a delivery method was first documented in 1020 [1]. Since this time, unprecedented improvement has been made, including procedures and incision techniques as well as the discovery of antibiotics, which has definitely increased its safety [2]. This leaves more room for the medicalization of childbirth, putting an end to the then common traditional delivery procedures [3]. Undoubtedly, medically justified CSD (or elective CSD) has been associated with tremendous benefits [4], including the prevention of maternal and perinatal morbidity and mortality [5]. However, as a major surgical procedure, CSD is not risk-free, despite the vigilance of professional and scholarly societies in developing guidelines to maximize its safety [6].

A wealth of studies has reported some morbimortality events associated with CSD. In that line, Gilliam [7] laid out uterine rupture. According to other authors, it may result in major short – or long-term health issues, including greater IgE-mediated sensitization [8], a higher risk of developing asthma [9], neonatal lung disease [10], rhinitis or an atopic allergy [11], an increased risk of childhood-onset type 1 diabetes [12], chronic immune disorders [13], celiac disease [14], and modification of the endocrine-immune system in the newborn [15,16]. The very recent landmark systematic review of Keag et al. [17] portrayed long-term risks for the mother-infant dyad.

Apart from CSD rates being higher in private hospitals, a differential in materno-fetal and materno-infant outcomes was found between private versus public hospitals [18,19]. Some associate this difference to hospital culture [20] or routine [21] even though it does not fit the guideline [6]. Other literature pointed out the supplier-induced demand for profit maximization [22,23], which is likely to be more prevalent in the private health sector. Additionally, the public perception that a CSD is now a nearly risk-free procedure facilitates the request of elective CSD in the absence of clinical indications [2,22,24,25].

To date, CSD prevalence contrasts with the recommendations of the World Health Organization (WHO) of between 10% and 15% (WHO, 1985) as the “ideal” rate, suggested since 1985. The mounting trend was first noticed in high-income countries (HICs) [26,27]. Today, however, regardless of the continent, LMICs have surpassed their high-income counterparts with respect to rates of recorded CSD. For instance, statistics show rates of 43.4% in Colombia, 56.4% in Dominican Republic, 51.8% in Egypt, 47.9% in Iran [28,29], 64.1% in urban China [30], and 55.6% in Brazil, where second deliveries by CSD verge on 80% when the first was by CSD and over 99% for third births, when the first two were by CSD [28,31].

A wealth of reviews has addressed the subject of CSD from various angles. However, despite the topicality of the challenge, the subsequent materno-fetal and materno-infant outcomes of the procedure from the perspective of hospital ownership (public versus private) still remain unclear. Thus, a systematic review may be necessary to gather and assess current global evidence on materno-fetal and materno-infant outcomes associated with CSD in public and private hospitals in LMICs. This may be particularly imperative giving the expansion of the private healthcare sector in LMICs in the last two decades. Additionally, such a review could generate information for researchers and policymakers alike allowing for evidence-based decision-making. To do so, this review aims to investigate the difference in materno-fetal and neonatal outcomes of CSD in the perinatal period, between private and public hospitals. The review focuses on LMICs with more or less comparable healthcare systems.

Methods

This review is shaped from the published protocol [32], which was registered within the International Prospective Register of Systematic Reviews (PROSPERO 2016: CRD42016036871).The Cochrane Handbook for Systematic Reviews of Interventions [33] was used as a foundation to carry out this systematic review.

Types of Studies Included and Inclusion Criteria

This review included quantitative studies as well as qualitative and mixed-method studies. Searches included experimental study design, namely Randomized control trials (RCTs), non-RCTs, before – and-after quasi-experimental and interrupted time series designs. Non-RCT studies included case-control, cohort and cross-sectional studies dealing with CSD. We selected studies that include medically-prescribed planned and unplanned CSDs performed in accredited public or private healthcare settings, as well as elective CSDs. In addition, primiparous as well as multiparous, twin, and breech births were also included. However, we excluded: 1) utilization of experimental CSDs, 2) stillbirth CSDs, 3) outreach mass surgery, and 4) long-term perinatal outcomes. Countries are listed as LMICs based on the World Bank 2016 country classification [34].

Search Strategy

The present systematic review adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Statement [35]. A concept plan was built and adapted to keywords and descriptors of the six targeted databases. Using a three-step strategy, we first conducted an exploratory search in Ovid-Medline, testing the strategy (descriptors and vocabulary). Second, the strategy was adjusted to each database included. The search strategy was validated by an information specialist (M-C L). Finally, the principal investigator (PI) (IB) performed an extensive and exhaustive search in Ovid-Medline®, CINHAL, Cochrane Database, and Embase. LILACS and HINARI, focusing on low– and middle-income countries, were further screened in December 2018. Grey literature was further examined, including both published and unpublished studies. Finally, additional references were tracked from citations within the pertinent studies. The full search strategy for each database is provided in *supplementary 1.* Just before the publication draft was issued, IB ran an updated literature search in August 2019. The review considered January 1, 1990, as the starting point to coincide with the adoption of WHO's 1985 recommendation [36], leaving a 5-year period as a time lag for countries to implement it. The publication language was restricted to English and French, and all the records imported in the Rayyan reference screening system [37]. IB and AD, independently conducted the initial stream of screening of all titles and abstracts captured to determine eligibility. Using an agreed-upon extraction grid, IB, AD and TM extracted data that was populated in a customized spreadsheet in Microsoft Excel 2010.

Quality Assessment

We detected bias and graded the quality of studies by employing the Cochrane Risk-of-Bias (ROB) tool for the assessment of possible methodological bias [33]. In order to ensure a consistent overview, cross-sectional studies were assessed with the same tool. IB and AD independently rated the quality of each study as either "low", "unclear", or "high" risk of bias, throughout the six domains of the ROB tool (*Fig. 3)*..

Types of Comparisons

In the review, we compared the materno-fetal and materno-infant outcomes of CSD in the perinatal period between private and public facilities. For the purpose of this review, private providers were defined as "all organizations and individuals working outside the direct control of the state" [38]. They consist of for-profit (FP) and not-for-profit (NFP) providers; the former are defined as benefit-focused and the latter include philanthropic medical institutions. Institutional stewardship is further considered to complete the definition of the private healthcare sector, because in LMICs, services delivered in the private sector may be publicly financed – in the case of NFP providers [39]. Further, a comparison between continents was conducted.

Outcome Measurement

Based on the targeted outcomes (materno-fetal and materno-infant), the review looks at the key characteristics that may determine the CSD outcomes: (1) the what (i.e. ownership, financing system, payment scheme, and the management system), the where (2) (country and continent), and (2) the who (i.e. practitioner characteristics). The primary outcomes of interest consisted of perinatal materno-fetal and materno-infant medical outcomes: (1) mortality, (2) morbidity, and (3) observed complications. The secondary outcomes of interest included (1) participants' location; (2) the type of CSD; and (3) other outcomes: birth goal attainment, quality of life, self-efficacy, and social functioning.

Data Analysis and Synthesis

As expected, no RCT design was met. Furthermore, the interventions in the review were too heterogeneous to pool quantitative data for a meta-analysis. Therefore, we performed a descriptive synthesis, in a narrative form [40].

Results

Search Results

Figure 1 exhibits the study selection process using the PRISMA flow diagram. The initial search in August 2018 led to a total of 7,762 potentially relevant citations. Following further screenings, 54 plain texts were reviewed – three from hand-search [41–43] – of which 26 articles were ultimately included in the review (Table 1). In terms of ownership, 14 included both public and private health facilities, 11 run in public facilities only, and one run in a private facility only (Fig 2). Of these reviewed articles, there were seven from Africa [42–48], seven from Asia [49–55], and 10 from Latin America [4,41,56–63], as well as two cross-continental papers [64,65]. The study contexts were both the private and public sectors (Fig 1). No further study was included upon the up-to-date search in July 2019.

Description and Quality of Evidence Reviewed

Summary descriptions of the articles selected are presented in Table 2. Of the 26 studies selected, approximately 31% (n = 8) and 38.5% (n = 10) have a prospective or retrospective cohort design with a random component. Additionally, one study had a panel design and seven (27%) were cross-sectionally designed. When evaluating the quality of the selected studies, we noticed an important variation in the participants sampled. There was a minimum of 109 participants [63] and a maximum of 610,630 participants [59] for single studies, and 83,439 [48] versus 137,094 participants [46] for multi-continental studies. The multi-country participants were however equal: 277,736 [64] versus 286,565 [65].

Narrative Synthesis of Reviewed Evidence

Maternal Outcomes Associated with Caesarean Section Delivery

The evidence reviewed showed that CSD in LMICs is associated with a range of maternal health complications. Considering mental health-related outcomes, one prospective cohort study conducted in private institutions found that 11.2% of post elective-CSD postpartum depressive symptoms, 5.6% before and after childbirth and 5.6% after childbirth [63]. Two studies discussed postpartum-related infection. Rwabizi et al. outlined a prevalence of 83% of maternal morbidity associated with postpartum infection in a sample of public and private facilities [43]. More specifically, Sharma and Dhakal found an incidence of surgical site infections (SSI) of 7.6% [54].

Likewise, for Chu et al., this was 7.3% (range 1.7–10.4%) in the DRC, Burundi and Sierra Leone [42]. For public institutions, the surgical site infection SSI incidence was 23.5% (95% diagnosed within the two weeks following discharge) in Del Monte and Neto's study [56]. However, in Nepal, undergoing a CSD in public hospitals led to a significantly lower prevalence of SSI (3.8%), but the most prevalent was postpartum hemorrhage (30.5%), followed by injury to the surrounding structure (19.2%) [49]. Sharma & Dhakal found greater prevalence in low segment CSD (53.5% vs. 39%; χ 2 = 9.11, $p < 0.05$) [54]. Cisse et al., in their mix of private facilities in Senegal, contended with a CSD-related maternal mortality and morbidity at 3.3% versus 13.85 (with indication), 2.6% vs. 3.8% (discretion), 3.7% vs. 14.6% (essential) $p < 10^{-8}$ [44]. In a panel study analyzing a time trend CSD (2000 to 2011) at the Muhimbili National Hospital in Dar es Salaam, Tanzania, Litorp et al. found an increase in the maternal mortality ratio from 463/100,000 live births to 650/100,000 ($p = 0.031$) [46]. Lumbiganon et al.'s Asian wide cross-sectional study, which randomly selected 122 private and public facilities, found an important risk associated to CSD [53]. Compared to spontaneous delivery, antepartum CSD with indication was increased (adjusted odds ratio [aOR] = 1.1, 0.5–2.3). The risk was even greater during the intrapartum stage: aOR = 4.8 (95%CI = 0.6 – 36,5) (without indication) and aOR = 1.6 (95%CI = 0.9 – 2.8) (with indication) [53].

In dealing with urinary incontinence (UI) in public institutions, Borges et al. [41] found that the burden was borne more by mothers who underwent normal vaginal delivery (VD) for either mixed UI (OR = 8.53, 95% CI = 1.25–364.12) or stress UI (OR = 9.07, 95% CI = 1.34–385.56) than for CSD: mixed UI (OR = 7.3, 95% CI = 0.83–341.94) and stress UI (OR = 2.43, 95% CI = 0.12–146.16). Similarly, Kavosi et al. [51]

highlighted a low postpartum quality of life (QOL) (mental health score, SF–36) for CS delivery (56.05±11.97) compared to normal VD (60.17±18.76) and water birth (61.41±11.16), but the difference was not significant ($p = 0.247$). Silva et al.'s research in aggregating public and private facilities in a cross-sectional study of 2,434 singleton live births found that mothers who underwent CSD (33.7%) show an increased risk of low birth weight (LBW) (OR 1.58, 95% CI 1.09–2.26) [61]. One study focused on the incidence of maternal near – miss events during hospitalization for childbirth care. Mixing both public and private providers, it appears that compared to VD, maternal near-miss events associated with elective CSD were significantly ($p < 0.001$) greater (AOR = 2.54, 95%CI 1.67–3.88) than those with intrapartum CSD (AOR = 1.05, 95%CI 0.54–2.03) [57].

Neonatal Outcomes Associated with CSD

Over the perinatal period, Litorp et al.'s time trend analysis of CSD (2001 to 2011) found an increase in perinatal mortality ($p = 0.381$) and neonatal distress ($p = 0.171$), although not statistically significant [46]. In Senegal, Cisse et al., after following women undergoing a CSD over a one-month period, found that the magnitude of neonatal mortality and morbidity was 14.5% vs. 8.7% (with indication), 2.8% vs. 3.2% (discretion), and 12.4% vs. 5.6% (essential) ($p < 5*10^{-8}$) [44]. In one Nepalese study, 94.5% of the newborns had APGAR score ≥6 at one minute and 97.9% at five minutes [49]. For breech and other presentations, CSD tended to be very protective for both the fetal (intepartum without indication: AOR = 0.07, 95%CI = 0.03 – 0.1; intrapartum with indication: AOR = 0.3, 95%CI = 0.2 – 0.4) and the perinatal period while either antepartum (AOR = 0.2, 95%CI = 0.1 – 0.3) or intrapartum (AOR0.3, 0.2–0.4), was associated with improved perinatal outcomes, but also with increased risk of stay in neonatal ICU (2.0, 1.1–3.6); and 2.1, 1.2–3.7, respectively [53]. In Ethiopia, neonate deaths were estimated at 4.49% for emergency CSD [45] and 8.93% of perinatal death of the 392 CSD cases in a Kabul maternity hospital [50]. Sharma & Dhakal found a rather high prevalence of complications (not specified) in newborns through low segment CSD vs. VD (52,1% vs. 28.4%; χ 2 = 26.12, $p < 0.05$) [54]. Torres et al. analyzed deliveries compiled from both public and private providers, including those with the standard care model ("typical" hospitals) and baby-friendly health facilities ("atypical" hospitals) [62].

Torres et al. conducted a national hospital-based cohort and have observed better neonate outcomes for atypical hospitals for early skin-to-skin contact (37.7% vs. 12.8%, $p = 0.000$); breastfeeding in the first hour after birth (65.8% vs. 11.9%, $p = 0.000$); rooming-in care during hospitalization (92.2% vs. 34.7%, $p = 0.000$); exclusive breastfeeding up until discharge (90.3% vs. 56.5%, $p = 0.000$), and adverse neonatal outcomes (3.2% vs. 2.4%, $p = 0.250$) [62]. Another study that includes both private and public facilities shows a significant delay in initiating breastfeeding for emergency CSD (aOR 63.85, 95%CI = 34.09–119.60) and elective CSD (aOR34.49, 95%CI = 19.94–59.66) compared to VD [55].

Comparing Outcomes of Elective CSD to Vaginal Delivery

Gonzales et al., when analyzing Peru-wide secondary perinatal data (563,668 deliveries) from 2000 to 2010 from 43 public health facilities, found that, compared to VD, there was a fourfold increase in the prevalency of maternal mortality for elective CSD (OR = 4.45, 95%CI = 3.21–6.18) and as well as for emergency CSD (OR = 4.82 95%%CI = 3.44–6.75) [58]. This mortality rate was higher in low-level hospitals (OR = 5.55 95%CI = 1.46–21.0) than in high-level hospitals OR = 2.37 95% (CI = 1.16 4.0). A multi-country study in seven African countries (Algeria, Angola, DRC, Niger, Nigeria, Uganda, Kenya) contended that high emergency caesarean delivery rates are associated with poor perinatal outcomes (fresh stillbirths: $\beta = 5.119$, $p < 0.05$), severe neonatal morbidity ($\beta = 5.224$, $p <0.05$), while high elective caesarean rates protect fetuses and neonates (fresh stillbirths: $\beta =—6.775$, $p < 0.05$), and neonatal death ($\beta =—6.945$, $p < 0.05$) [48]. Another study in eight Latin American countries (Argentina, Brazil, Cuba, Ecuador, Mexico, Nicaragua, Paraguay, Peru) with 97,095 parturients of public and private health facilities showed that elective CSD leads to low risk for severe maternal morbidity and mortality index ($\beta = 0.277$, $p = 0.02$) compared to intrapartum CSD outcomes ($\beta = 0.355$, $p = 0.0001$) [4]. This was similar for perineal laceration or postpartum fistula ($\beta = (-)0.016$, $p = 0.2$ vs. $\beta = (-)0.016$, $p = 0.8$). For fetal outcomes, the likelihood of death was higher for CSD ($\beta = 0.163$, $p = 0.01$) compared to intrapartum CSD ($\beta = 0.063$, $p = 0.0001$), but lower for neonatal death for elective (elective CSD, $\beta = 0.010$, $p = 0.9$, vs. intrapartum CSD, $\beta = 0.072$, $p = 0.2$).

Several authors have approached the comparison between CSD outcomes and VD postpartum QOL and Quality Adjusted Life Days (QALDs). Thus, Kohler et al. [52] found that the VD group had a higher QOL (0–3 days postpartum: 0.28 vs. 0.57, 3–7 days postpartum: 0.59 vs. 0.81; $p < 0.001$) and was more likely to report no or slight problems in 4 of 5 health dimensions (mobility, self-care, usual activities, pain or discomfort; $p < 0.04$) during interviews (1st and 7th days). Similarly, in Nepal, Sharma and Dhakal [49] found that VD led to fewer complications for mothers compared to CSD (39%, vs. 53.5%) and likewise for newborns (28.4% vs. 52.1%).

Intercontinental CSD outcomes comparison

Bauserman et al. conducted a three-continent study in a mix of public and private facilities (India, Pakistan, Kenya, Zambia, Argentina and Guatemala) [64]. The intercontinental comparison resulted in a lower maternal mortality rate (MMR) in Latin America (91/100,000) than in Asia (178/100,000) and an MMR of 125/100,000 in Africa. The relative risk (RR) of maternal death at six weeks was lower for CSD (2.4, 95%CI = 1.8–3.2) compared to assisted VD (3.4 95%CI = 1.8–6.6). In a similar comparative analysis, Souza et al., in dealing with private and public institutions, confirmed the aforementioned differences between continents. In Africa, the outcomes were the worst in all measured dimensions: antepartum CSD without indications: AOR = 71.29, 95%CI = 32.06–158.55, CSD with indications, AOR = 88.61, 95% CI = 74.88–104.86), while this was 2.14, 95%CI = 1.04–4.43 and 8.09, 95%CI = 7.12–9.1, respectively in Asia. In Latin American countries, the findings were the best: 1.94, 95%CI = 0.77–4.9 and 3.04, 95% CI = 2.71–3.41[65].

CSD Outcomes in Public vs. Private Facilities

Studying the LBW-related outcomes and clustering the analysis into private and public university hospitals, Murta et al [60] distinguished, through a multiple logistic regression, that there is a higher risk of LBW among born to women undergoing CSD in private hospitals (AOR = 2.33, 95% CI = 1.19–4.55) than in public ones (OR = 1.4, 95%CI = 0.82 to 2.4). In one study that targeted maternal mortality associated with facility ownership, undergoing CSD in the public sector was 3.3 (95% CI = 2.6–4.3) and was associated with a risk of maternal mortality, although the rate was 32.9% compared to 80.4% in the private sector [59].

Discussion

This review lays out four crucial results. Firstly, there is a huge discrepancy between public versus private hospitals in terms of maternal and perinatal morbimortality. Secondly, CSD, including elective ones, can result in maternal and perinatal morbimortality. Thirdly, we found a difference between continents in CSD performance-related outcomes, with African outcomes lagging behind. Finally, the results of vigorous policies revealed ways to critically reduce the CSD upward trend and the worst outcomes associated.

This review laid out the relevance of the facilities' ownership in materno-fetal and neonate CSD-related outcomes. Of the 14 studies targeting both public and private facilities [4,45,48,52–55,57,59–62,64,65], only Murta et al. [60] and Kilsztajn et al. [59] have frontally compared the CSD outcomes between participants in public and private institutions. In the case of the former, private institutions led statistically to fewer LBW babies (OR = 1.4 vs. 2.33), while in Kilsztajn et al.'s study, the likelihood of dying from CSD was 3.3 times higher [59]. This, as evidenced in Latin America, confirms the well-known volume-outcome relationship from a great deal of empirical published works [67].

Nevertheless, cross-comparative findings reveal that private facilities offer significantly better outcomes in terms of CSD-related maternal mortality [59] and public health institutions show worse outcomes of severe morbimortality versus VD [43,58]. The comparison features show a similar trend while using the Robinson approach for perinatal mortality, neonatal distress, and maternal mortality ratio [44,46,50], or maternal CSD complications [49]. This is also true for the incidence of SSI [56], emergency caesarean (versus VD), as well as the hospital level [58]. However, VD stands to be protective for urinary tract-related outcomes (compared to CSD) and for postpartum QOL (using SF12) [51].

The Within-Sector Comparison of CSD Outcomes

There was very little comparative data of relevance to CSD-related outcomes in the private versus public sectors at the within-country level. However, in Brazil, despite the much higher prevalence of CSD in the private sector – up to 90% [28,59,62], the highest in the world [68,69] – the risk of LBW was almost twofold that of the public sector [60]. In regard to SSI, findings in the public sector are very high (23.5%)

compared to 0.7%–5.1% reported in Brazil [70,71], but far less compared to subSahara Africa (SSA) situations (15.6%) [72].

Even Elective CSD Leads to Maternal and Perinatal Morbi-mortality

This review underlined that, in all the LMIC settings, emergency CSD protects mothers from death [71]. As for high elective CSD rates, it is protective for fetuses and neonates [48]. Compared to VD, elective CSD resulted in significant odds of mortality in Peru [58], maternal mortality in Africa [48], and depressive symptoms in Brazil [63].

In addition to maternal mortality, elective CSD results infetal death and neonatal death [66]. In all settings, in private and public health institutions, elective CSD leads to a delay in breastfeeding (OR = 10.115) in Africa [48] and in the Middle East [55]. In addition to preterm birth and its correlates, LBW is among the salient findings in Brazil, the epidemic setting [61], in both public and private facilities in Brazil – more in private facilities [60].

Intercontinental Comparison of CSD Outcomes

When comparing continents, irrespective of ownership, the findings of [57,66] showed that Latin America performed better with better maternal outcomes comparing VD to CSD, followed by Asian settings. Africa is lagging behind for both antepartum CSD and intrapartum CSD outcomes [65]. This ranking was however partly demonstrated by Bauserman et al.[64]. Indeed, maternal mortality in Africa – in particular in SSA, which has remained which is indicative of the poor quality of maternal services – progressively declined over the last three decades [73]. We argue that the comparatively high adverse outcome associated with CSD in SSA is associated with vigorous policies, including, for instance, general practitioners, non-MD training [74] or free or the levying of a nominal fee by governments for CSDs [75,76]. Unfortunately, some countries like Morocco, rapidly lead to an alarming peak rate [77] necessitating a retaliate plan [78].

Hopeful Results in the Reduction of the CSD Trend: Lessons from China

China, in particular, is paving the way to address the CSD epidemic. Very recent initiatives have shown CSD rates decline, particularly in supercities, by as much as 30% between 2008 and 2014 [79]. The literature also indicated that other strategies are feasible. Li et al.'s retrospective cohort study demonstrated that trial of labour after caesarean delivery may be a potential strategy for decreasing the CSD rate [80]. This steady decline of CSD, particularly significant among nulliparous and multiparous births without a uterine scar, which is concomitant with a decline in perinatal mortality from 10.1 per 1,000 births to 7.2 per 1,000 births, is the result of institutional interventions and policy change [81]. While in Brazil, Galvao et al. [82] propose the enforcement of Resolução Normativa 368, in addition to structural changes (e.g. on-call schedule and higher compensation for vaginal births in the private sector), Yu et al.'s pre- and post-design (2006–2014) demonstrated that institutional and policy interventions (health education, painless delivery, doula care, and controlling CDMR rates) lead to a quick decline from 20.11% to 4.30% in Wenzhou, China [83]. The authors suggest the inclusion of CDMR rates in hospitals' performance assessment matrix [82]. Finally, Torloni et al. the systematic review [84] and others literature [85] contended that, the use of Robinson classification as well as clinical and non-clinical classification in intervention policies [83,86], societal approaches [87], and management interventions (health promotion, practitioner training and tightening of hospital regulations) [83] are possible alternatives.

Conclusion

Interestingly, this review revealed that high emergency CSD rates, unlike high elective CSD rates, were associated with poor perinatal outcomes, while the risk of neonatal death was lower in facilities with high elective CSD rates and, fortunately, high elective CSD rates reduced the risk of fresh stillbirths. In contrast, neonatal deaths increased with high emergency CSD rates. Increased emergency CSD rates were associated with fresh stillbirths, neonatal deaths, and severe neonatal morbidity. In contrast, increased elective CSD rates were associated with fewer fresh stillbirths and neonatal deaths. Despite the quality of the studies selected, the majority of these targeted both the public and private sectors of health, but did not distinguish the part played by each sector in terms of outcome, leaving room for extrapolation, based on the magnitude of the CSD rate in each sector. Finally, all of the Latin American studies in this review were conducted in Brazil.

This systematic review portraying the evidence on materno-fetal and neonatal outcomes between private and public hospitals outlines the critical question on how best to shape policies to optimize the quality and safety of CSD.

Declarations

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Authors’ contributions

IB conceived the study. IB and AD conducted the search strategy, extracted data with MT and drafted the first manuscript. SD, ETN and JS reviewed and rearticulated the literature review and reviewed successive drafts of the manuscript. All authors have read and approved the manuscript.

Competing interests

The authors declare that they have no competing interests.

Consent for publication

Not applicable.

Ethics approval and consent to participate

Not applicable.

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Tables

Due to technical limitations, full-text HTML conversion of Tables 1 & 2 could not be completed. However, they can be downloaded and accessed as a PDF.

Figures

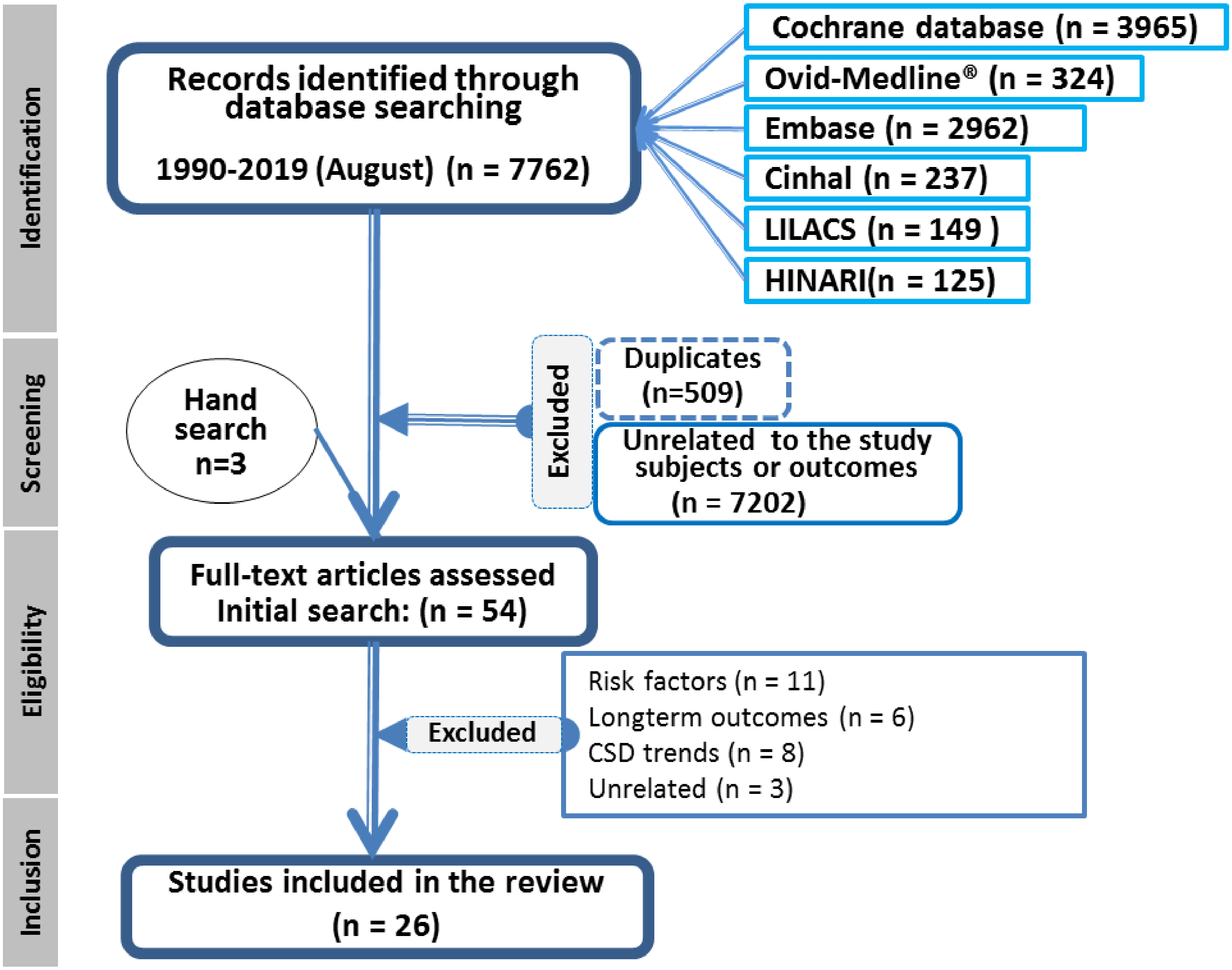

Fig 1. Prisma flow diagram illustrating the search strategy.

Figure 1

Prisma flow diagram illustrating the search strategy

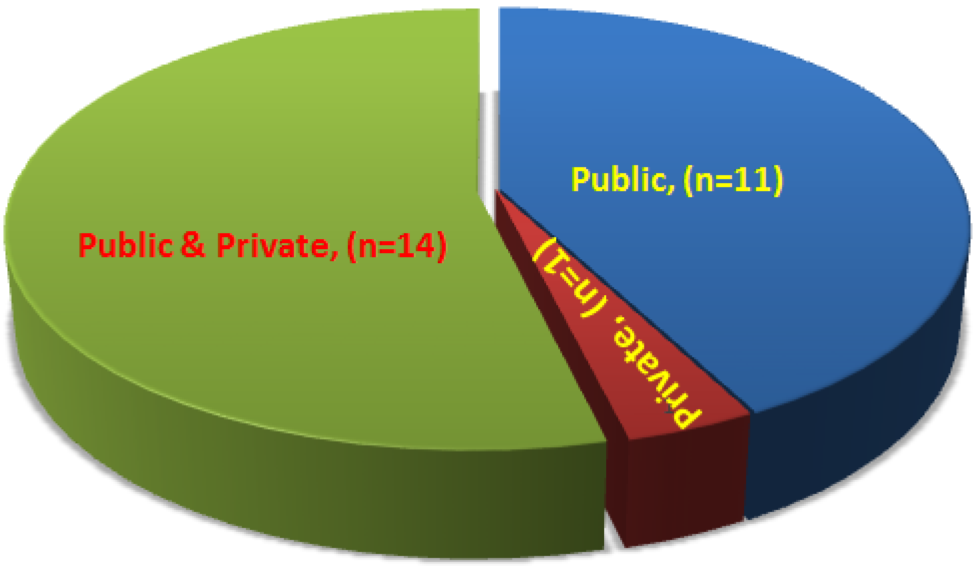

Fig 2: Type of health facility

Figure 2

Type of health facility

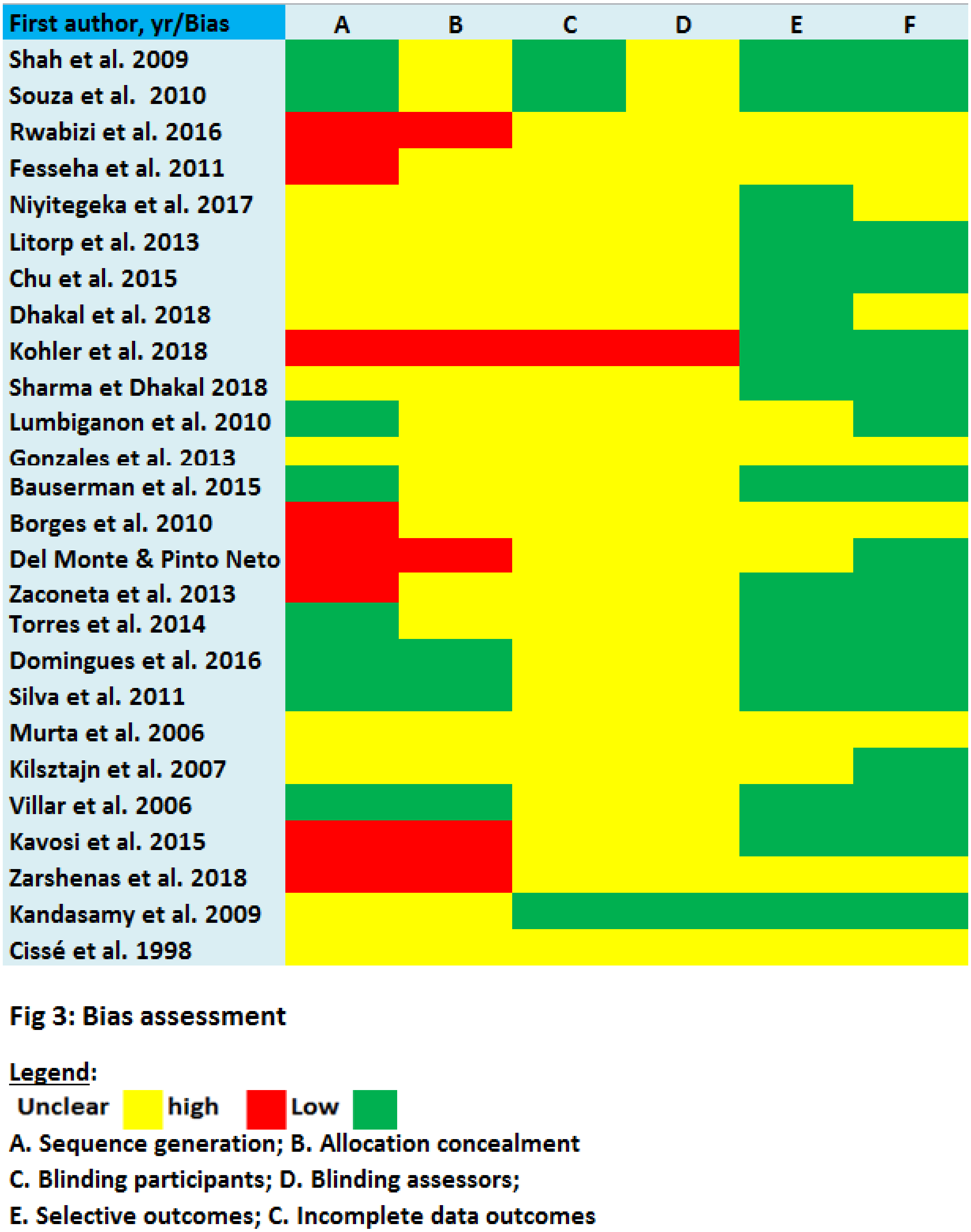

Figure 3

Bias assessment

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- Supp.File.pdf
- Tables.pdf