

# Women's preference for caesarean section: a systematic review and meta-analysis of observational studies

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**Background** The striking increase in caesarean section rates in middle- and high-income countries has been partly attributed to maternal request. We conducted a systematic review and meta-analysis of women's preferences for caesarean section.

**Objectives** To review the published literature on women's preferences for caesarean section.

**Search strategy** A systematic search of MEDLINE, EMBASE, LILACS and PsychINFO was performed. References of all included articles were examined.

**Selection criteria** We included studies that quantitatively evaluated women's preferences for caesarean section in any country. We excluded articles assessing health providers' preferences and qualitative studies.

**Data collection and analysis** Two reviewers independently screened abstracts of all identified citations, selected potentially eligible studies, and assessed their full-text versions. We conducted a meta-analysis of proportions, and a meta-regression analysis to

determine variables significantly associated with caesarean section preference.

**Main results** Thirty-eight studies were included ( $n = 19\,403$ ). The overall pooled preference for caesarean section was 15.6% (95% CI 12.5–18.9). Higher preference for caesarean section was reported in women with a previous caesarean section versus women without a previous caesarean section (29.4%; 95% CI 24.4–34.8 versus 10.1%; 95% CI 7.5–13.1), and those living in a middle-income country versus a high-income country (22.1%; 95% CI 17.6–26.9 versus 11.8%; 95% CI 8.9–15.1).

**Authors' conclusions** Only a minority of women in a wide variety of countries expressed a preference for caesarean delivery. Further research is needed to better estimate the contribution of women's demand to the rising caesarean section rates.

**Keywords** Caesarean section, childbirth, choice, delivery, obstetric, prefer, request.

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## Introduction

Over the past three decades, there has been a striking increase in caesarean section rates in middle-income and high-income countries around the world.<sup>1–3</sup> Caesarean section rates continue to rise despite evidence that there is no associated improvement to maternal and perinatal mortality and morbidity; rather, it can increase the risk of complications, such as maternal mortality, vesical injury, ureteral tract injury, and hysterectomy.<sup>3–6</sup> There are several and complex reasons for this increasing trend, with maternal request being one of the most frequently mentioned.<sup>3,7</sup> Although the rise in caesarean section rates is often attrib-

uted in part to requests from women without a medical indication,<sup>8</sup> there is evidence that few women actually prefer caesarean sections.<sup>9–15</sup>

Although numerous studies have examined women's preferences for mode of delivery, only a handful of reviews have systematically and comprehensively synthesised this information,<sup>16–20</sup> but none of them have quantitatively summarised the results by performing a meta-analysis. These reviews report a wide variation in caesarean section rates and the factors associated with women's preferences. Differences in preference are partially attributed to parity and country-specific characteristics. Furthermore, a clearer understanding of the rates and factors related to women's

preferences is limited by study characteristics, including methodological constraints, inclusion of qualitative and quantitative studies, timing of preference elicitation (e.g. prenatal versus postnatal) and women's characteristics, such as parity and previous history of caesarean section (i.e. nulliparous, multiparous, and multiparous with previous caesarean section).

The aim of this article is to review and summarise the published literature on women's preferences for caesarean section, and to assess the factors associated with a higher preference for caesarean section. With this aim, we conducted a systematic review and meta-analysis of studies reporting the rate of women preferring caesarean section.

## Methods

We followed the Meta-analysis of Observational Studies in Epidemiology (MOOSE) Group guidelines to conduct this systematic review and meta-analysis.<sup>21</sup>

### Type of studies

We included all research articles that quantitatively evaluated preferences for caesarean section and contained original data. We did not restrict our search by country, study design or methodology. We restricted the search to articles written in English, Spanish, French, German, Portuguese and Chinese. The following authors were reviewers: NHL assessed articles in Chinese; AM evaluated articles in French; AM and AMB evaluated articles in Portuguese; and AM, AMB, AJS and NHL evaluated articles in Spanish and English. Two consultants assessed articles in German. We excluded articles that assessed healthcare providers' preference for mode of delivery, editorials, letters to the editor, commentaries, and purely qualitative studies.

### Electronic searches

We conducted a systematic literature search of the following major electronic databases: MEDLINE, EMBASE, LILACS and PsychINFO. We evaluated articles published until 1 March 2009, without setting a lower date limit. The oldest citation identified by our search was published in 1967. A highly sensitive search strategy was performed by a professional librarian, using the following terms: 'caesarean section', 'parturition', 'partum', 'delivery, obstetric', 'childbirth'; with 'request', 'prefer', 'patient satisfaction', 'patient participation', 'decision', 'perception', and 'choice'. To broaden our search, we also used truncated forms of each term. Reference lists of all retrieved full-text articles were examined for additional references.

The full electronic search strategy used for MEDLINE was the following: ((Delivery, Obstetric[Mesh] OR Parturition[Mesh] OR cesarea\*[tiab] OR caesarea\*[tiab] OR parturition\*[tiab] OR C Section\*[tiab] OR partum[tiab] OR

childbirth[tiab]) AND ((Patient Satisfaction[Mesh] OR Patient Participation[Mesh]) OR (Patient[tiab] OR woman[tiab] OR women[tiab] OR pregnan\*[tiab] OR mother\*[tiab])) AND (request[tiab] OR Prefer\*[tiab] OR satisfact\*[tiab] OR decision\*[tiab] OR perception\*[tiab] OR choice\*[tiab] OR particip\*[tiab])) AND humans[mesh]) NOT Pregnancy Complications[Mesh].

### Selection of eligible articles and data abstraction

Two reviewers (of NHL, AMB, AJS and AM) independently pre-screened the titles and abstracts of all identified citations and selected potentially eligible studies. Full-text versions of all potentially eligible articles were independently assessed by two reviewers to evaluate whether they met the inclusion criteria. Any discrepancies were resolved by consensus in both phases. A flow chart diagram of this process is presented in Figure 1.

Data were abstracted using a previously piloted electronic chart, including the following headings: region, country, country income level, study design, year of the study, population, parity, history of caesarean section, period of reproductive life when preference was evaluated, type of instrument used to assess the preference, primary results, total number of women in study, number of women preferring caesarean section, and risk of bias in the study. AMB and NHL extracted the data from all included studies, and AM confirmed the accuracy of the data abstraction, reviewing each article and comparing the information with the data abstracted in the data abstraction form.

Those studies including women of all parities and not reporting the caesarean section preference separately for nulliparous and multiparous women were assigned to the multiparous category if more than 50% of the women in the study were multiparous. Otherwise the study was categorised as a nulliparous study. The same criterion was applied to the subgroup analysis examining the history of caesarean section: if more than 50% of the women had a previous caesarean section, the study was categorised as performed in women with previous caesarean section. In the case of studies including women of different subgroups (e.g. nulliparous and multiparous, with and without previous caesarean section) that reported caesarean section preference separately for each group, we included the data from each specific subgroup as if derived from separate studies in the corresponding subgroup analysis. For example, in a study including both nulliparous and multiparous women and reporting caesarean section preference by parity subgroup, the data from the nulliparous and multiparous women were included as two separate studies in the by parity subgroup meta-analysis.

We used the World Bank classification to classify countries according to income per capita.<sup>22</sup>

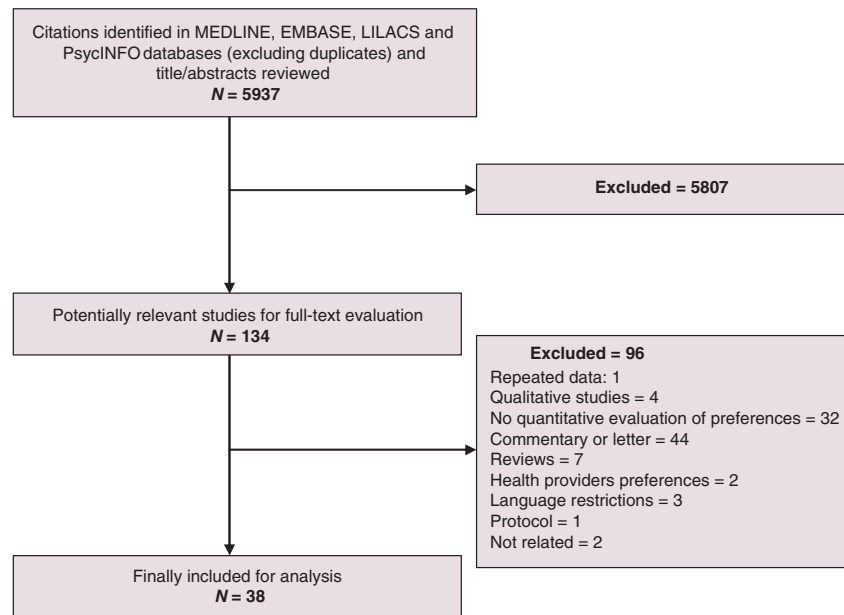


Figure 1. Flow chart of study selection process.

### Statistical analysis

We conducted a meta-analysis of proportions. An arc-sine transformation was applied to establish the variance of proportions (Freeman–Tukey variant of the arc-sine square-root of transformed proportions method).<sup>23</sup> The pooled proportion was calculated as the back-transformation of the weighted mean of the transformed proportions, using inverse arc-sine variance weights for the fixed and random effects model. We applied DerSimonian–Laird weights for the random effects model where heterogeneity between studies was found.<sup>24</sup> We calculated the  $I^2$  statistic as a measure of the proportion of the overall variation in the proportion that was attributable to between-study heterogeneity. STATA-DIRECT and STATA 8.0 were used for all analyses.<sup>25,26</sup>

We also estimated the proportion of women preferring caesarean section in subgroups according to study characteristics (i.e. study region, country income level and year of the study); and to women's characteristics (i.e. history of caesarean section, parity and period of reproductive life when preference was evaluated).

To evaluate if the assignment to categories of parity and history of caesarean section (considering the 50% or more criterion we used) was reliable, we conducted a sensitivity analysis considering only those studies that include 100% of nulliparous women versus studies including 100% of multiparous women; and studies including 100% of women with a previous caesarean section versus studies including a 100% of women without a previous caesarean section.

We also applied a random-effect meta-regression analysis<sup>27</sup> to determine which variables were significantly associ-

ated with caesarean section preference. The regression analysis included the above-mentioned variables.

### Quality assessment of included studies

The methodological quality of all included observational studies was assessed based on the checklist of essential items stated in the Strengthening the Reporting of Observational studies in Epidemiology (STROBE) statement<sup>28</sup> and the results of a systematic review evaluating tools for assessing quality and susceptibility to bias in observational studies.<sup>29</sup>

We considered four criteria for quality assessment:<sup>29</sup> (1) appropriate methods for selection of study participants or explicit definition of inclusion and exclusion criteria; (2) appropriate methods for measuring outcome variables; (3) design-specific sources of bias (appropriate methods outlined to deal with any design-specific issues such as recall bias or interviewer bias); and (4) statistical methods (excluding confounding). Methods to control for confounding were not considered because we included only descriptive studies. Each criterion was given one point and we considered as 'low risk of bias' those studies that scored three or higher.

We performed a sensitivity analysis comparing the overall pooled caesarean section preference considering only the 14 studies categorised as having 'low risk of bias' with the overall pooled preference considering the 38 studies.

## Results

The search strategy identified a total of 5937 citations. After review of titles and abstracts, 5807 references were excluded (concordance for inclusion between reviewers was 98%)

and 134 studies were potentially eligible (Figure 1). After revision of all full texts, 38 studies met the inclusion criteria and were included for data abstraction (concordance for inclusion between reviewers was 90.4%).

### Description of studies

Table 1 summarises the major characteristics of the included studies (see Table S1 for a full description of the 38 included studies).

### Caesarean section preference

Table 2 shows the overall results and results by subgroup. The overall pooled preference for caesarean section was

15.6% (95% CI 12.5–18.9). As the preference for caesarean section in the studies is heterogeneous, the significance of the overall preference should be considered with caution. In the subgroup meta-analysis by region, the highest preference for caesarean section was found in the Americas (21.3%, 95% CI 16.4–26.7). Latin American studies showed a higher preference for caesarean section than those from USA and Canada (24.4%, 95% CI 19.4–29.8 versus 16.8%, 95% CI 7.9–28.1, respectively). Highest caesarean section preference was found among studies conducted in middle-income countries (22.1%, 95% CI 17.6–26.9), and conducted before 2000 (19.4%, 95% CI 13.8–25.7) compared with the other respective subgroup categories.

**Table 1.** Characteristics of the included studies

	Number of studies	Studies
<b>Study design</b>		
Cross-sectional	32	9, 10, 12–15, 30–55
Cohort	6	11, 56–60
<b>Methodology for preference assessment</b>		
Self-administered questionnaire	23	9, 10, 15, 30, 32, 34, 36, 37, 39–42, 44, 45, 48, 49–51, 53–55, 57, 59
Interviewer-based questionnaire	12	11–14, 31, 33, 35, 38, 46, 47, 52, 58
Telephone-based questionnaire	1	43
Other	2	56, 60
<b>Region</b>		
Latin America	10	11–13, 30, 31, 33, 37, 40, 47, 52
North America	6	32, 46, 48, 49, 53, 56
USA	5	32, 46, 49, 53, 56
Canada	1	48
Europe	12	10, 35, 36, 39, 41, 44, 50, 54, 55, 57, 58, 60
Asia	7	14, 15, 38, 42, 43, 51, 59
Africa	1	45
Australia	2	9, 34
<b>Country income level</b>		
High-income	23	9, 10, 15, 32, 34–36, 39, 41, 43, 44, 46, 48, 49, 50, 53–59, 60
Middle-income	15	11–14, 30, 31, 33, 37, 38, 40, 42, 45, 47, 51, 52
Low-income	0	–
<b>Year of conduction</b>		
2000 or after	23	12–15, 32–34, 37, 38, 41, 42–45, 48–50, 52–55, 57, 59
Before 2000	14	9–11, 30, 31, 35, 36, 39, 40, 46, 51, 56, 58, 60
Not specified	1	47
<b>Time of preference elicitation</b>		
During pregnancy	24	9, 10, 11, 13–15, 32, 36–38, 41, 44–46, 48–50, 52, 54–57, 59, 60
Postpartum	11	12, 30, 31, 33–35, 39, 40, 47, 51, 58
Nonpregnant women	3	42, 43, 53
<b>Sample size</b>		
More than 2000 women	2	10, 54
1000–2000 women	3	11, 35, 50
500–1000 women	6	12, 14, 30, 32, 39, 43
100–500 women	24	9, 13, 15, 33, 34, 36–38, 40–42, 44–49, 51, 53, 55–59
<100 women	3	31, 52, 60
<b>Risk of bias</b>		
Low risk of bias	14	10, 11, 13, 35, 40, 46, 47, 50, 51, 54, 55, 57, 59, 60
High risk of bias	24	9, 12, 15, 30–34, 36–39, 41–45, 48, 49, 52, 53, 56, 58, 59
<b>Total</b>	38	

**Table 2.** Caesarean section preference by subgroup

	Number of studies	Number of women	Caesarean section preference	
			%	95% CI
<b>Overall*</b>	38	19 403	15.6	12.5–18.9
<b>Region</b>				
Latin America	10	4027	24.4	19.4–29.8
North America	16	5658	21.3	16.4–26.7
USA, Canada	6	1631	16.8	7.9–28.1
Europe	12	10 348	11.0	7.6–15.0
Asia	7	2658	12.7	6.3–21.0
Africa	1	221	14.2	9.9–19.1
Australia	2	518	13.8	2.0–33.6
<b>Country income level</b>				
High-income	23	13602	11.8	8.9–15.1
Middle-income	15	5801	22.1	17.6–26.9
<b>Year of study</b>				
Before 2000	14	8689	19.4	13.8–25.7
2000 or later	23	10 597	13.8	10.1–17.9
Not specified	1	177	7.2	3.3–12.5
<b>Previous caesarean section**</b>				
Yes	16	4010	29.4	24.4–34.8
No	23	13 922	10.1	7.5–13.1
Not specified	7	1471	12.0	5.8–19.9
<b>Parity**</b>				
Nulliparous	17	6161	10.2	6.8–14.1
Multiparous	29	12 677	17.5	13.4–21.8
Not specified	2	565	9.7	4.2–17.1
<b>Period of reproductive life</b>				
Nonpregnant	3	1002	13.7	1.2–36.4
Pregnancy	24	13 684	13.1	10.1–16.5
First and second half	13	9748	11.2	8.0–15.0
Second half	11	3936	15.5	10.2–21.8
Postpartum	11	4717	22.0	15.2–29.6

\* $I^2 = 97.3\%$ . The range of  $I^2$  of the different subgroups is between 82.2 and 98.5%.

\*\*Number of studies is greater than total number of included studies because preference is reported in subgroups.

Similarly, in the analysis performed by women's characteristics, highest caesarean section preference was found among multiparous women (17.5%, 95% CI 13.4–21.8), women with a previous caesarean section (29.4%, 95% CI 24.4–34.8), and women for whom preferences were evaluated postpartum (22.0%, 95% CI 15.2–29.6).

In the sensitivity analysis considering only the 14 studies categorised as low risk of bias, the overall pooled preference for caesarean section was similar (14.9%; 95% CI 10.9–19.3) to that considering the 38 studies (15.6%, 95% CI 12.5–18.9).

Regarding categorisation of parity and previous caesarean section, the sensitivity analysis showed that if we con-

sider only the 11 studies including 100% of women with a previous caesarean section, the caesarean section preference is 31.7 versus 29.4% for the studies also including the 'attributed' previous caesarean section (more than 50% of the women had a previous caesarean section). Regarding parity, the preferences for caesarean section are also similar comparing only those studies assessing the preference in 100% of nulliparous women (14 studies: 9.3%) with the total number of studies also including the 'attributed nulliparous women' (17 studies: 10.2%).

The meta-regression revealed that history of caesarean section, country income level, parity and period of reproductive life showed statistically significant associations in the univariate analysis. In the multivariate meta-regression, women with previous caesarean section ( $\beta$  coefficient 0.48, 95% CI 0.33–0.62), and women from middle-income countries ( $\beta$  coefficient 0.18, 95% CI 0.05–0.31) remained statistically significant after adjustment for the other characteristics, compared with women with no history of caesarean section and women from high-income countries respectively.

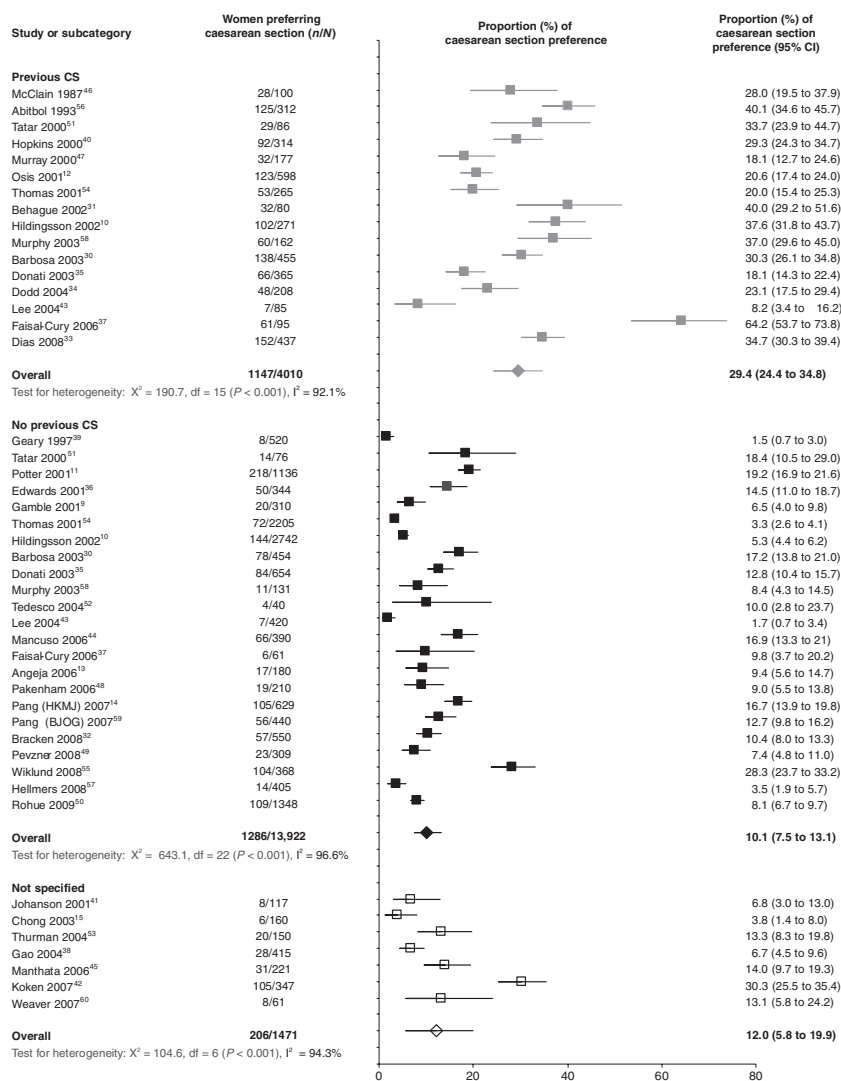
Figure 2 shows a Forest plot of the proportion of women preferring caesarean section stratified by previous caesarean section.

## Discussion

The available evidence shows that across a range of countries approximately 16% of women prefer caesarean section as mode of delivery. However, as the preference for caesarean section was shown to vary according to different subgroups (ranging from 7.2 to 29.4%), the value of the overall pooled preference should be considered with caution. Higher preference for caesarean section was reported in women with a previous caesarean section (29.4%), and those living in a middle-income country (22.1%).

This review has several strengths. First, we considered both English and non-English published literature, evaluating abstracts and full-text articles written in English, Spanish, Portuguese, French, Italian, German and Chinese.<sup>30,33,38,52</sup> Our final analyses included four non-English articles.<sup>30,33,38,52</sup> Second, we adhered strictly to the rigorous and most current recommended standards for systematic reviews of observational studies.<sup>21</sup> Third, we only included articles that quantitatively reported preference for caesarean section and conducted a meta-analysis of proportions, which is a valid and robust approach to summarising this literature. Finally, the meta-regression technique applied to the subgroup analyses allowed us to identify relevant factors associated with women's preference for caesarean section.

There were some limitations to this review. We have summarised studies evaluating women's preferences, not actual requests for caesarean section. Therefore, the actual



**Figure 2.** Forest plot of the proportion of women preferring caesarean section stratified by previous caesarean section.

caesarean section rates that result from maternal request cannot be inferred from the data. Future studies should examine this topic across both qualitative and quantitative studies.

To our knowledge, three other systematic reviews of studies evaluating women's preferences for mode of delivery have been published.<sup>17,18,20</sup> None of them included articles published in languages other than English or performed a meta-analysis to summarise the caesarean section preference rates of the included studies. Moreover, two of these reviews included both quantitative and qualitative studies,<sup>18,20</sup> and the third included studies evaluating outcomes that were not strictly women's preferences for a particular mode of delivery.<sup>17</sup> These characteristics make it difficult to directly compare them with our review. Nevertheless, the conclusions of two of these systematic reviews

are consistent with our findings. Kingdon *et al.*<sup>18</sup> included nine studies evaluating nulliparous women's views on planned caesarean section. The studies' median rate of women requesting caesarean section in the absence of clinical indication was 9%. McCourt *et al.*<sup>20</sup> systematically reviewed 17 studies evaluating women's preferences or requests for caesarean section, and concluded that preferences for caesarean section range between 0.3 and 14%. Finally, Eden *et al.*<sup>17</sup> evaluated childbirth preferences in women with a previous caesarean section. They reported a wide range of women's preferences for trial of labour: between 22 and 90% in the six studies reporting this outcome.

This review shows that only a minority of women in a great variety of countries and situations expressed a preference for caesarean section. Although caesarean section on



demand has been suggested as a relevant factor for the increasing caesarean section rates,<sup>8,61</sup> it seems unlikely that this explains the high caesarean section rates in some countries and regions. In Latin American countries, where most women prefer vaginal delivery, and also where most are not allowed to play a role in the decision of the mode of delivery, around 29% of childbirths are caesarean sections.<sup>5</sup>

We believe that further qualitative and quantitative studies are needed to assess the role of women in the decision of mode of delivery, and to better estimate the contribution of caesarean section on demand to the caesarean section rates. The obstetric community is looking with caution at the increase in caesarean section rates and the current rates in mid-income and high-income countries. A comprehensive approach evaluating the role of both health providers and users in the decision of mode of delivery is needed. These studies would contribute to a more rational use of a surgical intervention that can cause more harm than good when not medically indicated.

## Conclusion

Only a minority of women in a wide variety of countries and situations expressed a preference for caesarean section. Further research is needed to assess the role of women in the decision-making for mode of delivery and to better estimate the contribution of caesarean section on demand to the rising caesarean section rates.

## Disclosure of interest

All authors declare that there are no conflicts of interest.

## Contribution to authorship

AM, FA and JMB conceived and designed the study. AMB, AJS, NHL and AM collected the data. LG analysed the data and AM, FA, JMB, LG, AMB, AJS and NHL interpreted the data. AM drafted the manuscript in collaboration with FA, NHL and JMB.

## Details of ethics approval

Ethical approval for the research protocol was not required.

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## Supporting information

The following supplementary materials are available for this article:

**Table S1.** Description of included studies.

Additional Supporting Information may be found in the online version of this article.

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