The influence of individual provider characteristics and attitudes on caesarean section decision-making

Caesarean section (CS) rates have risen worldwide in the past two decades, particularly in middle and high-income countries. In addition to changing maternal and health system factors, there is growing evidence that provider factors may contribute to rising unnecessary caesareans. The aim of this review was to assess the evidence for the associations between individual provider characteristics, attitudes towards CS and decision-making for CS. A search was conducted in May 2018 in PubMed and Web of Science with 23 papers included in our final review. Our results show that higher anxiety scores and more favourable opinions of CS were associated with increased likelihood of performing CS. These findings highlight a need for appropriate interventions to target provider attitudes towards CS to reduce unnecessary procedures.

Keywords: caesarean delivery; provider; obstetrician; midwife; attitudes
Introduction

Caesarean section (CS) rates have risen worldwide in all global regions in the past two decades, particularly in middle and high-income countries (Betrán et al., 2007, 2016; Vogel et al., 2015). When medically indicated, this procedure can be life-saving for both the mother and unborn child. However, rapidly rising CS rates indicate the procedure is often increasingly used in the absence of medical indications (Gibbons et al., 2010; Kabore et al., 2016), increasing the risk of obstetric complications when compared to vaginal birth, such as infection, bladder injury, and deep-vein thrombosis (Souza et al., 2010; Ye et al., 2016). Unnecessary CS may also place increased pressure and financial burden in health systems with limited resources, and act as a barrier to achieving universal health coverage for emergency obstetric care (Gibbons et al., 2010).

Studies have attempted to identify the major factors driving the rise in CS procedures, with the aim of providing guidance on reducing unnecessary CS (Khunpradit et al., 2011; Mascarello, Horta and Silveira, 2017; Mumtaz, Bahk and Khang, 2017; Shabila, 2017). The evidence has shown that, in addition to changing clinical practices and demographic maternal factors, such as increases in BMI and maternal age leading to higher-risk deliveries (Khan et al., 2017), economic, organisational and legal factors higher socioeconomic status and private healthcare systems service level factors may also contribute to the observed rise (Linton, Peterson and Williams, 2004; Kamal et al., 2005; Soto-Vega et al., 2015). In addition, maternal request was often thought to contribute to rising CS rates, but a systematic review by Mazzoni et al. (2011) showed only a minority of women express a preference for caesarean delivery (Mazzoni et al., 2011). There is some suggestion that preference for CS is higher later in pregnancy,
implying that interactions with providers during pregnancy may contribute to shaping maternal requests for CS (Domingues, 2014).

In addition to maternal and health system factors, it is increasingly recognised that individual provider factors—including individual-level characteristics such as gender and occupation, as well as perceptions, attitudes and opinions of CS—may have a significant influence on CS rates (Panda, Begley and Daly, 2018). Provider factors may include individual-level characteristics (such as age, gender, occupation) as well as their perceptions, attitudes and opinions of CS. Previous studies have identified wide variation in individual providers’ CS rates (Poma et al., 1999; Grant, 2005). A recent systematic review of clinicians’ opinions of factors influencing decision-making for CS by Panda and colleagues (Panda, Begley and Daly, 2018) suggests that clinicians’ personal beliefs about CS are a major factor influencing decision-making for CS, alongside health system factors and individual characteristics. However, no reviews to date have assessed how providers’ characteristics and attitudes to CS are associated with their CS decision-making in practice.

The aim of this review is to synthesise the evidence on individual provider characteristics, attitudes and CS decision-making by examining the association between: (1) individual provider characteristics and provider attitudes towards CS; (2) individual provider characteristics and CS decision-making; and (3) provider attitudes towards CS and CS decision-making.
Materials and Methods

A conceptual framework was developed to describe the inter-related factors influencing CS decision-making, including individual-level provider characteristics and attitudes (Figure 1). Provider attitudes to CS, defined as providers’ evaluation of the risks and benefits of performing a CS compared to vaginal delivery, are thought to influence how likely they are to perform a CS. Provider attitudes are likely to be shaped by individual-level characteristics, such as age and years of practice, as well as their facility and health system culture, including insurance systems, financial incentives, and resource availability. In daily practice, providers’ attitudes to CS may interact with maternal and health system factors in shaping their decision-making on mode of delivery: for example, a provider believing that CS carries very little risk to the mother is more likely to accept a maternal request for CS in the absence of medical indications if they believe that CS carries very little risk to the mother, especially or if they practice in a health system context where they receive a higher payment for CS than vaginal delivery.

We carried out a literature review in May 2018 to identify papers assessing the association between (1) individual provider characteristics and attitudes towards CS, (2) individual provider characteristics and CS decision-making, and (3) provider attitudes towards CS and CS decision-making. We searched PubMed and Web of Science using keyword search terms related to caesarean section, CS attitudes and decision-making, and providers (Supplementary Table 1 for search strategy).

A manual search of the reference lists of the most relevant articles was also performed to identify any further literature eligible for inclusion. Only publications in English.
from the last 10 years reporting quantitative findings were included in this review, but
there was no discrimination on geographic location. Only quantitative research was considered, and evidence on all providers caring for women
during labour or influencing their mode of delivery was included (obstetricians-
gynaecologists, nurses and midwives).

We considered studies to assess providers’ attitudes to CS if they measured agreement
with statements on risks of CS (such as safety/risk to mother and/or baby), reported
preferred mode of delivery for themselves or a relative, or opinions on optimal caesarean
rates or caesarean rates in their own health facility. We considered articles measuring
both self-reported and observed CS decision-making, including self-reported agreement
to CS on maternal request or vaginal birth after caesarean (VBAC), self-reported
preferred mode of delivery for their patients, recommendation for mode of delivery based
on clinical vignettes/scenarios, and individual provider CS rates. Non-CS specific indices
measuring fear, anxiety, or risk-taking were considered as suitable proxies for overall
provider attitudes affecting clinical CS decision-making.

The identified publications were first screened on the basis of abstract-title and
title-abstract. Retained articles were then assessed on the basis of full text to determine if
they met the inclusion criteria (summarised in Table 1), with some articles
contributing to several objectives. We did not use a formal ranking system to assess the
quality of evidence. A systematic review was not attempted for this topic due to the lack
of established index terms and the diversity in measurement of attitudes to CS and CS
decision-making in the literature.
Results

A total of 2642 individual papers were identified through our search strategy. 2619 were excluded due to duplication, 2444 based on title/abstract, and the remaining 120 after full-text review due to lack of quantification for the association between provider characteristics, provider attitudes and/or CS decision-making (Figure 2). A total of 23 unique studies were included in our review. Table 2 summarizes the key findings for each objective. Table S2 describes full data extraction of all included papers, split by sub-objective.

Of the 23 studies, one had a global scope, 12 (52%) were conducted in Europe, six (26%) in North America, while the remaining four were spread across the remaining regions from Australia, Russia, Nigeria and Japan. One study had a global scope, while notably, no studies were conducted in China or South Asia. Twenty-one studies had providers as study respondents, while in two, women who had given birth were study respondents (who were asked about reported provider characteristics and mode of delivery).

Association between individual provider characteristics and provider attitudes towards CS

Nine studies investigated the association between provider characteristics and attitudes towards CS. Of the 5 studies that investigated differing attitudes to CS by provider gender, one study in Italy (Monari et al., 2008) observed no difference in attitudes on CS rate in their own hospital or risk/benefits of the procedure (Monari et al., 2008) and one study in...
Sweden (Josefsson et al., 2011) found male and female providers’ reported similar “reasonable” CS rates for their hospital (13.7% vs 13.1%, p=0.028) (Josefsson et al., 2011) or risk/benefits of the procedure. One study in Sweden found no difference in percentage of male and female providers reporting a preference for vaginal delivery for themselves, a partner or their daughter (p=0.642) (Gunnervik et al., 2008) although more female than male providers felt that the current CS rate in their own department was too high (43.5% vs 34.1%, p=0.025) (Gunnervik et al., 2008). One global survey of obstetric care providers (Cavallaro, Cresswell and Ronsmans, 2016) found males reported a higher optimal CS rate than females (25% vs 20%, p=0.008) (Cavallaro, Cresswell and Ronsmans, 2016), although in Sweden (Josefsson et al., 2011) male and female providers report similar “reasonable” CS rates for their hospital (13.7% vs 13.1%, p=0.028). In the United Kingdom, male providers were more likely to opt for a CS “for themselves or their partners” than female providers (13% vs 9%, no p-value reported) (Lightly et al., 2014).

Of the 34 studies that investigated differing attitudes to CS by provider age, 2 studies conducted in Sweden reported that older providers were more likely to agree that CS is as safe as vaginal birth for mother and baby, and the best mode of delivery for a woman with fear of delivery (Gunnervik et al., 2008; Josefsson et al., 2011) (Josefsson et al., 2011) (Sahlin et al., 2017). However, one global survey (Cavallaro, Cresswell and Ronsmans, 2016) found no difference in reported optimal CS rate by age of providers (p>0.05) (Cavallaro, Cresswell and Ronsmans, 2016).

Two studies assessed the differing attitudes to CS by years of practice experience: one paper showed no difference between provider responses to questions on safety/risk of CS procedure (Josefsson et al., 2011). In Sweden, providers with longer work experience
were less likely to agree that vaginal birth increases the risk of incontinence (p=0.005) and prolapse (p=0.001) than providers with shorter work experience, however there was only weak evidence of a difference in agreement that elective CS is as safe for mother as vaginal birth (p=0.056) (Gunnervik et al., 2008). Six studies examined differences in attitudes to CS by provider occupation. Three studies (Sahlin et al., 2017) (Kisa, Kisa and Younis, 2017) (Monari et al., 2008) in Sweden, Turkey and Italy found that midwives were more likely than obstetricians to report that the CS rates in their own hospitals were too high (p=0.033; no p-value reported; p<0.001, respectively) (Monari et al., 2008; Kisa, Kisa and Younis, 2017; Sahlin et al., 2017) (Sahlin et al., 2017) (Kisa, Kisa and Younis, 2017) (Monari et al., 2008), and in Sweden researchers found midwives reported slightly lower reasonable CS rates than obstetricians (11.5% vs 13.8%, p<0.001) (Josefsson et al., 2011). Midwives in Italy were less likely than obstetricians to believe that CS provides benefits to the mother (p=0.02) and reported more risks associated with elective CS, including foetal distress and emotional stress (Monari et al., 2008). One study in the United States reported attitude scores more favourable to CS among obstetricians than midwives (no scores or p values were reported) (White VanGompel et al., 2018), while researchers in Australia found midwives were less likely to opt for elective CS in future pregnancies (11% vs 21%, no p value) (Turner et al., 2008). Only one study, conducted in Sweden, found no difference between midwives and obstetricians in agreement to vaginal birth being preferable to CS (p=0.809), but did find obstetricians were more likely to agree that CS is as safe as vaginal birth (p<0.001) (Josefsson et al., 2011).
Association between individual provider characteristics and CS decision-making

A total of 16 studies investigated the association between provider characteristics and CS decision-making. Of the nine studies examining the association between provider gender and CS decision-making, four studies observed no difference by gender in providers’ willingness to offer VBAC in women with two prior CS (Doret et al., 2010; M. et al., 2010), acceptance of CS on maternal request (Chigbu, Ezenyeku and Ezenkwele, 2010), or obstetrician CS rates (Dweik et al., 2014; Ito et al., 2014; Dweik et al., 2014). In clinical scenarios, the odds of male providers were more likely to recommending CS were 1.50 to 2.74 times higher than for female providers (OR=1.50; 95% CI 1.05 – 2.13) in the United States (Cheng et al., 2014) and Russia (Danishevski et al., 2008; Cheng et al., 2014) (OR=2.74, p=0.015) (Cheng, Snowden, Handler, Tager, Hubbard, Caughey, et al., 2014); male providers were also more likely to accept CS on maternal request with previous complicated deliveries (OR=1.92; p<0.001) in Norway (Fuglenes, Øian and Kristiansen, 2009) and to agree with CS on maternal request in Sweden (p<0.001) (Gunnervik et al., 2008). One study in the United States found male providers had higher mean CS rates when compared to their female colleagues, although the absolute difference was small (33.6% vs 29.9%, p=0.002) (McClelland et al., 2017). Of the seven studies investigating the association between provider age and CS decision-making, four observed little or no difference in age as a determinant for higher CS rates in Hungary (OR=0.61) (Dweik et al., 2014), in preferred delivery mode for their patients in Norway (Fuglenes, Øian and Kristiansen, 2009), willingness to offer VBAC (Doret et al., 2010), and for acceptance of CS on women’s request in Sweden.
The remaining two studies observed reported older providers were more likely than their younger counterparts to recommend CS (OR 1.84, p<0.001) in the United States and to perform CS in Russia (OR 1.04 with each additional year, p=0.033) (Danishevski et al., 2008; Cheng et al., 2014).

Of the six studies assessing the association between years of provider practice experience and CS decision-making, three studies found no difference in obstetricians’ willingness to offer VBAC in France (p>0.05) (Doret et al., 2010), accept maternal requests for CS in Nigeria (p=0.56) (Chigbu, Ezenyeaku and Ezenkwele, 2010), or recommend CS in the United States (p=0.05) (Cheng et al., 2014). One Swedish study observed that providers with ≥10 years’ work experience were more likely to agree with a woman’s right to elective CS than those with less work experience (p=0.022) (Gunnervik et al., 2008). Conversely, while an American British study also found physicians practicing obstetrics for >10 years were significantly more likely to offer VBAC than those practising for less (52% vs 36%, p<0.001) (Wells, 2010). Conversely, in two and in one studies from Saudi Arabia and the United States, conversely, found that more less experienced staff had up to 2.5-fold lower higher CS rates — one study found that less experienced staff (board certified) had 2.5-fold higher CS rate than consultants (Al-Kadri et al., 2015) (Wells, 2010).

Of the seven-six studies analysing the association between provider occupation and CS decision-making, one study in Sweden found no difference by provider occupation in their agreement to women’s request for CS (p=0.952) (Sahlin et al., 2017). In Poland, midwives were less likely to approve of maternal request for CS than obstetricians (14.8%...
vs 35.9%, p<0.001), while no difference was observed between Ukrainian midwives and obstetricians (p=0.1419) (Skręt-Magierło et al., 2016). One Argentine study found obstetricians had 4.4 times higher the odds more likely than midwives to perform CS on maternal request than midwives (95% CI 1.58,—12.09, no p value) (Rivo et al., 2018). Three papers directly examined differences in CS rates by occupation: in the United States, care by obstetricians compared to midwives was associated with an increased risk of unplanned CS in two studies - (adjusted OR: 1.43, 95% CI: 1.04—2.12) (Carlson et al., 2018) and (41.8% vs 29.9%, p<0.0001) (McClelland et al., 2017). In Canada, the relative risk of CS delivery was 0.48 when women cared for by family physicians had half the caesarean rate compared to obstetricians after adjusting for age, income, hospital type and a number of clinical risk factors. However, after adjusting for unmeasured confounders using instrumental variable analysis, the caesarean rate was 27% higher in family physicians compared to obstetricians (Dawe et al., 2017).

Association between provider attitudes towards CS and CS decision-making

Three studies examined the association between provider attitudes and their CS decision-making, using quantitative indices to measure attitudes. Two of these calculated a score based on general provider attitudes/traits (not specific to CS), while one study calculated a score specific to provider attitudes towards CS. The first paper from Norway calculated a fear index, measuring providers’ fear of complaints and litigation (rather than of the CS itself), and a risk attitude index, measuring general decision-making under uncertainty, using a previously validated tool measuring general decision-making under uncertainty (Fuglenes, Øian and Kristiansen, 2009). Providers with a higher fear score were more likely to recommend CS in all five ambiguous clinical...
scenarios (OR range: 1.05-1.10), however risk attitude was not associated with CS recommendation in any of the scenarios. The second study in Wales calculated a general anxiety trait score among attending registrars using a validated psychometric questionnaire, and found a strong correlation between higher anxiety trait levels and registrars’ emergency CS rate (Pearson’s correlate 0.722, p<0.001) (Allcock, Griffiths and Penketh, 2008).

Another study conducted in the United States calculated a score specific to provider attitudes toward CS, using a previously validated questionnaire survey instrument of provider birth attitudes (including benefits of caesarean section and fear of vaginal birth) to calculate an attitude score out of 5, with higher scores indicating more favourable attitude to CS. Providers’ CS rates were significantly associated with their attitude scores, with each 1-point increase in attitude score associated with a 21% increase in CS rates (incidence rate ratio: 1.21, 95% CI: 1.002–1.45) (White VanGompel et al., 2018). One second study in Wales calculated a general anxiety trait score among of attending registrars using a validated general psychometric questionnaire, and found a strong correlation between higher anxiety trait levels and registrars’ emergency CS rate (Pearson’s correlate 0.722, p<0.001) (Allcock, Griffiths and Penketh, 2008).
Discussion

Results from this review show that attitudes towards CS (including anxiety trait scores and fear of litigation) were associated with a higher propensity to perform caesareans. In contrast, the evidence regarding individual provider characteristics, such as gender, age and years of practice experience showed varied results. Around half of studies found that male providers were more likely to have favourable attitudes towards caesareans; although these were all conducted in Western Europe, limiting their generalisability; and half of studies found that male providers were more likely to perform CS, most of which were conducted in Scandinavia and North America. There was mixed evidence that older providers have more favourable attitudes and are more likely to perform caesareans; while years of practice showed little evidence of a difference in attitudes with half of studies reporting no association, the remaining evidence presents inconsistencies in the direction of CS decision-making, or inconsistent associations with CS decision-making. Midwives consistently have a less favourable opinion of CS than obstetricians, although birth attendant occupation was not consistently associated with CS rates.

Roter et al. (2002) and Janssen et al. (2012) have commented/suggested that male providers often have poorer communication with patients when compared to their female counterparts, where female providers often engage in more positive and informative dialogue with a more patient-centred approach, which may influence the likelihood of reducing maternal request for CS due to their patients being more educated by their attending physician due to improved patient education and confidence (Roter, Hall and Aoki, 2002; Janssen and Lagro-Janssen, 2012). Another possible explanation for the
gender differences in attitudes towards CS could be the choice of obstetrician; Furthermore, Liu et al. noticed that patients in Taiwan would often specifically request a female obstetrician, which could lead to reduced clinical experience for male providers, potentially accentuating their anxiety of vaginal birth and distorting risk perceptions of the CS procedure (Liu et al., 2008).

It is unclear why older providers were found to have a different lower risk perception than their younger colleagues, although in Gunnervik (2008)’s study, the older physicians reported feeling a higher pressure and demand from midwives to end an ongoing delivery with CS, compared to their younger and less experienced colleagues (Gunnervik et al., 2008). This may lead to obstetricians becoming desensitised to the risks of performing CS, increasing their likelihood of recommending or recommending a CS over time. Alternatively, Sahlin (2017)’s review of old and new medical textbooks showed that listed indications of CS had increased over time, which may explain why older providers relate differently to CS than their younger counterparts (Sahlin et al., 2017).

One possible explanation for midwives consistently having less favourable attitudes towards CS could be related to their training and healthcare approach. One study in the Netherlands suggested that the differing attitudes by occupation may be due to traditional care models in Western European countries where midwives have a less medicalised attitude to childbirth compared to obstetricians, who often take a more biomedical approach; the authors state that rising CS rates may be a consequence of their primarily midwife-led care model becoming increasingly obstetrician-led in the Netherlands (Offerhaus et al., 2015). Another explanation may be that in addition, obstetricians may be more comfortable and involved with surgical
procedures and tend to see more complicated pregnancies than midwives, which may potentially lead to a biased perspective of the risks of vaginal delivery overall. One study observed midwives were less risk-averse than obstetricians, and would accept higher levels of risk before opting for a CS (Cox, 2011), while another found midwives were willing to accept significantly higher risks of potential complications of vaginal birth than clinicians (Turner et al., 2008), suggesting differences in risk attitude could also contribute to explaining the difference in acceptance of CS between midwives and obstetricians. The observed higher CS rates among deliveries assisted by obstetricians and family medicine physicians compared to midwives likely reflects both more favourable attitudes towards the procedure as well as differences in risk of deliveries of their patient populations, in settings where deliveries without complications are managed by midwives and physicians are responsible for the final decision to perform a CS.

Our findings echo the conclusions of the review by Panda and colleagues (2018), which identified that clinicians’ personal beliefs are the main factor identified by providers as influencing their decision to perform CS, alongside individual provider characteristics and health system factors. Our review confirms that attitudes to CS and anxiety/fear can be associated with clinician’s decision, although the evidence base is currently limited. In addition, the quantitative scores used in included studies had not all been validated. The one paper identified that calculated an attitude score towards CS did not include a number of important factors that emerged from Panda’s review, such as provider’s responses regarding convenience of CS or confidence levels in performing CS, and therefore may not have captured all relevant attitudes (White VanGompel et al., 2018).
General risk scores were not associated with CS in one study (Fuglenes, Øian and Kristiansen, 2009), although higher general anxiety trait and higher composite attitude score (i.e., more favourable attitudes towards CS) provider attitudes regarding “fear of vaginal birth” and “safety by mode or place of birth” were associated predictive of higher with provider’s CS rates in other studies (Allcock, Griffiths and Penketh, 2008; White VanGompel et al., 2018) (Allcock, Griffiths and Penketh, 2008); for the former study, the results observed may be due to a lack of proximity how closely related the of the general risk score was to how-clinical as make CS decision makings about caesareans rather than a true lack of effect. Gawande (2006) argues that the increased use of CS is partly due to a desire to manage the risks of vaginal deliveries: scheduled CS are less risky than emergency CS, and the reliability of caesareans in producing better Apgar scores may encourages providers to choose them, despite the increased risk to mothers (Gawande, 2006), suggesting a possible explanation for that-risk-adverse providers may indeed having higher CS rates.

Most of the evidence concerning providers and CS decision-making concerns the link between individual characteristics and decision-making. There is scarce evidence on provider attitudes towards CS, and we only identified three studies that calculated a quantitative attitude index score, highlighting the need to further understand the specific psychological traits or opinions of CS leading to more interventionist practice. This scarcity of evidence is problematic because providers’ attitudes are a more proximal risk factor for CS decision-making than provider characteristics; furthermore, characteristics such as age and gender are non-modifiable, offering little opportunity for intervention to limit unnecessary caesareans. Based on the three identified studies, the association

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between providers’ favourable CS attitudes towards CS and higher practice of CS seems strong, suggesting efforts to prevent unnecessary CS should target provider attitudes to CS should be explored as an avenue for preventing unnecessary CS.

Our study has some limitations. We only considered articles published in English, although only 4 publications were excluded due to language. The diversity in measurement of provider attitudes and CS decision-making across studies was a challenge for synthesising results. The majority of studies used Likert scales to measure agreement with statements on risks related to caesareans, while others used questionnaires and clinical scenarios to capture views and opinions. These proxies may not represent provider’s true CS rates, however vignettes have been shown to be valid in other contexts, and similar patterns were observed with studies examining the association with CS rates (Mohan et al., 2013; Evans et al., 2015). There is a lack of consensus in the literature on how to calculate attitudes indices measuring attitudes towards CS among providers. We suggest adapting and validating a version of the birth attitudes score adapted by White VanGompel (2018) (White VanGompel et al., 2018) to ensure all important factors influencing propensity to perform CS are captured. This score comprised Likert-style items on factors likely to affect primary caesarean among low-risk women compared to vaginal delivery for women and babies, we suggest by including additional factors such as opinions on convenience of CS and confidence of performing a vaginal birth (as identified as possibly influencing decision-making by Panda et al. (Panda, Begley and Daly, 2018) and Savage et al (Savage, 2007)), to ensure all important factors influencing propensity to perform CS are captured.
The key strength of our paper was the conceptual framework we developed to describe the relationship between individual provider characteristics, provider attitudes towards CS, and CS decision-making. This study reviewed the association between these three groups of factors separately, identifying stronger evidence for the association of the more proximal risk factor (attitudes to CS) than distal risk factors (individual characteristics) with clinical practice, supporting our conceptualisation of the relationship between these variables.

Our results suggest that interventions targeting providers’ attitudes towards CS may help reduce unnecessary interventions. A meta-analysis by Chaillet (2007) of evidence-based strategies for reducing CS rates only found one study incorporating physician education of maternal and foetal benefits of vaginal birth (p<0.001 for reduction of CS rates post-intervention). To our knowledge, no studies have attempted to change provider risk perceptions towards CS, however previous work on providers’ attitudes towards evidence-based guidelines may help inform any future interventions. From Grimshaw (2001) it is known that passive interventions alone such as posters in the workplace are unlikely to elicit change in practice, and multifaceted approaches incorporating both active and passive components at regular intervals are more effective at changing attitudes (Grimshaw et al., 2001). For CS, regular audits and feedback on CS rates in each clinical practice, and regular training on indications for CS may help remind providers of the risks of CS and support them in assisting complicated vaginal deliveries; it may also be useful to provide support after experiencing a traumatic delivery to mitigate fear attitudes. Implementation of evidence-based guidelines combined with a mandatory second-opinion policy may also curtail the influence of personal attitude on decision-making and reduce unnecessary procedures.
and has been shown to slightly reduce CS use (sites in health facilities in Argentina, Brazil, Cuba, Guatemala, and Mexico and in Taiwan (Althabe et al., 2004; Liang et al., 2004). Additionally, recently one hospital programme in the United States found a significantly decreased primary CS rate when residents were supervised by a senior obstetrician (Bardos et al., 2017). Further research is needed to understand in which policy and healthcare organisation contexts mandatory second opinions could help prevent unnecessary CS, and what other interventions may be effective. The WHO recently reviewed the evidence on non-clinical interventions to reduce unnecessary CS (World Health Organization (WHO), 2018) however, based on the evidence available recommendations focus on educating women about the risks of CS and improving provider adherence to protocols (through audits and feedback, and mandatory second opinion). No guidance exists on interventions directly challenging provider beliefs or attitudes regarding CS, which our results suggest are worth exploring. within existing policies of decision-making to understand in which contexts mandatory second opinion could help prevent unnecessary CS, regarding The need for further research to guide the development of non-clinical interventions to reduce unnecessary caesarean sections led the WHO to establish a working group and publish specific guidance on the issue.

Finally, in our review we identified a lack of studies from certain geographical areas where CS rates are known to be exceptionally high, such as East and South Asia, Eastern Europe, the Middle East and Latin America and therefore it would be important to conduct further studies to understand the influence of provider characteristics and attitudes in these regions.

Conclusion
As key decision-makers for CS, obstetricians drive the overall CS rates within their countries. However, the factors that influence their decision are multiple and difficult to quantify. To our knowledge, this was the first review of the quantitative evidence for on the association between provider characteristics, attitudes, and decision-making for CS, aiming to synthesise what is known about how the former two domains affect the latter CS decision-making in practice. Our results indicate that provider attitudes appear to be an important determinant of CS decision-making — confirming obstetricians’ opinions synthesised in a prior review (Panda, Begley and Daly, 2018) — and that interventions aiming to change provider attitudes may help to prevent unnecessary CS. Heterogeneity was observed in our findings related to individual provider characteristics, suggesting that associations with CS attitudes and decision-making are context-specific and therefore any interventions to prevent unnecessary CS must be tailored to the setting. Provider gender, age and occupation are not modifiable through intervention, but they may be helpful in targeting interventions to change provider attitudes and ensure women receive the safest and most appropriate care at birth.

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References


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Two-stage.


Figure captions

Table 1. Inclusion and exclusion criteria

Table 2: Summary of key findings for each objective

Figure 1. Conceptual framework of individual provider factors influencing CS rates.

Figure 2. Identification of studies

Supplementary Table 1. Example search strategy (PubMed)

Supplementary Table 2. Data extraction table.