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CLINICAL ARTICLE

Knowledge, attitudes, and practices of obstetrics residents towards cesarean delivery–sparing procedures

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Abstract

Objectives: Obstetrics and gynecology (ObGyn) trainees will impact future practice patterns and their cesarean rates. The knowledge, attitudes, and practices (KAP) of ObGyn residents have not been extensively studied. We aimed to assess KAP towards mode of delivery and cesarean-sparing procedures among ObGyn trainees.

Methods: This is a multicountry study that was conducted in Brazil, Egypt, Ghana, Sweden, Thailand, Uganda, and the United States. A questionnaire was developed, piloted, translated, and adapted for ObGyn trainees in seven countries. The questionnaire was administered to assess knowledge regarding safety of cesarean and vaginal delivery (VD), attitudes towards mode of delivery, and perceived competency in performing cesarean-sparing procedures (forceps and vacuum-assisted VD, external cephalic version [ECV], and breech VD). The outcomes included the KAP of a group of global trainees, including number of procedures towards cesarean sections and cesarean-sparing procedures.

Results: Of 744 complete responses, most residents perceive VD as safer than cesarean delivery for the mother (67%) and baby (55%). More trainees in Sweden (92%) and the United States (73%) agree that patients with breech presentation should be offered an ECV, compared with Ghana (8%), Egypt (8%), and Uganda (10%), and only in Sweden do most trainees feel competent with ECV (62%). Trainees in Ghana (86%) and Uganda (78%) report perceived competency with singleton breech VD while few do in Sweden (7%), Thailand (5%), and the United States (2%).

Conclusion: Most trainees agreed on the comparative risks of CD versus VD but there is marked variation in self-perceived competency around cesarean-sparing procedures, particularly ECV and breech delivery. These findings can provide useful insights into focus areas for ObGyn training.

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KEYWORDS
cesarean section, global surgery, resident education

Globally, cesarean rates continue to rise. In 2015, 21.1% of all live births globally were performed by cesarean delivery (CD), nearly double the 2000 rate.[1,2] The rise in CD rates is complex and multifactorial, with substantial variation in rates between and within countries, suggesting varying regional and local practices.[3]

Postgraduate training is a formative period in a physician's career. During this time, trainees acquire the competencies and skills needed for independent practice; therefore, practice environments and the attitudes held by their supervisors are likely to influence their own attitudes and practices in the future.

For obstetrician and gynecologists (ObGyns), cesarean-sparing skills, such as breech and assisted vaginal deliveries (AVDs) acquired during residency training likely depend on local practice patterns and it is likely that gained competencies influence the attitudes of residents and their future practice. There is marked variation in obstetric training models depending on place of training (rural vs. urban), role of midwifery, and local cesarean rates. While several studies have examined the knowledge and attitudes of patients,[4,5] physicians,[6,7] and students[8] towards mode of delivery, and some suggesting obstetricians play a role in driving the rising rate,[7] very little is known about the knowledge, attitudes, and practices (KAP) of ObGyn postgraduate trainees and how this is influenced by their practice environment.[9,10]

In this study we aimed to characterize the KAP of Ob/Gyn trainees practicing in seven countries with varying cesarean rates and different models of training. This would allow us to better understand global trends in surgical education that could be driving CD rates. We hypothesized that there would be significant variation between countries.

1 | METHODS

1.1 | Study design

This is a cross-sectional multicountry survey study of ObGyn trainees in seven countries aiming to assess the KAP towards mode of delivery.

1.2 | Participants

The participants were trainees in ObGyn in any year of training. All included countries have a structured training program and an official registration of trainees pursuing specialist training, although the structure and duration of training varied by country. Countries were included for several reasons, including: (1) to obtain geographic and economic diversity (i.e. global north and south and low-, middle-, and upper-income countries), (2) variation in CD rates, and (3) where longstanding or new academic partnerships facilitated distribution of the survey. The seven represented countries include Brazil, Egypt, Ghana, Sweden, Thailand, Uganda, and the United States. Inclusion criteria included anyone officially enrolled in an ObGyn training program in the countries chosen who had completed at least 6 months of training.

1.3 | Setting

For details on regulation of training, duration of training, and workforce division between ObGyns, general practitioners, and midwives in each participating country, see Data S1.

1.4 | Tool

A literature search revealed no existing validated questionnaire to address our research question, thus we developed a questionnaire to assess the KAP of trainees towards mode of delivery. The questionnaire was informed by existing literature[4,6–8,10] and by the learning objectives set by training programs in the participating countries. The questionnaire was co-designed with research and clinical experts from participating countries to ensure the questions were suitable for each setting. While we took into account face validity, content validity, internal validity, and external validity when developing the questionnaire, this is not a validated questionnaire.

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The questionnaire consists of four major sections: (1) knowledge, (2) attitudes, (3) practices, and (4) demographics. Knowledge questions assessed the respondent's knowledge about indications and risks associated with different modes of delivery and perceived competency in performing CD-sparing procedures, and knowledge about recommended CD rates. We defined CD-sparing procedures as procedures that are known to safely reduce CD rates, including external cephalic version (ECV) for breech presentation, AVD (vacuum or forceps), breech VD, VD of twin gestations when the presenting twin is cephalic, manual rotation for persistent occiput posterior, and trial of labor after CD. Attitude questions related to decision-making to determine mode of delivery. Practice questions asked about the procedural volume on a given month of obstetric training. Demographic questions captured age, sex, year of training, setting of training (public vs. private), and ethnicity.

The survey flow asked knowledge questions first, followed by attitude questions and finally practice questions. The demographics questions were at the end. Respondents were able to change their answers at any time while filling out the questionnaire. Completion time during the pilot was approximately 15 min.

Only select questions are presented in this article. We piloted the questionnaire with 49 trainees from Brazil, Sweden, and the United States to assess face validity and ease of administration seeking feedback from participants. Face validity was assessed by clearly defining what we were measuring, by having experts (trainees and ObGyns) review it, getting feedback from target users with focus on clarity and wording and revising the instrument based on feedback. Minor modifications were made to the wording of the questions, and redundant questions were removed based on the pilot results. The meaning of the questions was not changed. Pilot participants were excluded from the final analysis. Questionnaires were translated to the local language when recommended by the collaborator from that country. See Data S2 for more details on survey administration.

1.5 | Data collection

Surveys were administered using the REDCap electronic data collection tool[11] and paper surveys. Data were securely stored in RedCap and analysis was performed with aggregate data, therefore individual participants could not be identified. Paper surveys were transcribed to RedCap and the paper copy was stored in a secure place. Methods of distribution varied by country and utilized email or WhatsApp to maximize distribution while adhering to local regulations for trainee contact. Three reminders to complete the survey were sent to each participant. The online survey remained open for 1 year. An information sheet describing the study and participants' rights accompanied the survey. Informed consent was provided implicitly by voluntarily agreeing to fill out the survey. Details of survey administration by country are provided in Data S2.

1.6 | Statistical analysis

Complete responders were those who completed all questions related to procedural experiences and perceived clinical competency. Descriptive statistics, such as means and standard deviations and medians and interquartile ranges (IQRs), were used to describe the demographics, knowledge, attitudes, and practices of the trainees, stratified by country.

To assess competence in various CD-sparing skills, trainees' answers were categorized as competen if the respondent answered they could perform the skill independently or with minimal supervision; requiring additional supervision or inability to perform was considered a perceived lack of competency. To test the robustness of our analysis and its assumptions, a sensitivity analysis focusing on competency of senior residents (i.e. those in the last year of training) was conducted. All statistical analyses were conducted in StataIC, version 16.0.

1.7 | Ethics

Ethics approval for the multicountry study and US data collection was obtained from MassGeneral Brigham (2018P001864). Approval was also obtained from the ethics boards of the University of Sao Paulo for Brazil (2.807.112), AlAzhar University for Egypt (2022P000003), University of Ghana Ethical and Protocol Review Committee for Ghana (CHS-Et/M.3-P4.2/2021–2022), Mbarara University of Science and Technology Research Ethics Committee (01/02–20) and the Uganda National Council of Science and Technology (HS758ES) for Uganda, and Bangkok Central Research Ethics Committee (CREC080/62BRs) for Thailand. The protocol was exempt from ethics approval in Sweden.

2 | RESULTS

In total, there were 1474 respondents to the survey, of which 744 responses met our criteria for complete responders for analysis (Figure S1). Survey response rates could not be determined, as the total number of residents in each country was not known because most countries did not have comprehensive mailing lists of all their trainees. Survey completion rates varied from 54% to 100% depending on the country. The demographic characteristics of participants and their countries are described in Table 1.

2.1 | Knowledge

The majority of respondents in all countries agreed that a VD is safer for the mother (67%) and baby (55%) compared with a nonmedically indicated CD (Figure 1). Regarding management of a singleton breech pregnancy at term, the management options are ECV, breech delivery, or CD. Most respondents in Sweden (92%) and the United States

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TABLE 1 Demographic characteristics of respondents.

Country statistics	Sweden	Brazil	United States	Uganda	Thailand	Ghana	Egypt
National CD rate (%)	19 (1)	58 (2)	32 (3)	4.7 (4)	35 (5)	21 (6)	52 (7)
No. of years in training program	4	3[a]	4	3	3	3	3
Survey respondents demographics, *n* (%)							
	***N* = 117**	***N* = 63**	***N* = 140**	***N* = 111**	***N* = 257**	***N* = 36**	***N* = 20**
Completion rate	70	70	61	89	94	54	100
Sex							
Female	85 (73)	40 (64)	96 (69)	25 (23)	179 (70)	11 (31)	8 (40)
Male	10 (8.5)	8 (13)	7 (5.0)	64 (58)	61 (24)	25 (69)	12 (60)
Prefer not to answer	1 (0.9)	1 (1.6)	0 (0.0)	5 (4.5)	8 (3.1)	0 (0.0)	0 (0.0)
Nonbinary	0 (0)	0 (0.0)	1 (0.7)	0 (0.0)	3 (1.2)	0 (0.0)	0 (0.)
Missing	21 (18)	14 (22)	36 (26)	17 (15)	6 (2.3)	0 (0.0)	0 (0.0)
Age, mean (SD), y	34. (3.9)	28.0 (4.5)	29 (2.1)	32 (4.7)	28 (3.0)	35 (2.8)	31 (3.1)
Year of trainee							
1	12 (10)	22 (35)	21 (15)	52 (47)	71 (27)	11 (31)	3 (15)
2	29 (25)	13 (21)	35 (25)	32 (29)	80 (31)	12 (33)	4 (20)
3	30 (26)	11 (17)	33 (24)	27 (24)	95 (37)	12 (3)	6 (30)
4	24 (21)	—	15 (11)	—	4 (1.6)	1 (3)	—
Missing	22 (19)	17 (27)	36 (26)	0 (0)	7 (2.7)		7 (35)
Type of training hospital							
Public	95 (81)	47 (75)	65 (46)	87 (78)	241 (94)	33 (92)	5 (25)
Private	1 (0.9)	2 (3.2)	38 (27)	23 (21)	10 (3.9)	1 (3)	2 (10)
Mix of public and private	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	2 (6)	0 (0)
Missing	21 (18)	14 (22)	37 (26)	199 (64)	6 (2.3)	0 (0)	13 (65)

Note: Adapted from National Board of Health and Welfare[12]; Observatório Obstétrico Brasileiro[13]; National Center for Health Statistics[14]; Atuheire et al.[15]; Policy Brief[16]; Ghana Statistical Service (GSS) and ICF[17]; Demographic and Health Survey-Egypt.[18].

Abbreviations: CD, cesarean delivery; SD, standard deviation.

[a]With the possibility of an additional year in specific areas such as fetal medicine.

(73%) strongly agreed that an ECV should be attempted. However, only a minority of trainees in Ghana, Egypt, and Uganda (8%–10%) agreed that an ECV should be attempted. In all countries, less than half of all participants agreed that a singleton breech should undergo a CD (Figure 1).

Regarding the immediate and long-term risks of CD, most respondents in all countries agreed that CD increases the risk of placental abnormalities, uterine rupture in subsequent pregnancies, and emergency hysterectomy. There was variation among countries on perceived risk of fistula by mode of delivery, with 59.6% of trainees in Brazil responding that a CD increases the risk, while 65% of trainees in Sweden responded that VD increases the risk of fistula. A large portion of respondents in all countries (from 41% in Sweden to 70% in the United States) reported no difference on the mode of delivery on the impact of future sexual dysfunction. Most trainees in all countries answered that CD reduces the risk of pelvic organ prolapse, while there was more variation in responses regarding the risk of urinary incontinence (Figure 2).

2.2 | Attitudes

In Thailand (60%), Uganda (60%), and the United States (70%), most respondents believe that in the absence of medical indication, the patient and physician should decide the mode of delivery together. In Sweden (55%), more respondents indicated a preference for the physician making the decision (Figure 3). Most trainees think that in the absence of medical indication for CD, physicians prefer for patients to have a VD (72% in Thailand to 100% in Ghana and United States). In Thailand, only 43% of respondents believe that a VD is more convenient for patients, while in Ghana 93% of respondents believe this.

2.3 | Practices

The number of CDs performed independently by a trainee in a month varied from 8 (IQR, 5–10) in Sweden to 20 in Egypt (IQR, 10–32.5). Trainees in Sweden reported the most exposure to ECVs,

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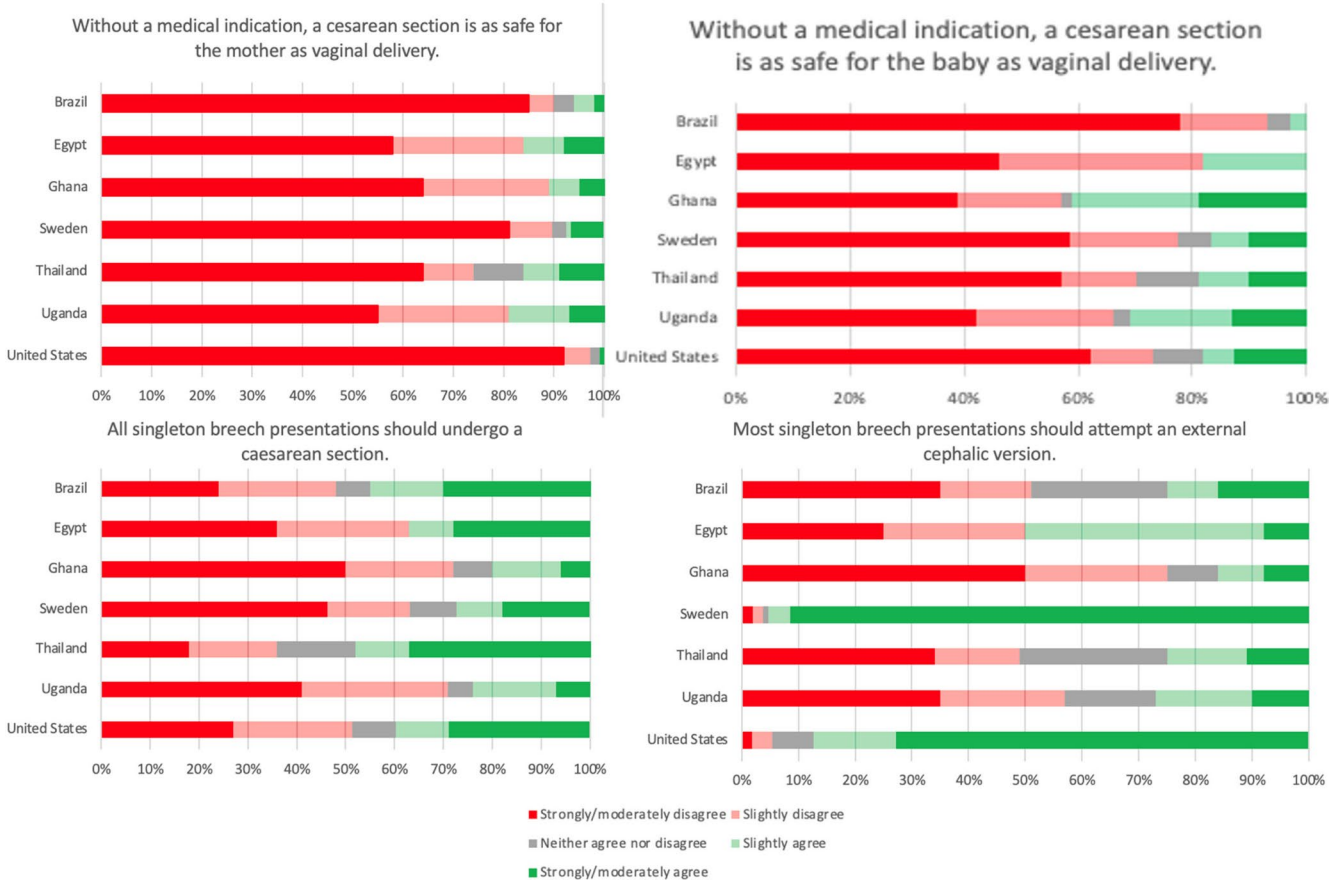


FIGURE 1 Trainees' knowledge on safety of mode of delivery. Answers by country to the question of: "Based on the best evidence available today, what is your view of the following statements" to assess the safety for mother and baby by mode of delivery, mode of delivery for singleton breech and the role of external cephalic version.

performing on average of 3 (IQR, 1–4) per month and to vacuum deliveries, with 2 (IQR, 1–4) per month.

In all countries, <30% of trainees reported perceived competency with forceps-assisted vaginal deliveries (FAVDs) either independently or under minimal supervision. In Brazil and Egypt, only 13% and 12.5% of trainees, respectively, reported a perceived competency performing a vacuum-assisted VD (VAVD), while >70% of trainees in Ghana and Uganda reported competency. There was also large variation in reported perceived competency with singleton breech VDs. Less than 10% of respondents in Sweden (7%), Thailand (5%), and the United States (2%) reported competency with singleton breech VDs, while 86% and 78% of trainees in Ghana and Uganda, respectively, reported competency with breech VD. A similar pattern was seen in delivering a second twin in the breech presentation. Perceived competency with ECV was limited in most countries, with the highest proportion of perceived competency reported by Swedish trainees (62%) and all other countries reporting <40%. There were also large variations in competence with manual rotation of a malpositioned cephalic fetus; while in Egypt, 42% of respondents were competent, in Sweden <5% were (Figure 4). We found a greater proportion of senior residents reported perceived competency across skills, and our sensitivity analysis found similar patterns of variation of perceived competencies for skills across countries (Table S1).

3 | DISCUSSION

3.1 | Main findings

We examined the KAP of ObGyn trainees towards mode of delivery and cesarean-sparing procedures in diverse global settings. Our survey demonstrated broad agreement among trainees among countries on the relative safety of VD where no medical indication for a CD exists, and the increased risks posed by a CD. However, we describe substantial variation on knowledge of risk for pelvic floor disorders, disagreement on the management of breech pregnancies both in terms of appropriateness for ECV and suitability for VD, as well as substantial variation in reported perceived competency for ECV and breech VD. Overall, we found low rates of perceived competency in FAVD, even among senior residents, and substantial variation in perceived competency for VAVD.

3.2 | Interpretation

Our findings regarding knowledge of the relative safety of VD over CD in the absence of an indication for CD are consistent with literature that has shown globally that midwives and obstetricians

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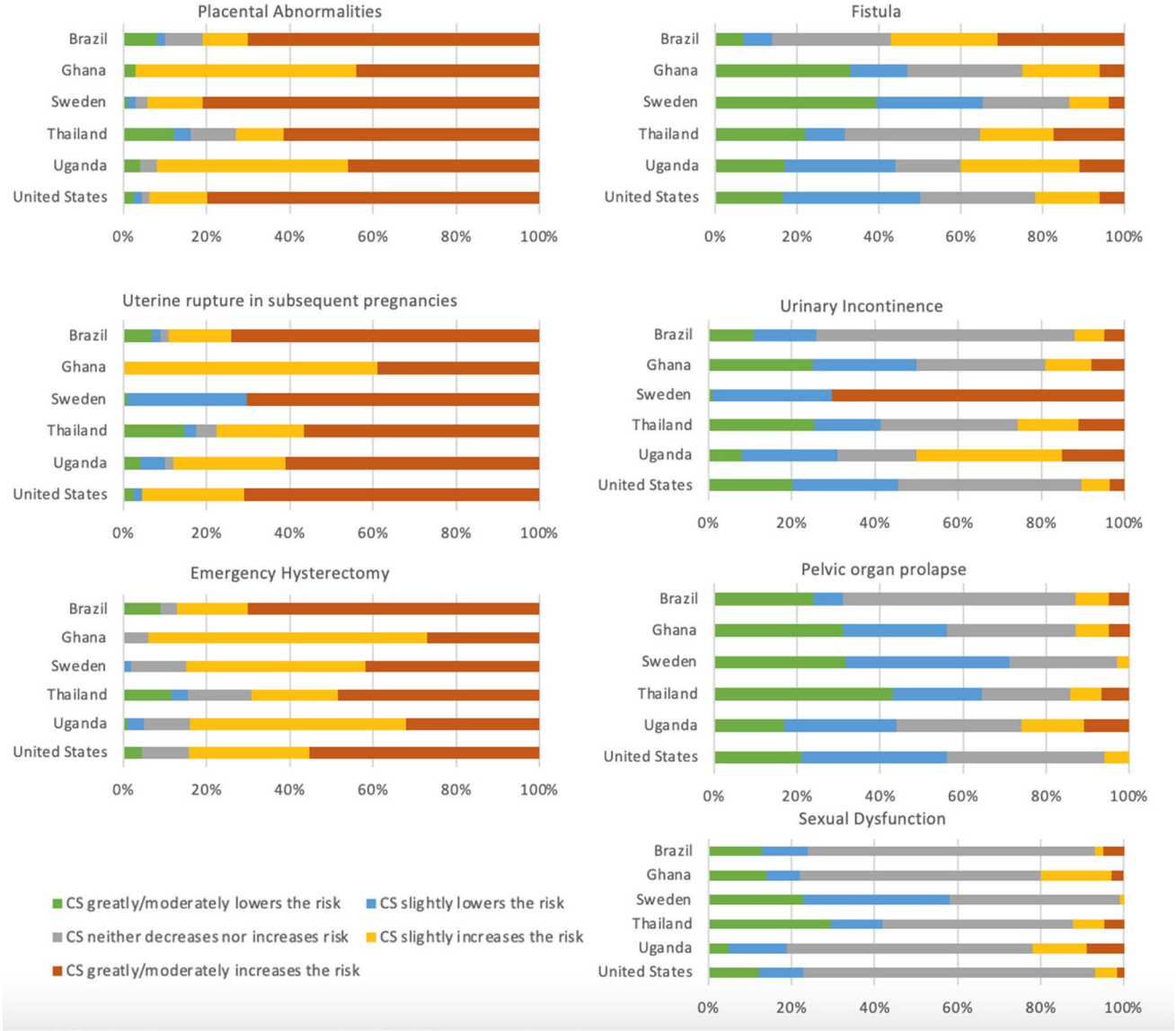


FIGURE 2 Knowledge questions on the maternal risks of CS and VD. CS, cesarean section; VD, vaginal delivery.

generally recognize vaginal birth to be the safer and preferred mode of birth.[19,20] There is limited literature exploring the knowledge and attitudes among ObGyn trainees towards mode of delivery. One survey conducted among Canadian trainees examined their agreement with Canadian guidelines on practices that influence cesarean rates, including trial of labor after CD and assisted VD, finding favorable attitudes to these practices (11). However, this study did not examine attitudes around perceived convenience and preference of patients for mode of delivery, and there are no other studies surveying trainees with which to compare our results. Our results showed variation in attitudes by country around the perceived convenience and preference for mode delivery for patients; however, there was no clear pattern of influence by income status of country (i.e. high-income vs. low- to middle-income countries [LMICs] or region). More work will be needed to understand how practice environments and cultures within different settings may drive the observed variation in attitudes.

Singleton breech presentation at term can be managed with a VD or CD, or an ECV followed by VD. There is no international consensus on optimal management of breech presentation, but multiple national guidelines from high-income countries recommend offering ECV.[21,22] Notably, our findings suggest reported agreement on the use of ECV seems to fall along resource settings: more respondents in high-income countries (Sweden and the United States) agreed most singleton breech presentations should undergo an ECV, compared with a much lower proportion of respondents in LMICs (Brazil, Ghana, and Uganda). This pattern was not seen for reported competency in ECV, although, notably, the lowest proportion of trainees reporting perceived competency in ECV were in Brazil and Egypt—the two countries with the highest national CD rates (56% and 52%, respectively). On the other hand, a high proportion of trainees from the three represented African countries (>60%) reported perceived competency with singleton breech vaginal deliveries. In contrast, <10% of trainees in Sweden, Thailand, and the United

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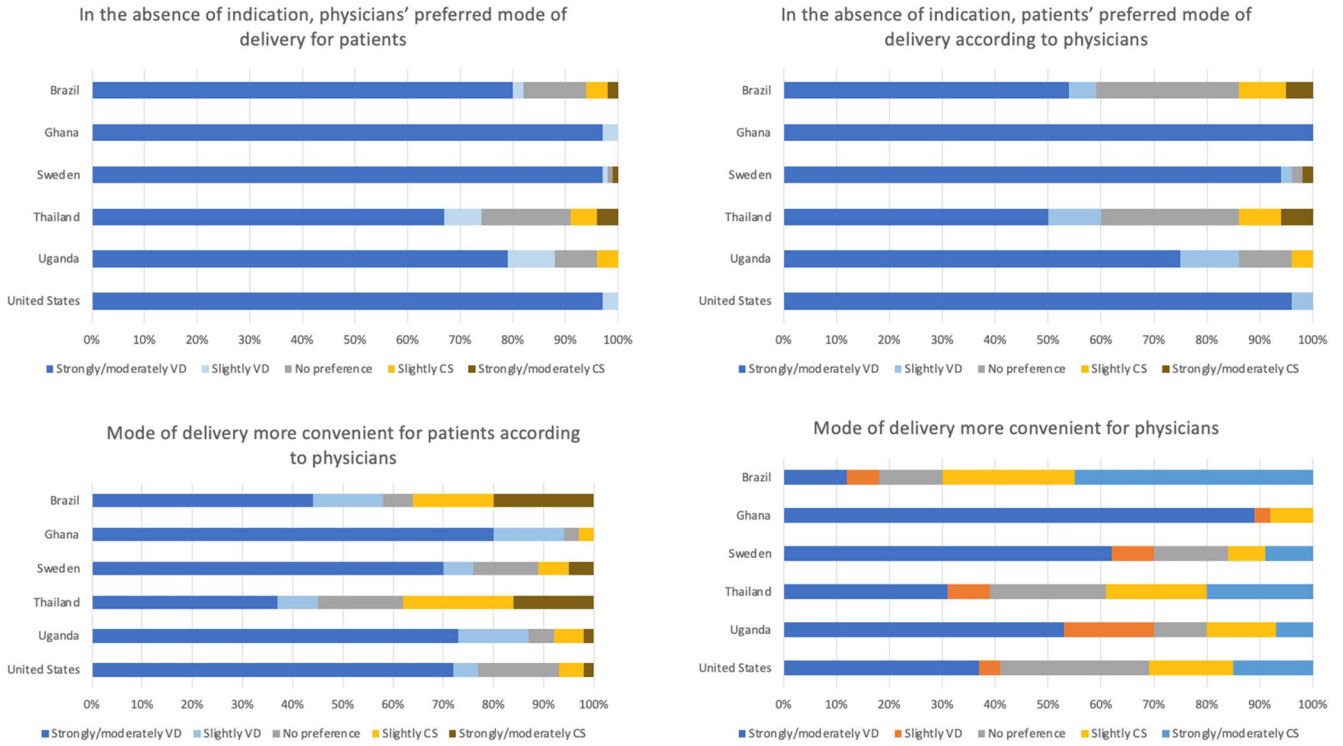


FIGURE 3 Attitudes regarding personal preference and convenience for patients and physicians in the absence of medical indications for a CS. CS, cesarean section; VD, vaginal delivery.

States reported perceived competency with this procedure. Our findings on the indication for ECV, skills around ECV, and singleton breech delivery skills very likely reflects the training environment and health system structures that influence when and how pregnant patients with breech presentation present for prenatal care and delivery. In contexts where antenatal care is more limited, and ultrasound availability during antenatal care is sparce, opportunities for ECV and training in ECV may be rare. Further delays in diagnosis and presentation to facilities for birth may mean that patients may subsequently present in advanced labor in a breech presentation necessitating a breech delivery. Our results highlight the need for further work to explore the use of ECV and/or vaginal breech delivery and their outcomes in global settings, for international consensus on the role of ECV and vaginal breech delivery, and increased global training opportunities on basic ultrasound and ECV. Similarly, further exploration is needed on training opportunities to strengthen skills for breech VD in appropriate circumstances. Despite the lack of international consensus on management of breech deliveries, national guidelines agree that VD can be a safe alternative to CD in carefully chosen candidates and with skilled providers.[21,22]

In the past decades, as the CD rates have increased, operative vaginal birth has declined. Despite being a safe alternative and being considered an integral part of obstetric emergency care,[23] most trainees in our study reported a lack of perceived competency with forceps-assisted deliveries, even among senior residents. In addition, in the two countries with the highest national CD rates (Brazil and Egypt), few residents reported perceived competency with VADs (<15%), compared with >70% of trainees in countries with low CD rates. Interestingly, in Sweden, where CD rates are within the World-Health Organization (WHO)–recommended range, most trainees are not competent with forceps, but they are with vacuum. Our findings on reported perceived competency around operative delivery reflects global patterns with low rates of operative VD seen in LMICs and declining rates globally.[24–26] While the factors for this decline are multifactorial, there is evidence to suggest that with concerted effort, AVD can be reintroduced and rates can be reversed.[27–29] The WHO has recognized the importance of increasing the use of AVD and recently published its research agenda to address this issue.[23] Our findings emphasize the importance and urgency of prioritizing training around AVD and calls for innovative solutions for training with fewer senior or teaching obstetricians retaining this skill.

Rising global CD rates are driven by a variety of factors and, therefore, to address this concerning rise, a multifactorial approach will be needed. While patient factors, such as increased rates of advance maternal age or comorbidities, will be challenging to address, there is an opportunity to focus on the training of future ObGyns. Our findings have implications on ObGyn resident education. There is no global consensus or defined standard reference of number of procedures to be performed to determine competency. Determining the number needed to achieve competency and ensure trainees meet these criteria could increase their confidence to perform these procedures in the future. Our findings demonstrate marked variation in self-perceived competency around cesarean-sparing procedures, particularly ECV and breech VDs. Use of simulation to increase competence with breech deliveries or with point-of-care ultrasound to

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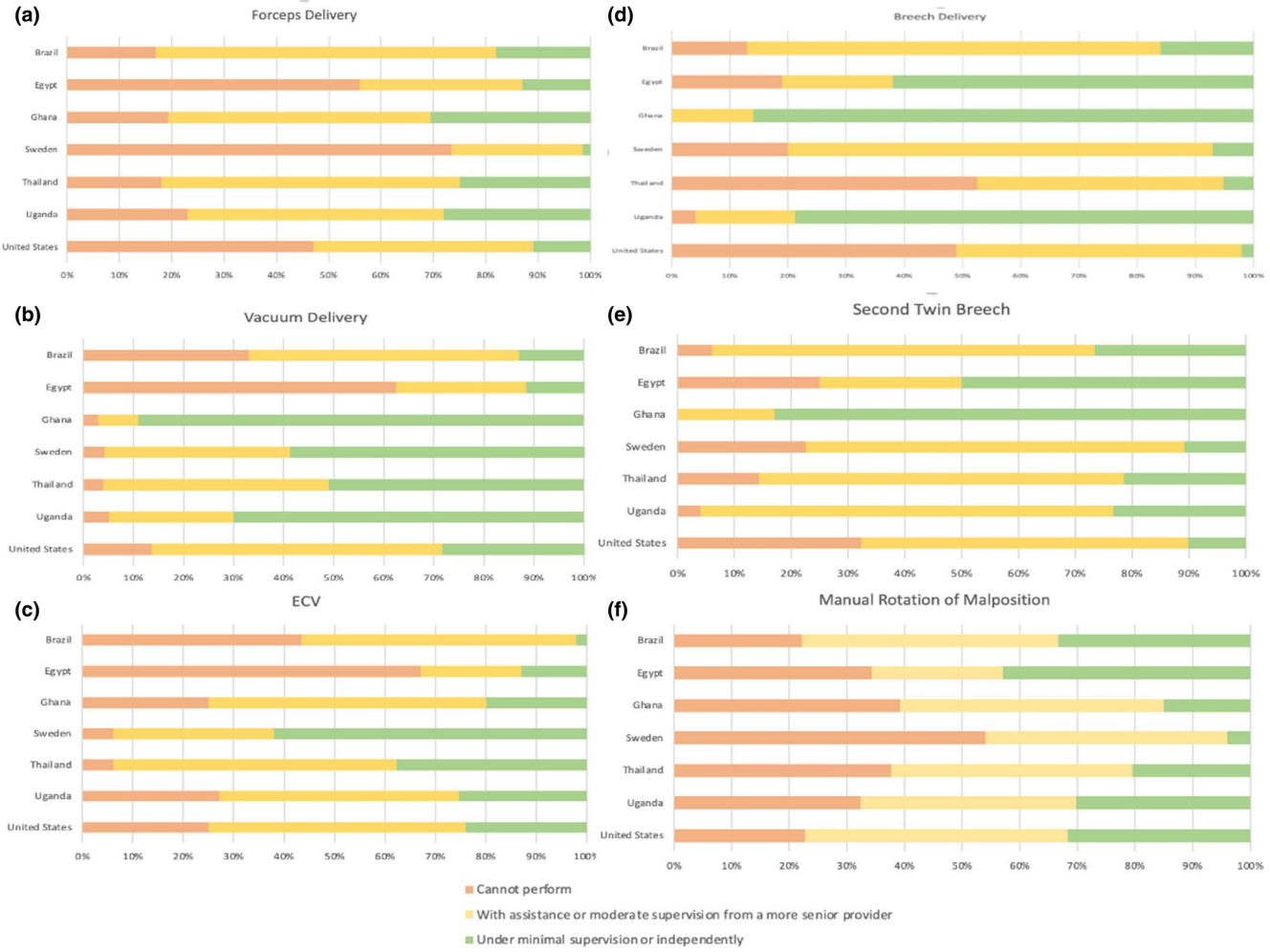


FIGURE 4 Perceived competency of trainees at performing CD-sparing procedures. Response to: "How well can you perform the following procedures?" (a) forceps delivery; (b) vacuum delivery; (c) external cephalic version; (d) singleton breech delivery; (e) Second twin breech delivery; (f) manual rotation. Red indicates "cannot perform"; yellow indicates "can perform with assistance or moderate supervision from a more senior provider"; green indicates "can perform independently." CD, cesarean delivery; ECV, external cephalic version.

perform ECV are strategies that could be implemented in countries where these skills are not widely taught.

4 | STRENGTHS AND LIMITATIONS

There are several limitations to this study. We were unable to determine response rates, as comprehensive mailing lists of trainees in each country were not available, and, in some countries, rules around survey distribution to trainees prohibited direct contact, making it difficult to ascertain the number of residents invited to complete the survey. Given that we are uncertain of our response rate, it is possible that our sample is not representative of the trainees in each respective country and may have been influenced by selection bias, with those trainees most concerned about their local CD rates more likely to answer the questionnaire. We limited our questionnaire to topics and areas relevant to our research objectives; however, we did observe some survey fatigue with several missing values towards the end of the questionnaire. "Competency" in this study was also based on self-report due to the nature of our study design. We are unable to objectively determine trainee competency. Despite these limitations, to our knowledge, this is the largest global assessment of ObGyn trainees. The collaborative nature of this work allowed for adaptation of the survey to diverse countries, ultimately providing a global overview of ObGyn trainees.

5 | CONCLUSION

Understanding the KAP of the ObGyn workforce of the future can guide medical education initiatives that will optimize cesarean rates globally. Our findings on variation in KAP emphasize how the environment for trainees may influence their competencies and, in turn, contribute to evolving trends in obstetric practices globally. Although further work is needed to explore the variation in perceived competencies demonstrated by this survey, our findings regarding management of breech presentation and delivery and AVD suggest clear targets for optimizing skill acquisition. At the country

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level, national training associations may benefit from using this information to assess potential for improvement in their training curriculum, with the opportunity for cross-learning from countries demonstrating increased competency in a particular skill.

AUTHOR CONTRIBUTIONS

LR manuscript writing: study conception and design, data interpretation, manuscript writing. KJ: Statistical analysis, manuscript editing. HFAR, AM, KAB, OB, SDA, FRPV, HL, LL, SM, JAR, SS, KS, ES: participant recruitment, data collection, data interpretation, manuscript editing. AAB: Study conception and design, data interpretation, manuscript writing.

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The authors have nothing to report.

CONFLICT OF INTEREST STATEMENT

None of the authors report any conflicts of interest relevant to this manuscript.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ETHICS STATEMENT

Ethics approval for the multicountry study and US data collection was obtained from MassGeneral Brigham (2018P001864). Approval was also obtained from the ethics boards of the University of Sao Paulo for Brazil (2.807.112), AlAzhar University for Egypt (2022P000003), University of Ghana Ethical and Protocol Review Committee for Ghana (CHS-Et/M.3-P4.2/2021–2022), Mbarara University of Science and Technology Research Ethics Committee (01/02–20) and the Uganda National Council of Science and Technology (HS758ES) for Uganda, and Bangkok Central Research Ethics Committee (CREC080/62BRs) for Thailand. The protocol was exempt from ethics approval in Sweden.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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