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## Mode of delivery among women with a history of prior cesarean in rural Guatemala: Results from a quality improvement database

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### Author contributions

MSH conceived of the analytic plan with feedback and input from all authors, with significant feedback from ML and EA. CR, SBM, and GAB managed and oversaw data collection. AJZ performed data management. GH, EA, and SB established the data collection program, which is now managed by AN. The analysis was performed by MSH with feedback from ML, and EA. MSH wrote the manuscript with input and edits from all authors.

### Ethical statement

The Colorado Multiple Institutional Review Board approved this de-identified secondary analysis of data prospectively collected as part of a quality improvement database (COMIRB # 15-0909).

### Declaration of Competing Interest

The authors have no relationships to disclose that may be deemed to influence the objectivity of this paper and its review. The authors report no commercial associations, either directly or through immediate family, in areas such as expert testimony, consulting, honoraria, stock holdings, equity interest, ownership, patent-licensing situations or employment that might pose a conflict of interest to this analysis. Additionally, the authors have no conflicts such as personal relationships or academic competition to disclose. The findings presented in this paper represent the views of the named authors only, and not the views of their institutions or organizations.

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**Dear Editor,**

As you are aware, cesarean delivery is the most commonly performed surgery in the world, and rates are rising, in part because elective repeat cesarean birth in women who have had a prior cesarean birth has become more frequent [1]. For appropriately selected women, a trial of labor, which is an attempt at vaginal birth, is a safe alternative to elective repeat cesarean birth [2]. However, a complicated or failed trial of labor can be associated with increased frequency of maternal and neonatal complications compared to elective repeat cesarean delivery [2].

Rates of cesarean birth have been increasing in a rural region of Southwest Guatemala, paralleling global trends, with about 20 % of cesareans being performed for a history of prior cesarean birth (RR 4.8, CI [3.4,6.9]) [3]. Since October 1, 2018, we have begun collecting additional data on cesarean birth (whether it was performed before the onset or during the course of labor) in order to better understand mode of delivery among women with a history of cesarean birth. Table 1 describes observed mode of delivery in the past year (through October 1, 2019) in this population.

Of 35 women, 10 (28.6 %) delivered vaginally, 22 (62.9 %) by elective repeat cesarean birth, and 3 (8.6 %) by intrapartum repeat cesarean birth. These groups differed by parity at enrollment (para 1 10.0 % vs 54.6 % vs 100.0 %,  $p = 0.004$ ), delivery in a healthcare facility (40.0 % vs 100 % vs 100 %,  $p < 0.001$ ), and birth attendant (50 % of vaginal birth after cesarean by the traditional birth attendant vs 100 % skilled attendants for all cesareans,  $p = 0.002$ ).

This descriptive analysis is limited by its observational design, that data were collected by maternal self-report, and by the small convenience sample, which precludes more complex analyses [3]. However, it is notable that 60.0 % of women ( $n = 6$  of 10) achieving successful vaginal birth after cesarean did so at home with traditional birth attendants attending ( $n = 5$  of the 6 women who delivered at home). Given the potential for catastrophic maternal and neonatal complications in the setting of trial of labor after cesarean (although there was no statistical difference in rate of maternal complications per Table 1 and too much missing data to observe neonatal complications in this cohort), this finding deserves further exploration [2]. Accordingly, we are planning a qualitative study to analyze attitudes and beliefs about mode of delivery, including delivery setting, among about 20 women (or until we reach thematic saturation) with a history of prior cesarean in February 2020.

We feel that it is important for your readers to be aware that women with a history of cesarean birth are pursuing multiple modes of birth in multiple settings around the world. We feel it is of great interest to understand the knowledge and attitudes of women regarding

mode of delivery after cesarean birth, and it is of great importance to study how shared decision making and informed consent regarding mode of delivery in these populations is or is not occurring around the world. We feel this brief commentary contributes to the building literature around these issues,

## Acknowledgements

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## References

- [1]. Betran AP, Ye J, Moller AB, Zhang J, Gulmezoglu AM, Torloni MR. The increasing trend in caesarean section rates: global, regional and national estimates: 1990–2014. *PLoS One* 2016;11(2):e0148343. [PubMed: 26849801]
- [2]. ACOG. Vaginal birth after cesarean. *Obstet Gynecol* 2019;133(2):e110–27. [PubMed: 30681543]
- [3]. Harrison MS, Scarbro S, Juarez-Colunga E, et al. Trends in the mode of delivery of pregnant women in rural Guatemala from a quality improvement database. *Matern Child Health J* 2019;23(4):435–42. [PubMed: 30542986]

**Synopsis/precis**

Women who delivered by vaginal birth after cesarean, pre-labor elective repeat cesarean, and intrapartum repeat cesarean differed by parity, location of delivery, and attendant.

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Table 1

Mode of delivery among women with a history of prior cesarean birth between October 1, 2018 and October 1, 2019 in the Southwest Trifinio, Guatemala.

	Total Population (n = 35)	Vaginal Birth After Cesarean (n = 10, 28.6 %)	Elective Repeat Cesarean Birth, Pre-labor (n = 22, 62.9%)	Repeat Cesarean Birth, Intrapartum (n = 3, 8.6%)	P-value
<i>Sociodemographic Characteristics</i>					
Age in years (median, IQR)	0 % missing 22.9 [21.1,28.4]	0 % missing 25.5 [22.7,28.2]	22.6 [20.9,29.6]	22.6 [21.3,23.0]	0.69 <sup>a</sup>
Education					1.0
None	4 (11.4 %)	1 (10.0 %)	3 (13.6 %)	0 (0.0 %)	
Any	31 (88.6 %)	9 (90.0 %)	19 (86.4 %)	3 (100.0 %)	
Not Employed	0 % missing 35 (100 %)	0 % missing 10 (100 %)	22 (100 %)	3 (100 %)	-
Not Single (Marital Status)	0 % missing 33 (94.3 %)	0 % missing 9 (90.0 %)	21 (95.5 %)	3 (100.0 %)	0.61
Weekly Income (Quetzales)	n = 33, 5.7 % missing	n = 33, 5.7 % missing			0.33
0 - 500	28 (84.9 %)	7 (70.0 %)	18 (90.0 %)	3 (100.0 %)	
500 - 1000	5 (15.2 %)	3 (30.0 %)	2 (10.0 %)	0 (0.0 %)	
Community	0 % missing	0 % missing			0.24
1	2 (5.7 %)	0 (0.0 %)	2 (9.1 %)	0 (0.0 %)	
2	2 (5.7 %)	2 (20.0 %)	0 (0.0 %)	0 (0.0 %)	
3	6 (17.1 %)	1 (10.0 %)	5 (22.7 %)	0 (0.0 %)	
4	3 (8.6 %)	0 (0.0 %)	3 (13.6 %)	0 (0.0 %)	
5	5 (14.3 %)	2 (20.0 %)	2 (9.1 %)	1 (33.3 %)	
6	0 (0.0 %)	0 (0.0 %)	0 (0.0 %)	0 (0.0 %)	
7	1 (2.9 %)	1 (10.0 %)	0 (0.0 %)	0 (0.0 %)	
8	8 (22.9 %)	4 (40.0 %)	3 (13.6 %)	1 (33.3 %)	

	Total Population (n = 35)	Vaginal Birth After Cesarean (n = 10, 28.6 %)	Elective Repeat Cesarean Birth, Pre-labor (n = 22, 62.9%)	Repeat Cesarean Birth, Intrapartum (n = 3, 8.6%)	P-value
9	0 (0.0 %)	0 (0.0 %)	0 (0.0 %)	0 (0.0 %)	
10	2 (5.7 %)	0 (0.0 %)	2 (9.1 %)	0 (0.0 %)	
11	1 (2.9 %)	0 (0.0 %)	1 (4.6 %)	0 (0.0 %)	
12	5 (14.3 %)	0 (0.0 %)	4 (18.2 %)	1 (33.3 %)	
<i>Obstetric and Antepartum Characteristics</i>					
Interpregnancy Interval in months (median, IQR)	n = 32, 8.6 % missing 32.7 [18.7,45.8]	n = 32, 8.6 % missing 45.5 [30.9,49.5]	26.7 [13.8,36.0]	36.5 [34.2,63.2]	0.06 <sup>a</sup>
Parity at Enrollment	0 % missing	0 % missing			<b>0.004</b>
1	16 (45.7 %)	1 (10.0 %)	12 (54.6 %)	3 (100.0 %)	
2+	19 (54.3 %)	9 (90.0 %)	10 (45.5 %)	0 (0.0 %)	
Number of Prior Cesarean Births	0 % missing	0 % missing			0.53
1	25 (71.4 %)	6 (60.0 %)	16 (72.7 %)	3 (100 %)	
2	10 (28.6 %)	4 (40.0 %)	6 (27.3 %)	0 (0.0 %)	
Trimester mother entered care	0 % missing	0 % missing			0.29
First	7 (14.3 %)	0 (0.0 %)	6 (27.3 %)	1 (33.3 %)	
Second	20 (40.0 %)	7 (70.0 %)	12 (54.6 %)	1 (33.3 %)	
Third	8 (45.7 %)	3 (30.0 %)	4 (18.2 %)	1 (33.3 %)	
Number of Madres Sanas PNVs <sup>*</sup>	0 % missing	0 % missing			0.24
<4	7 (74.3 %)	4 (40.0 %)	3 (13.6 %)	0 (0.0 %)	
4+	28 (25.7 %)	6 (60.0 %)	19 (86.4 %)	3 (100.0 %)	
<i>Delivery Characteristics</i>					
Location of Delivery	n = 34, 2.9 % missing	n = 34, 2.9 % missing			<0.001 <sup>**</sup>
Home or Other Facility	6 (17.7 %)	6 (60.0 %)	0 (0.0 %)	0 (0.0 %)	
	28 (82.4 %)	4 (40.0 %)	21 (100 %)	3 (100 %)	

	Total Population (n = 35)	Vaginal Birth After Cesarean (n = 10, 28.6 %)	Elective Repeat Cesarean Birth, Pre-labor (n = 22, 62.9%)	Repeat Cesarean Birth, Intrapartum (n = 3, 8.6%)	P-value
Birth Attendant	0 % <i>missing</i>	0 % <i>missing</i>			<b>0.002<sup>**</sup></b>
Comadrona (TBA) or Family	5 (14.3 %)	5 (50.0 %)	0 (0.0 %)	0 (0.0 %)	
Nurse or Physician	30 (85.7 %)	5 (50.0 %)	22 (100 %)	3 (100 %)	
	0 % <i>missing</i>	0 % <i>missing</i>			
Infant Sex					0.26
Male	17 (48.6 %)	6 (60.0 %)	11 (50.0 %)	0 (0.0 %)	
Female	18 (51.4 %)	4 (40.0 %)	11 (50.0 %)	3 (100 %)	
	0 % <i>missing</i>	0 % <i>missing</i>			
Gestational Age					0.49
Preterm (< 37 + 0)	3 (8.6 %)	2 (20.0 %)	1 (4.6 %)	0 (0.0 %)	
Term (37 + 0–40 + 6)	13 (37.1 %)	3 (30.0 %)	8 (36.4 %)	2 (66.7 %)	
Late Term (41 + 0–41 + 6)	9 (25.7 %)	1 (10.0 %)	7 (31.8 %)	1 (33.3 %)	
Postterm ( 42 + 0)	10 (29.6 %)	4 (40.0 %)	6 (27.3 %)	0 (0.0 %)	
	0 % <i>missing</i>	0 % <i>missing</i>			
Birthweight at Delivery in grams (mean, SD)	2940 ± 497	3008 ± 633	2921 ± 480	2872 ± 130	0.64 <sup>b</sup>
	0 % <i>missing</i>	0 % <i>missing</i>			
Antepartum or Intrapartum Obstetric/Maternal Complication	19 (54.3 %)	3 (30.0 %)	14 (63.6 %)	2 (66.7 %)	0.39 <sup>c</sup>
	0 % <i>missing</i>	0 % <i>missing</i>			
Skin-to-Skin	13 (37.1 %)	6 (60.0 %)	5 (22.7 %)	2 (66.7 %)	0.07
	0 % <i>missing</i>	0 % <i>missing</i>			
Breastfed Within 1 Hour of Birth	11 (31.4 %)	4 (40.0 %)	7 (31.8 %)	0 (0.0 %)	0.54

\* PNVs: prenatal visits, TBA: traditional birth attendant.

Note: p-value is the result of Fisher's exact testing unless otherwise noted.

\*\* Attendant and hospital were highly correlated with pearson's coefficient of 0.88.

NOTE: too much missing data on: neonatal outcomes (22.9 % missing).

<sup>d</sup>Kruskal-Wallis test.

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<sup>b</sup>ANOVA test.

<sup>c</sup>Maternal/obstetric complications included obstructed labor, hemorrhage (anteartum, intrapartum, postpartum), uterine rupture, hypertensive disease/pre-eclampsia, chorioamnionitis, endometritis, maternal death, blood transfusion, surgical management of hemorrhage (hysterectomy, dilation & curettage, iliac artery), antibiotics, magnesium sulfate, medical treatment of hypertension, postpartum uterotonics.