Prevalence of and characteristics associated with operative vaginal birth at Mizan-Tepi University Teaching Hospital

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Background: To observe prevalence, characteristics and outcomes associated with operative vaginal birth (OVB).

Methods: We compared spontaneous vaginal birth with OVB.

Results: Of 993 women, 759 (76.4%) experienced vaginal birth; 716 were spontaneous (94.3%), 14 (1.8%) underwent forceps-assisted birth and 29 (3.8%) had vacuum assistance. In a multivariable model of OVB (forceps and vacuum), compared with a midwife, general practitioners (OR 5.6, \( p = 0.04 \)) and integrated emergency surgical officers (OR 42.8, \( p = 0.001 \)) were more likely to attend. Women experiencing OVB were more likely to receive local anesthesia (OR 3.0, \( p = 0.009 \)).

Conclusion: OVB is used sparingly but safely at Mizan-Tepi University Teaching Hospital.

Keywords: Ethiopia, operative vaginal birth.

Introduction

Operative vaginal birth (OVB), which refers to forceps- and vacuum-assisted vaginal birth, in appropriate candidates, can be an alternative to cesarean birth. 1 It is often used in settings where the uterine ‘power’ or strength of contractions to move a fetus through the birth canal is not sufficient. 2 Recent literature has shown that forceps- and vacuum-assisted vaginal births are uncommon (less than 5%) in low- and middle-income countries and rates of use may be declining. 3 We wanted to observe the use of these obstetric methods at Mizan-Tepi University Teaching Hospital (MTUTH) in Ethiopia to determine characteristics and outcomes associated with and prevalence of OVB in this setting.

Methodology

We executed a hospital-based, prospective, cross-sectional study at MTUTH, in the Southern Nations, Nationalities and People’s Region of Ethiopia to observe service delivery in order to design and guide future quality improvement interventions and initiatives. We followed a convenience sample of 1000 women (those who conveniently presented to the facility to give birth after 28 completed weeks of gestation) at MTUTH between 6 May and 21 October 2019. Through a combination of chart review and structured interview at admission, delivery and discharge, three physicians collected de-identified data on paper forms, which was then entered into REDCap (an electronic data capture system) after quality checking of the paper forms was complete. The rationale for performing this work at MTUTH is that is the only major referral facility in the Bench Maji Zone and, given a catchment area of 2.5 million people, we wanted to ensure that high-quality care is being delivered.

Bivariate comparisons of sociodemographic, obstetric, birth and pregnancy outcomes of women experiencing vaginal vs OVB were performed using STATA software version 15.2 (StataCorp LP, College Station, TX, USA). Fisher’s exact, \( \chi^2 \) and Kruskal-Wallis tests were performed depending on the variables. All covariates significant to \( p < 0.05 \) were included in a multivariable logistic regression to determine which covariates were independently associated with cesarean birth. Subsequently, individual logistic regressions, adjusted for covariates significant in the first multivariable model to \( p < 0.05 \), were executed to observe the association of OVB with a number of maternal and neonatal outcomes.
### Table 1. Bivariate comparisons and multivariable modeling of women experiencing spontaneous vaginal birth with those who gave birth with vacuum assistance

(A) Bivariate comparisons of women who experienced unassisted vaginal birth compared with those who underwent assisted vaginal birth (operative vaginal delivery)

| Characteristic                  | Total N = 759 | Unassisted vaginal birth (n = 716, 94.3%) | Assisted vaginal birth (n = 43, 5.7%) | p-value** |
|---------------------------------|---------------|------------------------------------------|--------------------------------------|-----------|
| **Sociodemographic**            |               |                                          |                                      |           |
| Age, y (median [IQR])           |               | 24 [20–28]                               | 22 [20–29]                           | 24 [20–28] | 0.62^a     |
| Missing                         | 1 (0.1%)      | 1 (0.1%)                                 | 0 (0.0%)                             |           |
| Education                       |               |                                          |                                      |           |
| Unable to read and write        |               | 173 (22.8%)                              | 160 (22.3%)                          | 13 (30.2%)| 0.53^b     |
| Read and write only             |               | 46 (6.1%)                                | 44 (6.2%)                            | 2 (4.7%)  |           |
| Primary school                  |               | 302 (39.8%)                              | 288 (40.2%)                          | 14 (32.6%)|           |
| Secondary school                |               | 106 (14.0%)                              | 102 (14.3%)                          | 4 (9.3%)  |           |
| Higher education                |               | 131 (17.3%)                              | 121 (16.9%)                          | 10 (23.3%)|           |
| Missing                         | 1 (0.1%)      | 1 (0.1%)                                 | 0 (0.0%)                             |           |
| Religion                        |               |                                          |                                      |           |
| Muslim                          |               | 79 (10.4%)                               | 75 (10.5%)                           | 4 (9.3%)  | 0.78^b     |
| Orthodox Christian              |               | 256 (33.7%)                              | 239 (33.4%)                          | 17 (39.5%)|           |
| Catholic Christian              | 0 (0.0%)      | 0 (0.0%)                                 | 0 (0.0%)                             |           |
| Protestant                      |               | 421 (55.5%)                              | 399 (55.7%)                          | 22 (51.2%)|           |
| Jehovah's Witness               | 2 (0.3%)      | 2 (0.3%)                                 | 0 (0.0%)                             |           |
| Missing                         | 1 (0.1%)      | 1 (0.1%)                                 | 0 (0.0%)                             |           |
| Relationship status             |               |                                          |                                      | 0.58^b    |
| Single                          | 22 (2.9%)     | 20 (2.8%)                                | 2 (4.7%)                             |           |
| Not single                      | 730 (96.2%)   | 689 (96.2%)                              | 41 (95.3%)                           |           |
| Missing                         | 7 (0.9%)      | 7 (1.0%)                                 | 0 (0.0%)                             |           |
| **Woreda**                      |               |                                          |                                      | 0.03^c    |
| Urban                           | 389 (51.2%)   | 360 (50.3%)                              | 29 (67.4%)                           |           |
| Rural                           | 370 (48.8%)   | 356 (49.7%)                              | 14 (32.6%)                           |           |
| Missing                         | 0 (0.0%)      | 0 (0.0%)                                 | 0 (0.0%)                             |           |
| **Number of prenatal visits**   |               |                                          |                                      | 0.52^a    |
| Median (IQR)                    | 4 [3–5]       | 4 [3–5]                                  | 4 [3–6]                              |           |
| Missing                         | 5 (0.7%)      | 5 (0.7%)                                 | 0 (0.0%)                             |           |
| **Antepartum, labor and delivery** |   |                                          |                                      | 0.12^b    |
| Parity                          |               |                                          |                                      | 0.34^b    |
| 0                               | 325 (42.8%)   | 302 (42.2%)                              | 23 (53.5%)                           |           |
| 1                               | 199 (26.2%)   | 189 (26.4%)                              | 10 (23.3%)                           |           |
| 2                               | 120 (15.8%)   | 118 (16.5%)                              | 2 (4.7%)                             |           |
| 3                               | 114 (15.0%)   | 106 (14.8%)                              | 8 (18.6%)                            |           |
| Missing                         | 1 (0.1%)      | 1 (0.1%)                                 | 0 (0.0%)                             |           |
| **Number of prior cesarean births** | |                                          |                                      |           |
| 0                               | 741 (97.6%)   | 700 (97.8%)                              | 41 (95.4%)                           |           |
| 1                               | 15 (2.0%)     | 13 (1.8%)                                | 2 (4.7%)                             |           |
| 2                               | 1 (0.1%)      | 1 (0.1%)                                 | 0 (0.0%)                             |           |
| Missing                         | 2 (0.3%)      | 2 (0.3%)                                 | 0 (0.0%)                             |           |
| **Interpregnancy interval, mo (IQR)** | |                                          |                                      | 0.20^b    |
| Missing                         | 0 (0.0%)      | 0 (0.0%)                                 | 0 (0.0%)                             |           |
Table 1. Continued.

(A) Bivariate comparisons of women who experienced unassisted vaginal birth compared with those who underwent assisted vaginal birth (operative vaginal delivery)

| Characteristic                                      | Total N=759 | Unassisted vaginal birth (n = 716, 94.3%) | Assisted vaginal birth (n = 43, 5.7%) | p-value** |
|-----------------------------------------------------|-------------|------------------------------------------|--------------------------------------|-----------|
| Labor onset                                         |             |                                          |                                      |           |
| Not applicable                                      | 3 (0.4%)    | 2 (0.3%)                                 | 1 (2.3%)                             | 0.10b     |
| Spontaneous                                         | 663 (87.4%) | 628 (87.7%)                              | 35 (81.4%)                           |           |
| Induced/augmented                                   | 92 (12.1%)  | 85 (11.9%)                               | 7 (16.3%)                            |           |
| Missing                                             | 1 (0.1%)    | 1 (0.1%)                                 | 0 (0.0%)                             |           |
| Transferred                                         |             |                                          |                                      | 0.007c    |
| No                                                  | 416 (54.8%) | 401 (56.0%)                              | 15 (2.3%)                            |           |
| Yes                                                 | 342 (45.1%) | 628 (43.9%)                              | 28 (65.1%)                           |           |
| Missing                                             | 1 (0.1%)    | 1 (0.1%)                                 | 0 (0.0%)                             |           |
| Cervical dilation on admission (cm)                 |             |                                          |                                      | 0.02a     |
| Median (IQR)                                        | 4 [2–7]     | 3 [2–7]                                  | 4.5 [3–10]                           |           |
| Missing                                             | 14 (1.8%)   | 13 (1.8%)                                | 1 (2.3%)                             |           |
| Duration of labor, h                                |             |                                          |                                      | 0.28b     |
| Not applicable                                      | 6 (0.8%)    | 6 (0.8%)                                 | 0 (0.0%)                             |           |
| <12s                                                | 424 (55.9%) | 404 (56.4%)                              | 20 (46.5%)                           |           |
| 12–24                                               | 304 (40.0%) | 284 (39.7%)                              | 20 (46.5%)                           |           |
| ⩾24                                                 | 25 (3.3%)   | 22 (3.1%)                                | 3 (7.0%)                             |           |
| Missing                                             | 0 (0.0%)    | 0 (0.0%)                                 | 0 (0.0%)                             |           |
| Antepartum hemorrhage                               |             |                                          |                                      | 0.51b     |
| No                                                  | 746 (98.3%) | 704 (98.3%)                              | 42 (97.7%)                           |           |
| Yes                                                 | 12 (1.6%)   | 11 (1.5%)                                | 1 (2.3%)                             |           |
| Missing                                             | 1 (0.1%)    | 1 (0.1%)                                 | 0 (0.0%)                             |           |
| Chorioamnionitis                                    |             |                                          |                                      | 1.0b      |
| No                                                  | 755 (99.5%) | 712 (99.4%)                              | 43 (100.0%)                          |           |
| Yes                                                 | 4 (0.5%)    | 4 (0.6%)                                 | 0 (0.0%)                             |           |
| Missing                                             | 0 (0.0%)    | 0 (0.0%)                                 | 0 (0.0%)                             |           |
| Antepartum pre-eclampsia/eclampsia/chronic hypertension |          |                                          |                                      | 1.0b      |
| No                                                  | 724 (95.4%) | 683 (95.4%)                              | 41 (95.4%)                           |           |
| Yes                                                 | 34 (4.5%)   | 32 (4.5%)                                | 2 (4.6%)                             |           |
| Missing                                             | 1 (0.1%)    | 1 (0.1%)                                 | 0 (0.0%)                             |           |
| Anesthesia                                          |             |                                          |                                      | <0.001b   |
| No                                                  | 671 (88.4%) | 643 (89.8%)                              | 28 (65.1%)                           |           |
| Yes, local                                          | 87 (11.5%)  | 73 (10.2%)                               | 14 (32.6%)                           |           |
| Yes, spinal                                         | 1 (0.1%)    | 0 (0.0%)                                 | 1 (2.3%)                             |           |
| Missing                                             | 0 (0.0%)    | 0 (0.0%)                                 | 0 (0.0%)                             |           |
| Delivery provider                                   |             |                                          |                                      | <0.001b   |
| Midwife                                             | 729 (96.0%) | 702 (98.0%)                              | 27 (62.8%)                           |           |
| General practitioner                                | 9 (1.2%)    | 7 (1.0%)                                 | 2 (4.6%)                             |           |
| Integrated emergency surgical officer               | 20 (2.6%)   | 6 (0.8%)                                 | 14 (32.6%)                           |           |
| Obstetrician                                         | 1 (0.1%)    | 1 (0.1%)                                 | 0 (0.0%)                             |           |
| Missing                                             | 0 (0.0%)    | 0 (0.0%)                                 | 0 (0.0%)                             |           |
| Gestational age, wk (median [IQR])                  | 38 [38–40]  | 38 [38–40]                               | 38 [38–40]                           | 0.66a     |
| Missing                                             | 2 (2.5%)    | 2 (2.5%)                                 | 0 (0.0%)                             |           |
| Characteristic                                | Total N = 759 | Unassisted vaginal birth (n = 716, 94.3%) | Assisted vaginal birth (n = 43, 5.7%) | p-value** |
|----------------------------------------------|---------------|------------------------------------------|--------------------------------------|-----------|
| Birth weight, g                              |               |                                         |                                      |           |
| <2500                                        | 57 (7.5%)     | 55 (7.7%)                                | 2 (4.6%)                             | 0.76b     |
| ≥ 2500                                       | 671 (88.4%)   | 15 (88.3%)                               | 33 (90.8%)                           |           |
| Missing                                      | 31 (4.1%)     | 29 (4.1%)                                | 2 (4.6%)                             |           |
| Baby gender                                  |               |                                         |                                      |           |
| Male                                         | 401 (52.8%)   | 373 (54.4%)                              | 28 (66.7%)                           | 0.12c     |
| Female                                       | 327 (43.1%)   | 313 (45.6%)                              | 14 (33.3%)                           |           |
| Missing                                      | 31 (4.1%)     | 0 (0.0%)                                 | 0 (0.0%)                             |           |
| Postpartum complications MATERNAL           |               |                                         |                                      |           |
| Postpartum hemorrhage                        |               |                                         |                                      | 1.0b      |
| No                                           | 755 (99.5%)   | 712 (99.4%)                              | 43 (100.0%)                          |           |
| Yes                                          | 4 (0.5%)      | 4 (0.6%)                                 | 0 (0.0%)                             |           |
| Missing                                      | 0 (0.0%)      | 0 (0.0%)                                 | 0 (0.0%)                             |           |
| Uterotonics                                  |               |                                         |                                      | 1.0b      |
| No                                           | 756 (99.6%)   | 713 (99.6%)                              | 43 (100.0%)                          |           |
| Yes                                          | 2 (0.3%)      | 2 (0.3%)                                 | 0 (0.0%)                             |           |
| Missing                                      | 1 (0.1%)      | 1 (0.1%)                                 | 0 (0.0%)                             |           |
| Blood transfusion                            |               |                                         |                                      | 1.0b      |
| No                                           | 755 (99.5%)   | 712 (99.4%)                              | 43 (100.0%)                          |           |
| Yes                                          | 4 (0.5%)      | 4 (0.6%)                                 | 0 (0.0%)                             |           |
| Missing                                      | 0 (0.0%)      | 0 (0.0%)                                 | 0 (0.0%)                             |           |
| Postpartum antibiotics                       |               |                                         |                                      | 0.07b     |
| No                                           | 740 (97.5%)   | 700 (97.8%)                              | 40 (93.0%)                           |           |
| Yes                                          | 17 (2.2%)     | 14 (2.0%)                                | 3 (7.0%)                             |           |
| Missing                                      | 2 (0.3%)      | 2 (0.2%)                                 | 0 (0.0%)                             |           |
| Perineal tear                                |               |                                         |                                      |           |
| No                                           | 758 (99.9%)   | 715 (99.9%)                              | 43 (100.0%)                          |           |
| Yes                                          | 0 (0.0%)      | 0 (0.0%)                                 | 0 (0.0%)                             |           |
| Missing                                      | 1 (0.1%)      | 1 (0.1%)                                 | 0 (0.0%)                             |           |
| Days hospitalized (IQR)                      | 1 [1–1]       | 1 [1–1]                                  | 1 [1–1]                              | 0.24a     |
| Missing                                      | 3 (0.4%)      | 0 (0.0%)                                 | 0 (0.0%)                             |           |
| NEONATAL OUTCOMES                            |               |                                         |                                      |           |
| 5-min Apgar score median (IQR)               | 9 [8–9]       | 9 [8–9]                                  | 8 [7–9]                              | <0.001a   |
| Missing                                      | 30 (4.0%)     | 29 (4.1%)                                | 1 (2.3%)                             |           |
| Fetal status at delivery                     |               |                                         |                                      | 0.09b     |
| Alive                                        | 702 (99.9%)   | 663 (92.7%)                              | 39 (90.7%)                           |           |
| Fresh stillbirth                             | 15 (0.0%)     | 12 (1.7%)                                | 3 (7.0%)                             |           |
| Macerated stillbirth                         | 11 (0.1%)     | 11 (1.5%)                                | 0 (0.0%)                             |           |
| Missing                                      | 31 (4.1%)     | 29 (4.1%)                                | 1 (2.3%)                             |           |
| Bag and mask resuscitation                   |               |                                         |                                      | 0.09b     |
| No                                           | 746 (98.3%)   | 705 (98.4%)                              | 41 (95.4%)                           |           |
| Yes                                          | 9 (1.2%)      | 7 (1.0%)                                 | 2 (4.6%)                             |           |
| Missing                                      | 4 (0.5%)      | 4 (0.6%)                                 | 0 (0.0%)                             |           |
### (A) Bivariate comparisons of women who experienced unassisted vaginal birth compared with those who underwent assisted vaginal birth (operative vaginal delivery)

| Characteristic                        | Total N = 759 | Unassisted vaginal birth (n = 716, 94.3%) | Assisted vaginal birth (n = 43, 5.7%) | p-value |
|---------------------------------------|---------------|------------------------------------------|--------------------------------------|---------|
| Oxygen                                |               |                                          |                                      |         |
| No                                    | 740 (97.5%)   | 699 (97.6%)                              | 41 (95.4%)                           | 0.23b   |
| Yes                                   | 16 (2.1%)     | 14 (2.0%)                                | 2 (4.6%)                             |         |
| Missing                               | 3 (0.4%)      | 3 (0.4%)                                 | 0 (0.0%)                             |         |
| Continuous positive airway pressure (CPAP) |            |                                          |                                      | 1.0b    |
| No                                    | 750 (98.8%)   | 708 (98.9%)                              | 42 (97.7%)                           |         |
| Yes                                   | 5 (0.7%)      | 5 (0.7%)                                 | 0 (0.0%)                             |         |
| Missing                               | 4 (0.5%)      | 3 (0.4%)                                 | 1 (2.3%)                             |         |
| Neonatal antibiotics                  |               |                                          |                                      | 0.18b   |
| No                                    | 727 (95.8%)   | 687 (96.0%)                              | 40 (93.0%)                           |         |
| Yes                                   | 26 (3.4%)     | 23 (3.2%)                                | 3 (7.0%)                             |         |
| Missing                               | 6 (0.8%)      | 6 (0.8%)                                 | 0 (0.0%)                             |         |
| Blood transfusion                     |               |                                          |                                      | 0.15b   |
| No                                    | 750 (99.0%)   | 709 (95.4%)                              | 41 (98.8%)                           |         |
| Yes                                   | 3 (0.3%)      | 2 (2.3%)                                 | 1 (0.4%)                             |         |
| Missing                               | 6 (0.7%)      | 5 (2.3%)                                 | 1 (2.8%)                             |         |
| Neonatal demise                       |               |                                          |                                      | 0.04b   |
| Dead                                  | 35 (4.6%)     | 30 (4.2%)                                | 5 (11.6%)                            |         |
| Alive                                 | 720 (94.9%)   | 682 (95.3%)                              | 38 (88.4%)                           |         |
| Missing                               | 4 (0.5%)      | 0 (0.6%)                                 | 0 (0.0%)                             |         |
| Days hospitalized [IQR]               | 1 [1–1]       | 1 [1–1]                                  | 1 [1–1]                              | 0.52a   |
| Missing                               | 13 (1.7%)     | 11 (1.5%)                                | 2 (4.7%)                             |         |

(B) Multivariable model of characteristics associated with assisted vaginal birth

| Characteristic                        | AOR   | CI            | p-value |
|---------------------------------------|-------|---------------|---------|
| Living in an urban area               | 1.0   | 0.4 to 2.3    | 0.95    |
| Transferred from another facility     | 1.7   | 0.7 to 3.9    | 0.21    |
| Cervical dilation on admission, cm    | 1.0   | 0.9 to 1.2    | 0.57    |
| Compared with a midwife attendant     |       |               |         |
| General practitioner                  | 5.6   | 1.0 to 30.0   | 0.04    |
| Integrated emergency surgical officer | 42.8  | 13.8 to 132.3 | <0.001  |
| Compared with no anesthesia           |       |               |         |
| Local anesthesia                      | 3.0   | 1.3 to 7.0    | 0.009   |

(C) Multivariable model of individual adjusted logistic regressions of association of operative vaginal birth with maternal and neonatal outcomes significant in bivariate comparisons (Table 1)d

| Characteristic                                                      | AOR   | CI            | p-value |
|--------------------------------------------------------------------|-------|---------------|---------|
| Maternal postpartum antibiotic administration                      | 2.0   | 0.4 to 9.8    | 0.38    |
| Apgar score ≥ 7                                                    | 0.6   | 0.2 to 1.8    | 0.40    |
| Live birth occurred                                                | 0.9   | 0.2 to 4.1    | 0.86    |
| Infant needed resuscitation with bag and mask                      | 1.7   | 0.2 to 3.7    | 0.64    |
| Infant was alive at discharge from hospital                        | 0.6   | 0.2 to 2.1    | 0.43    |

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aKruskal-Wallis test.
bFisher's Exact test.
c\(\chi^2\) test.
dAdjusted for delivery attendant and type of anesthesia.

*Missing data on one fetal status re: mode of delivery.

**Please note that all tests of covariates in bivariate comparisons do not include missing data.
Results

Table 1A shows the characteristics of the overall study population as well as those of women delivering by spontaneous vaginal birth compared with OVB. Overall, the population was young (median age 24 y, IQR range 20–28 y), had experienced some amount of schooling (77.2%) and had a religious affiliation (all patients); the majority were married (96.2%), lived in an urban setting (51.2%) and had a median of four prenatal visits (IQR 3–5).

Women who delivered by OVB were more likely to be from an urban area (67.4% vs 50.3%, \(p = 0.03, \chi^2\) test), to have been transferred to MTUTH from another facility (65.1% vs 43.9%, \(p = 0.007, \chi^2\) test), to have had greater cervical dilation on admission (4.5 vs 3 cm, \(p = 0.02,\) Kruskal-Wallis test), to receive local or spinal anesthesia (34.9% vs 10.2%, \(p < 0.001,\) Fisher’s exact test) and to be delivered by a physician or integrated emergency and surgical officer than a midwife (37.3% vs 1.9%, \(p < 0.001,\) Fisher’s exact test). Adverse outcomes that were more likely to result after a woman delivered by OVB included: a lower 5-min Apgar score (8 vs 9, \(p = 0.001,\) \(\chi^2\) test) and a higher prevalence of neonatal demise (11.6% vs 4.2%, \(p = 0.04,\) Fisher’s exact test). All tests were performed on available data and missing data were excluded from the comparison.

Table 1B displays a multivariable logistic regression of antepartum characteristics associated with OVB. In a multivariate logistic regression predicting OVB, general practitioners (adjusted OR [aOR] 5.6) and surgical officers (aOR 42.8) were more likely to perform OVD procedures compared with midwives (\(p = 0.04\) and \(p = 0.001\), respectively; Table 1B). Odds of use of local anesthesia was also higher in women giving birth with assistance (aOR 3.0, \(p = 0.009\)).

To analyze if there was any association of OVB and adverse pregnancy outcomes, we then performed individual logistic regressions of OVB to test the association with various maternal and neonatal outcomes, adjusted for delivery attendant and anesthesia use. As shown in Table 1C, none of these individual models were significant.

Discussion

The overall prevalence of OVB at MTUTH is 5.7%, which is consistent with usage globally, regardless of development index.\(^4\) The obstetric skill is provided by higher level providers (general practitioners and integrated emergency and surgical officers) and is often associated with the use of local anesthesia, presumably for perineal tear repair, but is not associated with advanced tearing in this setting.\(^2\) No other adverse maternal and neonatal outcomes were found to be more prevalent after OVB compared with routine vaginal birth, suggesting that the procedure is being performed without undue harm. The implication of this analysis is that with global cesarean birth rates rising, OVB may be an alternative mode of delivery that can reduce unnecessary cesarean birth.\(^4\) The experience at MTUTH, a low-resource setting, suggests that the procedure can be used by mid-level non-physician providers without undue harm to women and infants, which is a reassuring finding related to OVB.

Authors’ contributions: MSH conceived of the analysis, executed it and wrote the manuscript. TL, EK and BT collected data, AJZ managed data, MM arranged the project and TY oversaw the project. All authors provided edits and feedback on the manuscript.

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Ethical approval: Despite the fact that only de-identified data were collected for quality improvement purposes, oral consent was obtained from each woman prior to collection of her personal data. This quality improvement survey was given an exemption from human subjects’ research approval (COMIRB # 18–2738) by the University of Colorado and approval by Mizan-Tepi University and the Chief Executive Director of Mizan-Tepi University Teaching Hospital.

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