International Journal of Reproduction, Contraception, Obstetrics and Gynecology
Kwari SD et al. Int J Reprod Contracept Obstet Gynecol. 2026 Jan;15(1):50-55
www.ijrcog.org
pISSN 2320-1770 | eISSN 2320-1789

DOI: https://dx.doi.org/10.18203/2320-1770.ijrcog20254259

Original Research Article

Instrumental vaginal delivery in a comprehensive emergency obstetric and new born care centre in North Central Nigeria

Shiktira D. Kwari[1]*, Olugbenga Bello[2], Aminu M. Mai[3], Abdulhakeem O. Akintobi[3], Oma Nnena Amadi[4], Oluseyi Ayoola Asaolu[3]

[1]Department of Obstetrics and Gynecology, Asokoro District Hospital, Abuja, and Nile University of Nigeria, Abuja, Nigeria
[2]Department of Obstetrics and Gynaecology, Asokoro District Hospital, Abuja, Nigeria
[3]Department of Obstetrics and Gynaecology, Nile University of Nigeria, Abuja, Nigeria
[4]Department of Paediatrics, Asokoro District Hospital, Abuja, and Nile University of Nigeria, Abuja, Nigeria

Received: 28 October 2025
Accepted: 12 December 2025

***Correspondence:**
Dr. Shiktira D. Kwari,
E-mail: kwarydan@yahoo.com

ABSTRACT

Background: Instrumental vaginal delivery (IVD) is a long-standing obstetric practice used to expedite vaginal delivery and avoid cesarean section, along with its associated fetal and maternal morbidity and mortality. Recent trends have shown that IVD, especially the use of forceps, has declined, as the rate of caesarean deliveries continues to increase.
Methods: This was a retrospective descriptive study to determine the rate of instrumental vaginal deliveries, the common indications, and to compare fetomaternal outcomes between forceps and vacuum deliveries in a Comprehensive Emergency Obstetric and New-born Care Centre in North Central Nigeria. The labour ward registers were used to compile a list of parturient who had instrumental vaginal deliveries between 2013 and 2019, and in 2021-2023 in the facility. Sociodemographic data, indications for IVD, and fetomaternal outcomes were retrieved from the electronic medical database. Data analysis was conducted using SPSS version 25.
Results: During the study period, there were 15,338 deliveries, with 190 (1.23%) being instrumental vaginal deliveries. Among these, forceps and vacuum deliveries accounted for 20 (10.5%) and 170 (89.5%), respectively. The most common indication was prolonged second stage of labour (27.8%). Babies delivered by vacuum were more likely to have birth asphyxia (p=0.03) and be admitted to the neonatal intensive care unit (p=0.04). There was no significant association between the type of instruments and maternal complications.
Conclusions: The rate of instrumental vaginal deliveries in our institution is low, with a shift from forceps to vacuum-assisted deliveries. Babies delivered by vacuum were more likely to have birth asphyxia and be admitted to the neonatal intensive care unit, and there is no significant difference in maternal outcomes.

Keywords: Fetomaternal outcome, Forceps, Instrumental vaginal delivery, Vacuum

INTRODUCTION

Caesarean section (CS) rates are rising globally and are expected to continue increasing due to the over medicalization of childbirth.[1] Instrumental vaginal delivery (IVD) refers to the use of obstetric forceps and/or vacuum-assisted delivery to expedite the second stage of labor and help to decrease the primary cesarean-section rate.[1,2] It is a viable alternative procedure that reduces the risks associated with caesarean sections and lowers the costs of obstetric care.[2] IVD remains an important component of modern labor management, accounting for 7.98% of all deliveries in sub-Saharan Africa, 11% of births in Australia, and around 10% of births in New Zealand.[3,4] Using instruments to assist birth is usually

recommended when the condition of either the baby or the mother makes it less safe to allow time for a normal birth to occur. Trained care providers perform this to minimize maternal and neonatal complications.[2,3,5,6] Even though instrumental vaginal deliveries have been used in the past centuries as an alternative mode of delivery, the recent trends have demonstrated that IVD, particularly forceps use, has declined as the caesarean delivery rate is increasing.[2,3,5] IVD is recommended for certain maternal medical conditions, delayed second-stage labor due to malposition or insufficient fetal descent, and fetal heart rate abnormalities, among other indications.[2,3,7] Although IVD decreases the maternal risk of caesarean delivery, it is associated with serious fetal and maternal complications in untrained hands. Fetal complications include facial or scalp lacerations, skull fracture and/or intracranial hemorrhage, facial nerve palsy, compression injury to cornea, retinal hemorrhage, subaponeurotic/subgaleal hemorrhage, cervical spine injury, and hyperbilirubinemia.[2,5-7] Cervical lacerations, vaginal lacerations and/or hematomas, and third- and fourth-degree perineal tears are the maternal complications associated with IVD.[2,3,5-7]

When performed correctly in an appropriate environment by experienced and trained practitioners, the procedure typically leads to a lower risk of maternal hemorrhage, shorter hospital stays, reduced admissions to neonatal intensive care, and a decreased need for pain relief. It also expedites the delivery process and increases the likelihood of a spontaneous vaginal birth in subsequent pregnancies.[2,8] The caesarean section rate at our facility is 35%, which exceeds the World Health Organization's recommendation of 10-15% for the population.[1] This study aims to determine the rate of IVD, the common indications, and the maternal and fetal outcomes in our facility. The findings may inform policy changes that help reduce the caesarean section rate in our facility.

METHODS

Study setting

The study was conducted in the Obstetrics and Gynecology department of Asokoro District Hospital, Abuja, North-Central Nigeria. The hospital is owned by the Federal Capital Territory Administration (FCTA) and is located in the Abuja Municipal Area Council of the territory. It is a 120 beds hospital providing comprehensive emergency obstetric services to women in the Federal Capital Territory and the neighbouring States of Nasarawa, Kogi, Kaduna, and Niger. It has one major operating theatre with two suites for all surgeries, one obstetric (labour ward) theatre, and an Intensive Care Unit (ICU). The average annual delivery rate is 1,674.

Study design

This retrospective cross-sectional study was carried out over 10 years from January 2013 to December 2023, excluding the year 2020 when the facility was used as a COVID-19 isolation and treatment Centre.

Data collection

The list of cases of instrumental vaginal deliveries during the study period was obtained from the labour ward register, and the individual case files were retrieved from the electronic record database. Relevant information regarding sociodemographic characteristics, booking status, parity, type of procedure, complications, indications, and fetal and maternal outcomes were recorded on a proforma. The total number of deliveries during the study period was also collected. All women who underwent instrumental vaginal delivery during the study period were included, although ten cases were excluded due to incomplete information regarding either the indication or fetomaternal outcomes.

Data analysis

The information obtained was analyzed using SPSS version 25. The instrumental delivery rate was expressed as a percentage. A descriptive analysis was performed by calculating frequencies and percentages for categorical variables. The chi-square test assessed relationships among groups, while means and standard deviations were determined for quantitative variables, with the independent t-test used to evaluate group differences where applicable. P value of <0.05 at 95%confidence interval was considered statistically significant.

Ethical issues

Ethical approval was obtained from the Research and Ethics Committee of the Hospital with reference number FCTA/HSES/HMB/ADH/255/25.

RESULTS

During the study period, there were 15,338 deliveries, of which 190 (1.23%) were instrumental vaginal deliveries. Forceps and vacuum delivery accounted for 20 (10.5%) and 170 (89.5%), respectively. The instrumental delivery rate over the ten-year period ranged from 0.4% to 2.0% with no specific pattern. This is shown in Table 1.

Table 2 shows that the majority of women who had IVD were booked (58.9%), nulliparous (56.1%), and within the 20-29-year age group (58.9%). The majority of deliveries were done by senior residents (64.4%). Patients delivered by vacuum were more likely to be booked (p=<0.001), younger (=0. p04), and of lower parity (p=<0.001) compared to women delivered by forceps. The common indications for IVD were prolonged second stage (27.8%), poor maternal effort (25.0%), and hypertensive disorders in pregnancy, particularly preeclampsia and eclampsia (24.5%). Prolonged second stage (30.6%), Poor maternal effort (27.5%), and Hypertensive disorders (25.6%) were the leading indications of vacuum delivery, while

intrauterine fetal death (40.0%) and hypertensive disorders (15.0%) were the leading indications of forceps delivery (Table 3). Table 4 shows that babies delivered by vacuum were significantly more likely to have birth asphyxia (p=0.03), cephalhaematoma (p=0.001), and be admitted to the neonatal intensive care unit (p=0.04). Parturient delivered by forceps were more likely to have extension of episiotomy (p=0.3), and those delivered by vacuum were more likely to have cervical tears (p=1.00), vaginal tears (p=0.4), postpartum haemorrhage (p=0.6), and have blood transfusion (p=1.00). However, these differences were not statistically significant. This is shown in Table 5.

Table 1: Annual trend of instrumental vaginal delivery.

Year	Deliveries	Instrumental vaginal deliveries	Rate (%)	Forceps N (%)	Vacuum N (%)
2013	2152	23	1.1	2 (8.7)	21 (91.3)
2014	1723	14	0.8	1 (7.1)	13 (92.9)
2015	1621	27	1.7	1 (3.7)	26 (96.3)
2016	1853	22	1.2	1 (4.5)	21 (95.5)
2017	1523	22	1.4	5 (22.7)	17 (77.3)
2018	1822	18	1.0	5 (27.8)	13 (72.2)
2019	1934	8	0.4	0 (0.0)	8 (100.0)
2021	1162	10	0.9	3 (30.0)	7 (70.0)
2022	1548	31	2.0	2 (6.5)	29 (93.5)
2023	1400	15	1.1	0 (0.0)	15 (100.0)
Total	15,338	190	1.2	20 (100)	170 (100)

Table 2: Clinical variables of the study population.

Variable	All instrumental vaginal deliveries N (%)	Forceps N (%)	Vacuum N (%)	X^2	P value
Age (Mean±SD)	27.7±5.5	30.4±7.3	27.4±5.2	8.601	0.04
Age group (in years)					
< 20	4 (2.2)	0 (0)	4 (2.5)	17.836	
20–29	106 (58.9)	9 (45.0)	97 (60.6)		<0.001
30–39	66 (36.7)	8 (40.0)	58 (36.3)		
40–49	4 (2.2)	3 (15.0)	1 (0.6)		
Parity (Mean±SD)					
Parity group	0.9± 0.9	1.2±1.5	0.8±0.8	34.472	
0	101 (56.1)	10 (50.0)	91 (56.9)	46.744	<0.001
1–2	70 (38.9)	3 (15.0)	67 (41.9)		
3–4	9 (5.0)	7 (35.0)	2 (1.2)		
Booking status					
Booked	106 (58.9)	2 (10.0)	104 (65.0)	22.213	<0.001
Unbooked	74 (41.1)	18 (90.0)	56 (35.0)		
Cadre of birth attendants					
Junior resident	23 (12.8)	1 (5.0)	22 (13.7)	2.610	
Senior resident	116 (64.4)	12 (60.0)	104 (65.0)		0.271
Consultant	41 (22.8)	7 (35.0)	34 (21.3)		
Total	180	20	160		

Table 3: Indications for instrumental vaginal deliveries.

Indications for instrumental vaginal delivery	All instrumental vaginal deliveries N (%)	Type of instrument	
		Forceps, N (%)	Vacuum, N (%)
Poor maternal effort	45 (25.0)	1 (5.0)	44 (27.5)
Fetal distress	10 (5.6)	0 (0.0)	10 (6.3)
Prolonged second stage	50 (27.8)	1 (5.0)	49 (30.6)
Maternal heart disease	8 (4.4)	2 (10.0)	6 (3.7)
Sickle cell disease	7 (3.9)	3 (15.0)	4 (2.5)
Preeclampsia eclampsia	44 (24.5)	3 (15.0)	41 (25.6)
Anaemia in pregnancy	6 (3.3)	2 (10.0)	4 (2.5)
Abruptio placentae with Intrauterine fetal death	2 (1.1)	0 (0.0)	2 (1.3)
Intrauterine fetal death	8 (4.4)	8 (40.0)	0 (0.0)
Total	180 (100)	20 (100)	160 (100)

Table 4: Fetal outcome.

Variable	Forceps	Vacuum	Chi-square	P value
Asphyxia				
Yes	3	30	4.500	0.03
No	17	130		
Neonatal sepsis				
Yes	5	3	1.000	0.7
No	15	157		
Cephalhaematoma				
Yes	0	57	10.427	0.001
No	20	103		
Instrument marks				
Yes	12	10	0.402	0.63
No	8	150		
Neonatal jaundice				
Yes	5	5	1.464	0.614
No	15	155		
Neonatal intensive care unit admission				
Yes	6	34	4.321	0.04
No	14	126		
Perinatal mortality				
Yes	15	2	113.060	
No	5	158		<0.001
Total	20	160		

Table 5: Maternal outcome.

Variable	Forceps	Vacuum	Chi-square	P value
Extension of episiotomy				
Yes	20	18	2.500	0.3
No	0	142		
Third and fourth-degree perineal tears				
Yes	1	1	3.097	0.210
No	19	159		
Cervical tear				
Yes	0	6	0.776	1.000
No	20	154		
Vaginal tear				
Yes	3	2	0.411	0.4
No	17	158		
Periurethral tear				
Yes	1	0	8.045	0.1
No	19	160		
Postpartum haemorrhage				
Yes	0	8	1.047	0.6
No	20	152		
Blood transfusion				
Yes	0	2	0.253	1.00
No	20	158		
Total	20	160		

DISCUSSION

In this study, the prevalence of IVD was 1.23%, which is similar to 1.39% reported in a similar facility in India.[6] It is higher than reported in some secondary and tertiary health facilities in Nigeria and lower than reported in some health facilities within and outside Nigeria.[9-14] Studies in Ethiopia reported a higher prevalence of up to 7.6% in their facilities.[5,15] The wide variation in prevalence can be attributed to variation in the number of personnel skilled in IVD within countries and regions. The study done in Ethiopia was a prospective study, and the sequential use of instruments was allowed in the study. This may explain the high prevalence reported. Although the prevalence rates vary, all the studies mentioned indicated a higher use of vacuum delivery compared to forceps delivery. This

supports the existing evidence that obstetricians are increasingly favoring vacuum delivery over forceps delivery.[9-15] This trend may be attributable to its relative safety and inbuilt safety mechanism, lower risk of maternal trauma, less propensity to resort to caesarean sections, less peripartum blood loss, and less need for analgesia. The procedure is also easy to learn. On the contrary, the application of forceps is technically more challenging and requires more time to acquire the skill.[2-6,8] The majority of our patients were booked in accordance with studies from some centres in Nigeria, but in variance with reports from some facilities within Nigeria, and southern Ethiopia.[9-12,16] The difference may arise from differing attitudes of women toward antenatal care, within and outside Nigeria.

The majority of women who had IVD were primigravidae and between 20-29 years, in keeping with many studies within and outside Nigeria.[6,9-11,13-17] This may not be unconnected with the higher tendency to second-stage delays in primigravida, which was the most common indication for instrumental vaginal delivery in this study. Tight, untested lower genital tracts, undue anxiety, and inexperience in labour among young-aged primigravids no doubt accounted for the higher frequency of this diagnosis.[9-11] Additionally, hypertensive disorders are more common in this age group and parity. The majority of deliveries were carried out by senior residents, as reported in a tertiary care Centre in Nigeria.[18] This may be because they are usually the most senior staff on duty in the labour ward during the call period, and many patients present late at night when these doctors are the most senior obstetricians on the ground. It is concerning that junior residents conducted only 12% of the deliveries, in contrast to reports from Jos and Sokoto, Nigeria, where junior residents performed the majority of the deliveries.[19,20] Furthermore, our study shows that only one forceps delivery was done by a junior resident. This may also explain the dwindling rate of forceps delivery, which requires time and practice to acquire the skills for its use.

Common indications for IVD in our study included prolonged second-stage labor, followed by poor maternal effort, hypertensive disorders in pregnancy, and fetal distress. Other indications include medical conditions like cardiac disease and sickle cell anaemia in pregnancy, which require elective shortening of the second stage of labour. This aligns with findings from earlier studies conducted in our environment.[9-12,19,20]

Birth asphyxia, admission to the neonatal unit, and cephalhaematoma were the common neonatal complications observed in our study, and they were significantly more common in babies delivered by vacuum, which is at variance with reports from some tertiary and secondary health centres in Nigeria, where forceps delivery had more neonatal complications.[10-12] This may be because the majority of the IVD and all the cases of fetal distress in our study were delivered by vacuum. In addition, the commonest indication for IVD in our study is delayed second stage, which is usually associated with some fetal compromise. Additionally, the majority of babies delivered by forceps were already dead, and so other complications could not be assessed. This is responsible for the high perinatal mortality observed in the forceps delivery group. Some studies showed no difference in neonatal complications.[9,13,17] The common maternal complications observed in our study are similar to reports from previous studies.[9-12,17,20] However, we did not observe any statistically significant association between maternal complications and the type of instrument used, as was also reported in Sokoto.[13] This may not be unrelated to the fact that more than 80% of IVDs in both studies were vacuum deliveries, which is safer with fewer maternal complications.[2,3,5]

This study was retrospective, which means it is subject to limitations commonly associated with this type of research. These limitations include the inability to retrieve some patients' case notes, inadequate documentation in the records, and the absence of documentation for certain cases. Additionally, since it was conducted in a hospital setting, the findings may not be representative of the broader general population.

The findings of this study suggest that the skills necessary for instrumental vaginal delivery are not being effectively passed on to junior residents. This gap in training may contribute to a higher caesarean section rate at our facility. Therefore, senior obstetricians need to make concerted efforts to teach this critical skill to the next generation of obstetricians to help reduce the caesarean section rate.

CONCLUSION

The rate of instrumental vaginal deliveries in this institution is low, with a shift from forceps to vacuum-assisted methods. Babies delivered by vacuum were more likely to have birth asphyxia and be admitted to the neonatal intensive care unit, and there is no significant difference in maternal outcomes.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Betran AP, Ye J, Moller AB, Souza JP, Zhang J. Trends and projections of caesarean section rates: global and regional estimates: BMJ Global Health. 2021;6:5671.
2. Murphy DJ, Strachan BK, Bahl R. on behalf of the Royal College of Obstetricians and Gynaecologists. Assisted Vaginal Birth. Green-top Guideline No. 26. April 2020. Available online at: https://www.rcog.org.uk/guidance/browse-all-guidance/green-top-guidelines/assisted-vaginal-birth-

green-top-guideline-no-26/ Accessed on 24 June, 2025.
3. Mebratu A, Ahmed A, Zemeskel AG, Alemu A, Temesgen T, Molla W, et al. Prevalence, indications and fetal outcomes of operative vaginal delivery in Sub-Saharan Africa, systematic review, and meta-analysis. BMC Women's Health. 2023;23:95-103.
4. Leung Y, Gibson G, White S, Pettigrew I, Milward K, Milford W, et al. the Royal Australian and New Zealand college of Obstetricians and Gynaecologists Women's Health Committee (RANZCOG). Instrumental vaginal birth, C-Obs 16. March 2020. Available at: https://ranzcog.edu.au/wp-content/uploads/Instrumental-Vaginal-Birth.pdf. Accessed on 24 June, 2025.
5. Balis B, Debella A, Ketema I, Eshetu B, Zerihun E, Deressa Wayesa A, et al. Prevalence, indications, and outcomes of operative vaginal deliveries among mothers who gave birth in Ethiopia: A systematic review and meta-analysis. Front Glob Womens Health. 2022;3:948288.
6. Sonawane AA, Gadappa SN, Gaikwad RA. Study of fetomaternal outcome in instrumental vaginal deliveries at a Tertiary Teaching Hospital. The New Indian J OBGYN. 2021;7(2):172-6.
7. Unuigbe JA, Agbon-Ojeme GE, Erhatiemwomon RA, Maduako KT. Instrumental vaginal deliveries: A review.Trop J Obstet Gynaecol. 2018;35:99-107.
8. Sainz JA, García-Mejido JA, Aquise A, Borrero C, Bonomi MJ, Fernández-Palacín A. A simple model to predict the complicated operative vaginal deliveries using vacuum or forceps. American J Obstet Gynecol. 2019;220(2):193.
9. Jumbo CTH, Ayogu ME, Abdullahi HI. Outcome of instrumental vaginal delivery in University of Abuja Teaching Hospital: a five-year review. Int J Reprod Contracept Obstet Gynecol 2021;10:2390-4.
10. Egbodo CO, Edugbe AE, Akunaeziri AU, Ayuba C, Oga EO, Shambe HI, et al. Instrumental Vaginal Delivery at Jos University Teaching Hospital (JUTH): forceps versus vacuum extraction, a four-year retrospective review. Res Obst Gynecol. 2018;6(3):47-51.
11. Aliyu LD, Kadas AS, Hauwa MA. Instrumental Vaginal Delivery In Bauchi, Northeast Nigeria. J West African College of Surg. 2011;1(4):18-27.
12. Babah OA, Saalu TT, Adekanye TV, Owie E, Soibi-Harry A, Ofoegbu OU. Trends and outcomes of instrumental vaginal deliveries at Lagos University Teaching Hospital: A 10-year review. African Journal of Feto-Maternal Med. 2022;1(1):9-13.
13. Garba JA, Burodo AT, Saidu AD, Sulaiman B, Umar AG, Ibrahim R, et al. Instrumental vaginal delivery in Usmanu Danfodiyo University Teaching Hospital, Sokoto: A ten-year review. Trop J Obstet Gynaecol. 2018;35:123-7.
14. Sahoo RK, Mohapatra S. Fetomaternal Outcome in Instrumental Vaginal Delivery. Int J Pharma Clin Res. 2022;14(7);750-5.
15. Sium AF, Gudu W, Lucero-Prisno DE, Tilahun A. Predictors of adverse perinatal and maternal outcomes of instrumental vaginal delivery at a tertiary setting in Ethiopia: A cross-sectional study. Public Health Chall. 2022;1:41.
16. Israel E, Abayneh S, Utalo D, Geta T, Kassaw T, Shonde T, et al. Determinants of fetomaternal complications of instrumental vaginal delivery among women who gave childbirth in Southern Ethiopia: a facility-based cross-sectional study. BMC Res. 2023;16:308-14.
17. Jeyamani B, Dhasleema AN. Fetomaternal outcome in operative vaginal delivery. Int J Reprod Contracept Obstet Gynecol. 2021;10:4096-100.
18. Alegbeleye JO, Orazulike NC, Nyengidiki TK, Uzoigwe SA. A 10 years review of instrumental vaginal delivery at the University of Port Harcourt Teaching Hospital, Port Harcourt, Nigeria. Trop J Obstet Gynaecol. 2018;35:118-22.
19. Ochejele S, Musa J, Eka PO, Attah DI, Ameh T, Daru PH, et al. Trends and operators of instrumental vaginal deliveries in Jos, Nigeria: A 7-year study (1997–2003). Trop J Obstet Gynaecol. 2018;35:79-83.
20. Shehu CE, Omembelede JC. Instrumental vaginal delivery - an assessment of use in a tertiary care centre. Orient J Med. 2016;28(2):22-7.

Cite this article as: Kwari SD, Bello O, Mai AM, Akintobi AO, Amadi ON, Asaolu OA. Instrumental vaginal delivery in a comprehensive emergency obstetric and new born care centre in North Central Nigeria. Int J Reprod Contracept Obstet Gynecol 2026;15:50-5.