

# Trends and operators of instrumental vaginal deliveries in Jos, Nigeria: A 7-year study (1997-2003)

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## ABSTRACT

**Context:** Instrumental vaginal delivery is one of the lifesaving functions of emergency obstetric care to reduce perinatal and maternal morbidity and mortality.

**Objective:** To determine the instrumental vaginal delivery rate, the trends, and the status of their operators in Jos University Teaching Hospital, Nigeria (JUTH) over a 7-year period (1997–2003).

**Study Design:** A 7-year cross-sectional study of obstetric service data from 1<sup>st</sup> January 1997 to 31<sup>st</sup> December 2003.

**Patients and Methods:** A register was kept for all cases of instrumental deliveries at JUTH from 1<sup>st</sup> January 1997 to 31<sup>st</sup> December 2003. This register with the patient case notes and neonatal ward records was used to conduct this study.

**Results:** During the study period, there were a total of 17,888 deliveries and 349 instrumental vaginal deliveries, giving a rate of 1.95%. Out of these, 238 (68.2%) were vacuum extraction and 111 (31.8%) were forceps delivery. There was a 67% decline in the use of these instruments from 84 (3.18%) in 1997 to 34 (1.05%) in 2003. Majority 313 (90%) of the procedures were performed by residents (Registrars 49%, Senior Registrars 41%). Consultants performed 10%, and all were in the first four years of the study. Forceps delivery rate 0.62% and vacuum delivery rate was 1.33%. There was a strong negative correlation with the performance of IVD in JUTH. At the current trend, no forceps delivery ( $R = -0.93008$ ) will be performed in JUTH in 2005 while only 4 vacuum deliveries ( $R = -0.80015$ ) will be conducted in the same period.

**Discussion:** There is a low instrumental vaginal delivery rate in JUTH with a strong negative correlation in the performance of these procedures. Most procedures are performed by residents, and vacuum is the preferred procedure.

**Conclusions:** Instrumental vaginal delivery in JUTH is a dying art. Training and re-training of resident doctors on this lifesaving function is recommended.


**Key words:** Instrumental vaginal delivery; Jos; Nigeria.

## Introduction

Instrumental vaginal delivery is defined as vaginal delivery accomplished with the aid of instruments, which can be vacuum or forceps.<sup>[1]</sup> It is one of the lifesaving functions of at least a basic emergency obstetric care facility.<sup>[2-5]</sup> It is used to shorten the second stage of labor, while

its alternative in complicated labor with a live fetus is caesarean section.

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The incidence of instrumental vaginal delivery varies from 1–15%. Developing countries generally have a low incidence while developed countries have a higher incidence. The incidence is 1–4% in Africa, 4.5% in the United States, 10–13% in the United Kingdom, and 15% in Australia and Canada.<sup>[6-17]</sup>

In Nigeria, appropriate anesthesia, efficient blood transfusion services, efficacious antibiotics, and qualified personnel are not readily available. There is also poverty as well as cultural aversion to caesarean section.<sup>[6,9,18]</sup> Despite these challenges, there is a rising caesarean section rate on account of fear of complications of instrumental vaginal delivery due to the poor skills of operators of instrumental vaginal delivery.

Training and research in instrumental vaginal delivery will improve the benefit for mothers and their babies and maintain and improve the skills for these procedures.<sup>[19]</sup>

The objective of this study was to determine the trends and operators of instrumental vaginal deliveries in Jos University Teaching Hospital and make appropriate recommendations on any observed gaps.

### Objective

The main outcome measures were the instrumental vaginal delivery rate, the trends, and the status of the operators of instrumental vaginal delivery in Jos University Teaching Hospital (JUTH) over a 7-year period (1997–2003).

### Patients and Methods

This was a 7-year cross-sectional study using the instrumental vaginal delivery register, patient case notes, and neonatal ward records in JUTH from 1<sup>st</sup> January 1997 to 31<sup>st</sup> December, 2003. Data from the registers were analyzed using SPSS version 16 (SPSS Inc., Chicago, IL, USA).

### Results

During the study period, there were a total of 17,888

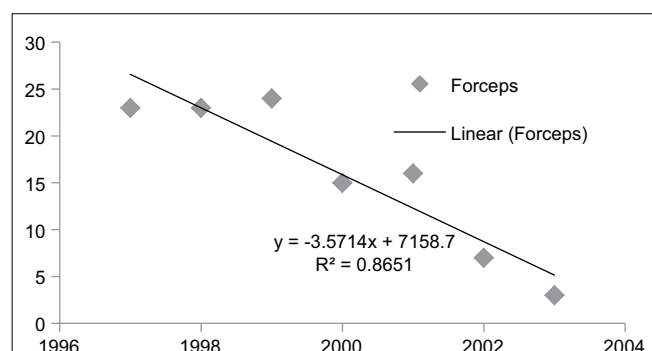


Figure 1: Regression line of forceps delivery in JUTH

deliveries and 349 instrumental vaginal deliveries giving a rate of 1.95%. Out of these, 238 (68.2%) were vacuum extraction and 111 (31.8%) were forceps delivery. There was a 67% decline in the use of these instruments from 84 (3.18%) in 1997 to 34 (1.05%) in 2003. Majority 313 (90%) of the procedures were performed by residents (Registrars 49%, Senior Registrars 41%). Consultants performed 10% of these deliveries and all these were in the first four years of the study. The forceps delivery rate was 0.62% and the vacuum delivery rate was 1.33%. There was a strong negative linear correlation (forceps  $R = -0.93008$  and vacuum  $R = -0.80015$ ) with the performance of IVD in JUTH. At the current trend, no forceps delivery ( $y = -3.5714x + 7158.7$ ) will be performed in JUTH in 2005 while only 4 vacuum deliveries ( $y = -7.5x + 15034$ ) will be conducted in the same period. Tables 1 and 2 show the frequency and status of operators of IVD in Jos. Figures 1 and 2 show the correlation and the regression line of IVD in Jos during the same period.

### Discussion

The instrumental vaginal delivery rate in JUTH is 1.95% (forceps delivery rate 0.62% and the vacuum delivery rate 1.33%). Vacuum extraction is the commonly performed procedure. There was a strong negative linear correlation with the performance of instrumental vaginal delivery during the study period. There was a 67% decline in the use of these instruments from 84 (3.18%) in 1997 to 34 (1.05%) in 2003. Majority 313 (90%) of procedures were performed by residents. All the procedures performed by the consultants were in the first four years of the study.

The study is very useful in monitoring the trends and status of the operators and determining the rate of instrumental vaginal delivery but did not analytically compare the relative complications of the instruments.

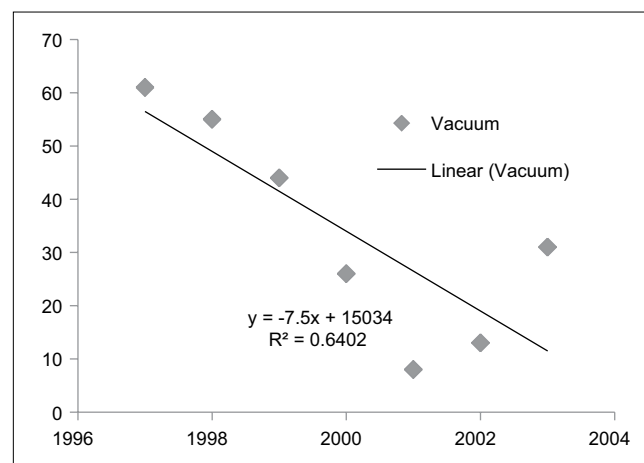


Figure 2: Regression line of vacuum delivery in JUTH

The overall instrumental vaginal delivery rate of 1.95% from this study is lower than the 4.52%, 4.4%, and 3.6% reported from Lagos, Enugu, and Zaria, respectively.<sup>[9,20,21]</sup> It is, however, higher than the 1.06%, 1%, and 0.69% reported from Sokoto, Ilorin, and Bauchi.<sup>[6,13,19]</sup> Compared with findings from other West African countries, our instrumental vaginal delivery rate is higher than the rate of 1% or less in Niamey (Niger), Ougadaougou (Burkina Faso), and Bamako (Mali) but lower than 3% in Nouakchott (Mauritania).<sup>[22]</sup> It is also very much lower than 8.5% recommended by the Royal College of Obstetricians and Gynaecologist (RCOG).<sup>[23]</sup> The finding from this study is in agreement with other studies, that the developing countries generally have a low incidence while the developed (except Czech Republic with an incidence of 1.5%) countries have a higher incidence. The incidence is 1–4.5% in Africa, 4.5% in the United States, 10–13%, in the United Kingdom and 15% in Australia and Canada.<sup>[6-17]</sup> The higher rates of instrumental deliveries in the developed countries may be attributed to routine use of epidural analgesia in labor that is associated with malrotation and poor descent of the presenting in the second stage of labor. In low resource countries where instrumental vaginal delivery is a good alternative for caesarean delivery it is underutilized.<sup>[23,24]</sup>

The trend in instrumental vaginal delivery from this study shows a decline in both forceps and vacuum deliveries. No consultant performed any instrumental vaginal delivery in the last three years of the study. This was clearly demonstrated by the strong, linear, negative correlation in the performance of both instrumental vaginal deliveries. System analysis often reveals that inadequate training is a key contributor to adverse outcomes, and training is central to patient safety initiatives. The lack of consultants' interest in the training of residents on IVDs can contribute to adverse outcomes, which

**Table 1: Frequency of IVD in JUTH**

Period	Total Deliveries	Forceps	Vacuum	Total
1997	2640	23	61	84
1998	2,712	23	55	78
1999	2,271	24	44	68
2000	2,354	15	26	41
2001	2,330	16	8	20
2002	2,337	7	13	34
2003	3,244	3	31	34
Total	17,888	111 (0.62%)	238 (1.33%)	349 (1.95%)

**Table 2: Status of operators of instrumental vaginal delivery**

Status of doctor	Forceps (%)	Vacuum (%)	Total (%)
Consultant	16 (14.4)	20 (8.4)	36 (10.0)
Senior Registrar	38 (34.2)	105 (44.1)	143 (41.0)
Registrar	57 (51.4)	113 (47.5)	170 (49.0)
Total	111 (100)	238 (100)	349 (100)

will further reduce the interest of the residents in performing the procedure.<sup>[25]</sup>

The global trend is a decline in instrumental vaginal delivery rate with the developed countries reducing their high incidence, and the developing countries paradoxically reducing their low incidence rather than increasing it. Instrumental vaginal delivery is one of the signal functions of the United Nations process indicators. The loss of this art/skill will make the attainment of the UN process indicators for an emergency obstetric care facility, unattainable.<sup>[26,27]</sup>

There are, however, some conflicting reports on the trend in the general rate of instrumental vaginal delivery with the US showing a decline while a relatively constant rate has been reported in some countries such as Scotland and Australia.<sup>[28,29]</sup>

The vacuum delivery rate of 1.33% from this study is lower than the vacuum delivery rate of 3.5%, 1.5%, 1.6%, 1.7%, and 1.96% reported from Enugu, Ile-Ife, Ilorin, and Lagos, respectively.<sup>[13,20,21,30,31]</sup> It is, however, higher than 0.02%, 0.3%, and 0.98% reported from Bauchi, Ilorin, and Sokoto, respectively.<sup>[6,13,19]</sup> The vacuum delivery rate of 1.33% from this study is twice as high as the forceps delivery rate of 0.62%. Our forceps delivery rate is lower than the 1.57% reported from Ibadan and higher than the 0.15% and 0.08% reported from Bauchi and Sokoto, respectively.<sup>[6,10,19]</sup>

In the 1980s, most instrumental vaginal deliveries were by forceps, but since then, the general trend is that of a decline. There is a gradual shift away from the use of forceps in favor of the vacuum extractor, which now accounts for about four times the rate of forceps-assisted vaginal births.<sup>[22]</sup> Much of the decline has been attributed to increasing preference for vacuum extraction or caesarean section when difficult vaginal delivery is anticipated.<sup>[32-34]</sup> The choice of the vacuum for IVD in Africa may be because of simplicity of use and the ease with which the skill to use it is acquired. These may be the same factors that made the vacuum the most commonly used instrument in our centre.

In the US, however, legal issues also play a role in determining the choice of which instrument to use for IVD. In the US the instrument of choice is the vacuum.<sup>[35,36]</sup> African obstetricians and those of USA prefer vacuum extraction to forceps while the reverse is the case with their counterparts in Eastern Europe and South America.<sup>[37]</sup> This decline may be due to concerns about both instruments' potentials for poor neonatal outcomes, especially neurodevelopmental, and maternal morbidity, particularly, the short-term and long-term pelvic floor injury.<sup>[38,39]</sup> In the United States, 3.1% of all deliveries in

2015 were accomplished via an operative vaginal approach.<sup>[40]</sup> Forceps deliveries accounted for 0.56% of vaginal births and vacuum deliveries accounted for 2.58% of vaginal births. However, there is a wide range in the prevalence of operative vaginal delivery both across and within geographic regions in the United States (1–23%) that suggests that evidence-based guidelines for operative vaginal delivery are either inadequate or randomly applied, or familiarity and expertise with the technique is declining.<sup>[41]</sup> Prevalence rates vary worldwide depending on local practice patterns and availability of trained clinicians and other necessary resources.<sup>[23]</sup> A nonscientific survey from 111 countries showed that knowledge, training, and use of vacuum extraction range widely in different countries, and in certain regions, instrumental deliveries are not taught or performed.<sup>[42]</sup>

Majority 313 (90%) of the procedures were performed by residents (Registrars 49%, senior registrars 41%). Consultants performed 10% of these deliveries and all these were in the first four years of the study. This finding is similar to that of Shehu *et al.* from Sokoto where Junior Resident doctors applied the instruments in 108 (71.4%) procedures, while Senior Residents and Consultant Obstetricians conducted 38 (25%) and 7 (4.6%) procedures, respectively. Resident doctors undergoing training applied 93.4% of the instruments. This may be because most of the procedures were undertaken as emergencies, and these doctors are usually at hand for most emergencies. This may also explain the dwindling rate of forceps delivery, which need requisite skills for its use.

The study showed a decline in instrumental vaginal delivery rate in JUTH. The vacuum extractor is the most commonly used instrument to expedite vaginal delivery in this institution.

Analytical epidemiology of indications and complications is recommended to further explain the reason for the decline and the preference for the vacuum.

In conclusion, there is a reduction in instrumental vaginal delivery rate in JUTH. Training and re-training of resident doctors on instrumental vaginal delivery is recommended.

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#### Conflicts of interest

There are no conflicts of interest.

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