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TRENDS, PATTERN AND OUTCOME OF CAESAREAN SECTION AT LAGOS UNIVERSITY TEACHING HOSPITAL, LAGOS, NIGERIA: A TEN-YEAR REVIEW
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TRENDS, PATTERN AND OUTCOME OF CAESAREAN SECTION AT LAGOS UNIVERSITY TEACHING HOSPITAL, LAGOS, NIGERIA: A TEN-YEAR REVIEW

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ABSTRACT

Background: **Caesarean section (C/S) rate and pattern of indications can be a reflection of maternal health status and quality of medical practice. This study aimed at determining current C/S rate at Lagos University Teaching Hospital (LUTH) and to assess trend, pattern and outcome of C/S in the last ten years.**

Study design: **A cross sectional study of all cases of C/S ≥28 weeks gestational age performed at LUTH from January 1, 2008 to December 31, 2017. Information which included maternal age, parity, gestational age at delivery, booking status, type of C/S and indications was retrieved from Labour Ward register using an electronic database. Data analysis was done with IBM SPSS version 23.**

Results: **A total of 12,811 deliveries that met the inclusion criteria during the study period were reviewed. Overall C/S rate was found to be 51.3% and there has been an increase over the years (p = 0.000). Commonest indications were previous C/S, HIV infection, hypertensive disorders, fetal distress and antepartum haemorrhage. HIV infection ranked topmost in the list of indications in 2008 and 2009, with a change in trend to previous C/S in subsequent years. Maternal death was significantly lower in women who had C/S (0.1%) compared to those who delivered vaginally (0.4%), p = 0.000. Perinatal death rate was also lower in those who had C/S (4.8%) compared to women delivered vaginally (8.5%), p = 0.000.**

Conclusion: **Decision to perform primary C/S should be based on clear cut indications as repeat C/S was found to be a major contributor to rising C/S rate in this study. There is thus a need to conduct regular audits on C/S performed in every health institution using the World Health Organization Robson classification and review policies regarding delivery based on the findings.**

INTRODUCTION

Caesarean section is one of the commonest obstetric surgeries performed worldwide. It was originally an alternative where vaginal delivery is not feasible and was being conducted to save the lives of mother and baby. However, it is associated with several complications which put the mother and her newborn at relatively higher risk of morbidity and mortality. In a study by Ijaiya et al, it was found the maternal mortality ratio following caesarean section was significantly higher than following vaginal delivery being 1,050 per 100,000 and 40 per 100,000 respectively.[1] The higher morbidity and mortality reported with C/S sometimes may not be related to the surgery itself but to the choice of anesthesia, as general anaesthesia for instance, has been found to be associated with a greater incidence of complications like failed intubation, atelectasis and aspiration pneumonitits compared to spinal anaesthesia.[2,3] There is thus a need to review the choice of anaesthesia used for C/S while assessing morbidities and mortalities associated with caesarean section.

Indications for caesarean sections can be maternal or fetal factors. The maternal factors include placenta praevia, previous caesarean section, lower uterine segment fibroids and medical conditions like HIV infection, eclampsia, diabetes mellitus, etc. Fetal factors include fetal distress, fetal anomaly like hydrocephalus, fetal macrosomia and prematurity. Social factors such as maternal request for various reasons such as fear of labour pain or to choose a specific birth date for the baby is now gradually being recognized as a relative indication for caesarean section. Bayou et al in a study in Ethiopia found that 36.4% of women requested caesarean section to avoid labour pain and that 6.9% of caesarean sections performed had no medical indications.[4] They also found that caesarean section rate was higher in private health facilities compared to public health institutions (41.1% versus 11.7% respectively).[4] This higher rate in the private sector might be a reflection of the more liberal use of caesarean section as a mode of delivery and willingness of the birth attendant to offer caesarean section for social reasons. In the public sector the birth attendant may be less willing to conduct caesarean section based on social indication alone.

Caesarean section rates have risen worldwide over the past decades.[5,6] The rising trend calls for concern globally.[7] The rate differs from country to country, and even among health facilities operating within the same country and might be a reflection of the practice and standard of obstetric care in a health facility. The World Health Organization (WHO) recommended a caesarean section rate of 10 – 15%.[8] In a study by Ye et al, it was found that there was no important association between caesarean section rate and maternal and neonatal mortality when caesarean rate is above 10%.[5] Hence a caesarean section rate above 10% at the population level may not decrease maternal mortality ratio and perinatal mortality rate. Once a woman has had a caesarean section, the risk of having a repeat caesarean section is higher. If she has had two previous caesarean sections, the next delivery will be by caesarean section. An earlier study in Lagos found that previous caesarean section is a predictive factor for caesarean section.[9] It is thus very important to observe strict criteria in determining precisely a woman's mode of delivery in the first pregnancy as this has a great impact on her future obstetric career.

Previous caesarean section has featured consistently as a leading indication for caesarean section in most studies.[10,11,12,13] while

obstructed labour was the commonest indication in other places.[1,14,15] The indication for caesarean section vary from place to place, and there is thus a need for us to determine the current rate and pattern in our environment as this will help in health resource planning, lead to development of guidelines on criteria for selecting patients for caesarean section in an attempt to lower the soaring caesarean section rate to that recommended by WHO.

The caesarean section rate and pattern of indications can be a reflection of maternal health status and quality of medical practice. In an earlier study in Zaria Nigeria, it was found that the commonest indication in 1985 was cephalopelvic disproportion while in 1995 it was found to be breech presentation. This change in trend of indication was thought to be a reflection of improved maternal health and increased utilization of the hospital, increased use of diagnostic facilities, and increased awareness and referral of cases.[16] The areas of need in terms of medical training may also be identified by the findings of our study and such rendered in order to lower the caesarean section rate, for instance trainings on the conduct of vaginal birth after caesarean section (VBAC), breech delivery, vaginal delivery for twin pregnancies etc.

In a country wide survey in Ecuador by Oritz-Prado et al, it was found that less than 36% of caesarean sections were found to be clinically justified by parallel analysis of absolute and relative indications.[17] This buttresses the need for us to conduct this study in our environment as the result may lead to development of protocols to guide appropriate selection of patients for caesarean section. The objectives of this study were thus to determine the current rate of caesarean section in LUTH, assess the trend in pattern of caesarean section in LUTH, identify the various indications for Caesarean section in our environment and the contribution of each, determine the trend in the choice of anaesthesia for C/S over the last ten years and determine the outcome of caesarean deliveries in LUTH.

METHODOLOGY

This was a retrospective cross-sectional study conducted at the Lagos University Teaching Hospital (LUTH), Idi-Araba, Lagos, the largest tertiary health institution in Lagos State, Nigeria. The hospital receives referrals from within Lagos state and its environs. Ethical approval was obtained from the hospital's Health Research and Ethics Committee (HREC) prior to commencement of this study, HREC No. ADM/DCST/HREC/APP/2103.

The study population comprised all cases of caesarean sections conducted at 28 weeks and above and cases delivered by other methods documented in the labour ward register. Information retrieved from the labour ward registers included the maternal age, parity, gestational age at delivery, type of caesarean section, indications for caesarean section, choice of anaesthesia, estimated blood loss at surgery and maternal and fetal outcome.

The data obtained was analyzed using the IBM SPSS statistics version 23 (IBM Corp., USA). Numerical variables were presented as Mean ± S.D. or as Median where applicable. Categorical variables were presented in terms of frequency (percentages of total). Student's t-test was used in comparing difference in means between groups. Chi square test was used to test for statistical significance between categorical variables. Fischer's exact test was used when the value in a cell is less than 5 and Chi square test is inappropriate. A p-value of less than 0.05 was considered to be statistically significant. The parturient were

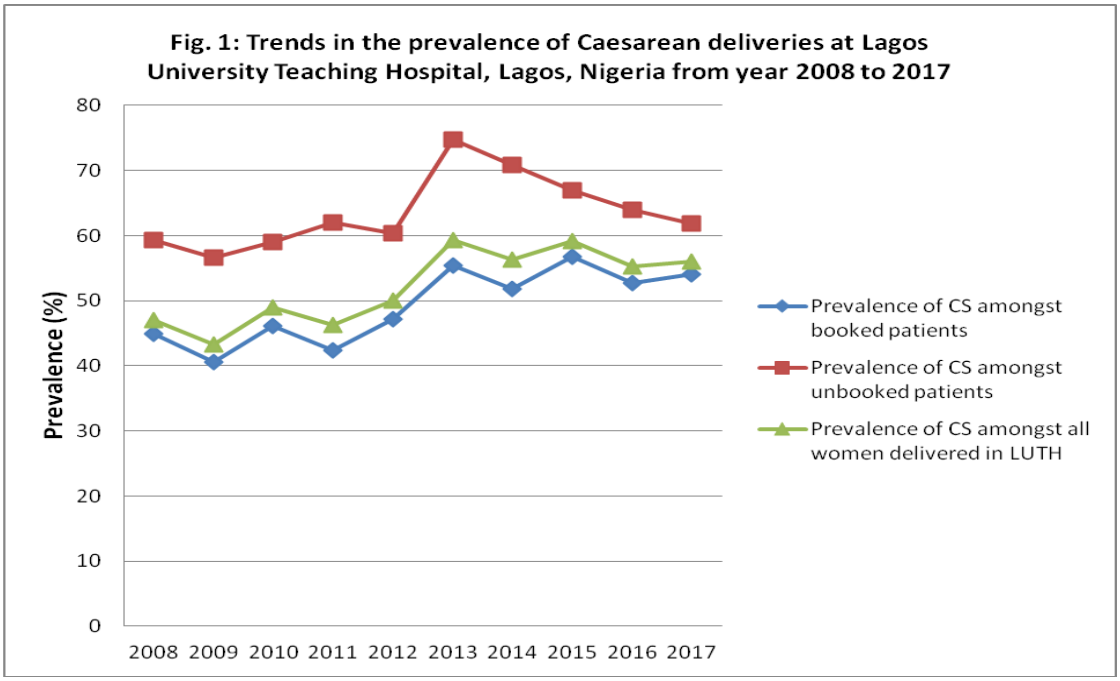
classified into two groups – booked and unbooked and also C/S versus non-C/S, and comparison made where applicable. The outcome measures were estimated blood loss at surgery, maternal outcome and fetal outcome. Odds Ratio (OR) and Relative Risk (RR) were used in calculating risks where applicable. Missing data were excluded during statistical analysis.

RESULTS

Clinical profile of parturients: A total of 12,811 deliveries conducted during the study period, January 1, 2008 to December 31, 2017 met the inclusion criteria for this study. Of these 6,567 (51.3%) had caesarean section (C/S). The Mean age ± S.D. was 31.6 ± 4.9 years for women who had C/S and 30.7 ± 5.6 years for women who had other forms of delivery (p = 0.000). The median parity was found to be 1.000 in both groups (0.141). The C/S rate was 63.1% for unbooked patients and 48.2% for booked patients, p = 0.000, OR = 0.542 (95%CI = 0.497 – 0.592). The mean gestational age at delivery was significantly lower for women who had C/S compared to those who had vaginal delivery, 37.3 ± 2.9 weeks and38.0 ± 2.7 weeks respectively, p = 0.000.

Prevalence and trend in C/S in recent decade: The overall prevalence of C/S over the study period was 51.3%. There has been a statistically significant increase in C/S rate from 47% in 2008 to 56% in 2017 (p = 0.000). The lowest prevalence of 46.3% was recorded in 2009. Peak periods for C/S in this study were 2013 and 2015 with prevalence of 59.3% and 59.2% respectively. Figure 1 shows the details of the trend in caesarean section over the study period and also explores the trends in booked and unbooked patients.

Fig. 1: Trends in the prevalence of Caesarean deliveries at Lagos University Teaching Hospital, Lagos, Nigeria from year 2008 to 2017



Note: On comparison of yearly prevalence rates, there was statistically significant differences in the prevalence of CS amongst booked patients $\chi^2 = 98.579$, p = 0.000, amongst unbooked patients $\chi^2 = 32.926$, p = 0.000, and in total population of women delivered by various methods during study period $\chi^2 = 129.702$, p = 0.000.

Indications for C/S: The 5 commonest indications for C/S in our centre during the study period were in descending order: previous caesarean section, HIV infection, hypertensive disorders, foetal distress, and antepartum haemorrhage. Tables I show details of these findings. On doing a year by year analysis of the various indications for C/S, we found that there has been a changing trend. The commonest indication for C/S as at 2008 and 2009 was HIV infection and in subsequent years it was found to be previous C/S (Figure 2).

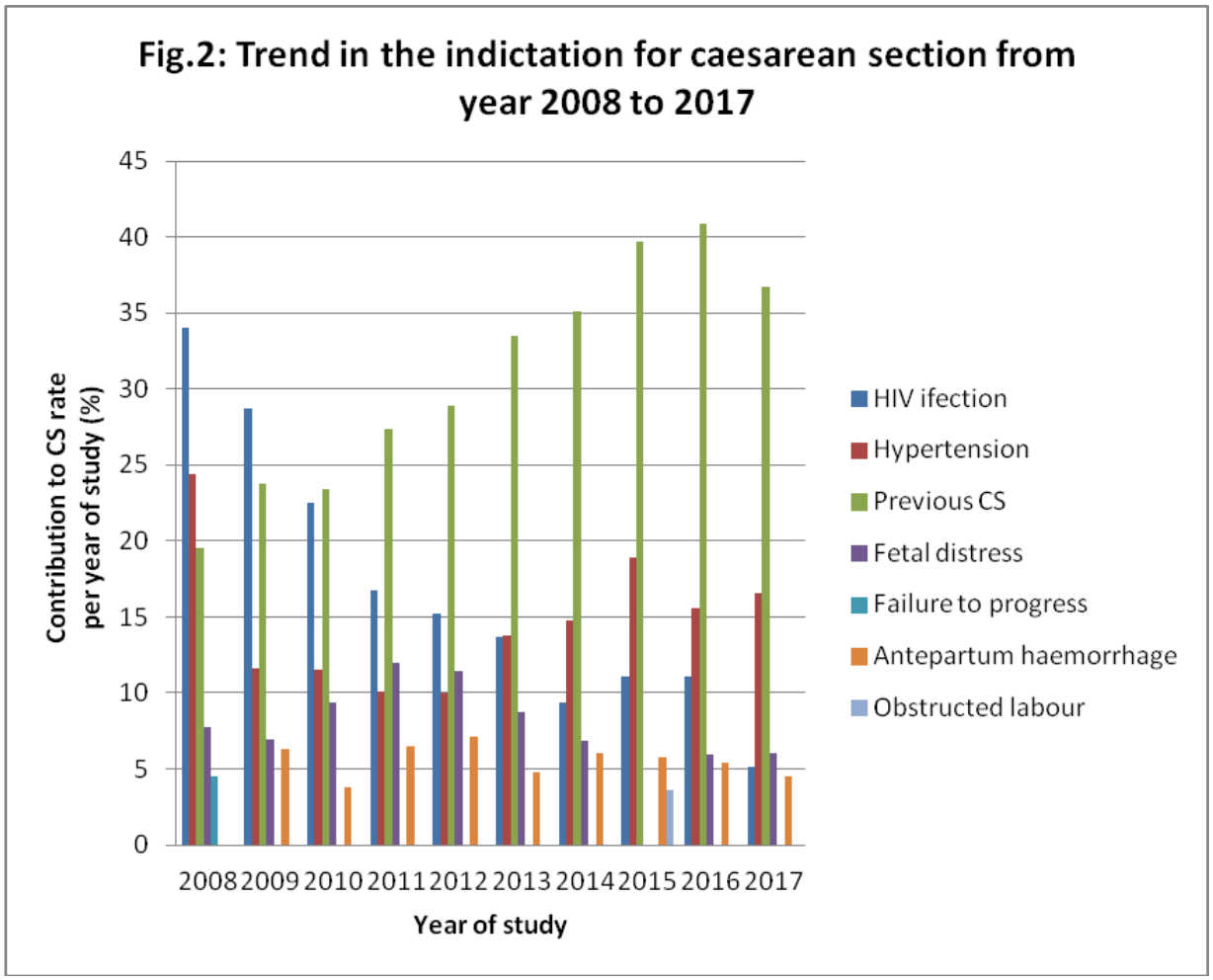
Table I

Indications for caesarean section performed in LUTH between January 1, 2008 and December 31, 2017

INDICATION FOR CAESAREAN SECTION	FREQUENCY, N = 6,567	PERCENTAGE FREQUENCY
MATERNAL INDICATIONS		
Previous scars		
Previous caesarean section*	2105	32.05
Previous myomectomy	87	1.32
Previous ruptured uterus	2	0.03
Fetopelvic disproportion/ problems relating to labour progress		
Obstructed labour	205	3.12
Prolonged labour	47	0.72
Cephalopelvic disproportion	342	5.21
Failed induction of labour	70	1.07
Failure to progress	332	5.06
Failed instrumental delivery	4	0.06
Delayed second stage	24	0.37
Retained second twin	8	0.12
Medical conditions		
Hypertensive disorders*	999	15.21
Human Immunodeficiency Virus (HIV) infection*	1158	17.63
Hepatitis	9	0.14
Sickle cell disease	157	2.39
Diabetes mellitus	123	1.87
Cardiac diseases	26	0.40
Thyroid disease	9	0.14
Malignancy	14	0.21
Maternal history		
Short interpregnancy interval	26	0.40
Elderly primiparity	47	0.72
Bad obstetric history e.g. miscarriages, unexplained stillbirth	76	1.16
Long standing infertility	21	0.32
Conception via invitro-fertilization	32	0.49
Genital tract problems		
Pelvic organ prolapsed pre-conception	4	0.06
Previous vaginoplasty	1	0.02
Previous vesicovaginal/ rectovaginal fistula	2	0.03
Placenta related problems		
Antepartum haemorrhage*	353	5.38
Others		
Musculoskeletal problems e.g. limb/ pelvic fractures, quadriplegia	17	0.26
Co-existing large ovarian cysts	7	0.11
Uterine fibroids	93	1.42
Maternal wish	29	0.44
Perimortem	2	0.03

FETAL INDICATIONS		
Prematurity	13	0.20
Intrauterine growth restriction (IUGR)	120	1.83
Fetal distress*	577	8.79
Abnormal lie	159	2.42
Malpresentation	324	4.93
Cord prolapse	35	0.53
Fetal anomaly	93	1.42
Fetal macrosomia	167	2.54
Multiple gestation	288	4.39
Oligohydramnios	104	1.58
Polyhydramnios	21	0.32

*Asterixed * parameters are amongst the five leading indications for caesarean section*



Changing trend in anaesthesia use for C/S: The commonest form of anaesthesia used during the 10-year study period was spinal anaesthesia 5994/6411 (93.5%). The prevalence of failed spinal anaesthesia necessitating conversion to general anaesthesia was 22/641 (0.3%). There has been no significant change in trend of the form of anaesthesia used over the years. Table II shows details of these findings. We also did not find any association between the type of C/S and the form of anaesthesia used.

Table II

Trend in anaesthesia use for Caesarean Section 2008 - 2017

	ANAESTHESIA					
YEAR	**CSE**	**EPIDURAL**	**GA**	**GA/SPINAL**	**SPINAL**	**Total**
2008	0	0	28	6	732	766
	(0.0%)	(0.0%)	(3.7%)	(0.8%)	(95.6%)	(100.0%)
2009	0	1	13	2	278	294
	(0.0%)	(0.3%)	(4.4%)	(0.7%)	(94.6%)	(100.0%)
2010	0	0	49	2	984	1035
	(0.0%)	(0.0%)	(4.7%)	(0.2%)	(95.1%)	(100.0%)
2011	0	1	44	0	750	795
	(0.0%)	(0.1%)	(5.5%)	(0.0%)	(94.3%)	(100.0%)
2012	1	6	56	0	849	912
	(0.1%)	(0.7%)	(6.1%)	(0.0%)	(93.1%)	(100.0%)
2013	0	4	45	3	868	920
	(0.0%)	(0.4%)	(4.9%)	(0.3%)	(94.3%)	(100.0%)
2014	1	2	27	3	346	379
	(0.3%)	(0.5%)	(7.1%)	(0.8%)	(91.3%)	(100.0%)
2015	0	1	28	0	325	354
	(0.0%)	(0.3%)	(7.9%)	(0.0%)	(91.8%)	(100.0%)
2016	0	3	37	2	392	434
	(0.0%)	(0.7%)	(8.5%)	(0.5%)	(90.3%)	(100.0%)
2017	0	9	39	4	470	522
	(0.0%)	(1.7%)	(7.5%)	(0.8%)	(90.0%)	(100.0%)
Total	**2**	**27**	**366**	**22**	**5994**	**6411**
	(0.0%)	**(0.4%)**	**(5.7%)**	**(0.3%)**	**(93.5%)**	**(100.0%)**

Pearson's Chi-Square = 85.802, p = 0.000

NOTE: GA is general anaesthesia, CSE is combined spinal and epidural anaesthesia

Comparison of blood loss at surgery and type of C/S: The mean ± S.D. of blood loss at C/S in this study was found to be 614 ± 466mls. There was no statistically significant difference in blood loss during emergency C/S when compared with elective C/S, 615 ± 480mls versus 609 ± 405mls respectively (p = 0.705).

Maternal outcome following C/S: The overall maternal death rate was significantly lower in women who had C/S 8/6599 (0.1%) compared to those who had vaginal delivery 28/6243 (0.4%), p = 0.0004, RR = 0.9967 (95%CI = 0.9949 – 0.9986). Maternal death rate following elective C/S and emergency C/S were comparable in this study, 1/1356 (0.1%) versus 7/5209 (0.1%) respectively, p = 0.5686, RR = 1.0006, 95%CI = 0.9989 – 1.0024).

Perinatal outcome following C/S: Perinatal death rate was found to be significantly lower following C/S 316/6566 (4.8%) than with vaginal delivery 532/6229 (8.5%), p = 0.000, RR = 0.9608 (95%CI = 0.9519 – 0.9698). It was also found that perinatal death rate was significantly higher following emergency C/S 306/3208 (5.9%) compared to elective C/S 9/1356 (0.7%), p = 0.000, RR = 1.0554 (95%CI = 1.0469 – 1.0639).

DISCUSSION

Our study showed a staggering caesarean section rate of 51.3% which is more than 3

times higher than the 15% recommended by World Health Organization (WHO).[8] Many studies on Caesarean section in Nigeria have given different rates like 11.8% in Maiduguri,[11] 18% in Jos,[18] 23.1% in Sagamu,[19] 34.5% in Abraka[20] and 35.5% in Osogbo.[12] None of them come close to the rate in our study. A recent study in Lagos by Akinola et al,[9] gave a caesarean section rate of 40.1% which has been the highest in Nigeria before our own. Also, studies in east Africa, Europe and North America gave caesarean section rates of 35.5%, 25% and 32.5% respectively. The consistent finding in all these studies including ours, is the steady increase in caesarean section rates over the years and in some, the increase was unprecedent.[21] Despite the very high caesarean section rate in our study, it was still nonetheless, lower than 57% recorded in China.[22] Their rate was largely attributed to the fact that their prenatal care doctors encouraged their patients to choose caesarean section over vaginal delivery, and so many of their caesarean sections were not medically indicated.[22]

This unprecedented high caesarean section rate in our study could be explained by the fact that our center being the largest and providing the highest level of care in Lagos State, Nigeria receives referral from within and outside the state. A lot of patients present with diagnosis requiring emergency caesarean sections following their referral to us. Our center is also one of the main centers in the state offering Prevention of Mother-to-Child Transmission of HIV (PMTCT) services and thus many of the HIV-infected pregnant women who do not meet the criteria for vaginal delivery would have a caesarean section. Among the indications for caesarean section in our study, previous caesarean section was the commonest. Similar reports were gotten in some other studies.[12, 23-25] Some of the reasons are not far-fetched; due to the soaring rate of caesarean section worldwide,[26] it is now very common to see pregnant women with a previous scar which ultimately increases their risk of having another caesarean section. Even though VBAC plays a role in reducing a repeat caesarean section,[27] many of our patients who are usually unbooked either do not meet the criteria for a VBAC or they present very late in labour with maternal/foetal complications necessitating an urgent abdominal delivery. Moreover, as it is the practice in our environment, after two previous caesarean sections the subsequent deliveries must be via repeat caesarean section. It is therefore crucial to reduce primary caesarean section rate as one of the ways of curbing this soaring rate. In contrast to our study, the commonest indication for caesarean section in studies carried out in different regions of Nigeria was cephalopelvic disproportion, closely followed by previous caesarean section.[11,28,29] In one of the studies,[28] a large turnout of unbooked patients was adduced as the main reason why cephalopelvic disproportion accounted for most of the caesarean section.

Spinal anaesthesia formed the vast majority (93.5%) of the types of anaesthesia used for caesarean sections in our study. A similar finding was seen in a study carried out in Port Harcourt where it was 91.7%.[28] In contrast, the finding in a similar but smaller study carried out by Ikeako et al[29] in Awka, general anaesthesia was reported as the only form of anaesthesia used in their caesarean sections. This was most likely due to lack of proper training in regional anaesthesia as suggested by the authors. Internationally, spinal anaesthesia has been recommended over general anaesthesia for obstetric analgesia due to incidences of failed endotracheal intubation and aspiration of gastric content in pregnant women who undergo general anaesthesia, less anaesthetic complications, cost

effectiveness and rooming of the neonate can start within a few minutes of delivery thereby promoting mother-baby bonding.[2,3] Consequently, the use of general anaesthesia has declined in comparison to spinal anaesthesia.[2] For over a decade now in our institution spinal anaesthesia has been favoured, hence our finding.

The average blood loss at elective and emergency caesarean sections were not significantly different in our study (615 ± 480ml and 609 ± 405ml respectively, p = 0.705). A similar result was gotten in a study conducted in Nepal where the estimated blood loss for emergency and elective caesareans section was 320.66 ± 210.3ml and 329.89 ± 228.5ml respectively, p = 0.743.[30] Our finding was in variance with the study carried out by Nuaim et al, where emergency caesarean section produced more blood loss than elective caesarean section. They said that could have been from increased haemorrhage in emergency caesarean sections due to the stretching of the lower uterine segment and the impaction of the presenting part into the pelvic cavity thereby making the operation bloody.[31]

Many studies have shown increased maternal death rate in women who had caesarean section compared with those who had vaginal deliveries.[12,32-35] In one of the studies this increase was due to postpartum haemorrhage and anaesthetic complications.[32] However, our study gave a contrasting result where vaginal delivery recorded a statistically more significant maternal death rate than caesarean section. This may be due to the timely surgical intervention, surgical expertise of our doctors as reflected in the optimal average blood loss at caesarean section and anaesthetic acumen of our anaesthetists in minimizing complications. A similar result to ours was also gotten in another study conducted in Canada, although the difference was not statistically significant.[36] While our study did not show any difference in maternal death rate between elective and emergency caesarean section, same could not be said in a study carried out in India, where all the maternal deaths recorded were in women who had emergency caesarean section. This is not surprising because studies in the developing countries have shown that emergency caesarean sections are more common and more likely to result in maternal morbidity and mortality.[28] Our finding could yet again be explained by the timely surgical intervention and expertise of our surgeons.

The perinatal death rate in our study was found to be significantly lower in women who had caesarean section compared to those that had vaginal delivery. While in one study there was no difference,[37] yet in many others the perinatal death rate was significantly more in women who had caesarean sections than in those who had vaginal delivery.[38-40] It was stated in one these studies that poor obstetric care given to the women contributed to the high perinatal death rate, as decision to carry out emergent caesarean section was delayed and there was also poor neonatal resuscitation.[40] Emergency caesarean section was also associated with a significantly higher perinatal death rate when compared to elective caesarean section in our study. This is not surprising as many of the women who usually present in emergency situations would have been poorly managed at the peripheral referral centers before presenting to us and a sizeable number of them also present to us pretty late. Similar findings were also gotten in some other studies.[38,41,42]

Caesarean section could reasonably be adjudged to be a safe method of delivery going by the findings in this study contrary to previous beliefs, however in low socioeconomic setting like ours where there is

great aversion for C/S, there is still a need to reduce the high rate of C/S in our centers, even if it is for the reason of cost alone. This we can achieve by applying WHO recommendations for reduction of unnecessary C/S by using non-clinical interventions which include educational interventions such as counseling of patients and educating health care providers on how to identify and refer complicated cases early, seeking second opinion on indications for C/S when necessary and conducting timely clinical audits.[7] WHO has also put in place a classification system, Robson classification to conduct comprehensive clinical audits on C/S which includes identifying and analyzing the groups of women which contribute most and least to overall C/S rates as was done in this study, comparing practices in these groups with other units with more desirable results and consider changing clinical practice accordingly, assessing the effectiveness of strategies and interventions targeted at optimizing the use of C/S, assessing the quality of care and of clinical management by analyzing outcomes, and assessing the quality of the data collected and creating staff awareness on the importance of appropriate data entry and good record keeping.[43]

CONCLUSION

Though our study has shown some benefits of caesarean section in our institution, the rate of caesarean section is unacceptably high, because many of these women are exposed to increased risk of having morbidly adherent placenta and abruptio placentae with their attendant haemorrhage which increased their morbidity and mortality in subsequent pregnancies. Although WHO has stated recently that every effort should be made to provide caesarean section to the women in need, rather than striving to achieve a specific rate, there is still a need to curb the unwarranted increase in primary caesarean section rate in our institution in order to prevent the future untoward effects. Decision to perform primary C/S should therefore be based on clear cut indications. There is thus a need to conduct regular clinical audits on C/S performed in every health institution using WHO Robson classification and review policies regarding delivery based on the findings.

What is already known on this topic:

- The soaring rate of caesarean section is recognised in previous studies, but this varies from place to place.
- The indications for caesarean section are well known.

What this study adds:

- The trend in caesarean section in terms of rates and indications are further explored in this study.
- This study gives a clear picture of the change in trend of indications for caesarean section by identifying the contributors to C/S, thus making it easier for health care planning.
- This study explores the change in trend of choice of anaesthesia for caesarean section.

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