

Determinants of Modes of Delivery: A Hospital based Retrospective Study in Kenya

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Abstract

This was a retrospective case-control study of the determinants of choice of mode of deliveries at PCEA Kikuyu Hospital, Kenya. The aim of the study was to investigate the prevalence of SVD and caesarean deliveries and to determine the factors predictive of each mode of delivery. Data was analysed using SPSS 20.0. Descriptive analysis involving frequencies and percentages was employed as well as ANOVA test at 95% CI. The study has shown that 65.1% of women who delivered at PCEA Kikuyu hospital had Spontaneous vaginal deliveries (SVD), 7.71% elective caesarean deliveries while 26.78% had emergency caesarean deliveries. Parity, gravidity, employment status, previous modes of delivery and gestation age were found to be predictive of the modes of delivery ($p < 0.05$). The study recommends that the hospital administrators and policy makers at the national and county levels should lay adequate plans for public awareness on the outcomes of modes of delivery based on the established rising rates of C/S deliveries. Finally, there is need for further research in other hospitals in different settings in order to ascertain the outcomes of different modes of delivery.

Keywords: Modes of delivery; Caesarian section; Vaginal delivery; Gestation age

Introduction

Modes of delivery refer to either the natural delivery or a delivery by surgical intervention. A vaginal delivery is the birth of offspring (babies in humans) in mammals through the vagina while Caesarean section delivery is a surgical procedure in which one or more incisions are made through a mother's abdomen and uterus to deliver one or more babies. Natural childbirth occurs without medication or obstetric intervention. Vaginal birth may involve any number of medical interventions with the baby ultimately born vaginally.

These medical interventions may include surgical or medical induction, oxytocin for augmentation, electronic cardiotocographic monitoring, analgesics for pain relief, episiotomy, and the delivery can be spontaneous i.e. unassisted or assisted i.e. by forceps or vacuum extractor [1]. Caesarean section involves surgical delivery of the fetus, and is often performed when a vaginal delivery would put the baby's or mother's life or health at risk. Some are also performed upon request without a medical reason to do so. The World Health Organization recommends that they should only be done based on medical need [2].

According to Timor-Tritsch and Monteagudo [3], despite lack of evidence of any increase in obstetric emergencies, the rates of CS deliveries has dramatically increased in most countries with as high as more than 50%. This trend is of concern as Caesarean deliveries increase the risk of neonatal morbidity and mortality and maternal morbidity, compared with spontaneous vaginal delivery [3].

Materials and Methods

Study design

The study took a case control retrospective design to compare medical complications associated with mode of delivery at PCEA Kikuyu hospital. The study used quantitative methods of data collection.

Study area

The study was conducted in PCEA Kikuyu Hospital located in Kikuyu town in Kiambu County. It serves mainly low and middle socio-economic populations. It is a prototype of a level IV hospital which has a full obstetric management team, midwives, medical officers and interns with 24 hour coverage. Therefore emergency response is expected to be close to ideal situation. Other amenities include a 24-hour operation theatre, availability of blood transfusion facilities and a functional new born unit with a consultant pediatrician available whenever needed. The hospital has 218 beds and 6 baby cots. Other services offered by the hospital include antiretroviral therapy, curative in-patient Services, family planning, HIV counseling and testing and immunization. The maternity ward of the hospital deals with care of mothers just before, during and after delivery including physical, emotional, spiritual and psychological support.

The ward has a 19 bed capacity and has a labor ward and delivery room. The ward has staff to handle obstetric emergencies, monitor labor, and give safe deliveries and support mother and child post-delivery. Other equipment in the maternity ward includes ultrasound and Doppler. The hospital receives an average of 61 deliveries in a month [4]. For every patient received in the hospital, a health register detailing place name of the patient, age, marital status, place of

residence, duration of labor and gravidity are created. Upon delivery, the APGAR scores, baby weight, blood loss, nature of placenta and medical outcomes are recorded in the health register as well as the doctor's file

Study population

The study targeted all deliveries at the hospital for 1 year (January 2014 to December 2014).

Inclusion and exclusion criteria

All deliveries registered in the hospital between January 2014 and December 2014 was included in the study. The study excluded all the records of patients admitted prior to or after the year 2014.

Sampling technique

The study employed purposive sampling technique where all the deliveries recorded between the month of January 2014 and December 2014 were sampled for the study. According to the health record, a total of 740 deliveries were recorded between the month of January 2014 and December 2014. The sampling was as illustrated in Table 1.

Normal deliveries (Control): This comprised of all the deliveries that were grouped as SVD in the hospital records during the period of the study. From the records, a total of 340 records were obtained. All the deliveries under this category were sampled. This cohort formed the control group in the study.

C-Section deliveries (Case): This comprised of both elective and emergency caesarean section deliveries. A total of 179 records were abstracted from the hospital records. This cohort formed the case for the study.

Variables	With complication	Without complications	Odds ratio	Relative risk
SVD (Control)	237	193	145.8	1.75
C-section delivery (Case)	179	0	-	-
Total	416	193	-	-

Table 1: Sampled records.

Study instruments

Data collection was carried out by using a check list (Appendix 1). This included mode of delivery, age, birth order, past delivery experience, place of residence, occupation, level of education and any subsequent medical conditions. The researcher picked the medical files for sampled files from the hospital records and extract relevant information as per the check lists. The data abstraction took place within the hospital premise for a period of 14 days.

Data analysis and presentation

Data analysis was performed using SPSS 20.0. To find out the prevalence of the caesarean and SVD deliveries, descriptive statistics involving frequencies and percentages was employed. To compare the

mode of delivery and the associated outcomes as well as the factors associated with choice of mode of delivery, one way ANOVA tests were conducted. All statistical tests were performed at a 5% level of significance (95% CI).

Study instruments

This study was a retrospective and therefore it involved documentation of existing practices without changing the clinical practice. Confidentiality was maintained on information regarding the patient since names of clients were not be sought and the information since is not to medical personnel or the patients themselves. The research proposal was submitted to Great Lakes University of Kisumu, ethical review committee and Ministry of health for clearance and approval. Permission was also sought from the medical superintendent of PCEA Kikuyu Hospital.

Results

The study was conducted at PCEA Kikuyu hospital, Kiambu County, between 28th August and 17th September, 2015. It was conducted on all deliveries at PCEA Kikuyu hospital registered between January 2014 and December 2014. Data was abstracted from a total of 519 complete records out of the expected 740 records (70.14%)

2.3. Study Population

Demographic characteristics

The demographic characteristics considered in the study included maternal age, level of education, place of residence as well as employment status. A majority of the women, 35.1% were aged between 25-28 years. Only 22.2% were 33 years and above. Of those who were 24 years and below of age, 67.67% delivered through SVD, 27.07% through Emergency C/S while 5.26% through elective C/S. On the other hand, 57.14%, 35.16%, 7.69% of the women who were of ages between 25-28 delivered through SVD, emergency C/S and elective C/S respectively. On the other hand most women, 82% indicated that they were married. The records from the hospital did not reveal any other marital status. The results from the study also reveal that SVD was mostly common among women who were married (68.31%).

The highest percentage of elective C/S was found among the married mothers (8.22%) while emergency C/S among the single mothers (41.94%). The study also revealed that a majority of the women, 55.9% of the women were unemployed and only 32.9% that they were formally employed. SVD was mostly found among the women who indicated that they were unemployed (72.76%). Most of the mothers who delivered through, emergency C/S (50%) were also self-employed. Elective C/S deliveries were mostly found among the women who had indicated that they were formally employed (12.28%).

Finally, the study revealed that a majority of the women, 55.9% of the women were unemployed and only 32.9% that they were formally employed. SVD was mostly found among the women who indicated that they were unemployed (72.76%). Most of the mothers who delivered through, Emergency C/S (50%) were also self-employed. Elective C/S deliveries were mostly found among the women who had indicated that they were formally employed (12.28%). Table 2 below represents the demographic characteristics of the sampled population.

Variables		Elective C/S (%)	Emergency C/S (%)	SVD (%)
Levels of education	Primary	0	22.8	77.2
	Secondary	2.5	13.3	84.2
	Post-Secondary	11.8	34.5	53.6
Employment status	Unemployed	5.9	21.4	72.8
	Employed formally	12.3	28.1	59.7
	Self-employed	3.5	50	46.6
Age	≤ 24	17.5	26.5	25.9
	25-28	35	30.6	46
	29-32	17.5	17.6	15.8
	33+	30	25.3	12.2
Marital status	Married	8.2	23.5	68.3
	Single	5.4	41.9	52.7

Table 2: Demographic characteristics.

Modes of delivery

The data was collected from the 519 complete records available at the hospital. Frequencies were run to establish the percentages. Out of the 519 deliveries recorded, 65.1% were Spontaneous vaginal deliveries (SVD).

About 7.71% were elective caesarean deliveries while 26.78% were emergency caesarean deliveries. Table 3 below represents the frequency and percentage of modes of delivery at PCEA Kikuyu hospital.

Variables	Frequency	Percent
Elective CS	40	7.71
SVD	340	65.51
Emergency CS	139	26.78
Total	519	100
Elective CS	40	7.71
SVD	340	65.51
Total	519	100
C/S delivery	179	34.49
Total	519	100

Table 3: Modes of delivery.

Factors predictive of modes of delivery

The factors considered included both the maternal and neonatal factors.

Maternal factors predictive of modes of delivery: Most women who were primipara (30.04%) had emergency C/S as compared to their multipara counterparts (19.04%) who had C/S. On the other women who were multipara had elective C/S (8.33%) and SVD (72.62%) as compared to their primipara counterparts 7.4% C/S and 62.1% SVD.

The relationship between parity and mode of delivery was found to be statistically significant at $p=0.022$ ($F=3.830$).

Equally, most women who were primigravida had emergency C/S, 30.74% as compared to their counterparts who were multigravida, 18.71%. On the other hand, most multi gravida women had Elective C/S, 8.77% and SVD, 72.51% as compared to their primigravida counterparts. The relationship between gravidity and mode of delivery was also found to be statistically significant at $p=0.014$ ($F=4.288$).

The study also found that most women who had had only C/S delivery had elective C/S, 54.29% while those who had had SVD as well as SVD and Abortion had SVD, 74.48% and 90% respectively. Those who had not delivered before tended to have SVD, 62.5% while those who had had both SVD and C/S previously had SVD, 75%. When mothers had abortion prior to their delivery, they tended to have emergency C/S delivery, 57.14%. The previous mode of delivery was found to be statistically related to the mode of delivery at $p=0.015$ ($F=1.339$).

The study also found a statistically significant relationship between duration of labor and the modes of delivery at $p=0.001$ ($F=72.909$). Duration of labor extending from 12 hours and above was mostly experienced by mothers who had SVD (88.73%). Table 4 below represents the results.

Variables	Factor	El.C/S (%)	SVD (%)	Em. C/S (%)	F	p-value
Parity	Primipara	7.4	62.1	30.04	3.83	0.022
	Multipara	8.33	72.62	19.04		
Gravidity	Primigravida	7.18	62.06	30.74	4.288	0.014
	Multigravida	8.77	72.51	18.71		
Previous Delivery	C/S	54.29	28.57	17.14	1.339	0.001
	SVD	5.2	74.48	20.31		
	SVD and C/S	-	75	25		
	None	3.63	62.5	33.87		
	SVD and Abortion	-	90	10		
	Abortion	28.57	14.29	57.14		
Maternal age	SVD, Abortion and C/S	-	100	-	4.229	0.015
	≤ 24	5.26	67.67	27.07		
	25-28	7.69	57.14	35.16		
	29-32	7.87	67.442	24.72		
Gestation (Wks)	33+	10.43	74.78	14.78	0.67	0.512
	38	11.18	70.59	18.23		
	38	6.32	59.47	34.21		
	40	2.63	59.65	37.72		
labor (Hrs)	42	13.33	86.67	0	72.909	0.001
	≤ 11	28.97	19.57	51.45		
	42718	-	80.39	19.61		
	15-15	-	88.73	11.27		
	16+	-	81.13	18.87		

Table 4: Maternal factors predictive of modes of delivery.

The key factors that were found to significantly influence mode of delivery were, Parity ($p=0.022$), gravidity (0.14), previous delivery (0.001), maternal age (0.015), and duration of labor (0.001).

Neonatal factors predictive of modes of delivery: The study looked at the neonatal factors influencing modes of delivery. The factors available in the records included baby weight and APGAR scores. One way ANOVA test was done to establish the relationship between the variables. The study revealed that baby weight and APGAR scores at the 1st minute significantly influenced the mode of delivery. Most

babies born weighing between 2.81 and 3.15 kilograms were delivered through SVD, 75.57% while those who were born weighing 2.8 kilograms and below were born through Elective C/S.

On the other hand, babies who were born weighing 3.51 and above kilograms were born through emergency C/S, 45.71%. The mode of delivery and baby weight was found to be statistically significant at $p=0.001$ ($F=21.49$). Most babies who were delivered through SVD had APGAR scores of not less than 10, 80% while those who were delivered through emergency C/S had APGAR scores of 8 and below, 38.57%.

Babies born through elective C/S had APGAR scores of 10, 8.57%. The relationship between the APGAR scores and the modes of delivery was found to be statistically significant (F=12.841; p=0.001). Table 5 below

represents the Summary of the neonatal factors influencing the modes of delivery.

Variables	Factor	El. C/S (%)	SVD (%)	Em. C/S (%)	F	p-value
Baby weight	≤ 2.8	16.03	68.7	15.27	21.49	0.001
	2.8-3.1	6.1	75.57	18.32		
	3.2-3.4	5.26	63.81	30.92		
	3.5+	2.86	51.43	45.71		
APGAR1'	≤ 8	8.1	53.33	38.57	12.841	0.001
	9	7.33	72.9	19.78		
	10	8.57	80	11.43		
APGAR5'	≤ 9	9.36	53.61	37.02	13.529	0.001
	10	6.36	75.27	18.37		

Table 5: Neonatal factors predictive of modes of delivery.

Discussions and Conclusions

From the study, a majority of the women delivered through SVD. However, the study established a higher prevalence of C/S deliveries. This was established to be higher than the WHO 2010 estimates which put the prevalence of C/S deliveries in Kenya at 4.0 for every 100 births. While emergency C/S accounted for the larger percentage of this figure, the factors responsible for the variation could be two fold. In the first instance, PCEA Kikuyu hospital serves as a referral hospital in the region [4] and therefore handles deliveries from other hospitals around. The second explanation could be based on the rising prevalence of C/S deliveries [5]. Given that the WHO estimates were done 5 years ago, this estimation could have risen over the period of time. The ANOVA test revealed that the maternal and neonatal factors associated with the modes of delivery included parity and gravidity, employment status, APGAR score and the baby weight. Mothers who were primipara had emergency C/S while those who were multipara had elective C/S and SVD. The study established that most women who were primigravida had Emergency C/S, while most multigravida mother had elective C/S. The findings of the study indicate that women in their earlier number of births prefer C/S deliveries. The findings of this study affirms KDHS 2003 report which indicated that women with first birth order registered a higher incidence of caesarean delivery of 6.7 as compared with those with 6 and above birth order with incidence rate of 1.4 for every 100 births [6].

The study established that most women who were formally employed had Elective C/S most unemployed women had SVD and that a majority of the women who had emergency C/S were self-employed. In Kenya, it is expected that people with formal employment occupy the highest economic status as compared to those who are unemployed as well as those who are self-employed. According to this finding therefore, it can be concluded that women who had higher economic status preferred elective C/S and that those of lower economic status had SVD. This finding is in agreement with the Kenya demographic and health survey conducted in 2003 which indicated a higher prevalence rate of caesarean delivery among women

of highest wealth profile to be 11.2 as compared to those of the lowest wealth profile which was 1.2 [6].

The study also found that the previous modes of delivery influenced the modes of delivery as recorded in the hospital register. Most women who had had only C/S delivery had elective C/S, those who had had SVD as well as SVD and Abortion had SVD. Those who had not delivered before tended to have SVD, while those who had had both SVD and C/S previously had SVD. When mothers had abortion prior to their delivery, they tended to have emergency C/S delivery. This finding is similar to a study conducted by reference [7] which indicated that the previous experience of mothers informed their choice of delivery. Similarly, reference [8] reported in their study that women who have undergone a non-elective caesarean section expressed confidence in the decision, felt well informed, and reported that they played an important role in the decision to have a caesarean birth.

Further, the study established that most women with gestation age of 41 and above weeks had SVD deliveries and that mothers delivering at 40 weeks had emergency C/S. This was an indication that emergency C/S deliveries resulted from other unforeseen factors while SVD deliveries were rather planned. This could also be an indication that C/S deliveries were rather induced. According to reference [9], the induction of labor is known to be associated with increased risk for caesarean section deliveries. The present study did not find significant relationship between the modes of delivery and marital status, place of residence and level of education. It can be argued that there was an error of social desirability in the hospital records regarding the marital status of the patients since this depended on verbal autopsy. It could also be difficult to determine segregate urban from rural since this depended on the name of the patients place of residence. Since the hospital operated in the periphery of the capital city of Kenya, there was an expected gray area as regards the urban rural continuum.

Conclusion

The study found a high prevalence of C/S deliveries at PCEA Kikuyu hospital (7.7% for elective and 26.8% for emergency C/S deliveries).

Factors predictive of the modes of delivery include parity, gravidity and employment status, previous modes of delivery and gestation age.

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