Global Scientific JOURNALS

GSJ: Volume 11, Issue 2, February 2023, Online: ISSN 2320-9186
www.globalscientificjournal.com

FACTORS ASSOCIATED WITH CESAREAN DELIVERY TRENDS AT A LARGE REFERRAL HOSPITAL IN WESTERN KENYA

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ABSTRACT

Caesarean section (CS) is an important life-saving surgical procedure for pregnant women. The procedure is on the rise globally and this has elicited debate on its use, importance and justifications. In 2015, a KDHIS report indicated Kenya CS rate at 9%, with Kisumu County recording 4% which is below the WHO recommended rate of 5% to 15%. This descriptive study investigated the level of CS and factors that influence its indication at Jaramogi Oginga Odinga Teaching and Referral Hospital (JOOTRH) in Kisumu County. Stratified sampling was used to select a sample of 385 files from the JOOTRH records department, from which data was extracted using a pre-designed form. Participant characteristics were summarized using descriptive statistics, and further inferential analysis done using Chi-square to detect association between various variables with indication for CS delivery, using SPSS v23 (α=0.05). The average CS rate for the period of the study was 19%, lowest in the 2013 (16.87%) and highest in year 2020 (21.63%). Of the demographic factors, only education (p= 0.018), employment (0.015), and mode of payment for CS (0.048) were significantly associated with CS indication. This study found no significant role for general medical history (p = 0.163), ANC attendance (p = 0.413), but a strong association with obstetric factors (p < 0.001), the greatest being a previous CS scar (31.4%). The findings of this study thus present evidence of increased CS rate, and identifies some associated factors. Kisumu County Ministry of Health should come up with polices and guidelines on how to control the increase of CS rate at JOOTRH, while strengthening good referral practices that will allow most deliveries at lower-level facilities across the county, which could be emulated in other parts of the country and beyond. This may include policies and guidelines on trial of labour after caesarean section and vaginal birth after caesarean section.

Key words: cesarean, delivery, referral, western Kenya

I. INTRODUCTION

Currently, CS is generally perceived as a low-risk procedure by both the expectant mother and the clinicians, despite this popular belief, CS is associated with a high risk of maternal morbidity and mortality when compared to vaginal deliveries. An increase in CS leads to an increased cost of burden to the health sector that is already underfunded, while lack of the procedure means that women are missing on the essential services and thus increase in maternal mortality rates. CS is also associated with maternal and infant morbidity like wound infections, difficulty in breathing and a long stay in hospitals. There is evidence that prenatal morbidity and mortality has not changed despite increased caesarean section rates, with recorded increased intra- and post-operative complications (Koridze *et al.*, 2015).

Newlin *et al.* (2015), Observed that women undergoing CS had higher chances of suffering from postpartum haemorrhage due to puerperal infections and surgical wound infections ending up getting a blood transfusion as a consequence of severe haemorrhage. A meta-analysis on maternal complications and

caesarean section without medical indication revealed higher maternal death in women undergoing CS than women who delivered normally (Mascarello *et al.*, 2017). According to (Koridze *et al.*, 2015), the situation is complex, since many factors are involved: the right of patients to choose the mode of delivery, the number of patients with prior caesarean section, and physician preference for caesarean section, among others.

Delivery via CS is associated with an increased risk of respiratory infections to the infant, a higher number of infants admitted to intensive care units and an increased infant mortality rate. Sandall *et al.* (2018), reported that short-term effects like breathing difficulties (transient tachypnoea of the new-born), and long-term effects like asthma and allergies due to the altered physiological process of birth are some of the morbidities common to infants born through CS. Several studies have also reported that planned CS has the risk of breathing the infant earlier compared to the normal physiological process of labor and vaginal delivery which enhances the baby lung adaptation through a catecholamine surge that stimulates the re-absorption of the fetal lung fluid and release of surfactant.

Usually, CS has some economic implications to the affected individuals, the facility and the health sector at large. The high reimbursement rate of CS is thought to be one of the factors fueling its increase, however, there are very few research papers written about it. According to He *et al.* (2016), the cost of CS is approximately double the cost of the trial of labor and vaginal delivery. In Kenya, the National Hospital Insurance Fund (NHIF) has reported an increase in pay out on claims arising from CS deliveries with the amount surpassing 1 billion in the year 2015 accounting for 58% of the maternity cost. Of particular concern is the 4.1% CS rate in Kisumu County (KDHS, 2014), which is below the recommended WHO rate of between 5% to 15%. This means that majority of these women are missing the essential services hence the high infant and mother mortality rate in the region.

II. METHODS

A. Study design

A hospital based cross-sectional descriptive study was conducted for 2 months (1st October- 30th November 2021) using secondary data that included 385 patients' files from the facility maternity records of 2011-2020. The design was chosen so that collected data could be analysed for an association of the predictor variable and the outcome in terms of persons, place and time. Both quantitative and qualitative method were used to gather the required information.

B. Study area

This study was conducted in Jaramogi Oginga Odinga Teaching and Referral Hospital (JOOTRH). The facility is located in Kisumu central about 6 km from the town, along Jomo Kenyatta highway. The hospital is a level 6 facility with an 800-bed capacity that is a referral centre for the entire Nyanza counties and also caters for Western and Rift valley counties. It is a teaching hospital that serves major universities and medical colleges in the region. The maternity wing consists of 60 bed capacity with 20 labour wards, the hospital conducts an average of 5000 deliveries annually.

C. Sample size determination

Sample size determination

The sample size was determined using Yamane (1967) formula. It is a simple formula used to calculate the sample size of known population size at a given confidence level.

$$n = N/1+N(e^2)$$

where:

n = The desired sample size
N=Population (10055)
e = error (0.05 at 95%CI)

Substituting: n = 384.6963 **= 385**

The sample size was allocated in each stratum (year) by getting the percentage (as shown on Table 3.1), for example, for the year 2011:

(962/10055) * 385= 36.83= 37

Table 1: Data from Kenya District Health Information System II (2020)

Year	Number of CS at JOOTRH	Sample
2011	962	37
2012	900	34
2013	994	38
2014	1050	40
2015	1243	48
2016	1236	47
2017	492	19
2018	1362	52
2019	963	37
2020	853	33
Total	**10,055**	**385**

D. Sampling procedure

The hospital register showed that in the study period there were 10,055 CS deliveries recoded, 385 files were selected using Stratified sampling technique and further used to allocate for each year. Files for each year was picked randomly. Purposive sampling was used to select (6) key informants for the study. Key informants comprised of informed, knowledgeable and experienced persons that included an obstetrician-gynecologist consultant, 2 medical officers and 3 midwives/nurses working in the maternity wing. After participant consented to participate in the study, they were interviewed using a pretested semi-structured questionnaire.

E. Inclusion and exclusion criteria

A complete record of all the women who delivered through CS in the facility from January 2011 to December 2020. Healthcare workers working in the maternity wing and willing to participate in the study. Women who deliver through normal vaginal delivery. The deliveries that were recorded outside the study period. Key informants who refused or were unable to give consent.

F. Data collection

The hospital register showed that in the study period there were 10,055 CS deliveries recoded, 385 files were selected using Stratified sampling technique and further used to allocate for each year. Files for each year was picked randomly. Purposive sampling was used to select (6) key informants for the study. Key informants comprised of informed, knowledgeable and experienced persons that included an obstetrics and gynaecologist consultant, 2 medical officers and 3 midwives/nurses working in the maternity wing. After participant consented to participate in the study, they were interviewed using a pretested semi-structured questionnaire.

G. Data analysis

Summarized sample data collected from the hospital records department that included the variables of interest was entered and analysed using SPSS (v.24). Descriptive statistics was used to summarize socio-demographic and medical data. Associations were detected using correlation analysis, while differences between different groups and variables were tested using the Chi-square test. The results were presented in form of tables, charts and graphs, as applicable and appropriate.

III. RESULTS

Introduction

The total deliveries at JOOTRH in the study period was 53060 of which CS deliveries was 10,055. The CS rate was highest in year 2020 (21.63%) and lowest in the 2013 (16.87%). Average CS rate as determined for the period of the study was 19%. The trend indicates that there was a gradually increase of CS rate over the period of the study (Figure 1).

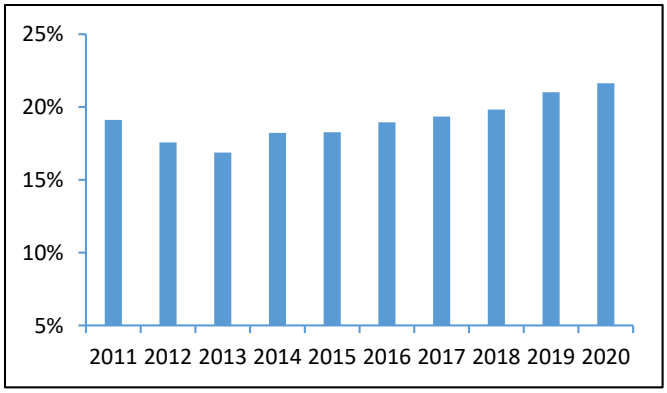

Figure 1: CS Rate at JOOTRH in 2011-2020

Demographic Factors

The average age for CS was established to be 26 years whereas the median age was also 26 years. Nonetheless, the age that appeared most for the cumulative period of study (2011-2020) was 22 years with a frequency of 51 (Figure 2). The youngest age to undergo CS during the period of study was 14 years while the oldest maternal case for CS was 42 years.

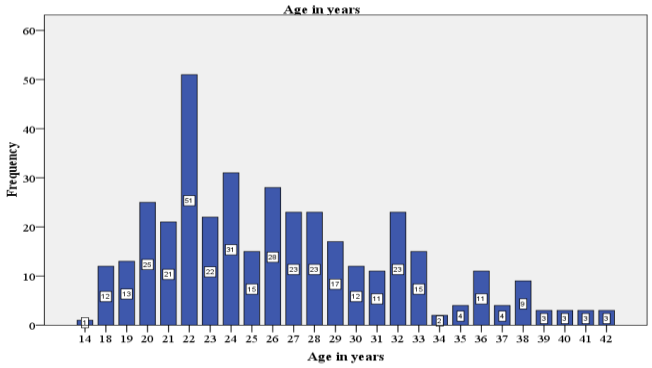

Figure 2: Age of the women who underwent CS

The youngest age was 14 years while the oldest were 42 years. Women of age 22 years were the majority presenting 51 (13%) of the cases. The chi-square test of association between type of CS and age yielded $p = 0.126$. Accepting the null hypothesis of no association between CS delivery and age while the alternative hypothesis, there was an association between the CS delivery and age of the patient being rejected Table 2).

Table 2: χ^2 test analysis of women's age vs. CS delivery

Chi-Square Tests			
	Value	**df**	***p***
Pearson χ^2	33.207	25	0.126
Likelihood ratio	40.782	25	0.024
# valid cases	385		

Religion, as identified in the literature is known to influence the decision of the pregnant women in the uptake of CS deliveries. In these study, the majority (362) representing 94% of the women who delivered through CS where Christian while 23 (6%) were Muslim. However, the chi-square test of association revealed there was no statistical association of type of religion and likelihood of delivering through CS ($p = 0.097$).

Majority of the CS patients were married and living with their spouses were 289 (75.1%) whereas those married and not

living with their spouses were 20 (5.2%), divorced or separated CS clients were 5 (1.3%), while 70 (18.2%) were single, and only 1 (0.3%) was widowed. The chi-square test showed there was no association between marital status and CS delivery (p = 0.297).

Education

Analysis of CS patients' educational levels revealed that 105 (27.3%) were either college or university graduates, those having only reached primary level were 123 (31.9%), while those with no education were 9 (2.3%). The majority of the CS patients had secondary education (148; 38.4%). Chi-square test of association revealed there was an association between CS patients' level of education and CS delivery (p= 0.018).

Residence

Classified by county of residence, majority (287; 74.5%) of the CS patients came from Kisumu County as the primary place of residence. Other counties with substantial numbers were Siaya (29; 7.5%), Vihiga (28; 7.3%) and Kakamega (16; 4.2%). Others came from diverse counties within Kenya, in small numbers. Chi-square test revealed no significant association between residency and indication for CS revealed (p = 0.24).

Number of children versus indication for CS

About one-third (121; 31.4%) of CS patients had only 1 child, while 119 (30.9%) had no children. The mean, median and modal number of children was 1 with a standard deviation of 1.085 and a variance of 1.177. The frequency of mothers undergoing CS decreased subsequently from the 2nd child to the 4th, 40 (10.4%) and 11 (2.9%), respectively (Figure 3).

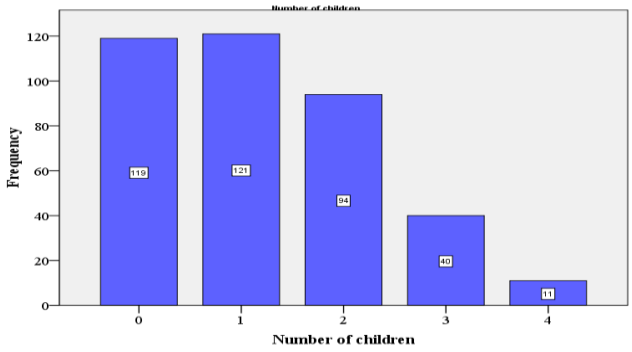

Figure 3: Number of children of CS delivery patients

Chi-square test of association established no statistically significant (p = 0.25), relationship between the number of children and indication for CS (Table 3).

Table 3: Number of children vs CS delivery

	Value	df	Asym Sig (2-sided)
Pearson χ^2	5.389[a]	4	0.250
Likelihood Ratio	5.862	4	0.210
N of Valid Cases	385		

Socioeconomic Characteristics of CS patients

The employment status of the CS patients varied from having no employment at all (162; 42.1%) to self-employment (122; 31.7%). The CS patients that had formal employment were 78 (20.3%), while non-formal or casual employment accounted for 23 (6%) of the CS patients. Chi-square test of association revealed that an association (p = 0.015) between employment status and indication for CS delivery (Table 4).

Table 4: Employment status vs CS delivery

	Value	df	Asymp. Sig. (2-sided)
Pearson χ^2	10.481[a]	3	0.015
Likelihood Ratio	10.906	3	0.012
N of Valid Cases	385		

Payment Method

Majority of the CS patients had their medical bill settled by insurance (70.65%), and medical bill waivers accounted for 21.56%. Payment for CS delivery using cash was only by 7.79% of the CS patients JOOTRH (Figure 4).

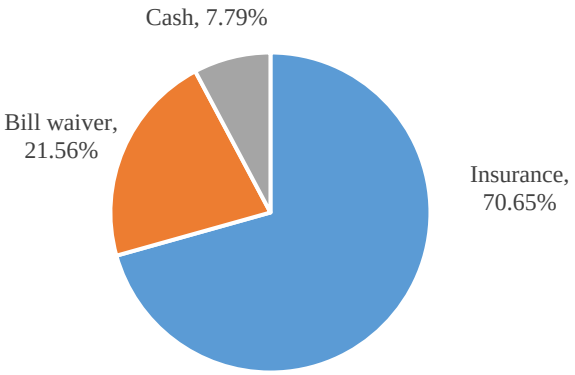

Figure 4: Hospital bill payment method for CS

Table 12 shows Chi square test of association between the payment option and indication for CS, which revealed a significant association (p= 0.048).

Time of Procedure

Most CS was performed in the evening with 175 (45.5%) patients having undergone the procedure within that timeframe. The rest had the procedure conducted in the morning (111; 28.8%), or at night (99; 25.7%). On further analysis, the chi-square test of association showed that there was no significant association between the time the CS procedure and indication for CS (p = 0.610).

Medical Personnel

Most of the CS procedures were conducted by general practitioners (288; 74.8%), and only 97 (25.2%) cases were

conducted by specialists. Chi-square test revealed that there was no significant association between the medical personnel who conducted the CS procedure and the indication for CS ($p = 0.120$).

Reason for CS

Up to 343 (88.83%) CS cases were conducted due to obstetric emergencies, and only 43 (11.17%) accounted for elective CS cases.

Medical History

Medical history was identified as a cause for CS indication, as 18 (4.7%) of the CS patients had cardiovascular diseases, 223 (57.9%) presented with *other* conditions (not specified by physician), while patients with no significant medical history were 144 (37.4%). Chi-square test showed no statistical association between the patients' medical history and indication for CS ($p = 0.163$)

ANC Attendance

Data revealed that 253 (65.7%) patients undergoing CS had completed at least 4 ANC visits while 130 (33.8%) had only partial ANC visits. Only 2 (0.5%) of the CS clients did not attend any antenatal clinic. There was no likelihood of association between ANC visit and indication for CS ($p = 0.413$).

Reasons for CS indication

The main reason for indication for CS delivery among the women was previous scars (121; 31.4%). Foetal distress also ranked high as a reason for CS with 59 (15.3%) and prolonged labour with 49 (12.7%) cases. Pre-eclampsia and cephalopelvic disproportion (CPD) were associated with 29 (7.9%) and 26 (6.8%) cases, respectively (Figure 20).

The Pearson Chi-square test of likelihood indicated that there was a strong association between the obstetric reasons and indication for CS ($p < 0.001$), as summarized on Table 5.

Table 5: Association between obstetric indication and CS

	Value	df	Asymp. Sig. (2-sided)
Pearson χ^2	44.514[a]	11	< 0.001
Likelihood Ratio	47.384	11	< 0.001
Valid Cases	385		

IV. DISCUSSION

The caesarean section rate at JOOTRH for the period of the study (2011-2020), was 19%. The trend indicates that there was a gradually increase of CS rate over the period of the study (19% in 2011 to 21.58% in 2020). The rate is more than the WHO ideal recommended rate of 5-15%. This is further voiced by all the health care workers who were interviewed that felt the CS rate in the facility was high. However, the findings is similar to a study done in Tanzania (Nilsen, 2014), that showed the CS rate was higher in teaching and referral hospitals. The higher CS rate may have been contributed by the increase of referrals of patients to JOOTRH This rate also bring sharp focus on the CS rate of Kisumu County which was 4.1% as indicated in the district health demographic survey report of 2015. Kisumu County is a city with several major health facilities thus it is ideal for future researchers to determine the disparity of the CS rate among the different hospitals in the County. The mean age of the mothers who delivered through caesarean section in this study was 26.40 years. Majority 165 (43%) were between the age of 20-24 years. The finding is similar to a study done in Nigeria (Evaluda *et al.* (2013) which showed that young women were more likely to undergo CS. This may be due to under-developed reproductive system and complication of vaginal delivery. Also, young women rely and readily accept the medical personnel decision to undergo CS procedure as opposed to individual preference. This is further highlighted by the health workers' views on the medical personnel influence on the decision:

"*Most decisions are made by healthcare workers"* key informant 2 (NURSE)
"*Most women don't have insight on the decision making",* key informant 6 (RMO)
There was equally a notion that women lack enough knowledge in making the decision,
"*most women lack adequate knowledge on the CS procedure, hence are unable to completely decide for them self",* key informant 11(MOI).

This study showed insignificant association between marital status and CS deliveries. However, the majority of women who delivered through CS in the study were married thus significantly showing that the mothers had support of their spouses in having a safe delivery. This is similar to a study by Ali, H. (2017), which reported that the marital status affects the mode of delivery as the mothers have to get consent from their spouses. The health care personnel had a similar view on spouse influence on having CS delivery as factor:

"*Mostly rely on family for decision making",* key informant 8 (MO)
"Influence from spouse" key informant 3 (nurse)
"Most women tend to consult their spouse before decision making" key informant 1 (nurse)

There was an association of the educational level and CS delivery. In this study, majority of the women who delivered through CS had some form of education. This result concur with studies done in Wajir-Kenya ,Ali, H. (2017), Ethiopia ((Tsega F *et al.*, 2015), and Uganda (Essex *et al.*, 2013) that showed acceptance of CS delivery among educated women. This could be a fact that educated women can easily access information and make appropriate decision on their health. Education help in demystifying the wrong and negative information.

The study showed that CS delivery was high in women with one child followed by those with no children. The result is in agreement with a study done in Cameron, Tebeu *et al.* (2011) that reported CS to be high in women of low parity and in Ethiopia (Tsega F *et al.*, 2015) reported that women with high parity are likely to deliver through vaginal delivery with CS being high in women with low parity. This may be due to, the women with high parity have undergone through the experience of child birth and thus more likely to have confidence with vaginal delivery and women with low parity have an obstetric indication of having previous CS delivery.

The CS delivery was high in mothers who had no employment. This is in agreement with a study done in Norway (Tollanes *et al.*, 2007) that reported high CS delivery among low-income group. This result is also contrary to study in Ghana, (Diema *et al.*, 2019) that reported positive correlation of CS and income. The difference may be due to the availablity of free delivery program in the public health facility while those with income are likely to be seeking services in private facilities.The study did reveal significance association in the religion and CS delivery. This is in agreement to a study by (Batieha *et al.*, 2017) and Ali, H. (2017), that showed religion have indirect influence in the mode of delivery. However, these can be explained by the disproportion representation of the religion in the region where the majority are Christians.

The current research established that previous scar was a major indication of CS delivery accounting 31% of all CS deliveries. These is similar to study in Pakistan by (Islam et al, 2011) that reported pervious scar accounted for more than a third of CS deliveries. Although the health of the mothers and their babies is paramount, studies have shown that vaginal delivery after one CS is safe if health personnel have proper monitoring resources, knowledge and access to emergency unit. It is also likely that higher CS rate in JOOTRH may be unnecessary interventions due to high number of previous scar.

The current research needed to establish if the number of times a mother attends antenatal clinic influenced their uptake of CS. The results showed that more mothers, 65% completed at least 4 ANC visits while 33.8% attended partially. ANC attendance which has been mostly associated with maternal outcome has been improved due to health advocacy and the supplementary efforts from community health workers. However, the results further showed that there was no statistical significance regarding antenatal attendance and indication for CS.

Pregnant mother's medical conditions like diabetes, hypertension and HIV infections are known factors that contribute to indications of CS. This study did not yield any association between the mother's medical condition and CS delivery. This contrary to study in Jordan (Batieha *et al.*, 2017) and Ethiopia (Abebe *et al.*, 2016) that reported an association of medical conditions and CS delivery. However, the study has shown that the majority of the women whom had undergone the CS were young women and had no known illness that nictitate the procedure. This finding can also be explained by the fact of the medical conditions were not specified in the patients file by the attending healthcare workers with very limited options of indicating known conditions like diabetes, hypertension and HIV.

Non-medical factors have been shown to contribute to CS deliveries. Medical personnel played a major role in the indications and carrying of the procedure in the health facilities. Although results analysed revealed that most (75%) of the CS procedures were conducted by general practitioners the study showed there was no significant association of CS and the medical personnel (p=0.120). Kenya being a resource constraint in health care with few specialist (skilled healthcare personnel), these assisted in the increase of access to such a crucial lifesaving surgical procedure. The study is consistent with (Kitul et al, 2013) that showed perceived availability of skilled health care personnel influenced the mother's delivery in the facility. All the key informants were of the opinion that the hospital infrastructure and availability of specialists influenced the high CS cases at JOORTH.

In this study, majority of the CS delivery were mostly conducted in the evening this could be due to the reason that JOOTRH is a referral hospital, the fact is further strengthened by over 80% of the cases being emergency. The majority of the patients whom had under gone the CS procedure came from within Kisumu County with considerable percentage coming from the neighbouring counties. This is an indication of need of strengthening the rural and low level facilities in offering this curial services to people closer. Cost of delivery has been known as one of the barriers to pregnant women accessing health care more so CS delivery services. However, in this study majority of the women who had undergone the CS procedure had their bills settled by the National health insurance fund. This shows the big impact of the government policies of free maternity under the Linda mama national insurance fund program in enabling pregnant mothers to access to health care .

VII. CONCLUSION

The findings reported gradual increase of CS deliveries rate over the study period, with the level surpassing the WHO recommendation of 5% to 15%. The level of CS sections were found to be related to mothers' educational level and employment status in this study. The main drivers of CS at JOOTRH were medical indications, the most outstanding being a previous CS scar, although there were several other unnamed

medical situations that, alongside cardiovascular disorders, necessitated caesarean section deliveries.

VIII. RECOMMENDATIONS

The Ministry of Health (Kisumu County) in collaboration with relevant stakeholders should come up with polices and guidelines on how to check and curb the increase of CS rate in JOOTRH and also address the low CS rate in the County. This may include policies and guidelines on trial of labour (TOC) and vaginal birth after caesarean section (VBAC).

The JOOTRH management together with relevant stakeholders should look into and scale up dissemination of knowledge to the patients, pregnant women and the community on the CS procedure. This will assist mothers to make informed choices on the preferred mode of delivery and will improve patient doctor's interaction.

The County government in collaboration with relevant stake holders, should invest and improve on hospital infrastructures that include skilled healthcare workers in all government and community facilities in the county. This will enhance services delivery closer to the people and reduce referral of cases. This should be in line with the tenets of strengthening of the application of the referral guidelines across the county.

REFERENCE

Abebe, F. E., Gebeyehu, A. W., Kidane, A. N., & Eyassu, G. A. (2016). Factors leading to cesarean section delivery at Felegehiwot referral hospital, Northwest Ethiopia: a retrospective record review. *Reprod Health, 13*, 6. doi: 10.1186/s12978-015-0114-8.

Ajeet, S., & Nandkishore, K. (2013). The boom in unnecessary caesarean surgeries is jeopardizing women's health. *Health Care Women Int, 34*(6), 513-521. doi: 10.1080/07399332.2012.721416.

Al Busaidi, I., Al-Farsi, Y., Ganguly, S., & Gowri, V. (2012). Obstetric and non-obstetric risk factors for cesarean section in oman. *Oman Med J, 27*(6), 478-481. doi: 10.5001/omj.2012.114.

Al Rifai, R. H. (2017). Trend of caesarean deliveries in Egypt and its associated factors: evidence from national surveys, 2005-2014. *BMC Pregnancy Childbirth, 17*(1), 417. doi: 10.1186/s12884-017-1591-2.

Bano, R., Mushtaq, A., Adhi, M., Saleem, M., Saif, A., Siddiqui, A., Parveen, T., & Saif, A. (2015). Rates of caesarian section and trials and success of vaginal birth after caesarean sections in secondary care hospital. *J Pak Med Assoc, 65*(1), 81-83.

Barber, E. L., Lundsberg, L. S., Belanger, K., Pettker, C. M., Funai, E. F., & Illuzzi, J. L. (2011). Indications contributing to the increasing cesarean delivery rate. *Obstet Gynecol, 118*(1), 29-38. doi: 10.1097/AOG.0b013e31821e5f65.

Batieha, A. M., Al Daradkah, S. A., Khader, Y. S., Basha, A., Sabet, F., Athamneh, T. Z., & Sheyyab, M. (2017). Cesarean Section: Incidence, Causes, Associated Factors and Outcomes: A National Prospective Study from Jordan. *Gynecology & Obstetrics Case report, 03*(03). doi: 10.21767/2471-8165.1000055.

Becher, L. a. S., S. (2013). Indications For Cesarean Section In St. Joseph Medical Hospital Moshi, Tanzania. (Masters), *Oslo University*.

Begum, B., Zaman, R. U., Rahman, A., Rahaman, M. S., Uddin, M. K., Hafiz, R., & Abedin, F. (2009). Comparison of risks and benefits of normal vaginal and caesarian section deliveries in a public tertiary hospital in Bangladesh. *Mymensingh Med J, 18*(1 Suppl), S12-14.

Betran, A. P., Ye, J., Moller, A. B., Zhang, J., Gulmezoglu, A. M., & Torloni, M. R. (2016). The Increasing Trend in Caesarean Section Rates: Global, Regional and National Estimates: 1990-2014. *PLoS One, 11*(2), e0148343. doi: 10.1371/journal.pone.0148343.

Bezirtzoglou, E., & Romond, C. (1991). Nosocomial infections of ocular conjunctiva in newborns delivered by cesarian section. *Ophthalmic Res, 23*(2), 79-83. doi: 10.1159/000267093.

Bucklin, B. A. (2007). Fetal Distress. *Elsevier*. .

Callan, T. D. (1964). A Second Look at Repeat Caesarian Section. *Med Times, 92*, 1024-1026. .

Can ONER, B. C., Sevinc SÜTLÜ, Selcuk KILINc. (2015). Effect of Social Factors on Cesarean Birth in Primiparous Women. *Iran Journal of Public Health, 45*(6). .

Cesaroni, G., Forastiere, F., & Perucci, C. A. (2008). Are Cesarean Deliveries More Likely for Poorly Educated Parents? A Brief Report from Italy. *BIRTH, 3*(35). .

Cheng, Y. (2011). Cesarean Delivery: Factors Affecting Trends. *PhD Thesis*. .

Dexter, S. C., Windsor, S., & Watkinson, S. J. (2014). Meeting the challenge of maternal choice in mode of delivery with vaginal birth after caesarean section: a medical, legal and ethical commentary. *BJOG, 121*(2), 133-139; discussion 139-140. doi: 10.1111/1471-0528.12409.

Diema, K., Baku, E. K., Japiong, M., Kennedy, D. K., & Amoah, R. M. (2019). Reasons for Women's Choice of Elective Caesarian Section in Duayaw Nkwanta Hospital. *J Pregnancy, 2019*, 2320743. doi: 10.1155/2019/2320743.

Dongen, P. W. J. v. (2009). Caesarean section – etymology and early history. *SAJOG, 15*(2). .

Evaluda , E. A., Agabo, H. A., Lassa, S., Kigbu, J. H., & Zoakah, A. I. (2013). Factors determining the choice of a place of delivery among pregnant women in Russia village of Jos North, Nigeria: achieving the MDGs 4 and 5. *International Journal of Medicine and Biomedical Research, 2*. .

Essex, H. N., Green, J., Baston, H., & Pickett, K. E. (2013). Which women are at an increased risk of a caesarean section or an instrumental vaginal birth in the UK: an exploration within the Millennium Cohort Study. *BJOG, 120*(6), 732-742; discussion 742-733. doi: 10.1111/1471-0528.12177.

KDHS. (2015). *Kenya Demographic and Health Survey*..

Feng, X. L., Xu, L., Guo, Y., & Ronsmans, C. (2012). Factors influencing rising caesarean section rates in China between 1988 and 2008. *Bull World Health Organ, 90*(1), 30-39, 39A. doi: 10.2471/BLT.11.090399.

Halifax. (2008). Best Practices in the Use of Cesarean Sections in Nova Scotia. *The Reproductive Care Program of Nova Scotia*. .

Halvorsen, L., Nerum, H., Oian, P., & Sorlie, T. (2008). [Is there an association between psychological stress and request for caesarian section?]. *Tidsskr Nor Laegeforen, 128*(12), 1388-1391.

He, Z., Cheng, Z., Wu, T., Zhou, Y., Chen, J., Fu, Q., & Feng, Z. (2016). The Costs and Their Determinant of Cesarean Section and Vaginal Delivery: An Exploratory Study in Chongqing Municipality, China. *Biomed Res Int, 2016*, 5685261. doi: 10.1155/2016/5685261.

Hruban, L., Janku, P., Ventruba, P., Paurova, L., Tapalova, V., Harastova, A., Huser, M., Gerychova, R., Hodicka, Z., & Jarkovsky, J. (2012). [Vaginal birth after previous caesarian section--outcomes analysis 2007-2010]. *Ceska Gynekol, 77*(2), 127-132. .

Islam, A., Ehsan, A., Arif, S., Murtaza, J., & Hanif, A. (2011). Evaluating trial of SCAR in patients with a history of caesarean section. *North American Journal of Medical Sciences*, 201–205. https://doi.org/10.4297/najms.2011.3201

Koridze, S., Kintraia, N., & Machavariani, P. (2015). Cesarian Section - Higher Rate and Higher Challenges. *Georgian Med News*(246), 13-17. .

Mascarello, C., HortaI, L., & SilveiraI, M. (2017). Maternal complications and cesarean section without indication: systematic review and meta-analysis. *Rev Saude Publica. 2017;51:105*. doi: 10.11606/S1518-8787.2017051000389.

Newlin, C., Kuehl, T. J., Pickrel, A., Cawyer, C. R., & Jones, R. O. (2015). Cesarean Section Incision Complications and Associated Risk Factors: A Quality Assurance Project. *Open Journal of Obstetrics and Gynecology, 05*(14), 789-794. doi: 10.4236/ojog.2015.514111.

Sandall, J., Tribe, R. M., Avery, L., Mola, G., Visser, G. H. A., Homer, C. S. E., Gibbons, D. L., Kelly, N., Kennedy, H. P., Kidanto, H., Taylor, P. D., & Temmerman, M. (2018). Short-term and long-term effects of caesarean section on the health of women and children. *The Lancet, 392*(10155), 9. doi: 10.1016/S0140-6736(18)31930-5.

Tsega F, Mengistie B, Dessie Y, & MM, M. (2015). Prevalence of Cesarean Section in Urban Health Facilities and Associated Factors in Eastern Ethiopia: Hospital Based Cross Sectional Study. *J Preg Child Health, 2*. doi: 10.4172/2376-127X.1000169.

Keller, B., & Toussaint, P. (1960). [Repercussions, on the newborn, of abdominal delivery: cesarian section]. *Strasb Med, 11*, 576-582. .

Khanum, S., & Chowdhury, L. (2020). Justification of Cesarean section in fetal distress: experience in a tertiary care military hospital in Bangladesh. *BIRDEM Med J 2020; 10(1): 60-63*.

Kitui, J., Lewis, S., & Davey, G. (2013). Factors influencing place of delivery for women in Kenya: An analysis of the kenya demographic and health survey, 2008/2009. *BMC Pregnancy and Childbirth*, *13*(1). https://doi.org/10.1186/1471-2393-13-40

Kraemer, D. F., Berlin, M., & Guise, J. M. (2004). The relationship of health care delivery system characteristics and legal factors to mode of delivery in women with prior cesarean section: a systematic review. *Womens Health Issues, 14*(3), 94-103. doi: 10.1016/j.whi.2004.04.002.

Lauer, J., A.,, Betrán, A., P.,, Merialdi, M., & Wojdyla, D. (2010). Determinants of caesarean section rates in developed countries: supply, demand and opportunities for control. *World Health Report.*(29). .

Manyeh, A. K., Amu, A., Akpakli, D. E., Williams, J., & Gyapong, M. (2019). Correction to: Socioeconomic and demographic factors associated with caesarean section delivery in Southern Ghana: evidence from INDEPTH Network member site. *BMC Pregnancy Childbirth, 19*(1), 13. doi: 10.1186/s12884-018-2118-1.

Matshidze, K. P., Richter, L. M., Ellison, G. T., Levin, J. B., & McIntyre, J. A. (1998). Caesarean section rates in South Africa: evidence of bias among different 'population groups'. *Ethn Health, 3*(1-2), 71-79. doi: 10.1080/13557858.1998.9961850.

McCusker, J., Harris, D. R., & Hosmer, D. W. J. (1988). Association of electronic fetal monitoring during labor with cesarean section rate and with neonatal morbidity and mortality. *Am J Public Health, 78*(9), 1170-1174. doi: 10.2105/ajph.78.9.1170.

Michikata, K., Sameshima, H., Urabe, H., Tokunaga, S., Kodama, Y., & Ikenoue, T. (2016). The Regional Centralization of Electronic Fetal Heart Rate Monitoring and Its Impact on Neonatal Acidemia and the Cesarean Birth Rate. *J Pregnancy, 2016*, 3658527. doi: 10.1155/2016/3658527.

Nelson, K. B., Sartwelle, T. P., & Rouse, D. J. (2016). Electronic fetal monitoring, cerebral palsy, and caesarean section: assumptions versus evidence. *BMJ, 355*, i6405. doi: 10.1136/bmj.i6405.

Nilsen, C. (2014). Trends in and socio-demographic factors associated with caesarean section at a large Tanzanian *hospital.* (Master of Philosophy in International Health), University of Bergen. .

Oner, C., Catak, B., Sutlu, S., & Kilinc, S. (2015). Effect of Social Factors on Cesarean Birth in Primiparous Women. *Iran Journal of Public Health,*. .

Oner, C., Catak, B., Sutlu, S., & Kilinc, S. (2016). Effect of Social Factors on Cesarean Birth in Primiparous Women: A Cross Sectional Study (Social Factors and Cesarean Birth). *Iran J Public Health, 45*(6), 768-773.

Oyegunle, A. O. (1976). Role of the anaesthetist in the prevention of maternal deaths in Caesarian Section. *Niger Med J, 6*(1), 106-111.

Pallasmaa, N., Ekblad, U., Aitokallio-Tallberg, A., Uotila, J., Raudaskoski, T., Ulander, V. M., & Hurme, S. (2010). Cesarean delivery in Finland: maternal complications

and obstetric risk factors. *Acta Obstet Gynecol Scand, 89*(7), 896-902. doi: 10.3109/00016349.2010.487893.

Penfield, C. A., Lahiff, M., Pies, C., & Caughey, A. B. (2017). Adolescent Pregnancies in the United States: How Obstetric and Sociodemographic Factors Influence Risk of Cesarean Delivery. *Am J Perinatol, 34*(2), 123-129. doi: 10.1055/s-0036-1584580.

Räisänen, S. G., M. Kramer,M,R. and Heinonen,S. (2014). Influence of delivery characteristics and socioeconomic status on giving birth by caesarean section. *BMC Pregnancy and Childbirth, 14*(120). .

Rajabi, A., Maharlouei, N., Rezaianzadeh, A., Rajaeefard, A., & Gholami, A. (2015). Risk factors for C-section delivery and population attributable risk for C-section risk factors in Southwest of Iran: a prospective cohort study. *Med J Islam Repub Iran, 29*, 294. .

Regassa, N. (2011). Antenatal and postnatal care service utilization in southern Ethiopia: a population-based study. *Afr Health Sci, 11*(3), 390-397.

Rupek, R., Feldmann, H. U., & Tenhaeff, D. (1972). [Caesarian section in primiparae with breech presentation]. *Z Geburtshilfe Perinatol, 176*(2), 139-148.

Salman, L., Ashwal, E., Hiersch, L., Gabbay-Benziv, R., Yogev, Y., & Aviram, A. (2017). Perinatal outcomes of vacuum assisted versus cesarean deliveries for prolonged second stage of delivery at term AU - Shmueli, Anat. *The Journal of Maternal-Fetal & Neonatal Medicine, 30*(8), 886-889. doi: 10.1080/14767058.2016.1191066.

Shamshad. (2008). FACTORS LEADING TO INCREASED CESAREAN SECTION RATE. *Gomal Journal of Medical Sciences, Vol 6*, (1).

Shields, S. G., Ratcliffe, S. D., Fontaine, P., & Leeman, L. (2007). Dystocia in Nulliparous Women. *American Academy of Family Physicians., 75*(167), 1-8.

Siabani, S., Jamshidi, K., & Mohammadi, M. M. (2019). Attitude of pregnant women towards Normal delivery and factors driving use of caesarian section in Iran (2016). *Biopsychosoc Med, 13*, 8. doi: 10.1186/s13030-019-0149-0.

Siddiqui, S. A. (2013). Obstetric factors for unsuccessful trial of labor in second-order birth following previous cesarean. *Ann Saudi Med, 33*(4), 356-362. doi: 10.5144/0256-4947.2013.356.

Singh, P., Hashmi, G., & Swain, P. K. (2018). High prevalence of cesarean section births in private sector health facilities- analysis of district level household survey-4 (DLHS-4) of India. *BMC Public Health, 18*(1), 613. doi: 10.1186/s12889-018-5533-3.

Sparic, R., Malvasi, A., & Tinelli, A. (2015). Analysis of clinical, biological and obstetric factors influencing the decision to perform cesarean myomectomy. *Ginekol Pol, 86*(1), 40-45.

Straker, M. (1962). Comparative studies of the effects of normal and caesarian delivery upon later manifestations of anxiety. *Compr Psychiatry, 3*, 113-124. .

Strom, S. (2013). *Rates*, Trends and Determinants of Cesarean Section Deliveries in El Salvador: 1998-2008. (masters in public health proposal), University of Washington.

Tebeu, P. M., Mboudou, E., Halle, G., Kongnyuy, E., Nkwabong, E., & Fomulu, J. N. (2011). Risk factors of delivery by caesarean section in cameroon (2003-2004):a regionalhospital report. *ISRN Obstet Gynecol, 2011*, 791319. doi: 10.5402/2011/791319.

Thomas, J., Kelly, T., & Kavanagh, J. (2001). The Use of Electronic Fetal Monitoring. *Royal College of Obstetricians and Gynaecologists*.

Tollanes, M. C., Thompson, J. M., Daltveit, A. K., & Irgens, L. M. (2007). Cesarean section and maternal education; secular trends in Norway, 1967-2004. *Acta Obstet Gynecol Scand, 86*(7), 840-848. doi: 10.1080/00016340701417422.

Torloni, M. R., Ana Pilar Betrán, A. P., Montilla, P., Scolaro, E., Seuc, A., Mazzoni, A., Althabe, F., Merzagora, F., Donzelli, P. G., & Merialdi, M. (2013). Do Italian women prefer cesarean section? Results from a survey on mode of delivery preferences. *BioMed Central.*

Ugwu, N. U., & de Kok, B. (2015). Socio-cultural factors, gender roles and religious ideologies contributing to Caesarian-section refusal in Nigeria. *Reprod Health, 12*, 70. doi: 10.1186/s12978-015-0050-7.

un. (2016). Evidence-based Practice Center Systematic Review Protocol. *Agency for helthcare research and quality*.

Vimercati, A., Greco, P., Kardashi, A., Rossi, C., Loizzi, V., Scioscia, M., & Loverro, G. (2000). Choice of cesarean section and perception of legal pressure. *J Perinat Med, 28*(2), 111-117. doi: 10.1515/JPM.2000.014.

Vogel, J. P., Pilar, B., A., Nadia, V., Paulo, S., J., Regina, T., M., Jun, Z., Özge, T., Rintaro, M., Naho, M., ., Eduardo, O., Bernardo, H., Ricardo, P., Zahida, Q., Metin, G., A., & Marleen, T. (2015). Use of the Robson classification to assess caesarean section trends in 21 countries: a secondary analysis of two WHO multicountry surveys. *The Lancet Global Health, 3*(5), e260-e270. doi: 10.1016/s2214-109x(15)70094-x.

Waidl, E. (1966). [Pregnancy following a previous cesarian section]. *Ther Ggw, 105*(1), 16-24.

Zarrow, M. X. (1966). Normal versus caesarian delivery: effects upon survival probability, weaning weight, and open-field activity. *J Comp Physiol Psychol, 61*(1), 159-160.

Zhmakin, K. N. (1967). [Are the further expanding indications for cesarian section well-founded?]. *Akush Ginekol (Mosk), 43*(6), 65-70.