Maternal and Fetal Outcomes Following Cesarean Deliveries: A Retrospective Study

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ABSTRACT

Introduction: Cesarean section (CS) was introduced in clinical practice as a life-saving procedure for both the mother and baby. The World Health Organization (WHO) has set a 15 percent minimum threshold for cesarean delivery to save the life of the mother and fetus. The rates of cesarean delivery have been increasing worldwide, leading to emerging public health issues affecting both developed and developing countries. This study examined the maternal and fetal outcomes of cesarean section at a tertiary-level hospital.

Methods: This study was based on secondary data retrieved from the record information of the registry of Maternity, Gynecological, Operation Theater, and Neonatal Intensive Care Unit (NICU) ward of the regional hospital in western Nepal. A total of 5802 women delivered by cesarean section, those record had complete information of year 2013 to 2016 were analyzed. Data were collected through review guidelines developed by the researcher. Frequency and percentage were used to analyze the socio-demographic and obstetric information, indication of cesarean section, maternal and neonatal outcomes, and the obtained results presented in tables, graphs, and narratives. The chi-square test was used to find out the association of cesarean section and its outcomes with demographic and obstetrics variables.

Results: The mean age of mothers was 25.25 ± 4.7 years,with the minimum and maximum age being 14 and 48 years respectively. Of the 5802 mothers, 17.1 percent of mothers had poor outcomes having some maternal complications. Regarding neonatal outcomes of 5872 neonates, 11.8 percent of new born had poor outcomes having some complications like low birth weight, asphyxia, etc. There was statistically significant association of age, ethnicity, and type of cesarean section with maternal outcomes. Similarly, weeks of gestation and mode of cesarean section were significantly associated with neonatal outcomes.

Conclusion: A large number of cesarean sections were emergency. Of the mothers who delivered by cesarean section majority of them and newborns had good outcomes. Mothers and neonates actual needs, contributory factors and outcomes following cesarean section need to be extensive evaluation before performing it.

Keywords: *Cesarean section, Indication, Maternal and fetal outcome, Retrospective study*

INTRODUCTION

Cesarean section (CS) is a surgical procedure whereby the fetus is delivered by making an incision on the abdominal and uterine wall.[1,2]Cesarean section was introduced in the health care setting as a lifesaving procedure that saves the life of the mother and baby. The WHO sets the minimum threshold for cesarean delivery rate of 15percent for saving the life of both mother and fetus.[2,3] Cesarean section is a greater public health issue all over the globe including both developed and developing countries.[4] There is no single cause for cesarean section and an increasing rate that not necessary for optimal maternal and neonatal health outcomes.[4]

A retrospective study from Patan Hospital Nepal showed that 41.9 percent of respondents had delivered by cesarean section. The most common cause of cesarean section was cephalo-pelvic disproportion (19.0%) followed by a previous cesarean section (16.5%).[5] The cesarean section is most effective, but only performed when medically indicated in case of inevitabilities in well-equipped health care center in a cause like mal-presentation, cephalo pelvic disproportion, excessive fetal growth and previous cesarean section, but it does not mean always have better perinatal and maternal outcomes. It always puts a risk to both the mother and fetus compared to spontaneous vaginal delivery.[3–6]

The upsurge of cesarean deliveries has become a serious concern for globe. Different health- related and socio-demographic

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factors are responsible for these rise[7], and puts the risk to mothers and babies, leading to many short-term and long-term complications when it was performed without any medically indications.[8] A retrospective study from Bangladesh showed that the rate of cesarean section has raised over the period of 10 years. The study concluded that cesarean section is a safe surgical intervention in obstetrics at present, still need a critical evaluation of the reason for performing surgery.[9] A cesarean delivery rate more than ten percent at community level not reduce the mothers and newborn death rate. Therefore, efforts ought to be created to stop complications related to maternal and newborn instead of try to attain the precise rate of cesarean delivery.[10]

A study from Gujrat showed that age of the mother, parity, previous cesarean and distance from the hospital were some of the important underlying factors of cesarean section rates.[11] The hazards related to cesarean section rates on other outcomes such as maternal and perinatal morbidity, newborn outcomes, and psychological or social well-being of both mother and baby remain unclear where more research is required to understand the health effects of cesarean section on immediate and long-term outcomes.[10] The main objective of the study was to assess the maternal and fetal outcomes following cesarean deliveries.

METHODS AND MATERIALS

A hospital-based cross-sectional retrospective study was conducted to assess the maternal and fetal outcomes following cesarean section. The study was conducted in one of the tertiary care hospital of the Pokhara Valley. The hospital has the highest flow of pregnant women and nearly 10000 deliveries per year. The study was based on secondary data retrieved from the record information from the registry of Maternity, Gynecological, Operation Theater, and NICU wards of period 2013 to 2016. The study population was all mothers who gave birth by cesarean section at the respective hospital at the time of the study period. All consecutive cesarean deliveries occurred during the period of 2013 to 2016 who met the eligibility criteria were included in the study. A total of 6422 deliveries done by cesarean section in the study period. However, those records that had complete information related to mothers and newborns were 5802, so those records were only analyzed. Data were collected through document review guidelines prepared by the researcher based on the literature. The developed retrospective guideline was validated by different experts related to women's health,

obstetricians, and gynecologist. Data for 2 months period of each year were recollected by a trained researcher to ensure the consistency of the data.

The retrospective guideline that was used as a tool for data collection was divided into three parts. The first part consisted of information related to demographic and obstetric information, including age, residence, religion, ethnicity, gravida, previous birth, previous bad outcomes, gestational week, and mode of CS. The second part consisted of information related to the indication of CS and the third part consisted of outcomes after CS. Maternal outcomes consist of information regarding postpartum hemorrhage, maternal death, hysterectomy, uterine rupture, and length of hospital study, while fetal outcomes consist of information like birth outcomes, weight, APGAR score, and shifted to the NICU etc. It was measured in terms of good and poor outcomes. Any one of the complications present in the mother and neonate were considered as poor outcome. Good size fetus in present study known as newborn weight greater or equal to 3.5 kg used by clinician in particular hospital. The data were entered into MS-Excel with validated command and analyzed using SPSS 16. Frequency and percentage were used to analyze the socio-demographic and obstetric information, indications and outcomes of cesarean section. The association between dependent and independent variables was assessed using the Chi-square test. Permission was obtained from the respective hospital for data collection and ethical approval from the Institutional Review Committee (IRC ref no: 108/73/74) of Pokhara University.

RESULTS

Almost three quarters (72.0%) of the mothers were of 25 -29 years, with the minimum and maximum age being 14 and 48 years respectively. The majority of mothers (96.3%) followed Hindu religion and (60.8%) from urban areas. The mean age of the mothers was 25.25 ± 4.7 years. With regard to ethnicity, more than half (51.1%) were from the upper caste, and (0.9%) were from religious minorities. Regarding obstetric information, (54.1%) of mothers were multigravida, (45.9%) were primigravida. Regarding the number of previous births among multigravida (3138), (69.5%) of mothers had one child and (13.9%) had no live birth. Regarding weeks of gestation (92.2%) of mothers were between 37 – 42 weeks of gestation at the time of their admission at hospital and (68.1%) of mothers underwent emergency cesarean section.

Table 1: Indications of Cesarean Section (n=5802)

Variables	Frequency	Percent (%)
Maternal Indication		
Previous cesarean section	861	14.8
Induction failure	276	4.8
Hypertensive disorder of pregnancy	153	2.6
Antepartum hemorrhage	63	1.1
Bad obstetrics history	52	0.9
Others Condition	46	0.8
Medical disorders during pregnancy	30	0.5
Maternal distress	28	0.5
Infection during pregnancy	19	0.3
Vaccum failed	09	0.2
Fetal Indication		
Fetal distress	808	13.9
Mal-presentation	534	9.2
Amniotic fluid problems	253	4.4
Good size fetus	151	2.6
Abnormal lie	97	1.7
Twins pregnancy	62	1.1
Premature rupture of membrane	47	0.8
Cord prolapse	10	0.2
Occipito posterior position	09	0.2
Maternal and fetal Indications		
Cephalo pelvic disproportion	2110	36.4
Non progress of labor	131	2.3
Obstructed labor	35	0.6
Post term	18	0.3

Cephalo pelvic disproportion was the most common indication (36.4%) for performing cesarean section. Other indications included previous cesarean section (14.8%), fetal distress (13.9%) mal presentation (9.2%), followed by induction failure (4.8%).
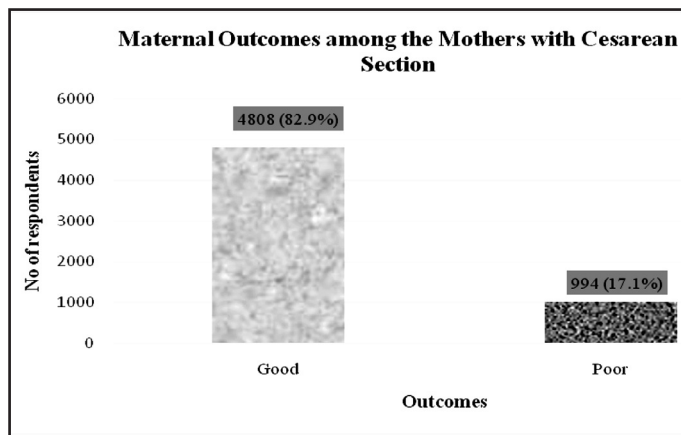

Fig 1: Maternal Outcomes among the mothers with Cesarean Section

With regard to maternal outcomes immediately after cesarean section showed that only (17.1)% of respondents had poor outcomes, including post-partum hemorrhage (0.4%), hospital stay greater than 7 days (16.9%), and other complications like maternal death, rupture of uterus and hysterectomy were not found (Fig. 1).
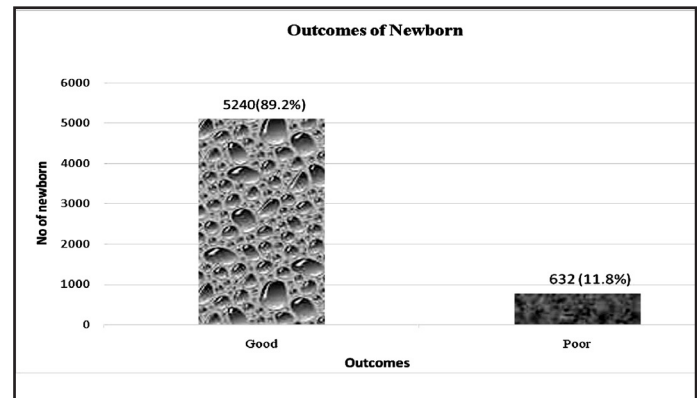

Fig 2: Newborn Outcomes after Cesarean Section

Neonatal outcomes immediately after cesarean section showed that (11.8%) had poor outcomes. Among the 5849 alive newborns, only (1.3%) of newborns shifted to the NICU. The main reason for NICU admission was asphyxia (62.4%). Among those admitted to the NICU, (12.9%) were discharged on condition. Regarding APGAR score at 1 min, severe asphyxia (0-3 score) was found in (0.8%) and (0.7%) at 5 min, birth weight of the newborn who had low birth (1.5 to <2.5) and very low birth weight (<1.5) were (5.3%) and (0.6%), respectively (Fig.2).

Table 2: Association between Different Variables with Maternal Outcomes

Variables	Maternal Outcomes		Total	χ2 Value	P-Value
	Good	Poor			
Age (in years)					
19 years or less	418 (77.4%)	122 (22.6%)	540	12.08*	0.001*
20 years and above	4390 (81.8%)	872 (16.2%)	5262		
Ethnicity					
Upper caste group	2488 (83.9%)	478 (16.1%)	2966	4.41	0.036*
Others	2320 (81.9%)	516 (18.1%)	2836		
Type of CS					
Elective	1415 (76.4%)	437 (23.6%)	1852	80.065*	0.001*
Emergency	3393 (85.9%)	557 (14.1%)	3950		

Table 2 shows that maternal outcomes were significantly associated with age, ethnicity, and mode of cesarean section. Religion, residence, and gravida are not significantly associated with maternal outcomes. Mothers who had cesarean section in an age 19 years or less had poor outcomes (p<0.05) than 20 years and above age. Also, upper caste group mothers had poor outcomes than others ethnicity group people. As well, mothers who had emergency cesarean section had poor outcomes than elective cesarean section.

Table 3: Association between Different Variables with Neonatal Outcomes

Variables	Neonatal Outcome		Total	χ2 Value	P-Value
	Good	Poor			
Weeks of Gestation					
< 37 weeks	292 (80.4%)	71 (19.6%)	363		
>37 weeks	4948 (89.8%)	561 (10.2%)	5509	31.17	0.001*
Mode of Cesarean					
Elective	1714 (90.9%)	171 (9.1%)	1885	8.26	0.004*
Emergency	3526 (88.4%)	461 (11.6%)	3987		

*Statistically significant at p <0.05.

Table 3 revealed the association between obstetric factors and neonatal outcomes. Weeks of gestation and mode of cesarean section were significantly associated with neonatal outcomes. Regarding newborn outcomes significantly higher proportion of the full term babies born by CS had good outcomes than the preterm babies (p<0.05). Similarly high number of babies born with elective cesarean section had significantly good outcomes than emergency cesarean section (p<0.05).

DISCUSSION

In the present study, more than half (54.1%) of the mothers were multigravida and (45.9%) were primigravida. nearly similar to the study of Gandaki Medical College (GMC) primigravida (52.0%) and mutigravida (48%)[12], contradicting the study from District Level Household and Facility Survey-3 India, where the cesarean section rate was higher in women having babies for the first time [13] and the study of Okhaldhunga, where multiparous women were (38.5%) lower than present study. [14] This study showed (92.2%) of mothers had 37-42 weeks of gestation that similar to study of the GMC Nepal and Gujrat India.[11,12] This study findings showed that (68.1%) of mothers underwent emergency cesarean section and (31.9%) had elective cesarean section moreover related to the study of GMC, Pokhara, where (74%) underwent emergency and (26%) with elective surgery[12] contradicts the findings with the study of Ethopia where (90.3 %) of these women had emergency cesarean section.[15]The main indication for cesarean section was cephalo pelvic disproportion (36.4%) in the present study, which was higher than study from South Nigeria (16.9%) and lower than the study of GMC account (28%) cases of cephalo pelvic disproportion for cesarean section.[12] In addition present study next main reason for cesarean section was previous cesarean section (14.8%) contradicts the findings of Bangladesh where a previous cesarean section account (24.1%).[17] In current study fetal distress (13.9%) malpresentation (9.2%) were the another common reasons of cesarean section, nearby similar with the study of Northwest Ethopia findings showed that fetal distress (15.9 %) and abnormal presentation (13.4 %)[15] and contradicts

the findings of Okhaldhunga Nepal where malpresentation account (25.3%) higher than present study and fetal distress (19.8%)[14] and Bangladesh (20.6%).[17] In this study induction failure consisted of (4.8%) and amniotic fluid problems (4.4%) and the least was cord prolapse (0.2%) and occipito posterior position (0.2%) contradicts the study of Ethopia that accounts (2.2%) cordprolapse[15] and amniotic fluid disorder consisted of (14.3%).[17] Obstructed labor was the indication for (0.6%) CS in this study in contrast accounted (30.7%) in Northwest Ethopia.[15] A total of (17.1%) of mothers developed maternal complications in this study; post-partum hemorrhage (0.4%) and (16.9%) of mothers had hospital stay greater than 7 days. The study of South Nigeria showed maternal blood loss was (12.2%), a hospital stay of ≥ 7 days (11.7%), ruptured uterus (2.0%), post-partum hemorrhage (0.9%), hysterectomy (0.2%), maternal death (0.9%)[16], the study of Nepal Medical College Teaching Hospital where hemorrhage was the main complication[18], a study of Nuwakot found post-partum hemorrhage (0.3%), similar to the present study[19] and a Swedish study[20] where bleeding complications (10.0%) percentage contradicts the findings of the present study. There was no maternal death, no hysterectomy, no ruptured uterus found in the present study contradicts the study of South Nigeria.[16]

In this study, (11.8%) of newborns had poor outcomes. Out of total birth (0.3%) of newborn were born dead/still birth,(1.3%) shifted to NICU, and the main reason for admission to the NICU was birth asphyxia, which consisted of (62.4%). In addition, there were (0.8%) of newborns had asphyxia at the time of birth, and the majority (94.1%) newborns had no asphyxia at time of 5 min in the present study. Likewise, (5.9%) of newborns had low birth weight and the remaining (94.1%) had normal birth weight. A study of Nuwakot contradicts the present study findings that showed (2.0%) neonatal death, (19.0%) babies born with low birth weight less than 2.5 kg, (89.2%) of babies had APGAR scores greater than 5 score at 1 min of birth.[19] Another study showed that the APGAR score at 1 and 5 min consisted of (81.9%) and (89.8%), respectively almost similar to the present study findings[16], (16.2%) of newborns had hospital admission,

while (6.0%) neonatal deaths and (1.3%) newborns need referral to higher center contradicts the present study findings. [16]

Maternal outcomes were statistically significant with maternal age (p 0.001), ethnicity ($\chi2$ 4.41, p 0.036), and type of CS (p 0.001) in the present study likewise study from Saudi Arabia maternal outcomes associated with gravity and weeks of gestation and not associated with adverse age those are contradicts the present study results.[21] Regarding factors associated with neonatal outcomes were weeks of gestation (p 0.001) and mode of cesarean section (p 0.004) was associated in this study almost, similar to the study from Saudi Arabian, where weeks of gestation was significantly associated with neonatal outcome [21] same as the present study.

CONCLUSION

The maternal and fetal outcomes immediately after cesarean section were good. However, complications like post-partum hemorrhage and hospital stay greater than 7 days were prevalent among mothers, and fewer newborns were shifted to the NICU and had conditional discharge as well as birth asphyxia. The cephalo pelvic disproportion and previous cesarean section were the most common causes of cesarean section. Although, cesarean section saves the life of mother and newborn, indication and its possible outcome needs to be carefully evaluated before performing cesarean section.

ACKNOWLEDGMENT

REFERENCES

1. Cesarean Delivery: Overview, Preparation, Technique. 2019 Nov 11 [cited 2020 May 14]; Available from: https://emedicine.medscape.com/article/263424-overview

2. Rahman MM, Haider MR, Moinuddin M, Rahman AE, Ahmed S, Khan MM. Determinants of caesarean section in Bangladesh: Cross-sectional analysis of Bangladesh Demographic and Health Survey 2014 Data. PloS one [Internet]. 2018;13(9). Available from: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0202879

3. Cavallaro FL, Cresswell JA, França GV, Victora CG, Barros AJ, Ronsmans C. Trends in caesarean delivery by country and wealth quintile: cross-sectional surveys in southern Asia and sub-Saharan Africa. Bull World Health Organ [Internet]. 2013 Dec 1 [cited 2020 May 14];91(12):914-922D. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3845270/

4. Chhetri S, Singh U. Caesarean section: its rates and indications at a tertiary referral center in Eastern Nepal. Health Renaissance [Internet]. 2011 [cited 2020 May 14];9(3):179–83. Available from: https://www.nepjol.info/index.php/HREN/article/view/5587

5. Pradhan B, Shrestha SD, Rc L, Sharma P, Bhandary S. Increasing trend of caesarean section in Patan hospital. Journal of General Practice and Emergency Medicine of Nepal [Internet]. 2015 Jun 30 [cited 2020 May 14];4(6):3–5. Available from: https://jgpeman.com/index.php/jgpeman/article/view/78

6. Ba'aqeel Hassan S. Cesarean delivery rates in Saudi Arabia: A ten-year review. Annals of Saudi Medicine [Internet]. 2009 May 1 [cited 2020 May 14];29(3):179–83. Available from: https://www.annsaudimed.net/doi/full/10.4103/0256-4947.51773

7. Amjad A, Amjad U, Zakar R, Usman A, Zakar MZ, Fischer F. Factors associated with caesarean deliveries among child-bearing women in Pakistan: secondary analysis of data from the Demographic and Health Survey, 2012–13. BMC Pregnancy Childbirth [Internet]. 2018 Dec [cited 2020 May 14];18(1):113. Available from: https://bmcpregnancychildbirth.biomedcentral.com/articles/10.1186/s12884-018-1743-z

8. WHO | Caesarean sections should only be performed when medically necessary [Internet]. WHO. World Health Organization; 2015 [cited 2020 May 14]. Available from: https://www.who.int/mediacentre/news/releases/2015/caesarean-sections/en/

9. Nazneen R, Begum RA, Sultana K. Rising Trend of Caesarean Section in a Tertiary Hospital Over a Decade. Journal of Bangladesh College of Physicians and Surgeons [Internet]. 2011 [cited 2020 May 14];29(3):126–32. Available from: https://www.banglajol.info/index.php/JBCPS/article/view/9432

10. WHO. WHO Statement on Caesarean Section Rates [Internet]. Department of Reproductive Health and Research , WHO; 2015. Available from: https://apps.who.int/iris/bitstream/handle/10665/161442/WHO_RHR_15.02_eng.pdf?sequence=1

11. Desai G, Anand A, Modi D, Shah S, Shah K, Shah A, et al. Rates, indications, and outcomes of caesarean section deliveries: A comparison of tribal and non-tribal women in Gujarat, India. PLoS ONE [Internet]. 2017;12(12):e0189260. Available from: https://

journals.plos.org/plosone/article?id=10.1371/journal.pone.0189260

12. Gurung RT, Gurung G, Shrestha R, Gurung T, Sharma P. Prevalence and Outcome of Cesarean Section at Gandaki Medical College Teaching Hospital and Research Centre, Pokhara, Nepal. Journal of Gandaki Medical College-Nepal [Internet]. 2016 [cited 2020 May 14];9(2):1–6. Available from: https://www.nepjol.info/index.php/JGMCN/article/view/17858

13. Shabnam S. Caesarean section delivery in India : causes and concerns. In 2013. Available from: https://www.semanticscholar.org/paper/Caesarean-section-delivery-in-India-%3A-causes-and-Shabnam/d918feef065f0edad277c00d101d98e2e8bf8e86

14. Samdal LJ, Steinsvik KR, Pun P, Dani P, Roald B, Stray-Pedersen B, et al. Indications for Cesarean Sections in Rural Nepal. J Obstet Gynaecol India [Internet]. 2016 Oct [cited 2020 May 14];66(Suppl 1):284–8. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5016471/

15. Abebe FE, Gebeyehu AW, Kidane AN, Eyassu GA. Factors leading to cesarean section delivery at Felegehiwot referral hospital, Northwest Ethiopia: a retrospective record review. Reprod Health [Internet]. 2016 Jan 20 [cited 2020 May 14];13. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4721205/

16. Mt M, Aa O, Ao O, Po E. Indications and the materno-foetal outcome of caesarean section in a secondary health facility in obudu, south-south Nigeria. Research and Reports in Gynecology and Obstetrics [Internet]. 2017 [cited 2020 May 14];0(0). Available from: https://www.alliedacademies.org/abstract/indications-and-the-maternofoetal-outcome-of-caesarean-section-in-a-secondaryrnhealth-facility-in-obudu-southsouth-nigeria-8057.html

17. Begum T, Rahman A, Nababan H, Hoque DME, Khan AF, Ali T, et al. Indications and determinants of caesarean section delivery: Evidence from a population-based study in Matlab, Bangladesh. PLoS ONE [Internet]. 2017;12(11):e0188074. Available from: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0188074

18. Suwal A, Shrivastava VR, Giri A. Maternal and fetal outcome in elective versus emergency cesarean section. JNMA J Nepal Med Assoc [Internet]. 2013 Dec;52(192):563–6. Available from: https://www.ncbi.nlm.nih.gov/pubmed/25327227

19. Bhandari BR. Maternal and Fetal Outcomes Following Cesarean Section in Comprehensive Emergency Obstetric Care Program at Nuwakot District Hospital. Nepal Journal of Obstetrics and Gynaecology [Internet]. 2015 [cited 2020 May 14];10(2):40–4. Available from: https://www.nepjol.info/index.php/NJOG/article/view/14336

20. Karlström A, Lindgren H, Hildingsson I. Maternal and infant outcome after caesarean section without recorded medical indication: findings from a Swedish case-control study. BJOG [Internet]. 2013 Mar;120(4):479–86; discussion 486. Available from: https://obgyn.onlinelibrary.wiley.com/doi/full/10.1111/1471-0528.12129

21. Rowaily MAA, Alsalem FA, Abolfotouh MA. Cesarean section in a high-parity community in Saudi Arabia: clinical indications and obstetric outcomes. BMC Pregnancy Childbirth [Internet]. 2014 Dec [cited 2020 May 14];14(1):1–10. Available from: https://bmcpregnancychildbirth.biomedcentral.com/articles/10.1186/1471-2393-14-92