Original Article

Analysis of Cesarean Section Rates Based on Robson's Classification and its Outcomes at a Governmental Tertiary Referral Teaching Hospital in the Sistan and Baluchestan Province, Iran

Zahra Moudi

Department of Midwifery, School of Nursing and Midwifery, Zahedan University of Medical Sciences, Zahedan, Iran

ORCID:

Zahra Moudi:
0000-0002-3230-8320

Abstract

Background: Timely cesarean section (CS) can be lifesaving, but its overuse may lead to health risks. Robson classification is a standard tool for monitoring and comparing CS rates at all levels. **Objectives:** The objective of this study is to analyze the CS rates based on Robson classification and its outcomes in a governmental tertiary referral teaching hospital in Zahedan city, Iran. **Methods:** A cross-sectional study was carried out on all CS (n = 1763) performed in Ali-Ibn-Abitaleb Hospital of Zahedan city from September 22 to March 19, 2019. Data were extracted from women's paper-based files. Descriptive analyses were performed. The Chi-square test was used to test the differences between groups. The odds ratio was used to calculate the risk of adverse maternal and perinatal outcomes in women with and without a previous CS. **Results:** The overall rate of CS was 44.81%. Women with previous CS (Robson group 5) were the largest contributors to the overall CS rate (39.82%), followed by Robson group 10 (i.e., women with a single cephalic pregnancy at ≤36 weeks' gestation: 19.45%). The CS rate in women in Robson groups 1 and 2 was 9.93% and 5.61%, respectively. The main indications for CS among nulliparous women were fetal distress (42.99%), malpresentation (14.95%), and prolonged and obstructed labor (10.98%). Adverse maternal outcomes were similar in women with and without a previous CS. **Conclusions:** The Robson classification system showed a high rate of CS in the study setting, and many CSs were performed in women with low-risk pregnancies.

Keywords: *Cesarean section, Iran, Robson 10-group classification system*

Introduction

Cesarean section (CS) is a surgical procedure used to save the lives of pregnant women and their endangered fetuses.[1] However, the CS rate has increased worldwide, exceeding 10%–15% of births.[2] The increased number of CS can negatively affect the health of women and their babies, and in the long term, can negatively affect future pregnancies. Wound dehiscence, hemorrhage, hysterectomy, internal organ injuries, and abnormal placentation are among the adverse outcomes of CS.[3] Low APGAR score, perinatal asphyxia, sepsis, stillbirth, respiratory infections, allergy, and asthma are also common in neonates born by CS.[4,5]

CS rates in the Middle-East range from 13.7% in Pakistan to 69.5% in Turkey and 47.5% in Iran.[6] Meanwhile, there are differences between Iranian provinces in rates of CS, the highest and lowest rates have been reported in Tehran (62.1%–72.1%) and Sistan and Baluchestan Provinces (12%), respectively.[7] Even when CS statistics are within the recommended range, the question is whether there was a clinical indication for CS and whether the right women received the right services at the right time.[8,9] Robson's 10-group classification system is a global

Access this article online

Quick Response Code:

Website: www.nmsjournal.com

DOI: 10.4103/nms.nms_135_21

Address for correspondence: Dr. Zahra Moudi, Department of Midwifery, School of Nursing and Midwifery, Mashahir Sq., Zahedan, Iran.
E-mail: zz_moudi@yahoo.com

Submitted: 22-Dec-2021 **Revised:** 09-Nov-2022 **Accepted:** 20-Nov-2022
Published: 18-Jan-2023

How to cite this article: Moudi Z. Analysis of cesarean section rates based on Robson's classification and its outcomes at a governmental tertiary referral teaching hospital in the Sistan and Baluchestan Province, Iran. Nurs Midwifery Stud 2022;11:261-8.

standard that helps perinatal audit and interpretation of the quality of care and rate of CS in maternity units.[10] Based on five basic obstetric characteristics (e.g., parity, onset of labor, gestational age, fetal presentation, and number of fetuses), Robson has classified parturient women into 10 groups.[11] This classification helps determine group-specific CS rates and enables health-care providers to develop interventions for each specific group.[8]

The Sistan and Baluchestan Province is located in Southeastern Iran, bordering Afghanistan and Pakistan countries. This province has the lowest Human Development Index (HDI = 0.608) in Iran.[12] In terms of health indices, this province has the highest family size (five persons per household), fertility rate (three live births per woman), and crude birth rate (31.7 per 1,000) compared to other provinces in the country, with 3.7 persons per household, 1.8 live births per woman, and 14.9 births per 1000.[13] Studies have shown that HDI (household income and fertility rate) is inversely associated with maternal mortality. Although maternal mortality has decreased in Iran, maternal mortality in Sistan and Baluchestan is still the highest in Iran.[14] Furthermore, with the introduction of the Health Sector Evolution Plan by the Iranian Ministry of Health and Medical Education in 2014, poor pregnant women have mostly turned to public/governmental hospitals for free obstetric care.[15] However, there are very few studies that look at the patterns and practices of CS in this deprived province.

Objectives

This study was conducted to explore the CS rates based on Robson's classification and its outcomes in a governmental tertiary referral teaching hospital in Zahedan city, the capital of Sistan and Baluchestan Province).

Methods

Study design and participants

A cross-sectional study was carried out in a tertiary referral teaching hospital to analyze all CS (n = 1763) and their maternal and perinatal outcomes for 6 months, from September 22 to March 19, 2019. A census sampling method was used to recruit all women who underwent CS during the study period. Ali-Ibn-Abitaleb Hospital is a tertiary referral teaching hospital in Zahedan. This hospital was selected because it is the only government hospital that provides free obstetric care and allowed researchers to access patients' medical records. Approximately 7,000 deliveries take place at this hospital annually. Thirty-four midwives provide one-to-one care to childbearing women during labor and delivery. Obstetric residents are responsible for making decisions regarding CS in the triage unit and delivery room, but the final decision rests with the attending physician. Internal podalic version for transverse presentation in twin pregnancies and instrumental delivery is not practiced at this hospital. Continuous electronic fetal heart monitoring is used during labor. In this hospital, CS is performed for all types of breech presentation and multiple pregnancies, but forceps or a ventouse are not used to help deliver the baby.

Data collection

All women who delivered at a gestational age ≥22 weeks were included in this study. Mothers who had a CS at other hospitals and were later referred to this hospital for any reason were excluded. Initially, a list of names and file numbers of women who had undergone CS during the relevant period was obtained from the hospital's information system. The list of women who had undergone normal vaginal delivery or CS was also obtained from the surgical and delivery logbook. This allowed us to ensure that all eligible women were included. The delivery logbook also provided us with the information we needed to classify the women according to the Robson classification system.

The mothers' paper-based files were then assessed by the first researcher to collect study data as follows: age, education level, insurance coverage, medical complications, parity, number of previous CS, number of fetuses, fetal presentation and lie, gestational age, the onset of labor, reasons for CS (based on physician's note), maternal outcomes (maternal death, hysterectomy, transfusion, bladder/bowel rupture, wound infection and wound dehiscence, readmissions, ICU admission, and hematoma after CS), and perinatal outcomes (APGAR score at 1 and 5 min, stillbirth, neonatal death, neonatal intensive care unit admission, and neonatal weight). Gestational age had been calculated by the resident responsible for the triage of pregnant women based on pregnancy ultrasound. Robson's 10-group classification is shown in Table 1.

Ethical considerations

The present study was approved by the Ethics Committee of Zahedan University of Medical Sciences, Zahedan, Iran (August 9, 2020; IR.ZAUMS.REC.1399.215). Permission was also obtained from the officials of Ali-Ibn-Abitaleb Hospital. All data were reported anonymously.

Data analysis

SPSS (version 16, SPSS Inc., Chicago, IL, USA) was used to analyze data. Frequencies and percentages were used to display the distribution of categorical variables. The overall CS rate, the relative size of the group, the group-specific CS rate, and the absolute and relative contribution of the group to the overall CS rate over the study period were calculated.[16] The Chi-square test was used to test for differences in characteristics between

women with and without previous CS. The unadjusted odds ratio (OR) and 95% confidence interval of the occurrence of adverse maternal and perinatal outcomes in women with and without a previous CS were also calculated. $P < 0.05$ for a two-sided test were considered statistically significant.

Results

The total number of women who gave birth from September 22 to March 19, 2019, was 4032, of whom 44.82% (1807/4032) had a CS. Of the 1807 cases with a CS, the files of 44 women could not be found in the hospital archives and were therefore excluded from the study. Finally, 1763 cases with CS were analyzed. Out of 1763 women, 70 women (3.97%) had a history of vaginal birth after CS (VBAC). However, during the study period, only 2.60% (47/1807) of women successfully delivered through VBAC.

Table 1 shows the distribution of women in the 10 Robson groups and their relative and overall contribution to the CS rate. Since the medical records had not been accurately completed, groups 1 and 2 were merged to analyze all nulliparous women together. As well, groups 3 and 4 were merged to analyze all multiparous women together [Table 1]. Groups 5, 10, 1, and 2 contributed to 39.82%, 19.45%, 15.54%, and 8.34% of the overall CS rates, respectively. Women without a previous CS (nulliparous women [i.e., groups 1 and 2], and multiparous women without a CS [i.e., groups 3 and 4]) were among the main contributors to CS and were therefore analyzed separately.

High blood pressure was the most common medical complication among nulliparous women (12.85%), in women without previous CS (13.85%), and in women with previous CS (9.79%). The characteristics of women with and without a previous CS are shown in Table 2. The top three causes of CS in nulliparous women were fetal distress (42.99%), malpresentation (14.95%), and prolonged and obstructed labor (10.98%). The three main causes of CS in multiparous women without previous CS were malpresentation (29.38%), fetal distress (25.99%), and multiple pregnancies (11.29%) [Table 3].

A review of the files of women who underwent CS for fetal distress showed: (1) in almost all women, labor was induced or augmented without recording the frequency, duration, and intensity of uterine contractions, (2) sometimes CS was performed an hour and a half after the physician's order due to fetal distress (e.g., declining heart rate), and the fetus was born with a 1 and 5 min APGAR scores >8, and (3) sometimes CS was performed in women with fetuses with multiple/serious anomalies. These fetuses were either stillborn or died while still in the operating room. The three most important findings in the files of women who underwent CS for prolonged and obstructed labor were: (1) the progress of labor was rarely recorded on the partograph, and the few partographs that were drawn were not correctly filled on all parameters (date, time …). (2) A note was not written about the position of the fetal head, especially when the physician concluded that labor had not progressed well. (3) Sometimes CS was performed in <2 h after full dilation.

Adverse maternal outcomes occurred in 6.18% (109/1763) of all women. By group, adverse maternal events occurred in 5.81% (57/981) of multiparous women with a history of CS, in 5.37% (23/428) of nulliparous women, and in 8.19% (29/354) of multiparous women with no history of CS. During the study period, two women (2/1763 = 0.11%) died; one due to postpartum hemorrhage and the other to a medical complication. Furthermore, 21 women (21/1763 = 1.19%) were readmitted to the hospital due to wound infection (n = 15; 15/21 = 71.43%), high blood pressure (n = 1; 1/21 = 4.76%), leg-vein thrombosis (n = 1; 1/21 = 4.76%), convulsion (n = 1; 1/21 = 4.76%), and hematoma after CS (n = 3; 3/21 = 14.29%) [Table 4]. Nine cesarean hysterectomies were also performed due to placenta previa (n = 1; 1/9 = 11.11%), placenta accreta and percreta (n = 6; 6/9–66.67%), and postpartum hemorrhage (n = 2; 2/9 = 22.22%). Maternal and perinatal adverse outcomes in women with and without previous CS and the corresponding unadjusted OR are shown in Table 4.

Discussion

Analysis of deliveries performed in a governmental tertiary referral teaching hospital over 6 months showed that the CS rate was 44.8%. This rate was much higher than the average CS rate (12%) previously reported in the Sistan and Baluchestan Province,[7] and is close to the rate of CS for the whole of Iran (51.6%).[17] The CS rate was also higher than the rates reported in nonprofit (30%), private (41%), and public (30%) hospitals in Bangladesh.[8] This highlights a significant increase in the CS rate and the need for regular surveillance and audits to implement evidence-based interventions for the appropriate use of CS. The ratio of <2:1 between the sizes of groups 1 and 2 (1/76) can be explained by the high rate of medical and surgical complications, which increases the rate of induced or prelabor CS.[16] The data showed that about 12% of nulliparous women had high blood pressure which is higher than the global rates (1%–8%).[18] Furthermore, in the present study, 8.88% of the causes of CS in

nulliparous women were attributed to high blood pressure.

In the current study, 3.03% of CS were also performed at the request of the mother. This finding is in line with a recent study.[19] Some women had also undergone CS for nonmedical reasons such as a “history of infertility.” The size of group 5 (18.62%) also showed a high CS rate compared to the WHO standards (15%).[16] This finding indicates the high CS rates in recent years, especially in groups 1 and 2,[16,20] and warns of an increase in nonmedical CS rates in this deprived province among nulliparous women (who are mostly adolescents) and exposes women to subsequent CSs due to the high fertility rate in this province. Studies have shown that improving women’s knowledge and reducing decision-making conflicts about the mode of delivery during prenatal care are starting points for reducing the rate of CS. Further studies, especially qualitative studies, might help identify why women request CS. Appropriate evidence-based interventions can then be taken at the local level to reduce women’s requests for CS. CS overuse is multifactorial. Therefore, CS prevention interventions should simultaneously consider women’s characteristics (e.g., age and education level), health-care professionals, and organizational factors.[21] Fetal distress and prolonged and obstructed labor were the two main causes of CS among low-risk women (i.e., groups 1–4) in the present study. In line with previous studies in Iran, a review of women’s records showed that these reasons are debatable in many cases,[22] especially because the partographs were not fully complete for cesarean deliveries performed due to prolonged labor. Consistent with previous studies, data also showed that women without previous CS were at similar risk for maternal and perinatal adverse outcomes as those with previous CS.[23] Improvement in the quality of intrapartum surveillance, structured audit of CS indications, and evidence-based interventions are needed to reduce CS rates among groups 1–4 who can potentially deliver vaginally.[24,25]

Although there is no absolute recommendation for the routine use of CS in breech presentation,[26] in the present study, nearly all women with breech presentation (i.e., groups 6 and 7) underwent CS. The unfavorable perinatal consequences of breech presentation do not depend solely on the mode of delivery, but other risk factors must also be considered.[27] Since groups 6 and 7 are among the major contributors to CS, reasoned decisions about the mode of delivery should be made in each case.

Consistent with previous studies, the size of group 10 (i.e., preterm births) was 17.11%, which is significantly higher than what is usually

Table 1: Robson 10 obstetric groups and their contribution to overall cesarean section rate

Robson group	Number of women in group (n1)	Number of CS in group (n2)	Group size[a] (%) (n1/N1)	Group CS rate[b] (%) (n2/n1)	Absolute group contribution to overall CS rate[c] (%) (n2/N1)	Relative contribution of group to overall CS rate[d] (%) (n2/N2)
The sum of Groups 1 and 2	887	274	21.99	30.89	6.79	15.54
1. Nulliparous, single, cephalic, ≥37 weeks, spontaneous labor	-	175	-	-	4.34	9.93
2. Nulliparous, single, cephalic, ≥37 weeks, induced or CS before labor	-	99	-	-	2.45	5.61
The sum of Groups 3 and 4	1384	147	34.32	10.62	3.64	8.34
3. Multiparous, single, cephalic, ≥37 weeks, spontaneous CS before labor (excluding previous CS)	-	99	-	-	2.45	5.62
4. Multiparous, single, cephalic, ≥37 weeks, induced or CS before labor (excluding previous CS)	-	48	-	-	1.19	2.72
5. Multiparous, single, cephalic, ≥37 weeks, with at least one previous uterine scar	751	702	18.62	93.47	17.41	39.82
6. All nulliparous women with a single breech pregnancy	62	62	1.53	100	1.54	3.52
7. All multiparous women with a single breech pregnancy (including previous CS)	131	127	3.24	96.94	3.15	7.20
8. All multiple pregnancies (including previous CS)	98	79	2.43	80.61	1.96	4.48
9. All transverse/or oblique lies (including previous CS)	29	29	0.71	100	0.72	1.64
10. All preterm single cephalic, <37 weeks, (including previous CS)	690	343	17.11	49.71	8.51	19.45
	N1=4032	N2=1763	The rate of C/S (%)			N2/N1=43.72

[a]Group size/or relative size of groups (%)=Number of women in the group/total number women delivered in the hospital ×100, [b]Group CS rate (%)=Number of CS in the group/total number of women in the group ×100, [c]Absolute contribution (%)=Number of CS in the group/total number of women delivered in the hospital ×100, [d]Relative contribution (%)=Number of CS in the group/total number of CS in the hospital ×100. CS: Cesarean section

Table 2: Characteristics of women with and without a previous cesarean section (*n*=1763)

	Without a previous CS		With a previous (*n*=981), *n* (%)	*P*[a]
	Nulliparous (*n*=428), *n* (%)	Multigravida (*n*=354), *n* (%)		
Maternal characteristics				
Age				
≤19	112 (26.17)	17 (4.80)	33 (3.36)	<0.001
20-29	237 (55.37)	151 (42.66)	431 (43.93)	
30-39	72 (16.82)	162 (45.76)	452 (46.08)	
≥40	7 (1.64)	24 (6.78)	65 (6.63)	
Insurance coverage				
Yes	109 (25.47)	114 (32.20)	182 (18.55)	<0.001
No	319 (74.53)	240 (67.80)	799 (81.45)	
Education level[b]				
Illiterate	72 (20.51)	100 (34.13)	243 (28.76)	<0.001
Primary school	144 (41.03)	140 (47.78)	391 (46.27)	
Secondary school	35 (9.97)	17 (5.80)	66 (7.81)	
High school and diploma	53 (15.10)	21 (7.17)	99 (11.72)	
University	47 (13.39)	15 (5.12)	46 (5.44)	
Medical-surgical complications				
No	314 (73.36)	251 (70.90)	748 (76.25)	0.4
Yes	114 (26.64)	103 (29.1)	233 (23.75)	
Pregnancy characteristics				
Gestational age				
<34	41 (9.58)	45 (12.71)	54 (5.51)	<0.001
34-36.6	58 (13.55)	77 (21.75)	197 (20.08)	
37-39.6	232 (54.21)	172 (48.59)	673 (68.60)	
≥40	97 (22.66)	60 (16.95)	57 (5.81)	
Number of fetuses				
1	407 (95.10)	314 (88.70)	963 (98.17)	<0.001
≥1	21 (4.90)	40 (11.30)	18 (1.83)	
Onset of labor				
Elective CS	113 (26.40)	82 (23.16)	290 (29.56)	<0.001
Induction	45 (10.51)	21 (5.93)	0	
Spontaneous	270 (63.09)	251 (70.91)	691 (70.44)	
Fetal presentation[c]				
Cephalic	339 (83.29)	219 (69.75)	908 (94.28)	<0.00001
Breech	62 (15.23)	83 (26.43)	44 (4.57)	
Shoulder	6 (1.48)	12 (3.82)	11 (1.15)	

[a]Chi-square, [b]Missing value (*n*=274), [c]Multiple pregnancies (*n*=79) were deleted. CS: Cesarean section

expected (i.e., <5%).[8,16,28] This finding can be explained by two reasons: first, the study setting hospital was a tertiary referral hospital; second, this hospital serves a population of women at increased risk of preterm delivery.[29] In such a situation, prevention programs that start before pregnancy and continue throughout pregnancy are necessary to prevent preterm birth.[30]

We used Robson's classification system for the first time to analyze the CS rate in a hospital in the Sistan and Baluchestan Province of Iran. Our results can be used by health-care authorities. However, there are some limitations that should be considered. First, this study was conducted in a governmental hospital, and the data showed that women with higher levels of education, who are likely to have higher rates of cesarean delivery,[31] do not attend this hospital. This issue affects the generalizability of the data to the whole province. Therefore, similar studies are recommended to determine the rate of CS in other hospitals in this province. Second, in some cases, the records did not clearly show when labor pain started, making it difficult to clearly distinguish between induction and augmentation of labor. Therefore, there is a possibility of misclassification between groups 1 and 2, and groups 3 and 4. Third, due to financial and workforce constraints, we were unable to review the files of women who had normal vaginal delivery during the study period. Therefore, we were unable to report "group size" and "group CS rate" separately

Table 3: Medical and nonmedical reasons for cesarean section among women with and without a previous cesarean section

Characteristics	Without a previous CS		With a previous CS (*n*=981), *n* (%)
	Nulliparous (*n*=428), *n* (%)	Multigravida (*n*=354), *n* (%)	
Previous CS	0	0	904 (92.15)
Prolonged and obstructed labor	47 (10.98)	18 (5.09)	1 (0.10)
Fetal distress	184 (42.99)	92 (25.99)	8 (0.81)
Mal presentation	64 (14.95)	104 (29.38)	18 (1.84)
Placental disorders	7 (1.64)	17 (4.80)	16 (1.63)
Medical and surgical conditions	38 (8.88)	24 (6.78)	12 (1.22)
Multiple pregnancies	21 (4.91)	40 (11.29)	18 (1.84)
History of infertility	32 (7.48)	4 (1.13)	0
Maternal request	13 (3.03)	8 (2.26)	0
Specialists recommend a CS[a]	15 (3.50)	7 (1.98)	0
Obstetrician decision to an elective CS[b]	7 (1.64)	40 (11.30)	4 (0.41)

[a]Seven cases discopathy, two cases of anxiety, two cases of heart disease, three cases of kidney stone, two cases of ophthalmic disorders, one case of brain tumor, one case of history of umbilical hernia repair, and one case of spinal canal stenosis, [b]for example, anterior and posterior vaginal wall repair, grand multipara, tubal ligation, fetal macrosomia, large ovarian cyst, uterine fibroid, and woman's lack of cooperation during childbirth. CS: Cesarean section

Table 4: Comparison of adverse maternal and perinatal outcomes among women with and without a previous cesarean section

Maternal outcome[b]	Without a previous CS		With a previous CS (*n*=981), *n* (%)	Unadjusted OR[a] (95% CI)
	Nulliparous (*n*=428), *n* (%)	Multigravida (*n*=354), *n* (%)		
Maternal death	0	1 (0.28)	1 (0.10)	1.25 (0.07-20.08)[NS]
Cesarean hysterectomy	0	1 (0.28)	8 (0.82)	0.15 (0.01-1.25)[NS]
Laceration of bladder/ileum	1 (0.23)	0	6 (0.61)	0.20 (0.02-1.74)[NS]
Relaparotomy	1 (0.23)	1 (0.28)	0	6.27 (0.30-130.82)[NS]
Wound infection and wound dehiscence	3 (0.70)	4 (1.13)	8 (0.81)	1.09 (0.39-3.04)[NS]
Hematoma after CS	1 (0.23)	0	1 (0.10)	1.25 (0.07-20.08)[NS]
Readmission	5 (1.09)	6 (1.69)	10 (1.22)	1.38 (0.58-3.27)[NS]
ICU/CCU admission[c]	6 (1.40)	6 (1.69)[d]	7 (0.71)	2.16 (0.84-5.53)[NS]
Blood transfusion (unit)				
≤5	6 (1.4)	14 (3.96)	24 (2.45)	1.04 (0.58-1.90)[f]
>5	3 (0.70)	5 (1.41)	15 (1.53)	0.66 (0.28-1.58)[f]
Neonatal outcome				
APGAR <7 at 1 min	35 (8.18)	46 (12.99)	48 (4.89)	2.11 (1.46-3.06)[f]
APGAR <7 at 5 min	15 (3.50)	29 (8.19)	26 (2.65)	2.12 (1.29-3.47)[f]
Neonatal death[e]	2 (0.47)	2 (0.56)	3 (0.31)	1.67 (0.37-7.49)[NS]
Fresh stillbirth[g]	1 (0.23)	4 (1.13)	4 (0.41)	1.57 (0.42-5.85)[NS]
Stillbirth	1 (0.23)	3 (0.85)	11 (1.12)	0.45 (0.14-1.43)[NS]
NICU admission	70 (16.35)	73 (20.62)	78 (7.95)	2.59 (1.93-3.47)[f]
Birth weight				
<1500	20 (4.67)	26 (7.34)	29 (2.96)	2.59 (1.93-3.47)[f]
1500-2499	94 (21.96)	92 (25.99)	132 (13.46)	2.00 (1.56-2.56)[f]
2500-3999	308 (71.97)	212 (59.89)	800 (81.54)	0.44 (0.36-0.55)[f]
≥4000	6 (1.40)	24 (6.78)	20 (2.04)	1.91 (1.07-3.40)[f]

[a]Columns 1 and 2 were combined to calculate OR, [b]A women may have experienced more than one complication, [c]ICU/CCU admission, [d]2 women were admitted to CCU, [e]Immediately after CS, [f]A statistically significant test result ($P \leq 0.05$), [g]The intrauterine death of a fetus during labor or delivery. NS: Not significant, ICU: Intensive care unit, NICU: Neonatal ICU, CS: Cesarean section, OR: Odds ratio, CI: Confidence interval, CCU: Cardiac care unit, APGAR: Appearance, Pulse, Grimace, Activity, Respiration

for groups 1, 2, 3, and 4. However, this did not affect the main results and does not diminish the value of the findings of this study. Despite all the problems associated with the retrospective nature of the study, this approach helped us determine if the women had been hospitalized again after discharge.

Conclusions

This study found that the CS rate was worryingly high in a hospital located in a deprived area. The Robson classification system helped us identify the main contributors to the CS rate in this hospital. However, further studies are needed to find out the main reasons for the high CS rates in each Robson group. Then appropriate measures can be taken to reduce the rate of CS.

Acknowledgments

The author would like to thank the manager of Zahedan University of Medical Sciences and Ali-Ibn-Abitaleb Hospital who supported us in conducting this study. Thanks also to an employee of the hospital archives who help the author to access the women's files.

Financial support and sponsorship

This study was supported by Zahedan University of Medical Sciences, Zahedan, Iran (grant number: 9978).

Conflicts of interest

There are no conflicts of interest.

References

1. World Health Organization. WHO Recommendations: Non-Clinical Interventions to Reduce Unnecessary Caesarean Sections. Geneva: World Health Organization; 2018. Available from: https://www.ncbi.nlm.nih.gov/books/NBK532672/.
2. Boerma T, Ronsmans C, Melesse DY, Barros AJ, Barros FC, Juan L, *et al*. Global epidemiology of use of and disparities in caesarean sections. Lancet 2018;392:1341-8.
3. Sandall J, Tribe RM, Avery L, Mola G, Visser GH, Homer CS, *et al*. Short-term and long-term effects of caesarean section on the health of women and children. Lancet 2018;392:1349-57.
4. Gedefaw G, Demis A, Alemnew B, Wondmieneh A, Getie A, Waltengus F. Prevalence, indications, and outcomes of caesarean section deliveries in Ethiopia: A systematic review and meta-analysis. Patient Saf Surg 2020;14:11.
5. Temmerman M, Mohiddin A. Cesarean section: More than a maternal health issue. PLoS Med 2021;18:e1003792.
6. Behjati Ardakani Z, Navabakhsh M, Ranjbar F, Tremayne S, Akhondi MM, MohseniTabrizi A. Dramatic rise in cesarean birth in Iran: A coalition of private medical practices and womens choices. Int J Womens Health Reproduct Sci 2020;8:245-58.
7. Jafarzadeh A, Hadavi M, Hasanshahi G, Rezaeian M, Vazirinejad R, Aminzadeh F, *et al*. Cesarean or cesarean epidemic? Arch Iran Med 2019;22:663-70.
8. Begum T, Nababan H, Rahman A, Islam MR, Adams A, Anwar I. Monitoring caesarean births using the Robson ten group classification system: A cross-sectional survey of private for-profit facilities in Urban Bangladesh. PLoS One 2019;14:e0220693.
9. Betran AP, Ye J, Moller AB, Souza JP, Zhang J. Trends and projections of caesarean section rates: Global and regional estimates. BMJ Glob Health 2021;6:e005671.
10. Robson M, Murphy M, Byrne F. Quality assurance: The 10-group classification system (Robson classification), induction of labor, and cesarean delivery. Int J Gynaecol Obstet 2015;131 Suppl 1:S23-7.
11. World Health Organization. WHO Statement on Caesarean Section Rates. Geneva: World Health Organization; 2015. Available from: https://apps.who.int/iris/bitstream/handle/10665/161442/WHO_RHR_15.02_eng.pdf.
12. Afghah S, Ahangari A, Askari por H. Estimating human development index of Iranian provinces and investigating its impact on economic growth using fuzzy logic. Quart J Quant Econom 2020;17:89-121.
13. Sabet Rohani H, Ahmadvand A, Garmaroudi G. The relationship between important reproductive health indices and human development index in Iran. Med J Islam Repub Iran 2018;32:54.
14. Gholampoor H, Pourreza A, Heydari H. The effect of social and economic factors on maternal mortality in provinces of Iran within 2009-2013. Evid Based Health Policy Manage Econom 2018;2:80-90
15. Behzadifar M, Behzadifar M, Bakhtiari A, Azari S, Saki M, Golbabayi F, *et al*. The effect of the health transformation plan on cesarean section in Iran: A systematic review of the literature. BMC Res Notes 2019;12:37.
16. World Health Organization. Robson Classification: Implementation Manual. Geneva: World Health Organization; 2017. Available from: https://www.who.int/publications-detail-redirect/9789241513197.
17. Pourshirazi M, Heidarzadeh M, Taheri M, Esmaily H, Babaey F, Talkhi N, *et al*. Cesarean delivery in Iran: A population-based analysis using the Robson classification system. BMC Pregnancy Childbirth 2022;22:185.
18. Al-Rubaie ZT, Hudson HM, Jenkins G, Mahmoud I, Ray JG, Askie LM, *et al*. Prediction of pre-eclampsia in nulliparous women using routinely collected maternal characteristics: A model development and validation study. BMC Pregnancy Childbirth 2020;20:23.
19. Shirzad M, Shakibazadeh E, Hajimiri K, Betran AP, Jahanfar S, Bohren MA, *et al*. Prevalence of and reasons for women's, family members', and health professionals' preferences for cesarean section in Iran: A mixed-methods systematic review. Reprod Health 2021;18:3.
20. Vila-Candel R, Martín A, Escuriet R, Castro-Sánchez E, Soriano-Vidal FJ. Analysis of caesarean section rates using the Robson classification system at a University hospital in Spain. Int J Environ Res Public Health 2020;17:1575.
21. Dumont A, Betrán AP, Kaboré C, de Loenzien M, Lumbiganon P, Bohren MA, *et al*. Implementation and evaluation of nonclinical interventions for appropriate use of cesarean section in low and middle-income countries: Protocol for a multisite hybrid effectiveness-implementation type III trial. Implement Sci 2020;15:72.
22. Saleh Gargari S, Essén B, Fallahian M, Mulic-Lutvica A, Mohammadi S. Auditing the appropriateness of cesarean delivery using the Robson classification among women experiencing a maternal near miss. Int J Gynaecol Obstet 2019;144:49-55.
23. Kongwattanakul K, Thamprayoch R, Kietpeerakool C, Lumbiganon P. Risk of severe adverse maternal and neonatal outcomes in deliveries with repeated and primary cesarean deliveries versus vaginal deliveries: A cross-sectional study. J Pregnancy 2020;2020:9207431.
24. Abdulrahman M, Abdullah SS, Alaani AF, AlAbdool NH, Sherif FE, Ahmed ZS, *et al*. Exploring obstetrical interventions and stratified cesarean section rates using the Robson classification in tertiary care hospitals in the united Arab emirates. Rev Bras Ginecol Obstet 2019;41:147-54.
25. Litorp H, Gurung R, Målqvist M, Kc A. Disclosing suboptimal indications for emergency caesarean sections due to fetal distress and prolonged labor: A multicenter cross-sectional study at 12

public hospitals in Nepal. Reprod Health 2020;17:197.
26. Impey LWM, Murphy DJ, Griffiths M, Penna LK on behalf of the Royal College of Obstetricians and Gynaecologists. Management of Breech Presentation. BJOG 2017;124:e151–e177.
27. Carbillon L, Benbara A, Tigaizin A, Murtada R, Fermaut M, Belmaghni F, *et al*. Revisiting the management of term breech presentation: A proposal for overcoming some of the controversies. BMC Pregnancy Childbirth 2020;20:263.
28. Nakamura-Pereira M, do Carmo Leal M, Esteves-Pereira AP, Domingues RM, Torres JA, Dias MA, *et al*. Use of Robson classification to assess cesarean section rate in Brazil: The role of source of payment for childbirth. Reprod Health 2016;13:128.
29. Soltani M, Tabatabaee HR, Saeidinejat S, Eslahi M, Yaghoobi H, Mazloumi E, *et al*. Assessing the risk factors before pregnancy of preterm births in Iran: A population-based case-control study. BMC Pregnancy Childbirth 2019;19:57.
30. Barfield WD. Public health implications of very preterm birth. Clin Perinatol 2018;45:565-77.
31. Sadat Z. Reasons for elective cesarean section in Iranian women. Nurs Midwifery Stud 2014;3:e22502.