

# Maternal and Fetal Outcomes after Emergency Caesarian Sections at Bashair Teaching Hospital, Khartoum State, Sudan, 2022

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## Abstract:

### ➤ *Background*

Emergency caesarean sections (ECS) are critical procedures performed to address urgent maternal or fetal conditions during childbirth. These interventions, although lifesaving, are associated with increased risks compared to planned caesarean sections. Maternal outcomes may include higher rates of infection, hemorrhage, and longer recovery periods, while fetal outcomes often involve respiratory distress, neonatal intensive care admission, and in some cases, perinatal mortality.

### ➤ *Objective:*

To assess fetomaternal outcomes of emergency caesarian sections at Bashair Teaching Hospital in 2022.

### ➤ *Methods:*

This study was an observational, descriptive, cross-sectional analysis conducted at Bashair Teaching Hospital in Khartoum, Sudan, from March to August 2022. It focused on patients who underwent emergency caesarean sections during this period, with a sample size of 124 participants selected via simple random sampling. Data was collected using structured questionnaires then analyzed using SPSS version 28.0, employing descriptive statistics and bi-variable analysis. Ethical approvals and participants consents were obtained, ensuring confidentiality and adherence to COVID-19 precautions.

### ➤ *Results:*

The study included 124 participants. The majority of participants were aged 20-29 years (39.5%), followed by those aged 30-39 years (33.1%). Almost half were from low socioeconomic backgrounds (49.2%), with 54.8% residing in urban areas. Education levels varied, with 33.1% having primary education, 31.5% secondary education, and 18.5% university education, while 16.9% were illiterate. More than half were housewives (55.6%), followed by officers (18.5%) and laborers (16.9%). Clinically, 57.3% of women received regular antenatal care, while 30.6% had irregular care, and 12.1% had no antenatal care. Common comorbidities included hypertension in (18.5%), anemia (7.3%), and diabetes mellitus (6.5%), 62.9% had no comorbidities. Pregnancy complications were prevalent, with previous scars being the most common (82.3%), followed by preeclampsia (8.9%) and pregnancy-induced hypertension (8.1%). The indications for emergency caesarean sections were previous scars in labor (38.7%), prolonged labor (21.0%), and malpresentation (14.5%). Maternal outcomes post-surgery were generally positive, with 87.9% of women discharged in good health, though 11.3% developed complications such as bleeding (5.6%), thromboembolism (3.2%), and postoperative pain (6.5%). Only 1.6% required ICU admission, and 15.3% needed blood transfusions. Neonatal outcomes showed that 73.4% of newborns had average birth weights, 20.2% were low birth weight, and 6.5% were large babies. Most were born at term (81.4%), with 8.9% preterm and 9.7% postdate. Apgar scores at 1 minute showed 58.9% scoring 7-10, while scores at 5 and 10 minutes revealed concerns,

with 52.4% scoring 4-6 and 16.1% scoring 0-3 at 5 minutes, and 71.8% scoring 4-6 and 20.2% scoring 0-3 at 10 minutes. Overall, 83.9% of newborns were alive and well, 12.9% developed complications, and there were 4 stillbirths (3.2%). Of these, 50% were fresh stillbirths and 50% macerated. Common neonatal complications included respiratory distress syndrome (50.0%) and meconium aspiration syndrome (25.0%), with 13.7% requiring NICU admission.

➤ **Conclusion:**

**Beside specialist is needed to reduce maternal morbidity related to emergency cesarean section. Delayed decision delivery interval, low birth weight, meconium stained liquor and lack of good neonatal equipment facility are associated with poor neonatal outcome.**

**Keywords:** Maternal, Fetal, Outcomes, Emergency, Caesarian Sections.

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## I. INTRODUCTION

Cesarean section is usually performed when a vaginal delivery would put the baby's or mother's life or health at risk. Cesarean section can save lives, but it is frequently performed without medical indications. It is often done as an emergency procedure in women with Cephalopelvic disproportion, obstructed labor, fetal distress, antepartum hemorrhage and previous cesarean section resulting in high perinatal and maternal morbidities. A noticed rise in cesarean section (CS) rate has been noted in many obstetric units all over the world. The reasons behind this rise vary between fear of litigation, lack of midwifery support and a reluctance to implement the active management of labor. Epidural analgesia may be associated with a doubling of the rate of emergency CS in nulliparous women. Reducing the overall CS rate can only be achieved through reducing the first CS rate especially. Moreover, studies claimed that women who have a caesarean section in their first pregnancy (primigravida) have about a 1 in 10 chance of having an emergency caesarean section for in their second pregnancy. Emergency cesarean section is a commonly performed surgical procedure in pregnant women with life-threatening conditions of the mother and/or fetus [1] According to the Royal College of Obstetricians and Gynecologists and the American College of Obstetricians and Gynecologists, decision to delivery interval for emergency cesarean sections should be within 30 min. It is an indicator of quality of care in maternity service, and if prolonged, it constitutes a third-degree delay. There are abundant cases of obstetric emergencies demanding prompt intervention. Emergency cesarean sections are classified into stable, urgent and immediate surgeries, although there is significant overlap between three groups. Stable emergency cesarean sections are performed in patients with stable maternal and fetal physiology, but who need surgery before instability occurs. Urgent cesarean sections refer to situations in which maternal and/or fetal physiology is unstable, whereas the immediate cesarean section is used for life-threatening condition such as sustained fetal bradycardia, maternal cardiopulmonary arrest. In most cases the key to proper management is the prompt communication between obstetricians and anesthesiologists. Anesthesiologists must have a clear understanding of certain obstetric emergencies. Cesarean section is a commonly

performed major obstetric surgery to deliver baby under certain indications which may be maternal or fetal. If performed timely, it is helpful to save the life of mother and fetus and if not, it increases both maternal and fetal risks. Studies reported many indications for emergency caesarian section in both prime/multigravida, especially when expect complications of labor and factors increasing the risk associated with vaginal delivery such as abnormal presentation, prolonged labor or a failure to progress, fetal distress, cord prolapse, uterine rupture or an elevated risk there of hypertension in the mother or baby after amniotic rupture, placenta problems (placenta praevia, placental abruption or placenta accreta), failed labor induction, failed instrumental delivery, large baby weighing > 4,000 grams (macrosomia), and umbilical cord abnormalities. Some studies reported that adverse outcomes expected to occur in a considerable proportion of caesarian section deliveries. An emergency caesarian section is associated with risks of postoperative adhesions, incisional hernias (which may require surgical correction), and wound infections. If a caesarian is performed in an emergency, the risk of the surgery may be increased due to a number of factors. The patient's stomach may not be empty, increasing the risk of anesthesia. Other risks include severe blood loss (which may require a blood transfusion) and postdural-puncture spinal headaches. Wound infections occur after caesarian sections at a rate of 3-15%. Women who had caesarian sections (both types) are more likely to have problems with later pregnancies. Along with this is a similar rise in the risk of emergency hysterectomies at delivery. Mothers can experience an increased incidence of postnatal depression and can experience significant psychological trauma and ongoing birth-related post-traumatic stress disorder after obstetric intervention during the birthing process. Both have higher risks than a vaginal birth with no previous caesarian section. There are many issues which must be taken into account when planning the mode of delivery especially for the first pregnancy. Throughout this context, this study aims to analyze and to assess the maternal and fetal outcomes after emergency caesarian sections at Bashair teaching hospital in 2022.

## II. MATERIAL AND METHODS

This is an observational, descriptive, cross-sectional and hospital-based study. Data is taken from the patients records in Bashair teaching hospital, Sudan from March-August 2022. It covered the pregnant women who underwent emergency caesarian sections and whom accepted to participate in the study.

**Sample size and technique:** Since this was a descriptive retrospective comparative study, with known estimated number of population (number of patients underwent for emergency caesarian section in study area and duration), the size of the study was determined through the following formula:  $n = N / (1 + N(e)^2)$  - Where n is the sample size and N is the population size. Estimated population size = 180 CS in 6 months in the minimum (according to the previous records in Bashair teaching hospital) so, the sample size (n) =  $180 / (1 + 180 \times (0.05 \times 0.05)^2) = 124.1$  or 124 participants. The cases were selected with simple random sampling method.

Statistical analysis was performed via SPSS version 28.0. Descriptive statistics in term of frequency tables with percentages and graphs. Means and standard deviations were presented with relevant graphical representation for quantitative data. Bi-variable analysis to determine the difference between characteristics of the participants and the perinatal outcomes after the emergency caesarian section using Chi squared statistical test (for categorical variables) and paired t- test (quantitative variables) statistical tests was used. P value of 0.05 or less was considered statistically significant. Data was represented after analysis in the form of uni-variable tables, cross tabulation (bi variable tables), figures and narrative illustration.

Written ethical clearance and approval for conducting this research were obtained from Sudan Medical Specialization Board Ethical Committee and general manager of the hospital. Written consent was obtained from the participants after they were fully aware of the study objectives and sequences. Also Preventive precautions against Covid 19 infection were strictly applied.

## III. RESULTS

### ➤ *Demographical Characteristics and Age Distribution:*

The age distribution of the 124 pregnant women at Bashair Teaching Hospital, Khartoum State, Sudan, in 2022, was detailed in (Table 1). The majority of participants (39.5%) were aged between 20 and 29 years, followed by 33.1% in the 30-39 years age group. Participants under 20 years constituted 15.3%, while those aged 40 years or older were only 12.1%. (Table 2) illustrated the socioeconomic status of the participants. Nearly half (49.2%) of the women were from low socioeconomic background, while 41.1% were from a middle socioeconomic status. Only 9.7% of the participants were from a high socioeconomic background.

Residence as shown in Table (3) : (54.8%) of the participants resided in urban areas, whereas 45.2% lived in rural areas. Concerning educational Level, Table 4 revealed

that 33.1% of the participants had primary education, 31.5% had secondary education, and 18.5% had a university education or higher. Only 16.9% of the women were illiterate. The occupational status of the participants was depicted in Table 5. Almost half were housewives (55.6%), while 18.5% were officers, 16.9% were laborers, and 8.9% were from other occupational categories.

**Clinical Characteristics:** Parity Table 6 outlined the parity distribution among the participants. Multiparous women were the commonest (39.5%), followed by primiparous (25.0%) then primigravidae (23.4%). Grand multiparous women constituted 12.1%. Antenatal Care Regularity in Table 7 among the participants. Regular antenatal care was reported by 57.3% of the women, while 30.6% had irregular antenatal care. A total of 12.1% did not receive any antenatal care.

**Comorbidities** shown in Table (8) The most common among the participants was hypertension (18.5%), followed by anemia (7.3%) and diabetes mellitus (6.5%). Almost two thirds (62.9%) had no comorbidities.

Table 9 listed the pregnancy complications experienced by the participants. The most frequent complication was previous scars in (82.3%), followed by preeclampsia in (8.9%) and pregnancy-induced hypertension (8.1%).

Table 10 identified the indications for emergency caesarean sections. The most common indication was a previous scar in labor (38.7%), followed by prolonged labor in (21.0%) and malpresentation in (14.5%).

Table 11 summarized the maternal outcomes post-emergency caesarean section. Most women (87.9%) recovered and were discharged in good health. However, 11.3% developed complications, and there was one maternal death (0.8%). The complications included : bleeding (5.6%), thromboembolism (3.2%), and postoperative pain (6.5%), among others.

Table 12 indicated that only 1.6% of the participants required intensive care admission post-caesarean section, with the vast majority (98.4%) not needing ICU care.

**Type of Anesthesia used - Table (13):** Spinal anesthesia was the predominantly used (97.6%) during emergency caesarean sections, with general anesthesia used in only 2.4% of cases.

**Need for Blood Transfusion** in Table 14 highlighted that 15.3% of the women required blood transfusion post-caesarean section, where as 84.7% did not.

**Neonatal Outcomes:** Table 15 detailed the birth weight of the newborns. The majority (73.4%) were of average weight, 20.2% were of low birth weight and only 6.5% were sizable babies.

As Gestational age Table 16 showed that most newborns (81.4%) were term, 8.9% were preterm, and 9.7% were

postdate. The Apgar scores at 1, 5, and 10 minutes after birth were detailed in Tables 17, 18, and 19, respectively. At 1 minute, 58.9% scored between 7-10, while 32.2% scored between 4-6, and 8.9% scored between 0-3. At 5 minutes, the scores were more concerning, with 52.4% scoring 4-6 and 16.1% scoring 0-3. By 10 minutes, 71.8% scored 4-6, and 20.2% scored 0-3.

**Overall Outcome:** Table 20 indicated that 83.9% of the newborns were alive and well, while 12.9% developed complications. There were four stillbirths (3.2%).

As a need for Neonatal Intensive Care Table 21 showed that 13.7% of the newborns required NICU admission, while 86.3% did not. Table 22 categorized the stillbirths, with an equal distribution of fresh (50.0%) and macerated (50.0%) stillbirths. Table 23 listed the neonatal complications observed, with respiratory distress syndrome in (50.0%) and meconium aspiration syndrome in (25.0%) being the most common.

**Table 1 The Distribution of the Participants According to their Age - Years (n = 124 Pregnant Women at Bashair Teaching Hospital, Khartoum State, Sudan in 2022)**

Age Group	Frequency	Percentage (%)
< 20 years	19	15.3
20 – 29 years	49	39.5
30 – 39 years	41	33.1
≥ 40 years	15	12.1
<b>Total</b>	<b>124</b>	<b>100</b>

**Table 2 The Distribution of the Participants According to their Socioeconomic Status (n = 124 Pregnant Women at Bashair Teaching Hospital, Khartoum State, Sudan in 2022)**

Socioeconomic Status	Frequency	Percentage (%)
Low	61	49.2
Middle	51	41.1
High	12	9.7
<b>Total</b>	<b>124</b>	<b>100</b>

**Table 3 The Distribution of the Participants According to their Residence (n = 124 Pregnant Women at Bashair Teaching Hospital, Khartoum State, Sudan in 2022)**

Residence	Frequency	Percentage (%)
Urban	68	54.8
Rural	56	45.2
<b>Total</b>	<b>124</b>	<b>100</b>

**Table 4 The Distribution of the Participants According to their Education Level (n = 124 Pregnant Women at Bashair Teaching Hospital, Khartoum State, Sudan in 2022)**

Education Level	Frequency	Percentage (%)
Illiterate	21	16.9
Primary	41	33.1
Secondary	39	31.5
University or above	23	18.5
<b>Total</b>	<b>124</b>	<b>100</b>

**Table 5 The Distribution of the Participants According to their Occupation (n = 124 Pregnant Women at Bashair Teaching Hospital, Khartoum State, Sudan in 2022)**

Occupation	Frequency	Percentage (%)
Housewife	69	55.6
Laborer	21	16.9
Officer	23	18.5
Other	11	8.9
<b>Total</b>	<b>124</b>	<b>100</b>

➤ *Clinical Characteristics*

**Table 6 The Distribution of the Participants According to their Parity (n = 124 Pregnant Women at Bashair Teaching Hospital, Khartoum State, Sudan in 2022)**

Parity	Frequency	Percentage (%)
Primigravidae	29	23.4
Primiparous	31	25.0
Multiparous	49	39.5
Grand multiparous	15	12.1
<b>Total</b>	<b>124</b>	<b>100</b>

**Table 7 The Distribution of the Participants According to their Antenatal Care Regularity (n = 124 Pregnant Women at Bashair Teaching Hospital, Khartoum State, Sudan in 2022)**

Antenatal Care Regularity	Frequency	Percentage (%)
Regular	71	57.3
Irregular	38	30.6
None	15	12.1
<b>Total</b>	<b>124</b>	<b>100</b>

Table 8 The Distribution of the Participants According to their Comorbidities (n = 124 Pregnant Women at Bashair Teaching Hospital, Khartoum State, Sudan in 2022)

Comorbidity	Frequency	Percentage (%)
Hypertension	23	18.5
Anemia	9	7.3
Diabetes Mellitus	8	6.5
Sickle Cell Disease	3	2.4
Asthma	1	0.8
Thyroid Disease	1	0.8
Heart Disease	1	0.8
None	78	62.9
<b>Total</b>	<b>124</b>	<b>100</b>

Table 9 The Distribution of the Participants According to their Pregnancy Complications (n = 124 Pregnant Women at Bashair Teaching Hospital, Khartoum State, Sudan in 2022)

Pregnancy Complication	Frequency	Percentage (%)
Previous Scars	102	82.3
Preeclampsia (PET)	11	8.9
Pregnancy Induced Hypertension (PIH)	10	8.1
Antepartum Hemorrhage (APH)	5	4.0
Gestational Diabetes (GDM)	4	3.2
Diabetes Mellitus (DM)	4	3.2
<b>Total</b>	<b>124</b>	<b>100</b>

Table 10 The Distribution of the Participants According to the Indications for Emergency Caesarian Section (n = 124 Pregnant Women at Bashair Teaching Hospital, Khartoum State, Sudan in 2022)

Indication for EM C/S	Frequency	Percentage (%)
Prolonged Labour (FTP)	26	21.0
Malpresentation	18	14.5
Fetal Distress	9	7.3
Failed Labour Induction	8	6.5
Sizable Baby	8	6.5
Placenta Problems	5	4.0
Failed Instrumental Delivery	1	0.8
Uterine Rupture	1	0.8
Umbilical Cord Abnormalities	0	0
Other (previous scar in labour)	48	38.7
<b>Total</b>	<b>124</b>	<b>100</b>

Table 11 The Distribution of the Participants According to the Overall Maternal Outcome After Emergency Caesarian Section (n = 124 Pregnant Women at Bashair Teaching Hospital, Khartoum State, Sudan in 2022)

Maternal Outcome		Frequency	Percentage (%)
Recovered & Discharged (Good)		109	87.9
Developed Complications		14	11.3
Dead		1	0.8
Type of complications occurred	Bleeding	7	5.6
	Wound Infection	3	2.4
	Thromboembolism	4	3.2
	Incidental Surgical Injury	1	0.8
	Extended Hospitalization	3	2.4
	Emergency Hysterectomy	0	0
	Postoperative Pain	8	6.5
	Poor Birth Experience	2	1.6
	Anesthesia Complications (headache)	4	3.2
	Bladder Injury	1	0.8
	Bowel Injury	0	0
	Other	8	6.5

Table 12 The Distribution of the Participants According to the Need for Intensive Care Admission After Emergency Caesarian Section (n = 124 Pregnant Women at Bashair Teaching Hospital, Khartoum State, Sudan in 2022)

Need for ICU	Frequency	Percentage (%)
Yes	2	1.6
No	122	98.4
<b>Total</b>	<b>124</b>	<b>100</b>

Table 13 The Distribution of the Participants According to the type of Anaesthesia used During Emergency Caesarian Section (n = 124 Pregnant Women at Bashair Teaching Hospital, Khartoum State, Sudan in 2022)

Complications of Anaesthesia	Frequency	Percentage (%)
Spinal	121	97.6
General	3	2.4
<b>Total</b>	<b>124</b>	<b>100</b>

Table 14 The Distribution of the Participants According to the Need for Blood Transfusion After Emergency Caesarian Section (n = 124 Pregnant Women at Bashair Teaching Hospital, Khartoum State, Sudan in 2022)

Need for Blood Transfusion	Frequency	Percentage (%)
Yes	19	15.3
No	105	84.7
<b>Total</b>	<b>124</b>	<b>100</b>

Table 15 The Distribution of the Participants According to the Birth Weight of Newborns After Emergency Caesarian Section (n = 124 Pregnant Women at Bashair Teaching Hospital, Khartoum State, Sudan in 2022)

Birth Weight	Frequency	Percentage (%)
Sizable	8	6.5
Average	91	73.4
Low	25	20.2
<b>Total</b>	<b>124</b>	<b>100</b>

Table 16 The Distribution of the Participants According to the Gestational Age of Newborns After Emergency Caesarian Section (n = 124 Pregnant Women at Bashair Teaching Hospital, Khartoum State, Sudan in 2022)

Gestational Age	Frequency	Percentage (%)
Term	101	81.4
Preterm	11	8.9
Postdate	12	9.7
<b>Total</b>	<b>124</b>	<b>100</b>

Table 17 The Distribution of the Participants According to Apgar Score at 1 Minute After Birth (n = 124 Newborns at Bashair Teaching Hospital, Khartoum State, Sudan in 2022)

Apgar Score (1 minute)	Frequency	Percentage (%)
7-10	73	58.9
4-6	40	32.2
0-3	11	8.9
<b>Total</b>	<b>124</b>	<b>100</b>

Table 18 The Distribution of the Participants According to Apgar Score at 5 Minutes After Birth (n = 124 Newborns at Bashair Teaching Hospital, Khartoum State, Sudan in 2022)

Apgar Score (5 minutes)	Frequency	Percentage (%)
7-10	39	31.5
4-6	65	52.4
0-3	20	16.1
<b>Total</b>	<b>124</b>	<b>100</b>

Table 19 The Distribution of the Participants According to Apgar Score at 10 Minutes After Birth (n = 124 Newborns at Bashair Teaching Hospital, Khartoum State, Sudan in 2022)

Apgar Score (10 minutes)	Frequency	Percentage (%)
7-10	10	8.1
4-6	89	71.8
0-3	25	20.2
<b>Total</b>	<b>124</b>	<b>100</b>

Table 20 The Distribution of the Participants According to Fetal Outcome After Emergency Caesarian Section (n = 124 Newborns at Bashair Teaching Hospital, Khartoum State, Sudan in 2022)

Overall Fetal Outcome	Frequency	Percentage (%)
Alive and well	104	83.9
Developed complications	16	12.9
Still birth	4	3.2
<b>Total</b>	<b>124</b>	<b>100</b>

Table 21 The Distribution of the Participants According to the Need for Neonatal Intensive Care Admission (n = 124 Newborns at Bashair Teaching Hospital, Khartoum State, Sudan in 2022)

Need for NICU	Frequency	Percentage (%)
Yes	17	13.7
No	107	86.3
<b>Total</b>	<b>124</b>	<b>100</b>

Table 22 The Distribution of the Participants According to the Type of Stillbirth (n = 4 Stillbirths at Bashair Teaching Hospital, Khartoum State, Sudan in 2022)

Type of Stillbirth	Frequency	Percentage (%)
Fresh	2	50.0
Macerated	2	50.0
<b>Total</b>	<b>4</b>	<b>100.0</b>

Table 23 The Distribution of the Participants According to Neonatal Complications after Emergency Caesarian Section (n = 16 Newborns with complications at Bashair Teaching Hospital, Khartoum State, Sudan in 2022)

Neonatal Complications	Frequency	Percentage (%)
Respiratory Distress Syndrome (RDS)	8	50.0
Meconium Aspiration Syndrome	4	25.0
Transient Tachypnea of the Newborn	3	18.6
Hypoglycemia	1	6.2
Neonatal Septicemia	1	6.2
<b>Total</b>	<b>16</b>	<b>100</b>

#### IV. DISCUSSION

Here we explored the critical analysis of outcomes associated with emergency caesarean sections (C-sections). This research is important due to the rising rates of C-sections globally, particularly in developing countries where healthcare systems face unique challenges. In Sudan, emergency C-sections are a common intervention to mitigate risks during childbirth, yet they come with their own set of maternal and neonatal outcomes that necessitate thorough evaluation. The implications of outcomes for clinical practice, policy-making, and future research are critically analyzed. This chapter aims to provide a comprehensive understanding of the factors influencing maternal and neonatal health following emergency C-sections, highlighting both the successes and areas needing improvement in the current healthcare practices at Bashair Teaching Hospital. Key themes explored include the rate of maternal complications such as postpartum hemorrhage and infections, as well as neonatal outcomes like Apgar scores and NICU admissions. Through putting our findings within the broader context of regional and global studies, we aim to contribute valuable insights into the optimization of emergency obstetric care in similar settings. This discussion underscores the importance of continuous monitoring, capacity building, and the implementation of evidence-based practices to enhance the quality of care for mothers and their newborns. 57 The current study provided an in-depth analysis of the clinical profiles of 124 participants who underwent emergency cesarean sections (ECS). The results indicated that a significant portion of the women received regular antenatal care (57.3%), while 30.6% had irregular care, and 12.1% had no antenatal care at all. Additionally, common comorbidities among these women included hypertension (18.5%), anemia (7.3%), and diabetes mellitus (6.5%), with 62.9% having no comorbidities. These findings are essential for understanding the healthcare landscape in Khartoum and comparing it with other regions. In a similar study conducted in Sudan by Adam et al. at Khartoum Hospital, the maternal and fetal outcomes of emergency cesarean deliveries were assessed. Adam et al. found that the primary indications for cesarean delivery included repeated previous cesareans (40.4%), failure to progress (12.3%), breech presentation (8.4%), and hypertensive disorders (8.2%) [2]. This aligns

with the current study where hypertensive disorders were also a common comorbidity (18.5%). However, the proportion of women with regular antenatal care in Adam et al.'s study was not specified, making direct comparison challenging. The significant finding in Adam et al.'s study was the high rate of repeated previous cesareans, indicating a potential area for intervention to reduce the ECS rate through improved trial of labor and instrumental deliveries. In Nepal, Pramod et al. investigated the indications and maternal-fetal outcomes of ECS. They reported that the incidence of ECS was 5.5%, with fetal distress being the most common indication (29.3%), followed by failed induction and cephalopelvic disproportion (each 14.6%) [3]. The prevalence of hypertension and diabetes as comorbidities in the current study mirrors the pattern seen in Pramod et al.'s research, although the indications for ECS differed. The Nepali study highlighted the critical need for adequate neonatal intensive care, reflected in the relatively high rates of neonatal resuscitation and admissions to intensive care. In India, Erika et al. studied the indications and outcomes of ECS, finding that fetal distress (25.58%) and antepartum hemorrhage (22.09%) were the most common indications [4]. The current study's focus on antenatal care utilization provides additional context, emphasizing the importance of regular antenatal visits in potentially mitigating the need for ECS. Erika et al.'s findings on fetal distress align with the broader pattern of ECS indications globally, although the prevalence of antepartum hemorrhage was not a major finding in the Sudanese cohort. In Ethiopia, Gedefaw et al. reported that cephalopelvic disproportion (18.13%) and non-reassuring fetal heart rate patterns (19.57%) were the leading indications for ECS [5]. Their study also highlighted significant neonatal complications such as low Apgar scores, perinatal asphyxia, and neonatal sepsis. The Ethiopian study's emphasis on maternal and neonatal complications underscores the critical role of antenatal care, which was more regularly utilized in the current Sudanese study. The high rate of regular antenatal care in the current study (57.3%) could be a contributing factor to better managing these complications. Ayano et al. in another Ethiopian study, found that dystocia (26.4%) and non-reassuring fetal heart rate patterns (18.8%) were the most frequent indications for ECS, with a noted cesarean section rate of 24.8% [6]. The maternal outcomes in their study were largely favorable, with a smooth postoperative course for 94.8% of the cases. This is an important comparison point, as the maternal outcomes in the current study at Bashair Teaching Hospital 59 would benefit from further exploration to assess postoperative recovery and complications. The findings from the current study at Bashair Teaching Hospital indicated a substantial proportion of women receiving regular antenatal care, which is crucial for monitoring and managing potential complications during pregnancy. The common comorbidities of hypertension, anemia, and diabetes mellitus are consistent with findings from other regions, suggesting these conditions are significant risk factors for requiring ECS. The relatively high rate of regular antenatal care (57.3%) compared to irregular (30.6%) and no care (12.1%) emphasizes the importance of consistent prenatal monitoring to improve maternal and fetal outcomes. These results highlighted the need for targeted interventions to enhance antenatal care coverage and quality, potentially reducing the

necessity for ECS. Through addressing the common comorbidities identified, such as hypertension and diabetes, through improved antenatal care protocols and patient education, healthcare providers can better manage pregnancies and decrease the rates of emergency interventions. Additionally, the study highlights the importance of healthcare infrastructure and resources in managing ECS, including adequate neonatal intensive care units and trained personnel, as recommended by Pramod et al. [8]. This study found that pregnancy complications were prevalent, with previous scars being the most common (82.3%), followed by preeclampsia (8.9%) and pregnancy-induced hypertension (8.1%). The primary indications for ECS were previous scars in labor (38.7%), prolonged labor (21.0%), and malpresentation (14.5%). These findings highlight the significant burden of repeat caesarean sections and other obstetric complications in the studied population. In Sudan, Adam et al. [2] assessed maternal and fetal outcomes of emergency caesarean deliveries at Khartoum Hospital. They reported that the indications for ECS included repeated previous caesareans (40.4%), failure to progress (12.3%), and hypertensive disorders (8.2%). This aligns with our findings, particularly regarding the high prevalence of previous scars as an indication for ECS. Adam et al. also noted that obesity was a significant predictor of ECS, suggesting a potential area for intervention to reduce ECS rates in Sudan. In Nepal, Pramod et al. [8] examined indications and maternofetal outcomes of ECS and found that fetal distress (29.3%) was the most common indication, followed by failed induction and cephalopelvic disproportion (14.6% each). While fetal distress was not a primary indication in our study, the high rates of prolonged labor and malpresentation reflect similar obstetric challenges that lead to ECS. Ayano et al. [6] also conducted a study in Ethiopia and found dystocia (26.4%) and non-reassuring fetal heart rate patterns (18.8%) as leading indications for ECS. These findings align closely with our results, where prolonged labor (dystocia) and malpresentation (a proxy for non-reassuring fetal heart rate) were significant indications. In China, Xiao-Jing Yang et al. [7] conducted a systematic review and meta-analysis comparing elective and emergency caesarean sections, revealing that ECS is associated with significantly higher rates of maternal complications such as infections and hemorrhage, as well as fetal complications and mortality. This underscores the critical need for preventive strategies and timely interventions to manage ECS, reflecting the high maternal morbidity observed in our study. In the Netherlands, Maaikje A.P.C. van Ham et al. [8] found higher intraoperative and postoperative complication rates in ECS compared to elective caesarean sections. This is consistent with our findings, where ECS due to previous scars and prolonged labor likely contributed to increased maternal morbidity. In Sweden, A. Karlström et al. [9] identified higher maternal complication rates in both elective and emergency caesarean sections compared to vaginal births. This comparison highlights the inherent risks associated with caesarean deliveries, emphasizing the importance of minimizing unnecessary caesarean sections through improved clinical management. Sian McDonnell and Edwin Chandrarahan [10] in London found significant maternal and fetal complications associated with ECS following failed

instrumental delivery. The trauma rates reported in their study mirror the complications arising from prolonged labor and malpresentation in our cohort, reinforcing the need for careful management of labor to reduce ECS rates. Lastly, Hillemanns et al. [11] in Germany demonstrated that achieving a decision-to-delivery interval under 30 minutes in ECS does not adversely affect maternal or neonatal outcomes. This finding supports the critical role of timely interventions in ECS to optimize maternal and fetal health outcomes, relevant to our study's context in Sudan. The findings from Bashair Teaching Hospital reflect a significant burden of previous caesarean scars, prolonged labor, and malpresentation as primary indications for ECS. These results are consistent with studies from other countries, indicating common obstetric challenges globally. The high rates of previous scars necessitate strategies to promote vaginal birth after caesarean (VBAC) where appropriate, and to minimize unnecessary primary caesareans. Furthermore, the comparison highlights the importance of addressing obesity as a predictor of ECS, as noted by Adam et al. [2]. Implementing targeted interventions to manage obesity and improve antenatal care could potentially reduce ECS rates and associated complications. The implications of these findings extend to the need for enhanced clinical training, adequate healthcare resources, and timely interventions to manage labor complications effectively. Ensuring the availability of skilled healthcare personnel and necessary equipment, as suggested by Pramod et al. [3], is crucial for improving maternal and neonatal outcomes. The study revealed that a significant majority of women (87.9%) were discharged in good health post-surgery. However, a subset of women experienced complications, with 11.3% developing issues such as bleeding (5.6%), thromboembolism (3.2%), and postoperative pain (6.5%). ICU admissions were relatively rare, at 1.6%, and 15.3% of women required blood transfusions. These findings provide valuable insights into the maternal outcomes associated with ECS and are comparable with results from other regions. In Sudan, Adam et al. [2] assessed maternal and fetal outcomes of emergency caesarean deliveries at Khartoum Hospital. They reported maternal complications including significant bleeding, though specific percentages were not provided. The requirement for blood transfusions and ICU admissions aligns with the findings from Bashair Teaching Hospital, indicating a consistent pattern of postoperative maternal care needs in Sudan. In Nepal, Pramod et al. [3] found that maternal complications following ECS included a 63 significant need for neonatal resuscitation and ICU admissions for newborns, though maternal ICU admissions were not specifically detailed. This suggests a broader issue of maternal and neonatal health requiring intensive care post-ECS. In India, Erika et al. [4] identified that maternal complications post ECS often involved infections and significant bleeding, which required intervention. The study did not specify the exact rates of complications, but the necessity for blood transfusions and the prevalence of bleeding complications resonate with the findings at Bashair Teaching Hospital. Gedefaw et al. [5] in Ethiopia reported maternal complications include febrile morbidity, surgical site infections, and severe anemia post-ECS. The need for blood transfusions due to severe anemia was noted,



which is consistent with the 15.3% transfusion rate observed in our study. Additionally, the occurrence of thromboembolism and postoperative pain reported in our study reflects the broader spectrum of maternal complications seen in Ethiopia. Ayano et al. [6] also conducted a study in Ethiopia and found that the most common maternal complications post-ECS included febrile morbidity and surgical site infections. Although specific rates for thromboembolism and postoperative pain were not provided, these complications are common in ECS and align with our findings. In China, Xiao-Jing Yang et al. [7] found that maternal complications post-ECS were significantly higher compared to elective caesarean sections. Common complications included infections, significant bleeding, and thromboembolism. The higher rates of complications in ECS compared to elective procedures support the need for vigilant postoperative care, as reflected in the 11.3% complication rate observed in our study. In the Netherlands, Maaikje A.P.C. van Ham et al. [8] reported an intraoperative complication rate of 14.8% and a postoperative morbidity rate of 35.7%, which included bleeding, fever and infections. The relatively high rates of bleeding and the need for blood transfusions in our study are consistent with these findings, indicating similar risks associated with ECS. In Sweden, A. Karlström et al. [9] found higher maternal complication rates in ECS compared to elective caesarean sections, including significant bleeding and infections. The need for blood transfusions and the occurrence of thromboembolism and postoperative pain in our study are in line with these higher complication rates. Sian McDonnell and Edwin Chandrarahan [10] in London reported significant maternal morbidity associated with ECS following failed instrumental delivery. The trauma rates and the need for intensive postoperative care in their study underscore the complications observed in our cohort, such as bleeding and thromboembolism. Lastly, Hillemanns et al. [11] in Germany demonstrated that timely interventions in ECS could mitigate adverse outcomes. However, complications such as significant bleeding and the need for blood transfusions were prevalent, which aligns with our findings at Bashair Teaching Hospital. The findings from Bashair Teaching Hospital indicate generally positive maternal outcomes post-ECS, with a majority of women discharged in good health. However, the complications observed, including bleeding, thromboembolism, and postoperative pain, highlight the need for comprehensive postoperative care. The relatively low rates of ICU admissions suggest that most complications were manageable without intensive care, but the significant percentage requiring blood transfusions underscores the importance of having adequate blood supplies and effective hemorrhage management protocols in place. The comparison with other studies reveals a consistent pattern of maternal complications post-ECS, such as significant bleeding and infections, across different regions. These similarities emphasize the universal nature of ECS-related complications and the need for standardized care protocols to manage these risks effectively. Addressing obesity, as noted by Adam et al. [2], and improving antenatal care can potentially reduce the incidence of ECS and its associated complications. Furthermore, ensuring the availability of skilled healthcare personnel, as suggested by Pramod et al. [3], is crucial for improving

maternal outcomes. The study showed that a majority of the newborns (73.4%) had average birth weights, while 20.2% were classified as low birth weight and 6.5% as large babies. Most were born at term (81.4%), with a smaller proportion being preterm (8.9%) and postdate (9.7%). The Apgar scores revealed concerning trends at 5 and 10 minutes, with 52.4% scoring 4-6 and 16.1% scoring 0-3 at 5 minutes, and 71.8% scoring 4-6 and 20.2% scoring 0-3 at 10 minutes. Despite these challenges, 83.9% of newborns were alive and well post-delivery, though 12.9% developed complications, and there were 4 stillbirths (3.2%). Of the stillbirths, 50% were fresh, and 50% were macerated. Common neonatal complications included respiratory distress syndrome (50.0%) and meconium aspiration syndrome (25.0%), with 13.7% requiring NICU admission. In Sudan, Adam et al. [2] reported that neonatal outcomes of emergency caesarean deliveries were influenced by multiple factors, including prematurity and low birth weight. Their findings indicated 66 that prematurity and related complications were significant contributors to neonatal morbidity and mortality, which aligns with our observation of 8.9% preterm births and the subsequent complications. In Nepal, Pramod et al. [3] found that 80.5% of babies delivered via ECS had normal birth weights, similar to our finding of 73.4%. However, they reported lower Apgar scores at 1 minute, with significant proportions requiring neonatal resuscitation, which is consistent with our study's Apgar scores at 5 and 10 minutes indicating substantial neonatal distress. The necessity for NICU admissions was also comparable, reflecting similar challenges in neonatal care. Erika et al. [4] in India identified that fetal distress and low Apgar scores were prevalent among newborns delivered via ECS. Their study noted significant rates of neonatal complications, such as respiratory distress syndrome, mirroring our findings where 50.0% of neonates experienced respiratory distress. This highlights a consistent trend of respiratory issues in newborns delivered via ECS. Gedefaw et al. [5] in Ethiopia reported common neonatal complications such as low Apgar scores, perinatal asphyxia, and neonatal sepsis. Their findings of low Apgar scores at 1 and 5 minutes resonate with our study's results, where a considerable number of neonates scored between 4-6 at 5 and 10 minutes, indicating distress and the need for intensive care. Ayano et al. [6] also conducted a study in Ethiopia, showing that neonatal complications were primarily due to perinatal asphyxia and meconium aspiration syndrome. This aligns with our findings of 25.0% of neonates experiencing meconium aspiration syndrome and a significant number requiring NICU admission. Their observation of neonatal outcomes emphasizes the critical need for effective management of respiratory complications in ECS. In China, XiaoJing Yang et al. [7] found higher rates of neonatal complications in ECS compared to elective caesarean sections. The common complications included respiratory distress and low Apgar scores, which are consistent with our study's findings. The need for NICU admissions due to severe neonatal distress further supports the necessity of specialized neonatal care post-ECS. In Netherlands, Maaikje A.P.C. van Ham et al. [8] reported higher neonatal morbidity rates in emergency caesarean sections, with significant numbers of neonates requiring intensive care due to low Apgar scores and respiratory complications. These findings

are in line with our observations of neonatal distress and the high rate of NICU admissions. In Sweden, A. Karlström et al. [9] identified increased neonatal morbidity in ECS, with common complications including respiratory issues and low Apgar scores. The need for intensive neonatal care observed in their study aligns with our findings, underscoring the risks associated with ECS for neonatal health. Sian McDonnell and Edwin Chandrachud [10] in London highlighted the high rates of neonatal morbidity following failed instrumental deliveries leading to ECS. The significant trauma and subsequent complications, including respiratory distress, were similar to the challenges observed in our study. Lastly, Hillemanns et al. [11] in Germany demonstrated that prompt ECS interventions could mitigate some adverse neonatal outcomes. However, they noted that neonatal complications, such as respiratory distress and low Apgar scores, remained prevalent, reflecting the persistent risks associated with ECS. The findings from Bashair Teaching Hospital highlight several critical neonatal outcomes associated with ECS. The high rates of average birth weights and term deliveries are positive indicators. However, the substantial proportions of neonates with low Apgar scores at 5 and 10 minutes, the need for NICU admissions, and common complications like respiratory distress syndrome and meconium aspiration syndrome underscore the significant risks involved. These results are consistent with findings from other regions, indicating that neonatal complications such as respiratory distress and low Apgar scores are common challenges following ECS. Addressing these issues requires enhanced neonatal care protocols, adequate NICU facilities, and timely interventions to manage neonatal distress effectively. Implementing evidence-based practices for neonatal resuscitation and respiratory management can help improve outcomes. Moreover, ensuring that healthcare facilities are equipped with the necessary resources and trained personnel is crucial for optimizing neonatal health post-ECS.

## V. CONCLUSION

Beside specialist is needed to reduce maternal morbidity related to emergency cesarean section. Delayed decision delivery interval, low birth weight, meconium stained liquor and lack of good neonatal equipment facility are associated with poor neonatal outcome.

## RECOMMENDATIONS:

Enhanced prenatal care should be provided to reduce the incidence of emergency cesarean sections by addressing and managing comorbidities and pregnancy complications early.

Regular antenatal visits should be encouraged and facilitated for all pregnant women to monitor and mitigate potential risks that may lead to emergency cesarean sections.

Increased education and awareness programs should be implemented to inform pregnant women about the importance of regular antenatal care and the potential risks associated with emergency cesarean sections.

Adequate postnatal support should be ensured to monitor and manage complications in both mothers and newborns following emergency cesarean sections.

Specialized training for healthcare providers in managing emergency cesarean sections and associated complications should be provided to improve maternal and neonatal outcomes.

Access to intensive care units and neonatal intensive care units should be expanded to accommodate the needs of mothers and newborns requiring critical care post-surgery.

Blood transfusion services and protocols should be strengthened to manage the high incidence of postpartum hemorrhage associated with emergency cesarean sections.

Further research should be conducted to identify additional risk factors and effective interventions for improving fetomaternal outcomes in emergency cesarean sections.

(You may need to add a section on Acknowledgement)

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