

# Prevalence, Indications and Morbidity of Caesarean Sections in a Referral Hospital of the Health Voucher Program: The Case of Garoua Regional Hospital in the Northern Region of Cameroon

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## Abstract

Caesarean section (CS) is a surgical procedure performed to remove a fetus from the mother's uterus through an incision on the abdominal wall, then on the uterine wall. The indications of CS vary not only between countries, but also from one hospital to another and from one team to another within the same hospital. Despite advances in asepsis and anesthesia/resuscitation techniques, there are still complications of varying severity inherent to the gravid-puerperal state on one hand and the techniques used on the other, irrespective of the operative indication. Thus, the present study was carried out with the objectives of determining the prevalence, identifying the indications, and evaluating the morbidity linked to caesarean sections in our environment. Cameroon has also set up a health voucher program in its northern region, aimed at reducing maternal and fetus morbidity and mortality. The program aims to improve financial access in antenatal care and deliveries, including caesarean sections, in this low-income region of the country. We conducted a

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descriptive cross-sectional study with retrospective data collection, from February 1, 2022, to May 31, 2022. We included all women who gave birth by caesarean section. In our study series, out of 905 parturient admissions into the Department of Obstetrics and Gynecology, 226 were caesarian cases. The overall frequency of CS during our study period was 25%. Fetal indications were dominated by cephalopelvic disproportion and non-reassuring fetal heart in 17.3% and 13.7% of cases respectively. Intraoperative complications were dominated by hemorrhage (15.5%). In our study, we noted an 11.1% of prevalence perinatal mortality. Cameroon is a low-income country with limited financial resources, especially in the Northern region. The health voucher program has improved financial access to caesarean sections for parturient in northern Cameroon, and consequently to emergency obstetric and neonatal care.

## Keywords

Caesarean Section, Health Voucher, Cephalon-Pelvic Disproportion, Hemorrhage

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## 1. Introduction

Caesarean section (CS) is a surgical procedure performed to remove a fetus from the mother's uterus through an incision on the abdominal wall, then on the uterine wall. It is an old obstetrical procedure whose origins are controversial, and which has undergone several innovations over the years [1]. Worldwide, caesarean section rates have risen in recent decades. According to recent estimates of over 150 countries, 21% of all births occur through caesarean section, with averages ranging from 1% to 58% depending on the country. The World Health Organization (WHO) estimates that the global caesarean section rate has almost tripled in a quarter of a century [2]. The indications of CS vary not only between countries, but also from one hospital to another and from one team to another within the same hospital [3]. The procedure is the result of an intellectual approach specific to each practitioner, given the limited internationally adopted consensus. The indications for caesarean section have evolved considerably, and this evolution is not yet complete.

Despite advances in asepsis and anesthesia/resuscitation technics, there are still complications of varying severity inherent to the gravid-puerperal state on one hand [4] and the surgical technics used on the other, irrespective of the operative indication [5]. That was our motivation for conducting this survey.

As far as we know, there are very few up-to-date studies on the prevalence and indications of caesarean section in Cameroon, especially in the northern region. Thus, the present study was carried out with the objectives of determining the prevalence, and identifying the indications and morbidity linked to caesarean sections in our environment.

Cameroon has also set up a health voucher program in its northern region, aimed at reducing maternal morbidity and mortality. The program aims to improve financial access to CS in this low-income region of the country by subsidizing pregnancy care and deliveries, including caesarean sections.

## **2. Materials and Method**

### **2.1. Study Design**

We conducted a descriptive cross-sectional study with retrospective data collection.

### **2.2. Site Justification**

The town of Garoua was chosen because of the cultural and social values in northern Cameroon which are in favor of fertility, the presence of subsidy programs for the fight against maternal and perinatal mortality. It also has a CE-mONC regional hospital, which is the referral center for the North. Our study was carried out in the department of Obstetrics and Gynecology of the Garoua Regional Hospital (GRH).

### **2.3. Study Period**

The study ran from February 1, 2022, to May 31, 2022.

### **2.4. Study Population**

#### **Target population**

All women admitted in the labor ward and who have given birth.

#### **Source population**

The population of our study will consist of all women who gave birth by caesarean section in the department of Obstetrics and Gynecology of the Garoua regional hospital.

#### **Inclusion criteria**

All women who gave birth by caesarean section were included in the study.

#### **Exclusion criteria**

All files with incomplete information were excluded, as well as all women who had undergone caesarean section in other health facilities but were managed at the Garoua Regional Hospital.

### **2.5. Sampling Method**

We used a non-probabilistic sampling, and our sample size was exhaustive, meeting the selection criteria during the study period, that is, 226 cases included in our study. We collected data on pre-established questionnaire, by using patient files, delivery room registers and operative room registers.

### **2.6. Variables**

We evaluated following variables: caesarian delivery, age, religion, education, marital status, parity, occupation, caesarian indications, maternal complications,

fetal complications, history of caesarean section, term of pregnancy.

## 2.7. Materials

Data collection sheets, medical records, computer equipment including a laptop with CSpro and SPSS software, Microsoft Word and Excel, cell phone, internet connection tools (modem). Office equipment: A4 paper, ballpoint pens, pencils, erasers.

## 2.8. Data Analysis

The data collected and recorded on the survey form were then entered and analyzed using CSpro-7.3, SPSS 26.0, Microsoft EXCEL and Word version 2016. The results of the study are presented in tables and figures; expressed as proportions and numbers for categorical variables. Quantitative variables are expressed as means with standard deviation.

The findings of the study are classified by quantitative and qualitative variables, which are represented in the form of figures and tables.

## 3. Results

### 3.1. Participant Recruitment

In our study series, out of 905 parturient admissions into the department of Obstetrics and Gynecology and during the period from February 1, 2022, to May 31, 2022, we recorded 226 cesarean sections which were included in our study (Figure 1).

### 3.2. Prevalence of Caesarean Sections during the Study Period

The overall frequency during our study period was 25%. A monthly study of caesarean section frequency reveals that the highest rate was observed in March, with 26.5% of cases, and the lowest rate in February and May, with 24.3% of cases respectively (Figure 2).

### 3.3. Sociodemographic Characteristics of Pregnant Women

The mean age of patients operated on was  $25.93 \pm 6.36$  years, with extremes of

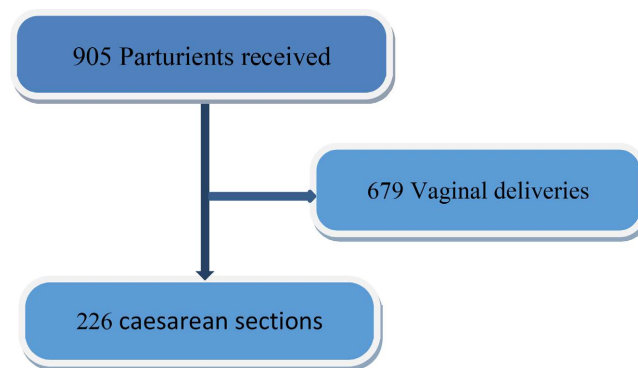


Figure 1. Recruitment flow chart.

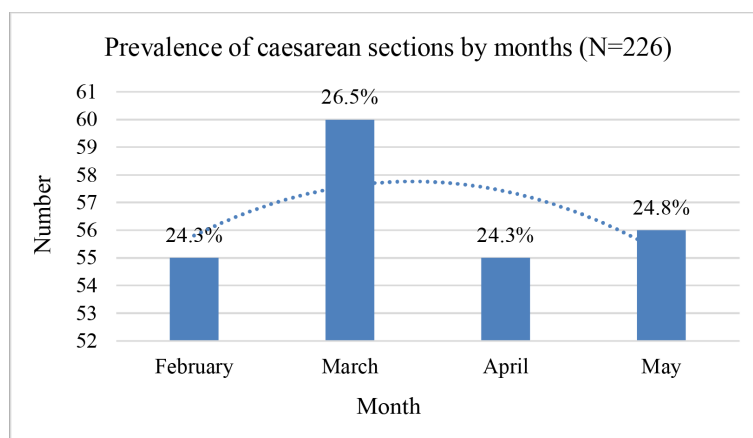
14 and 43 years. Most of the women were aged between 20 and 29 years (49.6%), married (83.2%), muslims (60.2%), living in urban areas (76.5%). The majority had primary education (41.2%) and were housewives (71.7%) (**Table 1**).

### 3.4. Clinical Aspects Mode and Reason for Admission

Most patients were referred from a health facility (82.7%). Lumbopelvic labor—like pains was the most common chief complaint (34.1%) (**Table 2**).

### 3.5. Obstetrical History

Primigravida and nulliparity were most common in 37.6% and 42.5% of cases respectively (**Table 3**).



**Figure 2.** Prevalence of caesarean section by month.

**Table 1.** Distribution of study population by socio-demographic characteristics.

Variables	Number (N = 226)	Frequency (%)
<b>Age groups (years)</b>		
<20	42	18.6
[20 - 30[	112	49.6
[30 - 40[	69	30.5
[40 - 50[	3	1.3
<b>Marital status</b>		
Single	28	12.4
Married	188	83.2
Divorced	10	4.4
<b>Religion</b>		
Christian	90	39.8
Muslim	136	60.2
<b>Residence</b>		
Urban	173	76.5

**Continued**

Rural	53	23.5
<b>Level of education</b>		
None	83	36.7
Primary	93	41.2
Secondary	29	12.8
Higher	21	9.3
<b>Profession</b>		
Business	20	8.8
Housewife	162	71.7
Civil servant	19	8.4
Student	8	3.5
Pupil	9	4.0
None	8	3.5

**Table 2.** Distribution by mode of admission and reason for consultation

Variables	Number (N = 226)	Frequency (%)
<b>Mode of admission</b>		
Referred	187	82.7
Came by herself	39	17.3
<b>Reason for consultation</b>		
Lumbopelvic pains	77	34.1
Amniotic fluid leakage	19	8.4
Per vaginal bleeding	23	10.2
Elective caesarian	32	14.2
Others	75	33.1

**Table 3.** Distribution by gravidity and parity.

Variables	Number (N = 226)	Frequency (%)
<b>Gravidity</b>		
Primigravida (G1)	85	37.6
Paucigravida (G2 - G3)	74	32.7
Multigravida (G4 - G6)	45	19.9
Grand multigravida (>G6)	22	9.7
<b>Parity</b>		
Nulliparity (P0)	96	42.5
Primiparity (P1)	38	16.8
Pauciparity (P2 - P3)	51	22.6
Multiparity (P4 - P6)	34	15.0
Grand multiparity (>P6)	7	3.1

### 3.6. Medical and Surgical History

High blood pressure was found in 5.3% of patients undergoing surgery. 21.2% of patients had undergone a previous caesarean section and 2.2% a laparotomy indicated for ectopic pregnancy (**Table 4**).

### 3.7. Pregnancy Follow-Up

The average number of prenatal consultations was  $3.99 \pm 1.74$ , with a minimum of 0 and a maximum of 8. Most of the women who underwent surgery had average ANC (64.6%), and 76.1% of them were managed by the health voucher program. Pregnancy follow-up was carried out in health centers (74.8%), largely by midwives (35.8%) (**Table 5**).

### 3.8. Clinical Signs

Most patients were at term (78.3%), and 19% had elevated blood pressure. Fetal heart rate anomalies were observed in 12.8% of admissions. Membranes were ruptured in 31%, and pelvic quality was abnormal in 4.9% of cases. The presentation was cephalic in most cases (81.0%) (**Table 6**).

### 3.9. Caesarean Section Indications

#### Caesarean section procedure

Caesarean sections were performed as an emergency procedure in the majority of cases (91.2%). The majority of procedures were performed under general anesthesia (85.8%). Close to half of caesarean sections were performed by gynecologists (47.3%). Pfannenstiel incision was performed in over 50% of patients, meanwhile transverse hysterotomy was done in all cases operated (100%) (**Table 7**).

The average procedure duration was  $44.98 \pm 14$  min, with a minimum of 25 minutes and a maximum of 90 minutes. The procedures most associated with

**Table 4.** Distribution according to medical and surgical history.

Variables	Number (N = 226)	Frequency (%)
<b>Medical</b>		
None	211	93.4
High blood pressure	12	5.3
Diabetes	1	0.4
Asthma	1	0.4
Sickle cell anemia	1	0.4
<b>Surgical</b>		
Previous caesarean	48	21.2
Laparotomy (Ectopic pregnancy)	5	2.2
None	173	76.5

**Table 5.** Pregnancy follow-up distribution.

Variables	Number (N = 226)	Frequency (%)
<b>Quality of ANC</b>		
Poor (0 - 3)	40	17.7
Average (4 - 5)	146	64.6
Good (6 - 8)	40	17.7
<b>Health Check</b>		
Yes	172	76.1
No	54	23.9
<b>Place of ANC</b>		
Health center	169	74.8
District medical center	21	9.3
Regional hospital	18	8.0
Others	18	8.0
<b>ANC provider</b>		
Obstetrician-Gynecologist	19	8.4
General practitioner	16	7.1
Nurse	55	24.3
Midwife	81	35.8
Midwife/caregiver	55	24.3

**Table 6.** Distribution according to clinical.

Variables	Number (N = 226)	Frequency (%)
<b>Gestational age</b>		
Pre-term	25	11.1
At term	177	78.3
Post term	24	10.6
<b>Blood pressure</b>		
Normal	183	81.0
Elevated	43	19.0
<b>Fetal heart rate</b>		
Normal	181	80.1
Abnormal	21	12.8
Absent	16	7.1
<b>Presentation</b>		
Cephalic	183	81.0



**Continued**

Breech	26	11.5
Transverse	10	4.4
Variable	7	3.1
<b>Membrane state</b>		
Intact	156	69
Ruptured	70	31.0
Pelvis	55	24.3
Normal	215	95.1
Abnormal	11	4.9

**Table 7.** Distribution by type of caesarean section, anesthesia, provider, and incision type.

Variables	Number (N = 226)	Frequency (%)
<b>Type of cesarean section</b>		
Emergency	206	91.2
Elective	20	8.8
<b>Type of anesthesia</b>		
General	194	85.8
Spinal anesthesia	32	14.2
<b>Provider</b>		
Gynecologist	107	47.3
General Practitioner	30	13.3
Surgeon	89	39.4
<b>Type of skin incision</b>		
Pfannenstiel	116	51.3
Median	61	27.0
Joël Cohen	49	21.7
<b>Type of hysterotomy</b>		
Transverse segmental	226	100.0

caesarean section were bilateral tubal ligation (2.7%), appendectomy (2.7%), emergency obstetric hysterectomy (2.2%) and ovarian cystectomy (1.8%) (**Table 8**).

### 3.10. Main Indications

The main maternal indications for caesarean section were scarred uterus (12.4%), followed by severe pre-eclampsia (11.1%) and pre-uterine rupture syndrome (5.3%). Fetal indications were dominated by cephalopelvic disproportion and non-reassuring fetal heart in 17.3% and 13.7% of cases respectively (**Table 9**).

**Table 8.** Distribution by duration of operation and associated procedures.

Variables	Number (N = 226)	Frequency (%)
<b>Intervention duration</b>		
<30 min	16	7.1
[30 - 60[ min	168	74.3
>60 min	42	18.6
<b>Associated intervention</b>		
Bilateral tubal ligation	6	2.7
Ovarian Cystectomy	4	1.8
<b>Emergency obstetric hysterectomy</b>	5	2.2
Myomectomy	2	0.9
Appendectomy	6	2.7
None	203	89.8

**Table 9.** Distribution by caesarean section indications.

Variables	Number (N = 226)	Frequency (%)
<b>Maternal</b>		
Scarred uterus	28	12.4
Eclampsia	7	3.1
Pre-uterine rupture syndrome	12	5.3
Prolonged premature rupture of membranes	4	1.8
Severe preeclampsia	25	11.1
Stationary labor	4	1.8
<b>Fetal</b>		
Placenta previa	12	5.3
Transverse presentation	4	1.8
Cord prolapse	3	1.3
Fetal malformation	3	1.3
Retention of 2 <sup>nd</sup> Twin	1	0.4
1 <sup>st</sup> Twin transverse/breech	5	2.2
Macrosomia	10	4.4
Abroptio placentae	6	2.7
Cephalopelvic disproportion	39	17.3
Fetal	6	2.7
Placenta previa	31	13.7
<i>Others*</i>	26	11.5

*Others\**: Cord prolapse, Post term/Post datism, Induction failure, Convenience...

### 3.11. Operative Complications

#### Maternal prognosis

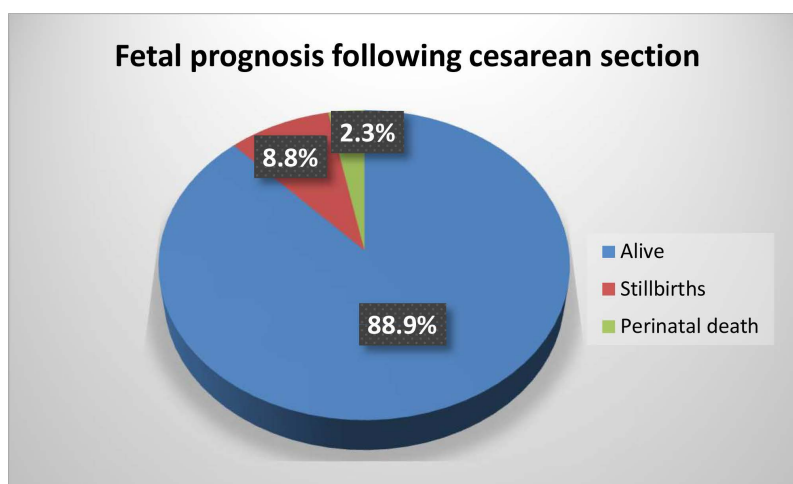
Intraoperative complications were dominated by hemorrhage (15.5%) and bladder lesions (4.9%), while postoperative complications were mainly abdominal wall suppuration (4.4%), endometritis (3.5%), burst abdomen/suppuration (0.9%), thromboembolic disease, and maternal death (0.4% respectively) (**Table 10**).

### 3.12. Fetal Prognosis

In our study, we noted 11.1% perinatal mortality, with 8.8% stillbirths and 2.3% early neonatal death (**Figure 3**).

**Table 10.** Complication distribution.

Variables	Number (N = 226)	Frequency (%)
<b>Intraoperative complications</b>		
Hemorrhage	35	15.5
Bladder injury	11	4.9
Intestinal injury	1	0.4
None	179	79.2
<b>Postoperative complications</b>		
Wall suppuration	10	4.4
Endometritis	8	3.5
Suppuration and evisceration	2	0.9
Burst abdomen	1	0.4
Thromboembolic disease	1	0.4
Maternal death	1	0.4
None	203	89.8



**Figure 3.** Distribution by fetal prognosis at birth.

## 4. Discussion

### 4.1. Prevalence of Caesarean Sections

The prevalence (25%) of caesarean sections at the Garoua Regional Hospital was higher than that recommended by WHO. It was same situation for Bokossa *et al.* [6] in Ivory Coast, which was 31.3%. Essiben *et al.* in 2017 in Yaounde-Cameroon found a prevalence of 29.6% [7]. This prevalence remains relatively high due to the fact that Garoua Regional Hospital receives parturients from other health facilities in the northern region. The health voucher scheme also promotes access to caesarean sections.

### 4.2. Socio-Demographic Characteristics of the Study Population

The mean age of operated patients was  $25.93 \pm 6.36$  years, with extremes ranging from 14 to 43 years. Most were aged between 20 and 29 years (49.6%). Mpogoro *et al.*, [8] in Tanzania in 2014 found a mean age of  $26.8 \pm 5.8$  years with extremes ranging from 14 to 44 years, the most represented age range in their study was 20 to 34 years. These results can be explained by the fact that, at this age, women are at the peak of their reproductive role.

The youngest patients were 14 years and the oldest 43years. These two extremes come as no surprise, as Fouedjio *et al.* [9] in Cameroon in 2021, reported extremes ranging from 14 to 46 years, while Barbut *et al.* [10] in France in 2004 reported extremes from 19 to 45 years. This difference can be explained by the fact that we face maternal health challenges such as early pregnancy and poor access to contraceptive methods, but also by the low level of education in our context.

Most of them were housewives (71.7%). This is probably because the majority of patients had a primary level of education (41.2%) and were illiterate (36.7%), but also because of early marriage in the region. The same observation was made by Teguede *et al.* [11] and several other studies in Mali, who reported that the majority of women operated on by caesarean section were over 90% illiterate. In the other hand, we observed that majority of women was muslims (60.2%), like Mali's authors, because Muslims are mostly represented in this region of the country.

### 4.3. Admission Mode

Most deliveries were referred from a health facility (82.7%). Ouédraogo *et al.* [12] in Burkina Faso found a 91.9% referral rate. The hypothesis that would justify this high referral rate is the level of attainment of the health voucher program to parturients in this region. In addition, Garoua Regional Hospital is a referral hospital with qualified staff and technical equipment for performing caesarean sections.

### 4.4. Obstetrical History

Primigravida and nulliparity were most represented in 37.6% and 42.5% of cases.

This confirms the data in the literature review which shows that primigravidas have an increased risk of caesarean delivery, as they have an untested pelvis.

Since our study population was dominated by nulliparous, we have encountered few patients with a scarred uterus, 21.2%, contrarily to Guindo and Keita who find out rate of 65.21% and 67.3% in Mali [13].

#### 4.5. Clinical Aspects

The average number of prenatal consultations was  $3.99 \pm 1.74$ , with a minimum of 0 and a maximum of 8. Most of the women who underwent surgery had normal prenatal consultations (64.6%) due to health voucher program, and 76.1% of them were managed by this program.

Pregnancies were followed up in health centers (74.8%) by qualified personnel like midwives (35.8%). In Yaoundé, on the same vein, Essiben *et al.* [7] found a follow-up rate of 93.7%, amongst which 62.6% of which were done by obstetrician-gynecologists. However, there is a shortage of obstetrician-gynecologists in Cameroon northern region.

Few patients present ruptured membranes in 31%, less than what Coulibaly *et al.* [14] reported 47% of cases of ruptured membranes.

#### 4.6. Management

Indications for caesarean section were dominated by cephalopelvic disproportion and fetal distress in 17.3% and 13.7% of cases respectively. Nkwabong *et al.* [15] in Cameroon found that cephalopelvic disproportion was the most frequent indication in 24.0% of cases. These results can be explained by the fact that most of the patients were primigravida and nulliparous, and therefore had pelvis that had never benefited from a trial of labor.

The health voucher program subsidizes caesarean sections, and imposes referral system. So, Caesarean sections were emergencies in the majority of cases (91.2%), similar to the 96.4% observed in Burkina Faso by Ouédraogo *et al.* [12]. However, our prevalence remains higher than those observed in France by Toulon and Palot [16], who reported emergency caesarean section rates of 61.0% and 64.0% respectively.

Most operations were performed under general anesthesia (85.8%). This is due to the observation that the surgical kits in the health voucher program are made up of general anesthesia drugs and materials.

#### 4.7. Complications

Intraoperative complications were dominated by hemorrhage (15.5%) and bladder lesions (4.9%), mainly due to the urgent nature of Caesarean sections.

Post-operative complications were infectious in 8.8%, represented by wall sepsis (4.4%), endometritis (3.5%) and evisceration/suppuration (0.9%). Kemfang *et al.* [17] in Yaounde-Cameroon reported a frequency of infectious complications in 7.6% of cases. This could be explained by the non-observance of

antibiotic prophylaxis by some surgical patients due to financial limitations, especially as the majority were housewives (71.7%) with no source of income since, the health voucher program does not provide postoperative antibiotics for caesarean patients.

Maternal death was observed in 0.4% of cases. This is lower than the rate observed by Cissé *et al.* [18] in Dakar, which was 0.8%. This relatively low rate is justified by the fact that most caesarean sections are covered by the health subsidy program (76.1%), but also by the permanent mobilization and quality of the high-performance staff at the Garoua Regional Hospital.

In our study, perinatal mortality was 11.1%, with 8.8% stillbirths and 3.1% early neonatal death. This could be linked to fetal distress being a significant indication for emergency obstetric care in our series (13.7%), increasing the risk of perinatal asphyxia and consequently death. This high mortality rate can also be explained by the difficulties associated with inadequate neonatal care, notably the lack of medical equipment and consumables.

## 5. Limitations of Our Study

Some files could not be found, and others were unusable, this could influence the representability of the population.

## 6. Conclusion

Cameroon is a low-income country with limited resources, especially in the Northern region. The health voucher program has improved financial access to caesarean sections for parturients in northern Cameroon, and consequently to emergency obstetric and neonatal care. The prevalence of caesarean section is relatively high at Garoua regional hospital, with a frequency of 25%. Most of those operated on were aged between 20 and 29, with a primary level of education (41.2%), primigravida and nulliparity in 37.6% and 42.5% of cases respectively. Caesarean sections were performed urgently in the majority of cases (91.2%). The main indications were cephalopelvic disproportion (17.3%) and acute fetal distress (13.7%). Infectious complications accounted for 8.8%, and maternal death was rare (0.4%).

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## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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