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Prevalence and Indications for Cesarean Section in the Mabakanga Health Area (Beni Health Zone, North Kivu, DRC)

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ABSTRACT

Title: Prevalence and Indications for Cesarean Section in the Mabakanga Health Area (Beni Health Zone, North Kivu, Democratic Republic of the Congo).

Introduction: The use of cesarean sections is increasing worldwide, including in sub-Saharan African cities, while access remains insufficient in rural areas. This study aimed to determine the prevalence and indications for cesarean section in the Mabakanga health area, Beni health zone.

Methods: A retrospective descriptive cross-sectional study was conducted in six health facilities in the Mabakanga health area, covering deliveries from January to June 2024. Prevalence was calculated from delivery records. Characteristics and indications were extracted from the records of 446 women who delivered by cesarean section and classified according to the Robson classification. Proportions are reported with 95% confidence intervals (CI), and facilities were compared using crude odds ratios (OR).

Results: Of 879 deliveries, 514 were by cesarean section, representing a prevalence of 58.5% (95% CI: 55.2–61.7). This prevalence ranged from 52.4% to 84.6% across the five facilities performing cesarean sections (p = 0.003) and was higher at CM Gracia than at CH Carl-Becker (OR = 3.81; 95% CI: 1.57–9.27). Most women were aged 20–35 years (70.2%). Cesarean sections were recorded as elective in 93.3% of cases. The main indications were a narrow pelvis (26.9%), cephalopelvic disproportion or a large fetus (24.2%), arrest of dilation (12.3%), brow presentation (11.0%), and a previous cesarean section (10.5%). Robson groups 8 (27.8%), 5 (19.5%), and 1 (17.9%) were the most common; the large number in group 8 likely reflects a classification error.

Conclusion: The prevalence of cesarean section in the Mabakanga health area is very high and is dominated by clinically diagnosed mechanical dystocia. Audits of indications, systematic use of the partograph, and recording of all women who give birth according to the Robson classification are needed.

Keywords: cesarean section, prevalence, indications, Robson classification, Beni, Democratic Republic of the Congo.

1. INTRODUCTION

Cesarean section saves lives when indicated, but it exposes both mother and child to short- and long-term risks when performed unnecessarily. Since 1985, the international community has considered a cesarean section rate of 10 to 15 percent to be ideal. The World Health Organization (WHO) states that, at the population level, once the cesarean section rate exceeds 10%, further increases in the rate are no longer associated with a decline in maternal and neonatal mortality (World Health Organization, 2015). Globally, 21.1% of births occurred via cesarean section during the 2010–2018 period, and this proportion could reach 28.5% by 2030. Sub-Saharan Africa had the lowest rate (5%) (Betran et al., 2021).

This low regional rate masks significant disparities. In South Kivu, 18.6% of births in health facilities were by cesarean section, while the estimated rate for the general population was only 6.9% (Mulinganya et al., 2020). In Lubumbashi, the cesarean section rate in five hospitals was 10.65% between 2009 and 2013 (Kinenkinda et al., 2017). To compare practices across facilities and identify the groups of women who contribute most to the cesarean section rate, the WHO recommends Robson's classification into ten groups (World Health Organization, 2015; World Health Organization, 2017).

In the Beni health zone in North Kivu, the Central Office of the Beni Health Zone reported an overall cesarean section rate of 46.2% for the year 2023 in facilities that perform cesarean sections, according to the 2023 annual report of the Central Office of the Beni Health Zone. The indications for these cesarean sections had not been documented in the Mabakanga health area, which includes several public and private facilities in the city.

The objective of this study was to determine the prevalence and indications for cesarean section in the Mabakanga health area, within the Beni health zone.

2. METHODS

2.1 Study Setting

The study was conducted in the Mabakanga health area, located in the Matonge neighborhood, Mulekera commune, within the Beni health zone (city of Beni, North Kivu Province, DRC). Six facilities provide childbirth services there: the Carl-Becker Hospital Center (CH), La Brèche Clinic, La Famille Medical Center (CM), Gracia Medical Center (CM), Amani, and Le Rocher Clinic—all of which are private and faith-based facilities with on-site physicians and ultrasound services.

2.2 Study Type and Time Period

This is a descriptive cross-sectional study with retrospective data collection, focusing on deliveries that took place from January 1 to June 30, 2024.

2.3 Population, Sample, and Criteria

The cesarean section prevalence was calculated using the delivery records from the six facilities, based on all 879 deliveries during the study period. For the description of patients and indications, all records of women who underwent cesarean sections during the study period were eligible (exhaustive recruitment, without sample size calculation). Included were women who gave birth via cesarean section at one of the six facilities during the study period and whose records were available and properly completed. In total, 446 of the 514 records of women who underwent cesarean sections (86.8%) were analyzed

2.4 Data Collection and Variables

Data were collected from birth records, surgical records, and patient charts using a checklist (data collection forms in June, July, and August 2024). The variables included sociodemographic characteristics (age, marital status, occupation, educational level), , medical, surgical, and obstetric history (gestational age, parity, live births, abortions,

prenatal visits, previous cesarean sections, and number of uterine scars), clinical examination prior to the procedure (blood pressure, fundal height, pelvic examination, level and type of presentation, fetal heart rate, fetal movements, status of the amniotic sac and amniotic fluid, use of the partogram, and prior interventions), and the cesarean section itself (timing of the decision, degree of urgency, indications, and whether the indication was absolute or relative). Each cesarean section was classified into one of the ten Robson groups, based on parity, number of fetuses, history of cesarean section, mode of labor onset, gestational age, and presentation (World Health Organization, 2017).

2.5 Statistical Analysis

The data were entered into Microsoft Excel and analyzed using SPSS version 20. Qualitative variables were described in terms of frequencies and percentages. The 95% confidence intervals (95% CI) for proportions were calculated using the Wilson method. The prevalence of cesarean section was compared across facilities using Pearson's chi-square test, or Fisher's exact test when the expected frequency was less than 5. The crude odds ratios for cesarean section for each facility relative to Carl-Becker Hospital the busiest facility were calculated with their 95% CI using the Woolf method. For each Robson group, the relative contribution (the group's share of cesarean sections) was calculated. A p-value less than 0.05 was considered statistically significant.

2.6 Ethical Considerations

The study was authorized by the health authorities of the Beni health zone and by the administrators of the facilities involved. As this was a retrospective chart review, no patients were contacted. The data were anonymized, and their confidentiality was preserved.

3. RESULTS

3.1 Prevalence of Cesarean Section

Of the 879 deliveries that took place during the study period, 514 were by cesarean section, representing a prevalence of 58.5% (95% CI: 55.2–61.7). The prevalence differed significantly among the five facilities that performed cesarean sections (p = 0.003). It reached 84.6% at CM Gracia, where the cesarean section rate was nearly four times higher than at CH Carl-Becker (OR = 3.81; 95% CI: 1.57–9.27); the differences compared with Clinique La Brèche (OR = 0.76; 95% CI: 0.56–1.04), CM La Famille (OR = 1.16; 95% CI: 0.71–1.88), and Amani (OR = 1.39; 95% CI: 0.47–4.12) were not statistically significant. Clinique Le Rocher performed no cesarean sections out of 4 deliveries (Table 1).

Table 1: Prevalence of cesarean section by facility, Mabakanga health zone, January–June 2024 (N = 879 deliveries)

Structure	Accouchements	Césariennes	% (IC 95 %)	OR brut (IC 95 %)	p
CH Carl-Becker	491	290	59,1 (54,7–63,3)	1 (référence)	
Clinique La Brèche	250	131	52,4 (46,2–58,5)	0,76 (0,56–1,04)	0,083
CM La Famille	80	50	62,5 (51,5–72,3)	1,16 (0,71–1,88)	0,561
CM Gracia	39	33	84,6 (70,3–92,8)	3,81 (1,57–9,27)	0,002
Amani	15	10	66,7 (41,7–84,8)	1,39 (0,47–4,12)	0,555
Clinique Le Rocher	4	0	0,0 (0,0–49,0)	Non estimable	0,029[f]
Total	**879**	**514**	**58,5 (55,2–61,7)**		

95% CI: 95% confidence interval (Wilson's method); OR: crude odds ratio for cesarean section compared to Carl-Becker Hospital, with 95% CI calculated using Woolf's method; p: Pearson's chi-square test, or Fisher's exact test ([f]) when the expected count was less than 5. "Cannot be estimated": a cell in the table is zero. Overall comparison of the five facilities that performed cesarean sections: $\chi^2 = 15.8$; df = 4; p = 0.003.

3.2 Sociodemographic Characteristics

Among the 446 women who underwent cesarean sections and whose records were analyzed, 70.2% (95% CI: 65.8–74.2) were between 20 and 35 years old, and 14.6% were under 20 years old. They were married in 65.2% of cases and were homemakers in 64.3% of cases. Educational level was not reported in 76.0% of the records (Table 2).

Table 2: Sociodemographic Characteristics of Women Who Underwent Cesarean Section (N = 446)

Caractéristique	Effectif	%
Âge		
< 20 ans	65	14,6
20 à 35 ans	313	70,2
> 35 ans	68	15,2
Statut matrimonial		
Mariée	291	65,2
Célibataire	142	31,8
Divorcée, séparée ou veuve	8	1,8
Non renseigné	5	1,1
Profession		
Ménagère	287	64,3
Élève ou étudiante	53	11,9
Salariée	36	8,1
Commerçante	27	6,1
Cultivatrice	17	3,8
Non renseignée	26	5,8
Niveau d'instruction		
Aucun	25	5,6
Primaire	3	0,7
Secondaire	55	12,3
Supérieur	24	5,4
Non renseigné	339	76,0
Total	**446**	**100,0**

3.3 Background

Primiparous women accounted for 34.3% of those who had cesarean sections, and multiparous women for 38.8%. In total, 80.0% (95% CI: 76.1–83.5) had attended at least four prenatal visits. A history of cesarean section was noted in 28.5% of patients (95% CI: 24.5–32.8), while only 25.6% had at least

one documented uterine scar (114 versus 127). Medical history was rare: HIV infection (2.7%) and diabetes (1.1%). The procedure code "cystectomy" was recorded for 95.3% of patients, which is implausible (Table1).

Table1 : Medical, Surgical, and Obstetric History of Women Who Underwent Cesarean Section (N = 446)

Characteristic	Number	%
Medical and surgical history		
cystectomy	425	95.3
HIV infection	12	2.7
Diabetes	5	1.1
Myomectomy	2	0.4
High blood pressure	1	0.2
Vesicovaginal fistula	1	0.2
Managed		
First-calf heifer	155	34.8
Low-lactation	105	23.5
Multi-gesture	149	33.4
Large multi-step	37	8.3
Parity		
First-time mother	153	34.3
Multiparous	105	23.5
Multiparous	173	38.8
High-parity	15	3.4
Number of living children		
None	164	36.8
1 to 3	122	27.4
4 or more	160	35.9
History of abortion		
Yes	164	36.8
No	282	63.2
Prenatal visits		
< 4	89	20.0
≥ 4	357	80.0
History of cesarean section		
Yes	127	28.5
No	319	71.5
Uterine scars		
None	332	74.4
One	97	21.7
Two	10	2.2
Three or more	7	1.6
Total	**446**	**100.0**

3.4 Clinical Findings Prior to Cesarean Section

The fundal height exceeded 35 cm in 88.1% of patients. The pelvis was considered clinically normal in 52.0% of them, generally narrow in 28.0%, and borderline in 20.0%. The presentation was high and mobile in 31.6% of cases and engaged in 5.2% of cases. A partogram had been used for only 36.1% of patients (95% CI: 31.8–40.7). Oxytocics had been administered to 25.6% of patients, and the amniotic sac was ruptured in 13.7% (Table 4).

Table 4: Clinical characteristics of women who underwent cesarean section prior to the procedure (N = 446)

Characteristic	Number	%
Blood pressure before cesarean section		
Normal	427	95.7
Hypotension	10	2.2
Hypertension	9	2.0
Uterine height		
< 35 cm	53	11.9
> 35 cm	393	88.1
Clinical Assessment of the Pelvis		
Normal	232	52.0
Generally narrowed	125	28.0
Limit	89	20.0
Presentation Level		
High and variable	141	31.6
Primed	238	53.4
Fixed	44	9.9
Committed	23	5.2
Fetal presentation		
Vertex	356	79.8
Face (or forehead)	48	10.8
Seat	25	5.6
Transverse	17	3.8
Fetal heart rate (last recorded)		
Normal (120–160 bpm)	414	92.8
Bradycardia (< 120 bpm)	13	2.9
Tachycardia (> 160 bpm)	7	1.6
Irregular	8	1.8
Absent	4	0.9
Active fetal movements		
Present	424	95.1
Absent	22	4.9
Hydatid cyst		
Intact	385	86.3
Broken	61	13.7
Appearance of amniotic fluid		
Intact membranes	385	86.3
Clear	15	3.4
Greenish	40	9.0
Not specified	6	1.3
Meconium in the amniotic fluid		
Yes	34	7.6
No	412	92.4
Use of the partogram		
Yes	161	36.1
No	285	63.9
Intervention prior to cesarean section		
Oxytoics	114	25.6
Soft tissue repair	62	13.9
None	270	60.5
Total	**446**	**100.0**

3.5 Type of Cesarean Section

The decision was made outside of labor for 94.4% of cesarean sections (95% CI: 91.9–96.2), and 93.3% were reported as elective. The indications were considered absolute in 66.6% of cases (Table 5).

Table 5: Timing of the decision, degree of urgency, and nature of the indication for cesarean section (N = 446)

Characteristic	Number	%
Timing of the decision		
Outside of labor	421	94.4
At work	25	5.6
Level of urgency		
Scheduled	416	93.3
Urgent	30	6.7
Nature of the indication		
Absolute	297	66.6
Relative	149	33.4
Total	**446**	**100.0**

3.6 Indications for Cesarean Section

Indications of mechanical dystocia were predominant: narrow pelvis (26.9%; 95% CI: 23.0–31.2), fetal-pelvic disproportion or macrosomia (24.2%; 95% CI: 20.5–28.4), and asymmetric pelvis (0.4%), meaning that at least one of these indications was present in 51.6% of patients when they were not combined. These were followed by stalled dilation (12.3%), breech presentation (11.0%), and a history of cesarean section (10.5%). Acute fetal indications (acute fetal distress: 3.6%; cord prolapse: 1.3%) and hemorrhagic indications (retroplacental hematoma: 2.2%; placenta previa: 0.7%) were rare (Table 6).

Table 6: Indications for Cesarean Sections (N = 446 patients ; 504 indications)

Indication	Number	% of patients (95% CI)
Narrow pelvis	120	26.9 (23.0–31.2)
Fetal-pelvic disproportion or large fetus	108	24.2 (20.5–28.4)
Stalled dilation	55	12.3 (9.6–15.7)
Frontal presentation	49	11.0 (8.4–14.2)
History of cesarean section	47	10.5 (8.0–13.7)
Failure to progress in labor	26	5.8 (4.0–8.4)
Transverse or oblique presentation	17	3.8 (2.4–6.0)
Acute fetal distress	16	3.6 (2.2–5.7)
Breech presentation	11	2.5 (1.4–4.4)
Retroplacental hematoma	10	2.2 (1.2–4.1)
Other absolute indications	9	2.0 (1.1–3.8)
Failure to trigger	8	1.8 (0.9–3.5)
Severe preeclampsia or eclampsia	6	1.3 (0.6–2.9)
Umbilical cord prolapse	6	1.3 (0.6–2.9)
Placenta previa (type III or IV)	3	0.7 (0.2–2.0)
Uterine rupture	3	0.7 (0.2–2.0)
Maternal illness	3	0.7 (0.2–2.0)
Twin pregnancy	3	0.7 (0.2–2.0)
Asymmetrical pelvis	2	0.4 (0.1–1.6)
History of genitourinary fistula	2	0.4 (0.1–1.6)
Total indications cited	**504**	—

3.7 Robson Classification

Group 8 (multiple pregnancies) was the most common (27.8%; 95% CI: 23.8–32.1), followed by Group 5 (multiparous women with a scarred uterus, at term, in cephalic presentation; 19.5%) and Group 1 (nulliparous women at term in spontaneous labor; 17.9%). Groups 1 through 4, which include women at term in cephalic presentation without a scarred uterus, accounted for 35.9% of cesarean sections (Table 7).

Table 7: Distribution of cesarean sections according to the Robson classification (N = 446)

Groupe	Définition	Effectif	Contribution relative, % (IC 95 %)
1	Nullipares, grossesse unique, céphalique, ≥ 37 SA, travail spontané	80	17,9 (14,7–21,8)
2	Nullipares, grossesse unique, céphalique, ≥ 37 SA, travail déclenché ou césarienne avant travail	20	4,5 (2,9–6,8)
3	Multipares sans utérus cicatriciel, grossesse unique, céphalique, ≥ 37 SA, travail spontané	20	4,5 (2,9–6,8)
4	Multipares sans utérus cicatriciel, grossesse unique, céphalique, ≥ 37 SA, travail déclenché ou césarienne avant travail	40	9,0 (6,7–12,0)
5	Multipares avec au moins un utérus cicatriciel, grossesse unique, céphalique, ≥ 37 SA	87	19,5 (16,1–23,4)
6	Nullipares, grossesse unique, présentation du siège	8	1,8 (0,9–3,5)
7	Multipares, grossesse unique, présentation du siège (y compris utérus cicatriciel)	17	3,8 (2,4–6,0)
8	Grossesses multiples (y compris utérus cicatriciel)	124	27,8 (23,8–32,1)
9	Grossesse unique, présentation transverse ou oblique (y compris utérus cicatriciel)	20	4,5 (2,9–6,8)
10	Grossesse unique, céphalique, < 37 SA (y compris utérus cicatriciel)	30	6,7 (4,8–9,4)
Total		**446**	**100,0**

4. DISCUSSION

4.1 Main Findings

More than one in two deliveries ended in a cesarean section in the Mabakanga health district during the first half of 2024, with significant differences among facilities. The indications were dominated by clinically diagnosed mechanical dystocia (narrow pelvis, fetal-pelvic disproportion), and nearly all cesarean sections were reported as elective. According to the Robson classification, groups 5 and 1 contributed significantly to the cesarean section rate; the presence of group 8 likely reflects a classification error.

4.2 Prevalence

The observed prevalence (58.5%) is nearly four times higher than the 15% threshold long considered ideal, and well above the 10% level beyond which no additional benefit on maternal and neonatal mortality has been demonstrated (World Health Organization, 2015). It far exceeds the rates reported in health facilities in South Kivu (18.6%) (Mulinganya et al., 2020), at Walikale Hospital in North Kivu (15.7%) (Bushu et al., 2025), and in hospitals in Lubumbashi (10.65%) (Kinenkinda et al., 2017), as well as the prevalence of 29.55% estimated by an Ethiopian meta-analysis (Gedefaw et al., 2020). It is also higher than the 46.2% rate reported for the entire Beni health zone in 2023.

However, this figure should be interpreted with caution. It represents a hospital rate in an urban health zone equipped with surgical facilities which may receive women referred from other health zones rather than a population-based rate. In South Kivu, the facility-based cesarean section rate (18.6%) corresponded to a population-based rate of only 6.9%, and high-risk women in unstable areas had more limited access to cesarean sections (Mulinganya et al., 2020). Given the security situation in Beni, a significant proportion of women who underwent cesarean sections at Mabakanga may have come from other health zones, thereby inflating the local rate. However, the wide variation between facilities (ranging from 52.4% to 84.6%) suggests that the practices of each facility and not just the patients' profiles influence the decision to perform a cesarean section. Smaller facilities, such as CM Gracia, may primarily admit women who have already been scheduled for a cesarean section; since the status and funding mechanisms of these facilities were not examined, this hypothesis remains to be verified.

4.3 Indications

A narrow pelvis and fetal-pelvic disproportion each accounted for about one-quarter of the indications. In Lubumbashi, fetal-pelvic disproportion (18.6%) was also the leading indication, but a narrow pelvis accounted for only 8.4% of cesarean sections, and acute fetal distress (11.9%) and placenta previa (9.2%) were significantly more common than in Mabakanga (Kinenkinda et al., 2017). In Ethiopia, cephalopelvic disproportion accounted for 18.13% of cesarean sections (Gedefaw et al., 2020). The high proportion of mechanical indications based on clinical criteria is concerning: the diagnosis of a narrow pelvis or a large fetus without radiopelvimetry, without ultrasound, and often without a labor trial is unreliable. The low use of the partogram (36.1%) and the proportion of pelvises deemed clinically normal (52.0%) contrast with the frequency of these indications. Some of these cesarean sections could therefore be classified as relative indications or even avoidable.

Furthermore, the breakdown between elective and emergency cesarean sections is not consistent with the indications. At least 124 indications were related to labor or emergency situations (stationary dilation, failure of labor induction or trial of labor, acute fetal distress, cord prolapse, uterine rupture, retroplacental hematoma), whereas only 25 cesarean sections were decided during labor and 30 were classified as urgent. Similarly, 25.6% of patients had received oxytocics and 36.1% had a partogram. The concept of "scheduled cesarean section" was therefore likely misunderstood or miscoded, which prevents us from drawing conclusions about the actual proportion of elective cesarean sections.

4.4 Robson Classification

The Robson classification makes it possible to determine, for each group, its size, its cesarean section rate, and its contribution to the overall rate, provided that all women who give birth are classified (World Health Organization, 2017). In our study, only women who underwent cesarean sections were classified; therefore, we can only calculate the relative contribution of each group, not the cesarean section rate per group. The prominence of Group 5 (19.5%) is consistent with observations made in North and South Kivu. In Walikale, Group 5 accounted for half of all cesarean sections (Bushu et al., 2025), and in South Kivu, Groups 5, 1, and 3 together accounted for 75% of cesarean sections (Mulinganya et al., 2020). The proportion of Group 1 (17.9%) suggests that managing labor in full-term nulliparous women is a key strategy: every cesarean section avoided in a primiparous woman prevents a future scarred uterus and thus a future Group 5 case. However, the proportion of Group 8 (27.8%) is inconsistent with the three twin pregnancies identified as indications. This group likely served as a default category, which limits the validity of the breakdown by group.

4.5 Strengths and Limitations of the Study

This study covers all facilities in the health region that perform deliveries and calculates the prevalence based on all deliveries during the study period. It applies, for the first time in this health region, the classification recommended by the WHO. However, it has several limitations. Only 446 of the 514 records of women who had cesarean sections were analyzed, which may introduce selection bias if the missing records primarily concern emergency cesarean sections. The retrospective data collection is subject to missing data (educational level not reported in 76.0% of records) and coding errors, several of which could not be corrected: the "cystectomy" procedure code assigned to 95.3% of patients; the discrepancy between history of cesarean section (127) and uterine scars (114); the size of the Robson Group 8, the discrepancy between meconium (34) and greenish fluid (40), and the discrepancy between labor indications and "elective" cesarean sections. The age groups (20–35 years and 35 years and older) and uterine height categories overlapped at 35. The definition of absolute and relative indications was not specified. Finally, the six-month time frame and the lack of data on the patients' place of origin, the status of the facilities, and maternal and neonatal outcomes make it impossible to explain the differences between facilities or to assess the appropriateness of the cesarean sections.

CONCLUSION

In the Mabakanga health district, more than one in two deliveries ended in a cesarean section in the first half of 2024, with significant variations among facilities. The primary indications were narrow pelvis and fetal-pelvic disproportion based primarily on clinical criteria as well as dynamic dystocia, forehead presentation, and a scarred uterus. These results warrant an audit of the appropriateness of the indications and systematic recording of all women who gave birth according to the Robson classification.

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