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Cesarean Section Trends in Urban Areas of Vietnam: A Case Study at a District-Level Hospital

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A B S T R A C T

This study aimed to determine the proportion of cesarean sections (C-sections) in urban areas of Vietnam and identify factors influencing the decision for cesarean delivery. A prospective cross-sectional descriptive study was conducted based on medical records of 2,172 women who underwent at the Obstetrics and Gynecology Department of District 7 Hospital in Ho Chi Minh City from July 2023 to June 2024. The C-section rate was 54.97%, primarily among women under the age of 35 (89.1%). Of these, 55.53% were elective C-sections. Regarding gestational age at the time of C-section, 51.34% were performed at ⩾ 39 weeks, 34.17 % at 38 weeks, and 14.49 % at ⩽ 37 weeks. Elective C-sections were more common in women with a history of prior C-section (64.51%), first-time C-sections (46.36%), assisted reproductive technology (ART) pregnancies (27.03%), and twin pregnancies (62.71%). Women with ART pregnancies had the highest rate of elective C-sections at ⩽ 37 weeks (54.55 %) and the lowest at ⩾ 39 weeks (7.41%). The rate of C-sections is increasing, with prior C-section scars being the primary contributing factor. Reducing the rate of primary C-sections, especially among nulliparous women, is critical for lowering the overall cesarean rate.

Keywords: cesarean section, urban areas, district-level hospital, Vietnam

1. INTRODUCTION

A cesarean section (C-section) is a surgical procedure performed to deliver a baby, along with its associated appendages, through incisions made in both the abdominal wall and the uterine wall. This procedure is typically indicated in cases where vaginal delivery poses risks to the mother or the baby, such as fetal distress, abnormal fetal positioning, cephalopelvic disproportion, or maternal health complications. In some instances, elective C-sections are also performed based on maternal request or previous surgical history.

In recent years, the indications for C-sections have become a topic of increasing concern among obstetricians, particularly regarding their use in both primiparous and multiparous women. Of particular importance is the rising rate of C-sections in primiparous women, as this trend contributes significantly to the overall increase in C-section rates. A higher number of initial C-sections leads to a greater likelihood of repeat C-sections in subsequent pregnancies, which may increase the risk of complications such as placenta previa, placenta accreta, uterine rupture, and adhesions. Therefore, in order to effectively manage and implement strategies aimed at reducing unnecessary C-sections – especially among multiparous women with a history of uterine scars – it is crucial to obtain an objective and accurate assessment of the current C-section rate. Identifying factors influencing the decision for surgical delivery will allow healthcare professionals to optimize clinical guidelines, promote safe vaginal deliveries where feasible, and improve maternal and fetal health outcomes.

At District 7 Hospital in Ho Chi Minh City, there has been no prior research systematically evaluating the rates of cesarean and vaginal deliveries. Without reliable statistical data, it is challenging to determine trends in delivery methods, assess potential overuse of C-sections, or develop targeted interventions to address the issue. Recognizing the need for a comprehensive assessment, this study aims to provide valuable insights into the prevalence and patterns of delivery methods within the hospital's Obstetrics and Gynecology Department. Specifically, the study is designed to achieve the following two objectives: 1. To determine the rates of cesarean deliveries at the Obstetrics and Gynecology Department of District 7 Hospital in Ho Chi Minh City during the period from July 2023 to June 2024; 2. To identify the key factors influencing the decision to perform C-sections at the Obstetrics and Gynecology Department of District 7 Hospital in Ho Chi Minh City. By systematically analyzing these aspects, our study aims to contribute to a more comprehensive understanding of cesarean section practices within the hospital, providing a foundation for future policies and clinical guidelines to promote safer, evidence-based delivery methods.

MATERIALS AND METHODS

2.1. Study Design

This study employs a cross-sectional descriptive design, utilizing retrospective data collection from medical records of women who gave birth at the Obstetrics and Gynecology Department of District 7 Hospital in Ho Chi Minh City. The study focuses on cases where deliveries occurred either through spontaneous vaginal birth or cesarean section, with an emphasis on identifying delivery trends, maternal and neonatal outcomes, and potential determinants influencing the choice of delivery method. Medical records were reviewed systematically to extract relevant clinical and demographic information, including maternal age, parity, residential area, occupation, gestational age at delivery, previous obstetric history. The data collected were then analyzed to determine the prevalence of cesarean and vaginal deliveries, as well as to assess the factors contributing to the preference for cesarean sections in specific cases.

2.2. Timeframe

The study was conducted over a six-month period, specifically from July 30, 2023, to June 30, 2024. This timeframe was chosen to ensure a sufficient sample size for statistical analysis while also providing an accurate snapshot of delivery trends and practices within the hospital during this period.

2.3. Sample

The study population consists of all pregnant women who were admitted to and subsequently delivered either via cesarean section or vaginal delivery at the Obstetrics and Gynecology Department of District 7 Hospital in Ho Chi Minh City. These women were included regardless of whether they were primiparous or multiparous, provided that they met the eligibility criteria specified below. The study aims to capture comprehensive data on delivery methods, associated maternal and fetal outcomes, and factors influencing the decision for surgical or non-surgical delivery.

To ensure the reliability and validity of the data, the study included only cases that met the following criteria: 1. Pregnant women who were admitted to and delivered at District 7 Hospital's Obstetrics and Gynecology Department during the study period; 2. Gestational age at the time of delivery was ⩾ 22 weeks, as per the World Health Organization's (WHO) definition of fetal viability; 3. Medical records were complete, with all essential clinical and obstetric information available for analysis. By restricting the study to women meeting these criteria, we aimed to obtain a consistent and comprehensive dataset, minimizing potential biases that might arise from incomplete or inconsistent records.

The following cases were excluded from the study to prevent confounding factors and ensure data accuracy: 1. Pregnant women who were discharged or transferred to another medical facility before delivery, as their delivery outcomes could not be accurately assessed; 2. Women who experienced postpartum complications at another healthcare facility and were later transferred to District 7 Hospital for further management, as their primary delivery did not occur at the study site; 3. Cases with incomplete or missing medical records, as the absence of key clinical details could compromise the validity of the findings. These exclusion criteria were established to maintain the integrity of the dataset, ensuring that all analyzed cases were directly managed at District 7 Hospital, allowing for more precise conclusions regarding delivery trends and influencing factors.

2.4. Statistical Analysis

The collected data will be processed and analyzed using SPSS version 26.0 to ensure accuracy and objectivity. Before conducting the analysis, data from medical records will be entered into the software and checked for errors or missing values during the collection process. Variables will be categorized into continuous variables and categorical variables.

Statistical analysis will primarily employ descriptive methods to summarize and present the data. For continuous variables, results will be expressed as mean, standard deviation, minimum value, maximum value, medianto describe the overall characteristics of the study population. For categorical variables, data will be presented as frequency (n) and percentage (%) to illustrate the distribution of factors such as delivery method, history of cesarean section, and the number of previous pregnancies. To compare the differences between the vaginal delivery and cesarean delivery groups, an Independent t-test will be used with a significance level of $p < 0.05$ to determine statistically significant differences.

The analysis results will be displayed using tables to provide a visual representation of the proportions of cesarean deliveries at District 7 Hospital during the study period.

3. RESULTS AND DISCUSSION

Table 1: Distribution of delivery methods

Delivery method	**n**	**%**	**p-value**
Vaginal delivery	978	45.03	p > 0.05
C-section	1194	54.97	
Total	2172	100	

Table 1 presents the distribution of delivery methods among the study population. Out of a total of 2,172 deliveries, 978 cases (45.03%) were vaginal deliveries, while 1194 cases (54.97%) were cesarean sections. The proportion of cesarean deliveries was higher than that of vaginal deliveries. The statistical analysis yielded a p-value greater than 0.05, indicating that the difference in delivery method distribution is not statistically significant. This suggests that there is no significant variation between the two groups based on the factors analyzed. However, the higher percentage of cesarean sections highlights the need for further investigation into the indications and contributing factors influencing the decision for surgical delivery.

Table 2: Demographic characteristics of the C-sections participants

Demographic characteristics		**n**	**%**
Age group	≤ 24	295	24.7
	25 – 29	504	42.2
	30 – 34	265	22.2
	35 – 39	100	8.4
	≥ 40	30	2.5
Residential area	Inner city	817	68.4
	Outer city and other provinces	377	31.6
Occupation	Farmer	17	1.4
	Worker	82	6.9
	Office worker	423	35.4
	Freelancer	672	56.3

Table 2 provides an overview of the demographic characteristics of the C-sections participants, including age distribution, residential area, and occupation. Regarding age distribution, the majority of participants were between 25 and 29 years old (42.2%), followed by those aged 30 to 34 years (22.2%). A smaller proportion of participants were ≤ 24 years old (24.7%), while only 8.4% were between 35 and 39 years old, and an even smaller group (2.5%) were aged 40 or older. In terms of residential area, most participants (68.4%) resided in the inner city, while 31.6% were from outer city areas or other provinces. For occupation, the largest group consisted of freelancers (56.3%), followed by office workers (35.4%). Meanwhile, workers (6.9%) and farmers (1.4%) made up a smaller proportion. These demographic characteristics provide insights into the distribution of participants in terms of age, living area, and occupation, which may contribute to understanding factors influencing delivery methods and maternal health outcomes.

Table 3: Reproductive characteristics of the women with C-sections

Characteristic	**Singleton pregnancy**				**Twin pregnancy**				**Total**	
	Natural		**ART**		**Natural**		**ART**			
	n	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Previous C-section	488	40.87	68	5.70	11	0.92	36	3.02	603	50.50
First-time C-section	477	39.95	43	3.60	38	3.18	33	2.76	591	49.50
Total	965	80.82	111	9.30	49	4.10	69	5.78	1194	100

Table 3 presents the reproductive characteristics of women who underwent C-sections, categorized by pregnancy type (singleton or twin) and conception method (natural or ART). Women with a history of previous C-sections predominantly had singleton pregnancies, with 488 naturally conceived and 68

ART pregnancies. In contrast, previous C-sections were less common among twin pregnancies, with only 11 naturally conceived and 36 ART pregnancies having a history of C-section. This suggests that women who conceive through ART, especially those with twin pregnancies, are more likely to have had prior C-sections due to maternal or fetal conditions. For first-time C-sections, 477 singleton pregnancies were naturally conceived, while 43 were ART-conceived. In twin pregnancies, 38 were naturally conceived, and 33 were ART-conceived. The higher rate of first-time C-sections in twin pregnancies, particularly ART-conceived, suggests that multiple gestations and assisted reproductive technologies contribute to an increased likelihood of surgical delivery. In summary, singleton pregnancies were more likely to have a history of previous C-sections, while twin pregnancies, especially those conceived via ART, had a higher proportion of first-time C-sections. ART and multiple gestations are key factors associated with an increased likelihood of C-sections.

Table 4: Rate of C-sections by gestational age

Characteristic		**With labor**		**Elective**		**Total**	
		n	**%**	**n**	**n**	**%**	**n**
Previous C-section with natural and singleton pregnancy (n = 488)	≤ 37 Weeks	22	1.84	32	2.68	54	4.52
	38 Weeks	65	5.44	66	5.53	131	10.97
	≥ 39 Weeks	74	6.20	229	19.18	303	25.38
	Total	161	13.48	327	27.39	488	40.87
First-time C-section with natural and singleton pregnancy (n = 477)	≤ 37 Weeks	34	2.85	18	1.51	52	4.36
	38 Weeks	83	6.95	75	6.28	158	13.23
	≥ 39 Weeks	128	10.72	139	11.64	267	22.36
	Total	245	20.52	232	19.43	477	39.95
ART (n = 111)	≤ 37 Weeks	15	1.26	18	1.51	33	2.76
	38 Weeks	41	3.43	10	0.84	51	4.27
	≥ 39 Weeks	25	2.09	2	0.17	27	2.26
	Total	81	6.78	30	2.51	111	9.30
Twin pregnancies (n = 118)	≤ 37 Weeks	13	1.09	21	1.76	34	2.85
	38 Weeks	29	2.43	40	3.35	69	5.78
	≥ 39 Weeks	2	0.17	13	1.09	15	1.26
	Total	44	3.69	74	6.20	118	9.88
Total		531	44.47	663	55.53	1194	100

Table 4 presents data on the rate of C-sections categorized by gestational age, type of pregnancy, and whether the procedure was performed with labor or electively. Among the 1194 cases, elective C-sections were more common, accounting for 55.53%, while 44.47% involved labor. The majority of C-sections occurred at ≥ 39 weeks (49.26%), followed by 38 weeks (34.25%), with the lowest proportion at ≤ 37 weeks (16.49%).

When examining different pregnancy types, women with a previous C-section and a natural singleton pregnancy had the highest C-section rate (40.87%), with a clear preference for elective procedures, particularly at ≥ 39 weeks (19.18%). In contrast, first-time C-sections for natural singleton pregnancies were slightly lower (39.95%), with a more balanced distribution between elective and labor-related procedures.

For pregnancies conceived through Assisted Reproductive Technology (ART), the total C-section rate was significantly lower (9.30%), with a notable proportion occurring at ≤ 37 weeks, suggesting that these pregnancies may require earlier interventions. Similarly, twin pregnancies, which accounted for 9.88% of the total, saw the highest number of C-sections at 38 weeks, likely due to medical recommendations to avoid complications associated with prolonged gestation in multiple pregnancies.

Overall, the data indicate that elective C-sections are generally preferred across most pregnancy types, particularly for those with a history of C-section. The lower rates in ART and twin pregnancies suggest different clinical management strategies, possibly emphasizing earlier delivery to mitigate risks. These findings highlight the influence of gestational age and pregnancy type on obstetric decision-making, with implications for maternal and neonatal health outcomes.

Table 5: Distribution of C-section indications

Research factors for difficult labor and cesarean scars		**n**	**%**
Maternal reproductive tract (n = 691)	Previous uterine scar (including old C-section scars)	603	50.50
	Non-progressing cervix (no dilation)	45	3.77
	Narrow pelvis, obstructed labor, vaginal stenosis, or failure of fetal head descent	41	3.43
	Uterine contractions too strong, uterine rupture, or threat of uterine rupture	2	0.17
	Total	691	57.87
Maternal health conditions (n = 93)	Preeclampsia, eclampsia, hypertension	66	5.53
	Severe maternal heart disease	7	0.59
	Severe obstetric history	11	0.92
	Advanced maternal age	9	0.75
	Total	93	7.79
Fetal factors (n = 247)	Large fetus (macrosomia)	108	9.05
	Fetal distress (including cases of incompatible blood group leading to miscarriage)	19	1.59
	Multiple pregnancies	118	9.88
	Abnormal fetal presentation	2	0.17
	Total	247	20.69
Placental factors (n = 74)	Placenta previa, placental abruption, or placenta accreta	37	3.10
	Oligohydramnios, premature rupture of membranes, or early water break	23	1.93
	Cord prolapse, limb prolapse, vasa previa, or cord knots	14	1.17
	Total	74	6.20
Social factors (n = 89)	Choosing an auspicious time, fear of pain, fear of vaginal delivery leading to vaginal dilation	89	7.45

Table 5 presents a detailed distribution of cesarean section (C-section) indications across various categories, offering insight into the factors influencing the decision to perform a C-section. The largest proportion of C-sections, 50.50%, is attributed to maternal reproductive tract issues, particularly the presence of previous uterine scars, including old C-section scars. This is consistent with clinical practices, as women with a history of C-sections are often advised to undergo another C-section to prevent the risk of uterine rupture during a vaginal birth. Other reproductive tract factors contributing to C-sections include a non-progressing cervix and narrow pelvis, which together account for a smaller but still significant portion, while uterine contractions that are too strong, as well as uterine rupture or the threat thereof, account for only a small percentage (0.17%).

The second most common category is fetal factors, contributing to 20.69% of C-sections, with macrosomia (large fetus) being the most common, as delivering a large baby vaginally can present significant risks to both mother and baby. Multiple pregnancies also contribute notably to the overall C-section rate, given the increased likelihood of complications in twin pregnancies. Other fetal factors, such as fetal distress and abnormal fetal presentation, represent a smaller percentage but remain critical reasons for opting for a C-section to ensure the safety of the baby.

Maternal health conditions account for 7.79% of C-sections. Among these, preeclampsia, eclampsia, and hypertension are the leading causes, reflecting the risks that these conditions pose to both the mother and the fetus, necessitating early delivery. Less frequent conditions such as severe maternal heart disease, a severe obstetric history, and advanced maternal age also contribute to the decision to perform a C-section, though they represent a smaller proportion of the total.

Placental factors are responsible for 6.2% of C-sections, with placenta previa, placental abruption, and placenta accreta accounting for the largest share in this category. These conditions present serious risks to both the mother and fetus, often making a C-section necessary. Other placental issues, such as oligohydramnios, premature rupture of membranes, and cord prolapse, also contribute, though they represent a smaller proportion of C-sections.

Lastly, social factors, while not as significant as medical factors, still play a role in the decision to undergo a C-section, accounting for 7.45% of cases. Factors such as choosing an auspicious time for delivery, fear of pain, or fear of vaginal delivery leading to vaginal dilation influence the decision, indicating that personal and cultural preferences can impact the choice of delivery method.

Overall, the data from Table 5 illustrates that medical reasons, particularly related to maternal reproductive tract issues, fetal conditions, and placental complications, account for the majority of C-sections. However, social factors also contribute to the decision, highlighting the need for comprehensive counseling and education to ensure that the decision to perform a C-section is made with a full understanding of both medical indications and personal preferences. This information is crucial for healthcare providers working to optimize delivery practices and potentially reduce unnecessary C-sections.

4. CONCLUSION

The rate of cesarean sections (C-sections) at District 7 Hospital in Ho Chi Minh City was found to be 54.97%, with over half of the C-sections being elective, accounting for 55.53% of all cases. The timing of the C-sections varied, with the majority (51.34%) occurring when the pregnancy reached ≥ 39 weeks, followed by 34.17% at 38 weeks, and 14.49% at ≤ 37 weeks. Among women with a previous history of C-section, the elective C-section rate was 64.51%, while for first-time C-section mothers, 46.36% had an elective procedure. Women undergoing assisted reproductive technologies had a lower elective C-section rate of 27.03%, while women with twin pregnancies had a higher rate of 62.71%. Notably, assisted reproduction mothers had the highest elective C-section rate at ≤ 37 weeks (54.55%) and the lowest at ≥ 39 weeks (7.41%).

Several factors contributed to the decision for a C-section. Previous uterine scars, particularly those from previous C-sections, were the most common indication, representing 50.50% of cases. In terms of maternal health, conditions such as preeclampsia, eclampsia, and hypertension were the primary reasons, accounting for 5.53% of C-sections. Fetal factors also played a significant role, with macrosomia and multiple pregnancies being the main contributors to higher C-section rates, representing 9.05% and 9.88% of cases, respectively. Among placental-related issues, placental abnormalities were the leading factor, contributing 3.10% of the total C-section cases. These findings highlight the importance of both medical and pregnancy-related factors in the decision to perform a C-section, underscoring the need for careful evaluation in each case.

This study has several limitations. Its cross-sectional design only captures data at one point in time, limiting the ability to establish causality. The study was conducted in a single hospital, which may not be representative of other regions or healthcare settings. Additionally, the reliance on retrospective medical records could result in incomplete or inconsistent data. The study also does not explore the socioeconomic factors or patient preferences influencing C-section decisions.

For future research, a longitudinal study could assess the long-term outcomes of different delivery methods. Examining socioeconomic and cultural influences on delivery choices, as well as the impact of patient education, would provide valuable insights. A multi-center study could help generalize findings to broader populations, and investigating the outcomes of elective versus emergency C-sections would further enhance understanding of their effects on maternal and fetal health.

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