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ADDIS ABABA UNIVERSITY
HEALTH SCIENCE COLLEGE
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DEPARTMENT OF ANESTHESIA

COMPARISON OF POSTOPERATIVE PAIN SEVERITY AND ANALGESIC CONSUMPTION BETWEEN PRIMARY AND REPEAT CESAREAN SECTIONS WITHIN 24 HOURS UNDER SPINAL ANESTHESIA AT TIKUR ANBESSA SPECIALIZED HOSPITAL, ADDIS ABABA, ETHIOPIA (2024/25 G.C.): A PROSPECTIVE COHORT STUDY

BY: MEQUANINT ZENEBE (MSC STUDENT IN ANESTHESIA)

A RESEARCH THESIS SUBMITTED TO ADDIS ABABA UNIVERSITY, COLLEGE OF HEALTH SCIENCES, SCHOOL OF MEDICINE, DEPARTMENT OF ANESTHESIA, IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE MASTER'S DEGREE IN ADVANCED CLINICAL ANESTHESIA

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Name of investigator	Principal Investigator: Mr. Mequanint Zenebe Bitewlign BSc in Anesthesia; MSc Student in Advanced Clinical Anesthesia
Name of Advisors	Mr. Luelayehu Akalu Assistant Professor, Head of the Anesthesia Department Email: leulayehu.akalu@aau.edu.et Mrs. Siryet MSc in Anesthesia, Lecturer of Anesthesia Email: Siryetesfaye@gmail.com
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Address of investigator	Tel: +251946423244 Mail: zenebemequa33@gmail.com

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CERTIFICATION

This is to certify that the thesis entitled *“Comparison of Postoperative Pain Severity and Analgesic Consumption Between Primary and Repeat Cesarean Sections Within 24 Hours Under Spinal Anesthesia* at Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia: A Prospective Cohort Study” has been carried out by Mequanint Zenebe under the supervision of Mr. Luelayehu Akalu (Assistant Professor of Anesthesia) and Mrs. Siryet (Lecturer of Anesthesia). To the best of my knowledge, this thesis is the original work of the candidate and has not been submitted to any other institution for the award of any degree or diploma.

Approval of the Board of Examiners

Examiner (external): _____

Signature: _____ Date: _____

Examiner (internal): _____

Signature: _____ Date: _____

Name of Advisor/s:

Primary: Luelayehu Akalu (Assistant Professor of Anesthesia),

Signature: _____ Date: _____

Secondary: Siryet (MSc, Lecturer of Anesthesia))

Signature: _____ Date: _____

Chair of department or graduate program coordinator

ADDIS ABABA UNIVERSITY
HEALTH SCIENCE COLLEGE
SCHOOL OF MEDICINE
DEPARTMENT OF ANESTHESIA

DECLARATION

I, Mequanint Zenebe, hereby declare that the thesis entitled “*Comparison of Postoperative Pain Severity and Analgesic Consumption Between Primary and Repeat Cesarean Sections Within 24 Hours Under Spinal Anesthesia* at Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia: A Prospective Cohort Study” is my original work and has not been presented for a degree in any other university or institution. All sources of information, literature, and data used in this work are properly cited in the reference section, and all individuals who contributed to this research have been duly acknowledged.

Author: Mequanint Zenebe Signature:  _____ Date: _____

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ABSTRACT

Background: A cesarean section is one of the most common surgeries performed, and it is usually associated with moderate to severe postoperative pain. While the general pain experienced after a cesarean delivery is well reported, little is known regarding the differences in pain severity and analgesic use between primary and repeat cesarean surgeries.

Objective: The purpose of this study was to compare the degree of postoperative pain severity and total amount of analgesics consumption among women undergoing primary versus repeat cesarean sections under spinal anesthesia.

Methods: A prospective cohort study was conducted at Tikur Anbessa Specialized Hospital, involving 203 women who underwent cesarean delivery under spinal anesthesia. Participants were selected using systematic random sampling and categorized into two groups: primary and repeat cesarean sections. Data were collected through structured questionnaires. The primary outcome was the severity of postoperative pain, and the secondary outcome was total analgesic consumption within the first 24 hours post-surgery. Pain severity was assessed using the Numeric Rating Scale (NRS). Descriptive statistics were used to summarize the demographic and clinical characteristics of the participants. Independent t-tests were applied for normally distributed continuous variables, while the Mann–Whitney U test was used for non-normally distributed variables. Categorical variables were analyzed using the Chi-square test, and a p-value of < 0.05 was considered statistically significant.

Results: Women who underwent repeat cesarean sections reported significantly higher levels of postoperative pain, both incisional and visceral, during the first 24 hours. Specifically, 92.1% of women in the repeat group (RR = 3.03, 95% CI: 1.6–5.7) experienced moderate to severe pain with movement, compared to 66.7% in the primary cesarean group (RR = 0.50, 95% CI: 0.40–0.66; $p < 0.001$). At rest, 74.3% of women in the repeat group experienced moderate to severe pain (RR = 1.82, 95% CI: 1.20–2.70), compared to 52.9% in the primary group (RR = 0.71, 95% CI: 0.60–0.90; $p = 0.002$). Additionally, women with repeat cesarean sections experienced significantly higher postoperative pain severity within the first 6 hours after surgery, with a median NRS score of 7 (IQR: 7–8) compared to 5 (IQR: 4–7) in the primary group ($p < 0.001$). Analgesic consumption was also significantly higher among women in the repeat cesarean group, with an average intake of $243.3 \text{ mg} \pm 98.4$, compared to $146.3 \text{ mg} \pm 82.5$ in the primary group ($p < 0.001$).

Conclusion and Recommendation: Repeat cesarean sections have been associated to an increased incidence of moderate to severe postoperative pain and a greater requirement for analgesics, particularly in the first twenty-four hours after the procedure. According to these results, women undergoing repeat cesarean sections require greater individualized as well as stronger pain management strategies.

Keywords: Cesarean section, primary, repeat, postoperative pain, incisional pain, visceral pain, analgesic consumption.

TABLE OF CONTENTS

ACKNOWLEDGMENT	IV
ABSTRACT.....	V
LIST OF TABLES	IX
LIST OF FIGURES	X
LIST OF ACRONYMS AND ABBREVIATIONS	XI
CHAPTER ONE: INTRODUCTION	1
1.1. BACKGROUND.....	1
1.2. STATEMENT OF PROBLEM.....	3
1.3. RATIONALE OF THE STUDY	5
1.4. SIGNIFICANCE OF THE STUDY	6
CHAPTER TWO: LITERATURE REVIEW	7
2.1. PREVALENCE OF POSTOPERATIVE PAIN AMONG C-SECTIONS	7
2.2. DIFFERENCE IN POSTOPERATIVE PAIN SEVERITY AND ANALGESIA CONSUMPTION.....	9
2.3. RESEARCH HYPOTHESES	13
2.4. CONCEPTUAL FRAME WORK	14
CHAPTER THREE: OBJECTIVES.....	15
3.1. GENERAL OBJECTIVE:	15
3.2. SPECIFIC OBJECTIVES:.....	15
CHAPTER FOUR: METHODOLOGY.....	16
4.1. STUDY DESIGN.....	16
4.2. POPULATION.....	16
4.2.1. SOURCE OF POPULATION.....	16

4.2.2. STUDY POPULATION.....	16
4.3. STUDY AREA AND PERIOD	16
4.4. SAMPLE SIZE DETERMINATION.....	17
4.5. SAMPLING METHODS	18
4.6. ELIGIBILITY CRITERIA	19
4.6.1. INCLUSION CRITERIA	19
4.6.2. EXCLUSION CRITERIA	19
4.7. DATA COLLECTION PROCEDURES AND TOOLS	20
4.8. STUDY VARIABLES	21
4.8.1. DEPENDENT VARIABLES.....	21
4.8.2. INDEPENDENT VARIABLES.....	21
4.9. OPERATIONAL DEFINITIONS.....	22
4.10. DATA PROCESSING AND ANALYSIS PROCEDURES	24
4.11. DATA QUALITY MANAGEMENT	24
4.12. ETHICAL CONSIDERATION	25
4.13. DISSEMINATION OF RESULTS	25
CHAPTER FIVE: RESULT	26
5.1. SOCIO-DEMOGRAPHIC CHARACTERISTICS.....	26
5.2. PREOPERATIVE OBSTETRIC CHARACTERISTICS	28
5.3. INTRAOPERATIVE ANESTHETIC AND SURGICAL - RELATED FACTORS	29
5.4. COMPARISON OF POSTOPERATIVE PAIN SEVERITY AT REST AND WHILE MOVING (DURING COUGH)	31
5.5. COMPARISON OF POST-OPERATIVE ANALGESIA CONSUMPTIONS, PAIN CHARACTERISTICS, AND RECOVERY EXPERIENCES.....	35
CHAPTER SIX: DISCUSSION.....	39
CHAPTER SEVEN.....	42

7.1. LIMITATION OF STUDY	42
7.2. STRENGTH OF STUDY.....	42
7.3. CONCLUSION	42
7.4. RECOMMENDATION.....	42
REFERENCES.....	43
ANNEX.....	46
ANNEX ONE: ENGLISH VERSION INFORMATION SHEET	46
ANNEX TWO: QUESTIONNAIRE	47

LIST OF TABLES

TABLE 1: DISTRIBUTION OF SOCIO - DEMOGRAPHIC CHARACTERISTICS OF PATIENT WHO UNDERWENT CAESAREAN SECTION AT TASH, 2025.....	26
TABLE 2: PREOPERATIVE CHARACTERISTICS OF THE PARTURIENT WHO UNDERWENT CAESAREAN SECTION AT TASH, 2025	28
TABLE 3: INTRAOPERATIVE ANESTHETIC AND SURGICAL - RELATED FACTORS OF THE PARTURIENT WHO UNDERWENT CAESAREAN SECTION AT TASH, 2025	30
TABLE 4: COMPARISON OF POSTOPERATIVE PAIN SEVERITY BY NRS AT REST AND WHILE MOVING	32
TABLE 5: INCIDENCE OF MODERATE TO SEVERE POSTOPERATIVE PAIN AT REST AND WHILE MOVING (DURING COUGH) FOR MOTHERS WHO UNDERWENT CAESAREAN SECTION AT TASH, 2025	33
TABLE 6: COMPARISON OF POST-OPERATIVE PAIN CHARACTERISTICS, ANALGESIA CONSUMPTION AND RECOVERY EXPERIENCES WITHIN 24 HOURS AMONG PARTURIENT WHO UNDERWENT CAESAREAN SECTION AT TASH, 2025....	36

LIST OF FIGURES

FIGURE 1: CONCEPTUAL FRAMEWORK FOR COMPARING POSTOPERATIVE PAIN SEVERITY AND ANALGESIA CONSUMPTION AMONG PATIENTS WHO UNDERWENT PRIMARY VERSUS REPEATED CESAREAN SECTION UNDER SPINAL ANESTHESIA	14
FIGURE 2: FLOW DIAGRAM ILLUSTRATING THE SELECTION PROCESS OF STUDY PARTICIPANTS.	18
FIGURE 3: BOX PLOT SHOWING THE PAIN SCORES AT REST AND DURING MOVEMENT (COUGHING) WITH IN THE FIRST 24 HOURS POSTOPERATIVELY.....	32
FIGURE 4: BAR GRAPH ILLUSTRATING THE TYPES OF POSTOPERATIVE PAIN AMONG WOMEN UNDERGOING PRIMARY AND REPEAT CESAREAN SECTIONS.....	37
FIGURE 5: BAR GRAPH SHOWING THE DISTRIBUTION OF ANALGESIC TYPES AND ROUTES OF ADMINISTRATION WITHIN THE FIRST 24 HOURS POSTOPERATIVELY AMONG PRIMARY AND REPEATED CESAREAN SECTIONS.	38

LIST OF ACRONYMS AND ABBREVIATIONS

ASA	American society of anesthesiology
BMI	Body mass index
CS	Cesarean section
CD	Cesarean delivery
CI	Confidence interval
ETB	Ethiopian Birr
G.C	Gregorian colanders
IQR	Interquartile range
IM	Intramuscularly
IV	Intravenously
NRS	Numerical rating scale
OR	Odd ratio
PI	Principal investigator
POP	Postoperative pain
PACU	Post-anesthesia care unit
PCA	Patient-Controlled Analgesia
SPSS	Statistical package for the social sciences
SD	Standard deviation
WHO	World Health Organization
RCT	Randomized controlled trial
RR	Relative risk
TASH	Tikur Anbessa Specialized Hospital
USA	United States of America
VAS	Visual analog scale

CHAPTER ONE: INTRODUCTION

1.1. BACKGROUND

Cesarean section is one of the most common surgeries performed worldwide, with its rates continuing to rise in both developed and developing countries (1). Postoperative pain is a significant concern for women undergoing cesarean section (CS), as it can greatly impact their recovery, mobility, and ability to care for their newborn. During this period, pain is frequently characterized as an unpleasant and upsetting physical and emotional experience (2). As a result of tissue or organ damage that triggers the body's pain receptors, postoperative pain usually has a nociceptive origin (3). Neuropathic pain can also happen in some situations, especially when nerves are traumatized, stretched, or crushed during surgery (4).

According to international research, acute postoperative pain after CS affects up to 50% of women (1,2). Although the majority of these research emphasize on the prevalence of pain, few evaluate how the primary and repeat CS differ in terms of severity of pain and analgesic requirements. Regarding longer operation times and more complicated surgical challenges such adhesions, some research indicates that women with a history of CS, particularly those with multiple uterine scars, may experience more acute postoperative pain (5,6). Remarkably, other research indicates that women who have repeat cesarean sections sometimes have lower pain ratings and less consumption of opioids than those who have their first CS (7), while these results are still inconclusive it is essential to examine the possible differences in the level of pain severity and analgesics consumed by women having primary and repeat CS in light of these variability's. Through this, we can improve pain management techniques and make sure that every patient has a safer and more comfortable recovery.

The degree of postoperative pain and the use of analgesics differ depending on whether a woman undergoes a primary or repeat CS, according to several worldwide research. Repeat CS are typically associated with an increased risk of adhesions and other complications that might make surgery more challenging and affect the patient's pain tolerance (8,9). Nevertheless, there is currently little data that directly compares these two groups' degrees of postoperative pain.

Pain typically starts at the site of the incision in women undergoing a primary CS. Nonetheless, visceral pain is more common in women's who have had multiple previous cesarean deliveries (1). Scar tissue formation and repeated damage to the same site of anatomy are two factors that increase the chance of chronic or persistent pain with each subsequent surgery(8). In Ethiopia, postoperative pain management is frequently under optimal despite these clinical variations. The lack of knowledge among health care providers about the differences in levels of pain and analgesic need between women undergoing their first cesarean section and those undergoing repeated CS is a significant contributing factor.

Lack of knowledge could result in inadequate pain management techniques, which could negatively affect the mother's health and the surgical procedure as a whole. In order to offer effective individualized pain management, it is essential to fully understand all of these differences. When differentiating women who undergoing their first caesarean delivery from those who are having first or second repeat surgery, this finding is especially important to understand post-operative pain severity and analgesic consumption among cesarean section types.

1.2. STATEMENT OF PROBLEM

Primary and repeat surgery are the two main types of cesarean sections. Despite very comparable procedures, repeat cesarean section contain different risks than primary cesarean sections. These include increased risk of bowel or bladder damage, increased intraoperative blood loss, improper placentation, and increased formation of scar tissue. Whenever together, all of these factors may increase the severity of postoperative pain and the requirement for analgesic drugs (10). Notwithstanding these variations, pain management methods are often generalized and given not enough attention to the individual clinical requirements of women having repeated operations.

Inadequate postoperative pain management is still a common problem in patients with a history of uterine scarring, which accounts for approximately 30% of CS in the US (11). Postoperative pain has been associated with a history of prior surgery (8,12) . Moreover, some research indicates that women who have repeated CS experience a decrease in pain and need less opioids than those who have their primary CS (7). The inconsistent results, however, suggest that further investigation is necessary to determine the effect of a woman's previous cesarean history on her postoperative pain experiences.

According to numerous study postoperative pain after a cesarean section performed under spinal anesthesia is still a major global health concern. According to study findings, between 50% and 90% of women report moderate to severe pain, especially in the 48 hours following surgery (2,13). Even though there are many different analgesic alternatives available, postoperative pain is often not well addressed, particularly in places with limited resources like Ethiopia. Mothers and their families experience social, economic, physiological, clinical, and psychological repercussions as a result of this suffering in a variety of ways (8,14).

After CS, postoperative pain is often not adequately managed in Ethiopia. Due to a lack of knowledge on the differences in pain severity between primary and repeat CS, mothers may only receive analgesics once day in different healthcare settings. The under treatment of pain is also a result of enduring misunderstandings regarding the side effects of analgesics on both mothers and neonates (15). Because of this, the severity of postoperative pain is frequently underestimated, particularly during repeat procedures.

Unrelieved pain can lead to additional medical expenses, longer stays in the hospital, lower patient satisfaction, increased complications, and decreased quality of life. One of the chief perpetrators of these problems is the fact that medical professionals do not distinguish between women who undergo first CS and those with repeated CS by the degree of pain severity and requirement for analgesics. Therefore, most mothers suffer from delayed wound healing, frustration, and poor bonding with their newborns (3).

Nowadays, regardless of whether the cesarean section is primary or repeat, one-size-fits-all method of managing postoperative pain is usually applied. Recent studies, however, indicates that this strategy could not adequately address the various demands of women healing from cesarean delivery (16) Despite their value, these results are inconsistent, highlighting the need for more study to completely understand and personalize pain management techniques.

In this prospective cohort study, women receiving the primary and repeat CS including those undergoing first and second repeat surgery will have their postoperative pain scores and consumption of analgesics compared. In order bring light on how a woman's previous cesarean experience affects her postoperative pain and recovery, this study will assess pain scores, analgesic needs, and patient satisfaction.

1.3. RATIONALE OF THE STUDY

Poor postoperative pain management after cesarean sections is still a major issue globally, specifically in developing countries like Ethiopia. Ineffective pain management can have an adverse effect on the mothers, such as psychological, physical, and material well-being. It may even be a contributing factor in the rise of chronic pain disorders(17). This problem is largely caused by healthcare professionals' ignorance of the differences in postoperative pain severity and analgesic requirements between women undergoing their primary cesarean section and those who have had repeated cesarean sections. Because of this, all patients, regardless of their surgical background, are frequently treated using a similar approach to pain management(1). This highlights, the importance of studies that specifically examine the differences in postoperative pain severity between women receiving primary compared to first repeat and second-repeat CS. It is essential to understand these distinctions in order to improve pain management procedures.

Although postoperative pain after cesarean delivery is common, little study has been done on how a woman's history of cesarean sections affects the intensity of her pain and her requirement for analgesics. However, new study indicates that there may be physiological and psychological differences in pain perception between primary and repeat cesarean procedures(8). This research remains insufficiently studied. Addressing this gap is essential for developing more targeted and effective postoperative pain management strategies.

Current clinical guidelines, such as the latest Practice Guidelines for Obstetric Analgesia and Anesthesia, does not offer specific recommendations regarding differences in postoperative pain severity and analgesia needs between primary and repeat CS patients(1,8). While studies from other countries have explored postoperative pain after primary and repeat CS, there is a marked lack of data from Ethiopia.

Based on current knowledge, this has not been studied before specifically on comparing of postoperative pain severity and analgesia consumption among women undergoing primary and repeat CS in the Ethiopian context. Given the genetic, cultural, social, economic, and healthcare differences between Ethiopia and other nations, findings from other settings may not be directly applicable. Therefore, the aim of this study is to fill that gap and provide valuable information for clinicians, researchers, educators, and policymakers involved in developing effective pain management strategies practice to the Ethiopian healthcare system.

1.4. SIGNIFICANCE OF THE STUDY

Given the growing prevalence of cesarean sections globally, particularly in Ethiopia, it is essential to better understand and manage the postoperative pain among these patients had experience. Although increased interest globally, minimal study has been done on comparing pain experiences of women having a repeat surgery versus those undergoing their primary CS, especially in Ethiopian healthcare settings.

The purpose of this study is to fill that gap by giving data that can guide the development of policies and clinical practice. Particularly for women who have had prior cesarean deliveries, the results could help develop more effective, evidence-based recommendations for postoperative pain management. This study may assist to create individualized pain management strategies by analyzing variations in pain severity and analgesic requirements among the groups. This type of treatment may enhance patient satisfaction, fast recovery and minimizing complications.

It is expected the findings of this study will be improved significantly about the standard of postoperative care for Ethiopian women having caesarean sections deliveries. This study can help in the development of more effective pain management procedures served to the unique requirements of Ethiopian clients by providing awareness into the severity of postoperative pain and the use of analgesics in both primary and repeat cesarean sections. It may also be used as a model for similar low-resource settings facing with comparable difficulties.

CHAPTER TWO: LITERATURE REVIEW

2.1. PREVALENCE OF POSTOPERATIVE PAIN AMONG C-SECTIONS

An important concern for postoperative pain treatment worldwide is the rising incidence of cesarean sections (18). A cesarean delivery is frequently linked to moderate to severe postoperative pain, which can inhibit mother-infant bonding, delay healing, interfere with daily activities, have a detrimental effect on the mother's mental health, and make breastfeeding more difficult (3,18).

In a Brazilian longitudinal study, 1,062 women who underwent CS after spinal anesthesia were enrolled. According to the study's numerical pain score (intensity > 5), 78.4% of participants reported moderate to severe postoperative pain (95% CI: 90.9–94.2; $p < 0.05$). The chance of experiencing mild to severe pain following surgery was also shown to be considerably elevated by preoperative anxiety (3).

The results of a study conducted between 2010 and 2020 in 27 German Obstetrics and Gynecology departments, most women (82.2%) experienced moderate to severe pain following cesarean sections, with 53.9% experiencing severe pain. Severe postoperative pain was more common among women who had a history of chronic pain (68.5% vs. 53.3%). In addition to reporting decreased overall satisfaction with their surgical experience, those in severe pain also indicated a greater need for further pain relief (20).

In 2020/21, a cross-sectional study at Gandhi Women and Child Care Memorial Hospital in Ethiopia which included 384 women who underwent cesarean section under spinal anesthesia. 47.4% of the patients (95% CI = 42.7% -52.1%) reported having moderate to severe postoperative pain, according to the study. The duration of the surgery, the length of the skin incision, the use of adjuvants in bupivacaine, the presence of preoperative pain or anxiety, whether a nerve block was performed at the end of the procedure, and the type of surgical incision used were all significantly associated with this degree of pain (17).

According to a hospital based cross-sectional survey conducted at Hawassa University Comprehensive Specialized Hospital (2022), moderate to severe postoperative pain was reported by 89.8% (95% CI 84.7, 93.5) of women who had deliveries by cesarean section(19)

According to a prospective cohort study conducting at public hospitals in West Shoa, Ethiopia with 422 women. The study found that within 24 hours following cesarean section under spinal anesthesia, 50.4% of the participants had severe postoperative pain [95% CI: 40.7, 60.1]. And also, a number of predictors of severe acute postoperative pain were found in the study, including the length of surgery, the type of incision, the use of spinal anesthetic without adjuvants, preoperative pain and anxiety (2).

Based on the prospective cohort study conducted at Gandhi Memorial Hospital in Ethiopia from December 1, 2019, to February 28, 2020. The study was assessed 290 women who had cesarean sections using a numerical rating scale, immediate postoperative pain was measured by the study with more than four was the cut-off for moderate to severe pain. based on the finding, within the first 24 hours following surgery, 76.2% (95% CI: 71%, 81%) of the patients had moderate to severe acute pain and the risk factors for postoperative pain included preoperative anxiety, incision length, incision type (transverse), and number of previous cesarean sections (21).

About 290 women who underwent cesarean sections were participated in prospective cohort study was conducted in Northwest Ethiopia (2020). The study found that 85.5% (95% CI: 81.4–89.0%) of the respondents had experienced moderate to severe postoperative pain within the first 24 hours following surgery. The study found that women with history of previous cesarean sections, preoperative anxiety, and no prior use of regional analgesia also had postoperative pain significantly as well as frequently (13).

2.2. DIFFERENCE IN POSTOPERATIVE PAIN SEVERITY AND ANALGESIA CONSUMPTION

A prospective cohort research conducted in China in 2019 that included 101 mothers having a repeat cesarean section under spinal anesthesia and 67 primipara women undergoing their primary cesarean section. Within the first 48 hours following surgery, a visual analog score of more than 40 for visceral and incisional pain was considered inadequate for pain relief. Results showed that women under 30 who had repeat cesareans reported more visceral pain (22.7%) than those with primary cesareans (6.4%) ($P = 0.025$). In contrast, incisional pain was more common in primary cesareans (38.3%) compared to repeat CS (18.2%) ($P = 0.033$). There was no statically significant difference about the cumulative incidence of inadequate pain relief among the two groups (primiparas 40.2% vs. multiparas 33.7%), $P = 0.381$, 95% CI: 0.25 - 0.74) (1).

According to a retrospective study conducted at a teaching hospital in China between January 2018 and March 2019, reviewed the medical records of 1,543 women's undergoing cesarean section. Using propensity score matching, the researchers compared 571 matched pairs out of a total of 1,142 patients among primiparous and multiparous women undergoing cesarean delivery. The incidence rate of inadequate postoperative analgesia defined as a NRS score greater than 4 within the first 48 hours was significantly lower in primiparous women compared to these multiparous women 16.7%, 24.0%, respectively, both in matched and unmatched groups are ($p < 0.001$). Multiparous women were found to be at higher risk of inadequate analgesia following cesarean delivery, based on age. Age 35 years and older had the highest chance of experiencing inadequate pain relief (odds ratio: 2.18; 95% CI: 1.20–3.95), while those under 35 years a moderately increased risk (odds ratio: 1.43; 95% CI: 1.08–1.89) (8).

Based on the retrospective study conducted in USA, 1,020 patients were identified between January 1, 2016, and November 30, 2022, about 409 women are meeting the inclusion criteria. The study is compared among the postoperative opioid use and pain scores among women who undergoing a primary cesarean section and those having a first repeated cesarean section. The result showed no statistically significant difference in opioid consumption between the two groups median 45 mg [IQR: 15–89] for primary cesareans compared to 45 mg [IQR: 15–83] for repeat cesareans ($p = 0.98$; adjusted rate ratio, 1.20; 95% CI: 0.95–1.51). Even after adjusting for

variables such as age during CS, BMI, anxiety, depression, duration of surgery, gestational age, postoperative ketorolac use, type of neuraxial anesthesia and repeat cesarean delivery was not associated with increased use of opioid (22).

According to retrospective cohort study at a tertiary academic hospital in the USA from 2015 to 2017, examined 594 women undergoing elective primary and repeat cesarean delivery under spinal anesthesia. All patients had received a standardized multimodal analgesic regimen. The authors found that opioid consumption was significantly lower among repeat cesarean deliveries compared to primary cesareans ($p < 0.005$). This difference in opioid use, pain scores remained similar among the two groups ($p = 0.7288$), both primary and repeat cesarean patients reporting a median Numerical Rating Scale score of 3.0 (IQR: 2.3 for primary vs. 1.8 for repeat; 95% CI for their difference: 0.0226 [−0.467, 0.529]) (7).

In a retrospective cohort study in USA, analyzed 1,899 patients in 2015, to examine the impact of cesarean sections on postoperative pain. According to the data, women who had repeated cesarean sections experienced considerably more post-operative pain compared with those who had primary cesarean sections (OR 4.12; 95% CI, 1.15–14.75; $p < 0.05$). The study also identified the other factors that were linked to higher postoperative pain scores, including Black race, preoperative anxiety, chronic pain history, current tobacco use, intraoperative analgesic administration, and enrollment in a public insurance program (23).

In Turkey, an observational descriptive cross-sectional study among 78 patients who had had caesarean sections was performed. The study found, the average visual analog pain score within the first six hours following surgery was 5.56 ($SD \pm 1.31$). Pain was reported in different areas of the body such as 7.7% of patients experienced pain at the incision site, 14.1% below the umbilicus, 23.1% had pain throughout the abdominal region and 50% of them pain on the right side of the incision, 1.3% on the left side, and 3.8% experienced pain on both sides of the incision. However, there was no significant difference between the pain locations and the number of cesarean sections ($p > 0.05$) (24).

In a study at Baylor College of Medicine in Houston, USA, the incidence of chronic pain following cesarean delivery was found to be relatively low. The chronic pain risk, however, rises with each subsequent cesarean delivery, the researchers added, which may be a significant quandary for a great many women. A significant public health problem ($p < 0.05$) can be generated by the development of chronic postsurgical pain following cesarean sections because of the huge number of cesarean deliveries carried out globally (25).

There was a cross-sectional study in Brazil that assessed data from 1,062 women who had cesarean sections. Participants employed the Numerical Rating Scale (0–10) and were questioned prior to and after surgery to assess the severity and nature of their pain. According to the results, 37.5% of the women indicated severe postoperative pain and 92.7% of them indicated pain (95% CI: 90.9–94.2; $p < 0.05$). During the worst pain episode, the mean pain was 6.6 (SD = 2.2). Aching (91.6%), soreness (70.0%), and throbbing (56.1%) were the pain descriptors listed most often (4).

In 2020, 126 patients scheduled for repeat cesarean sections under spinal anesthesia were enrolled in a randomized, controlled, double-blind trial carried out in China. According to the study, women having multiple cesarean births experienced uterine cramping pain that was noticeably worse than incision (wound) pain ($p < 0.05$). Interestingly, compared to patients in the sufentanil group, individuals in the tramadol-butorphanol group reported significantly reduced mean Visual Analog Scale (VAS) scores for uterine cramping pain at rest at 6 and 12 hours after surgery. Additionally, at 6, 12, and 24 hours following surgery, the tramadol-butorphanol group demonstrated significantly decreased VAS values for uterine cramping pain during movement ($p < 0.05$) (26).

In Greece, 173 women who were scheduled for elective cesarean sections with spinal anesthesia were entered into a prospective study. Researchers employed a 100 mm visual analog scale to measure the intensity of the acute pain; scores on the scale varied between 0 and 100 mm and represented different intensities of pain. The research found that the average dose of morphine administered 24 hours post-surgery was 16 ± 7.1 mg. When the women walked, their mean pain score was 40 ± 20.9 mm versus 23 ± 17.3 mm at rest, according to the scores of visual analog scale. Interestingly, the pain scores at rest remained consistently below 31 mm throughout the

observation period. However, after movement, the scores rose above 40 mm at both four and eight hours post-surgery, with pain levels recorded at 45 ± 23.8 mm and 43 ± 23.2 mm, respectively(27).

In a prospective cohort study conducted in 2025, inadequate analgesia at rest was reported in 87.5% of women who underwent repeated cesarean sections, compared to 35.7% among those undergoing primary cesarean delivery. This result matches to a risk ratio (RR) of 2.45 (95% CI: 1.98–3.02; $p = 0.001$), indicating a significantly higher chance of inadequate pain control in the repeat cesarean group. During coughing, the proportion of women experiencing moderate to severe pain increased to 91.1% in the repeat cesarean section group, compared to the primary group (52.4%) (RR = 1.73, 95% CI: 1.49–2.02; $p = 0.001$). Additionally, women with repeat cesarean section group required earlier administration of analgesics and the overall consumption of opioids and diclofenac is high (28).

Several studies have looked at the differences between primary and repeat cesarean sections, and the results vary. Repeat cesarean sections are often linked to more intense visceral pain, greater surgical challenges, and a higher likelihood of chronic pain. In contrast, primary cesarean sections usually involve more incisional pain. Interestingly, even though the pain scores may be similar, patients undergoing repeat cesarean sections often use fewer opioids after surgery. Additionally, it seems that women who have had multiple births (multiparas) report experiencing inadequate pain relief more often than those who are giving birth for the first time (primiparas) during a cesarean section.

2.3. RESEARCH HYPOTHESES

Comparing the post-operative pain severity and analgesia consumption among pregnant women who underwent a primary cesarean section versus first, and second repeated cesarean section under spinal anesthesia was hypothesized as follows:

HO1: There is no significant difference in postoperative pain severity between women undergoing primary cesarean sections and those undergoing first and second repeat cesarean sections.

HA1: There is a significant difference in postoperative pain severity between women undergoing primary cesarean sections and those undergoing first and second repeat cesarean sections

HO2: There is no significant difference in total analgesic consumption within the first 24 hours postoperatively among the study groups.

HA2: There is a significant difference in total analgesic consumption within the first 24 hours postoperatively among the study groups.

2.4. CONCEPTUAL FRAME WORK

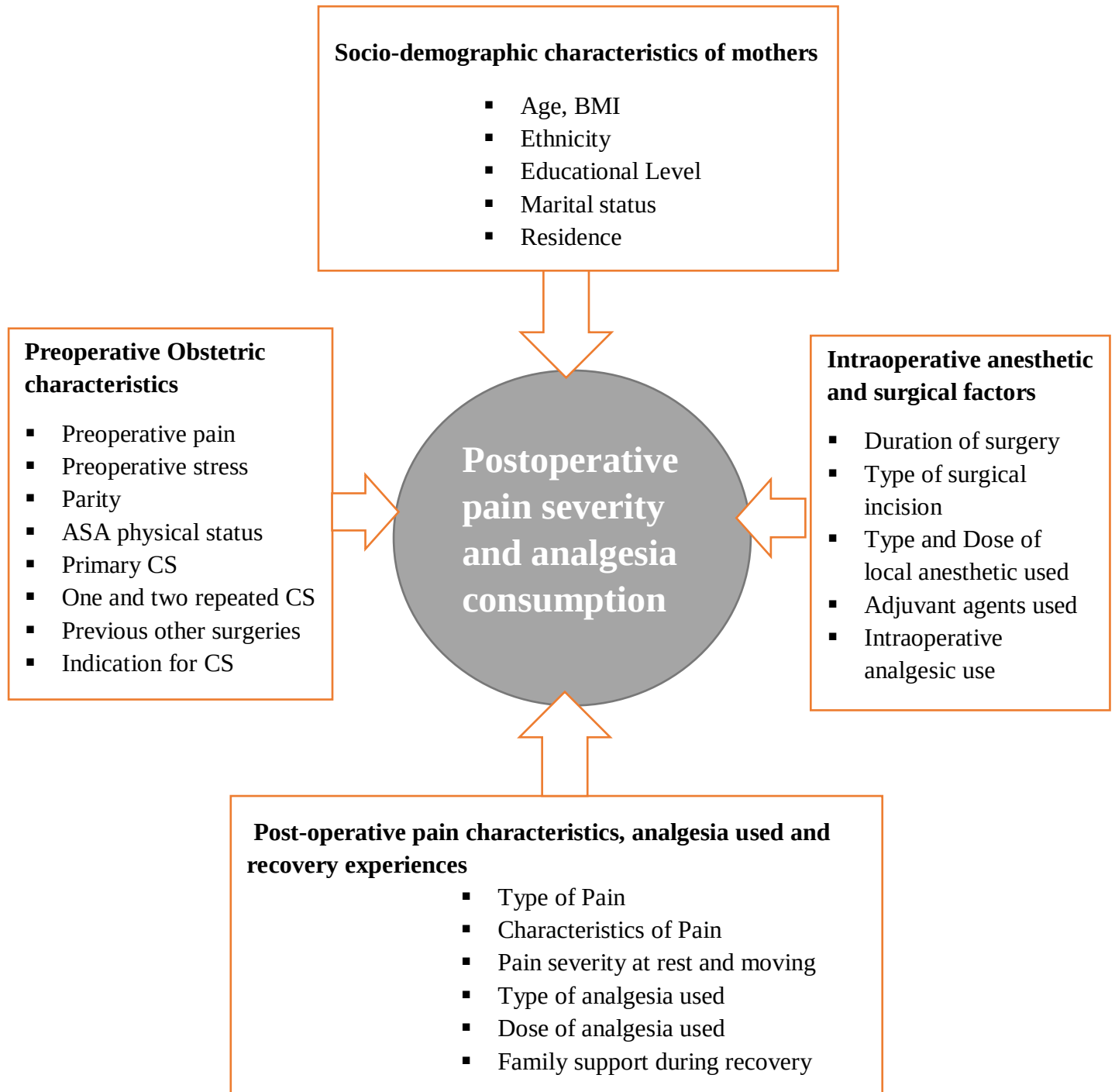


FIGURE 1: CONCEPTUAL FRAMEWORK FOR COMPARING POSTOPERATIVE PAIN SEVERITY AND ANALGESIA CONSUMPTION AMONG PATIENTS WHO UNDERWENT PRIMARY VERSUS REPEATED CESAREAN SECTION (CS) UNDER SPINAL ANESTHESIA (*Developed based on previous research on postoperative pain in cesarean sections*) (1,7,8,17,28).

CHAPTER THREE: OBJECTIVES

3.1. GENERAL OBJECTIVE:

The main objective of this study was to compare the severity of postoperative pain and analgesic consumption within the first 24 hours among pregnant women who underwent a primary cesarean section and those who had a first and second repeat cesarean section under spinal anesthesia at Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia, between January 1 and March 30, 2025 G.C.

3.2. SPECIFIC OBJECTIVES:

- To compare the severity of postoperative pain, as measured by the Numerical Rating Scale, within the first 24 hours after surgery between women undergoing primary cesarean sections and those undergoing first and second repeat cesarean sections.
- To compare the total amount of analgesic consumption (in milligrams of tramadol or diclofenac equivalent) within the first 24 hours postoperatively between women undergoing primary versus first and second repeat cesarean sections.

CHAPTER FOUR: METHODOLOGY

4.1. STUDY DESIGN

A prospective cohort study was conducted to compare the severity of postoperative pain and the amount of analgesia consumed within the first 24 hours among women who underwent primary cesarean section and those who had their first and second repeat cesarean section. All surgeries were performed under spinal anesthesia at Tikur Anbessa Specialized Hospital in Addis Ababa, Ethiopia, between January 1 and March 30, 2025 (Gregorian calendar).

4.2. POPULATION

4.2.1. SOURCE OF POPULATION

All pregnant women who underwent cesarean delivery under anesthesia at Tikur Anbessa Specialized Hospital (TASH).

4.2.2. STUDY POPULATION

The study population consisted of pregnant women who underwent either elective or emergency cesarean sections under spinal anesthesia at TASH during the study period, provided they met the inclusion criteria.

4.3. STUDY AREA AND PERIOD

This study was conducted at TASH, the largest and most well-known teaching and referral hospital in Ethiopia. TASH is located in the center of Addis Ababa, the capital city, which comprises 11 sub-cities and is served by 12 public hospitals and 96 health centers. According to the World Population review, the city's population was estimated to be 5.7 million in 2024 (G.C.).

Tikur Anbessa was originally established in 1961 by Emperor Haile Selassie I as Prince Mekonnen Memorial Hospital and was renamed in 1976. The hospital was funded by contributions from the Ethiopian people and has since served communities across the country. It operates under the

administration of Addis Ababa University. TASH is a large tertiary care facility with over 600 inpatient beds, nine major operating rooms, four orthopedic theaters, and two dedicated cesarean section rooms. The hospital performs an average of 6 to 12 cesarean deliveries daily, with more than half being elective procedures.

The data collection period for this study spanned three months, from January 1 to March 30, 2025.

4.4. SAMPLE SIZE DETERMINATION

The sample size for this study was determined using the Epi Info statistical calculator, based on data from a previously published comparative studies. In that study, the incidence of severe postoperative pain was reported as 16.7% among primiparous women undergoing a primary cesarean section, and 33.7% among multiparous women undergoing a repeat cesarean section, with findings derived from research conducted in China (1,8). These proportions were used as inputs to ensure adequate statistical power to detect a meaningful difference in pain severity and analgesia consumption between the two groups. To verify this estimate, a manual calculation was also performed using the double population proportion formula, assuming: 80% power, 95% confidence interval, and an equal ratio (1:1) between the primary and repeated cesarean section groups. Accordingly, the total calculated sample size was:

$$n = \frac{(Z_{\alpha/2} + Z_{\beta})^2 \times (p_1(1-p_1) + p_2(1-p_2))}{(p_1 - p_2)^2}$$

$$n = \frac{(1.96 + 0.84)^2 \times (0.167 \times 0.833 + 0.337 \times 0.663)}{(0.167 - 0.337)^2} = \frac{7.84 \times 0.362}{0.029} \approx \underline{98 \text{ per group}}$$

Total sample size = 98+98 = 196, including a 5% non-response rate (n = 10), the final calculated sample size was 206. Where;

- $p_1 = 0.167$ (proportion of postoperative pain severity in primary C-sections)
- $p_2 = 0.337$ (proportion of postoperative pain severity in repeated C-sections)
- $q = 1 - p$; $q_1 = 1 - p_1 = 1 - 0.167 = 0.833$ and, $q_2 = 1 - p_2 = 1 - 0.337 = 0.663$
- $Z_{\alpha/2} \approx 1.96$ (for a significance level of 0.05),
- $Z_{\beta} \approx 0.84$ (for a power of 0.80)

4.5. SAMPLING METHODS

A systematic random sampling method was employed to select eligible pregnant women from the daily surgical schedule. Over the three-month study period, a situational analysis of the operation logbook was conducted, which identified an estimated 400 women who met the inclusion criteria for cesarean delivery under spinal anesthesia at TASH.

To accommodate potential seasonal variations, the average case prevalence over the three-month period was used, based on the hospital's annual delivery data. Given a final sample size of $n = 206$, the sampling interval (kth) was calculated as follows: $kth = N/n = 400/206 = 1.94$. Rounding the interval to the nearest whole number, every second patient was selected. Patients were listed based on the chronological order of their admission to the operating room. The first participant was randomly selected using a lottery method from the day's scheduled patients posted on the operation board. Subsequently, data were collected from every second eligible patient until the required sample size was reached within the study period.

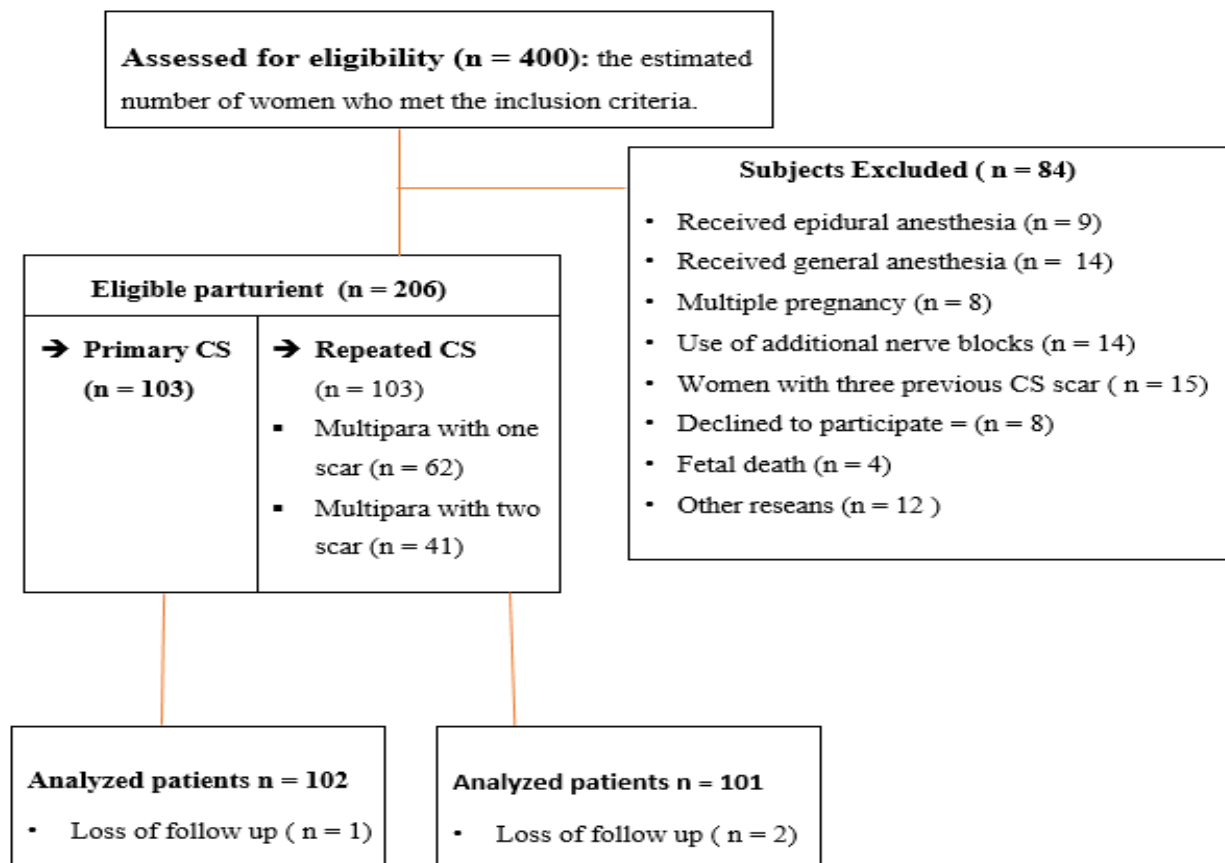


FIGURE 2: FLOW DIAGRAM ILLUSTRATING THE SELECTION PROCESS OF STUDY PARTICIPANTS.

4.6. ELIGIBILITY CRITERIA

4.6.1. INCLUSION CRITERIA

Participants were eligible for inclusion in the study if they met all of the following conditions:

- Women aged between 18 and 40 years undergoing cesarean section under spinal anesthesia
- Provided voluntary and informed consent to participate
- Classified as ASA (American Society of Anesthesiologists) physical status II or III

4.6.2. EXCLUSION CRITERIA

Participants were excluded from the study if they met any of the following conditions:

- History of chronic pain disorders, recent or long-term opioid use, substance abuse, or known psychiatric illness
- Hearing or speech impairments that interfered with communication
- Partial or complete failure of spinal anesthesia or any absolute or relative contraindication to its use
- Patients receiving epidural or general anesthesia
- Presence of severe pregnancy-related complications (e.g., cardiac, neurological, hepatic, or renal conditions) that were life-threatening and required emergency intervention before the cesarean section
- Use of additional nerve blocks for anesthesia or analgesia
- Multiple pregnancies
- Heavy smoking (defined as more than 30 pack-years) or alcohol dependence
- Intrauterine fetal demise, due to its potential psychological impact on the mother
- Women undergoing a third or higher repeat cesarean section (i.e., those with three or more previous uterine scars).

4.7. DATA COLLECTION PROCEDURES AND TOOLS

Data collection was carried out at TASH by three trained data collectors through chart reviews and structured questionnaires available in both English and Amharic. The questionnaire included sections on socio-demographic characteristics, preoperative obstetric information, intraoperative details, and postoperative pain characteristics, patient pain responses at rest and during movement, recovery experiences, and follow-up information. A Numerical Rating Scale (NRS) was used to measure the intensity of postoperative pain.

During the preoperative visit, the first data collector (an anesthetist) explained the study's objectives, potential risks and benefits, and confidentiality procedures to eligible participants. Informed consent was obtained from all participating mothers. In the operating room, patients were connected to standard ASA monitors. Spinal anesthesia was administered using 0.5% Bupivacaine at the L3–L4 interspace in a sitting position, after confirming free flow of cerebrospinal fluid without barbotage.

Following administration, the anesthetist assessed the block level: autonomic block with alcohol swabs, sensory block with a pinprick test, and motor block using the Bromage scale (target score of 3). Only patients who achieved an adequate sensory level (T5–T6) and a successful spinal block were included in the study. Intraoperative data were documented accordingly.

At the conclusion of surgery, patients were transferred to the Post-Anesthesia Care Unit (PACU), where immediate postoperative pain scores during the first hour were assessed using the NRS, both at rest and during movement (during cough). The patient's bed number and assigned ward were documented before transfer from the PACU, and a formal handover was provided to the ward nurse.

In the postoperative ward, the other two data collectors (nurses) assessed and recorded both incisional and visceral pain scores using the static NRS (at rest during quiet breathing) and dynamic NRS (after voluntary coughing). The women were asked to report their pain intensity using NRS at the, 6th, 12th, and 24th hours post-surgery (1,2,21,28). These scores were recorded from the patients' charts, and the total analgesic consumption within the first 24 hours was also documented for each patient.

The Numerical Rating Scale is a simple 11-point scale used to assess pain, where 0 indicates no pain at all and 10 represents the most severe/maximum/worst pain imaginable. Based on this scale, pain intensity is categorized as mild (scores of 1 to 3), moderate (4 to 6), and severe (7 to 10) (2,7,8). The principal investigator and supervisors closely monitored the quality, clarity, and completeness of each data collection form.

4.8. STUDY VARIABLES

4.8.1. DEPENDENT VARIABLES

- Postoperative pain severity
- Total post-operative analgesia consumption

4.8.2. INDEPENDENT VARIABLES

Maternal Socio demographic Factors

- Age
- Body Mass Index (BMI)
- ASA physical status classification
- Educational status
- Marital status

Preoperative obstetric characteristics

- Presence of preoperative pain
- Preoperative stress
- Parity
- Type of cesarean section (primary, first and second repeat)
- Indication for cesarean delivery
- History of previous other surgeries

Intraoperative anesthetic and surgical factors

- Duration of surgery
- Intraoperative use of analgesics
- Type of surgical incision
- Type of local anesthesia used
- Dose of local anesthetic and any adjuvant agents used

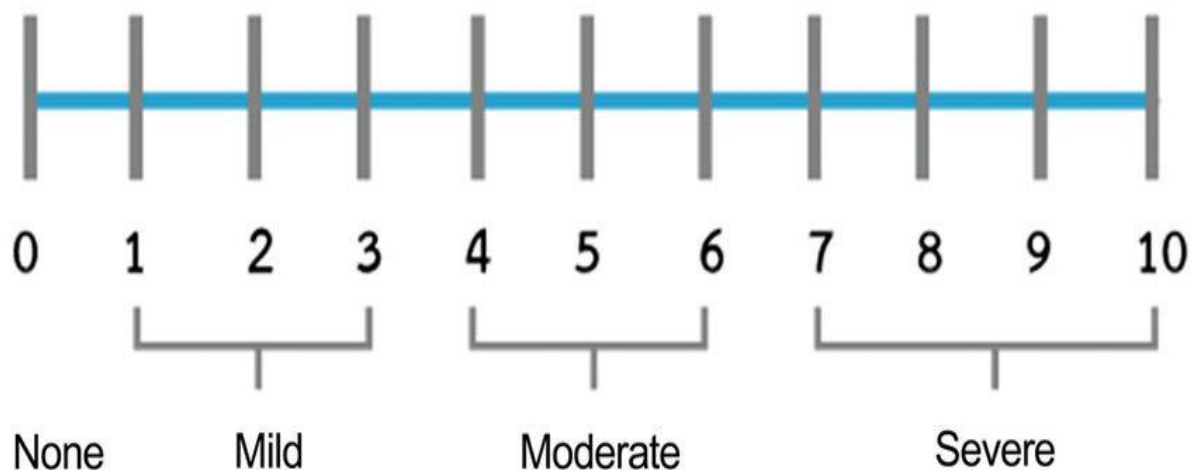
Post-operative pain characteristics, analgesia used and recovery experiences

- Type and amount of postoperative analgesics administered (including tramadol(IV), diclofenac (intramuscular injections and suppositories))
- Type of Pain
- Character or nature of Pain
- Pain experienced at rest and during movement (coughing)

4.9. OPERATIONAL DEFINITIONS

- Cesarean Section: A surgical procedure used to deliver one or more babies through an incision in the mother's abdomen and uterus, performed under anesthesia (29).
- ASA Physical Status Classification: A system developed by the American Society of Anesthesiologists to assess and communicate a patient's pre-anesthesia medical comorbidities (*adapted from Morgan and Mikhail, 7th edition*):
 - ASA I: A healthy patient undergoing a specific procedure.
 - ASA II: A patient with mild systemic disease without functional limitations.
 - ASA III: A patient with severe systemic disease with some functional limitations.
 - ASA IV: A patient with severe systemic disease that is a constant threat to life.
 - ASA V: A moribund patient not expected to survive without the operation.
 - ASA VI: A brain-dead patient whose organs are being removed for donation.
 - "E": Indicates that the procedure is performed as an emergency.
- Primary Cesarean Section: The first surgical delivery performed on a woman under spinal anesthesia (29).

- Repeated Cesarean Sections: Refers to the first and second repeat surgical deliveries performed after a previous cesarean section under spinal anesthesia (29).
- Primipara: A woman who has given birth once.
- Multipara: A woman who has given birth two or more times.
- Postoperative Pain (POP): Any pain reported by the patient following surgery, indicated by a pain score (NRS) greater than zero (28).
- Visceral pain: Is deep, dull, and poorly localized pain originating from internal organs like the uterus (1).
- Incisional pain: A type of somatic pain, but more narrowly focused on the area of incision (1).
- Postoperative inadequate analgesia: Defined as a NRS score of ≥ 4 , representing moderate to severe pain (8).
- Severity of postoperative pain: Defined as a NRS score of ≥ 7 , representing severe pain (2,8).
- Total Postoperative Analgesia Consumption: The total amount of analgesic drugs (in milligrams) administered within the first 24 hours following the patient's admission to the post-anesthesia care unit (7,28,30).
- Numerical Rating Scale: A simple, widely used method of pain assessment tool where the patient identifies their current pain level on a scale of 0 to 10. Pain intensity was assessed using the NRS at 1, 6, 12, and 24 hours postoperatively (2,17,28).



4.10. DATA PROCESSING AND ANALYSIS PROCEDURES

Upon completion of data collection, all questionnaires were carefully reviewed for completeness. The data were then coded and entered into Microsoft Excel, and subsequently exported to SPSS version 27 for statistical analysis. The normality of continuous variables was assessed using the Shapiro–Wilk test, supplemented by visual inspection of histograms to ensure accuracy. Descriptive statistics were used to summarize the data, with findings presented in tables and figures as appropriate. For continuous variables: If data were normally distributed, group comparisons were made using the independent t-test and results were expressed as mean $\pm$ standard deviation. If data were not normally distributed, the Mann–Whitney U test was used, and results were presented as median and interquartile range. For categorical variables: The Chi-square test was employed to assess differences between groups, with results expressed as frequencies (n) and percentages (%). A p-value < 0.05 was considered to indicate statistical significance throughout the analysis.

4.11. DATA QUALITY MANAGEMENT

To ensure the quality and reliability of the data, the questionnaire was pre-tested on 5% of the calculated sample size at Zewditu Memorial Hospital. Based on the feedback and results from the pretest, necessary modifications were made to improve clarity and relevance. Data collectors received one day of training from the principal investigator, which covered the overall purpose of the study, appropriate approaches for engaging with participants, handling of data collection tools, and the ethical right of mothers to decline participation.

Following the orientation, data were collected using a structured and pre-tested questionnaire. The principal investigator, along with designated supervisors, closely monitored the data collection process and routinely checked for completeness, clarity, accuracy, and consistency. Any questionnaires found to be incomplete were excluded from data entry. Prior to analysis, thorough data cleaning and verification were performed to ensure data integrity.

4.12. ETHICAL CONSIDERATION

Ethical approval for this study was obtained from the Institutional Review Board of the Department of Anesthesia, School of Medicine, and Addis Ababa University. In addition, permission to conduct the research was granted by the medical director of Tikur Anbessa Specialized Hospital, and the consent of the data collectors was also secured.

After participants were fully made aware of the significance of the study, process, and objective, all the participants provided consent after being fully informed. There was neither a material nor financial incentive for participating. All participants were fully made aware of their right to withdraw at any time from the study without risking any penalty. Unique numbers were allocated to anonymize participants, and no personal information was recorded in an effort to maintain privacy. All the information received was treated in utmost confidence and utilized only for the purpose of this research.

4.13. DISSEMINATION OF RESULTS

The results of this investigation will be sent to the Department of Anesthesia for evaluation and academic discussion. The findings will also be shared via seminars, presentations at scientific conferences, and national and international anesthesia association meetings. Policymakers and curriculum developers will be advised by the research findings to modify techniques for postoperative pain management among cesarean section types and prevention as well as resource allocation. Additionally, initiatives will be taken to publish the study in peer-reviewed scientific journals in order to guarantee wider distribution and add to the corpus of knowledge in the field of anesthesiology worldwide.

CHAPTER FIVE: RESULT

5.1. SOCIO-DEMOGRAPHIC CHARACTERISTICS

203 women who had cesarean sections (CS) at TASH in 2025 were included in the study. Participants were separated into two groups: those receiving a repeated CS and those receiving a primary CS. The average age in the primary CS group was 26.89 years (± 4.74), while women in the repeated CS group were significantly older, with a mean age of 30.86 years (± 4.22 ; $p < 0.001$). These findings suggest a potential association between older maternal age and the likelihood of undergoing repeated cesarean sections.

There were no statistically significant differences between the two groups in terms of educational level, marital status, weight, height, BMI, or ethnicity ($p > 0.05$). This consistency in marital status and BMI likely reflects similar socio-economic and lifestyle characteristics across the study population. Regarding ethnicity, the Amhara and Gurage were the most represented in both group. Most participants resided in urban areas, which may reflect better access to tertiary care facilities like TASH rather than any inherent differences in health risks or outcomes ($p = 0.318$), as shown in Table 1 below.

TABLE 1: DISTRIBUTION OF SOCIO - DEMOGRAPHIC CHARACTERISTICS OF PATIENT WHO UNDERWENT CAESAREAN SECTION (CS) AT TASH, 2025 (n = 203).

Variable	Category	Group (CS type)		P value
		Primary n = 102	Repeated n = 101	
Age	Years ($\bar{X} \pm SD$)	26.89 $\pm$ 4.74	30.86 $\pm$ 4.22	< 0.001*
Age group	18 – 30 year n (%)	81(79.4)	47(46.5)	< 0.001
	31 – 40 year n (%)	21(20.6)	54(53.5)	
Weight	In kilogram	66.95 $\pm$ 9.97	66.6 $\pm$ 10.69	P = 0.811
Height	In meters	1.61 $\pm$ 0. 065	1.61 $\pm$.058	P = 0.924

Educational level	No formal education n (%)	7(6.9)	10(9.9)	P = 0.327
	Read and write n (%)	38(37.3)	42(41.6)	
	Secondary school n (%)	28(27.5)	31(30.7)	
	Degree and above n (%)	29(28.4)	18(17.8)	
Marital status	Single n (%)	0(0.0)	1(1.0)	P = 0.368
	Married n (%)	101(99)	100(99)	
	Windowed n (%)	1(1.0)	0(0.0)	
BMI	Underweight (<18.5) n (%)	0(0.0)	1(1.0)	P = 0.743
	Normal weight (18.5-24.9) n (%)	47(46.1)	48(47.5)	
	Over weight (25-29.9) n (%)	43(42.2)	39(38.6)	
	Obesity (30-39.9) n (%)	12(11.8)	13(12.9)	
Ethnicity	Amhara n (%)	38(37.3)	31(30.7)	P = 0.487
	Oromo n (%)	21(20.6)	23(22.8)	
	Tigray n (%)	4(3.9)	3(3.0)	
	Gurage n (%)	22(21.6)	32(31.7)	
	Slte n (%)	10(9.8)	9(8.9)	
	Others n (%)	7(6.9)	3(3.0)	
Residence	Urban n (%)	101(99)	101(100)	P = 0.318
	Rural n (%)	1(1.0)	0(0.0)	

Note: Values are presented as number (%), analyzed using the Chi-square test; and as mean $\pm$ standard deviation (SD), analyzed using the independent t-test. BMI refers to Body Mass Index. A p-value < 0.05 was considered statistically significant.

5.2. PREOPERATIVE OBSTETRIC CHARACTERISTICS

A significantly greater proportion of women in the primary CS group were classified as ASA physical status II (94.1%) compared to the repeated CS group (85.1%). In contrast, ASA III status was more common among women in the repeated group (14.9%; $p = 0.036$). This may suggest that comorbidities or pregnancy-related complications increase with subsequent pregnancies and surgical interventions. Similarly, parity and the number of children were significantly higher among women in the repeated CS group ($p < 0.001$ for both), consistent with their reproductive history.

A notably higher proportion of women in the repeated CS group reported no preoperative pain (85.1%) compared to those in the primary CS group (56.9%; $p < 0.001$). This difference may be attributed to prior surgical experience, which could lead to better pain management or lower anxiety about the procedure. Emergency CS were more frequently performed in the primary group (65.7%), whereas the repeated CS group had a higher proportion of elective procedures (82.2%; $p < 0.001$). This likely reflects more advanced planning and decision-making for women with a known history of cesarean delivery (as seen in table 2 below).

TABLE 2: PREOPERATIVE CHARACTERISTICS OF THE PARTURIENT WHO UNDERWENT CAESAREAN SECTION AT TASH, 2025 (n =203).

Variable	Category	Group		P value
		Primary n = 102	Repeated n = 101	
ASA	II	96(94.1%)	86(85.1%)	P = 0.036
	III	6(5.9%)	15(14.9%)	
Parity	1 times	63(61.8%)	2(2%)	< 0.001**
	2 times	16(15.7%)	38(37.6%)	
	3 times	18(17.6%)	46(45.5%)	
	> or = 4 times	5(4.9%)	15(14.9%)	

Number of children's	1	68(66.7%)	3(3%)	< 0.001**
	2	17(16.7%)	54(53.5%)	
	> or = 3	17(16.7%)	44(43.6%)	
Preoperative pain (using the NRS)	No pain	58(56.9%)	86(85.1%)	< 0.001
	Mild pain	13(12.7%)	6(5.9%)	
	Moderate pain	23(22.5%)	9(8.9%)	
	Severe pain	8(7.8%)	0(0.0%)	
Reason for CS	Elective	35(34.3%)	83(82.2%)	< 0.001
	Emergency	67(65.7%)	18(17.8%)	
Preoperative stress	Low n (%)	39(38.2%)	39(38.6%)	P = 0.937
	Medium n (%)	46(45.1%)	47(46.5%)	
	High n (%)	17(16.7%)	15(14.9%)	

Note: Values are presented as number (%) and analyzed using the Chi-square test. ASA refers to the American Society of Anesthesiologists physical status classification. A p-value < 0.05 was considered statistically significant.

5.3. INTRAOPERATIVE ANESTHETIC AND SURGICAL - RELATED FACTORS

The duration of surgery was significantly longer in the repeated cesarean section group, averaging 51.7 minutes compared to 41.7 minutes in the primary CS group ($p < 0.001$). This extended time is likely due to the presence of adhesions or anatomical changes resulting from previous surgeries. The type of surgical incision, however, did not differ between the groups, with nearly all procedures employing the standard Pfannenstiel (horizontal) incision ($P = 0.314$).

There were no statistically significant differences between the two groups in terms of intraoperative analgesia or the use of adjuvant medications ($p > 0.05$). Although the difference in bupivacaine dose was not statistically significant ($p = 0.334$), there was a slight trend toward higher doses in the repeated CS group: 65.3% received 12.5 mg and 18.8% received 15 mg, compared to 61.8% and 14.7%, respectively, in the primary CS group.

TABLE 3: INTRAOPERATIVE ANESTHETIC AND SURGICAL - RELATED FACTORS OF THE PARTURIENT WHO UNDERWENT CAESAREAN SECTION AT TASH, 2025 (n =203).

Variable	Category	Group		P value
		Primary n=102	Repeated n=101	
Dose of bupivacaine given	10mg	24(23.5%)	16(15.8%)	P = 0.334
	12.5mg	63(61.8%)	66(65.3%)	
	15mg	15(14.7%)	19(18.8%)	
Adjuvant added	Morphine	2(2.0%)	5(5.0%)	P = 0.147
	None	94(92.2%)	90(89.1%)	
	Dexamethasone	3(2.9%)	0(0.0%)	
	Fentanyl	3(2.9%)	6(5.9%)	
Duration of surgery	In minutes ($\bar{X} \pm SD$)	41.7 $\pm$ 4.1	51.7 $\pm$ 5.4	P < 0.001**
Type of incision	Classical [midline]	0(0.0%)	1(1.0%)	P = 0.314
	Pfannenstiel	102(100%)	100(99.0%)	
Intraoperative analgesia used	None	95(93.1%)	98(97.0%)	P = 0.436
	Tramadol	5(4.9%)	2(2.0%)	
	Fentanyl	2(2.0%)	1(1.0%)	

Note: Values are presented as number (%) and were analyzed using the Chi-square test; mean $\pm$ standard deviation (SD) values were analyzed using the independent t-test. A p-value < 0.05 was considered statistically significant.

5.4. COMPARISON OF POSTOPERATIVE PAIN SEVERITY AT REST AND WHILE MOVING (DURING COUGH)

Pain intensity was assessed using the Numerical Rating Scale (NRS) at rest (during quiet breathing) and during movement (voluntary coughing) at 1, 6, 12, and 24 hours postoperatively. As shown in Table 4, pain levels during the first postoperative hour in the PACU were minimal across both groups, with a median NRS of 0 (IQR: 0–1), and no statistically significant difference was observed ($p = 1.00$).

However, by the sixth hour, pain at rest had increased significantly, with the primary CS group reporting a median score of 3 (IQR: 2–4), while the repeated CS group reported a higher median of 5 (IQR: 4.5–5), indicating a statistically significant difference ($p = 0.001$). A similar trend was seen in movement - related pain, which was more severe among patients in the repeated CS group (median: 7, IQR: 7–8) compared to the primary CS group (median: 5, IQR: 4–7; $p = 0.001$).

This pattern persisted at 12 hours postoperatively. Median pain scores at rest remained significantly higher in the repeated CS group (5 [IQR: 4–6]) compared to the primary group (3 [IQR: 2–5]; $p = 0.001$). During movement, the difference was even more pronounced, with repeated CS patients reporting a median score of 8 (IQR: 7–8) versus 5 (IQR: 4–7) in the primary CS group ($p = 0.001$).

Although pain levels had declined by the 24-hour mark in both groups, repeated CS patients continued to experience more pain. Median pain at rest remained elevated in the repeated group (4 [IQR: 4–6]) compared to the primary group (2 [IQR: 1–3]; $p = 0.001$), and movement-induced pain followed the same pattern, with scores of 7 (IQR: 6–8) and 4.5 (IQR: 4–5), respectively ($p = 0.001$). These findings consistently indicate a greater postoperative pain burden among women undergoing repeated cesarean deliveries, likely due to factors such as longer surgical duration, the presence of adhesions, and higher parity.

TABLE 4: COMPARISON OF POSTOPERATIVE PAIN SEVERITY BY NRS AT REST AND WHILE MOVING (n=203)

Time	NRS at rest			NRS while moving (cough)		
	Primary CS	Repeated CS	P value	Primary CS	Repeated CS	P value
1 st hour at PACU	0(0-0)	0(0-0)	1.00	0(0-0)	1(0-1)	1.00
6 th hours	3(2-4)	5(4-5.5)	0.001	5(4-7)	7(7-8)	0.001**
12 th hours	3(2-5)	5(4-6)	0.001**	5(4-7)	8(7-8)	0.001**
24 th hours	2(1-3)	4(4-6)	0.001	4.5(4-5)	7(6-8)	0.001*

Note: Values were analyzed using the Mann-Whitney U test, and are presented as median (interquartile range, IQR). PACU refers to the Post-Anesthesia Care Unit, and NRS stands for Numeric Rating Scale. ** indicates very statistically significant differences.

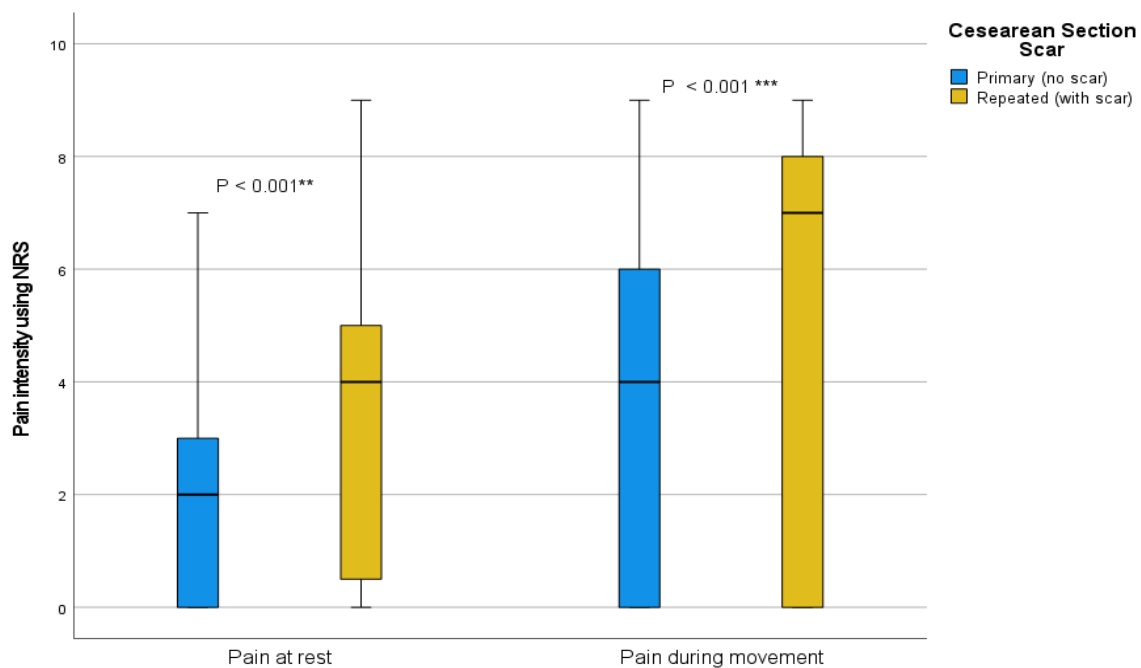


FIGURE 3: BOX PLOT SHOWING THE PAIN SCORES AT REST AND DURING MOVEMENT (COUGHING) WITH IN THE FIRST 24 HOURS POSTOPERATIVELY. *** indicates highly statistically significant differences.

TABLE 5: INCIDENCE OF MODERATE TO SEVERE POSTOPERATIVE PAIN AT REST AND WHILE MOVING (DURING COUGH) FOR MOTHERS WHO UNDERWENT CAESAREAN SECTION AT TASH, 2025 (n=203)

Group						
Variable	Primary n = 102		Repeated n = 101		RR 95% CI	P value
	Moderate to Severe POP n (%)		Moderate to Severe POP n (%)			
<i>Pain intensity</i>	NO	YES	NO	YES		
6th hrs.						
At rest	48(47.1)	54 (52.9)	26(25.7)	75(74.3)	1.82(1.2 -2.7)	P = 0.002
At moving	34(33.3)	68 (66.7)	8 (7.9)	93 (92.1)	3.03(1.6 -5.7)	< 0.001****
12th hrs.						
At rest	55(53.9)	47 (46.1)	27 (26.7)	74 (73.3)	1.97(1.4-2.8)	< 0.001**
At moving	36(35.3)	66 (64.7)	17(16.8)	84(83.2)	1.75(1.2-2.6)	
24th hrs.						
At rest	62(60.8)	40(39.2)	38(37.6)	63(62.4)	1.6(1.2-2.2)	P = 0.001*
At moving	53(52)	49(48)	31 (30.7)	70 (69.3)	1.7(1.1-2.3)	P = 0.002

Note: Values are presented as frequency (proportion) were analyzed using the Chi-square test. Abbreviations: CS – Cesarean Section, RR – Relative Risk, POP – Postoperative Pain, hrs. – Hours, CI – Confidence Interval. *** indicates highly statistically significant differences.

Table 5 further supports the above findings by categorizing pain intensity into two levels: "No to Mild" (NO) and "Moderate to Severe" (YES).

At the 6-hour mark, a significant difference in pain severity during movement was observed: 66.7% of patients in the primary cesarean section group experienced moderate to severe pain,

compared to 92.1% in the repeated CS group ($p < 0.001$), indicating a notable disparity in pain perception between the two groups.

At rest during the 12-hour mark, 73.3% of repeated CS patients reported moderate to severe pain ($p < 0.001$). Movement-induced pain at 12 hours was especially pronounced in repeated CS patients, with 83.2% experiencing moderate to severe pain compared to just 64.7% in the primary group ($p < 0.001$). By 24 hours after surgery, overall pain intensity had declined, which may be attributed to the natural physiological reduction of inflammatory mediators involved in the pain response.

Estimated cumulative incidence of moderate-to-severe pain (within 24 hrs.)

E.g. Pain on Movement at 6 Hours in primary cesarean :

- Maximum possible sum of pain events: $68 + 66 + 49 = 183$,
- Minimum unique patients = Maximum YES count (68, 66, 49) = 68
- Minimum Cumulative Incidence:
 - Minimum (lower bound): Maximum YES count/ $n = 68 / 102 = 66.7\%$,
 - Maximum (upper bound) = 102 (100 %)

Group	n	At Rest ≥ 1 Episode	Incidence (%)	At Movement ≥ 1 Episode	Incidence (%)
Primary Cesarean	102	≥ 54	$\geq 52.9\%$	≥ 68	$\geq 66.7\%$
Repeat Cesarean	101	≥ 75	$\geq 74.3\%$	≥ 93	$\geq 92.1\%$

Hint: Cumulative incidence was estimated based on the maximum number of patients experiencing moderate-to-severe postoperative pain at any of the recorded time points (6h, 12h, or 24h) (**see table 5**) and represent minimum cumulative incidence (due to possible individual-level overlap across time points).

The cumulative incidence of moderate-to-severe postoperative pain within 24 hours was at least 52.9% at rest and 66.7% on movement in the primary cesarean group. In the repeat cesarean group, the incidence reached at least 74.3% at rest and 92.1% on movement.

These estimates represent the minimum proportion of patients who experienced at least one episode of moderate-to-severe pain, assuming possible overlaps across time points.

5.5. COMPARISON OF POST-OPERATIVE ANALGESIA CONSUMPTIONS, PAIN CHARACTERISTICS, AND RECOVERY EXPERIENCES

The mean total dose of analgesics administered within the first 24 hours postoperatively was significantly higher in the repeated CS group, averaging 243.3 mg (± 98.4), compared to 146.3 mg (± 82.5) in the primary CS group ($p < 0.001$). This difference further highlights the increased postoperative analgesic needs associated with repeated cesarean deliveries.

A significantly higher proportion of women in the repeated CS group required more frequent analgesia in the first 24 hours following surgery. Specifically, 69.3% of these patients needed pain medication two to three times, and 18.8% required it four to five times. Only 4.0% did not use any analgesics. These findings suggest a greater intensity of postoperative pain among patients with repeated cesarean deliveries. In comparison, among the primary CS group, 52.0% took analgesia two to three times, 37.3% required it only once, and 10.8% did not require any medication during the first 24 hours ($p < 0.001$).

The character of the pain further distinguished the groups. Intermittent pain was more commonly reported by primary CS patients (72.5%), while a notable proportion of repeated CS patients (32.7%) experienced constant pain often regarded as more distressing. Although this difference approached statistical significance, it did not reach the threshold ($p = 0.058$). Support received from family or community during the immediate postoperative period also differed significantly. Only 30.4% of women in the primary CS group reported receiving very supportive care in the first 24 hours, compared to 81.2% in the repeated CS group ($p < 0.001$). This enhanced support in repeated CS cases may reflect greater awareness of recovery needs based on prior experience, as shown in table 6 below.

TABLE 6: COMPARISON OF POST-OPERATIVE PAIN CHARACTERISTICS, ANALGESIA CONSUMPTION AND RECOVERY EXPERIENCES WITHIN 24 HOURS AMONG PARTURIENT WHO UNDERWENT CAESAREAN SECTION AT TASH, 2025 (n =203)

		Group		
Variables	Category	Primary (n=102)	Repeated (n=101)	P value
Total dose of analgesia given	In mg ($\bar{X} \pm SD$)	146.3 $\pm$ 82.5	243.3 $\pm$ 98.4	< 0.001***
Pain killer medication-induced pain relief	No pain	52(51.5%)	11(10.9%)	< 0.001*
	Mild pain	47(46.5%)	82(81.2%)	
	Moderate pain	2(2.0%)	8(7.9%)	
	Not at all	11(10.8%)	4(4.0%)	
Frequency of pain medication given	Once	38(37.3%)	8(7.9%)	< 0.001*
	2 - 3 times	53(52.0%)	70(69.3%)	
	4 -5 times	0(0.0%)	19(18.8%)	
	Constant pain	21(20.6%)	33(32.7%)	
Nature of the pain	Intermittent	74(72.5%)	59(58.4%)	P = 0.058
	Dull pain	5(4.9%)	9(8.9%)	
	Sharp pain	2(2.0%)	0(0.0%)	
Family support	Very supportive	31(30.4%)	82(81.2%)	< 0.001*
	Somewhat supportive	71(69.6%)	19(18.8%)	

Note: Values are presented as Number (%) and analyzed using the Chi-square test. Continuous variables are expressed as mean ($\bar{X}$) $\pm$ standard deviation (SD) when normally distributed, and analyzed using the Independent t-test. *** indicates highly statistically significant differences.

The type of pain also varied markedly between the two groups. In the primary CS group, incisional pain alone was predominant (77.5%), whereas in the repeated CS group, the majority (78.2%) experienced a combination of incisional and visceral pain ($p < 0.001$) (see **fig. 4 below**). This difference may be due to increased internal manipulation, adhesions, or scarring associated with previous surgeries.

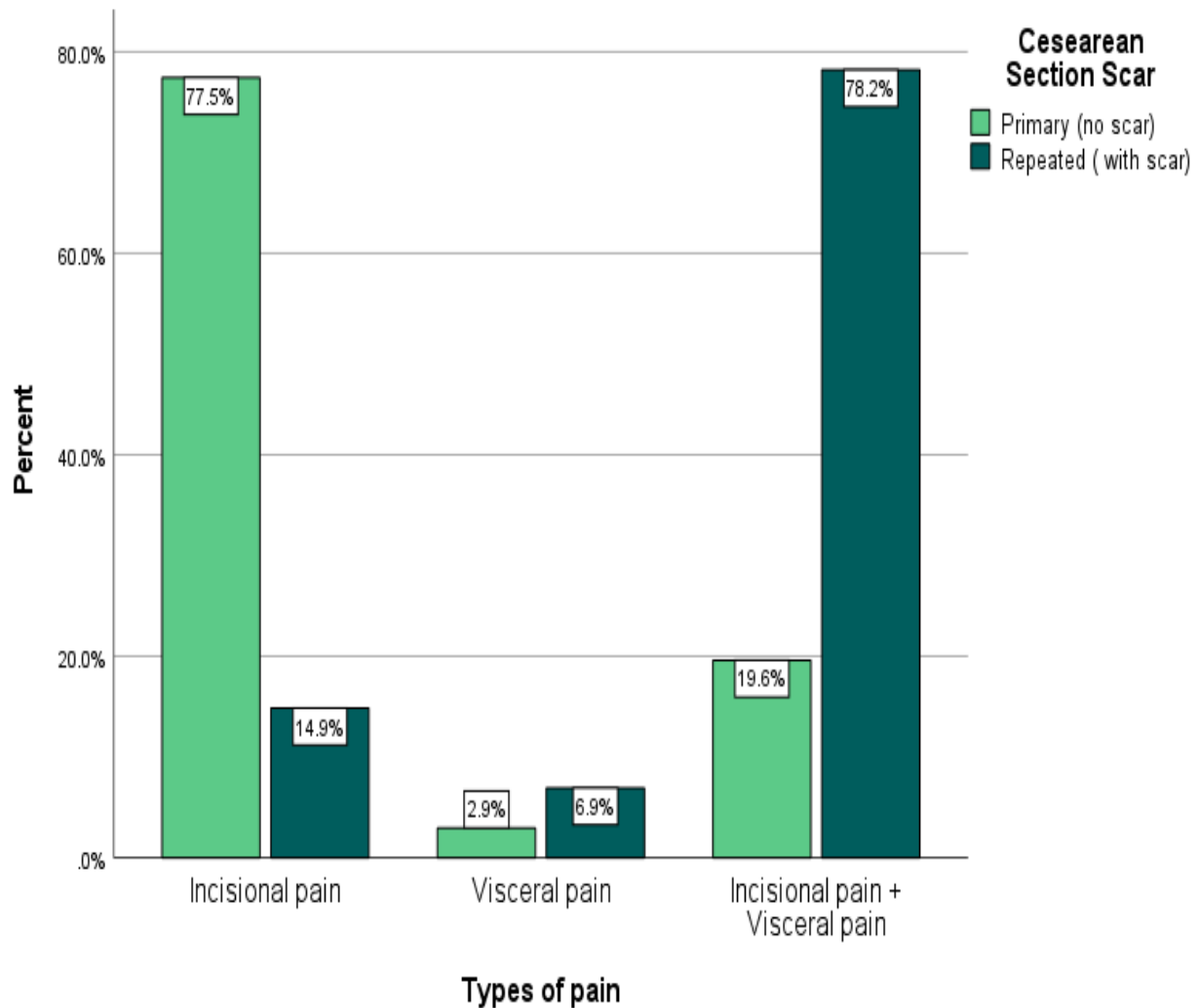


FIGURE 4: BAR GRAPH ILLUSTRATING THE TYPES OF POSTOPERATIVE PAIN AMONG WOMEN UNDERGOING PRIMARY AND REPEAT CESAREAN SECTIONS.

Regarding the type of analgesic treatments administered, the majority of primary cesarean section patients received diclofenac suppositories alone (55.9%), followed by intramuscular (IM) diclofenac (11.8%), and combination therapies such as diclofenac IM plus suppository (17.6%). In contrast, repeated cesarean section patients received more varied and intensive analgesic regimens. Only 24.8% were treated with diclofenac suppository alone, while nearly half (47.5%) received a combination of diclofenac IM and suppository. More complex regimens involving additional agents such as intravenous (IV) tramadol were also more commonly used in the repeated cesarean section group ($p < 0.001$), as shown in figure 5 below.

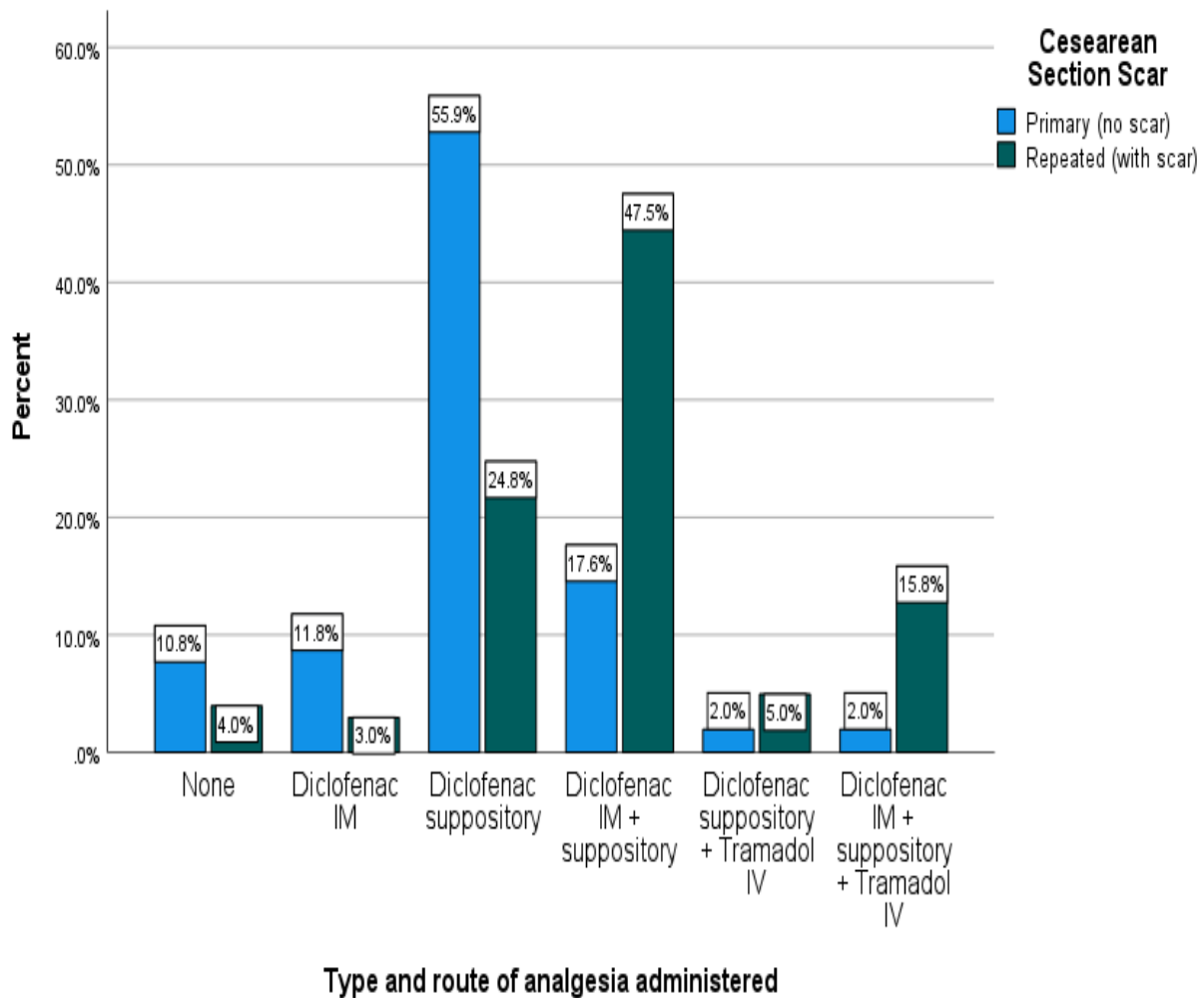


FIGURE 5: BAR GRAPH SHOWING THE DISTRIBUTION OF ANALGESIC TYPES AND ROUTES OF ADMINISTRATION WITHIN THE FIRST 24 HOURS POSTOPERATIVELY AMONG PRIMARY AND REPEATED CESAREAN SECTIONS.

CHAPTER SIX: DISCUSSION

This study demonstrates that women undergoing repeated cesarean sections experience significantly greater postoperative pain and require higher doses of analgesics compared to those undergoing a primary cesarean delivery. In particular, 92.1% of women in the group that had a repeat cesarean section experienced moderate to severe pain during movement, while only 66.7% of women in the primary cesarean group did the same. Women who have had previous cesarean sections had a significantly higher pain burden, as indicated by the computed relative risk of 3.03 (95% CI: 1.6–5.7). When evaluating postoperative pain, individual aspects including the existence of surgical scars should be considered since they may contribute to this enhanced pain experience.

In repeat CS, the median NRS score for post-operative pain severity was 7 (IQR: 7–8), while in the primary cesarean group, it was 5 (IQR: 4–7) ($p < 0.001$). The pain scores of both groups of patients were similar in the first hour after surgery, however there were differences by the sixth hour. At 6-, 12-, and 24-hours post-surgery, women who had repeated caesarean sections experienced higher pain severity during rest and exercise, particularly during coughing ($p < 0.001$). In the first 24 postoperative hours, the repeat cesarean group took significantly more analgesics than the primary cesarean sections, with an average of 243.3 mg (± 98.4) against 146.3 mg (± 82.5) ($p < 0.001$). This large range highlights the significance of personalizing postoperative pain management techniques, particularly for individuals undergoing repeat procedures.

Our findings align with Getahun et al.'s (2025) study, which found that 91.1% of women in the repeat cesarean group experienced moderate to severe pain while coughing or moving, compared to 52.4% in the primary group. Pain at rest was more common in repeat cesareans (74.3% in this research and 87.5% in Getahun's), compared to primary cesarean patients (52.9% and 35.7%, respectively), with a relative risk of 2.45 (95% CI: 1.98-3.02; $p < 0.001$) (28). Studies consistently reveal that repeated cesarean sections cause more severe pain following surgery, both at rest and during movement. This could be due to scar tissue, adhesions, or more complex surgical dissection, all of which can cause tissue trauma and slow wound healing.

Our results are similarly in line with a study conducted in China by Yang et al., which found that multiparous women experienced a higher rate of inadequate analgesia (24.0%) than primiparous

women undergoing cesarean section (16.7%) (8). But according to our research, a significantly greater percentage (92.1%) of women in the group that had multiple cesarean sections reported having moderate to severe pain, with a relative risk of 3.03. The application of patient-controlled analgesia (PCA) in Yang et al.'s study could account for this discrepancy, and which could have affected pain management and analgesic consumption. Additionally, the increased surgical complexity in repeated cesareans such as scarring, adhesions, and internal manipulation likely contributed to the higher pain levels observed in our cohort.

Contrary to our findings, a study by Gürbüz et al. conducted in Turkey assessed postoperative pain within the first six hours and reported a mean pain score of 5.56 ± 1.31 on the Visual Analog Scale, reported with no significant difference in pain levels based on the number of previous cesarean sections (24). However, our findings clearly reveal that women who have had many cesarean deliveries feel considerably more postoperative pain than those who have had a primary cesarean section. Pain intensity in the repeat cesarean section increased from a median NRS score of 7 (IQR: 7-8) at 6 hours post-surgery to 8 (IQR: 7-8) by 12 hours. At the same time period, however, the primary cesarean section reported a median NRS pain score of 5 (IQR: 4-7). These inequalities can be attributed to variations in pain measurement methodologies, timing of assessment, therapeutic interventions, and individual or cultural, social differences in pain perception.

This study's findings are consistent with those of Duan et al. in China, who followed both primiparas and multipara women undergoing multiple cesarean sections for 48 hours after surgery. The study indicated that women who had several cesarean sections had higher rates of postoperative pain, with a reported relative risk of 3.56 (95% CI: 1.05-12.04) (1). Demelash et al. found a link between multiple cesarean sections and higher postoperative pain (AOR: 2.3; 95% CI: 1.1-5.0), suggesting that previous procedures may contribute to post-operative pain severity (13). These findings support our findings and emphasize the need for personalized pain management measures for women enduring repeat cesarean procedures.

Study conducted by Duan et al. suggested that only 22.7% of women with repeated cesarean sections reported visceral pain, but incisional pain was more common in primary cesarean section (38.3%) (1). Our study found that women who had multiple cesarean sections (78.2%) experienced both incisional and visceral pain, while those in the primary cesarean section mostly reported

incisional pain (77.5%). Our study used the Numerical Rating Scale, while Duan's used the Visual Analog Scale, potentially explaining the variations in pain measurement methods. Variations may also be explained by characteristics such as surgical experience, number of previous procedures, and pain threshold. Increased scarring and adhesions from repeated operations are likely to contribute to more complex and extensive pain.

The current study found that cumulative postoperative analgesic consumption was higher in the repeat cesarean group than in the primary cesarean group. The finding of this study concurs with that of Getahun et al.'s prospective cohort study, which found that women in the repeat cesarean group required earlier analgesics and also had higher cumulative consumption of analgesics. The following are some reasons why this similarity may occur: same study design, increased tissue damage, adhesions from prior surgery, and longer operative times associated with repeated cesareans, which may all lead to more severe postoperative pain and greater doses of analgesics (28).

Our study revealed that women undergoing repeated cesarean section needed significantly higher doses of analgesics in the first 24 hours after surgery ($p < 0.001$) than those who had primary cesarean sections. In contrast to our findings, Chao A. et al. in the United States, who reported lower opioid consumption and no significant differences in postoperative pain ratings (7). This gap could be due to variations in patient characteristics, clinical assessment, or pain treatment approaches. One possible reason for our study higher pain and need for analgesics is that they had more severe adhesions or changed pain sensitivity due to previous operations. These findings underscore the importance of adapting pain treatment options to each patient's individual needs and clinical status.

As compared to the United States study by Holmes et al. where no difference was observed in opioid use or pain scores between primary and multiple cesarean section (22), our study showed significantly greater consumption of analgesic and postoperative pain severity among women who were exposed to repeated cesarean sections. This could be explained by the effect of surgical trauma, the number of previous surgeries, or variations in pain management types and strategies, population variability, and the current study's prospective cohort methodology. These disparities underscore the challenges of controlling pain following repeated cesarean sections.

CHAPTER SEVEN

7.1. LIMITATION OF STUDY

There are certain limitations to this research. First, the research was limited in external validity and its capacity to be generalized to more diverse or larger healthcare settings due to its single-institution design. Second, only the first 24 hours postoperatively were used in order to quantify severity of pain and consumption of analgesic, making it unable to examine effects longer-term such as chronic postoperative pain.

7.2. STRENGTH OF STUDY

There are some excellent strengths of the study. Statistical power and stability of the findings were enhanced by the sample size, which was quite large in relation to the previous research. A validated measure of pain assessment instrument (Numerical Rating Scale) was also utilized within the study at various rest and movement time points.

7.3. CONCLUSION

This study concludes that compared to women who have a the primary cesarean section, women who undergo multiple cesarean sections are much more likely to experience moderate to severe postoperative pain and need more analgesics. These results imply that when developing postoperative pain management policies, individual differences like surgical scars should be carefully taken into account.

7.4. RECOMMENDATION

We recommend that medical staff and anesthesia consider surgical scarring and history of previous cesarean sections when planning management of postoperative pain. In particular, in women having repeat cesarean sections, pain management has to be individualized.

In a better effort to understand their individual pain control needs, more than three women with previous cesarean sections must be enrolled in future studies. Beyond the first 24 hours post operation, long-term recovery and pain need to be evaluated and multicenter randomized trials conducted to ascertain that the results are more universally applicable.

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ANNEX

ANNEX ONE: ENGLISH VERSION INFORMATION SHEET

Title of study: Comparison of Postoperative Pain Severity and Analgesic Consumption Between Primary and Repeat Cesarean Sections Within 24 Hours Under Spinal Anesthesia at Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia (2024/25 G.C.).

Good morning/afternoon. I am _____, a data collector for research to be conducted by Mequanint Zenebe, a postgraduate student at the Department of Advanced Clinical Anesthesia, School of Medicine, and Addis Ababa University. Today, I am here to collect information regarding postoperative pain severity and analgesia consumption among patients who underwent primary cesarean sections versus first and second repeated C-sections under spinal anesthesia at TASH.

You have been selected to participate in a study because you will be undergoing a C-section with spinal anesthesia in the chosen operating room. The researcher is working on the record here for information when I decide to be a collector, it is to protect the confidentiality of the information. Participation in this study is completely voluntary, and you can decline to participate. Furthermore, you have the right to withdraw from the study at any time if you choose to do so. Participating in the survey has no personal benefits, but the results will help researchers and other healthcare professionals develop better ways to manage differences in postoperative pain.

Please note that any information you provide will be confidential using a unique code number. Only the researcher will have access to the coded data. The data collected will be used solely for this study. Your willingness to participate is crucial to the success of this study.

Consent form

According to the information provided earlier, you were briefly informed about the study and clearly understood its purpose. Would you please tell me if you agree to participate in the study?

- ☐ 1. Yes I agree, thank you! Please continue to the next page.
- ☐ 2. No I disagree, thank you! Kindly move on to the next eligible participant.

I have heard the information on the description page of the study, and the purpose of the study, and understand that not all the answers I give will be forwarded to a third party.

Your signature below indicates that you agree to participate in this study.

Date of data collection _____

Participant signature _____

Supervisor (Checked): Name _____ Signature _____ Date _____

The name of the chief researcher: Mequanint Zenebe Signature _____ Date _____

Address: Addis Ababa, Ethiopia

If you have any questions, you can contact me at zenebemequa33@gmail.com or +251946423244

ANNEX TWO: QUESTIONNAIRE

Instruction: For each question, please mark [✓] the number of alternatives that fit the response and fill in the blank space provided or choose from the given alternatives.

Data code _____

PART I: QUESTIONNAIRE ON SOCIO-DEMOGRAPHIC CHARACTERISTICS OF MOTHERS

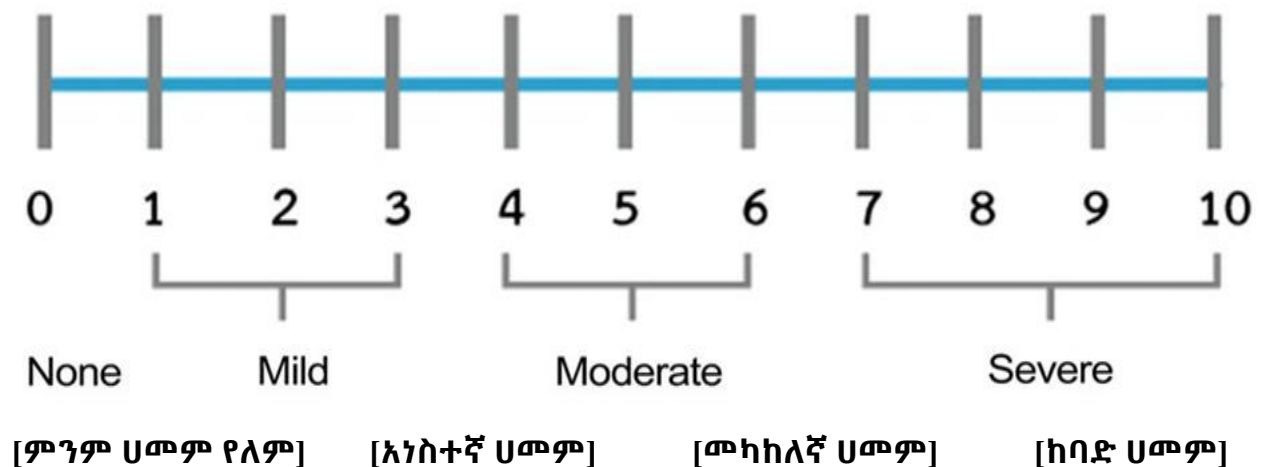
Serial number	Question	Response	
1.	Age (in years)	☐ Under 18 ----- ☐ 18 – 30 -----	☐ 31 – 40 ----- ☐ 41 – 50 -----
2.	BMI	_____ kg/m ²	
3.	Weight	_____ kg	
4.	Height	_____ cm	
5.	Ethnicity	☐ Amhara ☐ Oromo ☐ Somali	☐ Tigray ☐ Sidama ☐ Other: _____
6.	Educational Level	☐ No formal education ☐ Read and write	☐ Secondary school ☐ Degree and above
7.	Marital status	☐ Single ☐ Divorced	☐ Windowed ☐ Married
8.	Residence	☐ Urban	☐ Rural

PART II: QUESTIONS ON OBSTETRIC CHARACTERISTICS AND PERIOPERATIVE FACTORS

9.	Do you have any chronic medical conditions?	☐ Yes ☐ No	☐ If yes, specify: _____
10.	ASA physical status	☐ I	☐ II
11.	Have you had any previous surgeries?	☐ Yes ☐ No	If yes, specify: _____
12.	How many times have you been pregnant?	☐ 1 ☐ 2	☐ 3 ☐ 4 or more
13.	How many children do you have?	☐ 0 ☐ 1	☐ 2 ☐ 3 or more
14.	Preoperative pain	☐ No [0] ☐ Mild [1-3]	☐ Moderate [4-6] ☐ Severe [7-10]
15.	Preoperative analgesia given	☐ Yes	☐ No
[If your answer is yes to question number 16, answer question number 17 if not leave it.			
16.	Type of analgesia	Dose in mg ☐ Tramadol ☐ Diclofenac	Dose in mg ☐ Pethidine ☐ Other _____

17.	Type of incision	☐ Classical [midline] ☐ Pfannenstiel [horizontal]	
18.	Duration of surgery	_____min	
19.	Type of Cesarean Section	☐ Primary	☐ Repeated [First and second]
20.	What was the reason for your C- section?	☐ Elective ☐ Emergency	☐ Medical condition ☐ Other: _____
21.	How many previous C-sections have you had?	☐ I	☐ II ☐ No
22.	The dose of bupivacaine given	☐ 10mg ☐ 12.5 mg	☐ 15mg ☐ _____
23.	Adjuvant added	☐ Yes ☐ No	☐ If yes, specify: _____
24.	Intraoperative analgesia given	☐ None ☐ Tramadol	☐ Fentanyl

PART III: QUESTIONS ON POSTOPERATIVE PAIN CHARACTERISTICS, PARTICIPANT RESPONSE BOTH AT REST AND ON MOVEMENT [USING NRS] AND ANALGESIA USAGE



25.	Pain intensity at rest and while moving on a scale from (0-10) in the first hour's post-surgery.]	1hr. at rest	1hr. while moving
		☐ No [0] ☐ Mild [1-3] ☐ Moderate [4-6] ☐ Severe [7-10]	☐ No [0] ☐ Mild [1-3] ☐ Moderate [4-6] ☐ Severe [7-10]
26.	Pain intensity at rest and while moving on a scale from (0-10) in the 6 hours post-surgery	6hr. at rest	6hr. while moving
		☐ No [0] ☐ Mild [1-3] ☐ Moderate [4-6] ☐ Severe [7-10]	☐ No [0] ☐ Mild [1-3] ☐ Moderate [4-6] ☐ Severe [7-10]

27.	Pain at rest and while moving On a scale from (0-10) in the 12 hours post-surgery	12hr. at rest ☐ No [0] ☐ Mild [1-3] ☐ Moderate [4-6] ☐ Severe [7-10]	12hr. while moving ☐ Mild [1-3] ☐ Moderate [4-6] ☐ Severe [7-10]
28.	Pain intensity while moving On a scale from (0-10) in the next 24 hours post-surgery.	24hr. at rest ☐ No [0] ☐ Mild [1-3] ☐ Moderate [4-6] ☐ Severe [7-10]	24hr. while moving ☐ No [0] ☐ Mild [1-3] ☐ Moderate [4-6] ☐ Severe [7-10]
29.	Did you experience any of the following types of pain post-surgery?	☐ Incisional pain ☐ Visceral pain (Abdominal pain)	☐ Back pain ☐ Shoulder pain ☐ Other: _____
30.	How would you describe the nature character of your pain	☐ Sharp ☐ Dull ☐ Throbbing	☐ Constant ☐ Intermittent
31.	Type and dose of pain medication given within 24 hours of post-operative	Dose in mg ☐ None ☐ IV Paracetamol ☐ Diclofenac Suppository ☐ Diclofenac IM	Dose in mg ☐ Morphine ☐ Fentanyl ☐ Tramadol IV
32.	How often did you take pain medication in the first 24 hours?	☐ Not at all ☐ Once ☐ 2-3 times	☐ 4-5 times ☐ More than 5 times
33.	Any extra analgesia requirement	☐ Yes ☐ No	☐ If yes, specify: _____
34.	Did you experience any side effects from the pain medication?	☐ Yes: ☐ No	☐ If yes, specify: _____
35.	Did you use any traditional medicine for pain relief?	☐ Yes	☐ No
36.	Pain relief rating from medication	☐ No [0] ☐ Mild [1-3]	☐ Moderate [4-6] ☐ Severe [7-10]
37.	Family/community support during 24 hours post-surgery?	☐ Very supportive ☐ Somewhat supportive	☐ Not supportive
38.	Did you experience any complications during 24 hours post-surgery?	☐ Yes ☐ No	☐ If yes, specify: _____
39.	Additional comments or concerns regarding your postoperative pain: ----- ----- -----		

ANNEX [አባሪ] አንድ፡ ለጥናቱ ተሳታፊዎች መረጃ መስጫ እና የፈቃደኝነት መጠየቂያ ቅፅ

የጥናቱ ርዕስ ፡ በጥቁር አንበሳ ስፔሻላይዝድ ሆስፒታል ፣ አዲስ አበባ ፣ ኢትዮጵያ በ 2017 አ. ም ፣ ስፓይናል (በአከርካሪ) አንስቴዝያ ወስደው ለመጀመሪያ ጊዜ አፕራሲዎን አድርገው ልጅ ከወለዱ እና አንድ ወይም ሁለት ጊዜ ተደጋጋሚ አፕራሲዎን አድርገው ልጅ ከወለዱ ታካሚዎች መካከል ከቀዶ ጥገና በኋላ በ ሃያ አራት ሰዓታት ውስጥ ያለው የህመም ክብደት እና የህመም ማስታገሻ ፍጆታ ንፅፅር ነው ።

ጤና ይስጥልኝ እኔ _____ ነኝ ። በዚህ ሆስፒታል ውስጥ የምሰራ የጤና ባለሙያ ስሆን አሁን በአከርካሪ አንስቴዝያ ወስደው ለመጀመሪያ ጊዜ አፕራሲዎን ተደረጎ ልጅ ከወለዳቸው እና አንድ ወይም ሁለት ጊዜ ተደጋጋሚ አፕራሲዎን ተደረጎ ልጅ ከወለዳቸው ታካሚዎች መካከል ከቀዶ ጥገና በሃላ ከአንድ ሰዓት ጀምሮ እስከ ሃያ አራት ሰዓት ድረስ ያለውን የህመም ክብደት እና የህመም ማስታገሻ ፍጆታን በሚል ርእስ በ አዲስ አበባ ዩኒቨርሲቲ በአንስቴዝያ ትምህርት ክፍል የድህረ ምረቃ ተማሪ የሆኑት መኪንንት ዘነበ ለሚሰሩት ጥናት በመረጃ መዝገብዎት ላይ እና እርስዎን በመጠየቅ መረጃ እየሰበሰብኩ ነው ።

እርስዎ የጥናቱ አካል በመሆን ተመርጠዋል። ምክንያቱም በተመረጠው የቀዶ ጥገና ክፍል ውስጥ አከርካሪ አንስቴዝያ ስለሚወስዱ ፣ አጥኚዎ እዚህ መዝገብ ላይ የሚሰራው ጥናት ላይ እኔን ለመረጃ ሰብሳቢነት ሲመርጡኝ የመረጃውን ሚስጥራዊነት ለመጠበቅ ብሎ ነው ። በዚህ ጥናት ውስጥ ያለዎት ተሳትፎ ሙሉ በሙሉ በፈቃደኝነት ነው ፣ እና እርስዎ ለመሳተፍ እምቢ የማለት መብት አለዎት። በተጨማሪም፣ ይህን ለማድረግ ከመረጡ በማንኛውም ጊዜ ከጥናቱ የመውጣት መብት አለዎት ። በጥናቱ ውስጥ ለመሳተፍ ምንም የግል ጥቅሞች የሉም፣ ነገር ግን ውጤቶቹ ተመራማሪዎች እና ሌሎች የጤና ባለሙያዎች ከቀዶ ጥገና በኋላ ያለውን የህመም ልዩነት ለመቆጣጠር የተሻሉ መንገዶችን ለማዘጋጀት ይረዳሉ ።

ማንኛውም የሚያቀርቡት መረጃ ልዩ የሆነ ኮድ ቁጥር በመጠቀም በሚስጥር ይጠበቃል። ተመራማሪው ብቻ ኮድ የተደረገውን መረጃ ማግኘት ይችላል። የተሰበሰበው መረጃ ለዚህ ጥናት ብቻ ጥቅም ላይ ይውላል ። ለመሳተፍ ፈቃደኛ መሆን ለዚህ ጥናት ስኬት ወሳኝ ነው።

የስምዎን ቅጽ ፡ ቀደም ሲል በቀረበው መረጃ መሰረት ስለ ጥናቱ በአጭሩ እንዲያውቁ ተደርጓል እና ዓላማውን በግልጽ ተረድተዋል ። አሁን በጥናቱ ለመሳተፍ ከተስማሙ እባክዎን ንገሩኝ ?

- ☐ I. አዎ እስማማለሁ፣ አመሰግናለሁ! እባክዎ ወደ ሚቀጥለው ገጽ ይቀጥሉ ።
- ☐ II. አይ አልስማማም ፣ አመሰግናለሁ! በደግነት ወደ ቀጣዩ ብቁ ተሳታፊ ይሂዱ ።

በጥናቱ መግለጫ ገጽ ውስጥ ያለውን መረጃ ፣ የጥናቱን ዓላማ ሰምቻለሁ እና የምሠጣቸው መልሶች ሁሉ ወደ ሶስተኛ ወገን እንደሚይተላለፉ ተረድቻለሁ ። በተጨማሪም በጥናቱ ላይ ለመሳተፍ ወይም ላለመሳተፍ ወይም በማንኛውም ጊዜ ከጥናቱ መውጣት እንደምችል ተረድቻለሁ ።

ከዚህ በታች ያለው ፊርማዎ በዚህ ጥናት ውስጥ ለመሳተፍ መስማማትዎን ያሳያል ።

መረጃ የሚሰበሰብበት ቀን _____

የተሳታፊ ፊርማ ፡ _____

የቃለ-መጠይቅ ጠያቂው ስም ፡ _____ ፊርማ _____ ቀን _____

ተቆጣጣሪ ስም ፡ _____ ፊርማ _____ ቀን _____

የዋና ተመራማሪው ስም ፡ መኪንንት ዘነበ ፊርማ _____ ቀን _____

አድራሻ ፡ አዲስ አበባ ፣ ኢትዮጵያ ፣ ማንኛውም አይነት ጥያቄ ካሎት በኢሜል አድራሻ ፡
zenebemequa33@gmail.com ወይም የሞባይል ስልክ ፡ +251946423244 ሊያገኙኝ ይችላሉ ።

አባሪ ሁለት ፡ መጠይቅ [QUESTIONNAIRE]

መመሪያ [Instruction] ፡ ለእያንዳንዱ ጥያቄ እባክትን ከምላሹ ጋር የሚስማሙ የአማራጮች ቁጥር ላይ ምልክት [✓] ያድርጉ እና የቀረበውን ባዶ ቦታ ይሙሉ ወይም ከተሰጡት አማራጮች ውስጥ ይምረጡ ።
[For each question, please mark [✓] the number of alternatives that fit the response and fill in the blank space provided or choose from the given alternatives.]

የውሂብ [Data] ኮድ _____

ክፍል አንድ ፡ ስለ እናቶች ማህበራዊ - ስነ - ሕዝብ ባህሪያት መጠይቅ [Questionnaire on socio-demographic characteristics of mothers]

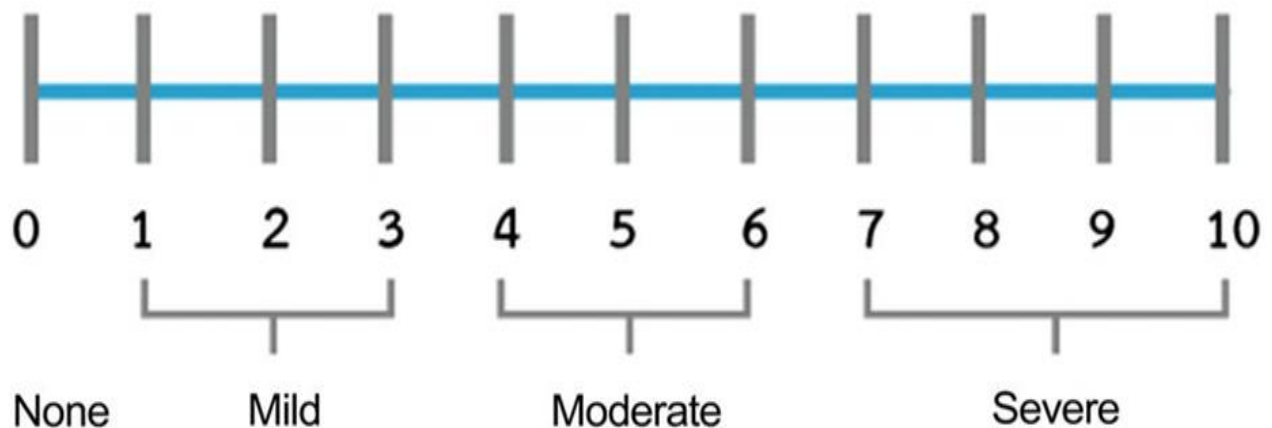
የመለያ ቁጥር	ጥያቄ (Question)	ምላሽ (Response)	
1.	ዕድሜ (በአመታት) [Age (in years)]	☐ ከ18 በታች ----- ☐ 18 – 30 -----	☐ 31 – 40 ----- ☐ 41 – 50 -----
2.	ክብደት [Weight]	_____ ኪ.ግ (kg)	
3.	ቁመት [Height]	_____ ሴ.ሜ (cm)	
4.	የሰውነት ብዛት ኢንዱክስ [BMI]	_____ ኪ.ግ / ሜ 2 (kg/m2)	
5.	ብሄር [Ethnicity]	☐ አማራ ☐ ኦሮሞ ☐ ሶማሊያ	☐ ትግራይ ☐ ሲዳማ ☐ ሌላ
6.	የትምህርት ደረጃ [Educational Level]	☐ መደበኛ ትምህርት የለም [No formal education] ☐ ማንበብ እና መጻፍ [Read and write]	☐ ሁለተኛ ደረጃ ትምህርት ቤት [Secondary school] ☐ ዲግሪ and above
7.	የጋብቻ ሁኔታ [Marital status]	☐ ነጠላ [Single] ☐ የተፋታ [Divorced]	☐ ባል የሞተባት [Windowed] ☐ ያገባች [Married]
8.	ቦታ [Residence]	☐ ከተማ [Urban]	☐ ገጠር [Rural]

ክፍል II : ስለ የፅንሰ ሰራዊት እና የፔሪፕራሰክቲክ ምክንያቶች ጥያቄዎች [Questions on Obstetric characteristics and perioperative factors]

9.	ሥር የሰደደ የጤና ችግር አለ? [Do you have any chronic medical conditions?]	☐ Yes ☐ No	☐ If yes, specify _____
10.	የአጫሪካ የአናስቲዚዮሎጂስቶች ማህበረሰብ አካላዊ ሁኔታ [ASA physical status]	☐ I	☐ II
11.	ከዚህ በፊት የተደረጉ ቀዶ ጥገናዎች ኖረዋል? [Have you had any previous surgeries?]	☐ Yes ☐ No	☐ If yes, specify _____
12.	ስንት ጊዜ እርጉዝ ሆናችኋል? [How many times have you been pregnant?]	☐ 1 ☐ 2	☐ 3 ☐ 4 or more
13.	ስንት ልጆች አሉት? [How many children do you have?]	☐ 0 ☐ 1	☐ 2 ☐ 3 or more
14.	ከቀዶ ጥገና በፊት ህመም [Preoperative pain]	☐ No [0] ☐ Mild [1-3]	☐ Moderate [4-6] ☐ Severe [7-10]
15.	ከቀዶ ሕክምና በፊት የተሰጠ የህመም ማስታገሻ [Preoperative analgesia given]	☐ Yes	☐ No
ለጥያቄ ቁጥር 16 መልስዎ አዎ ከሆነ፣ ካልተወሰነ ጥያቄ ቁጥር 17 ይመልሱ ። [If your answer is yes to question number 16, answer question number 17 if not leave it.]			
16.	የህመም ማስታገሻ አይነት እና መጠን [Type of analgesia and dose]	☐ Dose in mg ☐ Tramadol ☐ Diclofenac	☐ Dose in mg ☐ Pethidine ☐ Other _____
17.	የመቁረጥ አይነት [Type of incision]	☐ Classical [midline]	☐ Pfannenstiel [horizontal]
18.	የቀዶ ጥገናው ጊዜ [Duration of surgery]	_____ በ ደቂቃ	
19.	የማህጸን አፕራሲዎን አይነት [Type of CS]	☐ የመጀመሪያ ግዜ [primary]	☐ አንድ ወይም ሁለት ግዜ የተደገመ [Repeated]
20.	የማህጸን አፕራሲዎን ምክንያት ምን ነበር? [What was the reason for your C- section?]	☐ የተመረጠ [Elective] ☐ ድንገተኛ [Emergency]	☐ የሕክምና ሁኔታ ☐ ሌላ _____
21.	ስንት የቀዶ አፕራሲዎን ነበሩዎት? [If yes, how many previous CS have you had?]	☐ I	☐ II ☐ No
22.	Dose of bupivacaine given	☐ 10mg ☐ 12.5 mg	☐ 15mg ☐ _____

23.	Adjuvant added [drug name and dose]	☐ Yes ☐ No	☐ If yes, specify_____
24.	Intraoperative analgesia given	☐ None ☐ Tramadol	☐ Fentanyl

ክፍል III: ከቀዶ ጥገና በኋላ የህመም ባህሪያት ፣ የተሳታፊዎች ምላሽ በእረፍት ፣ በእንቅስቃሴ ላይ እና ፀረ-ህመም አጠቃቀም [Post-operative pain characteristics, participant response both at rest and on movement using NRS and analgesia usage].



[ምንም ህመም የለም] [አነስተኛ ህመም] [መካከለኛ ህመም] [ከባድ ህመም]

25.	ከቀዶ ጥገናው በኋላ በእረፍት ሰዓት እና በሚንቀሳቀሱበት ጊዜ በመጀመሪያ ሰዓት ውስጥ ከ [0 -10] ባለው ሚዛን ላይ የህመም ስሜት። [Pain intensity at rest and while moving on a scale from (0-10) in the first hour's post-surgery.]	1hr. at rest ☐ No [0] ☐ Mild [1-3] ☐ Moderate [4-6] ☐ Severe [7-10]	1hr. while moving ☐ No [0] ☐ Mild [1-3] ☐ Moderate [4-6] ☐ Severe [7-10]
26.	ከቀዶ ጥገና በኋላ በእረፍት ሰዓት እና በሚንቀሳቀሱበት ጊዜ ባሉት 6 ሰዓታት ውስጥ ከ [0-10] ባለው ሚዛን ላይ የህመም ስሜት። [Pain intensity at rest and while moving on a scale from (0-10) in the 6 hours post-surgery.]	6hr. at rest ☐ No [0] ☐ Mild [1-3] ☐ Moderate [4-6] ☐ Severe [7-10]	6hr. while moving ☐ No [0] ☐ Mild [1-3] ☐ Moderate [4-6] ☐ Severe [7-10]

27.	ከቀዶ ጥገና በኋላ በእረፍት ሰዓት እና በሚንቀሳቀሱበት ጊዜ ባሉት 12 ሰዓታት ውስጥ ከ [0-10] ባለው ሚዛን ላይ የህመም ስሜት። [Pain at rest and while moving On a scale from (0-10) in the 12 hours post-surgery.]	12hr. at rest ☐ No [0] ☐ Mild [1-3] ☐ Moderate [4-6] ☐ Severe [7-10]	12hr. while moving ☐ No [0] ☐ Mild [1-3] ☐ Moderate [4-6] ☐ Severe [7-10]
28.	ከቀዶ ጥገና በኋላ በእረፍት ሰዓት እና በሚንቀሳቀሱበት ጊዜ ባሉት 24 ሰዓታት ውስጥ ከ [0-10] ባለው ሚዛን ላይ የህመም ስሜት። [Pain intensity while moving On a scale from (0-10) in the next 24 hours post-surgery.]	24hr. at rest ☐ No [0] ☐ Mild [1-3] ☐ Moderate [4-6] ☐ Severe [7-10]	24hr. while moving ☐ No [0] ☐ Mild [1-3] ☐ Moderate [4-6] ☐ Severe [7-10]
29.	ከቀዶ ጥገና በኋላ ከሚከተሉት አይነት ህመም አጋጥሞታል? [Did you experience any of the following types of pain post-surgery?]	☐ የቁስል ሕመም [Incisional pain] ☐ Visceral ሕመም (የሆድ ህመም) [Abdominal pain] ☐ የጀርባ ህመም [Back pain] ☐ የትከሻ ሕመም [Shoulder pain]	
30.	የህመምህን ተፈጥሮ እንዴት ትገልጻለህ? [How would you describe the nature or character of your pain?]	☐ ስለታም [Sharp] ☐ አሰልቺ [Dull] ☐ መወጋት [Throbbing]	☐ ቋሚ [Constant] ☐ የሚያቋርጥ [Intermittent]
31.	ከቀዶ ህክምና በኋላ በ24 ሰዓታት ውስጥ የተሰጠ የሕመም መድሃኒት አይነት እና መጠን. [Type and dose of pain medication given within 24 hrs. of post-operative]	Dose in mg ☐ None ☐ IV paracetamol ☐ Diclofenac Suppository ☐ Diclofenac IM	Dose in mg ☐ Morphine ☐ Fentanyl ☐ Tramadol IV
32.	በመጀመሪያዎቹ 24 ሰዓታት ውስጥ የህመም ማስታገሻ መድሃኒት ምን ያህል ጊዜ ወስደዋል? [How often did you take pain medication in the first 24 S--hrs?]	☐ Not at all ☐ Once ☐ 2-3 times	☐ 4-5 times ☐ More than 5 times
33.	ማንኛውም ተጨማሪ የህመም ማስታገሻ ወስደዋል? [Any extra analgesia requirement?]	☐ Yes ☐ No	☐ If yes, specify_____

34.	የህመም ማስታገሻ መድሃኒት ምን አይነት የጎንዮሽ ጉዳት አጋጥሞታል? [Did you experience any side effects from the pain medication?]	☐ Yes ☐ No	☐ If yes, specify_____
35.	ለህመም ማስታገሻ ማንኛውንም ባህላዊ መድሃኒት ተጠቅመዋል? [Did you use any traditional medicine for pain relief?]	☐ Yes ☐ No	☐ If yes, specify_____
36.	ከመድኃኒት በሃላ የህመም ማስታገሻ ደረጃ [Pain relief rate from medication (0-10)]	☐ No [0] ☐ Mild [1-3]	☐ Moderate [4-6] ☐ Severe [7-10]
37.	በማገገም ወቅት የቤተሰብ ድጋፍ [Family support during recovery]	☐ Very supportive ☐ Not supportive	☐ Somewhat supportive
38.	በ 24 ሰዓታት ውስጥ ምን አይነት ችግር አጋጥሞታል? [Did you experience any complications during 24 hrs. of post-operative?]	☐ Yes ☐ No	☐ If yes, specify _____
39.	ከቀዶ ሕክምና በኋላ ህመምዎን በተመለከተ ተጨማሪ አስተያየቶች ወይም ስጋቶች ካሉዎት [Additional comments or concerns regarding your postoperative pain] ----- -----		