

**SAINT PAUL'S HOSPITAL MILLENNIUM
MEDICAL COLLEGE DEPARTMENT OF OBSTETRICS AND
GYNECOLOGY**



**Classification Of Caesarean Sections In Saint Paul's Hospital Millennium
Medical College Using Robson's 10 Classifications, 2019**

By

Demis Degu (MD, OB/GYN Resident)

Advisors

Delayehu Bekele (MD, OBGYN MFM Fellow, Associated Professor)

Samrawit Solomon (MD, MPH, Assistant professor)

Co-advisor

Ferid Abbas (MD, OBGYN , Assistant Professor In Obstetric And Gynecology)

**A Research Thesis Submitted to Saint Paul's Hospital Millennium Medical
College, Department Of Obstetrics And Gynecology As Partial Fulfillment
For Specialty Certificate In Obstetrics And Gynecology.**

**Addis Ababa, Ethiopia
May, 2019**

Acknowledgement

I would like to thank to my supervisor Dr.Delayehu Bekele for his invaluable mentorship and guidance in both choosing the title and developing this proposal. And also my second and co advisors,Dr.Samrawit Solomon and Dr. Ferid Abbas. I do also thank all the consultants and residents in the department of Obstetrics and Gynecology, SPHMMC for their unending guidance during development of the proposal. Nevertheless, I would like to give special thanks to SPHMMC Ethics and Research Committee.

Contents

Acknowledgement	II
List of abbreviations	v
List of Tables and Figures	vi
Abstract	vii
1. Introduction	1
1.1 Background	1
1.2 Statement of the problem	3
1.3. Significance of the study	5
2. Litreature review	6
3. Objectives	9
3.1 General objective	9
3.2 Specific objectives	9
4. Methodology	10
4.1 Study setting	10
4.2 Study period	10
4.3 Study design	10
4.4 Populations	10
3.4.1 Source population	10
4.4.2 Study population	10
4.5 Inclusion and exclusion criteria	10
4.6 Sample size and sampling methods	10
4.7 study variables	11
4.8 Data collection	11
4.9 Data quality assurance	12
4.10 Data processing and analysis	12
4.11 Ethical consideration	12
4.12 Definitions of Terms	12

5. Result	14
5.1. Socio demographic distribution	14
5.2 Classification based on Robson group	15
5.3 Robson classification and mode of delivery	16
5.4 Robson classification and contribution of each group to c/s delivery	19
6. Discussions	20
7. Strength and limitation of the study	23
8. Conclusion	23
9. Recommendation	24
References	25
Annexes:	28

List of abbreviations

AA	Addis Ababa
AAU.....	Addis Ababa University
ABD	Assisted Breech Delivery
CPD	Cephalopelvic Disproportion
CS	Cesarean Section
EDHS.....	Ethiopian Demographic and Health Surveys
FIGO	International Federation of Obstetrics and Gynecology
MCH.....	Maternal and Child Health
NRFHRP	Non-Reassuring Fetal Heart Rate Pattern
ODK.....	Open Data Kit
RTGCS	Robson's Ten Group Classification System
RG	Robson Group
SOGC.....	Society of Obstetrics and Gynecology of Canada
SPHMMC.....	St Paul's Hospital and Millennium Medical College
SPSS.....	Statistical Program for Social Science
SSA	Sub-Saharan Africa
TOLAC.....	Trial of Labor After Caesarean Section
TASH	TikurAnbessa Specialized Hospital
VBAC	Vaginal Birth After Caesarean Section
WHO	World Health Organization

List of Tables and Figures

<u>Table 1: Sociodemographic characteristics of mothers, SPHMMC, Addis Ababa, Ethiopia, 2019</u>	13
<u>Table 2: Robson classification, SPHMMC, Addis Ababa, Ethiopia, 2019</u>	14
<u>Table 3: Robson classification of each group and mode of delivery, SPHMMC, Addis Ababa, Ethiopia, 2019</u>	16
<u>Table 4: Total number of Cesarean section distribution across the Robson's ten group, CS rate in each group and contribution of each group to the overall CS rate, SPHMMC, Addis Ababa, Ethiopia, 2019</u>	18
<u>Figure 1: Proportion of deliveries by Robson group, SPHMMC, Addis Ababa, Ethiopia, 2019</u>	15
<u>Figure 2: Robson classification of each group and mode of delivery, SPHMMC, Addis Ababa, Ethiopia, 2019</u>	17

Abstract

Introduction: The international healthcare community has considered the ideal rate for caesarean sections to be between 10% and 15%. More than 85 % of these operations are performed for four reasons prior caesarean delivery, dystocia, fetal jeopardy, or abnormal fetal presentation. There is currently no internationally accepted classification system for caesarean section that would allow meaningful and relevant comparisons of CS rates across different facilities or regions.

Objective: To classify caesarean section deliveries, and to determine over all caesarean section rate using Robson's 10 classifications.

Method: A health facility based prospective cross-sectional descriptive study was conducted at Saint Paul's Hospital Millennium Medical College from January to March 2018 for three months. All mothers who delivered in Saint Paul's Hospital Millennium Medical College within the study period were included in the study. The data was entered to Microsoft Excel 2007 and SPSS Version 20. Data was described using frequency and percentage (rate) and presented in tables and graphs.

Result: Out of 2206 deliveries over all caesarean section rate was 33.9%. The result also indicated that 15.9% of mothers belong to Group 1 (nulliparous, singleton, cephalic, term, spontaneous labor). Whereas, 19.8% mothers belong to group 2 (nulliparous, singleton, cephalic, term, induced labor or CS before labor) had highest contribution to caesarean section (24%), and group 5 is the second largest contributor to caesarean section (17.4%).

Conclusion & recommendation: Caesarean section rate of Saint Paul hospital millennium medical college was high (33.9%). The Robson's classification is easy to use. It is important that efforts to reduce the overall CS rate should focus on reducing the primary CS rate (groups 1-4) and on increasing vaginal birth after CS (group 5). Attention should be made because CS rate is rising up and will be problematic in our low resource countries.

Key words: Robson, classification, Cesarean section, SPHMMC, 2019

1. Introduction

1.1 Background

Since 1985, the international healthcare community has considered the ideal rate for caesarean sections to be between 10% and 15%. Since then, caesarean sections have become increasingly common in both developed and developing countries. When medically justified, a caesarean section can effectively prevent maternal and perinatal mortality and morbidity. However, there is no evidence showing the benefits of caesarean delivery for women or infants who do not require the procedure. As with any surgery, caesarean sections are associated with short and long term risk which can extend many years beyond the current delivery and affect the health of the woman, her child, and future pregnancies. These risks are higher in women with limited access to comprehensive obstetric care (1).

Cesarean section significantly reduces maternal and perinatal mortality. The World Health Organization considers Cesarean section rates of 5–15% to be the optimal range for targeted provision of this life saving interventions for mother and infant, lower rates suggest unmet need, while higher rates suggest improper selection. However, access to safe Cesarean section in resource-limited settings is much lower, estimated at 1–2% reported in sub-Saharan Africa (2).

Cesarean section is one of the skilled delivery interventions that have proven to be a life-saving procedure. It should be done under appropriate indications owing to the inherent short and long term complications and high cost. In recent years, governments and clinicians have expressed concern about the rise in the numbers of caesarean section births and the potential negative consequences for maternal and infant health. In addition, the international community has increasingly referenced the need to revisit the 1985 recommended rate. Every year in the world there is an additional need for 0.8 – 3.2 million C/S in low income countries where 60% of the world's births occurrence. Simultaneously, 4.0-6.2 million CS in excess are performed in middle and high income countries where 37.5% of the births occur. From a population based approach, those CS in excess are likely to be medically unjustified and should be then considered unnecessary CS (2) (3).

There is currently no internationally accepted classification system for caesarean section that would allow meaningful and relevant comparisons of CS rates across different facilities, cities or

regions. Among the existing systems used to classify caesarean sections, the 10-group classification (also known as the ‘Robson classification’) has in recent years become widely used in many countries. In 2014, WHO conducted a systematic review of the experience of users with the Robson classification to assess the pros and cons of its adoption, implementation and interpretation, and to identify barriers, facilitators and potential adaptations or modifications.

WHO proposes the Robson classification system as a global standard for assessing, monitoring and comparing caesarean section rates within healthcare facilities over time, and between facilities. In order to assist healthcare facilities in adopting the Robson classification, WHO will develop guidelines for its use, implementation and interpretation, including standardization of terms and definitions.

Robson’ 10-Group Classification

1. Nulliparous, single cephalic, ≥ 37 weeks in spontaneous labor
2. Nulliparous, single cephalic, ≥ 37 weeks, induced or CS before labor
3. Multiparous (excluding previous CS), single cephalic, ≥ 37 weeks in spontaneous labor
4. Multiparous (excluding previous CS), single cephalic, ≥ 37 weeks, induced or CS before labor
5. Previous CS, single cephalic, ≥ 37 weeks
6. All nulliparous breeches
7. All multiparous breeches (including previous CS)
8. All multiple pregnancies (including previous CS)
9. All abnormal lies (including previous CS)
10. All single cephalic, < 37 weeks (including previous CS) (2)

1.2 Statement of the problem

In 1985 the World Health Organization (WHO) recommended a Caesarean section rate of no more than 15%. Yet Caesarean deliveries are steadily rising and in some areas represent a quarter of all deliveries. Many countries have an increasing rate of Caesarean sections which may increase maternal risks and affect subsequent pregnancies (1).

CS can be life-saving to both the mother and the fetus by preventing poor obstetric outcomes. However, there is a growing concern on the increasing percentage of the procedure of live births globally.

The risks and costs associated with caesarean deliveries are significant, especially where there was no medical indication. Evidence shows that caesarean delivery and maternal death are significantly and positively associated Worldwide, CS that are possibly medically unnecessary appear to command a disproportionate share of global economic resources. CS arguably function as a barrier to universal coverage with necessary health services. 'Excess' CS can therefore have important negative implications for health equity both within and across countries (3).

Only few reports have been published on indications of c/s but lack of published studies in patterns of CS in Ethiopia, also lack of published study of pattern of c/s has been conducted in SPHMMC since it was established, although it is one of the centers with highest number of deliveries in the country currently. The lack of methods to classify pattern of C/S, might be one of the contributing factors that limits.

The Robson system classifies all deliveries into one of ten groups on the basis of five parameters: obstetric history, onset of labour, fetal lie, number of neonates, and gestational age (2). Caesarean section delivery is increasing in Ethiopia indicative of access to obstetric care service in the country. In the urbanized region of the country, the rate ranges from 8 to 37%. The increment in caesarean section delivery rate in major urban cities is a cause of concern as it surpasses the WHO threshold of 15 %. However, according to the Ethiopian demographic and health survey 2016 report, only 2 % of the women had undergone caesarean section, and it 11% in the urban area , specificall in Addis Ababa it was 21%.

As stated above, CS can be life-saving to both the mother and the fetus by preventing poor obstetric outcomes. However, there is a growing concern on the increasing percentage of the procedure of live births globally. The risks and costs associated with caesarean deliveries are

significant, especially where there was no medical indication. Evidence shows that caesarean delivery and maternal death are significantly and positively associated. According to the 2016 Ethiopia Demographic and Health Survey (4) the overall rate of CS in Ethiopia was (2%), higher rate 11% in urbans and 1% in rural areas and was in consistent the 10%– 15% rate recommended by WHO Reducing CS rates can seem daunting because there are so many contributing factors. Determining the most important contributors for CS rates, gives us a place to begin, Target our quality improvement strategies, where you will see the biggest impact and Clinically meaningful, Feasible to measure and Actionable

Implementation of the Robson Classification for Caesarean Section, The flexibility of the classification allows for the creation of subdivisions in each group that can improve analyses of the classification of Caesarean sections should be relevant to obstetric care providers and Include all Caesarean sections, Local clinical practices.

Common classification of CS rates and indications allows evaluation and comparison of the contributors to the CS rate and their impact. It allows comparison between institutions, regions, and countries.

As mentioned above, every year in the world there is an additional need for 0.8 – 3.2 million CS in low income countries where 60% of the world's births occur. Simultaneously, 4.0-6.2 million CS in excess are performed in middle and high income countries where 37.5% of the births occur. From a population based approach, those CS in excess are likely to be medically unjustified and should be then considered unnecessary CS (2) (3).

1.3. Significance of the study

SPHMMC is one of the Federal hospitals in Addis Ababa, Ethiopia. As a referral hospital there are clients referred from both catchment and non catchment areas for different obstetric and medical indications. Per month on average of 800 deliveries attended.

The lack of data about the pattern of c/s ,incidence, causes and contributing factors for rate of C/S gives us a background to initiate a study with view of suggesting ways of strategies and informed decision making to decrease the rate of C/S in the institution and as well as in the country. This study classify C/S by using Robeson's 10 classifications at SPHMMC, and can also help as an input for other large scale studies in the institution and in the country.

This study will particularly help us to know magnitude of C/S rate in three month duration in SPHMMC. In the view of importance of maternal mortality as a major public health problem, it is important to conduct studies to define the magnitude, the common causes of maternal mortality and contributing factors. These in turn help us improve our health policy and propose important strategies to tackle maternal mortality.

Additionally also it helps the stake holders, policy makers and program managers a baseline information for planning and decision makers based on the current rate of cesarean section rate and indications.

2. Literature review

Rates of caesarean section are rising worldwide, but the determinants of this increase, especially in low-income and middle-income countries, are controversial. In 287 facilities in 21 countries that were included in both the WHO Global Survey of Maternal and Perinatal Health (WHOGS; 2004–08) and the WHO Multi-Country Survey of Maternal and Newborn Health (WHOMCS; 2010–11).

The caesarean section rate increased overall between the two surveys (from 26.4% in the WHOGS to 31.2% in the WHOMCS). Caesarean section rates increased across most Robson groups in all HDI categories. Countries included were Japan, Argentina, Mexico, Peru, Brazil, Ecuador, Sri Lanka, China, Thailand, Paraguay, Philippines, Vietnam, Nicaragua, India, Cambodia, Kenya, Nigeria, Uganda, DRC, Niger, Nepal (3).

By country Tanzania the total CS rate rose from 19% to 49%, involving nine out of ten groups. Multipara without previous CS with single, cephalic pregnancies in spontaneous labour had a CS rate of 33% in 2009 to 2011. The high CS rate among low-risk groups suggests that many CSs might have been performed on questionable indications (4).

In Brazil, clinical records of all births during two three months-periods were evaluated: Total number of deliveries and the high rate of CS were similar in both periods. Group 3 (multiparous excluding previous CS, single, cephalic, ≥ 37 weeks, spontaneous labour) accounted for the largest proportion of deliveries, 28.5 and 26.8% in both periods. Group 1 (nulliparous, single, cephalic, ≥ 37 weeks, spontaneous labour) was the second largest one, while Group 5 (previous caesarean section, single, cephalic, and ≥ 37 weeks) was the third but the largest contributor to CS, accounting for 16.6 and 14.9% among all deliveries in both periods. Groups 2 (nulliparous, single, cephalic, ≥ 37 weeks, induction or CS before labour) and 4 (multiparous excluding previous CS, single, cephalic, ≥ 37 weeks, induction or CS before labour) were less prevalent, however had higher rates of CS. Only in Group 10 (All single, cephalic, ≤ 36 weeks, including previous CS), there was a significant decrease of CS rate from 70.5 to 42.6% between periods (5).

232 unique reports were identified, 97 were selected for full-text evaluation and 73 were included. These publications reported on the use of Robson's classification in over 33 million women from 31 countries. According to users, the main strengths of the classification are its simplicity, robustness, reliability and flexibility. However, missing data, misclassification of women and lack of definition or consensus on core variables of the classification are challenges. To improve the classification for local use and to decrease heterogeneity within groups, several subdivisions in each of the 10 groups have been proposed. Group 5 (women with previous CS) received the largest number of suggestions (6)(7).

Netherland -The expert panel developed 16 indicators on planned CS and 11 indicators on unplanned CS. Indicator adherence was calculated, defined as the number of women in a specific obstetrical situation in which care was performed as recommended in both planned and unplanned CS settings. The most frequently occurring obstetrical situations with low indicator adherence were: Suspected fetal distress (frequency 17%, adherence 46%), Non-progressive labour (frequency 12%, CS performed too early in over 75%), Continuous support during labour (frequency 88%, adherence 37%) and previous CS (frequency 12%), with adequate counseling in 15% (8) (9) (10).

A total of 54 countries had C-section rates below 10%, whereas 69 showed rates above 15%. 14 countries had rates between 10 and 15%. They estimated that in 2008, 3.18 million additional CS were needed and 6.20 million unnecessary sections were performed. The cost of the global "excess" CS was estimated to amount to approximately US\$ 2.32 billion, while the cost of the global "needed" CS on approximately US\$ 432 million. (3)

In Ethiopia- The national EmONC assessment surveyed a total of 751 facilities providing childbirth services; from the 12-month summary of services statistics. Of these, 17 145 (or 0.6% of expected births) were delivered by cesarean. This population-based rate varied from 9.9% in Harari to less than 1% in the large regions. The overall institutional cesarean rate was 18% (based only on those facilities performing cesareans). When examined by sector, the highest institutional rate was in the for-profit private sector (46%), followed by the not-for-profit sector (22%), and the public sector (15%). The individual rates for private for-profit hospitals ranged from 3% to 91%.

Tsega et al evaluating the prevalence of CS in urban health facilities and associated factors in Eastern Ethiopia reported CS rate of 58.7% in private hospitals compared to the 26.6% in public hospitals.

Maternal indications accounted for 66% and fetal indications for 34% of cesarean deliveries. The primary indications for cesarean were cephalopelvic disproportion (CPD; 34%), fetal distress (15%), and breech/multiple gestations/malpresentation (14%) (10).

The cesarean delivery rate of 31.1% from public hospitals in our study is higher than the previous report from TASH and the national review report of the 15% and 18% cesarean rate in public hospitals and overall institutional rates, respectively. The cesarean delivery rate in the private fee-for-service hospitals, 48.3%, comparable to the 46% rate in private hospitals as shown in the national review report of 2011, (15) (16) (17).

3. Objectives

3.1 General objective

- To determine the magnitude of c/s, classify and compare Caesarean Section in Saint Paul's Hospital Millennium Medical College using Robson's 10 classifications, from January to March 2018.

3.2 Specific objectives

- To determine magnitudes of caesarean section at SPHMMC from January to March 2018.
- To classify caesarean section at SPHMMC from January to March 2018 using Robson's 10 classification.
- To compare caesarean section within and between Robson group

4. Methodology

4.1 Study setting

This is a hospital based study and was undertaken in Saint Paul's Hospital Millennium Medical College in Addis Ababa, capital city of Ethiopia. Saint Paul's hospital is one of the tertiary referral teaching hospitals under the federal ministry of health. As a referral hospital there are clients referred from both catchment and non catchment areas for different obstetric and medical indications. Per month on average of 800 deliveries attended.

4.2 Study period

The study was conducted from January to March, 2018 for three months.

4.3 Study design

A cross-sectional descriptive study was conducted with prospective data collection on all deliveries from January to March 2018 for three months.

4.4 Populations

4.4.1 Source population

The source populations were women who deliver at Saint Paul's Hospital Millennium Medical College.

4.4.2 Study population

The study populations were mothers who deliver at Saint Paul's Hospital Millennium Medical College from January to March 2018 for three months.

4.5 Inclusion and exclusion criteria

Inclusion criteria

All mothers who gave birth at SPHMMC after gestational age of viability.

Exclusion criteria

Mothers who gave birth outside hospital and admitted for postpartum complications.

4.6 Sample size and sampling methods

Sample size was determined using a single population proportion formula by taking $P = 0.21$, from EDHS 2016 prevalence of CS in Addis Ababa.

$$n = \frac{(Z_{\alpha/2})^2 P (1-P)}{d^2} = \frac{0.21 \times 0.79 \times 1.96 \times 1.96}{0.05 \times 0.05} = 255$$

Where;

n=the required sample size

p=the prevalence of cesarean section in Addis Ababa, Ethiopia 21%.

$Z_{\alpha/2}$ =the critical value at 95% confidence level of certainty (1.96)

d=the margin of error between the sample and the population 5%.

With 10% non-response rate, the sample size will be 281.

But conveniently we used/included in the study all mothers who delivered from January to March in 2018 were taken as sample size, which were 2206 with time bounded based on previous studies.

4.7 study variables

- Socio-demographic characteristics
- Maternal characteristics (age, parity, history of previous if multiparous),
- Information about the index pregnancy (gestational age, fetal presentation/lie, number of fetus, onset of labor and delivery, mode of delivery and indication for CS).
- Fetal presentations (cephalic, breech or transverse/oblique)
- Gestational age (term (≥ 37 weeks) or preterm (< 37 weeks))
- The course of pregnancy (spontaneous and induced or CS before labor)
- Robson classification group

4.8 Data collection

The registration numbers of all delivery were identified from the hospital register of delivery logbook. Their case files were retrieved from the patient card. A questionnaire was filled up on delivery in EGOPD and labor ward. Midwiferies were collecting information through review of

charts of women. Operational manual for the study was prepared to assure a uniform standard to carrying out the study with good quality control. The completeness of each questionnaire was checked by the principal investigator.

4.9 Data quality assurance

Semistructured questionnaire was developed and with which data collectors were trained and pilot study was conducted before the main data collection conducted. The principal investigator was cross checking for completeness and accuracy of the data on daily basis.

4.10 Data processing and analysis

Data was entered using ODK and analyzed using SPSS version 22. Continuous variables were expressed as mean $\pm$ standard deviation. Categorical variables were expressed by using frequency and percentage. Crosstabulation with frequencies and percentage of each variable was performed.

4.11 Ethical consideration

A formal letter of approval was obtained from the college's ethical review committee. Permission to conduct the study was taken from the hospital administration. Confidentiality was maintained during data collection, analysis and interpretation. All data was collected and stored anonymously.

4.12 Definitions of Terms

Cesarean section-is an operative procedure whereby the fetus/es after the end of 28 week/s is/are delivered through an incision on abdominal and uterine walls.

Parity-is the number of deliveries after 28 weeks of pregnancyweeks (calculated from the first day of the LMP or an obstetric ultrasound done before 24 weeks of pregnancy) or to an infant or infants weighing 1000 g or more, despite the outcome.

Term birth- birth occurring at or after 37 weeks of pregnancy calculated from the first day of the last menstrual period (LMP) or an obstetric ultrasound done before 24 weeks of pregnancy. If gestational age cannot be calculated from LMP or ultrasound, a birth weight of 2,500 g or more will be used

Preterm delivery –delivery before 37 completed weeks.

Viability age: (GA After 28 completed weeks calculated from the first day of the last menstrual period (LMP) or infants weighing more than 1000 g in cases where the LMP is unknown)

5. Result

5.1. Socio demographic distribution

A total of 2206 pregnant women who delivered at SPHMMC were included in the study. The socio-demographic characteristics of respondent were 78% Christian, 67.1% were unemployed by occupation, and about 37.9% completed primary school while 20.4% don't get formal education. Almost 2147(97%) of total respondents were married while about 1.9% were single. Detailed description of sociodemographic findings are shown in (Table1).

The median age group was 26-30years group accounting for 837(38.0%) women whereas the mean ($\pm$ SD) age of the respondents was 26.5($\pm$ 4.8SD) and ranged from 15 to 48 years. Almost all mothers had history of ANC follow up. About presentation of the babies 2089(94.7%) of them had cephalic presentation at time of delivery (Table 1)

Table 1: Sociodemographic characteristics of mothers, SPHMMC, Addis Ababa, Ethiopia, 2019

Variable	Category	Frequency	Percentage
Age of the mother	<20	257	11.7
	20-25	761	34.5
	26-30	837	38.0
	31-35	249	11.3
	35-40	88	4.0
	>40	13	0.6
Religion	Christian	1721	78
	Muslim	484	22
Educational status	No formal education	449	20.4
	Primary	837	37.9
	Secondary	563	25.5
	Higher education	356	16.1
Occupation	Unemployed	1480	67.1
	Employed	725	32.9
Marital status	Single	41	97.3
	Married	2147	1.9
	Widowed	3	0.1
	Divorced	15	0.7
Parity	Nullparity	981	44.5
	Multi parity	1224	55.5
Gestational age	<37 week	41	1.9

Fetal presentation	≥ 37 week	2165	98.1
	Cephalic	2089	94.7
	Breech	111	5
	Transverse	5	0.2
Gestation	Singleton	2037	92.3
	Multiple	167	7.7
ANC visit	Yes	2165	98.1
	No	41	1.9
Onset of labour	Spontaneous	1599	72.5
	Induced	314	14.2
	not in labour	291	13.3

5.2 Classification based on Robson group

The total number of women delivered within the study period were 2206, out of this mothers 350(15.9%) of them belong to group one (nulliparous, singleton, cephalic, term, spontaneous labor);whereas241 (10.9) of the mothers belong to group 3 (multiparous, singleton, cephalic, term, without a previous CS, spontaneous labour). Among the total deliveries 202 (9.2%) belong to group 5 (Multiparous, singleton, cephalic, term, with a previous CS). The least deliveries belong 5(0.2%) to group 9 (all singleton transverse /oblique lie). (Table 2)

Table 2: Robson classification, SPHMMC, Addis Ababa, Ethiopia, 2019

Gr o u p	Description	Total no. of deliveries in each group (n)%
1	Nulliparous, singleton, cephalic, ≥37wks, spontaneous labor	350(15.9%)
2	Nulliparous, singleton, cephalic, ≥37wks, induced labour or CS before labour	436(19.9%)
3	Multiparous, singleton, cephalic, ≥37wks, without a previous CS, spontaneous labour	241(10.9%)
4	Multiparous, singleton, cephalic , ≥37wks, without a previous uterine scar, induced labour or by CS before labour	317(14.4%)
5	Multiparous, singleton, cephalic, ≥37wks, with a previous CS	202(9.2%)
6	Nulliparous, singleton, breech	27(1.2%)
7	Multiparous, singleton, breech , (including previous c/s)	29(2.1%)
8	Multiple pregnancy , (including previous c/s)	190(8.6%)
9	Singleton, transverse or oblique lie, (including previous c/s)	5(0.2%)
10	Singleton, cephalic, <37wks (including previous c/s)	409(18.5%)

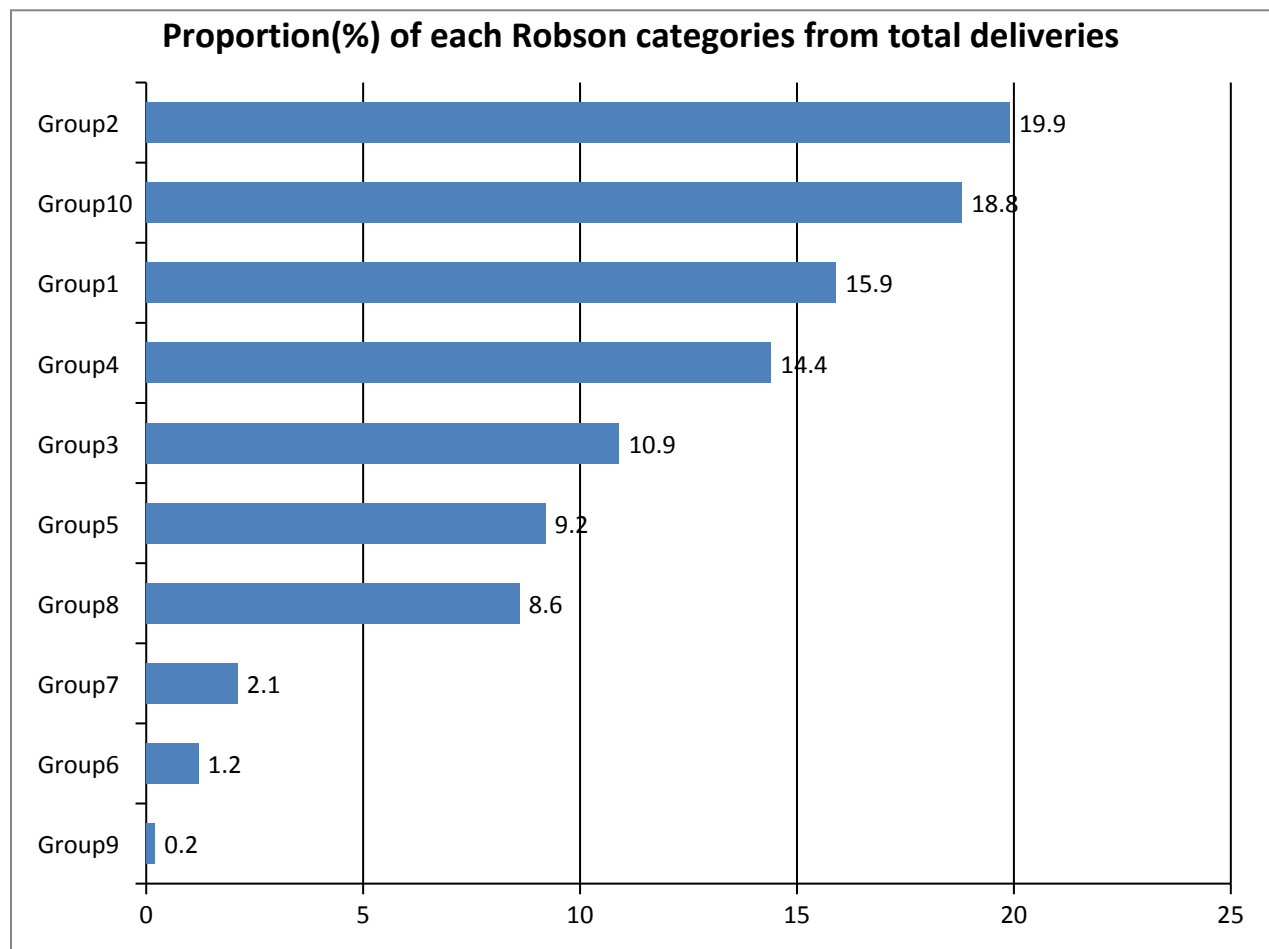


Figure 1: Proportion of deliveries by Robson group, SPHMMC, Addis Ababa, Ethiopia, 2019

5.3 Robson classification and mode of delivery

From the total of mother belong to group one 105 (30%) of mother delivered by c/s whereas mothers included in group two 180 (41.35) gave birth by c/s delivery. About mothers included in group five deliveries 131 (64.9%) gave birth by c/s and about mothers included in group ten

110(26.9%) gave birth by cs. Overall, from the total mothers included in this study 749(33.9%) of mothers delivered by c/s which makes the rate of c/s delivery rate 33.9%.

Table 3: Robson classification of each group and mode of delivery, SPHMMC, Addis Ababa, Ethiopia, 2019

Robson Group	Mode of delivery	
	CS delivery n (%)	Spontaneous delivery n(%)
1	105(30%)	245(70%)
2	180(41.3%)	256(58.7%)
3	49(19.1%)	195(80.9%)
4	37(11.7%)	280(88.3%)
5	130(64.4%)	72(35.6%)
6	20(74.1%)	7(25.9%)
7	24(82.8%)	5(17.2%)
8	92 (48.4%)	98(51.6%)
9	5(100%)	0
10	110(26.9%)	299 (73.1%)

As shown in the graph below, mothers in group9, all (100%) under went for cesarean section. Group7 and group six were the second and third highest cesarean section delivery rates accounting for 82.8% and 74.1% respectively. See figure 2 below for details.

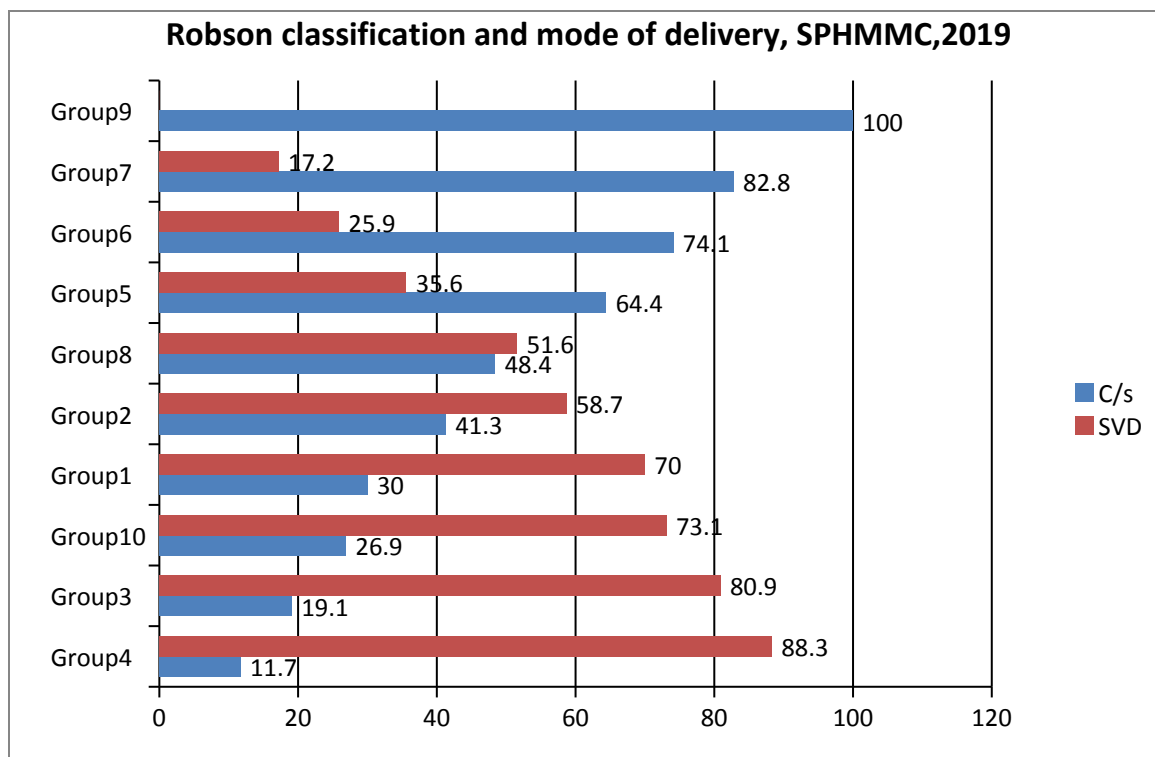


Figure 2: Robson classification of each group and mode of delivery, SPHMMC, Addis Ababa, Ethiopia, 2019

5.4 Robson classification and contribution of each group to c/s delivery

On analysis of CS according to Robson's classification, different rate of each group was shown separately. Group2 (24.0%), Group5 (17.4%) had the highest contribution to the CS rate and then group8 placed third. CS rate was calculated in each group separately to determine their contribution to the overall CS rate.

Table 4: Total number of Cesarean section distribution across the Robson's ten group, CS rate in each group and contribution of each group to the overall CS rate, SPHMMC, Addis Ababa, Ethiopia, 2019

G R O U P	No. of CS ^a	No. of delivery ^b	Relative size of group (%) ^c	Cesarean section rate in each group ^d (%)	Relative contribution ^e (%)	Absolute contribution ^f (%)
1	105	350	15.9%	30%	14%	4.75%
2	180	436	19.8%	41.3%	24%	8.2%
3	46	241	10.9%	19.9%	6.1%	2.1%
4	37	317	14.4%	11.7%	4.9%	1.7%
5	130	202	9.2%	64.4%	17.4%	5.9%
6	20	27	1.2%	74%	2.7%	0.9%
7	24	29	1.3%	82.8%	3.2%	1.0%
8	92	190	8.6%	48.4%	12.3%	4.2%
9	5	5	0.2%	100%	0.7%	0.2%
10	110	409	18.5%	26.9%	14.7%	5%
total	749	2206	100%		100%	33.9%

^cRelative group size (b/total no. of deliveries×100)

^dGroup CS rate (a/b×100)

^eRelative contribution to overall CS rate(a/total no. of CS×100)

^fAbsolute contribution of each group to the overall CS rate (a/total deliveries ×100)

6. Discussions

This is hospital based descriptive cross sectional study aimed to classify Caesarean Sections in Saint Paul's Hospital Millennium Medical College using Robson's 10 classifications.

The rate of caesarean section is increasing across the globe. To make valid global comparison and to investigate the determinant of the rising trend of caesarean section among different centers, there was need of an internationally acceptable and applicable system. Michael Robson, proposed Robson classification (also known as the ten group classification system) to allow easy comparisons and thereby improvement in overall obstetric care. The easy applicability of this system makes it appropriate for worldwide use (19).

This study also found that the overall rate of caesarean section rate was 33.9%. This is a bit higher than to a study done in black lion hospital, Addis Ababa which found that 33.1% as overall CS rate (20) (18). And it is also higher than a study done in Senegal which revealed that the overall rate of caesarean was 18.2% (21). The increase has been a global phenomenon, the timing and rate of the increase has differed from one country to another, and marked differences in rates persist. The CS rate reported in Australia ranges from 28% in Tasmania to 33.1% in Queensland. This CS rate is higher than Norway's (13.9%) and Asian countries (27.3%), also a bit higher than that reported in the USA (31.1%). Another study from Iran reported an increase from 35% to 40%, while this study gave the rate of 20.3%, which is quite low compared to other reports but still above the WHO criteria. In comparison with other international studies, the current study results were quite reassuring (22, 23, 24, 25, 26, 27). This could be due to difference in study setting and health policy of our study setting and the study from other countries.

This study also found that the average age of women participated in this study were 26.5 years, majority of the mothers belong to 26-35 age group. This is similar to a study done in black lion specialized hospital and study from South Africa; the average age of women was 27.7 years (20), similar with report from South Africa the majority of participants belong to age group 20-29 year which represents the most reproductively active group (28). This might be because of the similarity of the hospitals that they are tertiary referral hospitals.

This study also found that the main contributor to the overall c/s rate was 24 % (group 2) followed by 17.4% (group 5) and 14.7 % (group 10). Nulliparous patients at term (groups 1 and 2) made up 38% of CSs at SPHMMC. In most studies conducted using the TGCS, groups 1 and 2 were the second and third largest contributors to the CS rate. Group 3, usually constitutes the largest proportion of the obstetric population. But in this study it is the 5th largest group.

Group 5 was the 6th largest in this study (9.2% of the delivering women) and the high rate of CS in this group (64.4%) resulted that Group 5 was the second highest contributor to the overall CS rate (28.7% of total CS rate). Group 10 includes all preterm deliveries with a singleton cephalic presentation, irrespective of previous CS scar. Group 10 is cited as the reason for the high caesarean section rate at tertiary referral hospitals. Group 10 was the fourth largest contributor to the caesarean section rate in our study (14.7%). Our finding is similar to the finding in study done at tertiary hospital in South Africa where group 10 was the 4th largest (15.8%) contributor to the CS rate

This is different from a study done in Senegal which stated the main contributor to the overall caesarean rate was primiparous, term women in spontaneous labour (group 1) and women with previous caesarean section (group 5) (21). On the other hand a study done in Oman stated that Group 5 (previous CS group) made the greatest contribution to the total CS rate. Group 1 (Nullipara, Term, spontaneous labor vaginal deliveries) had the second highest contribution to the CS rate and then group 2 (Nullipara, Term, elective CS or after failed induction) placed third (29). Whereas a study done in Canada revealed that there was a statistically significant increase over time in the overall Caesarean section rate. Moreover, Caesarean section rates increased among nulliparous women with a single cephalic pregnancy ≥ 37 weeks (Groups 1 and 2), among multiparous women with a previous uterine scar and single cephalic pregnancy ≥ 37 weeks (Group 5), and among nulliparous women with breech pregnancies (Group 6). Within Group 5, the Caesarean section rate increased among those with labour induction and with Caesarean section before labour (30).

On the other hand a study done in Brazil found showed that Groups 3 and 1 were the two largest groups of women admitted for delivery and also those with the lowest proportion of caesarean sections. However, due to their large size, both accounted for considerable total number of caesarean sections (9).

Other study done in Tanzania stated that the three largest groups (groups 1, 3, and 5) contributed most to the total CS rate over the study period. Nullipara with single cephalic pregnancies in spontaneous labour (group 1) contributed 5.6% in the first time period and 12% in the last time period; multipara with single cephalic pregnancies in spontaneous labour (group 3) contributed 4.6% in the first time period and 12% in the last time period; and multipara with previous scar (group 5) contributed 4.7 % in the first time period and 14% in the last time period. Consequently, multiparity with previous scar (group 5) was the largest contributor to the total CS rate in the last time period (8).

A study done in India the main contributor of CS was group 2 (36.7%) then followed by group 5 (36%) the least contributor were group 7 and group 9 (0.6%) (31).

This study also indicated that the contribution of group 6,7 and 9 deliveries to the overall cs rate and to the total delivery was relatively lower. Similar to study from Oman showed that Groups 6-9 were smaller groups with high percentages of CS. High percentage in these groups was due to unavoidable obstetric indications. When compared with other studies internationally, almost all studies conveyed comparable results in groups 6-9 (29).

Caesarean section rates increased across most Robson groups in all human development index (HDI) categories. Use of induction and prelabour caesarean section increased in very high/high and low HDI countries and the caesarean section rate after induction in multiparous women increased significantly across all HDI groups. The proportion of women who had previously had a caesarean section increased in moderate and low HDI countries, as did the caesarean section rate in these women. Use of the Robson criteria allows standardized comparisons of data across countries and time points and identifies the subpopulations driving changes in caesarean section rates. Women who have previously had a caesarean section are an increasingly important determinant of overall caesarean section rates in countries with a moderate or low HDI. Strategies to reduce the frequency of the procedure should include avoidance of medically unnecessary primary caesarean section. Improved case selection for induction and prelabour caesarean section could also reduce caesarean section rates (7).

The high CS rate among low-risk groups suggests that many CSs might have been performed on questionable indications. Such a trend may result in even higher CS rates in the future. While CS

can improve perinatal outcomes, it does not necessarily do so if performed routinely in low-risk groups (8). The use of the Robson classification is increasing rapidly and spontaneously worldwide. Over 70% of the studies reported on the use of the classification at hospital-level and hospital records were the main source of data (10).

7. Strength and limitation of the study

This study can be said one of the first in our setting. Accessing all delivery files from the hospital was easy because the data was collected using digital method.

Limitation: one of the main limitations was the overall c/s rate could be overestimated because the study area is in a tertiary center.

8. Conclusion

In general this study found that the overall caesarean section rate at Saint Paul hospital millennium medical college was high (33.9%) and the main contributors to high C/s rate were, 24 % (group 2) followed by 17.4% (group 5) and 14.7 % (group 10). The Robson's classification is easy to use. Each maternity unit can compare its rates with those of units with similar level, to find whether some groups of women have high rates of caesarean section.

9. Recommendation

- Implementation of this classification system in order to improve our practice and lower CS rates in hospitals.
- Robson criteria should be used to enable comparison of Caesarean section rates.
- Health care providers should provide proper counseling during ANC on option of mode of delivery especially for VBAC.
- Attention should be made because CS rate is rising up and will be problematic in our low resource countries.
- It is time to systematize obstetric audits to lowers CS rates; having a consideration on common system for classifying of Caesarean section make the comparison easier.
- Further study should be done to assess the pattern of the caesarean section using Robson classification.

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Annexes:

questioner

Part I

Demographic Characteristics

1. Card No.....
2. Age
3. Place of residency
 - A. Addis Ababa
 - B. Outside Addis Ababa
4. Religion
 - A. Orthodox
 - B. Protestant
 - C. Muslim
 - D. Others (specify).....
5. What is the highest level of school the mother attended?
 - A. None
 - B. Primary school
 - C. High school
 - D. College
 - E. Graduate / Professional Degree
 - F. Don't know
6. What was the mothers' occupation?
 - A. Unemployed
 - B. Student
 - C. Employed
 - D. Farmer
 - E. Housewife
 - F. Other
7. What was the marital status?
 - A. Single
 - B. Married
 - C. Divorced
 - D. Separated
 - E. Widowed

Part III

Obstetrics' Characteristics

- 1) Gravidity.....
- 2) Parity
- 3) Gestational age

- A ≥ 37
- B < 37
- 4) Previous Caesarean Section
 - A yes
 - B No
- 5) Number of gestation
 - A. singleton
 - B. multiple gestation
- 6) Fetal lie
 - A. cephalic
 - B. breech
 - C .transverse/oblique
- 7) Onset of labor
 - A. spontaneous
 - B. induction
 - C. not in labor
- 8) Date of delivery...
- 9) Place of delivery
 - A. EGOPD
 - B. L/W
- 10) mode of delivery
 - A. vaginal delivery
 - B. Cesarean section
- 11) Birth weight
 - A < 2500 g
 - B ≥ 2500