A 6-YEAR REVIEW OF MATERNAL OUTCOMES FOR SECOND STAGE CESAREAN SECTION IN HOSPITAL UNIVERSITI SAINS MALAYSIA

By

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LIST OF ABBREVIATIONS

ACOG	American College of Obstetricians and Gynecologists
ARM	Artificial Rupture of Membrane
AS	Apgar Score
BMI	Body Mass Index
CS	Cesarean Section
CSFD	Cesarean Section in Full Dilatation
CTG	Cardiotocograph
EBL	Estimated Blood Loss
EMLSCS	Emergency Lower Segment Cesarean Section
FID	Failed Instrumental Delivery
FP	Fetal Pillow
GA	General Anaesthesia
HUSM	Hospital Universiti Sains Malaysia
ICU	Intensive Care Unit
LSCS	Lower Segment Cesarean Section
NICU	Neonatal Intensive Care Unit
OA	Occipitoanterior
OP	Occipitoposterior
OR	Odds Ratio
OT	Occipitotransverse
POA	Period of Amenorrhoea
POA	Period of Amenorrhoea
POG	Period of Gestation
PPH	Post Partum Hemorrhage

PPROM	Preterm Prelabour Rupture of Membrane
PROM	Prelabour Rupture of Membrane
RCOG	Royal College of Obstetricians and Gynaecologists
SA	Spinal Anaesthesia
sd	Standard Deviation
SMFM	Society for Maternal Fetal Medicine
SPSS	Statistical Package for the Social Sciences
SROM	Spontaneous Rupture of Membrane
SSCS	Second Stage Cesarean Section
SVD	Spontaneous Vertex Delivery
TAS	Transabdominal Scan
TEBL	Total Estimated Blood Loss
TVS	Transvaginal Scan
WHO	World Health Organisation

DEFINITION OF OPERATIONAL TERMS

i. *Gravida* refers to the number of pregnancies a woman has had regardless of the pregnancy outcome.

ii. *Parity* refers to the number of pregnancies reaching viable gestational age (including live births and stillbirths). Viable gestational age varies from region to region. In Malaysia particularly, the viable gestational age is taken from 22 weeks of gestation onwards or if the gestation is unknown, where the fetus is estimated to be more than or equal to 500gm.

iii. *Apgar Score* refers to a rating system measuring newborn baby's general condition on a scale from 1 to 10.

iv. *First stage of labour* is divided into two phases; the latent phase and the active phase. Latent phase occurs when the contractions become progressively more coordinated and the cervix dilates to 4cm while active phase begins from cervical dilatation of 4cm until it is fully dilated which is 10cm.

v. *Second stage of labour* is defined as the full dilatation of the cervix (10cm) until delivery of the baby.

vi. *Primigravida* defines a woman being pregnant for the first time.

vii. *Multipara* defines a woman who has borne two or more live births and stillbirths ≥ 22 weeks of gestation.

viii. *Grandmultipara* defines a woman who has borne five or more live births and stillbirths ≥ 22 weeks of gestation.

ix. *Great grandmultipara* defines a woman who has borne ten or more live births and stillbirths ≥ 22 weeks of gestation.

x. *Adolescent pregnancy or teenage pregnancy* is pregnancy in females under the age of 20years.

xi. *Advanced maternal age pregnancy* is pregnancy in females aged 35years and over.

xii. *Primary postpartum haemorrhage (PPH)* is defined as blood loss of 500ml or more from the genital tract following vaginal delivery or 1000ml or more following cesarean delivery within 24 hours of the birth of a baby. PPH can be minor (500–1000ml) or major (more than 1000ml). Major could be divided to moderate (1000–2000ml) or severe (more than 2000ml)[1].

xiii. *Maternal morbidity* refers to medical complications in a woman caused by pregnancy, labour or delivery.

xiv. *Gestational age* was estimated from the date of last menstrual period and amended by means of ultrasonography in some women in week 16-20 for those who are unsure of dates.

xv. *Extended uterine tear* refers to any uterine wall defect, either laterally into the uterine vasculature or vertically into the cervix or contractile uterus that required additional surgical steps to repair [2].

xvi. *The body mass index (BMI= weight (kg)/ height (m)* ^{2} *before pregnancy)* was categorized as Underweight (BMI< 18.5); normal (BMI = 18.5- 24.9); overweight (BMI=25- 29.9); obese (BMI> 30) [3].

xvii. *Malpositions* are abnormal positions of the vertex of the fetal head (with the occiput as the reference point) relative to the maternal pelvis.

xviii. *Term pregnancy*

Early term: 37 0/7 weeks through 38 6/7 weeks

Full term: 39 0/7 weeks through 40 6/7 weeks

Late term: 41 0/7 weeks through 41 6/7 weeks

Post term: 42 0/7 weeks and beyond

xix. *Operative vaginal delivery* refers to instrumental delivery which can be either ventouse or forcep assisted delivery.

xx. *Station* is defined as the descent of the fetal presenting part in relation to the maternal ischial spines.

High: station -1, -2

Low: station 0, +1, +2

xxi. *Position* is defined as the relationship of a specified bony landmark on the fetal presenting part to the maternal spine.

xxii. *Pfannenstiel incision* refers to a transverse suprapubic skin incision which is made along a skin crease approximately one finger-breadth above the pubic symphysis.

xxiii. Second stage cesarean section (SSCS) refers to a cesarean section which is performed when the cervix is fully dilated at 10cm. The other term that is commonly used and has similar meaning is cesarean section at full dilatation (CSFD).

xxiv. Cystotomy or Vesicotomy refers to incision into the urinary bladder.

ABSTRAK (Versi Bahasa Melayu)

Objektif: Untuk menilai kadar kelahiran secara cesarean yang dilakukan semasa tahap kedua proses bersalin dan mngenalpasti kesudahan kepada ibu dan faktor risiko yang berkaitan kepada ibu-ibu ini.

Rekabentuk kajian: Ini adalah kajian retrospektif yang dijalankan di Hospital University Sains Malaysia (HUSM). Rekod perubatan 207 wanita yang mengandung secara singleton, cephalic pada usia kandungan matang, yang telah melalui proses kelahiran secara cesarean di tahap kedua bersalin dalam lingkungan 1 Januari 2010 hingga 31 Disember 2015, dikenalpasti daripada pangkalan data hospital dan disemak yang mana data demografik dan kesudahan kepada ibu dikumpulkan.

Keputusan: Sepanjang tempoh kajian, sebanyak 8197/42,546 (19.3%) bayi dilahirkan melalui kaedah pembedahan cesarean. Dua ratus dan lima puluh tujuh pembedahan cesarean (4.1%) telah dilakukan semasa di tahap kedua proses bersalin. Hampir separuh daripada wanita-wanita adalah dikandungan pertama (49.3%) dan 87.9% adalah dalam proses bersalin spontan manakala 59.4% memerlukan bantuan oxytocin. Sebanyak 48(23.3%) wanita mempunyai sejarah pembedahan cesarean pada kandungan lepas dan 147(71.1%) wanita memiliki stesen di bawah kosong (62.3%, 7.7% dan 1.0% untuk stesen 0, +1 & +2 masing-masing). 85.5% daripada wanita-wanita ini melalui kelahiran secara pembedahan cesarean di tahap kedua proses bersalin tanpa percubaan secara alat. Purata tempoh tahap kedua proses bersalin di dalam kajian ini adalah 144 (±56.2)minit dan purata anggaran kehilangan darah adalah 545 (±357)ml. 12.6% daripada wanita (n=26) mengalami tumpah darah selepas kelahiran (lebih atau sama dengan 1000ml).

10.6% (n=22) daripada wanita-wanita ini memerlukan transfusi darah. Hanya satu wanita (0.5%) memerlukan kemasukan ke unit rawatan rapi setelah pembedahan dilakukan. 78.7% (n=163) daripada wanita-wanita ini tinggal di hospital secara keseluruhan selama 3 hari. 18.4% (38) dan 15.9% (33) daripada wanita-wanita mengalami koyakan yang panjang pada rahim dan rahim sukar mengecut selepas bersalin, masing-masing. Sebaliknya, tiada seorang pun daripada wanita-wanita ini mengalami koyakan pada serviks atau pun kecederaan pada pundi kencing. Jumlah kelahiran ($p<0.001$), percubaan alat ($p<0.001$) dan berat bayi ($p<0.004$) mempunyai kaitan statistik yang signifikan dengan jumlah hilang darah. Faktor risiko untuk koyakan panjang pada rahim pula mempunyai kaitan statistik yang signifikan dengan jumlah kelahiran ($p<0.012$) dan percubaan alat ($p<0.001$) masing-masing.

Kesimpulan: Keseluruhan hasil pembedahan cesarean di tahap kedua proses bersalin yang dilakukan di HUSM adalah setanding dengan kajian yang dilakukan di pusat-pusat lain. Amalan semasa perlu dikekalkan atau ditambah baik terutamanya berkaitan dengan dokumentasi yang teliti dan latihan kakitangan obstetrik junior untuk memberikan penjagaan yang terbaik kepada pesakit.

ABSTRACT (English Version)

Objectives: To determine the prevalence of cesarean section performed in the second stage of labour and to identify the maternal outcomes and its associated risk factors in these women.

Study design: This retrospective study was carried out in the Hospital University Sains Malaysia (HUSM). Medical records of 207 women with singleton cephalic pregnancies at term, identified from the hospital database, who underwent a second stage cesarean section (SSCS) between 1st January 2010 and 31st December 2015, were reviewed and demographic and outcome data were collected.

Results: During the study period 8197/42,546 (19.3%) babies were delivered by CS. Two hundred and fifty seven CS (4.1%) were performed in the second stage of labour. Almost half of the women were nulliparous (49.3%) and 87.9% had spontaneous labour and 59.4% (n=123) had oxytocin augmentation. There were 48 (23.2%) whom had previous cesarean sections and 147 (71.1%) had the station below zero (62.3%, 7.7% and 1.0% for station 0, +1 & +2 respectively). 85.5% of women had a second stage CS without a trial of instrumental delivery. The mean duration of second stage in this study was 144 (±56.2) minutes and mean estimated blood loss was 545 (±357) mls. 12.6% of women (n=26) had postpartum hemorrhage (greater than or equal to 1000mls). 10.6% (n=22) of these women required blood transfusion. Only 1 woman (0.5%) need to be admitted to intensive care unit post-operatively. 78.7% (n=163) had the overall length of hospital stay for 3 days. 18.4% (38) and 15.9% (33) of women had extended uterine tear and uterine atony respectively. Otherwise none of the women sustained neither cervical tear nor bladder injury. The parity ($p<0.001$), attempted instrumentation

($p<0.001$), and baby weight ($p<0.004$) were statistically significant association with the total blood loss. The risk factors for extended uterine tear was statistically significant associated with parity ($p<0.012$) and attempted instrumentation ($p<0.001$) respectively.

Conclusions: The overall outcomes of second stage CS performed in HUSM is comparable to studies done in other centres. Current practices need to be maintained or improved especially with regards to meticulous documentation and training of junior obstetric staff to provide the best care for the patients.

CHAPTER 1

INTRODUCTION
AND
LITERATURE REVIEW

1. INTRODUCTION AND LITERATURE REVIEW

INTRODUCTION

Cesarean section (CS) is the most commonly performed procedure in obstetrics. Over the past two decades, cesarean delivery has become more commonly used throughout the world. Despite the attempts at reducing CS rates, there has been a gradual and steady rise in most developed countries. This is cause for concern because CS is associated with a higher likelihood of adverse outcomes for both mother and fetus compared with vaginal delivery [2]. The World Health Organisation (WHO) has issued a consensus statement in 1985 that there were no additional health benefits associated with a CS rate above 10-15% [4]. The current cesarean section rate worldwide is around 10-20% [5]. In Hospital Universiti Sains Malaysia (HUSM) specifically, CS contributes to 19.3% of total number of deliveries from 2010-2015. As demonstrated in Figure 1 the rate of CS in HUSM increased year by year.

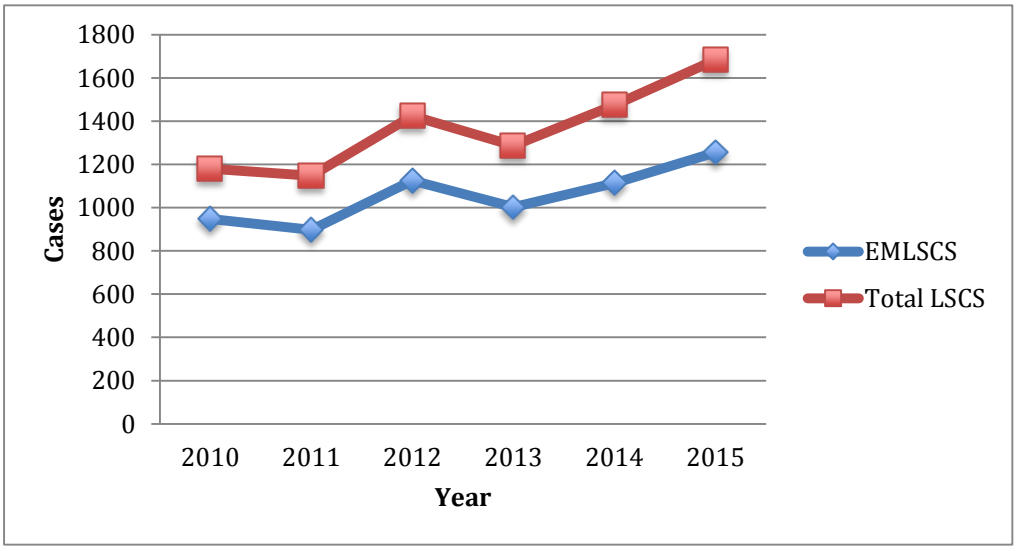


Figure 1. Rise of CS Rate from Year 2010 to 2015 in HUSM.

CS can be performed before labour or during the first and second stages of labour. Full cervical dilatation is referred hereinafter as a second stage of labour. CS at full cervical dilation is usually performed as an alternative to operative vaginal delivery. Cesarean delivery in the second stage of labour accounts for approximately 4.8% of all deliveries by CS [6].

The rate of CS in the second stage of labour is increasing as a result of reduced rates of attempted instrumental delivery. This trend may be associated with lack of experience or training of the operator, as well as patient preference and patient autonomy. It is also believed that increasing use of epidural analgesia, fear of litigation and changes in training contribute to the overall rise in cesarean section at full dilatation (CSFD) [7].

1.1 Complications of Second Stage Cesarean Section

When compared with emergency CS in the first stage of labour, delivery by CS in the second stage of labour is technically more difficult. These often occur as most of the time the fetal head is deeply impacted within the pelvis and the lower segment of the uterus is usually thin, overstretched, and edematous. Thus, CS performed in the second stage of labour may be associated with increased maternal and neonatal morbidity [8]. There is a higher incidence of uterine incision extensions, postpartum hemorrhage (PPH), increasing operating time, need for blood transfusion, ICU or NICU admission, increased length of hospital stay and birth injury to the baby [7].

1.2 Factors Affecting Second Stage Cesarean Section

A few factors have been identified that further complicate the condition for example if the CS performed following failed operative vaginal delivery, maternal obesity, duration of the labour, augmentation of labour, birth weight of the baby as well as position of the fetal occiput .

1.3 Methods Delivery the Baby During Second Stage Cesarean Section

There are many techniques described in the literature to address when severe difficulty is encountered in the delivery of a deeply impacted head in order to reduce morbidity to the mother and fetus. Despite of this, the difficulty in delivering the fetal head is unpredictable and can occur in any second stage cesarean section whether or not there has been a prior attempt at an instrumental delivery.

Currently there are no guidelines regarding performing CS in the second stage of labour. In HUSM particularly, not much data is found with respect to second stage CS. It is hoped that this study will help in recognizing factors and problems that are related to second stage caesarean section performed in HUSM hence, a concise manual guideline concerning SSCS can be formulated which may help our current practice and improve the outcome of the patients.

LITERATURE REVIEW

The second stage of labour commences at full dilation and is divided into 2 phases: the passive second stage when the fetal head progresses passively in the maternal pelvis and the active second stage that corresponds to the phase of active expulsive efforts [9].

Govender and his fellow collegues[10] defined second stage CS as one which was performed following full cervical dilatation. CS during second stage of labour with an engaged head is generally thought to carry higher maternal and neonatal morbidity.

Pergialiotis and friends[11] conducted a systematic review and meta analysis study in 2013 to compare maternal and neonatal morbidity between first versus second stage CS and found out that second stage CS lead to higher maternal mortality rate, higher maternal admission to ICU, higher blood transfusion rates, increased neonatal death rates along with admission to NICU and rates of Apgar Score (AS) less than 7 in 5 minutes.

Seal[7] also in his prospective study concluded that a CS in the second stage of labour is more likely to be associated with blood loss >1500ml, hysterectomy and ICU admission.

SSCS are technically challenging and need to be attended by a skilled obstetrician. Maternal morbidity associated with SSCS includes greater risk of bladder trauma and extension of the uterine angles leading to broad ligament hematoma, PPH and prolonged hospital stay. These are supported by a study done by Unterscheider[12] that half of the women in their cohort (n=136) had a hospital stay over 4 days, 2.2% women required transfusion and 2 women had major bladder or ureteric trauma at delivery.

In a retrospective study conducted by Moodley[13], 53 of 617 emergency CS were performed in the second stage of labour. This figure is in keeping with other reports. It is found that neonatal complications in this study were similar to those found in a control group of emergency first stage CS. Estimated blood loss (EBL), blood-stained urine, postoperative fever and operative times were greater in the second stage CS group.

Another study conducted by McKelvey[14], concluded that SSCS can be technically demanding procedure as the fetal head may be deeply impacted and elongated by moulding in the pelvis, especially after a prolonged labour and perhaps following an unsuccessful attempt at instrumental delivery, further impacting the skull. Disimpaction is often difficult and caries risks of fetal trauma, such as intracranial hemorrhage or skull fracture. It is found that maternal direct trauma is common in these situations, with a high rate of laceration injuries to the uterus, cervix and vagina (14/91, 15.4%). These tears can extend deep into the intrapelvic genital tract and can be challenging to repair because of their poor accessibility. Such injuries also may

lead to significant blood loss and increased intraoperative time, and are associated with sepsis.

Govender[10] in their study on second stage CS at a tertiary hospital in South Africa found out that maternal complications associated with second stage CS were much higher than that of the first stage CS, 72.4% (n=116) and 3.8% (n=975) respectively. The complications mentioned in the study were bladder injury, extension of the uterine incision and tears in lower uterine segments.

Another study which also associates SSCS and extended uterine tear was the one conducted by Lurie[15]. Stated in their study was "there is significantly higher rate of unintentional uterine incision extension in the second stage (17.1%) compared to the first stage CS (4.6%)".

Meanwhile Asicioglu and friends[2] conducted a study in 2014 and concluded that second stage CS is more technically difficult due to engagement of the fetal head, and this is associated with increased risk of maternal (such as surgical injuries and intraoperative hemorrhage) and fetal (such as hypoxia and fetal injury) morbidity.

Last but not least, Schwake and his friends[16] in their study also came to a conclusion that CS performed in the second stage of labour is associated with maternal complications which include extension of the uterine incision, damage to the uterine

vessels, blood transfusion, ureteral, bladder or bowel injury as well as postoperative fever and infection, whereas, perinatal morbidity is the result of trauma or injury to the newborn

There are few factors that further complicate SSCS. Few literatures reported that higher maternal body mass index (BMI), previous history of CS, induction of labour, augmentation of labour, longer duration of second stage of labour and attempted instrumental delivery prior to CS is associated with increase adverse outcome of CSFD. The same goes to the station and position of the fetus prior to CS as well as the birth weight of the fetus.

Murphy[17] noted that risk factors for poor delivery outcome include maternal body mass index (BMI), parity, duration of second stage, position of the presenting part, choice of instrument, cardiotocograph (CTG) features, operator experience and fetal birth weight.

McDonnell and Chandraharan[18] in their study on Determinants and Outcomes of Emergency CS following Failed Instrumental Delivery (FID): 5-Year Observational Review at a Tertiary Referral Centre in London stated that risk factors for FID which lead to CSFD included persistent OP presentation , birthweight >4kg, maternal BMI >30kg/m2 and mid-cavity delivery or when $1/5^{th}$ of fetal head is palpable per abdomen.

Another study by Le Ray and collegues[19] commented that they found an association between the duration of the active second stage of labour and the risk of severe PPH, defined as estimated blood loss >1000ml, in nulliparous low-risk women. The odd ratio (OR) of severe PPH was significant when the active second stage exceeded 40 minutes (40-49 minutes: adjusted OR 3.5, 95% CI 1.0-12.3; ≥50 minutes: adjusted OR 10.6, 95% CI 2.8-40.3).

On the other hand, a study conducted by Neilsen and Hokegard who reviewed surgical complications in 1319 abdominal deliveries, showed that bladder injuries were usually associated with the station of the fetal head immediately prior to surgery, emergency CS, a gestational age less than 32 weeks, rupture of membranes prior to surgery, the presence of a previous CS or lower abdominal surgery and the experience and skill of the operator [10].

It is unlikely that CS rates will fall significantly in the near future. Instead of bringing down further the CS rates, the alternative to reduce the postpartum morbidities be it to the mother or to the fetus is by modifying the surgical techniques done during second stage CS. The examples were given by a few studies done by Govender[10], O'Brien[6], Schwake[16], Vousden[20] and Seal[7].

Seal and friend[7] in their study introduce a device named as Fetal Pillow (FP) which is a soft silicone balloon that is inserted vaginally to elevate the fetal head atraumatically prior to performing a SSCS. Govender[10] on the other hand used 'push method' to

disimpact the head in second stage CS. Not to forget the 'pull method' in which the fetus is delivered by breech extraction during deeply impacted head in SSCS[16].

Meanwhile Vousden and O'Brien[6 20] summed up the technique for CS at full cervical dilatation starting from the modifications of maternal placement; lithotomy position, modifications of surgery entry method; making skin and fascial incisions wider plus more superior uterine incision, as well as delivery of the head by using non-dominant hand and Patwardhan's method. Patwardhan's method refers to delivery of both fetal shoulders through the incision followed by the trunk, breech, and then finally lifting the head out of the pelvis.

Apart from modification of the surgical techniques, The Royal College of Obstetricians and Gynaecologists (RCOG) suggests that a consultant be present at all second stage CS to make an informed decision and to reduce complications arising from such operations [13]

CHAPTER 2

STUDY OBJECTIVES

2. STUDY OBJECTIVES

GENERAL OBJECTIVE

To study the cesarean section during second stage of labour in HUSM from year 2010-2015.

SPECIFIC OBJECTIVES

1. To determine the prevalence of cesarean section during second stage of labour in HUSM during this period.
2. To identify the maternal outcomes associated with second stage cesarean section in HUSM during this period.
3. To identify the risk factors associated with maternal outcomes in second stage cesarean section in HUSM during this period.

CHAPTER 3

METHODOLOGY

3. METHODOLOGY

STUDY DESIGN

A retrospective study.

STUDY LOCATION

This study was conducted in HUSM. The relevant information of the patients was extracted at Medical Record Unit, HUSM.

STUDY DURATION

The study duration was from 1st of January 2010 until 31st of December 2015. The period of data collections was from 1st of March 2017 until 30th of June 2017.

REFERENCE POPULATION

The reference population for this study was all pregnant women who admitted to HUSM for delivery from 1st of January 2010 until 31st of December 2015.

SOURCE POPULATION

The source population for this study was all pregnant women who underwent second stage cesarean section in HUSM from 1st of January 2010 until 31st of December 2015.

STUDY PARTICIPANTS

All pregnant women who underwent second stage cesarean section in HUSM from 1st of January 2010 until 31st of December 2015 and fulfilled the inclusion and exclusion criteria have been selected in this study.

INCLUSION AND EXCLUSION CRITERIA

INCLUSION CRITERIA

- Patient who delivered via lower segment caesarean section in the second stage of labour in HUSM from 1st of January 2010 until 31st of December 2015
- Live pregnancy
- Term pregnancy
- Singleton pregnancy

EXCLUSION CRITERIA

- Patient with morbidly adherent placenta
- Patient with uterine fibroid in pregnancy
- Patient with coagulation disorders

SAMPLE SIZE AND SAMPLING METHOD

The sample size was calculated using the power and sample size calculation (PS) software (version 3.1.2). Parameters used for sample size calculation in this study were listed in the table 2 below.

Table 1. Parameters for Sample Size Calculation.

Symbol	Description	Parameters of Study
α	Significant level	0.05
1-β	Power of the study	0.80
m	Ratio of control to experimental subjects	1
p_0	Probability of the outcome for a control patient	
p_1	Probability of the outcome in an experimental subject	
δ	Difference in population means	
σ	Within group standard deviation	

Table 2. Sample Size Determination Based on Primary Postpartum Hemorrhage.

	Parameters of study
α	0.05
1-β	0.8
m	1
p_0	0.29[21]
p_1	0.47[21]

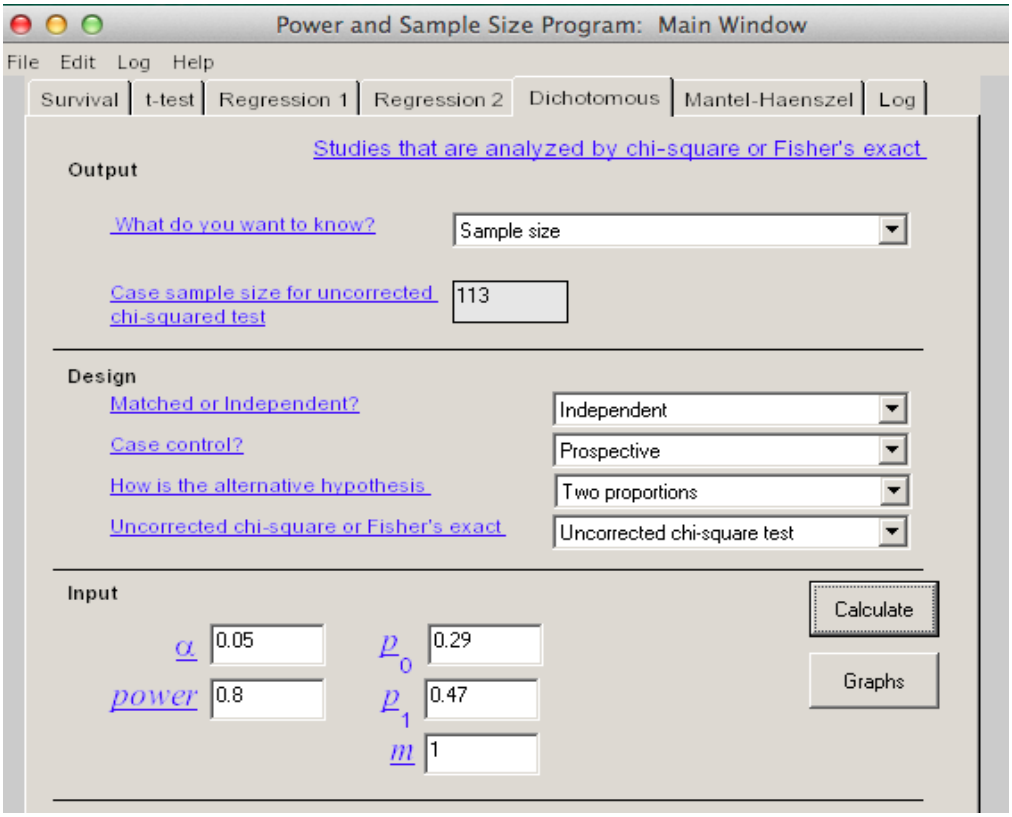


Figure 2. Sample Size Calculation Based on Primary PPH.

Table 3. Sample Size Determination Based on Extended Uterine Tear.

	Parameters of study
α	0.05
1-β	0.8
m	1
p_0	0.018[10]
p_1	0.224[10]

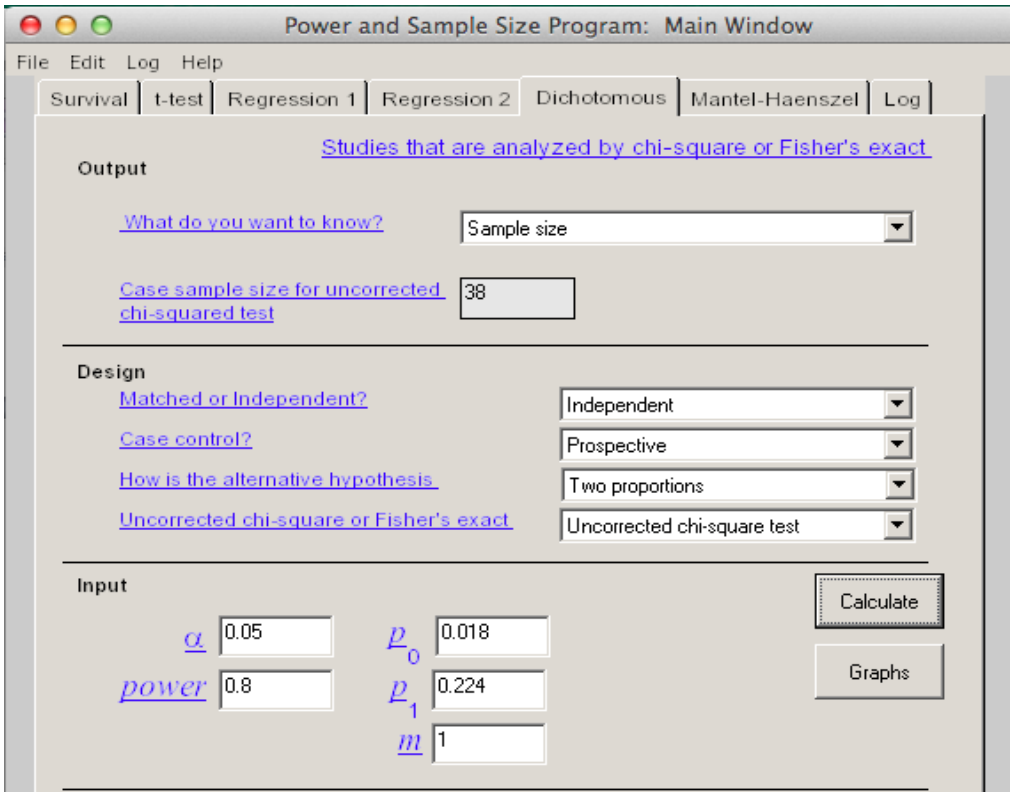


Figure 3. Sample Size Calculation Based on Extended Uterine Tear.

Table 4. Sample Size Determination Based on Duration of Hospital Stay (days).

	Parameters of study
α	0.05
1-β	0.8
m	1
δ	0.39^2
σ	0.82^2

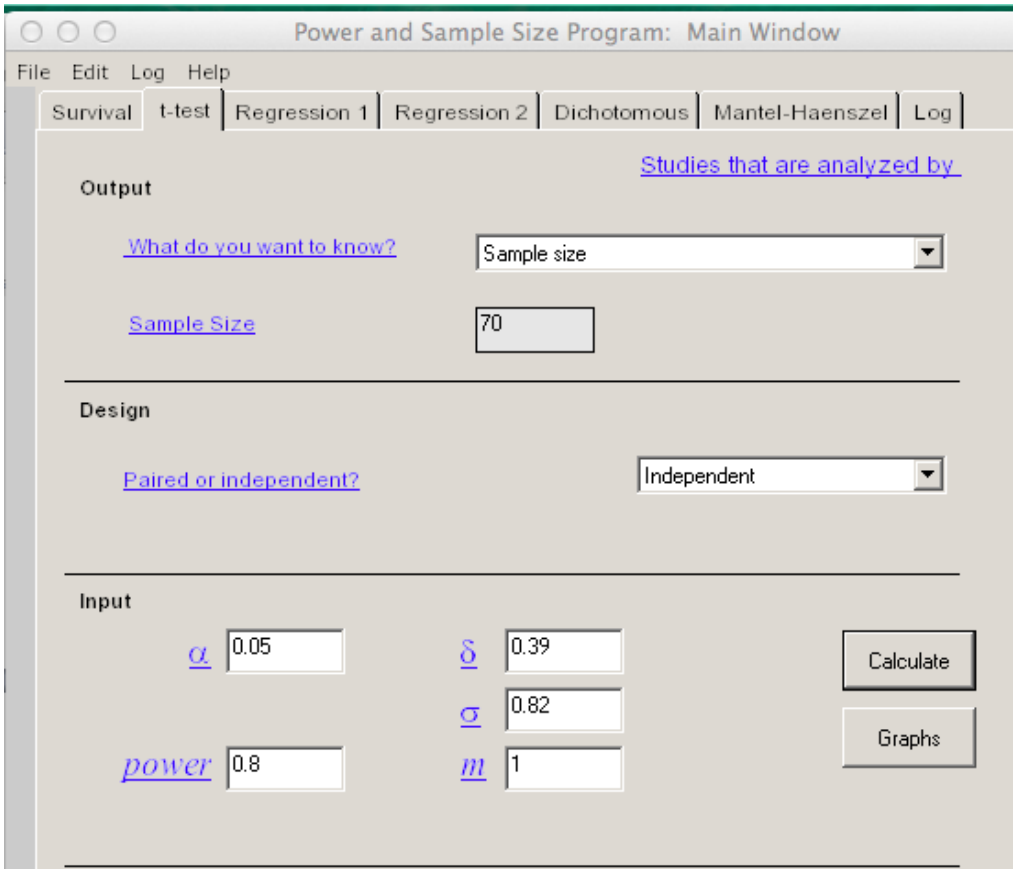


Figure 4. Sample Size Calculation Based on Duration of Hospital Stay.

The sample size determination based on primary postpartum hemorrhage was chosen as it yields the largest number among all.

Sample size = 113 + 20% (dropouts) = 136

Simple random sampling method was applied in this study whereby simple randomization software named Researh Randomizer [22] was used to select 136 patients as determined during sample size calculation.

METHOD OF DATA COLLECTION

The data was derived from retrospective case review of patients who underwent cesarean section during second stage of labour in HUSM from year 2010-2015. A computer-generated list was obtained from the medical record office. The cases were identified according to The codes of the International Classification of Diseases-Tenth revision (ICD-10). Keywords used when retrieving the records include cesarean section during second stage and emergency lower segment cesarean section. If the information needed is incomplete or not available, the patient's data is considered 'missing' and subjected for dropout.

DATA COLLECTION

The data was collected in 4 categories, which include:

1. Patient's demographic data which includes gravida, parity, period of gestation, BMI, previous LSCS scar and also comorbidities.
2. Delivery details including duration of labour, duration of augmentation, duration of second stage, station and position prior to CS, level of surgeon performing the caesarean section, operating time and baby's birth weight.

3. Maternal outcomes: EBL, extended uterine tear, cervical tear, bladder injury, need for blood transfusion, need for ICU admission and length of hospital stay.
4. Fetal outcomes: AS, need for intubation and admission to NICU

Details of each case were recorded using the DATA COLLECTION SHEET.

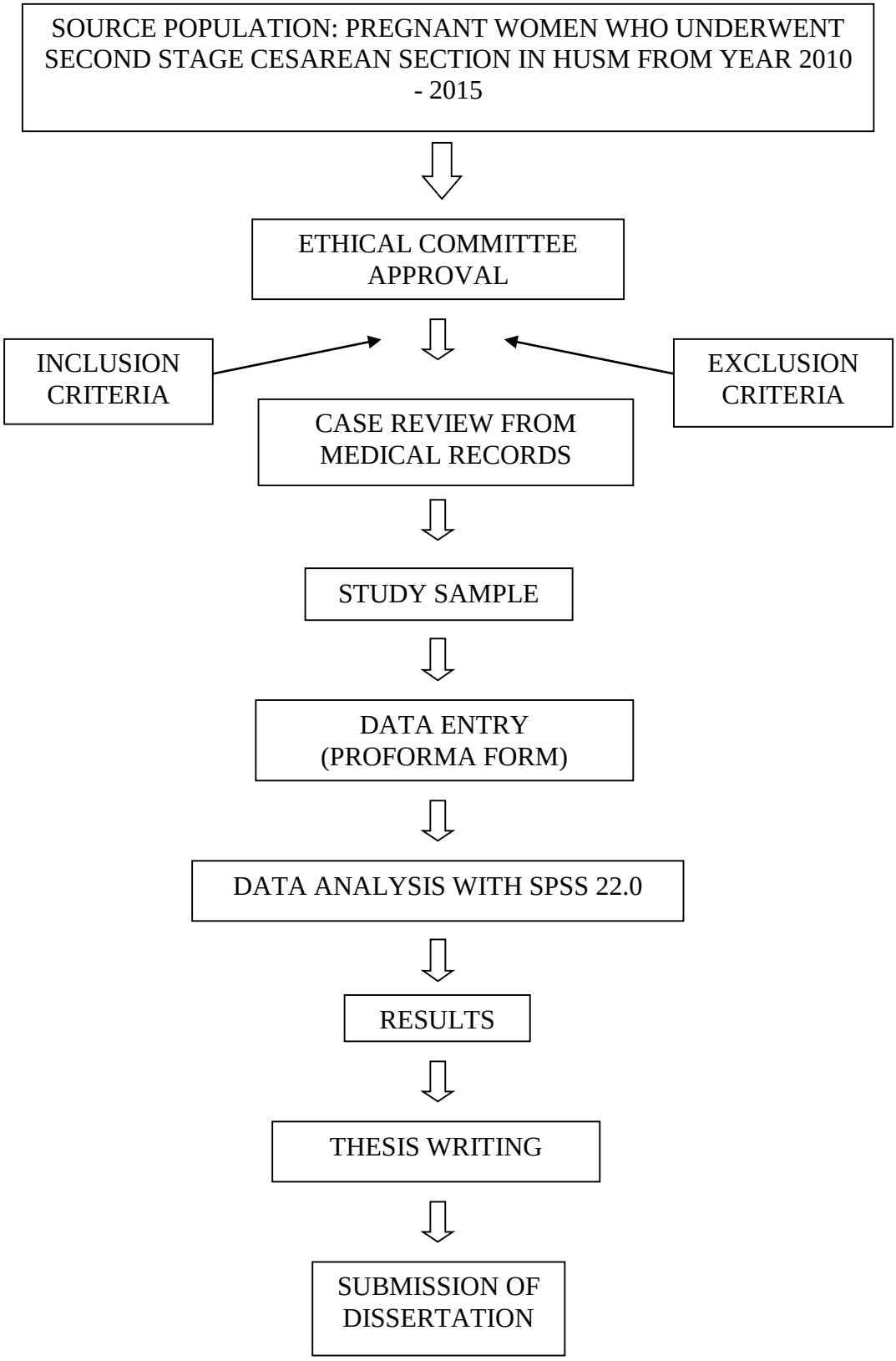
STATISTICAL ANALYSIS

Statistics programmed for social sciences (SPSS) software (version 22) was used for data processing and analysis. Descriptive statistics were utilized in which categorical data will be described as percentage whereas continuous data will be described as mean (sd)/ median (iqr). For hypothesis testing, multiple logistic regression analysis was used and the results were interpreted as OR.

ETHICAL ISSUE

This study was conducted with strict adherence to ethical consideration. An ethical clearance approval was obtained from the Human Research and Ethics Committee of HUSM (HREC). Approval letter as permission to conduct this study was obtained from the director of Hospital University Sains Malaysia. All the information retrieved from the medical records remained confidential. No individual names were used and cases were coded accordingly.

FLOW CHART OF THE STUDY



CHAPTER 4

RESULTS

RESULTS AND ANALYSIS

During the six-year study period (1st of January 2010 until 31st of December 2015), there were summations of 42 456 deliveries. The overall CS rate was 19.3% (8197 out of 42 546 total deliveries). Of all the CS, 6343 (77.4% of all CS) were performed as emergency. A total of 257 (4.1%) emergency lower segment cesarean sections (EMLSCS) were performed during second stage of labour, of which 207 patients were analyzed. 50 patients were excluded from the analysis because their medical records were either unavailable or incomplete.

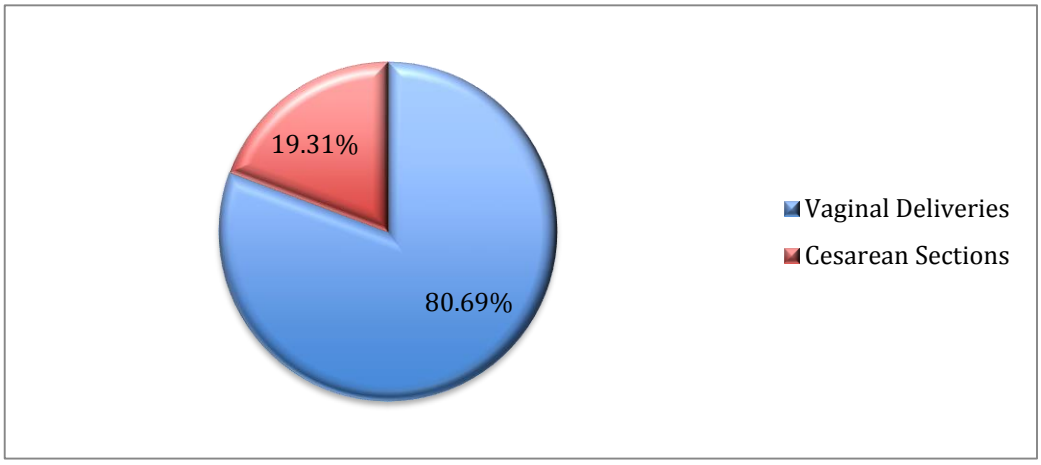


Figure 5. Distribution of Total Deliveries in HUSM from 1st of January 2010 until 31st of December 2015.

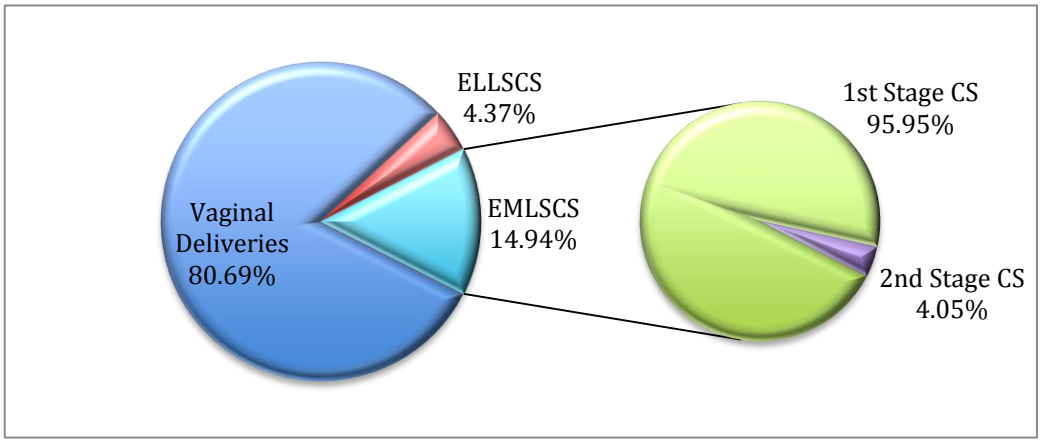


Figure 6. Percentage of 2nd Stage CS in HUSM from 1st of January 2010 until 31st of December 2015.

Table 5. Distribution of Maternal Demographic

Variables	N (%) n= 207	Mean (SD)
Age (years)		[a]29.6 (5.4)
≤ 19 (years)	0 (0%)	
20-34 (years)	172 (83.1%)	
≥ 35 (years)	35 (16.9%)	
Race		
Malay	202 (97.6%)	
Chinese	4 (1.9%)	
Others	1 (0.5%)	
Gravida/Parity		
1 (primigravida)	102 (49.3%)	
2-4 (multipara)	84 (40.6%)	
≥ 5 (grandmultipara)	21 (10.1%)	
Gestational age at delivery (weeks)		[b]39 (1.0)
Early term	48 (23.2%)	
Full term	120 (58.0%)	
Late term	39 (18.8%)	
Post term	0 (0.0%)	

Previous scar		
Yes	48 (23.2%)	
No	159 (76.8%)	
Referred in second stage of labour		
Yes	48 (23.2%)	
No	159 (76.8%)	
BMI (kg/m^2)		[a]31.2 (5.2)
< 18.5 (underweight)	0 (0%)	
18.5-24.9 (normal)	24 (11.6%)	
25.0-29.9 (overweight)	72 (34.8%)	
≥ 30 (obese)	111 (53.6%)	
Comorbidities		
PIH/Pre-eclampsia		
Yes	14 (6.8%)	
No	193 (93.2%)	
GDM/DM		
Yes	40 (19.3%)	
No	167 (80.7%)	
Anaemia (Hb < 11 g/dl)		
Yes	16 (7.7%)	
No	191 (92.3%)	

[a]Mean(SD)
[b]Median(IQR)

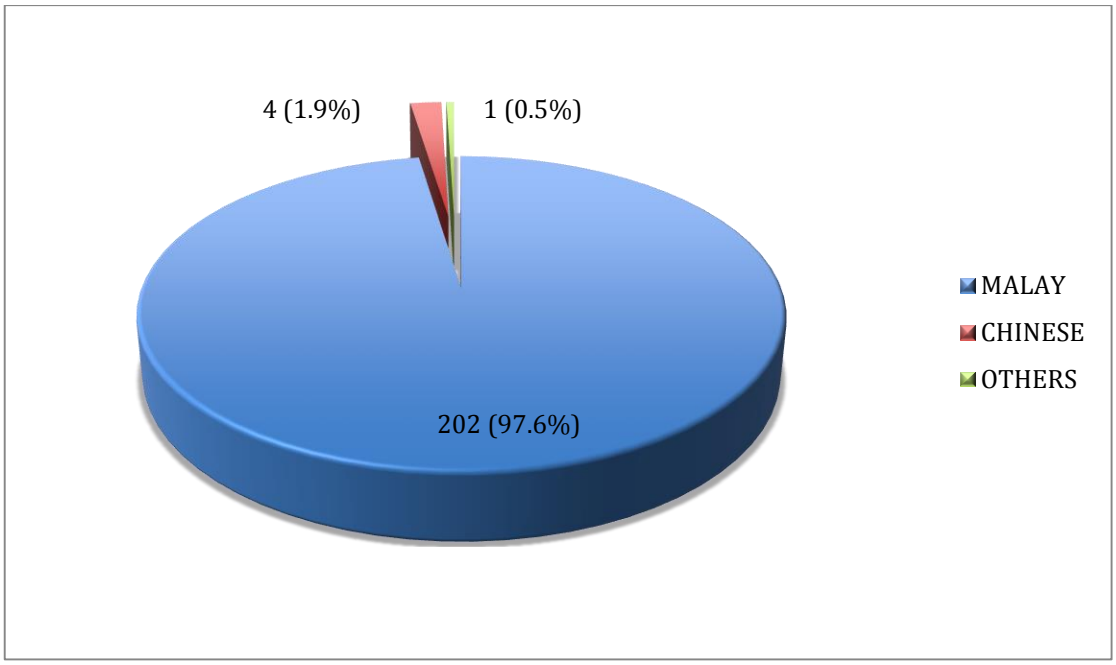


Figure 7. Ethnic Distribution.

Table 5 shows the distribution of the maternal demographics. The mean age for the women involved in this study was 29.6 ± 5.4 years old in which 97.6% of them were Malay followed by 1.9% Chinese and the others (Siamese, Orang Asli) were 0.5% as represented in Figure 7. None of the women were Indian.

Majority of the parturient women in this study were primigravida, which comprise of 49.3% of the sample size. Only 10.1% of them were grandmultipara and the rest 40.6% were multipara.

The gestational age at delivery were 39 weeks ± 1.0 week period of gestation (POG). All deliveries were vertex deliveries as non-cephalic presentation as well as face and brow were excluded from the study.

Majority of women in this study were obese (53.6%) with the mean BMI of 31.2 ± 5.2 kg/m^2 while 23.2% of them have 1 previous LSCS scar. There were 6.8% of the women with PIH/Pre-eclampsia, 19.3% GDM/DM and 7.7% were noted to be anemic.

Table 6. Labour and Delivery Characteristics.

Variables	**N (%)**	**Mean (SD)**
	n= 207	
Onset of labour		
Spontaneous	182 (87.9%)	
Induced	25 (12.1%)	
Prostin	21 (84%)	
Foley's Catheter	4 (16%)	
Pitocin augmentation		
Yes	123 (59.4%)	
No	84 (40.6%)	
Duration of labour (minutes)		
1st stage		[a]375.2 (200.5)
2nd stage		[a]143.8 (56.2)
< 60	9 (4.3%)	
60-89	22 (10.6%)	
90-119	44 (21.3%)	
120-149	49 (23.7%)	
150-179	30 (14.5%)	
≥ 180	53 (25.6%)	
Position prior to CS		
OT	80 (38.6%)	
OA	66 (31.9%)	
OP	61 (29.5%)	