



UNIVERSITI PUTRA MALAYSIA

***RISK FACTORS FOR CESAREAN DELIVERY FOR
PRIMIGRAVIDA IN LABOR AT HOSPITAL SERDANG***

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RISK FACTORS FOR CESAREAN DELIVERY FOR PRIMIGRAVIDA IN LABOR AT HOSPITAL SERDANG

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ABSTRACT

Introduction: The rate of cesarean delivery section that being performed has been increasing, in both low and high risk women. It was across all ages, races and ethnicities. The excessive use of cesarean delivery in low-risk woman will exposed both the baby and the mother to more harms than the benefits.

Objective: To identify the risk factors for cesarean section among primigravida patient at Hospital Serdang.

Methods: A hospital based case-control study was carried out. It involved 130 primigravida patients that undergo vaginal delivery section (controls) and 130 primigravida patients that undergo cesarean delivery section (cases) at the labor ward of Hospital Serdang from January until June 2013. The period of data collection used around three weeks. A proforma was used and it was completely filled up.

Results: Majority of the cases was Malaysian (86.9%) and mostly was from Malay ethnic group (75.4%). Citizenship, gestational age, hypertension status and fetal weight had a significant relationship with mode of delivery. Majority of both mother and baby from both type of delivery had shown no complications after delivery. Hypertension status, gestational age and fetus weight were significant affected the primigravida mothers prone to assign to cesarean delivery section upon arrival to labor.

Conclusion: Those patients that with any type of hypertension, over the expected delivery date and with heavy fetus weight will have higher chances to undergo caesarean delivery. There are more maternal and neonatal complications for those that undergo caesarean delivery section than those that undergo vaginal delivery section.

Key Words: *Cesarean delivery, risk factors, primigravida, labor room, complications*

FAKTOR-FAKTOR RISIKO YANG BOLEH MEMBAWA KEPADA KELAHIRAN SECARA CESAREAN DI KALANGAN PESAKIT PRIMIGRAVIDA KETIKA BERSALIN DI HOSPITAL SERDANG

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ABSTRAK

Pendahuluan: Kadar kelahiran secara pembedahan cesarean semakin meningkat, samada dalam kalangan wanita yang berisiko rendah mahupun juga dalam kalangan wanita yang berisiko tinggi. Kadar peningkatan ini berlaku di antara semua lapisan umur, bangsa dan juga etnik. Penggunaan pembedahan cesarean sebagai kaedah kelahiran secara berlebihan dalam kalangan wanita yang berisiko rendah boleh mendedahkan kedua-dua ibu dan juga anaknya kepada lebih banyak bahaya berbanding manfaat.

Objektif: Untuk mengenalpasti faktor-faktor risiko yang boleh membawa kepada pembedahan cesarean di kalangan pesakit-pesakit primigravida di Hospital Serdang.

Kaedah: Kajian kes kontrol telah dijalankan. Ia melibatkan 130 pesakit primigravida yang melalui proses bersalin secara vagina/normal (kontrol), dan juga 130 pesakit primigravida yang melalui proses bersalin secara cesarean (kes) di wad bersalin Hospital Serdang dari Januari hingga Jun 2013. Tempoh pengumpulan data adalah lebih kurang tiga minggu. Proforma telah digunakan dalam mengumpul data.

Keputusan: Majoriti kes melibatkan penduduk Malaysia (86.9%) dan kebanyakannya pula berbangsa Melayu (75.4%). Kewarganegaraan, usia kandungan, status tekanan darah tinggi, dan juga berat badan janin mempunyai hubungan yang penting dengan kaedah bersalin. Majoriti ibu dan bayi dari kedua-dua jenis kaedah bersalin tidak menunjukkan apa-apa tanda komplikasi selepas bersalin. Status tekanan darah tinggi, usia kandungan, dan berat badan janin memainkan peranan yang terpenting dan paling cenderung menyebabkan pesakit-pesakit primigravida untuk menjalani pembedahan secara cesarean sebaik sahaja ketibaan di wad bersalin.

Kesimpulan: Pesakit-pesakit yang datang dengan apa jua jenis tekanan darah tinggi, melebihi usia kandungan yang sepatutnya, dan juga dengan berat badan janin yang berlebihan akan mempunyai peluang yang lebih besar untuk melalui pembedahan secara cesarean. Kadar komplikasi untuk ibu dan juga bayi yang baru lahir melalui pembedahan cesarean adalah lebih tinggi jika dibandingkan dengan kadar komplikasi mereka yang melalui proses bersalin secara normal.

Kata Kunci: *Pembedahan cesarean, faktor-faktor risiko, primigravida, wad bersalin, komplikasi*



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LISTS OF ABBREVIATIONS

GDM	Gestational Diabetes Mellitus
HPT	Hypertension
LSCS	Lower Segment Cesarean Section
MSL	Meconium-stained Liquor
NCBI	National Center for Biotechnology Information
PIH	Gestational Hypertension
T1DM	Type 1 Diabetes Mellitus
T2DM	Type 2 Diabetes Mellitus

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CHAPTER 1: INTRODUCTION

INTRODUCTION

There are two different mode of delivery, one is the vaginal delivery and the other is the cesarean delivery. Cesarean delivery or cesarean section is the procedure in which the delivery of a baby is performed through the abdominal wall and uterus (Dorland medical dictionary). Recent study shows that the cesarean section rate performed in Malaysia public hospitals has increased from 10.5% in 2000 to 15.7% in 2006 (Ravindran, 2008).

Among the common risk factors for cesarean delivery includes maternal age (teenage or advanced maternal age) (Martel et al, 1987), ethnicity, maternal health conditions (such as preeclampsia and diabetes), poor cervical dilatation and effacement (dysfunctional labour), gestational age (postdate or postterm), dystocia (American College of Obstetricians and Gynecologists, 2000), and prolonged second stage (Thorp et al, 1989)

Cesarean section has higher maternal and fetal risks compared to vaginal delivery. Even though maternal mortality rates after cesarean delivery are low, cesarean section is more

hazardous than vaginal delivery by a factor of two to four (Miller, 1988). Furthermore, babies delivered by breech or lower segment cesarean section (LSCS) also had significantly higher mortality than those delivered by other modes of delivery (Boo et al, 1991).

Within these two decades, the rate of cesarean section being performed has been increasing, in both women at low and high risk of complications, and across all ages, races and ethnicities (Menacker et al, 2006. Boyle et al, 2012). As cesarean rates increase, thus more lower-risk women experiences cesarean delivery. (Barber et al, 2011. Baicker et al, 2006). This excessive use of cesarean delivery in low-risk woman exposes both the baby and the mother to more harms than the benefits (New York: Childbirth connection, 2012). Thus if we are able to predict whether if the patients were at a high risk or at a low risk for cesarean delivery as they entered established labor, then unnecessary prolonged course of labor, time in labor, increased costs and severe complications may be avoided.

Hence the objective of this study was to identify risk factors which enable medical doctors to place a term primigravida patient in labor at high risk for cesarean delivery as they arrive for labor and delivery, and also to identify whether the risk of patient undergo cesarean delivery.

1.1 PROBLEMS STATEMENT

In order to prevent or avoid unnecessary prolonged labor, unnecessary costs and complications arising from cesarean section performed on low-risk women, a research need to be carried out.

The research is done with the aim of:

- To identify the risk factors for cesarean section among primigravida patient at high risk
- To identify the risk factors are involved that will enable placing a term primigravida patient in labor at risk for cesarean delivery as they arrive for labor and delivery
- To identify the outcome of mothers and babies with different mode of delivery

1.3 SPECIFIC OBJECTIVES

1.2 RESEARCH QUESTION

What are the risk factors that must be present in a term primigravida women before she can be identified as one from high-risk group for cesarean delivery?

1.3 OBJECTIVES OF THE STUDY

1.3.1 GENERAL OBJECTIVE

To identify the risk factors for cesarean section among primigravida patient at Hospital Serdang.

1.3.2 SPECIFIC OBJECTIVES

- To describe the demographic characteristics of the respondents.
- To describe the indications of cesarean delivery.
- To investigate the association between risk factors and mode of delivery.
- To investigate the association between complications of mother and baby and mode of delivery
- To identify the risk factors involved which may place a term primigravida patient in labor at high risk for cesarean delivery upon arrival to labor

1.4 RESEARCH HYPOTHESIS

There are associations between maternal age and the mode of delivery.

There are associations between maternal ethnicity and the mode of delivery.

There are associations between maternal citizenship and the mode of delivery.

There are associations between gestational age and the mode of delivery.

There are associations between maternal diabetes status and the mode of delivery.

There are associations between maternal hypertension status and the mode of delivery.

There are associations between cervical dilatation at admission and the mode of delivery.

There are associations between cervical effacement at admission and the mode of delivery.

There are associations between colour of liquor and the mode of delivery.

There are associations between fetal sex and the mode of delivery.

There are associations between fetal weight and the mode of delivery.

There are associations between mode of delivery and maternal postpartum complications.

There are associations between mode of delivery and neonatal complications.

CHAPTER 2: LITERATURE REVIEW

2.1 Cesarean section rates

Rates of caesarean section have been rising in all countries where data is available. (Churchill 1997). The caesarean section rate in Malaysia public hospital has increased to 15.7% in 2006 from 10.5% in 2000. There are inter-state variations in the rate ranging from a high of 25.4% in Melaka to 10.9% in Sabah. The West Coast states generally had a higher caesarean section rate than the East Coast states as well as East Malaysia. (Ravindran 2008)

2.2 Factors affecting rates of cesarean section

2.2.1 Sex of fetus

A study carried out in Hospital Sultanah Aminah, Johor Bahru in 2008 to determine the influence of fetal sex on the outcome of labor at term in a cohort of Malaysia nullipara, indicates that mothers giving birth to male infants have a greater risk of requiring cesarean delivery because male babies are heavier and have statistically significantly greater head circumference. These findings concur with those obtained in western populations and suggest that the

differences in outcome observed are biological, not dictated by race, ethnicity, or environmental conditions. (Viegas et al 2008)

2.2.2 Maternal age

Increasing maternal age was associated with higher rates acquiring cesarean section.

(Santos et al 2009, Cleary-Goldman et al 2005, Patel et al 2005, Adashek et al 1993)

The obstetric performance of 240 elderly primigravida delivering at the University Hospital, Kuala Lumpur, Malaysia between January 1987 and February 1990 was compared with a random group of 250 young primigravida delivering during the same time period. The incidence of caesarean section in the older group was 40.4% compared with 6.8% in the younger (p less than 0.001). (Urquhart et al, 1991)

2.2.3 Ethnic origin

The risk of emergency lower segment cesarean section (LSCS) is significantly higher in the Indians compared to Chinese and Malays, but does not differ significantly between the latter two groups. (Hin et al 1994)

2.2.4 Birth weight

Birth weight of less than 2,500g or greater than 3,500g is the most significant association with emergency LSCS rate. (Hin et al 1994)

Extremes of neonatal birth weight were associated with an increased risk of Caesarean section (all Caesareans and emergency section) compared with vaginal delivery as was increasing neonatal head circumferences. (Patel et al 2005)

In an increased birth weight, greater or equal to 3600gm, patients were more likely to be delivered by cesarean section (Adashek et al 1993)

2.2.5 Non-cephalic (breech) presentation

Non-cephalic (breech) presentation was associated with higher rates acquiring cesarean section (Patel et al 2005)

2.2.6 Previous Caesarean section

Previous Caesarean section was associated in all analyses with an increased risk of Caesarean section. (Patel et al 2005)

2.2.7 Parity

Increasing parity was associated with a decrease in risk for all Caesareans and emergency section. (Patel et al 2005)

2.2.8 Gestation

Increasing gestation was independently associated with a decreased risk of both all Caesareans both elective as well as emergency Caesarean. (Patel et al 2005)

2.3 The effects of cesarean section

Cesareans affect women differently to vaginal deliveries. The evidence suggests that women who have cesarean births suffer more negative effects, both psychologically and physiologically. The negative effects of cesarean sections are compounded by having such things as having emergency operations as opposed to elective ones, the type of anesthetic used for the operation, whether a partner/ birth companion was allowed to be present for the birth, and how prepared the woman was for the operation in terms of the amount of information available to her about cesarean birth. (Churchill 1997)

2.3.1 Effects of cesarean section on the mother

2.3.1.1 Psychological and perceptions on delivery

Study indicates that most women still feel happy and excited about the newborn, although they were also disappointed about having to have a cesarean delivery. They also required continued attention, sensitive care, presence of their partners throughout birth experience, and sustained contact with their newborn. (Reichert et al 1993)

Emergency cesarean birth group had the most negative perception on delivery as compared to vaginal delivery group or elective delivery group. (Cranley et al 1983)

Among women having cesareans, more positive perceptions were associated with regional anesthesia, presence of their husbands at delivery, and greater participation in decision making. Women in the cesarean groups were less likely to breast feed, and those having planned cesareans were least likely to attend childbirth classes. (Cranley et al 1983, Fawcett et al 1992)

They also had more doubts about their capacity to care for their babies, more depressed with the symptoms, and found difficulty in adjusting to the birth of their first baby and parenthood more than the normal delivery group. (Trowell 1982)

A study reported that mothers with emergency cesarean section experienced more general mental distress and showed more symptoms of post-traumatic stress at 1 month postpartum compared to those with elective cesarean delivery and normal vaginal delivery group. (Ryding et al 1998)

Cesarean section was associated with high postnatal depression score even week(s) after the delivery. (Hannah et al 1992)

After a caesarean section, mothers tended to have fewer children and more difficulty in conceiving. (Garel et al 1990)

Cesarean delivery had no significant effects on parental depression and marital adjustment. (Culp et al 1989)

2.3.1.2 Maternal mortality, morbidity and any other physiological effects

Maternal mortality rates after cesarean delivery are low, but cesarean section is more hazardous than vaginal delivery by a factor of two to four. (Miller 1998)

The maternal mortality rate after cesarean section is currently very low, but cesarean section is more hazardous than vaginal delivery by a factor of 2-11 (Petitti 1985)

Following a comparison study of effects between epidural and general anesthesia on cesarean patients, those who were given epidural anesthesia experienced less pain, discomfort in the immediate postoperative period, gastrointestinal stasis, pyrexia, coughing, fever, and less tired and depression. (Morgan et al 1984)

Four years after delivery, mothers in the caesarean group reported fatigue more frequently than control mothers. (Garel et al 1990)

Mothers who had cesarean delivery had significantly higher labor index risk scores than those with vaginal birth. (Culp et al 1989)

Analysis by mode of delivery showed that of those delivered by caesarean section 23.2% fewer had another pregnancy than those who had a spontaneous vaginal delivery. Miscarriage was more common in women who had been delivered by caesarean section. (Hall et al 1989)

2.3.1.3 Effects on mother-child relationship

Mothers delivered by cesarean section had a period of amnesia after birth so their recollected first contact with their baby was later than the mothers delivered by normal vaginal delivery. (Trowell 1982) Although other study was reported that it had no any other significant differences in mother-infant behaviors during the feedings observed. (Culp et al 1989)

Mothers giving birth by cesarean had a later first breastfeeding and expressed less satisfaction with the birth experience than did those who delivered vaginally, but no relationships were found between delivery type and duration of breastfeeding or pain or fatigue related to breastfeeding. Time of first breastfeeding was not related to breastfeeding duration. (Kearney et al 1990)

2.3.1.4 Cesarean section and intraoperative surgical complications

Mothers with emergency cesarean section has higher complication rate (18.9%) compared to elective cesarean section (4.2%). Six risk factors were associated with the occurrence of surgical complications in emergency cases: Station of the presenting part of the fetus in relation to the spinal plane, labor prior to surgery, low gestational age, rupture of fetal membranes (with labor) prior to surgery, previous cesarean surgery, and skill of the operator. (Nielsen et al 1984)

2.3.2 Effects of cesarean section on the baby

2.3.2.1 Neonatal mortality and morbidity

Cesarean birth rarely causes the death of a newborn. (Miller 1998)

There were no difference in neonatal outcome in between the use of epidural anesthesia and general anesthesia in elective cesarean section. (Hong et al 2003)

A study reported an association between cesarean section birth and development of respiratory distress syndrome on the newborn (White et al 1985), although another study reported awaiting the onset of labor appears to be beneficial in preventing respiratory morbidity in term neonates delivered by elective cesarean section. (Cohen et al 1985)

There was an increased risk of asthma medication and asthma diagnosis during year of follow-up in children born with cesarean section, but when separating between emergency and elective CS, the effect on asthma medication remained for emergency CS, but not for elective CS, although, both groups had significant effects on asthma diagnosis compared with vaginal delivery.

(Almqvist et al 2012)



2.4 Conceptual Framework

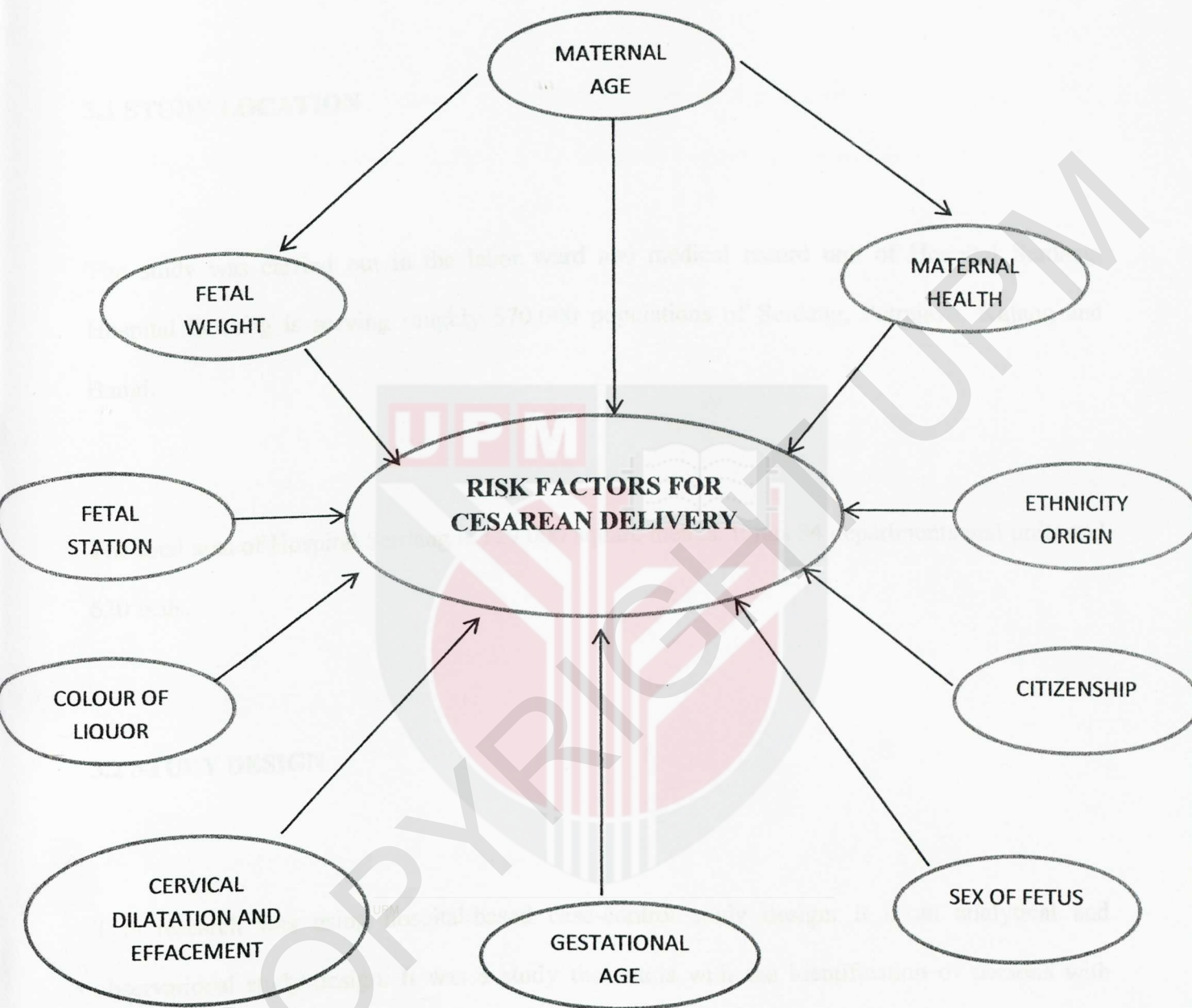


Figure 1: Conceptual Framework

CHAPTER 3: METHODOLOGY

3.1 STUDY LOCATION

The study was carried out in the labor ward and medical record unit of Hospital Serdang. Hospital Serdang is serving roughly 570,000 populations of Serdang, Putrajaya, Kajang and Bangi.

The total area of Hospital Serdang is 129,000 square metres. It has 34 departments and units and 620 beds.

3.2 STUDY DESIGN

This research was using hospital-based case-control study design. It is an analytical and observational study design. It was a study that starts with the identification of persons with outcome of interest and suitable control group of persons without the outcome.

Cases and controls were selected from the same hospital. Both cases and controls were selected regarding the inclusion and exclusion criteria.

3.3 STUDY PREPARATION

The permission of ethical committee of both institutions Faculty of Medicines and Health Sciences, UPM and Hospital Serdang was obtained before starting of data collection.

3.4 STUDY DURATION

This research is conducted from 25th March 2013 until 5th September 2013. The data that collected was data from January until June year 2013.

3.5 STUDY POPULATION

The study population included primigravida mothers who delivered birth in Hospital Serdang.

The population includes both vaginal and cesarean delivery primigravida mother.

3.5.1 SAMPLING POPULATION

The sampling population of this study was the primigravida mother (vaginal delivery and cesarean delivery) who delivered birth in labor ward, Hospital Serdang at January to June year 2013.

The cases that selected were the primigravida mothers who undergo cesarean delivery in labor ward, Hospital Serdang.

The controls that selected were the primigravida mothers who undergo vaginal delivery in labor ward, Hospital Serdang.

3.5.1.1 INCLUSION CRITERIA

The inclusion criteria include:

- Deliveries that occurred at labor ward Hospital Serdang at January to December year 2012
- Primigravida mothers
- Aged 15 – 45 years old
- Singleton gestations

3.5.1.2 EXCLUSION CRITERIA

The exclusion criteria include:

- Deliveries that occurred at labor ward Hospital Serdang before and after year 2012
- Multigravida mothers
- Aged under 15 years old and more than 45 years old
- Multiple pregnancies
- Major fetal abnormalities
- Significant maternal diseases (such as renal failure, myocardiac infarction and others)

3.5.2 SAMPLING FRAME

A sampling frame which was a list of primigravida mothers who admitted to labor ward Hospital Serdang, Selangor during January until June year 2013 was obtained for this study.

3.5.3 SAMPLING UNIT

The sampling unit was the primigravida mothers who fulfilled the inclusion criteria and exclusion criteria.

3.5.4 SAMPLING METHOD

Probability sampling method that used in this research for choosing sample. The sampling method that used for this study was simple random sampling.

3.5.5 SAMPLE SIZE

The formula that is using for sample size estimation is(Lu AA, 2006) :

$$n = \frac{\{Z_{1-\alpha/2}\sqrt{2P^*2(1-P^*2)} + Z_{1-\beta}\sqrt{P^*1(1-P^*1) + P^*2(1-P^*2)}\}^2}{(P^*1-P^*2)^2}$$

$$= \frac{\{1.960\sqrt{2 \times 0.3 \times 0.7} + 0.842\sqrt{0.4615 \times 0.5385 + 0.3 \times 0.7}\}^2}{(0.4615-0.3)^2}$$

$$= 129.858 \approx 130$$

Note : “*” here refers to proportion (P*) exposed in case-control design

P*1 = Proportion exposed in cases

P*2 = Proportion exposed in controls

Regarding to Wikes PT,2003 : P*1 = 0.4615, P*2 = 0.3

This study was a two-sided test. Therefore value of “ α ” was 0.05 and “ $Z_{1-\alpha/2}$ ” was 1.96. The confidence interval was set as 95% in this study. The power was being set as 80% and “ $Z_{1-\beta}$ ” was 0.842.

The sample size that being calculated for 129.858 respondents. It was round up as 130 for both cases and controls respectively.

Therefore, there were 130 respondents in each study group.

3.6 PARAMETERS / VARIABLES

3.6.1 DEPENDENT VARIABLE

The risk category of patients undergoes cesarean section.

3.6.2 INDEPENDENT VARIABLE

The demographic characteristics of respondents

The risk factors for cesarean delivery

The outcome of the mothers and babies in different mode of deliveries

3.7 INSTRUMENTS

This study was using performa to collect data.

The performa was divided into 4 sections:

- 1) Sociodemographic information
- 2) Antenatal information
- 3) Intrapartum information
- 4) Postpartum information

3.8 DATA COLLECTION

3.8.1 DATA COLLECTION TECHNIQUE

The data was collected through accessing patients' medical record at Department of Obstetrics and Gynecology and Department of Medical Record. The result was obtained from the performa that was being filling up.

3.9 DATA ANALYSIS

The data that had collected was analyzed by using Statistical Package for Social Sciences Program (SPSS) version 21.

The categorical variables were analyzed by using Chi-square test, χ^2 test or Fisher exact test.

Logistic regression analysis was used to identify independent risk factors of cesarean delivery.

Confidence interval was set at 95 % and significant levels was set at a standard p value of <0.05 .

3.10 STUDY ETHICS

- 1) Ethical clearance was obtained from JKEUPM of the Faculty of Medicine and Health Sciences, UPM.
- 2) Approval to conduct the study was obtained from Hospital Serdang.
- 3) Approval of National Medical Research Register (NMRR) was obtained.
- 4) Data was confidential and can only be assessed by researchers.

3.11 OPERATIONAL DEFINITIONS

Cesarean section - Delivery of baby by incision through the abdominal wall and uterus (Dorland medical dictionary)

Primigravida- A woman pregnant for the first time (Dorland medical dictionary)

Parity - The condition of a woman with respect to her having borne viable offspring (Dorland medical dictionary)

Gravida- Number of pregnancy regardless of outcome (Dorland medical dictionary)

Cervical dilatation - Dilating or stretching of the cervix (Dorland medical dictionary)

Cervical effacement - the obliteration of form or features; said of the cervix uteri during labor when it shortens from 1 or 2 cm in length to paper thin and there is no longer a cervical canal but only an external cervical os. (Dorland medical dictionary)

Fetal station - the relationship between the presenting part of the baby - the head, shoulder, buttocks or feet, and two parts of the mother's pelvis called the ischial spines. Normally at the level of ischial spines are the narrowest part of the pelvis. They are a natural measuring point for the delivery progress

- If the presenting part lies above the ischial spines, the station is reported as a negative number from -1 to -5 (each number is a centimeter). If the presenting part lies below the ischial spines, the station is reported as a positive number from +1 to +5. The baby is said to be "engaged" in the pelvis when it is even with the ischial spines at 0 station (Melanie, 2012)

Fetal position - the relationship of the part of the fetus that presents in the pelvis to the four quadrants of the maternal pelvis, identified by initial L (left), R (right), A (anterior), and P (posterior). The presenting part is also identified by initial O (occiput), M (mentum), and S (sacrum). If a fetus presents with the occiput directed to the posterior aspect of the mother's right side, the fetal position is right occiput posterior (ROP). (Mosby's Medical Dictionary, 2009)

Dystocia – abnormal labor or childbirth.

- There are three types of dystocia, which include fetal dystocia (that due to shape, size, or position of the fetus), maternal dystocia (that due to some condition inherent in the mother) and placental dystocia (difficult delivery of the placenta). (Dorland Medical Dictionary)

3.12 BIAS

- Misclassification bias

It is an error due to the information that being collected is being wrongly classified or measured. This may affect all the study groups or only certain group only. To reduce the bias, the interviewer or researcher should be clearly understand about the data that should be collected and the way of collecting data. Besides, the classification of data should be clearly noted.

CHAPTER 4: RESULTS

4.1 Demographic Characteristics of Respondents

4.1.1 Maternal Age

There were total 260 participants that had being collected. There were 130 participants for vaginal delivery (control) and another 130 participants for cesarean delivery (case).

The mean age for the respondents was (26.65 ± 4.03) years old. The median was 26 years old. The mode was 25 years old. The interquartile range was 5 years old. The distribution had a minimum value of 16 years old and a maximum value of 40 years old.

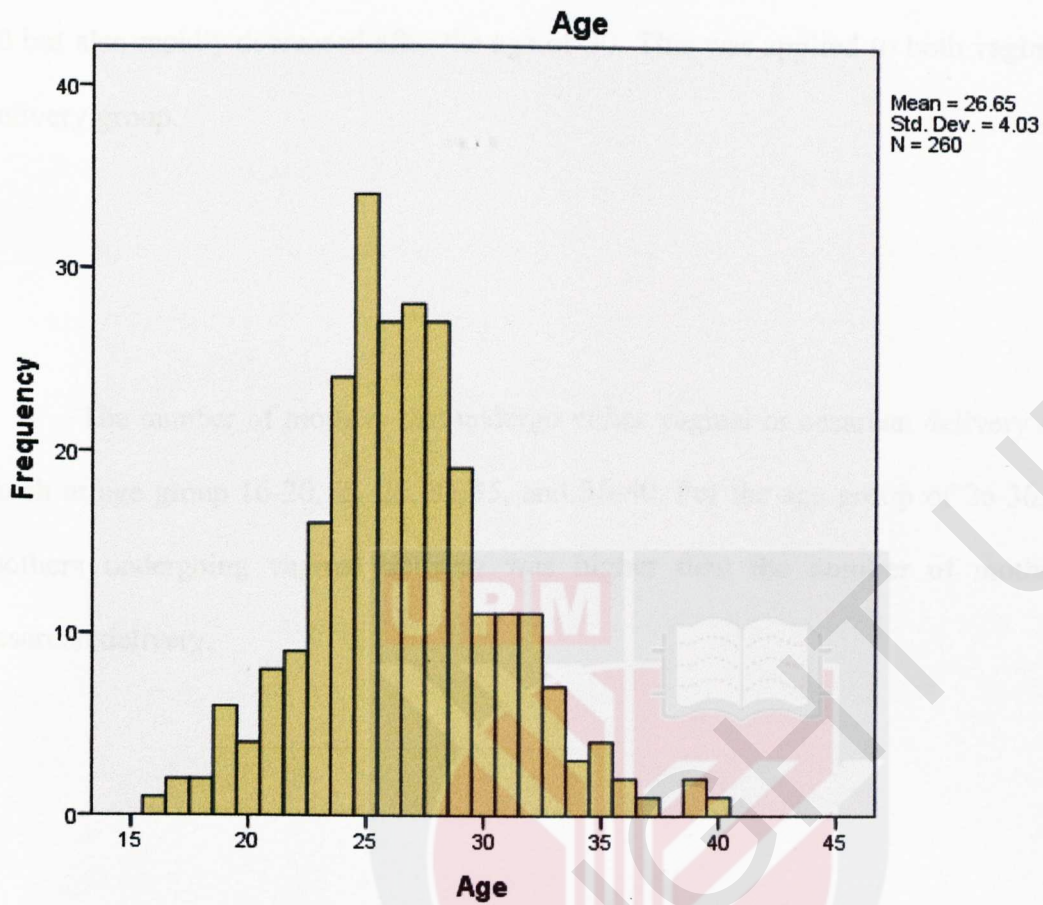


Figure 2: Distribution of respondents by age

The maternal age was then classified into several groups. There was five classification of maternal age according to the data that had being collected, which were 16-20 years old, 21-25 years old, 26-30 years old, 31-35 years old and 40-45 years old.

According to Table I, the number of deliveries were rapidly increasing from age 16 to age 30 but also rapidly decreased after the age of 30. This was applied to both vaginal and cesarean delivery group.

The number of mothers that undergo either vaginal or cesarean delivery does not differs much at age group 16-20, 21-25, 31-35, and 36-40. For the age group of 26-30, the number of mothers undergoing vaginal delivery was higher than the number of mothers undergoing cesarean delivery.

Table I: Distribution of maternal age group of respondents according to mode of delivery

Maternal Age (years)	Cesarean Delivery, n(%)	Vaginal Delivery, n(%)	Total
16-20	8 (6.2%)	7 (5.4%)	15
21-25	47 (36.2%)	44 (33.8%)	91
26-30	49 (37.7%)	63 (48.5%)	112
31-35	21 (16.2%)	15 (11.5%)	36
36-40	5 (3.8%)	1 (0.8%)	6
Total	130 (100%)	130 (100%)	260

4.1.2 Ethnicity

The ethnic groups were classified by 4 ethnic groups, Malay, Chinese, Indian and others. The ethnic groups were classified according to mode of delivery, which was vaginal and cesarean delivery.

From Table II, the Malay ethnic group has the highest number of total deliveries of 199 where 101 gave births through vaginal method while the remaining 98 gave births through cesarean method.

Chinese ethnic group had the second highest number of vaginal delivery, which was 19. It had the lowest number in cesarean delivery group, which were 6. Whereas the Indian ethnic group had the lowest number of vaginal delivery, that was only 3. The number of Indian for cesarean delivery group was higher than the Chinese, which were 8.

The ethnic group was then further classified into two groups, which were Malay and non-Malay to study about the relationship between ethnicity and mode of delivery.

Table II: Distribution of ethnicity of respondents according to mode of delivery

Ethnic Groups	Cesarean Delivery,	Vaginal Delivery,	Total
	n(%)	n(%)	
Malay	98 (75.4%)	101 (77.7%)	199
Chinese	6 (4.6%)	19 (14.6%)	25
Indian	8 (6.2%)	3 (2.3%)	11
Others	18 (13.8%)	7 (5.4%)	25
Total	130 (100%)	130 (100%)	260

4.1.3 Citizenship

From the total 260 data that had collected, 236 were from Malaysian patient while the other was non-Malaysian patients. Based on Table III, Malaysian showed the highest proportion for both cesarean delivery and vaginal delivery group.

There were 123 (94.6%) of Malaysian primigravida mothers undergo vaginal delivery section, whereas there was only 7 (5.4%) of non-Malaysian primigravida mothers vaginal delivery. For cesarean delivery section, there were 113 (86.9%) of Malaysian primigravida mothers experience cesarean delivery section. The remaining 17 (13.1%) of primigravida mothers that undergo cesarean delivery section was non-Malaysian.

Table III : Distribution of citizenship of respondents according to mode of delivery

Citizen	Cesarean Delivery,	Vaginal Delivery,	Total
	n(%)	n(%)	
Malaysian	113 (86.9%)	123 (94.6%)	236
Non-Malaysian	17 (13.1%)	7 (5.4%)	24
Total	130 (100%)	130 (100%)	260

4.1.4 Gestational Age

Table IV shows the cross-tabulation between gestational age and mode of delivery. The result shows that the highest total number of deliveries is those between 36-40 weeks, which followed by more than or equal to 41, 31-35 and 28-30 weeks respectively.

The primigravida mothers who had the gestational age between 36 and 40 weeks had the highest proportion in cesarean delivery section (78.5%), followed by gestational age more than or equal to 41 weeks (13.8%), between 31 and 35 weeks (6.9%) and between 26 and 30 weeks (0.8%).

The highest proportion of primigravida mothers who undergo vaginal delivery was having the gestational age between 36 and 40 weeks (69.2%). It was followed by gestational age more than or equal to 41 weeks (27.7%), between 31 and 35 weeks (2.3%) and between 26 and 30 weeks (0.8%).

The gestational age was then further classified into two groups, which were less than or equal to 40 weeks and more than or equal to 41 weeks to study about the relationship between the gestational age and mode of delivery.

Table IV: Distribution of gestational age of respondents according to mode of delivery

Gestational Age (weeks)	Cesarean Delivery, n(%)	Vaginal Delivery, n(%)	Total
26-30	1 (0.8%)	1 (0.8%)	2
31-35	9 (6.9%)	3 (2.3%)	12
36-40	102 (78.5%)	90 (69.2%)	192
≥ 41	18 (13.8%)	36 (27.7%)	54
Total	130 (100%)	130 (100%)	260

4.2 Indications of Cesarean Delivery

Table V shows the record of indicators of cesarean delivery section for primigravida mother that delivered birth in Hospital Serdang. Most of the primigravida mothers who undergo cesarean delivery were due to fetal distress (46.9%), and then followed by malpresentation (13.8%) and poor progress (7.7%). For the primigravida mothers who undergo cesarean delivery, they were least likely indicated by thick meconium staining.

Indication of Cesarean	Frequency	Percent (%)
Fetal Distress	13	46.9
Malpresentation	5	13.8
Poor Progress	3	7.7
Maternal Request	1	2.6
Suspected Macrosomic Baby	1	2.6
Preclamped Second Stage	1	2.6
Characteristic Growth Restriction	1	2.6
Thick Meconium Staining	0	0.0
Others	1	2.6
Total	30	100%

Table V: Distribution of Common Indications for Cesarean Delivery

Indication of Cesarean	Frequency	Percent (%)
Fetal Distress	61	46.9
Malpresentation (breech presentation)	18	13.8
Poor Progress	10	7.7
Failed Intraoperative Labour (IOL)	8	6.2
Secondary Arrest	8	6.2
Maternal Request	6	4.6
Suspected Macrosomic Baby	6	4.6
Prolonged Second Stage	3	2.3
Intrauterine Growth Restrictions (IUGR)	3	2.3
Thick Meconium Staining	1	0.8
Others	6	4.6
Total	130	100%

4.3 Association between Risk Factors and Mode of Delivery

4.3.1 Association between Maternal Age Group and Mode of Delivery

Table VI shows the association between maternal age group and mode of delivery. The majority age group for both mode of delivery was age 21-30 years old and declining trend onwards above 30s and extreme age group more than 35 and less than 20s. The Chi-square test's p-value is 0.233. Since the p-value is more than 0.005, there was no significant relationship between maternal age group and mode of delivery.

Table VI: Association between maternal age group and mode of delivery

Maternal Age (years)	Cesarean Delivery, n(%)	Vaginal Delivery, n(%)	Chi-square Test	
			X ²	p-value
16-20	8 (6.2%)	7 (5.4%)	5.582	0.233
21-25	47 (36.2%)	44 (33.8%)		
26-30	49 (37.7%)	63 (48.5%)		
31-35	21 (16.2%)	15 (11.5%)		
36-40	5 (3.8%)	1 (0.8%)		
Total	130 (100%)	130 (100%)		

4.3.2 Association between Ethnicity and Mode of Delivery

Based on Table VII, there were 98 Malay primigravida mothers undergo cesarean delivery whereas there was 101 Malay primigravida mothers undergo vaginal delivery. There were 32 and 29 non-Malay primigravida mothers that undergo cesarean and vaginal delivery method respectively.

From the Chi-square test, the p-value is 0.661. There is no significant association between ethnicity of respondents and mode of delivery as the p-value is more than 0.05. The odds ratio that being calculated was 0.879 and the relative risk is 0.939.

Table VII: Association between ethnicity of respondents and mode of delivery

Ethnic Groups	Cesarean Delivery, n(%)	Vaginal Delivery, n(%)	Chi-square Test	
			X ²	p-value
Malay	98 (75.4%)	101 (77.7%)	0.193	0.661
Non-Malay	32 (24.6%)	29 (22.3%)		
Total	130 (100%)	130 (100%)		

4.3.3 Association between Citizenship and Mode of Delivery

The association between citizenship of respondents and mode of delivery is showed in Table VIII. The numbers of Malaysian primigravida mothers were higher than non-Malaysian primigravida mothers for both types of delivery methods.

The p-value of Chi-square test is 0.032. As the p-value is less than 0.05, there was a significant association between citizenship and mode of delivery. The calculated odds ratio was 0.378 and the relative risk is 0.676.

Table VIII: Association between citizenship of respondents and mode of delivery

Citizen	Cesarean Delivery, n(%)	Vaginal Delivery, n(%)	Chi-square Test	
			X ²	p-value
Malaysian	113 (86.9%)	123 (94.6%)	4.590	0.032
Non-Malaysian	17 (13.1%)	7 (5.4%)		
Total	130 (100%)	130 (100%)		

4.3.4 Association between Gestational Age and Mode of Delivery

Table IX shows the association between gestational age of respondents and mode of delivery. For cesarean delivery method, there was 112 of them was delivered within the expected date of delivery (less than or equal to 40 weeks), while the other 18 primigravida mothers was delivered over the expected date of delivery (more than 40 weeks). Among the primigravida mothers that undergo vaginal delivery, 94 of them was delivered within the expected date of delivery (less than or equal to 40 weeks) and the other 36 of them was delivered over the expected date of delivery (more than 40 weeks).

The p-value shown in Chi-square test was 0.006. The result showed there was significant association between gestational age of less than or equal to 40 weeks and more than 40 weeks and mode of delivery. The value of odds ratio was 2.383. The value of relative risk was 1.631.

Table IX: Association between gestational age of respondents and mode of delivery

Gestational age (weeks)	Cesarean Delivery, n(%)	Vaginal Delivery, n(%)	Chi-square Test	
			X ²	p-value
≤ 40	112 (86.2%)	94 (72.3%)	7.573	0.006
> 40	18 (13.8%)	36 (27.7%)		
Total	130 (100%)	130 (100%)		

4.3.5 Association between Diabetes Status and Mode of Delivery

Table X shows the distribution of diabetes status according to mode of delivery. There was a total 220 women did not have any type of diabetes, whether type 1 diabetes mellitus (T1DM), type 2 diabetes mellitus (T2DM), or gestational diabetes mellitus (GDM) prior to their method of delivered births.

There were only 2 mothers who had type 2 diabetes mellitus (T2DM) in the total number of cases and controls. The 2 of them were assigned to cesarean delivery.

Moreover, the number of mothers having GDM was 38 in total. Among them, there were 21 primigravida mothers that assigned for cesarean delivery, while the remaining 17 primigravida mothers were assigned for vaginal delivery.

The primigravida mothers were then further classified into two groups according to their diabetes status, which were has diabetes and no diabetes. This is to study about the relationship between diabetes status and mode of delivery.

Table X: Distribution of diabetes status of respondents according to mode of delivery

Diabetes Status	Cesarean Delivery	Vaginal Delivery	Total
No Diabetes	107 (82.3%)	113 (86.9%)	220
T1DM	0 (0.0%)	0 (0.0%)	0
T2DM	2 (1.5%)	0 (0.0%)	2
GDM	21 (16.2%)	17 (13.1%)	38
Total	130 (100%)	130 (100%)	260

The association between diabetes status and mode of delivery was shown in Table XI. There was higher in number of diabetes primigravida mothers that undergo cesarean delivery than those undergo normal vaginal delivery. For those primigravida mothers who had no any diabetes diseases, they were more likely assigned to vaginal delivery section than cesarean delivery section.

From the Chi-square test that being carried out, we can found that the p-value was 0.302. Since the p-value was more than 0.05, there is no significant association between diabetes status of mothers and mode of delivery. Nevertheless, there was higher percentage of LSCS among diabetic mother than non-diabetic mother. Odds ratio that being calculated was 0.700, while the relative risk that being calculated was 0.846.

Table XI: Association between diabetes status of respondents and mode of delivery

Diabetes Status	Cesarean Delivery, n(%)	Vaginal Delivery, n(%)	Chi-square Test	
			X ²	p-value
Yes	23 (17.7%)	17 (13.1%)	1.064	0.302
No	107 (82.3%)	113 (86.9%)		
Total	130 (100%)	130 (100%)		

4.3.6 Association between Hypertension Status and Mode of Delivery

The distribution of hypertension status according to mode of delivery was shown in Table XII. Most of primigravida mothers have neither type of hypertension prior to them giving births, while there are some mothers which have gestational hypertension (15 mothers), preeclampsia (15 mothers), and chronic HPT (3 mothers) prior to them giving births. There are more mothers who have hypertension will be assigned to cesarean delivery compared to vaginal delivery.

The primigravida mothers were then further classified into two groups according to their hypertension status, which were has any type of hypertension and no hypertension. This is to study about the association between hypertension status and mode of delivery.

Table XII: Distribution of hypertension status of respondents according to mode of delivery

Hypertension State	Cesarean Delivery	Vaginal Delivery	Total
No HPT	114 (87.7%)	127 (97.7%)	241
Gestational HPT			
(PIH)	12 (9.2%)	3 (2.3%)	15
Preeclampsia	1 (0.8%)	0 (0.0%)	1
Chronic HPT	3 (2.3%)	0 (0.0%)	3
Total	130 (50%)	130 (50%)	260

Based on Table XIII, there was higher proportion of hypertension primigravida mothers were assigned to cesarean delivery than vaginal delivery. It was found that the p-value of Chi-square test was 0.002. There is a significant relationship between hypertension status of respondents and mode of delivery since the p-value was less than 0.05. The odds ratio shown was 5.942 and the relative risk was 1.780.

Table XIII: Association between hypertension status of respondents and mode of delivery

Hypertension Status	Cesarean Delivery, n(%)	Vaginal Delivery, n(%)	Chi-square Test	
			X ²	p-value
Yes	16 (12.3%)	3 (2.3%)	9.596	0.002
No	114 (87.7%)	127 (97.7%)		
Total	130 (100%)	130 (100%)		

4.3.7 Association between Colour of Liquor and Mode of Delivery

As shown in Table XIV, majority of delivery usually having clear liquor colour, there was 115 and 121 for vaginal and cesarean delivery respectively. There was 14 mothers who delivered through vaginal delivery produced a light meconium colour, while there was only 5 mothers who delivered through cesarean delivery produced a light meconium colour.

For those having moderate meconium liquor, there was only 1 mother who experienced vaginal delivery and only 2 mothers experienced cesarean delivery. There are only 2 mothers who delivered through cesarean delivery having thick meconium staining of liquor.

The colour of liquor was then classified into two groups which was clear liquor and meconium stained liquor to further study about the association between colour of liquor and mode of delivery.

Table XIV: Distribution of colour of liquor of respondents according to mode of delivery

Colour of Liquor	Cesarean Delivery	Vaginal Delivery	Total
Clear	121 (93.1%)	115 (88.5%)	236
Light meconium	5 (3.8%)	14 (10.8%)	19
Moderate meconium	2 (1.5%)	1 (0.8%)	3
Thick meconium	2 (1.5%)	0 (0.0%)	2
Total	130 (100%)	130 (100%)	260

Table XV showed the association between colour of liquor of respondents and mode of delivery. Based on the Chi-square test, we can found that the χ^2 value was 1.653 whereas the p-value was 0.199. The p-value shown was more than 0.05. There is no significant association between colour of liquor of respondents and mode of delivery. The value of odds ratio was 1.754, while the value of relative risk was 1.367.

Table XV: Association between colour of liquor of respondents and mode of delivery

Colour of Liquor	Cesarean	Vaginal	Chi-square Test	
	Delivery, n(%)	Delivery, n(%)	χ^2	p-value
Clear	121 (93.1%)	115 (88.5%)	1.653	0.199
Meconium Stained	9 (6.9%)	15 (11.5%)		
Total	130 (100%)	130 (100%)	.	

4.3.8 Association between Fetal Sex and Mode of Delivery

Table XVI showed the association between fetal sex and mode of delivery. The total number of baby boy (133) was more than baby girl (127). There were 63 baby boys and 67 baby girls born through vaginal delivery method, whereas there were 70 baby boys and 60 baby girls were delivered through cesarean delivery method.

Based on the Chi Square test, the χ^2 value was 0.754 and the p-value was 0.385 ($p > 0.05$). There is no significant relationship between fetal sex and the mode of delivery. The odds ratio that calculated was 1.241. The relative risk that calculated was 1.114.

Table XVI: Association between fetal sex and mode of delivery

Fetal Sex	Cesarean Delivery	Vaginal Delivery	Total	Chi-square Test	
				χ^2	p-value
Male	70 (53.8%)	63 (48.5%)	133	0.754	0.385
Female	60 (46.2%)	67 (51.5%)	127		
Total	130 (100%)	130 (100%)	260		

4.3.9 Association between Fetal Weight and Mode of Delivery

Table XVII showed the association between fetal weight and the mode of delivery. 75 (57.7%) of the baby that delivered through cesarean delivery method had the weight more than 3000 gram. The other 53(40.8%) of them had the weight between 1501 gram and 3000 gram and 2(1.5%) of them had the weight less than 1500 gram. It shows that the higher birth weight is the higher chance of LSCS is. Among the 130 baby that born through vaginal delivery, majority of them were weighted 1.5- 3.0 kg which account about 56.2% (n=73), 43.1%(n=56) of them weighed more than 3000 gram and only 0.8%(n=1) of them weighed less than 1500 gram.

The p-value that obtained from Chi-square test was 0.044, which was less than 0.05. There are significant relationship between fetal weight and the mode of delivery.

Table XVII: Association between fetal weight and mode of delivery

Fetal Weight (gram)	Cesarean Delivery	Vaginal Delivery	Total	Chi-square Test	
				X ²	p-value
≤1500	2 (1.5%)	1 (0.8%)	3	6.264	0.044
1501-3000	53 (40.8%)	73 (56.2%)	126		
>3000	75 (57.7%)	56 (43.1%)	131		
Total	130 (100%)	130 (100%)	260		

4.3.10 Association between Cervical Dilatation (Os), Cervical Effacement (Cx length), and Fetal Station (st) upon Admission and Mode of Delivery

4.3.10.1 Association between Cervical Dilatation (Os) upon Admission and Mode of Delivery

Table XVIII showed the association between cervical dilatation during admission and mode of delivery. It was classified into two groups, which were less than 4.0cm and more than 4.0cm. For cesarean delivery primigravida mothers, 80 (61.5%) of them were having cervical dilatation less than 4.0cm, and the remaining 50(38.5%) of them were having cervical dilatation more than 4.0cm. On the other hand, for vaginal delivery primigravida mothers, 77(59.2%) of

them were having the cervical dilatation less than 4.0cm, whereas 53(40.8%) of them were having cervical dilatation more than 4.0cm.

Based on the Chi-Square test, the p-value shown was 0.704 which was more than 0.05. There is no significant relationship between cervical dilatation at admission and the mode of delivery. The odds ratio was 1.101. The relative risk was 1.050.

Table XVIII: Association between cervical dilatation (Os) during admission and mode of delivery

Cervical Dilatation (cm)	Cesarean Delivery	Vaginal Delivery	Total	Chi-square Test	
				X ²	p-value
<4.0	80 (61.5%)	77 (59.2%)	157	0.145	0.704
>4.0	50 (38.5%)	53 (40.8%)	103		
Total	130 (100%)	130 (100%)	260		

4.3.10.2 Association between Cervical Effacement (Cx length) upon Admission and Mode of Delivery

Table XIX shows the association between cervical effacement (Cx length) during admission and mode of delivery. Among the cesarean delivery primigravida mothers, the cervical of 66 (50.8%) of them were effaced on admission whereas the cervical of 64 (49.2%) of them were not effaced on admission. For the vaginal delivery primigravida mothers, the cervical of 67 (51.5%) of them were effaced on admission whereas the cervical of 63 (48.5%) of them were not effaced on admission.

The p-value from the Chi-square test was 0.901 ($p > 0.05$). There is no significant relationship between cervical effacement on admission and the mode of delivery. The value of odds ratio was 0.970 and the value of relative risk was 0.985.

Table XIX: Association between cervical effacement (Cx length) during admission and mode of delivery

Cervical Effacement	Cesarean Delivery	Vaginal Delivery	Total	Chi-square Test	
				X ²	p-value
Effaced	66 (50.8%)	67 (51.5%)	133	0.015	0.901
Not Effaced	64 (49.2%)	63 (48.5%)	127		
Total	130 (100%)	130 (100%)	260 (100%)		

4.3.10.3 Association between Fetal Station (st) upon Admission and Mode of Delivery

Based on Table XX, most of the primigravida mothers of both type of delivery method were showing the fetus was not engaged during admission. There were 127 (97.7%) primigravida mothers who undergo cesarean delivery showed no fetus engagement during admission. For primigravida mothers who undergo vaginal delivery, 129 (99.2%) of them showed no fetus engagement during admission. There were only 3 (2.3%) of those who undergo cesarean delivery showing fetus engagement during admission, whereas for vaginal delivery, there was only 1(0.8%) of them showing fetus engagement during admission.

According to the Chi-Square test, we can found that the p-value was 0.314, which was more than 0.05. There is no significant relationship between fetal station during admission and the mode of delivery. The odds ratio that being shown was 3.047 while the relative risk that being shown was 1.512.

Table XX: Association between fetal station (st) during admission and mode of delivery

Fetal Station	Cesarean	Vaginal	Total	Chi-square Test	
	Delivery, n(%)	Delivery, n(%)		X ²	p-value
Engaged	3 (2.3%)	1 (0.8%)	4	1.016	0.314
Not Engaged	127 (97.7%)	129 (99.2%)	256		
Total	130 (100%)	130 (100%)	260		

4.4 Association between Mode of Delivery and Complications of Mother and Baby

4.4.1 Associations between Mode of Delivery and Maternal Postpartum Complications

Table XXI showed the association between mode of delivery and the maternal complications. The complications include pain, hemorrhage, nausea and vomiting and urinary problems. From the table we can observe that most of the mothers had no complications whether they undergoes cesarean or vaginal delivery. There was 108 (83.1%) from cesarean delivery group and 125 (96.2%) from vaginal delivery group did not have any complications. For those who having complications, 22 (16.9%) of them was from cesarean delivery group whereas 5 (3.8%) of them was from vaginal delivery group.

The Chi-square test that carried out gave a value of p was 0.001 which is less than 0.05. This shows that there are significant association between mode of delivery and maternal postpartum complications. There were more complications in LSCS compared to vaginal delivery. The odds ratio was 0.196. The relative risk was 0.569.

Table XXI: Association between mode of delivery and maternal complications

Maternal Complications	Cesarean Delivery, n(%)	Vaginal Delivery, n(%)	Total	Chi-square Test	
				X ²	p-value
Yes	22 (16.9%)	5 (3.8%)	27	11.944	0.001
No	108 (83.1%)	125 (96.2%)	233		
Total	130 (100%)	130 (100%)	260		

4.4.2 Association between Mode of Delivery and Neonatal Complications

Table XXII showed the association between mode of delivery and neonatal complications. The neonatal complications that had observed include birth asphyxia (HIE), respiratory problems, cardiovascular problems and iatrogenic prematurity. The table shows that majority of babies are born without any complication occurring, regardless of their mode of delivery. There were 100(76.9%) babies that born through cesarean delivery method and 123(94.6%) babies that born through vaginal delivery showed no complications after birth. For those babies who were having complications after birth, 30(23.1%) of them were born through cesarean delivery method and 7(5.4%) of them were born through vaginal delivery.

From the Chi-square test that being carried out, the p-value was 0.000, which was less than 0.05. This shows that there are significant association between mode of delivery and neonatal complications in which more neonatal complications in LSCS than vaginal delivery. The odds ratio that being calculated was 0.190, for the relative risk was 0.553.

Table XXII: Associations between mode of delivery and neonatal complications

Neonatal Complications	Cesarean Delivery	Vaginal Delivery	Total	Chi-square Test	
				X ²	p-value
Yes	30 (23.1%)	7 (5.4%)	37	16.669	0.000
No	100 (76.9%)	123 (94.6%)	223		
Total	130 (100%)	130 (100%)	260		

4.5 Risk Factors Involved Which May Place a Primigravida Patient at Risk for Cesarean Delivery upon Arrival to Labor

Table XXIII showed the logistic regression between risk factors and cesarean delivery. From the table, those risk factors that were significant will affected the primigravida mothers prone to assign to cesarean delivery section upon arrival to labor. There was only some of the risk factors that were significant for cesarean delivery section, which were hypertension status, gestational age (weeks) and fetus weight (gram).

From the regression between hypertension status and cesarean delivery, the p-value shown was 0.008 (<0.05). This showed that the primigravida mothers, who had any type of hypertension, will have 0.175 higher risks to assign to cesarean delivery than those primigravida mothers who did not had any type of hypertension.

The p-value that showed in regression between gestational age (weeks) and cesarean delivery was 0.005. It was less than 0.05. For those primigravida mothers who the gestational age over the expected delivery date, which was more than 40 weeks, they were at 2.597 higher risks than those primigravida mothers who delivered birth within the expected delivery date to undergo cesarean delivery section upon arrival to labor.

Based on the results of regression between fetus weight (gram) and cesarean delivery, we can found that the p-value shown was 0.023, which was less than 0.05. Those mothers, who their fetus weight was heavier, will have higher risk to assign to cesarean delivery section than those who their fetus had lighter weight.

5.1.1 Demographic Characteristics

Table XXIII: Logistic regression between risk factors and cesarean delivery

Risk Factors	p-value	Exp (β)	95% CI for Exp (β)	
			Lower	Upper
Hypertension Status	0.008*	0.175	0.048	0.640
Gestational Age (weeks)	0.005*	2.597	1.343	5.024
Fetus Weight (gram)	0.023*			
Citizenship	0.079	2.378	0.905	6.257
Ethnicity	0.205	0.616	0.291	1.302
Colour of Liquor	0.249	1.702	0.689	4.204
Fetal Station (st) During Admission	0.458	2.607	0.207	32.789
Maternal Age (years)	0.642			
Cervical Effacement (Cx Length) During Admission	0.660	0.887	0.520	1.513
Fetus Sex	0.704	1.111	0.645	1.912
Cervical Dilatation (Os) During Admission (cm)	0.884	0.955	0.519	1.759
Diabetes Status	0.903	0.955	0.450	2.024

Note: * Significant

CHAPTER 5: DISCUSSION AND CONCLUSION

5.1 Discussion

5.1.1 Demographic Characteristics

The total number of patients' information that we had collected during the study is 260, in which 130 is from the vaginal delivery group and the other 130 is from the cesarean group. The data that collected in this study was from January 2013 until June 2013. The data was collected at labor ward and Unit Record of Hospital Serdang.

From our study, the most common indications for cesarean delivery is fetal distress (46.9%), followed by malpresentation (13.8%), and poor progress (7.7%). This is supported by other studies in which some studies also shows that among the most common indicators for cesarean delivery includes fetal distress (Corine et al, 2013; Wanyoyi et al, 2006), malpresentation (breech presentation) (Dumont et al, 2001), and poor progress (Corine et al, 2013).

For the maternal age, the findings from our study reported that in comparison between groups of maternal age, the mothers in the age group of 26 to 30 had the highest probability of having to do cesarean delivery. This is different to other studies which stated that cesarean rates increased with maternal age. (Adashek et al, 1993; Cleary-Goldmen et al, 2005; Ecker et al, 2001; Patel et al, 2005; Santos et al, 2009; Urquhart et al, 1991).

In the study of ethnicity, it is observed that Malay has the highest proportion in cesarean delivery (78.5%). However, in the research carried out in Malaysia states that the rate of cesarean is higher in the Indians compared to Chinese and Malays (Hin et al, 1994).

The study between citizenship and cesarean rates shows that Malaysian had higher rates of cesarean as compared to non-Malaysian. Although currently there is no research regarding similar topics carried out in Malaysia, other research states that there is a wide variability in rate of indications for primary cesarean section by race/ethnicity (Getahun et al, 2009).

11.2 In our study, the cesarean rates among different gestational age groups reported the highest rate of cesarean occurs in 36-40 weeks of gestation group (78.5%). However, this is different as compared to other research which reported that most cesarean delivery occurred in advanced gestational age (over 40 weeks) (Bettegowda et al, 2008; Caughey et al, 2006; Hammoud et al, 2004; Heffner et al, 2003).

The associations between maternal age, ethnicity, citizenship, gestational age and the mode of delivery will be further discussed in the later part of the discussion.

5.1.2 Associations between Risk Factors and the Mode of Delivery

According to several studies there exists strong associations between maternal age and cesarean rates, for example Abu-Heija et al (1998) and Cleary-Goldmen et al (2005), just to name a few. However, in our study it is reported that there are no significant associations between maternal age and the cesarean section rates, which obviously contradicts many other researches. The exact reason for this occurrences could be due to various factors such as data collected does not reflect the whole population or the sort or it could also be associated to the knowledge level about cesarean among Malaysians, genetics, demographic or other factors that may play a role on determining the associations between maternal age and the mode of delivery. If we compared between age group, we can found that there is significant associations in age group 36-40. The total 6 of the sample collected, 5 of them are assigned for cesarean delivery. This shows that increase maternal age will increase the risk of cesarean delivery.

In the study of associations between ethnicity and mode of delivery, the result of our study shows that it is insignificant or that there are no associations between ethnicity and cesarean rates. This is contrary to the other study also carried out in Malaysia which states that there are associations between ethnicity and mode of delivery (Hin et al, 1994). Thus another experiment in Malaysia must be carried out to further predict the association between different ethnic groups in Malaysia and the mode of delivery.

The study between citizenship and the mode of delivery shows a significant value, which means there are a significant association between citizenship and the mode of delivery. Currently there are no other study carried out to investigate whether Malaysians or non-Malaysians more prone to cesarean delivery, but from our research, Malaysians has higher rates of cesarean delivery (86.9%). We might assume that among the factors involved that cause more Malaysians experience cesarean delivery may include knowledge about cesarean, genetics, cultures, financials and others. Besides, some of the non-Malaysian are more likely to undergo home delivery and because of the higher fees for cesarean delivery section compared to vaginal delivery.

For the study of gestational age and cesarean rates, the study found that there are significant associations between them. From the Chi-square test, the p-value shown was 0.006. The result showed there was significant association between gestational age of less than or equal to 40 weeks and more than 40 weeks and mode of delivery. However, in our research the result shows that most cesarean occurs for the gestational group before 40 weeks. This is contrary to several other researches which found that the rate for cesarean delivery increases especially for mothers beyond gestational age 39 and 40 (Caughey et al, 2006; Hammoud et al, 2004; Heffner et al, 2003). The reason for this could be such that there might be other factors involved which causes more mothers at earlier gestational age to proceed with cesarean delivery, for example fetal distress, malpresentations, poor progress and others.

According to Remsberg et al (1999), diabetes, both preexisting and gestational, increases the risk of cesarean delivery. The result according to our study however, shows that there is no significant association or relationship between diabetes status of a mother to the mode of delivery. Several factors could have affected the association, for example maternal age, maternal weight, cultures, other sociodemographic factors, health status, practice patterns, physicians' referrals and others. Further studies should be done in Malaysia in order to better understand the association between diabetes and the mode of delivery in Malaysia.

From our study on hypertension status and the mode of delivery, we found that there are significant associations between hypertension status and the mode of delivery. In our study, mothers with hypertension, whether it is pregnancy-induced hypertension, chronic hypertension or eclampsia is more likely to undergo cesarean delivery compared to mothers without any type of hypertension. This is similar to two other studies which also found that hypertensive women had higher rates of cesarean delivery compared to normotensive women (Ben-Haroush et al, 2005; Ye et al, 2009). The reason why hypertension may leads to higher rates of cesarean delivery is because if the blood pressure rises to a level where it would put the mother to a high risk, or the mother already developed preeclampsia, then the doctor would likely suggests early delivery. But early delivery also means prematurity, so there is a greater chance that the mother might need a cesarean section (Ellen et al).

The number of pregnancies associated with meconium-stained liquor (MSL) in our study is 24 out of 260 births (9.2%). According to NCBI, MSL, in the vast majority of labours, is not a cause of concern. However, in some circumstances, the passage of meconium in utero is associated with significant increases in perinatal morbidity and mortality. In a study conducted by Meena et al (2013), MSL can also be associated with poor outcome, increased cesarean section rate, and increased neonatal complications. Nevertheless, in our study it shows that there are no association between liquor colour and the mode of delivery. The reason for this result might be related to common physicians' practices in Malaysia, though a further study about this factor is recommended in order to investigate more on the topic.

There are several studies that have been conducted previously in an attempt to investigate the association between fetal sex and the mode of delivery. A study by Lieberman et al (1997) states that women carrying male fetuses had higher cesarean rates compared to women who carried female fetuses. Another study by Lurie et al (2004) however, states that in contrast with previous investigators, they did not find an increased risk of cesarean section in women carrying male fetuses. Our study agrees with the latter. The study reported that the number of fetuses born despite of gender is about the same, which is 70 and 60 out of 130 babies respectively, and it gives a non-significant p value. Better studies about the topic should be conducted in the future as the association between fetal sex and the mode of delivery is still much unclear.

Regarding the study of association between fetal weight and mode of delivery, our study findings is that there are significant associations between fetal weight and the mode of delivery. The study shows that the highest rates of cesarean is among babies more than 3000g (57.7%) This is similar to other study which states that babies with birth weight extremities are more likely to have greater rates of cesarean delivery. (Adashek et al, 1993; Hin et al, 1994; Patel et al, 2005). According to National University Hospital, big babies are more likely to have shoulder dystocia at vaginal delivery (shoulders getting stuck, requiring special maneuvers to deliver the shoulders). Shoulder dystocia is a cause of labor related baby deaths and baby's nerve injuries. Thus this calls for cesarean delivery in order to minimize neonatal complications.

In the study of association between cervical dilatation at admission and the mode of delivery, our study reported an insignificant value of p , which means that there are no association between cervical dilatation at admission and the mode of delivery. This is contrary to two other studies which states that cervical dilatation is among the significant predictors for cesarean delivery (Turcot et al, 1997; Wilkes et al, 2003).

While for the study of association between cervical effacement at admission and the mode of delivery, the same occurs. Study conducted by Eslamian et al (2002) reported that the rate of cesarean section decreased significantly when cervix effacement increased. The same findings can be found in study by Wilkes (2003). Nevertheless, the result does not occur in our study, where our result reported an insignificant association between cervical effacement and the mode of delivery.

As for the association between fetal station at admission and the mode of delivery, a study conducted by Oboro et al (2005) states that an unengaged vertex significantly increased the caesarean delivery rate. Furthermore, the same findings are also found in the study by Wilkes (2003). This contradicts our study in which there are no significant association between fetal station at admission and the mode of delivery. The exact reason for the contradictions between our study of cervical dilatation, effacement, and fetal station with other studies may be due to the retrospective view of study design. The data that being collected may be classified differently regarding the physicians. Hence a prospective view of study is more preferable.



5.1.3 Associations between Mode of Delivery with Maternal and Neonatal Complications

Apart from investigating the associations between various risk factors and the mode of delivery, our study also investigates the associations between cesarean section and complications, occurring in mothers and/or newborns.

In the study of associations between mode of delivery and maternal postpartum complications, our study found that there are significant associations between them. In this case, mothers that undergone cesarean had significantly higher risk of developing complications. This is similar to several other studies which also reported that cesarean section carries a higher number of postpartum complications, as compared to vaginal delivery (Loverro et al, 2001; Pallasmaa et al, 2010). Moreover, according to both the researches, the higher complication rates occurring in cesarean delivery depends on obesity, degree of emergency, and increases with maternal obesity, older age and pre-eclampsia.

Several studies reported that cesarean section increases the risk of complications in newborn significantly. Among the common complications occurring in newborns includes neonatal deaths (Towner et al, 1999), respiratory difficulties (Levine et al, 2001), asthma (Bager et al, 2003; Hakansson et al, 2003), iatrogenic prematurity (Madar et al, 1999) and trauma (Dessole et al, 2004). Our study had showed the similar results that there was significant association between mode of delivery and neonatal complications, where neonates born through cesarean section had higher rates of complications. The neonatal complications include birth asphyxia (HIE), respiratory problems, cardiovascular problems and iatrogenic prematurity.



5.1.4 Risk Factors Involved that Placing a Primigravida Patient for Cesarean Delivery upon Arrival to Labor

The significant risk factors for cesarean delivery for primigravida patients in labor were identify by this study. By using logistics regression analysis, the independent risk factors were determined.

In this study, we found that the independent risk factors of placing a primigravida patient in labor for cesarean delivery upon delivery upon arrival to labor were hypertension status, gestational age (weeks) and fetus weight (gram). The primigravida patients who had any type of hypertension or they were over the expected delivery date or fetal macrosomia had higher chances to place in cesarean delivery upon arrival to labor.

Previous study had shown there were five risk factors that remained independently significant for cesarean delivery, which were change in cervical dilatation within 2 hours, maternal weight, gestational age, fetal station at 2 hours, and preeclampsia. (Wikes et al, 2003) Both studies showed that gestational age and hypertension status (preeclampsia) were the independent risk factors for cesarean delivery. This showed that these two factors were clearly known as the risk factors that will place a primigravida mothers in cesarean delivery. On the

other hand, other studies also identified that fetal macrosomia was a mediating factor in high cesarean delivery rate. (Naylor et al, 1996; Weeks et al, 1995) Those mothers who had the antenatal prediction of fetal macrosomia will had the higher chances to assign to cesarean delivery at labor.



5.2 CONCLUSION OF STUDY

This study was included 130 of cases (cesarean delivery) and controls (vaginal delivery) respectively with the mean age of 26.65 ± 4.03 . Most of them were Malay (98 patients for cesarean delivery group, 101 patients for vaginal delivery group) and followed by non-Malay (32 patients for cesarean delivery group, 29 patients for vaginal delivery group).

There is a significant association between citizenship, gestational age (weeks), hypertension status and fetal weight (gram) between mode of delivery.

There is a significant association between mode of delivery and maternal complications.

There is a significant association between mode of delivery and neonatal complications.

The risk factors that involved placing a primigravida patient for cesarean delivery upon arrival to labor are hypertension status, gestational age (weeks) and fetal weight (gram). It is important that the primigravida patient that needed deliver through cesarean delivery should be identified as soon as possible to avoid complications.

5.3 LIMITATIONS OF STUDY

Misclassification bias might be involved during data collection. This may due to inaccurate categorization of data that collected. To reduce the bias, the researchers should be clear about the classification criteria. Besides, there may be incomplete data of some patients due to this was a retrospective study. This missing data may lead to inaccurate results. The interpretation of the results may be incorrect due to this. Therefore, those patients with incomplete data should be excluded in the study.

Furthermore, this study did not include maternal height and weight. By having these factors, body mass index (BMI) of mothers can be calculated. This is because obesity may influence the risk of placing a primigravida mother to undergo cesarean delivery. Moreover, this study did not include amount of amniotic fluid. It may be affected the risk of mothers to assign to cesarean delivery.

5.4 IMPLICATION OF STUDY

The cesarean section rate performed in Malaysia public hospitals had increased from 10.5% in 2000 to 15.7% in 2006 (Ravindran, 2008). The findings of this study have research application to identify the risk of primigravida patients to assign to cesarean delivery upon arrival to labor. The study enables the physicians to identify the primigravida patients that should delivered birth through cesarean delivery method as early as possible. By this, preparation can be made whether the physicians or the patients. This can reduce the complications due to prolonged labor. The maternal and neonatal mortality rate also can be reduced since those that are at risk can be identifying earlier. Besides, the unnecessary cesarean section can be reduced as they can identify those who are no need to undergo cesarean delivery section.

5.5 RECOMMENDATIONS

For further study, a larger sample size of primigravida patients (cesarean and vaginal delivery group) from other hospitals in Malaysia is recommended so that a more representative condition can be viewed. The results that obtained will also be more representative.

More risk factors should be studied in the future research, so that can find out more risk factors that will affect the risk of mother to assign to cesarean delivery method. This will be more accurate and precise. The amount of unnecessary cesarean delivery will also be minimize as more risk factors that is being counted when the physicians are making the decision to place their patients on cesarean delivery section .

The public should be educated regarding the cesarean delivery method, whether is about the risk factors or complications of it, especially women. They should have knowledge about the risk factors of undergo cesarean delivery, so that preparation can be done earlier as they know they might have chances to undergo cesarean delivery. The education regarding the complications of cesarean delivery should also be taught to public especially women. This is nice to know as they may experiences the complications after having cesarean delivery section. The right method to clean the wound of cesarean delivery section should also be taught to the patients

clearly to prevent any infection. For husbands, they will also need to have knowledge about cesarean delivery section as they might need to sign for the consent form for the cesarean delivery section of their wives.

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APPENDIX**PROFORMA****Part 1 :Sociodemographic information**

SD : _____

Age : _____

Ethnic group : Malay ☐ Chinese ☐ Indian ☐ Others ☐

Citizen : _____

Gravidity : _____ Parity : _____

Gestation : _____

Part 2 :Antenatal informationDiabetes : Yes ☐ No ☐If Yes, type of DM – TYPE 1 DM, ☐TYPE 2 DM, ☐GDM ☐Hypertension : Yes ☐ No ☐If Yes, type of HPT – Gestational HPT (PIH) ☐Preeclampsia ☐Chronic HPT ☐

Part 3 :Intrapartum information**3.1 Mother's information**Type of delivery : Vaginal delivery ☐Cesarean section ☐

Indication of cesarean :

Acute fetal distress ☐Poor progress ☐Secondary arrest ☐Prolonged second stage ☐Malpresentation ☐

Others; specify _____

Vaginal examination finding on admission

Cervical dilatation at admission (cm) : _____

Cervical effacement at admission (cm) : _____

Station at admission : _____

Ruptured membranes at admission : Yes ☐No ☐Liquorcolour : Clear ☐Light ☐Moderate ☐Thick ☐

Fetus presentation : _____

Vaginal examinations in labor (cm)

Cervical dilatation at 4 hours (cm) : _____

Cervical effacement at 4 hours (cm) : _____

Fetal station at 4 hours : _____

Changes in cervical dilatation at 4 hours (cm) : _____

Changes in cervical effacement at 4 hours (cm) : _____

Changes in fetal station at 4 hours : _____

Duration of labour:

First stage _____

Second stage _____

Third stage _____

3.2 Fetus's information

Fetal sex : Male ☐

Female ☐

Fetal weight (gram) : _____

Apgar's Score :

1 min: _____

5 min:- _____



Part 4 :Postpartum information

4.1 Mother's information

Complications :

Pain	
Infection	
Hemorrhage	
Nausea/Vomiting	
Bowel problems	
Uterine ruptured	
Urinary problems	
Extended hospitalization	
Maternal death	
Others	

Blood loss (ml) : _____

4.2 Baby's information

Complications :

Birth asphyxia / HIE	
Injury during delivery	
Respiratory problems	
Asthma	
Cardiovascular problems	
Iatrogenic prematurity	
Others	

RESEARCH TEAM

No.	Items	Estimated Cost (RM)
1.	Photocopying	100.00
2.	Printing	130.00
3.	Material and other (Gadgets)	50.00
TOTAL :		280.00

Supervisor: Dr Ma Saung Oo

**Co-supervisor: Dr Habibah binti
Abd Hamid**

**Group Member
Cheng Hui Ching**

**Group Member
Mohd Shariffullah
Yahya bin Hussin**

BUDGET PLANNING

No.	Items	Estimated Cost (RM)
1.	Photostating	100.00
2.	Printing	120.00
3.	Hard cover and Binding	50.00
TOTAL :		270.00



**NATIONAL INSTITUTES OF HEALTH (NIH) RECOMMENDATION FOR THE
CONDUCT OF RESEARCH IN THE MINISTRY OF HEALTH MALAYSIA
PENGESAHAN INSTITUSI KEBANGSAAN NEGARA UNTUK MENJALANKAN
PENYELIDIKAN DI KEMENTERIAN KESIHATAN**

This is an auto-generated document. It is issued by one of the research institute under the National Institutes of Health (NIH). The institutes as follows: Institute for Medical Research (IMR), Institute for Public Health (IPH), Clinical research centre (CRC), Institute for health Management (IHM), Institute for Health System Research (IHSR) and Institute for Health Behavioural Research (IHBR).

Dokumen ini adalah cetakan berkomputer. Borang ini dikeluarkan oleh salah satu Institusi dibawah National Institutes of Health (NIH) iaitu Institut Penyelidikan Perubatan (IMR), Institut Kesihatan Umum (IKU), Pusat Penyelidikan Klinikal (CRC), Institut Pengurusan Kesihatan (IPK), Institut Pengurusan Sistem Kesihatan (IPSK) dan Institut Penyelidikan Tingkahlaku Kesihatan (IPTK).

Unique NMRR [Nombor Pendaftaran]	NMRR-13-516-16153
Research Title [Tajuk]	Risk Factors for Cesarean Delivery for Primigravida in Labor at Hospital Serdang, 2012
Protocol Number if [Nombor Protokol jika ada]	

#	Investigator Name [Nama Penyelidikan]	Institution Name [Nama Institusi]
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2	HABIBAH BINTI ABDUL HAMID	Serdang Hospital
3	Ma Saung Oo	Serdang Hospital
4	MOHD SHARIFFULLAH YAHYA BIN HUSSIN	Serdang Hospital

I have reviewed the above titled research, and has recommended to MREC* for its decision.
Saya telah menyemak penyelidikan yang bertajuk diatas, dan telah disyorkan untuk MREC bagi keputusannya.

Name of Director [Nama pengarah]	Dr Roslinah Ali
NIH Institute (IMR, IPH, CRC, IHM, IHSR, IHBR) [Nama institusi di bawah NIH]	Institute for Health Management (IHM)
Signature & Official Stamp [Tandatangan dan Cop Rasmi]	
Date [Tarikh]	08-07-2013

*Final approval is pending MREC decision.

JKEUPM Ref No. : FPSK_Mei (13)35

Members of the JKEUPM who reviewed the documents:

Prof. Dr. Lim Thiam Aun

Date of approval: 22/7/2013

Endorsed at JKEUPM Meeting on 2/8/2013, attended by:

NAME	DESIGNATION	GENDER	TICK IF PRESENT
Prof. Dr. Norlijah Othman	Paediatrics & Dean, Faculty of Medicine and Health Sciences	Female	√
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