FACTORS ASSOCIATED WITH THE MODE OF DELIVERY IN TWIN PREGNANCY IN HOSPITAL USM

NOR AZLINA BT ROSDI@ROSLI

UNIVERSITI SAINS MALAYSIA

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FACTORS ASSOCIATED WITH THE MODE OF DELIVERY IN TWIN PREGNANCY IN HOSPITAL USM.

by

NOR AZLINA BT ROSDI@ROSLI

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LIST OF ABBREVIATIONS

SVD: Spontaneous Vaginal Delivery

LSCS: Lower segment caeserean section

MCDA: Monochorionic Diamniotic

DCDA: Diachorionic Diamniotic

MCMA: Monochorionic Monoamniotic

DZ : Dizygotic

FSH: Follicle stimulating hormon

IVF: In vitro fertalisation

VD: Vaginal delivery

CI: Confidence Interval

OR: Odd Ratio

SD: Standard deviation

LIST OF SYMBOLS

$1-\beta$	Power
α	Level of significance
δ	Standard Deviation
Δ	Estimated difference from population mean
Y	Dependent variable
$\hat{Y}$	Predicted value
e	Residual
H_0	Null hypothesis
H_A	Alternative hypothesis
β	Coefficient
dx^2	Delta Chi-square

ABSTRAK

Latarbelakang: Kejadian kehamilan kembar semakin meningkat dalam tren terkini. Cara-cara kelahiran dalam peringkat kedua kelahiran boleh menjadi sama ada melalui bersalin secara spontan, bersalin secara pembedahan, bersalin secara bantuan kelahiran. Kedudukan kembar pertama akan menentukan jenis kelahiran tanpa mengira kedudukan kembar kedua. **Objektif**: Objektive kajian ini adalah untuk menentukan faktor-faktor yang berkaitan dengan cara kelahiran di antara kehamilan kembar di Hospital Universiti Sains Malaysia, Kubang Kerian, Kelantan. **Kaedah**: Kajian keratan rentas telah digunakan sepanjang kajian ini. Data daripada unit rekod perubatan mengenai kehamilan kembar diambil secara retrospektif dari 1 Januari 2010 sehingga 31 Disember 2015 Kriteria kemasukan adalah kelahiran hidup untuk kedua-dua bayi, berusia lebih dari 24 minggu usia. Gestasi dan berat lebih daripada 500 gram. Bayi yang mengalami kecacatan yang teruk atau kematian janin dalam rahim dikecualikan. Borang pengumpulan data telah digunakan untuk mengumpul maklumat kelahiran kembar bagi mengelakkan bias dalam kajian.. Sample tidak bersandar bagi kajian ini adalah umur, pengalaman bersalin spontan, jenis persenyawaan dan kedudukan kembar pertama.. Regresi logistik yang multinomial telah digunakan untuk analisis statistik dalam kajian ini. **Keputusan**: Antara 522 kehamilan kembar dalam rekod perubatan di Hospital USM, 388 kelahiran kembar termasuk dalam kriteria kemasukan. Dua ratus tiga puluh telah dipilih secara rawak untuk dimasukkan dalam kajian ini. Purata umur untuk kelahiran kembar ialah 29.0 (5.37) tahun untuk semua jenis kelahiran. Terdapat 120 (52.38%) kes telah dilahirkan secara bersalin spontan melalui faraj (bagi kedua-dua kembar, 96 kes (41.56%) telah dilahir secara pembedahan untuk kedua-dua kembar, dan 14 (6.06%) kes telah dilahirkan spontan melalui faraj bagi kembar pertama

dan secara bantuan kelahiran bagi kembar kedua. Faktor-faktor yang berkaitan kelahiran secara pembedahan bagi kedua-dua kembar adalah umur (OR: 1.11, 95% CI: 1.03, 1.20, ,p = 0.007), kelahiran secara spontan melalui faraj (OR: 9.35, 95%CI: 4.01,21.81, $p < 0.001$), kedudukan kembar pertama (OR: 90.69, 95%CI: 18.45, 436.18, $p < 0.001$), dan jenis persenyawaan (OR: 8.71, 95%CI: 1.14, 66.46, p= 0.037).

Kesimpulan: Kelahiran secara dibedah untuk kedua-dua kembar berkaitan dengan peningkatan umur pada ibu, kedudukan songsang kembar pertama dan sejarah kelahiran secara spontan melalui faraj. Manakala kelahiran secara bantuan berkaitan dengan jenis persenyawaan secara spontan.

ABSTRACT

Background: The incidence of twin pregnancy has been increasing in trend. The mode of delivery in second stage can be either via spontaneous vaginal delivery, assisted vaginal delivery or by lower segment caesarean section. The presentation of the first twin will determine the type of delivery regardless the presentation of the second twin. **Objective** : The objective of this study was to determine the factors associated with the mode of delivery among twin pregnancy in Hospital USM. **Methods:** A cross sectional study was conducted for this study. Data of twin pregnancy were reviewed from medical record department in Hospital USM from 1st of January 2010 until 31st December 2015. The inclusion criterias were live births for both babies, delivered more than 24 weeks of gestational age and baby weight more than 500 grams. Babies with severe fetal malformation or in utero fetal death were excluded. Proforma was used during data collection to reduce bias. Multinomial Logistic Regression was applied for statistical analysis in this study. **Result :** Among 522 twin pregnancy retrieved from medical record in Hospital USM, 388 of twin pregnancy met the inclusion and exclusion criteria. Two hundred and thirty were randomly selected and included in the study. The overall mean (SD) age for delivery in twins was 29.0 (5.37) years old for all mode of delivery. There were 120 cases (52.38%) were delivered via spontaneous vaginal delivery (SVD) for both twins, 96 cases (41.56%) were delivered by lower segment caesarean section (LSCS) for both twins, and 14 cases (6.06%) were delivered by SVD for first twin and assisted vaginal delivery for second twin (SVD-Assisted VD). The significant factors associated to LSCS-LSCS delivery for both twin were age (OR: 1.11, 95%CI 1.03, 1.20, p=0.022), history of spontaneous vaginal delivery (OR: 9.35, 95%CI: 4.01, 21.81, p<0.001), and non cephalic

presentation of first twin (OR: 90.69, 95%CI: 18.45, 436.18, p<0.001), while significant factor associated to SVD-Assisted VD mode was type of conception (OR: 8.71, 95%CI: 1.14, 66.46, p=0.037). **Conclusion:** A caesarean section for both twin was associated with older age of mother, noncephalic presentation of first twin and history of vaginal delivery for mode of delivery. While in SVD- Assisted VD for twin delivery was associated with spontaneous type of conception.

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

Twin birth rates have increased worldwide during last two centuries and comprise approximately three percent of all pregnancies, commonly due to the increased use of assisted reproductive technologies (ART) (Martin *et al.*, 2007). According to National Vital Statistics reported the twin birth rate was 33.9 per 1,000 in 2014, which was not significantly higher than the rate for 2013 (33.7/1000), but was a new high for the nation (Hamilton *et al.*, 2015). The triplet and higher-order multiple birth rate (triplet/+) dropped another 5% in 2014 to 113.5 per 100,000 births and is down by more than 40% since the 1998 highbirth rate. Additionally, around 80% of twin pregnancy has increased around the world because of growing assisted reproductive technologies and increased in average age at the first child (Sentilhes *et al.*, 2015)

The incidence rate of twin births varies across developed and developing countries. In the United states, the twin rates increased by 76% over past 30 years, from 18.9 per 1000 in 1980 to 33.2 per 1000 in 2009 (Boyer *et al.*, 2014). As reported by Lee *et al.* (2011), caesarean rates for twin births increased gradually from 53.4% to 75.0% in 2008 in United States . The rates for the breech twin category from 81.5% to 92.1% and the vertex twin category from 45.1% to 68.2% (Davidson *et al.*, 2008). In the developing countries, twin rates were very low in East Asia and Oceania which was less than 8 twin births per 1000 births (Smits and Monden, 2011).

The twins can be either identical or non-identical as twin pregnancy is generally classified by the zygosity and chronicity of the fetus (Turton *et al.*, 2009). As reported to European Journal, monozygotic also known as identical twins were developed from

one embryo that splits at some point in the first two weeks after fertilization (Turton *et al.*, 2009). If zygote divides within the first 72 hours past fertilization, it was known as diamniotic and dichorionic (DADC) also called fraternal twin. They maybe same or different sex of baby (Davidson *et al.*, 2008). In monochorionic diamniotics (MCDA), twins share same placenta and chorion but have separate amnion. Normally, the zygote is splitting between day 4 and day 7. While in monochorionic monoamniotic (MCMA), it occur more than7days after insemination and will be in a single sac (Dera *et al.*, 2007). The incidence rate of twins varies based on different types of chronicity.

Twin pregnancy was diagnosed and detected by routine ultrasound during antenatal check-up at first or second trimester. More than 95% was accurately diagnosed by ultrasound if the twins share the same placenta and those without ultrasound only can diagnosed of twins starts at 26 weeks of gestation (Lum, 2013).

Process of delivery in twin pregnancy was similar as singleton pregnancy. For the admission of twin pregnancy, obstetrician, anaesthetist, paediatrician, neonatal intensive care unit and operating are informed early in case needed for unplanned caesarean section. In cephalic presentation and have no medical illness, the mother will be recommended for spontaneous vaginal delivery. There was circumstances where assited vaginal delivery was indicated in twin pregnancy (Lum, 2013).

There was no single factor to decide the mode of delivery in twin pregnancy. The optimal mode of delivery in twins was remains unclear compare to single pregnancy as it depend on various factors like mother age, presentation of first twin, chronicity, parity, gestational age and underlying disease of mother (Khalil *et al.*, 2013). For singleton pregnancy, mode of delivery can be decided in sense of fetal presentation (Haest *et al.*, 2005). According to article by Lum (2013) mention that the greatest factor

that influence mode of delivery in planned lower segment caesarean section in twin pregnancy was malpresentation of first twin. For breech (buttocks, feet, or knees) presentation of first twin, a transverse lie of the first twin, twins shares placenta, conjoined twins is good for planned caesarean (Lum, 2013). This malpresentation was agreed in most obstetrician to undergo caesarean delivery to avoid complication to both mother and babies (Dera *et al.*, 2007). The purpose of the present study was to determine the factors associated the mode of delivery in twin pregnancy in Hospital USM. The mode of delivery was divided into both twin delivered with spontaneous vaginal delivery (SVD), both twin delivered with caesarean delivery (LSCS-LSCS), and first twin delivered SVD and second twin delivered with assisted vaginal delivery.

1.2 Problem Statement

Twin pregnancy comprises approximately one percent of all pregnancies but account for nearly ten percent of perinatal mortality. The clinician today is faced with many other dilemmas in managing patient. Moreover, management of second stage of labor is controversial problem faced by most clinician. Some physicians have widely used caeseran section for the second twin, with the hope of attaining better results and reducing infant morbidity and mortality (Laufe and Berkus, 1992). Twin or multiple pregnancy are known as high risk pregnancy for preterm delivery (Boyer *et al.*, 2014). Some observational studies have shown that vaginal delivery of non- cephalic presenting second twin is safe with no significant different in neonatal morbidity as compared to delivery by caesarean delivery (Dera *et al.*, 2007)

The different aspects of the risk and complication include the mode of delivery which remain unclear and controvercial among obstetrician. A recent study states the time interval between delivery of each twin should be no longer than 30 minutes as if it take longer may lead to asphyxia of second twin (Barret, 2014). Since there was yet no

agreement for standard mode of delivery in twin pregnancy, therefore present study focused on factor associated the mode of delivery in twin pregnancy.

1.3 Benefits of the Study

Present study aimed to determine the factors influencing the mode of delivery in twin pregnancy. Most of studies have shown that twin pregnancy is a high risk pregnancy compared to singleton pregnancy which could leads to perinatal mortality between first born and second born twin (Smits and Monden, 2011). The mode of delivery in twin is controvercial and most challenging decision among obstetrician. This study emphasized on factors associated different modes of delivery in twin based on various factors which are discussed in detail during variable selection. Furthermore, there was little published study done in Malaysia on factor influence mode of delivery in twin pregnancy.

1.4 Justification of the study

Twin or multiple gestations are high risk pregnancies for both mother and fetus. The number of twins is increasing worldwide due to increase resources to assisted reproductive technique. The optimal mode of delivery for twin pregnancy is controversial among obstetricians. There were few published studies in Malaysia on factors associated with the mode of delivery in twin pregnancy. Most of the articles were mainly from the United State, United Kingdom, Hong Kong, France and Canada. The data in this study was analyzed by using Multinomial Logistic Regression to estimate the relationship between a polytomous dependent variables or outcome and more than one independent variables or covariates (Hosmer and Lemeshow, 2000). The independent variables could be a combination of numerical and categorical variable.

Therefore, the present study could determine whether there is any association between modes of delivery (both twin delivered by spontaneous vaginal delivery, both twin delivered lower segment caesarean section (LSCS), and second twin delivered with assisted delivery after first twin SVD.

1.5 Research Question

Is there any significant relationship between the studied factors (social demographic, types of conception and fetal presentation) and with the modes of delivery of twin pregnancy in Hospital USM.

1.6 Objectives

1.6.1 General Objectives:

To determine factors associated with the modes of delivery in twin pregnancy in Hospital USM.

1.6.2 Specific Objectives:

- To determine the proportion of different modes of delivery in twin pregnancy in Hospital USM.
- To determine the factors associated with the modes of delivery in twin pregnancy in Hospital USM.

1.7 Research Hypothesis

There is a significant association between the factors (socio-demographic, types of conception, fetal presentation) and the modes of delivery in twin pregnancy in Hospital USM.

CHAPTER 2

LITERATURE REVIEW

2.1 Literature Search Strategy

For the literature review, standard search strategies were used involving the querying of two online databases (MEDLINE® and Cochrane) using key words, followed by evaluation of the bibliographies of relevant articles. Citations may include links to full-text content from PubMed Central and publisher web sites.

Online database like PubMed consist of jounal article and online books. Search for the literature were phase searching, use of keywords with Boolean operators and citation search. Phrases used in phase searching were “factors influence mode of delivery in twin pregnancy”, “associated factors of mode delivery in twins, risk factors of twin pregnancy and predictors of delivery in twin pregnancy”. Keywords used were “factors influence AND mode of delivery in twin pregnancy” and “Associated factor of mode of delivery among twin pregnancy. For citation search, author’s name and title of article were used to search for the citation. Search engine used were PubMed, Science Direct, Google Scholar. Related articles found were saved in form PDF and imported to the Endnote Library. The table was summarizing as below:

My Research Question	**What are the factors associated with the mode of delivery in twin pregnancy?**			
	What are the types of delivery in twin pregnancy?			
Places to search for information Library catalogue, Medline,Google scholar, Web of Science,sciendirect, ProQuest Disertations and Thesis				
List of sources search	Date of search	Search strategy used, including any limits	Total number of results found	Comment
Google Scholar, Science Direct, PubMed,	28 April 2015	By keywords Mode of delivery, 'twin pregnancy, vaginal delivery, cesarean section, combined delivery	178	
USM ez-proxy	02 May 2015	OR, AND, NOT	358	
Medline, ProQuest	16 Mei 2015	Search term 'twin gestation', factor influence to 'type of delivery'	767	
Science Direct	2 Jun 2015	Search term using "Clinical predictor" to "mode of delivery"	1333	

2.2 Type of Twin Pregnancy

Twin pregnancy refers to any pregnancy that carries more than one fetus which is two fetuses in one womb. Twins pregnancy was commonly classified by zygosity of the fetus which is depend on time of fertilization (Turton *et al.,* 2009). The types of twin pregnancy based on chorion and amniotic which were dichorionic diamniotic, monochorionic diamniotic, and monochorionic monoamniotic. Dichorionic Diamniotic known as twin with two separate placenta (connected with membranes or not) and two

fused placenta and two separate sacs (Derom *et al.*, 2003). Monochorionic Diamniotic known as twin with one placenta and two separate sacs (Derom *et al.*, 2003).

Monochorionic Monoamniotic known as one or shared placenta and one sacs (Derom *et al.*, 2003) Transvaginal Ultrasonography is the method used to determine chorionicity as well as to determine the fetal gender,number of placenta, and the thickness of inter twin membrane of womb (Rao *et al.*, 2004).

As stated by Boyer *et al.* (2014) gestational age of pregnancy was determined by the last menstrual period or by vitro fertilization transfer date that is validated during the first trimester ultrasound. Women with multiple pregnancies should be offer a first-trimester ultrasound scan at approximately 11 weeks zero days to 13 weeks six days. Ideally, scan can estimate the gestational age, determine chorionicity and screen for Down's syndrome. Chorionicity should be determined using the number of placental masses, the lambda or T-sign and membrane thickness (Borton, 2016). The risks are greater if the fetuses share a placenta (monochorionic), so it was important to establish early.

2.3 Incidence rate of mode of delivery in twin pregnancy

The caesarean delivery rate for twin gestations in the United States had increased modestly in the years just prior to the current study period, from 50% to 53% over the years 1989 to1994 (Barber *et al.*, 2011). There were gradually rise in caesarean delivery rates from 1995 to 2008 and 16% of the rise was attributable to multiple gestation (Lee *et al.*, 2011). It is because caesarean delivery can increase both short-term and long-term maternal morbidity, justifications for its routine use, such as potential neonatal benefit, are necessary. Lee *et al.* (2011) stated that caesarean rates for twins in breech presentation were above 80% at the beginning of the study period and

rose to greater than 90%. The relative increase in cesarean delivery for twins in vertex presentation was dramatically higher, increasing more than 50% from 45.1 to 68.2%.

The incidence of assisted vaginal delivery in the United States was estimated at around 5%, or approximately one in twenty deliveries (Martin *et al.*, 2007) although there are large geographic differences in the rates of assisted vaginal delivery across the country. The proportion of vacuum-assisted deliveries has been increasing and now accounts for almost four times the rate of forceps-assisted vaginal births (Clark *et al.*, 2007).

2.4 Factors associated the mode of delivery in twin pregnancy

2.4.1 Types of conception

Type of conception can be divided into spontaneous conception and assisted conception. The increasing number of twin pregnancy is commonly due to evolution of biotechnology in reproductive system such as assisted reproductive techniques. Assisted reproduction is commonly known as in vitro fertilisation (IVF) is worldwide spread to encounter sub fertility (Liu *et al.*, 2012). Mother who received in-vitro fertilization is likely to choose caesarean delivery due to anxiety and anxious toward pregnancy compared to those who conceived spontaneously(Liu *et al.*, 2012). A systematic review study reported that percentage of caesarean section were 52.9% to those mother with assisted reproductive (IVF) versus 42.7% in spontaneously conceived in twin pregnancy (Pinborg, 2005). Moreover, IVF twin do bear a significantly higher risk than IVF singleton in term neurological sequel, motor and cognitive development, growth and chronic disease and so on (Pinborg, 2005). As reported by, type of conception were statistically significant to mother choice of delivery (p=0.013) which were mother with assisted reproduction will request to delivered in mode elective caesarean 57% and 35% in emergency caesarean compare to 8% were delivered in vaginal delivery.

2.4.2 Presentation of first twin

The presentation or fetal lies of the first twin was a statistically significant factor that influenced the mother to choose type of delivery. A study done by Shi *et al*, (2004) indicated that approximately 35-40% of twin presentation is vertex-non vertex during birth. In most study done, there was still debate on delivery of choice for the second twin with a vertex- non vertex presentatation mentioned that twin pregnancy approximately 3% of all pregnancies and for vertex-non vertex presentation accounting 35-51% of all twins. Based on the particular study, the result was 63.6% for vaginal delivery for the vertex-non vertex twins (Usta *et al.*, 2005). Moreover, some previous study have reported that the rate of caesarean delivery for second twin after first twin delivered vaginally ranged from 0.33% to 26.8% (Yang *et al.*, 2005a) and caesarean rate for that presentation vertex-non vertex on present study was 24.8% compared to other previous study on the same population which is only 9.5%. As quotes by expert mentioned that indication for assisted vaginal delivery rate were higher for presentation of nonvertex, fetal distress, arrest of rotation, and after coming head and for the mother indications were medical problem, cardiac problems, exhaustion, excessive analgesia (Persad *et al.*, 2001). Furthermore, as reported a in Public hospital in Hong Kong by (Liu *et al.*, 2012), non-cephalic presentation on second twin were statistically significant in delivered in caesarean which were 42% delivered in emergency caesarean, 55% were delivered in mode elective caesarean respectively. However, one study stated that vaginal delivery of non-cephalic of second twin was safe according to the fetal weight, if the fetal weight <1500g then it can be delivered via spontaneous vaginal delivery (Yang *et al.*, 2005a).

2.4.3 Gestational age

In a twin or single pregnancy, gestational age is determined by the last menstrual period or by in vitro fertilization transfer date and it can be confirmed by an ultrasound at the first trimester of pregnancy. Gestational age of delivery can be divided into two groups which is delivery < 37 weeks know as preterm delivery and ≥ 37 weeks and more weeks known as term delivery (Lee *et al.*, 2011). A systematic review showed that policies of planned vaginal delivery and caesarean delivery were not significant different for twins at least 1500g or reaching at least 32weeks gestation in perinatal outcome (Barrett, 2014). Gestational age is important as a baseline parameter for maternal characteristics and delivery outcomes.Barzilay *et al.* (2012) reported the median gestational age at delivery was 31.4 weeks in caesarean group of delivery compared to vaginal delivery at 30.4 weeks of gestation age. Moreover Easter *et al.* (2015) reported the range of gestational week in delivered twin were between 32 and 40 of gestational weeks. The percentage of delivery by spontaneous vaginal delivery was 36.9% and 36% in caesarean delivery respectively.

2.4.4 Parity of mother

The other associated factors that influence the different mode of delivery is parity. A study indicated that multiparous women more often to choose caesarean delivery than nulliparous women (Fuglenes *et al.*, 2011). Low parity and high parity is associated to different type of delivery. A study shown predictor of vaginal operative delivery among low parity was associated with reduced likelihood to caesarean delivery. In a simple word, low parity lead to assisted vaginal delivery because vaginal delivery is easier for mother with high parity (Yang *et al.*, 2005c) Nulliparity was significantly higher among pregnancies with in vitro compared to spontaneously conceived with 77% (Daniel *et al.*, 2000). In contrast, one study in Hong Kong, stated that there was no statistically significant in low parity that influence mode of delivery in twin (p=0.058)

(Liu *et al.*, 2012). A similar finding was reported by Easter *et al.* (2015), there was not associated factor of parity in cervical dilation in vaginal delivery and ceaserean delivery p=0.460).

2.4.5 Maternal Age

According to the National Vital Statistics in the United Stated reported that the mean age of mother at the first birth rose again in 2014 to 26.3, up from 26.0 in 2013 (Hamilton *et al.*, 2015). The chance of having dichorionic twin increases approximately double with increasing maternal age (Bulmer, 1970). The reason for the increase in twinning frequency with age is thought to lie in the dynamic interplay of hormonal signals between the pituitary gland and the ovary. In the younger women, there is a pool of growing follicles ready to respond immediately to the rise in follicle stimulating hormon (FSH) at the beginning of each menstrual cycle. The immediate response is to send hormonal signals back to the brain and pituitary gland to turn down the FSH signal. Therefore, with the increasing number of age, the pool of ovarian follicles available to grow and respond to the hormonal signal has diminishes. When this happens, both follicle mature and ovulate increasing the chance of having twins in older age (Hoekstra *et al.*, 2007).

Above finding was supported by National Statistics Institute in England and Wales that women aged more than 45 were most likely to have a multiple birth; 105.5 out of every 1,000 women giving birth within this age had a multiple birth in year 2014 (Statistics, 2014). As reported by (Liu *et al.*, 2012), the mean age of vaginal delivery and caeserean was between 30 to 32 years respectively. Moreover, the other finding reported by (Yang *et al.*, 2005c) in their study, the common range of age in delivering twin were between 20.0 -29.0 years old in all three groups of delivery. One study in United stated about trend in delivery twins reported the range age of delivery between

30.0 -34.0 year, which were 35.1% delivered in mode vaginal delivery, 64.9% were delivered in mode caeserean (Lee *et al.*, 2011). Moreover, there was a study done in Bringham and Women Hospital in year 2007 till year 2011 reported those with nonvertex presentation were younger (median age between 32.0 years and 33.0 years) compared to patient with vertex-vertex position when in labor (Daniel *et al.*, 2000)..

2.5 Conceptual Framework

In conjunction with research hypothesis, the overall conceptual framework of present study can be expressed by variables that will predict for the mode of delivery. There were nine factors sociodemographic patient (age, bmi at booking, history of smoking), obsetric parameter (gestational age at delivery, parity, gravida, type of conception, presentation of first twin, chorionicity, history of vaginal delivery, history of previous twin). Those factors in the present study were extracted from previous studies and modify accordingly. It was hypothetically proposed that all variables were significantly associated factors to the mode of delivery in twin pregnancy. The conceptual framework was presented in flow chart as below.

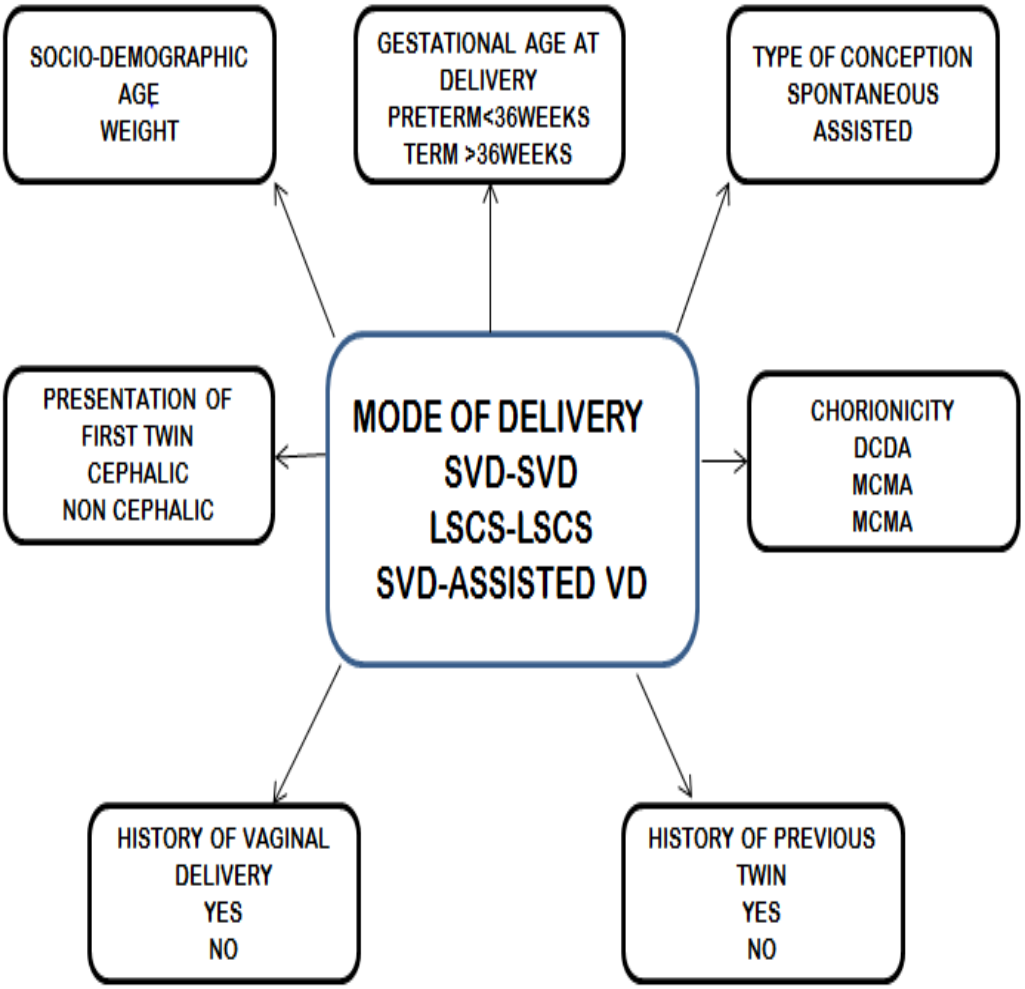

Figure 2.1: Theoretical framework of factors associated with the mode of delivery among twin pregnancy

CHAPTER 3

METHODS

3.1 Study Design

The study was conducted in Hospital Universiti Sains Malaysia, Kubang Kerian, Kelantan. Hospital USM is one of the largest hospital in Kelantan (Kamari, 2009).

The study design was cross sectional study. The study design provides an overview of the outcome and the characteristics associated with it, at a specific point in time.

3.2 Study Period

Data were obtained from medical records for six year record review from 1st 2010 till 31st December 2015.

3.3 Study Location

Hospital USM which is an urban, academic, tertiary care center consists of many departments and Obstetric and Gynaecology is one of it. As a tertiary hospital, Hospital USM receives more referred cases from health clinics and other district hospitals.

Obstetric and gynaecology department offers a clinic for twin pregnancy every Monday morning. The specialists and medical officers are incharge of the clinic who check and review the mother for any related problem.

3.4 Reference Population

The population for this study were all twin pregnancy who delivered in Hospital USM.

3.5 Source population

The source population were all twin pregnancy who delivered in Hospital USM from 1st January 2010 till 31st December 2015.

3.6 Sampling Frame

The sampling frame in this study was all twin pregnancy who delivered in Hospital USM and meet the inclusion and exclusion criteria.

3.7 Sample size determination

The calculation of sample size was done using Power and Sample Size Calculation (PS) software, with the significance level (alpha) 0.05, and the power of study (1- β) of 80%. The following steps were sample size determination based on parameter which had proportion (Hosmer and Lemeshow, 2000).

Table 3. 1 Sample size determination

Both twin delivered SVD vs both twin delivered LSCS

Factor:	P_1 (LSCS)	P_0 (SVD)	Type 1 error	Power of study	Required sample size (n)
Types of conception Assisted reproductive (IVF)	0.88	0.53	0.05	0.8	67X3=201
Sources article	Nathan *et al*, 2015; 212:106				
Maternal age	0.56	0.32	0.05	0.8	61X3=183
Sources of article	Nathan *et al*, 2015; 212:106				
Presentation 1st twin	*0.28	0.58	0.05	0.8	42x3=126
Vertex-vertex	#0.42	0.20	0.05	0.8	68X3=204
Vertex-breech					
Sources of article	*Olivier *et al*; 2005, 08; #Liu *et al*; 2012;18:99-107				
Parity	*0.57	0.2	0.05	0.8	26X3=78
	#0.88	0.54	0.05	0.8	27X3=81
Sources of article	*Olivier *et al*; 2005, 08. #Liu *et al*; 2012;18:99-107				

Table 3.1 shows the largest sample size was 68 patients for each group, and each group were multiplied by three groups, giving a total of 204patient. Two hundred and four patient were sampled in the study.

After adding 20% estimated missing data, get;

n = 204+ (0.2× 204) = 244. Therefore, a total 244 patients was sampled.

3.8 Sampling Methods

A simple random sampling method was applied for this study to prevent selection bias. From the list of sampling frame which was 522 of twin pregnancy in Hospital USM, there were 388 of twins delivered in labour room of Hospital USM. Two hundred and fourty four patient was randomly selected after the subject met the inclusion and exclusion criteria. The study subjects were chosen by using the random numbers generated by a spreadsheet prepared for simple random sampling (Najib, 2015).

3.9 Study subjects

Secondary data were collected using proforma within the time frame of study. That data were collected only after approval was obtained from Human Research Ethics Committee USM (HREC).

3.9.1 The Inclusion Criteria

1. All the twin pregnancy women that follow up in O&G clinic and delivered in Hospital USM from 1st January 2010 until 31st December 2015
2. It was strict to include mother with live birth for both baby. Mother had delivered more than 24 weeks of gestational age.

3. Mother with comorbid disease like anemia, preeclampsia, gestational diabetes mellitus, placenta previa.

3.9.2 Exclusion Criteria

1. Mother give birth at gestational age less than 24 weeks or whose birth weight was less than 500mg.

2. Present severe fetal malformation or in utero fetal death. Congenital abnormality, twin to twin transfusion syndrome.

3. Severe disease like hypovolumic shock, heart disease, fits, stroke.

3.10 Data collection method

Proforma was used for data collection. The data collection consisted of socio-demographic parameters and obstetric parameters. Twin pregnancy who delivered at Hospital USM during the 6 year period from 1st January 2010 till 31st December 2015 were identified using hospital birth record. The objective of using the proforma was to standardize the collection method in the same way. The proforma was designed carefully in order to obtain accurate information about exposures and outcomes.

The current analysis of twin pregnancy was based on the multiple birth file recorded in Hospital USM. There were 388 of multiple birth file containing twin births in the Hospital USM, with data extracted from patient's discharge folder. All reviewed records were recorded on proforma based on variable interested such as information on maternal demographic data, medical history, and obstetric history, type of conception, mode of delivery.

Relevant data include sociodemographic information of the mother, maternal life-style factors such as smoking during pregnancy, obstetric history, labor and delivery outcomes and indications for interventions, and infant variables, including birth weight

and gestational age were recorded in the proforma. The distribution of maternal and fetal characteristics of the first twin according to mode of delivery (spontanoues vaginal delivery, cesarean delivery, assisted vaginal delivery). Mode of delivery was the outcome variable, spontaneous vaginal delivery as the reference category. Independent variables that were entered into the regression models as factors such as age weight, BMI, parity, gravida, history of vaginal delivery, history of previous twin, type of conception and presentation of first twin.

The outcome were coding as zero,one and two (zero: SVD-SVD, one: LSCS-LSCS, two: SVD-Assisted VD) with spontaneous vaginal delivery was reference group. The independent factor such as number of parity were coding as (zero, less than one, two, and more than five, with more than three as the reference category), gestational age were coding as (<28 weeks, 28-31 weeks, 32-35 weeks, >36 weeks, with >36 weeks as the reference group), maternal bmi was presented by mean. The other variables were type of conception were coding as(zero: spontaneous and one: assisted, with spontaneous as a reference group), chorionicity were coding as (zero: MCDA, one : DCDA, two : MCMA with MCDA as a reference group), presentation of first twin (zero: cephalic, one: non cephalic with cephalic as a reference group), and mode of delivery (zero: SVD-SVD, one : LSCS-LSCS, two: SVD-Assisted VD, with SVD-SVD as a references group).

Maternal sociodemographic variables included in the regression models included maternal age, maternal race coding as (zero: malay, one: chinese, two: indian, three:others with malay as the reference group), maternal smoking was coding as (zero: yes, one : no, with ‘‘no’’ as the reference group), history of maternal previous twin was coding as (zero: no, one: yes with “no” as the reference group), history of vaginal delivery was coding as (zero: yes,one: no, with “yes” as the references group), and the

selection of clinical factors and the categories were determined by obstetricians among the research team after examining the availability of the clinical information in the database. The regression analysis was first performed on the overall study population, and then within subgroups stratified into preterm (<36 weeks of gestation) and term (>37 weeks of gestation) births.

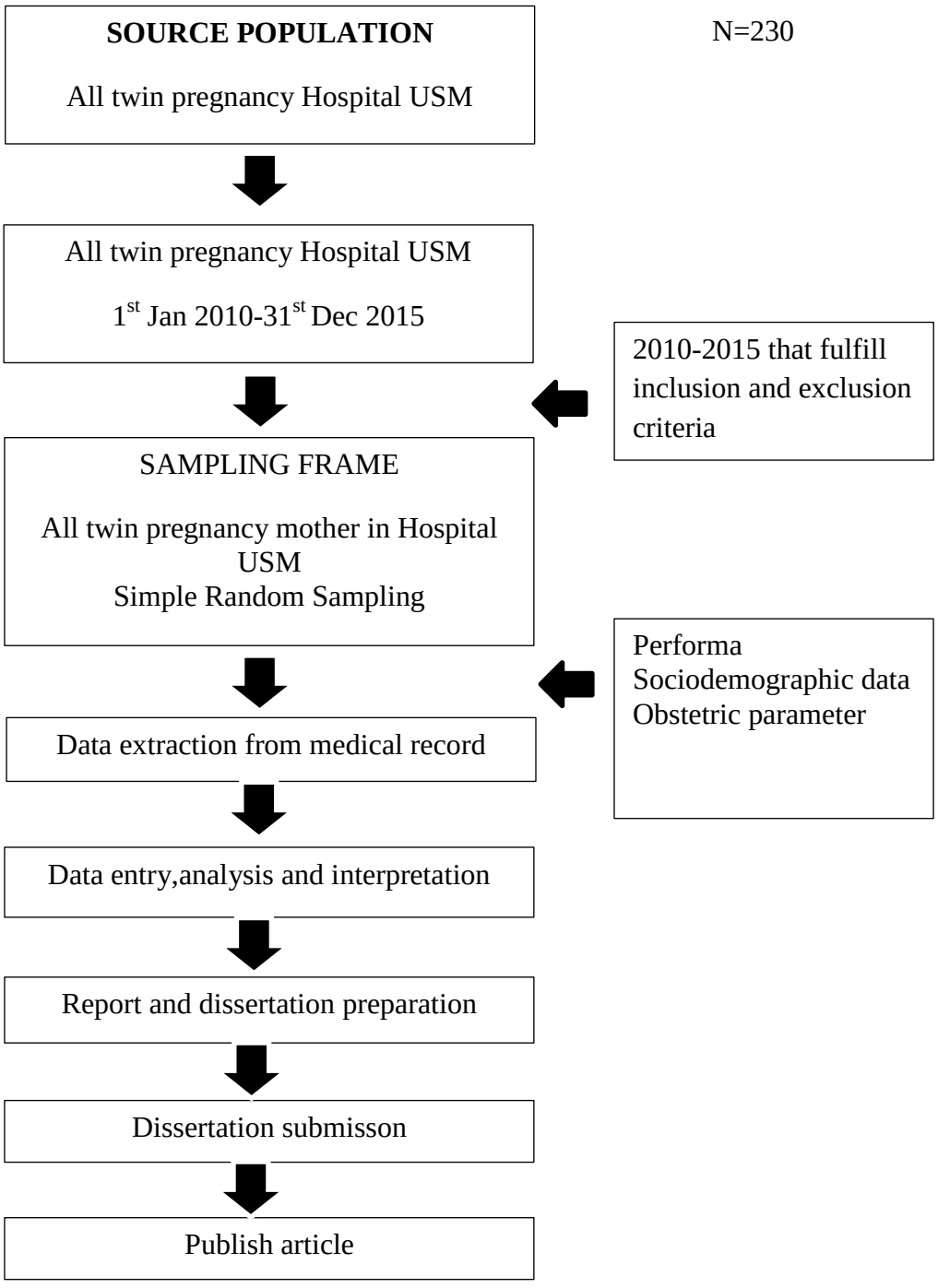

Figure 3.1: Study flow chart

3.11 Ethical issues/consideration/approval

Ethics is a code of thinking and behaviour govermed by a combination of personal, moral, legal, and social standards of what is right.Ethics is needed in sense of respect people as end, respect participant's ability to play a role in determining their need, respect everyone's human, civil, and legal rights.

With the above reasons, the researcher was applied ethics before proceed to data collection, thus approval was obtained from Human Research Ethics Committee USM (HREC) (USM/JAPem/15080283) and from Hospital Director (references no HUSM/11/020/JLD date 13th January 2016).

3.12 Operational Terms

Twin:	Two individuals derived from two fetuses that were fertilized at or about the same time, developed in the uterus simultaneously, and born to the same mother (Dictionary, 2013).
Gestational Age:	The age of the conceptus, beginning from the time of fertilization. In clinical Obstetrics, the gestational age is often estimated as the time from the last day of the last menstruation which is about 2 weeks before ovulation and fertilization (Dictionary, 2013).
Chorionity:	The outermost fetal membrance in human embryos, the villous part which becomes the fetal part of the placenta (Dictionary, 2013)
Dizygotic Twins:	Two offspring from the same pregnancy. They are from two OVA, fertilized at about the same time by two spermatozoa. Such Twins are genetically distinct and can be of different sexes (Dictionary, 2013).
Cephalic Presentation:	Fetal lie head down to pelvic bone (Dictionary, 2013).
External	Fetal version where the head is brought down into the

Cephalic Versions:	maternal pelvis by external manipulation (Dictionary, 2013).
Amnion:	Innermost of the extraembryonic membranes enveloping the embryo in utero and containing the amniotic fluid; it consists of an internal embryonic layer with its ectodermal component and an external somatic mesodermal component; in the later stages of pregnancy the amnion expands to come in contact with and partially fuse to the inner wall of the chorionic sac; derived from the trophoblast cells (Dictionary, 2013).
Assisted Vaginal Delivery:	A mother and baby need help at the end of pushing stage, a healthcare provider will gently apply forceps or small amount of suction to the baby's head. For example vacuum extractor used a device for producing traction on the head of a fetus by means of a soft cup held by a vacuum. Forsep assisted delivery help the baby out of the birth canal and typically used to assist mother while push the baby (Dictionary, 2013).
Maternal Bmi	BMI was calculatedted based on weight and height of mothers was taken at booking. BMI=weight (kg)/height squared (m2) (Dictionary, 2013).
Caesarean	Extraction of the fetus by means of abdominal hysterotomy (Dictionary, 2013).

3.13 Statistical flow chart

Statistical flowchart was detailed diagram or chart of the operations through the whole analysis. Multinomial Logistic Regression was used for statistical analysis and the steps involved for model to fit the data were showed below.

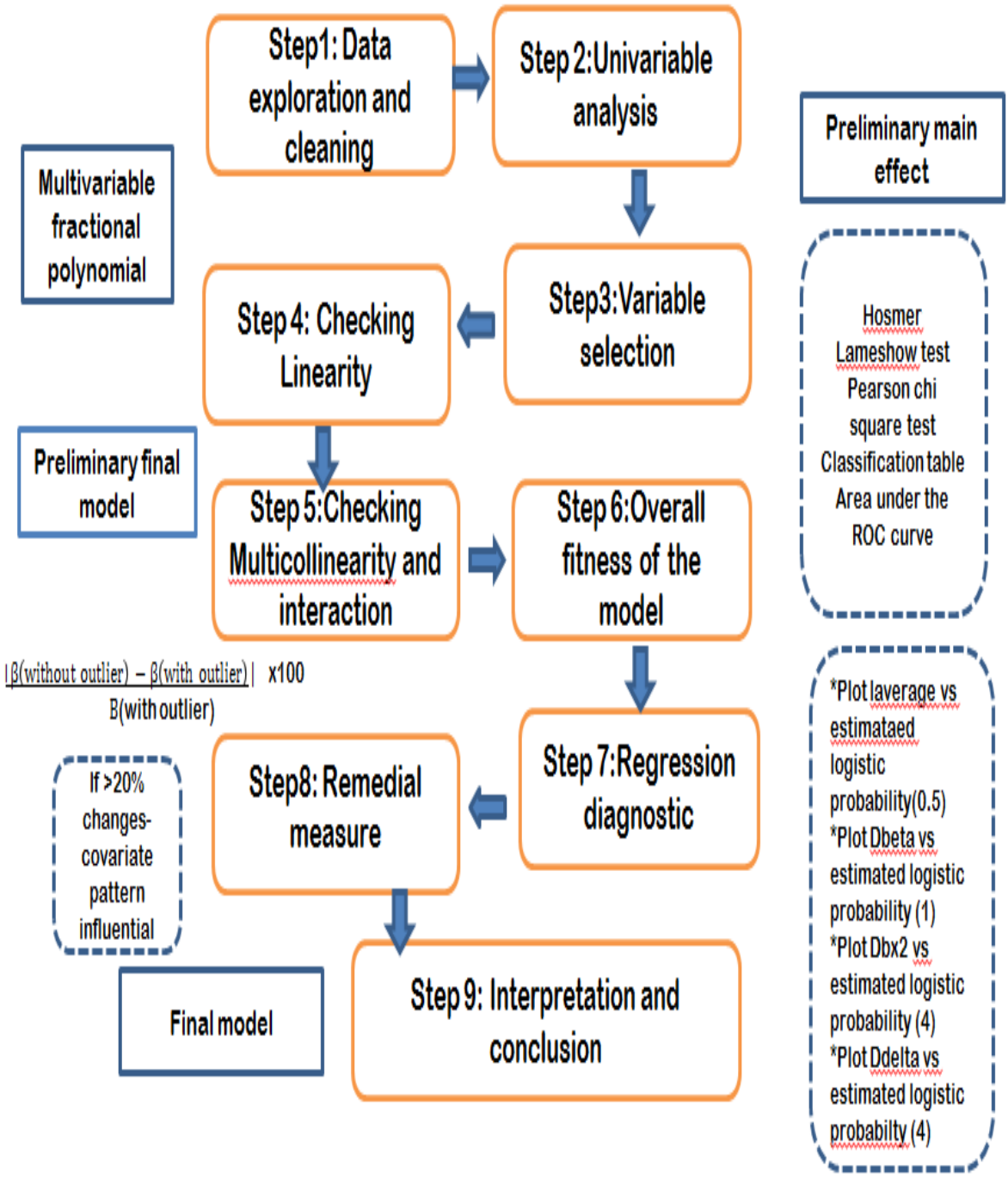

Figure 3.2: Statistical Flow Chart