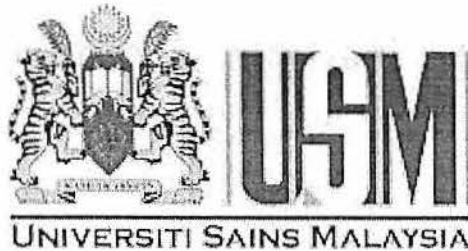


UNIVERSITI SAINS MALAYSIA



**PREVELANCE AND FACTORS CONTRIBUTING
TO ANEMIA AMONG PREGNANCY WOMEN IN
HOSPITAL UNIVERSITI SAINS MALAYSIA
(HUSM)**

by

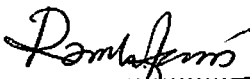
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**Dissertation submitted in partial fulfillment of
the requirements for the degree
of Bachelor of Health Sciences (Nursing)**

April 2009

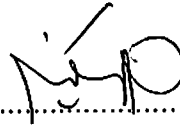
CERTIFICATE

This is to certify that the dissertation entitled Prevalence and Factors Contributing to Anemia among Pregnancy Women in HUSM is the bonafide record of research work done by Norazila Bt. Abdullah 87444 during the period of July 2008 to April 2009 under my supervision. This dissertation submitted in partial fulfillment for the degree of Bachelor of Health Sciences (Nursing). Research work and collection of data belong to Universiti Sains Malaysia



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PREVALENCE AND FACTORS CONTRIBUTING TO ANEMIA AMONG PREGNANCY WOMEN IN HOSPITAL UNIVERSITI SAINS MALAYSIA (HUSM)

ABSTRACT

Anemia is one of the most frequent complications related to pregnancy. Anemia is defined as a decrease in hemoglobin in the blood to a level below the normal range of 10-11 g/dL for pregnancy women. Anemia also can cause many complications which can effects maternal and child health. Many factors can contribute to anemia during pregnancy such as level of education, income, interval of pregnancy, nutritional intake and others. Therefore, the purposes of the study were to identify the prevalence of anemia among pregnancy women, to determine association between anemia with the nutrient intake, selected socio-demographic data and interval of pregnancy among pregnancy women. The study design is cross sectional study. The study had been conducted in O&G clinic and antenatal wards in HUSM. The numbers of respondents involved in the study were 55 respondents. The subjects were selected using convenience sampling. The associations between income, level of education, and interval of pregnancy with anemia were determined by using chi-square test where p value will be determined. While, the prevalence of anemia among pregnancy women was described in percentage. The results showed the prevalence of anemia among pregnancy women in HUSM was 18.2%. Approximately, 10 respondents was having anemia from the total of 55 respondents involved. There was no association found between anemia and income where p value was 0.23($p>0.001$). The result showed majority of the respondents 8(14.5%) whose having anemia has income between RM2000-RM3000. There was also no association found between anemia and level of education where p value was 0.18 ($p>0.001$). Respondents who's mostly getting anemia

were respondents with higher education 7(12.7%). A part from that, no association was found between anemia and interval of pregnancy where p value was 0.73($p>0.001$). Women who have interval of pregnancy less than 2 years have a tendency to get anemia 6(10.9%) compared to mothers with interval of pregnancy more than 2 years. But, there was an association was found between anemia and nutritional intake where p value was 0.00($p<0.001$). As a conclusion, nutritional intake was one of the important factors contributing to anemia during pregnancy.

**PREVALEN DAN FAKTOR-FAKTOR MENYUMBANG KEPADA ANEMIA DI
KALANGAN WANITA MENDUNG DI HOSPITAL UNIVERSITI SAINS MALAYSIA
(HUSM)**

ABSTRAK

Anemia merupakan salah satu komplikasi yang sering berlaku kepada wanita yang mengandung. Anemia didefinisikan sebagai tahap hemoglobin dalam darah di bawah paras normal 10-11g/dL. Anemia boleh menyebabkan pelbagai komplikasi kepada kesihatan ibu dan anak. Pelbagai faktor boleh menyumbang kepada anemia kepada wanita mengandung antaranya ialah tahap pendidikan, pendapatan isi rumah, jarak kandungan, pemakanan dan sebagainya. Oleh itu, tujuan kajian ini ialah untuk melihat prevalen dan hubungkait antara anemia dan ciri demografik, jarak kandungan dan pemakanan di kalangan wanita yang mengandung. Kajian ini dijalankan di klinik O&G dan wad antenatal di HUSM. Hubungkait antara ciri demografik, jarak kandungan dan pemakanan ditentukan menggunakan ujian khi-kuasa dua di mana nilai p ditentukan. Manakala prevalen anemia ditentukan dalam bentuk peratus. Kajian ini melibatkan 55 orang responden. Daripada hasil kajian, prevalen wanita mengandung mengalami anemia di HUSM ialah 18.2% di mana 10 orang responden daripada jumlah responden mendapat anemia. Tiada hubungkait antara tahap pendidikan ($p=0.18$), pendapatan isi rumah ($p=0.23$) dan jarak kandungan ($p=0.73$) dengan anemia. Tetapi, terdapat hubungkait antara pemakanan dengan anemia ($p=0.00$). Kebanyakan wanita mengandung mengalami anemia terdiri daripada wanita yang mempunyai pendapatan antara RM2000-RM3000 iaitu sebanyak 8(14.5%), mempunyai tahap pendidikan yang tinggi 7(12.7%), dan wanita yang mempunyai jarak kandugan kurang daripada 2 tahun

6(10.9%). Secara kesimpulanya, pemakanan merupakan salah satu faktor penyumbang yang penting kepada anemia di kalangan ibu mengandung.

CHAPTER 1

INTRODUCTION

1.1 Background Of The Study

Pregnancy is a stage where women will have many physiological and physical changes. Most physiological changes occur during pregnancy is hormone changes. During pregnancy, women are vulnerable to many complications which can affect maternal and fetal health. Anemia is one of the most frequent complications related to pregnancy. The word implies a decrease in the oxygen-carrying capacity of the blood and is best characterized by a reduction in hemoglobin concentration (Sifakis & Pharmakides, 1990). According to World Health Organization (2000), about 40% of the world population (more than 2 billion individuals) suffer from anemia where the groups with the highest prevalence are pregnant women (about 50%). A part from that, World Health Organization (2000), data also shows that approximately 10.8 million in African countries, 9.7 million in the Western Pacific and 24.8 million pregnant women in South East Asia are anemic; the highest number being in South East Asia.

In pregnancy, anemia has a significant impact on the health of the fetus as well as a mother (Sahoo & Panda, 2006). Anemia is the most wide spread nutritional disorder in the world effecting 30 percent of the world's population (Thangaleela & Vijayalakshmi, 1994). According to Agrawal (1991) maternal anemia resulted in 12 to 28 percent of fetal, 30 percent of prenatal and 7 to 10 percent of neonatal death. Anemia in pregnancy is also associated with increased maternal morbidity and mortality. A part from that, anemia also can cause abortion, pre-term delivery, low birth weight and fetal mortality (Wiebe, Trouton, Eftekhari, 2006).

From the study, it also showed having anemia during pregnancy can result in low birth weight (LBW) infant. Low birth weight infant still remain the single most important cause of infant morbidity and mortality in the world. In majority of low birth weight infants the seed of death is soon much before they are born which increase the risk of prenatal, neonatal, mortality and growth and chronic disease as adults (Garg & Kashyp, 2006). Thus it shows that anemia is one of the complications during pregnancy that can effects health which can lead to mortality.

Anemia still constitutes a public health problem in the world, especially in the developing countries (Royston & Armstrong, 1989, AbouZahr & Royston, 1992 cited in Zulkifli, Rogayah, Hashim, Mohd. Shukri, 1997). Nutritional anemia is found more among rural mothers, where poor dietary intake and parasitic infections are more common. Many women start their lives with insufficient iron stores, but also, because of inadequate child spacing, they have little time to build up their iron levels between pregnancies (WHO, 1975).

Malaysia is one of the developing countries in the world which also facing anemia problem among pregnancy women. From the study that been done by Jamaiyah, Anita, Lim, Chen, Noraihan, Sanjay, Safiah, Muralitharam, Kumar, Kularatnam, Zaki, Mohd. Zaher (2007), show the prevalence of anemia among pregnancy women in Malaysia is 35%. While study that been conducted in Kelantan by Zulkifli et al., (1997) found 4688 (47.5%) pregnancy women are having anemia. Thus it show that anemia is one of the major disease occur among pregnancy women in most of the country in the world including Malaysia. This disorder does not only can cause maternal mortality but also fetal mortality.

1.2 Problem Statement

Anemia is a condition of too few red blood cells, or a lowered ability of the red blood cells to carry oxygen or iron. Tissue enzymes dependent on iron can affect cell function in nerves and muscles. The fetus is dependent on the mother's blood and anemia can cause poor fetal growth, preterm birth, and low birth weight (University of Virginia, 2004).

There are many factors that can contribute to the anemia during pregnancy such as deficiency in iron and folate intake, inadequate child spacing and others. Socio-demographic profile also can influence the incidence of anemia among pregnancy women. Anemia is one of complications that mostly occur among pregnancy women which can effects maternal and fetal health. Not only that, anemia also lead to mortality and morbidity among mothers and fetus. Many women did not realize when they get pregnant they are in high risk to develop anemia. It is because in pregnancy, a woman's blood volume increases by as much as 50 percent. This causes the concentration of red blood cells in her body to become diluted. This is sometimes called anemia of pregnancy and is not considered abnormal unless the levels fall too low (University of Virginia, 2006).

Lack of iron and folate intake from daily diet can lead to anemia. In pregnancy, anemia has been shown to be associated with an increase risk of maternal and fetal mortality and morbidity (Tasker,1958; Llewellen-Jones, 1965; Lourdenadin, 1969; Bake, 1978 cited in Wiebe et al., 2006). Lack of iron and folate intake occur because most of women did not realize and sometimes did not know that this two elements can be taken via diet that they intake every day. A part from that, iron and folic acid also can be taken via supplement to meet body need during pregnancy. Child spacing is also one of the factors that can contribute to develop of anemia during pregnancy. It is because, inadequate child spacing, mothers have little time to build up their iron levels between pregnancies (WHO, 1975).

Many studies had been conducted in western and Asian about pregnancy and anemia among pregnancy women to find out the prevalence and risk of anemia to pregnant women. Studies that had been done about anemia mostly focus on pregnant women group because according to World Health Organization (2000), groups with the highest prevalence of anemia in the world are pregnant women (about 50%). Most study had been conducted in Malaysia on anemia in pregnancy focused on prevalence of anemia not the factors that contribute to developing of anemia among pregnant women. To reduce the number of anemia among pregnancy women, most important is to know the factors that cause this complication among mothers. With this information, many programmed can be conducted to improve quality of health among pregnancy women. A part from that, number of women having anemia can also been reduce.

The concept of web causation model will be use in this study. The causal web is a metaphor that emphasizes the interconnectedness of the casual components in a population. In this model, it explains about direct causes and indirect causes. Direct causes are proximal to pathogenic events. While, indirect causes are distal ("upstream") from pathological events (Disease and Causal Concept, 1994).

1.3 Objectives of The Study

1.3.1 General Objective

To identify factors contributing to anemia among pregnancy women in HUSM

1.3.2 Specific objectives

1. To identify the prevalence of anemia among pregnancy women.
2. To determine association between anemia and the nutrient intake among pregnancy women.
3. To determine association between anemia and the selected socio-demographic factors among pregnancy women.

4. To determine association between anemia and the interval of pregnancy among pregnancy women.

1.4 Research Question

1. What is the prevalence of anemia among pregnancy women in HUSM?
2. What is the relation between nutrient and anemia in pregnancy women?
3. What is the relation between socio-demographic factors and behaviors of nutrient intake?
4. How nutrient intake can prevent anemia among pregnancy women?
5. Why adequate nutrient is very important to pregnancy women?

1.5 Research Hypothesis

Null Hypothesis

Ho: There is no association between selected socio-demographic factors and anemia.

Ho: There is no association between anemia in pregnancy and nutrient intake.

Ho: There is no association between anemia and interval of pregnancy.

Alternative Hypothesis

HA: There is an association between socio-demographic factors and anemia.

HA: There is an association between anemia in pregnancy and nutrient intake.

HA: There is an association between anemia and interval of pregnancy.

1.6 Definition of Terms

1.6.1 Nutritional

Nutritional is defined as the science or practice of taking in and utilizing foods. A part from that nutritional also known as a nourishing substance. (Medicine.Net.Com, 2008)

While according to Mosby Pocket Dictionary (2002), nutritional is describe as pertaining to the quality of food or eating behavior that provides nourishment through assimilation of food to tissue.

1.6.2 Nutrition

Nutrition is defined as the sum of the processes involve in the taking in of nutrients and their assimilation and use for proper body functioning and maintenance of health. A part from that it also been described as the study of food and drink as related to the growth and maintenance of living organism. (Mosby Pocket Dictionary, 2002)

1.6.3 Nutritional anemia

Nutritional anemia is defined as a disorder characterized by the inadequate production of hemoglobin or erythrocytes caused by a nutritional deficiency of iron, folic acid, or vitamin B12 or other nutritional disorders. (Mosby Pocket Dictionary, 2002).

1.6.4 Pregnancy

Pregnancy is the gestational process, comprising the growth and development within women of a new individual from conception through the embryonic and fetal periods to birth (Mosby Pocket Dictionary, 2002).

1.6.5 Anemia

Anemia is a condition where there is a decrease in hemoglobin in the blood to level below the normal range of 10-11 g/dL for pregnancy women (Jamaiyah et. al., 2007).

1.7 Significance of the Study

This study is conducted to identify factors contribute to anemia among pregnancy women in HUSM. Many studies had been done in Western an Asian countries about prevalence and risk of anemia in pregnancy mothers. From the study that had been done by Jamaiyah et al., (2007), showed the prevalence of anemia among pregnancy women in Malaysia is 35% (for Hb 11g/dL) and 11%(for Hb 10g/dL). While in Kelantan, study had been conducted by Zulkifli et al., (1997) found 4688 (47.5%) pregnancy women were having anemia. Mothers with anemia during pregnancy are vulnerable to many risks such as abortion, low birth weight, pre-term birth, pre-eclampsia, cerebral anoxia and postpartum hemorrhage. These complications can lead to mortality and morbidity among maternal and fetal. Therefore, it is very important to conduct this study in HUSM to identify factors contributing to anemia among pregnancy women which will help the mothers to increase their quality of life and in the same time number of mortality and morbidity among maternal and fetal can be reduce.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The purpose of this chapter is to analyze the previous studies conducted on factors contribute to anemia and its prevalence among pregnancy women. Many studies had been conducted by researcher from western countries and Asian to show how anemia in pregnancy can cause problems to maternal and fetal health. In this chapter, studies that had been conducted previously will be written back in summary which it will be a guideline and reference to conduct the study with the similar topic. From what have been discussed before, many researches had conducted research about prevalence of anemia and factors contribute to anemia among pregnancy women and its effects to maternal and fetal health.

2.2 Prevalence and Factors contributing to anemia among pregnancy women

2.2.1 Anemia

Anemia is one of the most frequent complications related to pregnancy. The mean minimum acceptable hemoglobin level during pregnancy by WHO criteria is taken to be 11g/dL in the first half of pregnancy and 10.5 g/dL in the second half of pregnancy. The World Health Organization further divide anemia in pregnancy into: mild anemia (hemoglobin 10-10.9g/dL), moderate anemia (Hb 7.0-9.9g/dL) and severe anemia (hemoglobin < 7g/dL) Normal physiologic changes in pregnancy affect the hemoglobin (Hb), and there is a relative or absolute reduction in Hb concentration (Sifakis & Pharmakides, 1990). The most common anemia is iron-deficiency anemia and folate deficiency megaloblastic anemia. These anemias are more common in women who

have inadequate diets and who are not receiving prenatal iron and folate supplements. A part from that, nutritional anemia is not a broad-based problem in the populations of developed countries. It is nevertheless a problem for many individuals in these countries, and it is certainly a major health problem in poor, underdeveloped countries (Sifakis & Pharmakides, 1990).

According to the study that been conducted by Jans, Daemers, de Vos, Largo-Jansen (2008), different ethnicity have different high risk of having anemia during pregnancy. A part from that, the researchers also state in his study that women with haemoglobinopathies (HbPs) also have a high risk of having anemia which many of them do not respond to the treatment. It is because HbPs can cause extreme or severe anemia among pregnancy women. Severe anemia has adverse effects on the mother and the fetus. There is also evidence that less severe anemia is associated with poor pregnancy outcome. Major maternal complications directly related to anemia are not common in women with a hemoglobin level greater than 6 gr/dl (Sifakis & Pharmakides,1990).

The Demographic and Health Survey (DHS), (2003), reported anemia prevalence in 400 pregnant women aged 15–49 years as 65%. The odds of being anemic were increased if women were iron deficient or had malaria parasitemia. This statement had been proven in other study which done by Adam, Khamis, Elbashir (2005). In their study, the researchers found women who were infected with falciparum malaria had a 4.5-fold higher risk of anemia than women without malaria. Several studies have reported malaria as a primary cause of anemia in pregnant women in other countries with unstable or stable malaria transmission. But, today there was a lower prevalence of malaria parasitemia and anemia, but a higher incidence of iron deficiency late in pregnancy. It is because the availability of free intermittent presumptive treatment or the

seasonal variations in malaria prevalence may explain the reduced incidence of malaria parasitemia and anemia late in pregnancy (Engmann, Adanu, Lu, Bose, Lozoff, 2008).

In other study that been conducted by Levy, Villapando, Rivera, Rodriguez, Cisneros, Monterrubio (2005), maternal anemia was found in their analysis to be associated with several pregnancy complications leading to Cesarean delivery. Such complications include previous placenta previa, placental abruption, labor induction and non-vertex presentation. A part from that, Levy et al., (2005) in their study also find out that Anemia was associated with high parity. It is because during pregnancy, the iron requirements of the pregnant woman are increased and unless these needs are met, anemia develops. Plasma volume increases disproportionately compared with red cell mass, resulting in physiological decrease in hematocrit. Blood volume expands by a mean of 50%, resulting in increased incidence of anemia.

Having anemia during pregnancy also can increase prenatal mortality. In a study of both low and high hemoglobin level in association with poor prenatal outcomes, Murphy, Scholl, Reilly, Adam (1986), found that prenatal mortality was higher in pregnant women with low hemoglobin levels (10.4 gydl) than in those with hemoglobin levels between 10.4 and 13.2 gydl during the first and second trimesters. In the present study, Xiong, Buekensb, Fraser, Guo (2003) found that prenatal mortality was slightly increased in women with anemia diagnosed during early pregnancy. Xiong et al., (2003) also found that anemia late in pregnancy was associated with a decreased risk of preterm birth or low birth weight. It is because the physiological fall in hemoglobin levels (or a normal plasma volume expansion) in the third trimester is postulated to be an explanation for this inverse association between anemia in late pregnancy and preterm birth and low birth weight. The plasma volume expansion is necessary in normal pregnancy. In fact, failure of plasma volume expansion (or high hemoglobin level) has been found to be associated with increased risk of various poor birth outcomes.

Therefore, the plasma volume expansion and consequent 'anemia' are associated with fewer preterm birth and low birth weight deliveries. Although anemia does not appear to play a role as pathogenic factor for adverse infant outcomes, anemia is associated with certain adverse maternal conditions such as pregnancy-induced hypertension and postpartum hemorrhage.

2.2.2 Pregnancy

Pregnancy is a state of carrying a developing embryo or fetus within the female body. Pregnancy lasts for about nine months, measured from the date of the woman's last menstrual period (LMP). It is conventionally divided into three trimesters, each roughly three months long. The first trimester that some women experience "morning sickness," a form of nausea on awaking that usually passes within an hour. The breasts also begin to prepare for nursing, and painful soreness from hardening milk glands may result. As the pregnancy progresses, the mother may experience many physical and emotional changes, ranging from increased moodiness to darkening of the skin in various areas. During the second trimester, the fetus undergoes a remarkable series of developments. Its physical parts become fully distinct and at least somewhat operational. In the third trimester, the fetus enters the final stage of preparation for birth. It increases rapidly in weight, as does the mother. As the end of the pregnancy nears, there may be discomfort as the fetus moves into position in the woman's lower abdomen. Edema (swelling of the ankles), back pain, and balance problems are sometimes experienced during this time period. Most women are able to go about their usual activities until the very last days or weeks of pregnancy, including non-impact exercise and work. During the final days, some feel too much discomfort to continue at a full pace, although others report greatly increased energy just before the birth. Pregnancy ends when the birth process begins (MedicineNet.com, 2008).

During pregnancy the plasma volume starts to increase at about 6 weeks of pregnancy in a healthy woman. This increasing, is disproportionately greater than the corresponding changes on the red cell mass, accounts for the physiologic fall in the Hb concentration during pregnancy. The increase in plasma volume is about 1,250 ml at term, a total increase of about 48% above the non pregnant state. This is the result of an initial rapid rise, followed by a slower rise after the 30th week of pregnancy. (Sifakis & Pharmakides,1990).

A part from that, pregnancy consists of a series of small, continuous physiologic adjustments that affect the metabolism of all nutrients. The adjustments undoubtedly vary widely from woman to woman depending on her pre-pregnancy nutrition, genetic determinants of fetal size, and maternal lifestyle behavior. Studies of protein and energy metabolism illustrate the potential of adjusting the use of those nutrients to conserve a fetal supply. Although pregnancy is a continuum of small physiologic adjustments, the changes are often grouped by period of gestation, the first and last halves, the 3 trimesters, or the 4 quarters of pregnancy. The first half of pregnancy is primarily a time of preparation for the demands of rapid fetal growth that occurs later in pregnancy. The corpus luteum and the placenta secrete hormones that maintain pregnancy and influence metabolism. Although fetal demand for nutrients occurs primarily during the last half of gestation when > 90% of the fetal growth occurs, adjustments in nutrient metabolism are apparent within the first weeks of pregnancy. The rapid rate of fetal growth during the last half of gestation dictates changes in basal metabolism, protein, and mineral accretions. About 60% of the increase in basal metabolic rate (BMR) occurs during the last half of gestation, when the metabolic cost of fetal tissue synthesis is the greatest (King, 2000).

2.3 Conceptual / Theoretical Framework

The concept of web causation model will be used in this study. The web causation is first mentioned in 1960 by Brian MacMahon, Thomas F. Pugh, and Johannes Ibsen (Kreger, 1994). Web causation is a metaphor that emphasizes the interconnectedness of the causal components in a population. In this concept, it focuses on direct causes and indirect causes. Direct causes are proximal to pathogenic events. Indirect causes are distal ("upstream") from pathological events. Levels of cause in a causal web may be classified as Macro-level (including social, economic, and cultural determinants), Individual-level (including personal, behavioral, physiological determinants) Micro-level (including organ system, tissue, cellular, and molecular determinants)

Causal components can be classified as agent, host, or environmental factors. Agents are biological, physical, and chemical factors whose presence, absence, or relative amount (too much or too little) are necessary for disease to occur. Host factors include personal characteristics and behaviors, genetic predispositions, and immunologic and other susceptibility-related factors that influence the likelihood or severity of disease. Environmental factors are external conditions other than the agent that contribute to the disease process. Environmental factors can be physical, biologic, or social in nature. Multiple agent, host, and environmental factors are viewed in interdependent ecological terms.

Over time, it is possible for causal and preventive factors to form an epidemiologic homeostasis. Epidemics may arise when the relative influence of factors are thrown out of balance. For example, an epidemic may arise from any of the following events such as introduction of a new agent into the population, increases in the ability of an agent to survive in the environment, increases in an agent's ability to infect the host (infectivity), increases in the ability of the agent to cause disease once inside the host (pathogenicity), increases in the severity of the disease caused by the agent once it has

established itself in the host (virulence), increases in the proportion of susceptible in the population environmental changes that favor growth and environmental changes the favor transmission of the agent and environmental changes that compromise host resistance. Causal forces can strengthen, weaken, or cancel-out each other, tipping the epidemiologic balance in favor of or against disease. This principal of epidemiologic balance applies to infectious and non-infectious agents and to various environmental and host factors (Disease and Causal Concept, 1994).

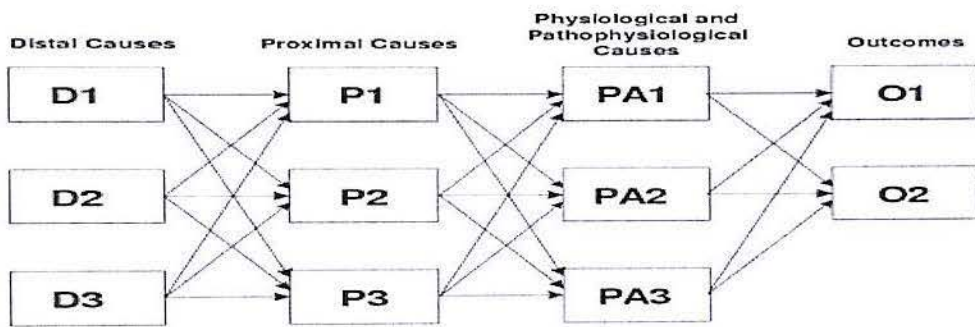


Figure 2.1: A causal-web illustrating various levels of disease causality (Disease and Causal Concept, 1994).

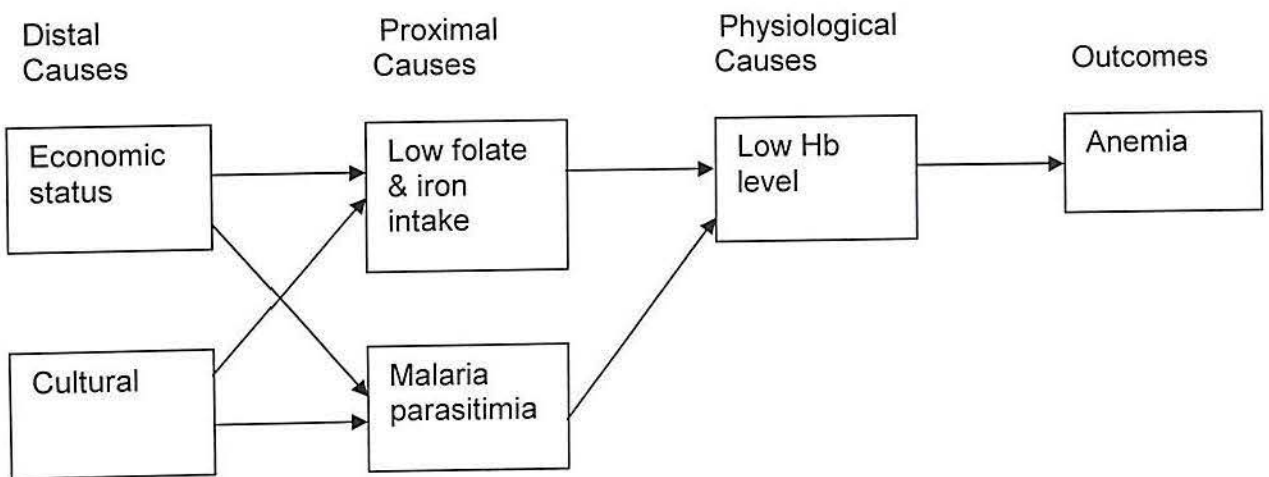


Figure 2.2: Example of a causal-web illustrating various levels of causality of anemia among pregnancy women

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Research Design

A cross-sectional and descriptive study was conducted using a self-administered questionnaire to identify factors contributing to anemia and its prevalence among pregnancy women in Hospital Universiti Sains Malaysia (HUSM).

3.2 Population and Setting

This study involved two places at Hospital Universiti Sains Malaysia (HUSM) Kubang Kerian. They were obstetric and gynecology (O&G) clinic and ward 2 Akik (antenatal ward).

3.3 Sample

3.3.1. Sample size

A convenience sample of 150 in Hospital Universiti Sains Malaysia (HUSM) is required to participate in the survey. The participants are pregnancy women with any duration of trimester.

$$\begin{aligned}n &= (Z\alpha / \Delta)^2 p (1-p) \\ &= (1.96 / 0.05)^2 0.11(1-0.11) \\ &= 150 \text{ people} + 10\% \text{ of drop out} \\ &= 165 \text{ people.}\end{aligned}$$

P = 11% (cut off point Hb <10g/dL in Jamaayah et. al., 2007)

α = 5% (0.05)

$Z\alpha$ = 1.96

Δ = \pm 5% (0.05)

The prevalence in this study was 11% (0.11) based on research about 'Anemia in pregnancy in Malaysia: a cross sectional study' which was done by Jamaayah et

al.,(2007). So, from this formula, the sample size for this study is 150 samples. However, due to time limitation only 55 respondents involved in this study

3.3.2 Sampling design

Type of samples used in this study is convenience samples.

3.3.3 Inclusion and Exclusion Criteria

Inclusion criteria

- Pregnancy women with any trimester
- Age 21-40 years old (Jamaiyah et al., 2007)
- Not having any chronic disease
- Volunteer of participant
- Able to read and write in Bahasa Malaysia

Exclusion criteria

- Women with medical illness
- Women who are in pain
- Unable to read and write in Bahasa Malaysia

3.4 Instrumentation

3.4.1 Instrument

Data is collected using self-reported questionnaires. This questionnaire contains three sections. Section A and section B are single choice item questionnaire where respondent were asked to make a best choice regarding to the question. Section A consist questions about demographic data which covers 5-item that includes age, educational level, household income, religion and ethnic. While section B consists questions about pregnancy and obstetric characteristic which covers 5-item that includes interval of the pregnancy, parity, gestational age and history of blood transfusion.

Section C is food frequency questionnaire (FFQ), a recently developed 38 – item, clearly defines 2 different types of food that contribute to anemia with photographs of reference meals to assist in determining serving sizes. The relative validity of the FFQ and recommended dietary allowances (RDA) will be compared to estimates the daily intakes of iron and folic acid of the respondent. Two models been used for estimating intakes from the FFQ, which differed in the assumptions underlying the intakes of infrequently consumed items.

3.4.2 Variables Measurement

Independent variables (X)

- X - Nutritional intakes
 - Socio-demographic data
 - Pregnancy intervals

Dependent variables (Y)

Y – Anemia

A. Demographic Data

The ordinal scale will be assign for ages are:

- <20 year old (1)
- 20-<30 year old (2)
- 30-<40 year old (3)
- ≥40 year old (4)

The ordinal scale will be assign for ethics are:

- Malay (1)
- Chinese (2)
- Indian (3)
- Others (4)

The ordinal scale will be assign for level of educations are:

- UPSR (1)
- PMR (2)
- SPM (3)
- STPM (4)
- Diploma (5)

Ijazah (6)

Others (7)

The ordinal scale will be assign for household incomes are:

≤RM1000 (1)

RM2000-RM3000 (2)

≥RM4000 (3)

The ordinal scale will be assign for religions are:

Islam (1)

Christian (2)

Buddha (3)

Hindu (4)

Others (5)

B. Obstetric and Pregnancy Characteristic

The ordinal scale will be assign for number of children are:

None (1)

1-4 children (2)

>4 children (3)

The ordinal scale will be assign for interval of pregnancy are:

1 year (1)

2 year (2)

3 year (3)

≥4 year (4)

The ordinal scale will be assign for gestational ages are:

Trimester 1: 12week (1)

Trimester 2: 12-<28 week (2)

Trimester 3: ≥28week

The ordinal scale will be assign for having blood donations for 3 month ago are:

Yes (1)

No (2)

C. Nutritional Intake

Nutritional intake will be measure by using Food Frequency Questionnaire (FFQ). In this questionnaire respondent will be ask on frequency of food (folic acid and iron food) been taken. Requirement intake of iron and folic acid for pregnancy women is

29mg/day. Therefore, to fulfill this requirement mothers need to take two food which rich in iron and one food which rich in folic acid everyday. There are two categories:

1. High intake of nutritional (1) - take 2 types of food which rich in iron and 1 food which rich in folic acid everyday.
2. Low nutritional intake (2) - take less than 2 types of food which rich in iron and 1 food which rich in folic acid everyday.

3.4.3 Validity

The questionnaire that will be used in this study has been validated before. For questionnaire in section A (demographic data) and B (pregnancy and obstetric characteristic) by Jamaiah et al., (2007). For questionnaire in section C (food frequency questionnaire) by Sakinah, (2009) .

3.4.4 Translation of Instrument

Questionnaire for section A (demographic data) and section B (pregnancy and obstetric characteristic) that been used in this study been translated into "Bahasa Malaysia". But for food frequency questionnaire (FFQ) is already in "Bahasa Malaysia" and been provided by Sakinah, (2009)

3.4.5 Reliability

Before collecting real data for this study, pilot study will be conducted for 10% of the samples.

Sample size (n) = 150

10% from sample = 0.1 (150)

= 15 people of pregnancy woman in HUSM

Pilot study will be done on 15 people of pregnancy woman in HUSM. Pilot study had been done for question C and cronbach's alpha was 0.91.

3.5 Ethical Considerations

Before research was to carry out a formal permission should be obtained from Research and Ethical Committee. A formal request letter was send to the hospital management granting the permission for the research to be conducted in Hospital Universiti Sains Malaysia (HUSM). The ethical issue was a concerned in this research is privacy and confidentiality. The respondent's identity in the questionnaires will not be mentioned or expose to protect and respect respondent's rights in personal identity. Researchers must not reveal the respondent's identity to protect them from unauthorized observer. Another ethical issue must been considered was volunteer participation of the respondents. Inform consent was given to the respondents before the research was conducted. Respondents had their rights to refuse from giving respond in the research. Before obtaining the permission from respondents to participate in the research, the respondents were informed about researcher's identity.

3.6 Data Collection Methods

Self administered questionnaire were used to collect data in this study. Respondents that met the criteria were invited to participate in this study. While, respondents whose did not meet the criteria were excluded. Before the questionnaire was distributed, inform consent was taken from the respondents who were involved in the study. Inform consent was evidence that respondents were volunteers to take part in the study. Then the questionnaire was distributed to the respondents which took about 10 minutes duration to be completed. Each of the respondents was being explained about the purpose of the study that was conducted. Researcher was always with the

respondents during the data collection. It is because researcher could give explanation about the questions if respondents did not understand. Data had been collected from

3.6.1 Flow Chart of Data Collection

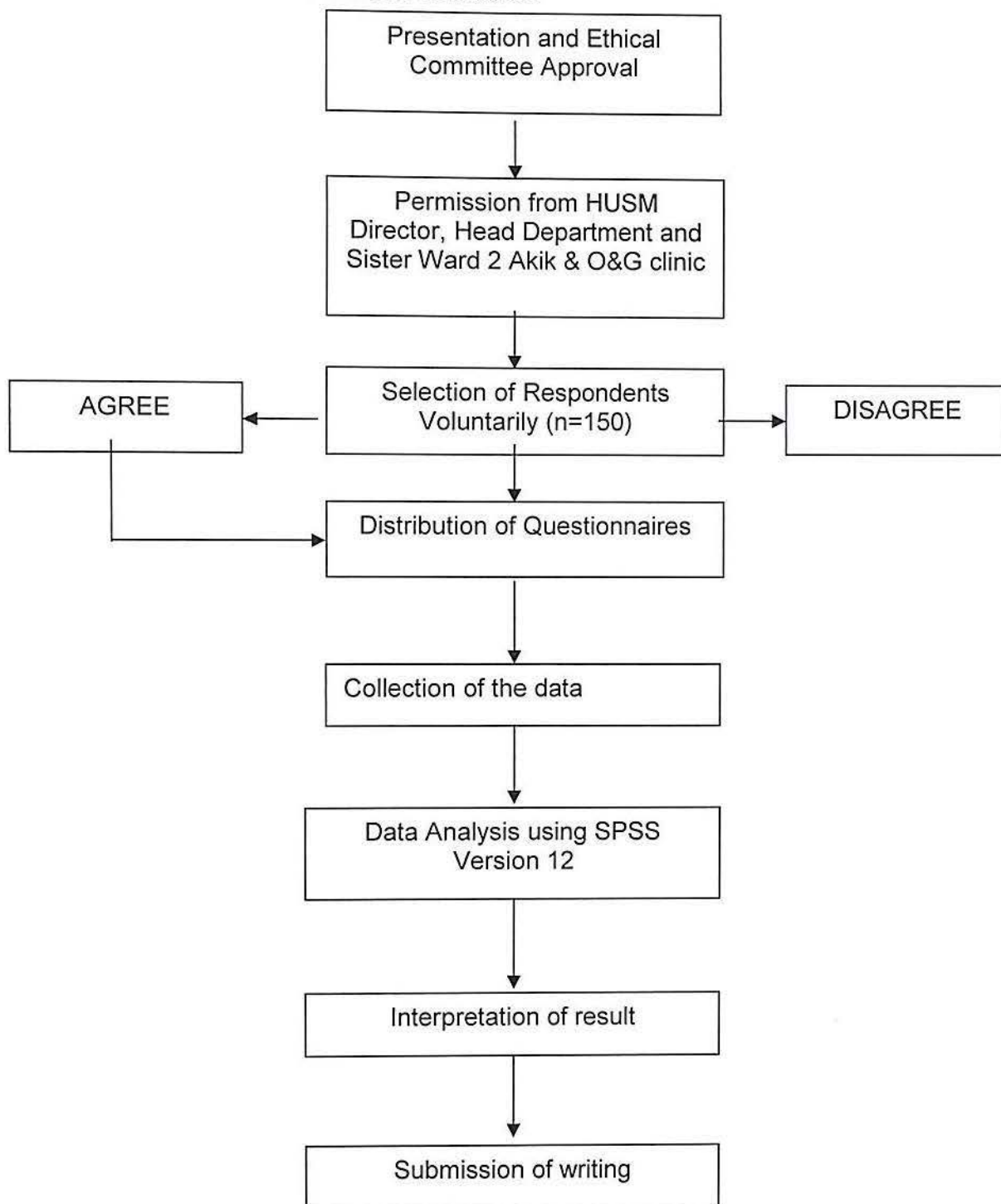


Figure 3.6: Flow Chart of Data Collection

3.7 Data Analysis

The data was analyzed by using the Statistical Package for the Social Sciences (SPSS) version 12.0 software. Chi-square test was used to estimate the association of covariates on hemoglobin levels. The questionnaire included social demographic data, pregnancy and obstetric characteristic and nutritional intake. The significant p value was <0.05 . Descriptive statistics was used to calculate frequency and percentage for all respondents for each respective index.

CHAPTER 4

ANALYSIS RESULT

A total sample for the study was 150 pregnancy mothers. But, only 58 pregnancy mothers enrolled in the study and 3(5.2%) after enrollment was excluded due to incomplete data, leaving 55 pregnancy mothers.

4.1 Data Demographic

Table 4.1 describes the frequencies and percentages of demographic data among respondents. Majority of the respondent aged were 20-<30 year old 25(45.5%). While only 7(12.7%) respondents age above than 40. From the table, it showed the number of respondent with primary and secondary education was 28(50.9%) compare to higher education which is only 27 (49.1%). There was only a small different of percentage between primary and secondary education with higher education. The different was only 1.8%. Majority income of the respondents enrolled in the study were between RM2000-RM3000 31(56.4%) and followed by less than RM 1000 16(29.1%). Only 8(14.5%) respondents had income above RM4000. All the respondents enrolled in the study were Malay 55(100%) and Muslim 55(100%).

Table 4.1: Percentage and Frequency of demographic data of respondents (n=55)

Variables	f (%)
Age	
20-<30	25(45.5)
30-<40	23(41.8)
≥40	7(12.7)
Ethnic	
Malay	55(100)

Cont. Table 4.1

Variables	f (%)
Education	
Primary and secondary	28(50.9)
Higher education	27(49.1)
Religion	
Islam	55(100)

4.2 Obstetric and Pregnancy Characteristic

Table 4.2 describes the frequency and percentage of obstetric and pregnancy characteristic among respondents. Most respondents had children between 1-4 persons 32(58.2%) and 18(32.7%) respondents were primgravida. Only 5 (9.1%) of the respondents had children more than 4 persons. A total 11 (20%) pregnancy mothers were enrolled at second trimester of pregnancy (less 28 week of pregnancy), while 44 (80%) pregnancy mothers enrolled at third trimester of pregnancy (more than 28 week). In the study, there were only two categorized of interval of pregnancy. There was more than two year or less than two year. Approximately 50.9% of respondents were having birth spacing less than two year. While only 40.1% were having birth spacing more than two year. All the respondents 55(100%) enrolled in the study did not have history of blood donation for three month ago.

Table 4.2: Percentage and Frequency of Obstetric and Pregnancy Characteristic (n=55)

Variables	f (%)
Children	
0	18(32.7)
1-4 person	32(58.2)
>4 person	5(9.1)
Interval of pregnancy	
<2 year	28(50.9)
>2 year	27(49.1)