AWARENESS AND PRACTICE OF ANEMIA PREVENTION AMONG ANTENATAL WOMEN IN HOSPITAL UNIVERSITI SAINS MALAYSIA

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SCHOOL OF HEALTH SCIENCES

UNIVERSITI SAINS MALAYSIA

2022

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by

SITI SYAKIRAH BINTI MOHD ASRI

Dissertation submitted in partial fulfillment

of the requirement for the degree

of Bachelor of Nursing (Honours)

July 2022

CERTIFICATE

This is to certify that the dissertation entitled 'Awareness and Practice of Anemia Prevention Among Antenatal Women in Hospital Universiti Sains Malaysia' is the bona fide record of research work done by Ms. Siti Syakirah binti Mohd Asri during the period from October 2021 to July 2022 under my supervision. I have read this dissertation, and in my opinion, it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation to be submitted in partial fulfilment for the degree of Bachelor of Nursing (Honours).

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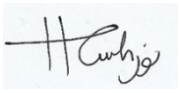

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DECLARATION

I hereby declare that this dissertation is the results of my investigations, except where otherwise stated and duly acknowledged. I certify that this dissertation has not been previously submitted for a degree or diploma in any university or other institution and does not contain any material previously published or written by another person except where due reference is made in the text. I grant Universiti Sains Malaysia the right to use this dissertation for teaching, research and promotion purposes.

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ACKNOWLEDGEMENT

Thanks God for the Blessing who has given me the strength and patience to complete this dissertation successfully. First of all, I would like to dedicate my dissertation to both of my supervisors, Mrs. Duangta Shet and Dr. Norhasmah Mohd Zain for spending their invaluable time and tremendous support in guiding, supervising and encouragement throughout the process until the completion of the dissertation.

Next, I would like to express my deep gratitude towards all the respondents for their willingness to participate in this research and cooperation in complete the questionnaire. Also, thanks to all my friends for their on-going support and motivation during this challenging and hard times in completing this dissertation especially to my final year project teammate, Ms. Izzah Asri.

Special thanks to my beloved family for their spiritual support to encourage me to complete this dissertation especially to my parents, Mohd Asri bin Alias and Norazlina binti Jamaluddin who endured this process with me and gave me fully financial support to me. Not forgetting my roommate, Izzah Zaidi, and my beloved friend Izzat Zaharuddin who gave me the strongest motivation and encouragement to complete this dissertation.

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LIST OF ABBREVIATION

USM	Universiti Sains Malaysia
SPSS	Statistical Package Social Science
WHO	World Health Organization
O&G	Obstetrics and Gynecology
HIV	Human Immunodeficiency Virus

Kesedaran dan Amalan Pencegahan Anemia dalam Kalangan Wanita Antenatal di Hospital Universiti Sains Malaysia

ABSTRAK

Anemia adalah masalah kesihatan awam global yang serius yang memberi kesan terutamanya kepada kanak-kanak kecil dan wanita hamil. Ia merupakan penyumbang besar kepada kematian ibu bersalin. Pertubuhan Kesihatan Sedunia (WHO) menganggarkan 40% wanita hamil di seluruh dunia mengalami anemia. Kajian ini bertujuan untuk mengetahui tahap kesedaran dan amalan pencegahan anemia dalam kalangan wanita antenatal. Kajian keratan rentas telah dijalankan di wad obstetrik dan Klinik Obstetrik dan Ginekologi Hospital Universiti Sains Malaysia dari April hingga Mei 2022. Seramai 106 peserta telah dipilih melalui persampelan mudah dan data dikumpul menggunakan soal selidik yang dikendalikan sendiri dan dianalisis secara statistik menggunakan perisian SPSS versi 26.0. Ujian korelasi Pearson dan Pearson Chi-Square digunakan untuk analisis data. Keputusan menunjukkan tahap kesedaran anemia dalam kalangan wanita antenatal adalah sederhana (n=43, 40.6%) dan majoriti mempunyai amalan pencegahan anemia yang tinggi (n= 105, 99.1%). Kajian menunjukkan bahawa tidak terdapat perkaitan yang signifikan antara kesedaran dan amalan pencegahan anemia. Kajian juga mendedahkan bahawa tidak terdapat perkaitan yang signifikan antara data demografi dan amalan pencegahan anemia. Kesimpulannya, wanita antenatal umumnya kurang kesedaran terhadap anemia. Terdapat keperluan untuk pendidikan awam dalam menyediakan maklumat tentang anemia semasa kehamilan, sekali gus mengurangkan risiko kematian ibu dan bayi.

Awareness And Practice of Anemia Prevention Among Antenatal Women in Hospital Universiti Sains Malaysia

ABSTRACT

Anemia is a serious global public health problem that particularly affect young children and pregnant women. It is a huge contributor to maternal mortality. The World Health Organization (WHO) estimates that 40% of pregnant women worldwide are anaemic. This research aimed to determine the level of awareness and practice of anemia prevention among antenatal women. A cross-sectional study was conducted in the obstetrics ward and Obstetrics and Gynecology Clinic of Hospital Universiti Sains Malaysia from April to May 2022. A total of 106 participants was conveniently selected and data were collected using structured self-administered questionnaire and analyzed with the Statistical Package of the Social Sciences version 26.0. Pearson's correlation test and Pearson Chi-Square was used for data analysis. Result showed that the level of awareness of anemia among antenatal women was moderate (n=43, 40.6%) and the majority have high practice of anemia prevention (n= 105, 99.1%). The study showed no significant association between awareness and practice of anemia prevention. The study also revealed no significant association between demographic data and the practice of anemia prevention. In conclusion, antenatal women generally lack of awareness towards anemia. There is a need for public education to provide information about anemia in pregnancy, thus decreasing the risk of maternal and neonatal mortality and morbidity.

CHAPTER 1 INTRODUCTION

1.1 Background of the Study

Anemia is a serious global public health issue that disproportionately affects children under the age of five and pregnant women. According to the World Health Organization, 42 percent of children under the age of five and 40 percent of pregnant women are anemic worldwide. Although the global prevalence of anemia decreased from 33 percent to 29 percent among non-pregnant women and from 43 percent to 38 percent among pregnant women between 1995 to 2011, it remains a major public health threat that requires immediate attention in order to meet one of the six recent Global Nutrition Targets of reducing anemia by 50 percent in women of reproductive age by 2025 (WHO, 2012). Besides, among pregnant women in Malaysia, 80 to 90 percent have low iron status while 38 to 42 percent develop anemia (Milman, 2015).

Anemia can affect people at any stage of their lives, but it is more common during pregnancy due to increased iron requirements, physiological demands, blood loss, and infections (Abriha et al., 2014). Anemia occurs when the number of red blood cells or hemoglobin concentration within them is lower than normal. Hemoglobin is required to transport oxygen, and a few or abnormal red blood cells, or not enough hemoglobin, will reduced the blood's capacity to carry oxygen to the body's tissues. Symptoms includes lethargy, weakness, dizziness, and shortness of breath (WHO, 2021). The most prevalent cause of anemia in pregnancy is iron deficiency. These types of anemia develop when the body does not have enough iron to produce enough hemoglobin. That is a red blood cell protein. It is responsible for transporting oxygen from the lungs to the rest of the body (WebMD, 2021).

Nutritional deficiencies, primarily iron deficiency, though deficits in folate, vitamins B12 and vitamin A are also important causes of haemoglobinopathies and infectious illnesses, such as malaria, tuberculosis, HIV, and parasitic infections, are among the most common causes of anemia (WHO, 2021). In addition, iron deficiency anemia is linked to poor reproductive outcomes in pregnant women, including preterm birth, low-birth-weight newborns, and lower iron storage in neonates, which can contribute to developmental delays. Failure to address anemia could affect the health and quality of life of millions of mothers, as well as their children's development and learning. Therefore, anemia is a sign of poor nutrition as well as bad health (Teshale et al., 2020).

1.2 Problem Statement

Anemia in women of reproductive age is a major public health issue in low- and middle-income nations, with long-term consequences on the health of women, their children, and the economic growth of society. Despite the World Health Organization's objective of a 50 percent reduction in worldwide anaemia among women of reproductive age by 2025, with present trends, this goal is unlikely to be met (Teshale et al., 2020). Besides, severe anaemia (>7 g/L) has been associated with serious maternal and foetal problems during pregnancy. Preterm birth, low birth weight, intrauterine foetal death, neonatal death, maternal mortality, and infant mortality are all increased by it (Osman et al., 2020). Moreover, despite a national health policy of frequent iron supplementation and intermittent anti-malarial medication treatment for malaria, maternal anemia remains a leading cause of morbidity and mortality (Ademuyiwa et al., 2020).

Furthermore, iron deficiency anemia awareness is strongly tied to a community's educational and social status, and it has been observed to increase through time due to increased exploration and access to media and health care facilities. Compared to older women, younger women are more concerned about their health and are more cautious

about the dietary needs of their unborn children (Hussain & Shu, 2010). According to the Ministry of Health in Malaysia, 14.2 percent of pregnant women in Putrajaya had anemia during 36 weeks of pregnancy in 2014. The proportion was higher than the Malaysian Ministry of Health's goal of 11.8 percent for the prevalence of anemia in pregnant women set in 2014 (Ministry of Health Malaysia, 2016).

The only way to prevent maternal death from anemia is by early detection and effective management, as well as creating awareness and health education (Balasubramanian et al., 2016). A cross-sectional study was conducted among antenatal women in South Ethiopia regarding the awareness of anemia in pregnancy, and the author reported that among 244 respondent, only 44.3 percent respondent have comprehensive awareness of anemia (Tadesse et al., 2017). Meanwhile, in Malaysia, there is a lack of published data to assess anemia in pregnancy awareness and practice of anemia prevention. Thus, this study is crucial to assess awareness and practice of anemia prevention in among antenatal women in Hospital Universiti Sains Malaysia.

1.3 Research Questions

i. What is the level of awareness of anemia among antenatal women in Hospital Universiti Sains Malaysia?

ii. What is the level of practice of anemia prevention among antenatal women in Hospital Universiti Sains Malaysia?

iii. Is there any association between awareness and practice of anemia prevention among antenatal women in Hospital Universiti Sains Malaysia?

iv. Is there any association between selected demographic variables (age, ethnicity, educational status, occupational status, household income) and practice of anemia prevention among antenatal women in Hospital Universiti Sains Malaysia?

1.4 Research Objectives

1.4.1 General Objective

To determine the awareness of anemia, practice of anemia prevention and factor associated with anemia prevention practices among antenatal women in Hospital Universiti Sains Malaysia

1.4.2 Specific Objectives

i. To assess the level of awareness of anemia among antenatal women in Hospital Universiti Sains Malaysia

ii. To assess the level of practice of anemia prevention among antenatal women in Hospital Universiti Sains Malaysia

iii. To examine the association between awareness and practice of anemia prevention among antenatal women in Hospital Universiti Sains Malaysia

iv. To determine the association between selected demographic variables (age, ethnicity, educational status, occupational status, household income) and the practices of anemia prevention among antenatal women in Hospital Universiti Sains Malaysia

1.5 Research Hypothesis

H_{O1}: There is no significant correlation between awareness and practice of anemia prevention among antenatal women in Hospital Universiti Sains Malaysia

H_{A1}: There is a significant correlation between awareness and practice of anemia prevention among antenatal women in Hospital Universiti Sains Malaysia

H_{O2}: There is no significant association between selected demographic variables (age, ethnicity, educational status, occupational status, household income) and practice of anemia prevention among antenatal women in Hospital Universiti Sains Malaysia

H_{A2}: There is a significant association between selected demographic variables (age, ethnicity, educational status, occupational status, household income) and practice of anemia prevention among antenatal women in Hospital Universiti Sains Malaysia

1.6 Definition of Operational Terms

The terms used in this research thesis is referring to the definition below:

1. **Awareness**

   Awareness refers to the state or level of consciousness and knowledge or perception of a situation or fact (Oxford Learner's Dictionary, 2021). This study refers to antenatal mother's awareness in anemia in pregnancy.

2. **Prevention**

   Prevention means an action that taken to decrease the chance of getting a disease or condition (Merriam-Webster, 2021). In this study, it refers to the prevention that pregnant women take from getting the anemia.

3. **Anemia**

   According to World Health Organization, anemia occurs when the quantity of red blood cells or the concentration of haemoglobin within them is lower than usual. Haemoglobin is required to transport oxygen, and if there are a few malformed red blood cells or not enough haemoglobin, the blood's capacity to transport oxygen to the body's tissues will be reduced (WHO, 2021)

4. **Antenatal Women**

   Pregnant women undergo a time of physical and physiological preparation for birth and parenthood, including prenatal health care during their pregnancy (Lowdermilk, 2013). In this study, antenatal women from antenatal ward and Obstetrics and Gynecology Clinic in Hospital Universiti Sains Malaysia aged more than 19 years old were selected as the respondents.

1.7 Significance of the Study

Anemia is one of the most frequent complications related to pregnancy. Severe anemia may develop a risk for the baby as an infant. People with anaemia are more likely to give birth prematurely or with a low-weight baby. Anemia makes it more difficult to fight infection since it raises the danger of blood loss during birth (Geng C., 2021). Anemia in pregnant women is still a serious and difficult health problem in Malaysia. We know the causes of anaemia and how to treat it, thus efforts should be focused on improving the implementation of early oral iron and vitamin prophylaxis, early anaemia diagnosis, and boosting women's low compliance with prophylactic programmes (Milman, 2015).

This study determined the level of awareness and practice of anemia prevention among antenatal women in Hospital Universiti Sains Malaysia. This topic is crucial since anemia in pregnancy can give a bad impact to the mother and baby and also increase the rate of morbidity and mortality among women. This study can be benefit because the finding from this research can contribute updated of awareness and prevention of anemia in pregnancy. On the other hand, this study’s finding can be used as a baseline and references for future research.

CHAPTER 2 LITERATURE REVIEW

2.1 Introduction

This chapter reviews the current literature related on awareness and prevention among antenatal women in Hospital Universiti Sains Malaysia by credited scholars and researchers. This chapter provides information about anemia in pregnancy, including its definitions, types, complications, prevention and treatment of anemia in pregnancy. It also provides an overview of the epidemiology and global impact of anemia in pregnancy respectively. Finally, this chapter also detailed the conceptual framework chosen for the study.

2.2 Anemia in Pregnancy

According to the World Health Organization, anemia occurs when the number of healthy red blood cells or hemoglobin level and thus their oxygen-carrying capacity is insufficient to meet the body's physiologic needs (WHO, 2021). The hemoglobin concentrations mention by WHO are 12.0 g/dL in women of reproductive age, 11.0 g/dL in pregnant women in the first and third trimesters, and 10.5 g/dL in the second trimester (Milman, 2015). Iron deficiency anemia is linked to poor reproductive outcomes in pregnant women, including preterm birth, low-birth-weight newborns, and lower iron storage in neonates, which can contribute to developmental delays. Failure to address anemia could affect the health and quality of life of millions of mothers, as well as their children's development and learning (WHO, 2021).

There are several causes of anemia in pregnancy which is iron deficiency anemia, folate deficiency anemia and vitamin B12 deficiency (WebMD, 2021). Iron deficiency anemia occur when the body does not have enough iron to produce adequate amount of hemoglobin. Therefore, causes the blood not to carry enough oxygen to tissue throughout the body. Usually, ferrous sulfate 325 mg orally once a day was given to pregnant mothers

to treat iron deficiency. Then, folate deficiency anemia means that pregnant mother does not get enough folates from their diet. Folate deficiency occur in 0.5 to 1.5 percent of pregnant women (Friel, 2021). During pregnancy, women need extra folates to produce new cells, including healthy red blood cells. Folate are vitamin found naturally in certain foods such as green leafy vegetables. Manmade folate supplements are folic acid, which is 1 mg twice daily. Folate deficiency has been linked to neural tube anomalies which is spina bifida and low birth weight, among other birth problems. Lastly, vitamin B12 deficiency is needed to form a healthy red blood cell. Pregnant mothers can prevent vitamin B12 deficiency by eating meat, poultry, dairy products and eggs (WebMD, 2021).

Anemia is a condition that almost all pregnant women experience. That is because they need more iron and folic acid than usual. But the risk is higher when pregnant women with two pregnancies close together, pregnant with multiples, which means more than one child, vomit a lot because of morning sickness and pregnancy at a teenage age. Furthermore, the symptoms of anemia during pregnancy are feeling tired or weak, shortness of breath, pale skin, lips and nails and rapid heartbeat. For the early stage of anemia, there are no obvious symptoms. Not all the symptoms might be anemic as long as pregnant mother get routine blood tests during prenatal appointments (WebMD, 2021).

2.3 Awareness of Anemia in Pregnancy

Regarding the awareness of anemia, among 244 respondents, only 44.3 percent of the women are aware of anemia while 55.7 percent has poor comprehensive awareness of anemia (Tadesse B, et al., 2017). Then, the study on knowledge, attitude and practices of prevention in pregnancy among pregnant women in the Antenatal Clinic at Ifako-Ijaiye General Hospital, Lagos, Nigeria conforms to the present study in their finding of a majority which is 95 percent of respondents being aware of anemia in pregnancy (Yesufu et al., 2013). Furthermore, in the study by Naresh & Shantini (2016), among 316 pregnant

women, only 39.87 percent of the participants were of aware and understood anemia. A study about awareness of anaemia during pregnancy among pregnant women attending a health facility in District Srinagar shows that among 110 participants, 32 percent were aware of the anemia symptoms. In contrast, 69 percent were not aware of it (Nelofar, 2018).

Most women were aware that iron was included in their diet and that it was important for their health. Women with children and those from the working group knew more about iron deficiency anemia. Iron deficiency anemia awareness is strongly tied to a community's educational and social status, and it has been observed to increase over time due to increased exploration and access to media and health care facilities. Compared to older women, younger women are more concerned about their health and are more cautious about the dietary needs of their unborn children (Hussain & Shu, 2010). In a study conducted in a general hospital in Lagos, although the majority of the respondents which is 95 percent were aware of anemia in pregnancy, the average knowledge score was only 56.5 percent. Less than half of 46.3 percent of the respondents thought that contraceptives could help prevent anemia in pregnancy by reducing closely spaced pregnancies (Yesufu et al., 2013).

Anemia awareness is often poor among pregnant women accessing antenatal care services at South Ethiopia, as pregnant women have less than average awareness about anemia. For example, uneducated, unemployed pregnant women with only one antenatal care visit had a low awareness of anemia. Women of childbearing age, and pregnant women in particular, should be educated about the dangers of anemia during pregnancy (Tadesse et al., 2017). Although the majority of women recognize the importance of iron supplements in their diet, there are still some who do not see any benefits from taking them, which could be due to their high cost, a lack of education and counselling provided

by community elders and health practitioners, or a combination of these factors (Hussain & Shu, 2010).

2.4 Practice of Anemia Prevention in Pregnancy

A study was done to assess pregnant women's knowledge and practice about anemia prevention in government hospitals in Ethiopia. According to the findings, among 286 pregnant women, only 57.3 percent and 50 percent of them had adequate understanding and bad practice, respectively, when it came to preventing anemia during pregnancy (Daka et al., 2018). Next, a descriptive study was carried out to evaluate knowledge, attitude and practice regarding the prevention of iron deficiency anemia among pregnant women attending primary health centres in the Tabuk region, the results show that 40 percent of the respondents had a poor practice score regarding the prevention of iron deficiency anemia (Aboud et al., 2019).

In the study of awareness and prevention of anemia among pregnant women attending antenatal clinic at a University Teaching Hospital in Nigeria Iyabo, the results show that among 182 respondents, 73.8 percent had a good overall practices of prevention of anemia in pregnancy (Ademuyiwa et al., 2020). On the other hand, in a study of knowledge and practice of mothers regarding the prevention of anemia during pregnancy, in a teaching hospital, Kathmandu, Ghimire, & Pandey., (2013) found that only 48.7 percent of mothers have adequate knowledge and 34 percent of study participants have good practiced regarding prevention of anemia during pregnancy. Next, from the study by (Appiah et al., 2020) that was conducted to assess the knowledge and adherence to anaemia prevention strategies among pregnant women attending antenatal care facilities in Juaboso District in Western-North Region, Ghana, among 598 participants, only 39.1 percent of the pregnant women were fully adhering to anemia prevention strategies.

In Tanzania, a study by Margwe & Lupindu, (2018), to examine the knowledge and attitude of pregnant women on the prevention of anemia was done on 354 pregnant women. According to the findings, 38 percent of pregnant women had an unfavorable attitude toward controlling and preventing anemia during pregnancy, whereas 31 percent had a neutral or good attitude. Primary iron deficiency prevention anemia treatment focuses on increasing iron intake through a well-balanced diet that contains both animal and vegetable and cereal sources of iron. Furthermore, Vitamin C enhances nutritional absorption while tannins (tea and coffee), phytates (legumes and cereals), and calcium decrease it (Vosnacos & Pinchon, 2015). Oral iron supplements are used as a second-line treatment. There is no consensus on the best oral iron supplementation dose, general versus focused treatment, or even daily versus intermittent versus no oral iron supplementation at all (Pavord, Myers, Robinson, Allard, & Oppenheimer., 2016)

2.5 Factor associated with the practice of anemia prevention

Educational status, living in an urban setting, having a nuclear family, having a previous history of anemia, and good practice were all significantly associated with knowledge. At the same time, educational status and good knowledge were significantly associated with anemia prevention (Ademuyiwa et al., 2020). Strengthening anemia prevention in health education during antenatal care follow-up and creating of a pamphlet that outlines symptoms, risk factors, and measures to prevent anemia. Private health care facilities should raise societal knowledge about the dangers of anemia during pregnancy (Daka et al., 2018). Other than that, eating nutritionally adequate diets and protein-rich foods were evaluated for anemia treatment and prevention, as well as intake of iron supplements and multivitamins as preventive and treatment alternatives (Serbesa, 2019).

A study on factors influencing the use of anemia on prevention measures among antenatal clinic attendees in the Kintampo North Municipality, Ghana, showed that high

socioeconomic position, frequent periodic shortages, and late clinic attendance have all been associated to the use of anemia prevention strategies. Other factors are frequency of subsequent visits, parity, gestational age at the first visit, educational background, facility, and health education. Employment status is known to be associated with anemia prevention measures among pregnant women in most studies (Lumor et al., 2019). A previous study in Western Region of Ghana regarding the knowledge of pregnant women on the factors that influence anemia in pregnancy demonstrated an association between women's education and awareness about the causes of anemia, prevention and treatment of anemia, and anemia preventative practices (Konlan et al., 2020).

2.6 Theoretical Framework

The Health Belief Model (HBM) connects concepts, empirical data, and relevant theories to improve and systematize knowledge about linked concepts or concerns. It is crucial role in locating the research and illustrating it with a figure. It establishes significant knowledge bases that lay the foundation for the importance of problem formulation and research topics (Rocco & Plakhotnik, 2009). The HBM was adopted in this study to explore the health behaviors among antenatal women based on their understanding and health-related action toward anemia.

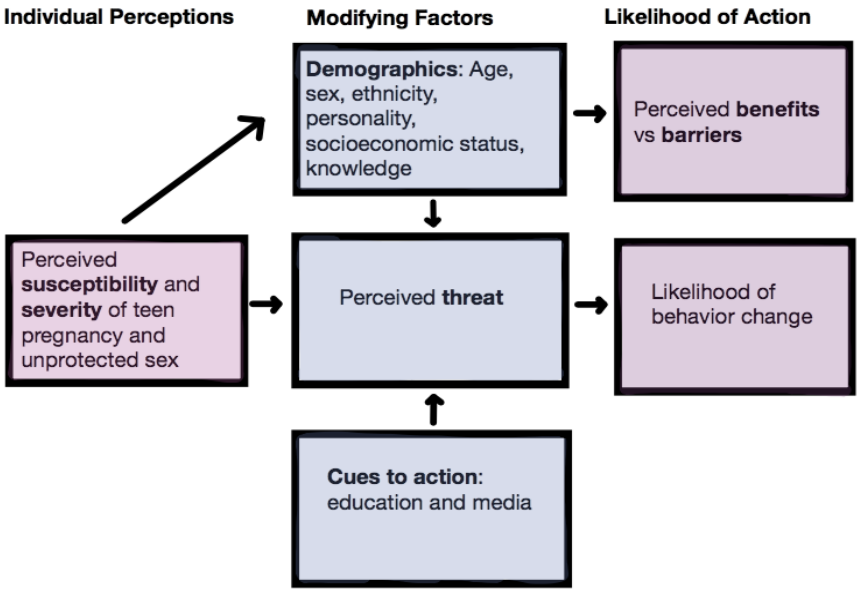

Figure 2.1 Health Belief Model adapted from Glanz, Rimer & Lewis (2002)

In the 1950s, public health researchers in the United States began constructing psychological models to improve the efficacy of health education programs. Demographic factors such as socioeconomic level, gender, ethnicity, and age have long been linked to preventative health-related behavior patterns such as patterns of behavior that predict disparities in morbidity and death, and differential health-care utilization (Rosenstock, 1974). Furthermore, it is the most commonly used in health education and health promotion (Glanz, Rimer, & Lewis, 2002). In HBM, four constructs are included, which are perceived severity, perceived susceptibility, perceived benefits and perceived barriers.

Perceived susceptibility is a belief about getting a disease or condition. It causes the adoption of prescribed health behaviors. The greater the risk to be perceived, the higher the chance of behavior change. In perceived severity, people believe about the seriousness of the condition, or leaving it untreated and its consequences. Next, perceived benefits are a belief about the potential positive aspects of health action. Perceived

benefits can help to lessen the threat that a health behavior poses. For the perceived barriers, people believe about the potential negative aspects of particular health action. Perceived barriers impede health behaviours. Benefits minus barriers support health behaviour change (Abraham & Sheeran, 2014).

Figure 2.2 shows the adapted Theory of Health Belief Model within this study. This conceptual framework explained the readiness of antenatal women to change health-related beliefs through obtaining awareness and participation in antenatal care and prevention programs regarding anemia.

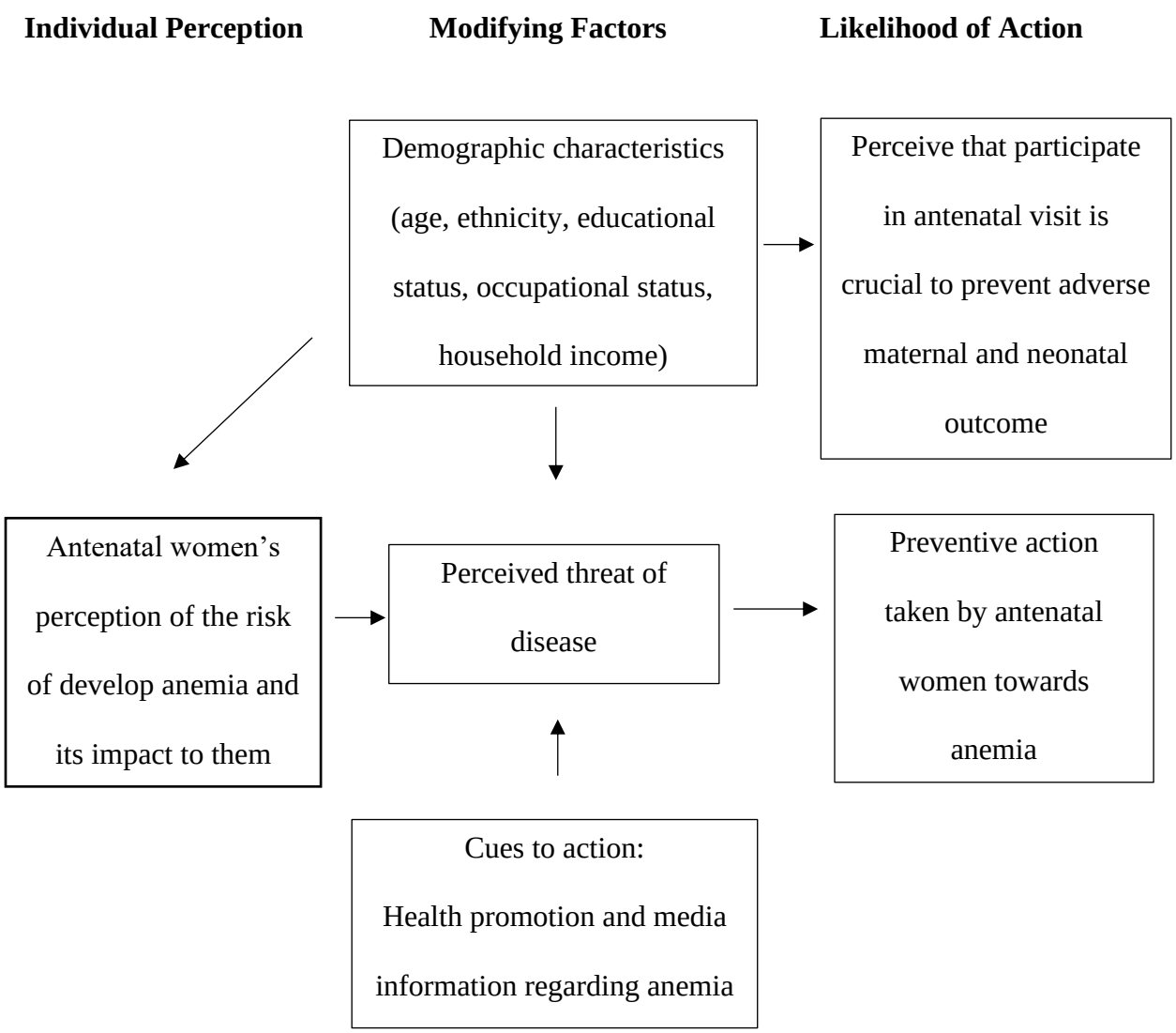

Figure 2.2 The adopted theory of Health Belief Model (HBM)

CHAPTER 3 METHODOLOGY AND METHODS

3.1 Introduction

This chapter explained and justified the approach and rationale used to support the chosen research methodology. A flow chart of the course was provided within this report. Along with the procedures and approach used, the actual process of carrying out the study had also been described, such as research design, population and study setting, sample and sample selection. It also detailed ethical considerations and the method used in the analysis.

3.2 Research Design

The research design selected for this study was a cross-sectional study using a questionnaire to assess the level of awareness and practice of anemia prevention among antenatal women in Hospital Universiti Sains Malaysia.

3.3 Study Setting and Population

To propose the objective of the study, the research location is at Antenatal Clinic and Antenatal Ward Hospital Universiti Sains Malaysia. The research duration of this study was from October 2021 until July 2022. The target population were antenatal women in HUSM that fulfilled inclusion and exclusion criteria.

3.4 Sampling Plan

3.4.1 Subject criteria – Inclusion and exclusion criteria

Inclusion criteria

Subjects were eligible for inclusion in this study if they were antenatal women:

- Antenatal
- Aged 19 and above
- Able to understand, speak and write in English or Bahasa Melayu

Exclusion criteria

Subjects were excluded from this study if they were antenatal women:

- Had a history of low hemoglobin (Hb)
- Diagnosed with thalassemia

3.4.2 Sampling Plan Estimation

For the first and second objectives, the sample size was calculated using single proportion formula:

$$n = \left[\frac{Z}{\Delta}\right]^2 p\ (1 - p)$$

Where,

n = minimum required sample size

Z = 95% confidence interval (CI) = 1.96

Δ= precision = 0.10

P **=** anticipated population proportion

For third and fourth objectives, the sample size was calculated using two proportion formula:

$$n = \frac{p_1(1-p_1) + p_2(1-p_2)}{(p_1-p_2)^2}(z_{a+}z_b)^2$$

Where,

n = required sample size

$\mathbf{Z_a}$ =1.96 (a= 0.05)

$\mathbf{Z_b}$ = 0.84 (80% power)

P **=** anticipated population proportion

Table 3.1 Sampling Plan Estimation

	***P*-estimate proportion**	***n***	**Drop out 10%**
Objective 1: To assess the level of awareness of anemia among antenatal women in Hospital Universiti Sains Malaysia	**P = 0.765** Refers to awareness of anemia among pregnant women and impact of demographic factors on their haemoglobin status (Balasubramanian et al., 2016)	69	76
Objective 2: To examine the level of prevention of anemia among antenatal women in Hospital Universiti Sains Malaysia	**P = 0.5** Refers to assessment of knowledge and practice towards prevention of anemia among pregnant women attending antenatal care at Government Hospitals in West Shoa Zone, Ethiopia (Daka et al., 2018).	96	106
Objective 3: To examine the association between awareness and practice of anemia prevention among antenatal women in Hospital Universiti Sains Malaysia	**P_1 –** Good awareness that had good practice on the anemia prevention = 0.669 **P_2** – Poor awareness that had good practice on the anemia prevention = 0.331 Refers to awareness and prevention of anemia among pregnant women attending antenatal clinic at a University Teaching Hospital in Nigeria (Ademuyiwa et al., 2020)	34	38
Objective 4: To determine the association between selected demographic variables (age, ethnicity, educational status, occupational status, household income) and practice of anemia prevention among antenatal women in Hospital Universiti Sains Malaysia	**P_1 –** High educational status (graduate) that had healthy practice on anemia prevention = 0.848 P_2 – Low educational status (illiterate) that had healthy practice on anemia prevention = 0.325 Refers to knowledge and practice of anemia among pregnant women attending antenatal clinic in Dr. Prabhakar Kore hospital, Karnataka (Yadav, Swamy, & Banjade., 2014)	13	15

Based on the sample size calculation, the sample size in objective 2 is (n= 106) was taken as it is more reasonable to do with the time frame.

3.4.3 Sampling method

Non-probability sampling technique was used to select the pregnant women that participated in the study.

3.5 Instrumentation

In this research, data was collected from the women who visit the Antenatal Clinic and Antenatal Ward in Hospital USM with a structured self-administered questionnaire.

3.5.1 Instrument

This instrument employed in this research was adopted from Yesufu et al., (2013) with permission (Appendix A). The language used in this instrument was bilingual, English and Malay. The instrument consists of three parts: Part A is demographic data. The questionnaire on sociodemographic data consisted of six questions which include age, ethnic group, marital status, occupation, income, and educational level. Respondents require to tick in the box which best represents them.

Part B contains questions to assess the level of awareness of anemia in pregnancy among antenatal women. This part consists of 7 items which include the definition of anemia, the causes of anemia and the sign and symptoms of anemia. Multiple answer can be chosen.

Part C contains 8 questions to assess the level of practice of anemia prevention among antenatal women.

3.5.2 Translation of Instrument

The questionnaire was originally in English and hence translated to the Malay version. A forward and backward translation from English to Malay again was performed.

The translation was validated and done by a bilingual expert in Pusat Pengajian Bahasa, Literasi dan Terjemahan Universiti Sains Malaysia, Kubang Kerian, Kelantan.

3.5.3 Validity and Reliability

The validity and reliability were important in the data collection instrument. Therefore, to achieve the content of the instrument validity and accuracy, the instrument was sent and validated by three experts of nursing lecturers in Health Campus, Universiti Sains Malaysia. All items in this survey were modified to ensure that the instrument used in this study could provide an accurate and valid measurement aspect and the participant could understand the questions.

In order to achieve validity and reliability of the instrument, a pilot study was carried out to pretest the questionnaire. According to Polit and Beck (2011), it can demonstrate the validity and reliability scores of the instrument. At the same time, it can provide a valuable insight for the researcher and act as an internal check of the questionnaire. In this study, 11 pregnant women from 10 percent of the sample that fulfil the inclusion criteria took part in the pilot study. The Cronbach's alpha tested is 0.924, indicating that it is reliable.

3.6 Variables

The variables used in this research study were the independent and dependent variables

Table 3.2 Variables (Independent and Dependent)

Independent variable	Level of Awareness of Anemia in Pregnancy Demographic Data (age, ethnicity, educational status, occupational status, household income)
Dependent variable	Level of Prevention Practice of Anemia in Pregnancy

3.6.1 Variable Scoring

Each correct response to the questions on awareness was scored one mark while each wrong or non-response was scored zero. The total score for each respondent was converted to percentages and graded as poor for <50%, fair (50-70%) and good (>70%). The mean awareness score in percentage for all the respondents was also calculated. The proportion of participants with scores of 70% and above had a high level of awareness, 50-70% moderate level of awareness and less than 50% poor level of awareness (Yesufu et al., 2013).

3.7 Data Collection Method

3.7.1 Procedure of data collection

The data collection was collected after the Human Research Ethical Committee, Universiti Sains Malaysia had approved. After that, respondent that met the inclusion and exclusion criteria was approach by the researcher. Then, the researcher explains the purpose of the study to the respondents and seeks their informed consent. The researcher was with the respondents while answering the questionnaire and assisted some respondents in answering the questionnaire. The duration to complete the questionnaire is within 20 minutes. Once the questionnaire was completed, the researcher collected the questionnaire. Only the researcher and her supervisors have accessed to all data information.

3.7.2 Flow Chart of Data Collection

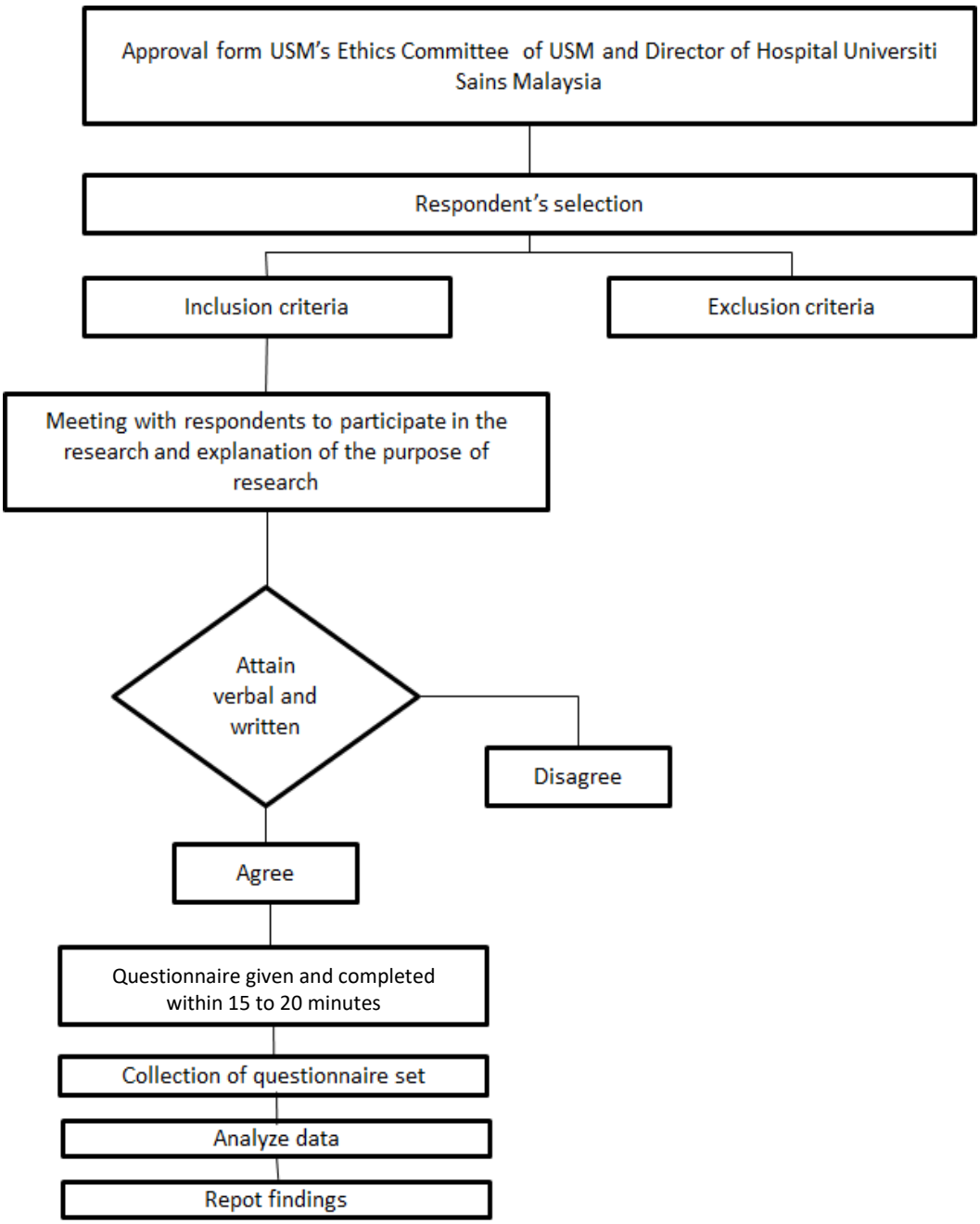

Figure 3.1 Flow Chart of Data Collection

3.8 Ethical Consideration

For ethical consideration, the study obtained approval to conduct the study from the Human Research Ethical Committee of Universiti Sains Malaysia (Appendix F). Approval of study location is obtained from the Director of Hospital USM to access the study population, the antenatal women in Hospital USM (Appendix E). The instrument employed in this study was adopted from Yesufu et al., (2013) with permission to use the instrument from the original author (Appendix B).

The participants were informed about the ethical values stated in human research, protecting the study participant's right and respecting their autonomy in deciding. The approached participant in this study had a choice either to participate or refuse to participate. Participants may refuse participation any time without any penalty or loss of benefit. There was no conflict of interest, and no payment to the researcher. The researcher declares any relevant non-financial potential conflict of interest to ensure and preserve study integrity.

All the information of the participants will strictly be confidential to maintain the autonomy of the participants and only will be used for academic and research purposes. Moreover, the researcher had been provided information related to the research study after they completed answering the questionnaire. The participant acknowledged that the study is self-funded by the researcher, an undergraduate student. Hence no honorarium had been given. Upon completion of the questionnaire, the respondents were verbally thanked by the researcher for their sincere and cooperative involvement in the study.

3.9 Data analysis

Table 3.3 Data Analysis

Research Objectives	**Test**
To assess the level of awareness of anemia among antenatal women in Hospital Universiti Sains Malaysia	Descriptive
To assess the level of practice of anemia prevention among antenatal women in Hospital Universiti Sains Malaysia	Descriptive
To examine the association between awareness and practice of anemia prevention among antenatal women in Hospital Universiti Sains Malaysia	Pearson's Correlation Test
To determine the association between selected demographic variables (age, ethnicity, educational status, occupational status, household income) and practices of anemia prevention among antenatal women in Hospital Universiti Sains Malaysia	Pearson's Chi-square Test