



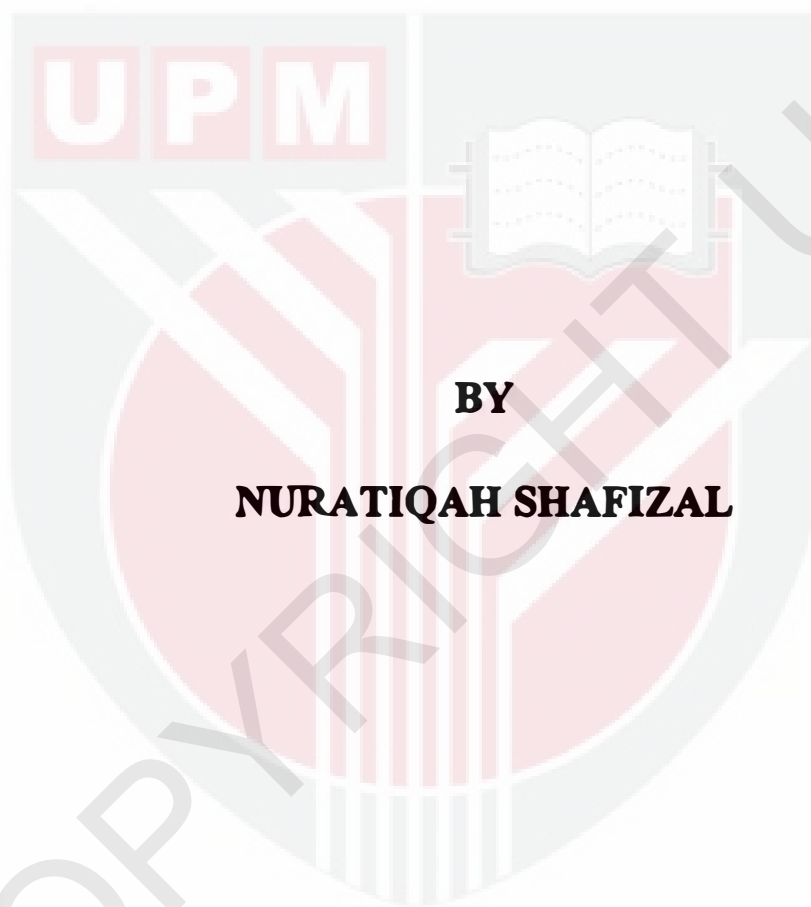
UNIVERSITI PUTRA MALAYSIA

***KNOWLEDGE, ATTITUDE AND PRACTICE (KAP) ON IRON AND ITS
LINK TO HAEMOGLOBIN LEVEL: A CROSS-SECTIONAL STUDY IN
PREGNANT WOMEN ATTENDING ANTENATAL CLINICS IN
SEREMBAN, NEGERI
SEMBILAN***

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FPSK3 2019 32**

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**A project submitted as a partial fulfilment of the requirement for the degree of
Bachelor of Science (Nutrition and Community Health) form the Faculty of
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LIST OF ABBREVIATION

BMI	Body Mass Index
Hb	Haemoglobin level
FACT-An	Functional Assessment of Cancer Therapy-Anemia
FAO	Food and Agriculture Organization
FFQ	Food Frequency Questionnaire
KAP	Knowledge, Attitude and Practice
KK	Klinik Kesihatan / health clinic
M	Mean
MANS	Malaysian Adults Nutrition Survey
MREC	Medical Research and Ethics Committee
NCCFN	National Coordinating Committee on Food and Nutrition
PKD	Pejabat Kesihatan Daerah
RNI	Recommended Nutrient Intakes
SD	Standard Deviation
WHO	World Health Organization

ABSTRACT

KNOWLEDGE, ATTITUDE AND PRACTICE (KAP) ON IRON AND ITS LINK TO HAEMOGLOBIN LEVEL: A CROSS-SECTIONAL STUDY IN PREGNANT WOMEN ATTENDING ANTENATAL CLINICS IN SEREMBAN, NEGERI SEMBILAN

Nuratiqah Shafizal

Anaemia has been a global problem. Nearly half of pregnant women globally (40%) were anaemic. The prevalence in Malaysia was 8.2% (2015). Extensive studies reported nutrition education on iron and anaemia was effective in improving this condition. Hence, this study's objective was to determine the association between KAP on iron and haemoglobin (Hb) level in pregnant women. A total of 114 pregnant women at any gestational week, conveniently selected from 6 antenatal health clinics in Seremban. A self-administered questionnaire was used. It consisted of sociodemographic, pregnancy background, FACT-An questionnaire, selective-iron containing FFQ and KAP on iron. The anthropometry measurement and Hb level were obtained from subjects' medical record. Pearson Product moment correlation was used in determining the association between KAP on iron and Hb level. Mean $\pm$ SD of study population for age, gestational week and Hb level were 30 ± 4.54 years old, 26 ± 8.54 weeks and 11.52 ± 1.07 g/dL respectively. Majority subjects were Malay (72.8%), Islam (72.8%), had tertiary education (57%) and non-government employed (46.5%). Subjects' mean $\pm$ SD dietary iron intake was 14.61 ± 7.85 mg/day, less than recommended requirement. Cereal and cereal products ($M=3.79 \pm 3.80$ mg/day) as well as meat and meat products ($M=3.75 \pm 3.39$ mg/day) were the main subjects' sources of dietary iron. Mean of subjects FACT-An score indicated subjects experienced less anaemia-related symptoms ($M=46.43 \pm 8.1$). Most of subjects' pre-pregnancy BMI was in ideal weight category between 18.5-24.9 kg/m² (47.4%). Subject KAP on iron score were considered as low level ($M=12.81 \pm 6.31$), high level ($M=14.22 \pm 1.94$) and medium level ($M=8.08 \pm 4.16$) respectively. A significant inverse weak association between knowledge on iron and Hb level ($r=-0.190$, $p<0.050$). A non-significant inverse association between attitude and Hb level ($r=-0.135$, $p>0.050$) and weak positive association between practice and Hb level ($r=0.067$, $p>0.050$). Overall, this study has found that knowledge could influence Hb level. Therefore, nutrition education for pregnant women should continue progressively as it can also influence their attitude and practice in preventing and managing anaemia during pregnancy.

ABSTRAK

PERHUBUNGAN ANTARA PENGETAHUAN, SIKAP DAN AMALAN BERKENAAN ZAT BESI DENGAN PARAS HEMOGLOBIN: KAJIAN KERATAN RENTAS DI KALANGAN WANITA HAMIL DI KLINIK KESIHATAN IBU DAN ANAK DI SEREMBAN, NEGERI SEMBILAN

Nuratiqah Shafizal

Anemia adalah antara isu kesihatan di seluruh dunia. Hampir separuh daripada wanita mengandung (40%) di dunia mengalami anemia. Peratus kelaziman anemia di kalangan wanita mengandung di Malaysia pada tahun ialah 8.2%. Terdapat banyak kajian menyatakan bahawa pendidikan pemakanan mengenai zat besi dan anemia dapat membantu dengan efektif dalam membendung anemia. Oleh yang demikian, objektif kajian ini adalah untuk menentukan perhubungan antara pengetahuan, sikap dan amalan berkenaan zat besi dengan paras haemoglobin (Hb) wanita mengandung. Seramai 114 wanita mengandung pada mana-mana minggu kehamilan dari 6 buah klinik kesihatan ibu dan anak di Seremban telah menyertai kajian ini atas persetujuan individu. Borang soal selidik mengandungi maklumat mengenai sosio-demografi, latar belakang kehamilan, butiran FACT-An, soal selidik kekerapan pengambilan makanan yang mengandungi zat besi dan PSA berkenaan zat besi digunakan. Data mengenai pengukuran antropometri dan paras Hb diperolehi dari rekod perubatan subjek. Purata umur, minggu kandungan dan paras Hb populasi kajian ialah 30 ± 4.54 tahun, 26 ± 8.54 minggu dan 11.52 ± 1.07 g/dL masing-masing. Majoriti subjek ialah Melayu (72.8%), Islam (72.8%), memperoleh pendidikan di institut pengajian tinggi (57.0%) dan pekerja bukan kerajaan (46.5%). Purata pengambilan zat besi dalam makanan oleh subjek ialah 14.61 ± 7.85 mg/sehari, kurang daripada saranan keperluan. Bijirin dan produk bijirin serta daging dan hasil daging ialah makanan utama yang diambil oleh subjek bagi memperoleh zat besi. Purata skor FACT-An ialah 46.43 ± 8.1 , menunjukkan subjek kurang mengalami simptom anemia. Kebanyakan subjek berada dalam kategori berat badan ideal (18.5-24.9) di awal minggu kehamilan (47.4%). Skor pengetahuan, sikap dan amalan berkenaan zat besi subjek adalah pada paras yang rendah (12.81 ± 6.31), tinggi (14.22 ± 1.94) sederhana (8.08 ± 4.16). Dari kajian ini, terdapat perkaitan signifikan yang songsang antara pengetahuan berkenaan zat besi dan paras Hb ($r=-0.190$, $p<0.050$). Walaubagaimanapun, tiada perkaitan yang signifikan antara sikap dan amalan dengan paras Hb ($r=-0.135$, $p>0.050$ dan $r=0.067$, $p>0.050$). Secara keseluruhan, kajian ini menunjukkan pengetahuan memainkan peranan yang penting dalam memberi kesan kepada paras Hb. Oleh itu, pendidikan pemakanan kepada wanita mengandung harus diteruskan kerana ia juga mempengaruhi sikap dan amalan subjek dalam menangani anemia ketika mengandung.

CHAPTER 1

INTRODUCTION

1.0. Introduction

Anaemia is a condition in which there is insufficient amount of red blood cells or haemoglobin in the blood. This condition will then lead to the reduction of haemoglobin ability to carry the oxygen and transport it to the cells all over the body for the cells to function accordingly (WHO, 2011). Nutrients insufficiency in iron, folate, vitamin B12 and vitamin A, infections and parasitic diseases are the main causes of anaemia among pregnant women (Taner et al., 2015; WHO, 2011). These put pregnant women at risk of anaemia and without proper management, this can later increase the risk of having low birth weight baby, as well as maternal and perinatal mortality (WHO, 2015). Fraenkel (2018) has emphasised that anaemia is a global problem and it is commonly affected the pregnant women. The World Bank Group (2018) has stated that the prevalence of anaemia among pregnant women worldwide with haemoglobin level less than 11g/dl in 2016 was around 40% and according to Malaysia's Health Informatic Centre, Ministry of Health in 2015, in Malaysia the prevalence of anaemia in pregnant women was 8.2% (NCCFN, 2016).

According to the National Plan of Action for Nutrition of Malaysia III (NPANM III) 2016-2025, Malaysia had targeted the prevalence of anaemia among pregnant women to

reach not more than 5% by the year of 2025 (NCCFN, 2016). Moreover, a substantial amount of studies had been addressing the importance of disseminating awareness on healthy diet and lifestyle during pregnancy and educate the pregnant women on ways for them to minimise the risk of anaemia (Abu Salem, Mahrous, Shazly, Ibrahim & Al-oshari, 2015; Ramakrishnan, Grant, Goldenberg, Zongrone & Martorell, 2012; Mohannad, Rizvi & Irfan, 2012). The studies concluded that the approach on improving the individual knowledge could improve the maternal health outcome in which could also help in reducing the prevalence of anaemia during the pregnancy.

Several studies showed that there was association between knowledge, attitude and practice level on health issues with the health outcomes. A cross-sectional study had been carried out in determining the association of knowledge, attitude and practice (KAP) on iron deficiency anaemia from November to December 2016 (Shahzad et al., 2017). In this study, 150 female subjects age only 20 to 21 years old were recruited in the Government Home Economics College in Lahore, Pakistan. The subjects were selected using stratified random sampling but the location or setting was chosen by convenient sampling. The KAP data were collected by self-administered questionnaire of KAP on iron deficiency anaemia which was by FAO (2014). This study had determined that there was no statistically significant association between knowledge on anaemia ($r=0.092$, $p=0.263$) and attitude towards self-awareness of anaemia as a disease ($r=-0.005$, $p=0.95$) with haemoglobin level. Nevertheless, the findings did showed weak association between these 2 variables with haemoglobin level. In which there was a positive association between knowledge with haemoglobin level ($r=0.092$, $p=0.263$) and inverse association between attitude with

haemoglobin level ($r=-0.005$, $p=0.95$). In this study, statistically significant association only seen between practice and the haemoglobin level ($r = 0.174$, $p = 0.033$).

Another cross-sectional study had determined the prevalence and factors associated with anaemia among 140 pregnant women recruited in urban and rural areas of North Sumatera Province, Indonesia (Lestari, Fujiati, Keumalasari, Daulay, Martina & Syarifah, 2018). Data were collected from July to October 2016 using structured questionnaire and cyanmethemoglobin method to determine the haemoglobin concentration. The findings stated that the prevalence of anaemia in this study was 40.7%. It was more prevalence among subjects who lived in urban areas. There was a statistically significant association between the pregnant women's knowledge about anaemia with haemoglobin level in which 57 out of 140 of them had good knowledge without having anaemia ($\chi^2=8.55$, $p=0.05$). There was also a statistically significant association between their diet practice with haemoglobin level in which 46 out of 140 of them practised less healthy diet were having anaemia ($\chi^2=3.56$, $p=0.05$).

Local cross-sectional study had also determined KAP on anaemia but it was associated with socio-demographic and antenatal characteristics instead of haemoglobin level (Adznam, Sedek, & Mohd Kasim, 2018). The data were collected from 4 government health clinics in Putrajaya which was selected using a random sampling method from September 2016 to April 2017. A total of 370 pregnant women were recruited from age range of 21 to 44 years old who had visited the clinic for their first antenatal check-up.

There was a statistically significant association between knowledge with attitude ($r = 0.317$, $p < 0.01$) and also attitude regarding anaemia with the diet practice ($r = 0.330$, $p < 0.01$). However, there was no significant association determined between knowledge on anaemia with the diet practice ($r = 0.007$, $p > 0.05$).

More cross-sectional study was carried out in 2 purposively selected private hospital in Klang Valley (Abdul Manaf et al., 2014). This study was carried out from March to June 2011 and 236 Malay pregnant women from age range between 20 to 45 years old were conveniently recruited. The haemoglobin level of the subjects was determined. The stated objective of this study was to determine the nutritional status and nutritional knowledge of the subjects which was not specific on anaemia. Self-administered nutritional knowledge questionnaire consisted of 68 items of nutritional knowledge, attitude and practice on general KAP of nutrition was used. There was only statistically significant association determined between nutritional knowledge with the haemoglobin level ($r = 0.203$, $p < 0.05$).

From the reviewed studies, the studies did stated that there was association between knowledge on nutrition as general or on anaemia specifically with the haemoglobin level in pregnant women. This indicated that by having sufficient knowledge on anaemia could improve the outcome of the nutritional or health status of the individuals. Moreover, the reviewed studies also showed association between attitude regarding anaemia and diet practice with the haemoglobin level in pregnant women. There were extensive studies that

had been carried out by the overseas researchers regarding the association of KAP on anaemia with the haemoglobin level in pregnant women as well as child-bearing age women but only few local studies in Malaysia had been carried out in this respective area. Moreover, these few local studies had been carried out in the area of big cities of Selangor and Kuala Lumpur only. Furthermore, not most of these few local studies determined the association between KAP on anaemia with the haemoglobin level. Therefore, this study had been carried out to determine the association between KAP on iron with the haemoglobin level in pregnant women attended the antenatal clinics in district of Seremban, Negeri Sembilan.

1.1. Significant of study

From carrying out this study, the findings help in identifying the current level of target population's knowledge, attitude and dietary practices on anaemia. Additionally, the findings can also help in planning future intervention strategies such as nutritional education programme focusing on not just providing the awareness in terms of giving but also focusing on the attitude as well as application of the dietary practices. These in which can help the pregnant women to maintain normal haemoglobin level throughout the pregnancy that can improve not just their health status but also the foetus' health.

1.2. Objectives of the study

The objectives of this study are as following:

1.2.1. General objective of the study

The general objective of this study was to determine the association between knowledge, attitude and practice (KAP) on iron with haemoglobin level in pregnant women attended antenatal clinics in district of Seremban, Negeri Sembilan.

1.2.2. Specific objectives of the study

The specific objectives of this study were to:

- Determine sociodemographic background, pregnancy history and symptoms related to anaemia of the pregnant women attended antenatal clinics in Seremban, Negeri Sembilan
- Determine dietary iron intake of pregnant women attended antenatal clinics in Seremban, Negeri Sembilan

- **Assess anthropometric measurement of pregnant women attended antenatal clinics in Seremban, Negeri Sembilan**
- **Assess haemoglobin level of pregnant women attended antenatal clinics in Seremban, Negeri Sembilan**
- **Determine the KAP on iron of pregnant women attended antenatal clinics in Seremban, Negeri Sembilan**
- **Determine association between the KAP on iron with haemoglobin level of pregnant women attended antenatal clinics in Seremban, Negeri Sembilan**

1.3. Hypotheses of the study

- **There is a significant association between knowledge on iron with haemoglobin level of pregnant women attending antenatal clinics in district of Seremban, Negeri Sembilan.**
- **There is no significant association between attitudes on iron with haemoglobin level of pregnant women attending antenatal clinics in district of Seremban, Negeri Sembilan.**
- **There is no significant association between dietary practices on iron with haemoglobin level of pregnant women attending antenatal clinics in district of Seremban, Negeri Sembilan.**

CHAPTER 2

LITERATURE REVIEW

2.1. Iron

Iron in the human body is usually found together bound with protein such the heme compounds as haemoglobin or myoglobin, heme enzymes and non-heme compounds as transferrin and ferritin. In human body, there is a different amount of iron in both women and men (Abbaspour, Hurrell, & Kelishadi, 2014). The iron in adult women is approximately around 35mg/kg of body weight lower than adult men which is approximately around 45mg/kg of body weight. Iron in the body can be classified into 4 major classes which are the iron containing heme proteins such as haemoglobin, myoglobin and cytochromes. Then, there is iron sulphur enzymes such as flavoproteins and heme-flavoproteins. Next is the iron storage and transport proteins such as transferrin, lactoferrin, ferritin and hemosiderin. The fourth one is the iron-containing activated enzymes which are sulphur and non-heme enzymes (NCCFN, 2017).

Iron is required for oxygen transportation as the iron will be used to synthesise the protein to transport oxygen such as the haemoglobin and myoglobin. It is also will be used in the formation of iron for electron transfer and redox reaction in the body. Most of the

iron found in the body is in the formation of haemoglobin. Twenty five percent of the iron is readily mobilized from the storage while 15% of the iron is bound together with myoglobin in muscle tissues and enzymes that participated in redox reaction and other cell functions (Abbaspour, Hurrell, & Kelishadi, 2014). Furthermore, iron is used in the making of the DNA, RNA and proteins. It is also involving in the cellular respiration, cell proliferation and differentiation and gene expression regulation. Moreover, it is responsible to maintain iron homeostasis in cells and it is essential in developing normal brain function that could affect the learning and memory (NCCFN, 2017).

Sources of iron are from foods and there are 2 types of dietary iron. There are the heme and non-heme iron. The heme iron can be obtained from foods that contained haemoglobin and myoglobin. These foods are the animal-based foods such as meat, poultry and fish. While, the non-heme iron can be obtained from the plant-based foods such as cereals, pulses, legumes, fruits and vegetables. Between these 2 types of iron, heme iron has better absorption around 15 to 35% as it is soluble at pH of the small intestine and other dietary factors have little effect in inhibiting the iron. This absorption can be interfered if it is eaten together with calcium-containing foods such as milk, cheese. If the heme iron containing foods are cooked too long at a higher temperature, this action can degrade the heme iron and turn it into non-heme iron which will reduce its bioavailability. While for non-heme iron, the absorption is poor than the heme iron around 2 to 20%. The absorption of this iron is also strongly inhibited by other dietary factors if compared to heme-iron as it is also contained other nutrients that majorly inhibiting the iron absorption which are the phytic acid, polyphenols, inositol phosphates and soy

proteins. Moreover, proteins from the animal products such as milk and egg can also inhibit the iron absorption due to the presence of casein, whey and albumin (egg white). In order to overcome these interferences of iron absorption, ascorbic acid should also be consumed together with the heme-iron containing foods such as fruit juices, fruits, potatoes and other Vitamin C containing vegetables. Other than that, consuming fermented foods such as fermented vegetables such as sauerkraut, kimchi and fermented soy sauce can also help in enhancing the absorption of the iron. These enhancers will reduce the ferric to more absorbable ferrous iron form. Most of all, avoid eating those inhibitors-containing foods together with the iron-containing foods (Abbaspour, Hurrell, & Kelishadi, 2014; NCCFN, 2017).

The total of iron in red blood cells or erythrocytes is approximately around 2000 to 3000 mg. The daily erythrocyte iron turnover (DEIT) is estimated around 17 to 25 mg. From this DEIT, around 1 to 2 mg of iron or 5 to 10% is approximated to be absorbed. Hence, the daily requirement of iron for adults is around 8 to 18 mg of iron or 50 to 100% of DEIT (Ganz & Nemeth 2012). According to Abbaspour, Hurrell, and Kelishadi (2014), it is also stated that around 1 to 3 g of iron is stored in average adults' body. Approximately around 1 mg of iron is lost each day from the degradation of dead skin and mucosal surfaces such the gastrointestinal tract lining. Furthermore, among premenopausal reproductive aged women, menstruation will increase the iron loss to about 2 mg a day. Referring to Alibabić, Šertović, Mujić, Živković, Blažić and Zavadlav (2016), it is stated that the Recommended Dietary Allowance (RDA) for iron in men and post-menopausal

women is similar 8 mg/day due to the absence of menstruation. While, RDA for pre-menopausal reproductive women is 18mg/day and a lot higher for pregnant women which is 27mg/day due to the physiological changes to compensate blood loss later during childbirth and to supply iron for the foetus as well. However, referring to Malaysia RNI 2017, depending on the individual diets which will determine the iron bioavailability percentage which is categorised into 2 categories. There are the 10% and 15% of iron bioavailability. The higher bioavailability value is indicated for diet that contains variety of foods with meat and foods that rich in ascorbic acid. While the lowest bioavailability value is indicated for diet that contained more cereals, tubers and legumes with little or no meat or ascorbic acid containing foods. For adults men aged 19 years and above, the iron requirement is estimated around 14 mg/day for 10% bioavailability while 9 mg/day for 15% bioavailability. For post-menopause women, the iron requirement is estimated around 11 mg/kg for 10% bioavailability value while 8 mg/day for 15% bioavailability value. For pre-menopause women aged 19 years and above, the iron requirement is estimated around 29 mg/day for 10% bioavailability value and 20 mg/day for 15% bioavailability value. For pregnant women, the daily iron requirement is increased to 0.8 mg up to around 10 mg during the last six weeks of pregnancy (NCCFN, 2017).

2.2. Haemoglobin level

Haemoglobin is found in the blood at a different concentration according to sex in which male would be between 13.5 to 18.0g/dl while female would be between 11.5 to 16.0g/dl. Each of erythrocyte or the red blood cells are made of 200 to 300 million molecules of haemoglobin. Each of the haemoglobin contained 4 globin chains with haem molecule for each of the chain would bind with the oxygen. Hence, one of the haemoglobin function is to transport the oxygen to cells all over the body and also form a complex with carbon dioxide calls carbamino haemoglobin to eliminate this waste out of the body (Thomas & Lumb, 2012). This emphasised the importance of haemoglobin as general.

Furthermore, the insufficient number of haemoglobin can lead to anaemia which hence, the importance in measuring the haemoglobin concentration to determine this condition. According to WHO (2011), the used of cut-off point in haemoglobin concentration helped in monitoring and assessing the progress in fulfilling the international goals of advocating the prevention of anaemia. Therefore, WHO had defined the cut-offs of haemoglobin levels to diagnose anaemia in which it was developed since 1968 and separated into several categories as stated in the table below (Table 2.1). Thus, this haemoglobin level cut-off is necessary to use in determining the prevalence of anaemia in a population.

Table 2.1: Haemoglobin level to diagnose anaemia				
Population	Non-anaemia (g/L)	Mild (g/L)	Anaemia	
			Moderate (g/L)	Severe (g/L)
Children 6-59 months of age	≥110	100-109	70-99	< 70
Children 5-11 years of age	≥115	110-114	80-109	< 80
Children 12-14 years of age	≥ 120	110-119	80-109	< 80
Non-pregnant women (15 – 49 years of age)	≥ 120	110-119	80-109	< 80
Pregnant women	≥110	100-109	70-99	< 70
Men (15 years of age and above)	≥ 130	110-129	80-109	< 80

2.3. Anaemia

A study was carried out to indicate the pattern of anaemia prevalence and haemoglobin concentration in pregnant women of childbearing age which was 15 to 49 years old from 107 countries all around the world (Stevens et al., 2013). Data from 1995 to 2011 on haemoglobin level and anaemia prevalence were obtained from 257 population-representative data sources. This data were extracted from the countries' health, nutrition and household surveys, statistical summary from WHO Vitamin and Mineral Nutrition Information System and statistical summary from other national and international agencies. The findings from this study showed that there was an increased pattern of global mean haemoglobin concentration in pregnant women, between 1995 to

2011 which was from 112g/L to 114g/L. This mean haemoglobin concentration was more than the anaemia cut-off for pregnant women which was 110g/L. The global anaemia prevalence in pregnant women also showed an improvement from 1995 to 2011 in which 43% to 38% of them were anaemic. The prevalence indicated around 32 million of the pregnant women globally in 2011 were anaemic which was still a huge number of people. For countries in Southeast Asia, the prevalence of anaemia in pregnant women had improved a lot from 34% in 1995 to 25% in 2011 and there was an increased pattern for the haemoglobin concentration from 115g/L in 1995 to 119g/L in 2011. However, the prevalence indicated that around 8 million of pregnant women had anaemia which was still a large number and a burden condition in improving mother and child health care.

Anaemia without a proper management can lead to fatal consequences and this condition is a risky one in pregnant women because it is affected both the mother and the foetus development and health. A cross-sectional study was carried out in 359 health facilities in 29 countries all around Latin America, Africa, the Western Pacific, eastern Mediterranean and South-east Asia (Daru et al., 2018). The findings showed that there was an association between severe anaemia and maternal death through data gathering from the WHO Multicountry Survey on maternal and newborn health. The findings showed that there were 312,281 pregnancies with 4687 cases of severe anaemia and 341 cases of maternal death due to that. Furthermore, the findings showed that there was a significant association between anaemia severity with maternal death ($p=<0.0001$). Moreover, adjusted odds ratio indicated that pregnant women with severe anaemia had 2.36 times risk of maternal death compared to those without severe anaemia (95% CI).

This showed how fatal anaemia consequences could be to the pregnant mother. Hence, anaemia condition in pregnant women should be put into a major concern and a priority to tackle this burden of health problems.

2.4. Nutrition education in preventing and managing anaemia

Referring to an intervention study in which 100 pregnant women were purposively selected who attended the out-patient Department of Obstetrics and Gynecology in Gandhinagar, India (Nimbalkar, Patel, Thakor & Patni, 2017). This intervention study had included pre-test and post-test method to determine the outcome of the intervention. A semi-structured questionnaire was given to the subjects in both pre and post-test for evaluation of the outcome. This questionnaire was used to evaluate the knowledge level of subjects on anaemia and its preventive measures. As for the intervention strategy, a single educational interventional training were carried out. In this interventional training, the researchers gave a lecture with power point presentation, charts, demonstration and discussion with the subjects for a period of 45 minutes. The post-test was done right after the interventional training. The findings from this study showed that there was a significant improvement of subjects' knowledge on anaemia and its preventive measure after carrying out the interventional training ($p < 0.001$). As for this study population, from the pre-test; only 21% of them knew the causes of anaemia, 23% of them had the knowledge on signs and symptoms of anaemia, nearly half of them (40%) knew the sources of dietary iron, 25% had the knowledge on the inhibition of iron absorption but

only 4% of them knew the factors that increase the iron absorption and 30% of the subjects had the knowledge on treatment for anaemia. Hence, an improvement of knowledge showed in the findings after the intervention, the percentage increased to 64% of the subjects knew the causes of anaemia, 66% of them had gained the knowledge on sign and symptoms of anaemia, the percentage increased to nearly three quarter of them (72%) knew the source of obtaining dietary iron, more than half of the them (55%) had gained the knowledge on the factors that could inhibit the iron absorption, 41% of them knew the factors that could increase the iron absorption and an increment up to 79% of the subjects were knowledgeable on the treatment of anaemia.

A quasi-experimental study was carried out for 48 mothers in reproductive age between 20 to 45 years old in Pernantin Vilage of Juhar, Indonesia (Ukurta, Kusumayati & Syarifah, 2018). This experimental study consisted of pre and post-test in which the researchers obtained the information by asking listed questions in the questionnaire to the subjects. The subjects were then divided into 2 groups of intervention and control group. The control group had not receive the intervention. While, the intervention group was consisted of 24 subjects in which they had to play a game of ladders and snakes as part of the intervention module. The game was equipped with reproductive health messages in which the researchers explained about each of the messages while the subjects played the game. In the pre-test, the findings found that most of the subjects had never heard or learned about the reproductive health; 62.5% of them in the control group while 91.7% of them in the intervention group. As for the knowledge level on reproductive health, in

control group only 4.2% of them had a good knowledge about it and none of the intervention subjects had a good knowledge on reproductive health. After the intervention, from findings in the post-test, 41.7% of the intervention subjects had obtained good knowledge on reproductive health in which it was a significant improved ($p < 0.001$) while the control group subjects had no improvement. Moreover, this study also looked into the improvement of subjects' attitude towards reproductive health from this intervention method. However, the findings found that there was no significant difference between pre-test attitude and post-test attitude of subjects in intervention group ($p = 0.758$). Hence, enhancing the subjects' knowledge could not directly influence in improving their attitude towards the issue.

A randomised control trial was carried out to identify the effectiveness of nutrition education intervention in iron deficiency anaemia (IDA) by exploring their KAP level among 89 iron deficient female adolescents with range age between 15 to 19 years old. This study was carried out in Gaza Strip (Jalambo, Sharif, Naser & Karim, 2017). The subjects were divided into 2 groups of intervention ($n = 44$) and control group ($n = 45$). All of the subjects either in intervention or control group received weekly the iron supplementation which consisted of 200mg of ferrous fumarate and advised to consume it for the course of 3 months. While for the intervention group, they had to attend nutrition education sessions for those 3 months while consuming the iron supplementation. There were 9 sessions which consisted of lectures, wall writings, video, booklets and brochure distribution. The topics that were covered was on nutrition as general consisted of the

introduction of food groups, food pyramid and balanced diet. More specific topics on IDA which was about anaemia in general, IDA as a serious public health problem, growth and development, the inhibitors and enhancers for iron absorption and the good source of dietary iron foods. In pre-test, the findings showed a higher proportion of the subjects in both control (77.3%) and intervention (77.8%) had a low level of knowledge. While more than half of them had not-desired practice, control (64.4) and intervention group (63.6%). As for attitude, nearly half of them had a negative attitude on IDA, control (40.0%) and intervention group (45.5%). After 6 months of the intervention, there was a significant improvement on knowledge (90.9% of them had a good level, $p<0.001$) for the intervention group while for control group the finding was non-significant. Similarly, both practice (70.5% of them had desired practice, $p=0.002$) and attitude (70.5% had positive attitude, $p<0.001$) showed a significant improvement for the intervention group while no significant improvement for the control group.

Another experimental study was carried out locally in Kelantan, Malaysia on the effects of nutrition education intervention on awareness of IDA among 280 school adolescents aged 16 years old (Yusoff, Wan Daud & Ahmad, 2013). Subjects were grouped into 2 groups in which one group received both nutrition education package and supplement of 250mg ferrous gluconate, 1mg folic acid and 50mg Vitamin C once daily for the course of 3 months. While the other group was not receiving the nutritional education but just the supplement. The nutrition education activities was scheduled for 1 hour of each week throughout the period of 3 months. Topics that covered in the session

were on the introduction to IDA and its prevention through healthy nutrition. The subjects' awareness on IDA was tested through self-administered questionnaire. The findings from this study showed that there was a significant difference in mean of knowledge scores between group that received the nutritional education ($p < 0.001$) and not receive the education plus the score was higher ($M = 48.6$) than the one who only received the supplements ($M = 30.3$).

2.5. Knowledge, Attitude and Practice (KAP) of pregnant women

According to cross-sectional study by Zelalem, Mikyas and Erdaw (2018) with 322 pregnant women were recruited in randomly selected 4 of the public hospitals in Addis Ababa, Ethiopia in order to determine the subjects' nutritional knowledge, attitude and practices during pregnancy. The data were collected within one month in April 2015 by distributing questionnaire to the subjects. The findings showed that only 27% of them had good knowledge on maternal nutrition during pregnancy and 48.4% had favourable attitude towards maternal nutrition during pregnancy in which among these, 91% of them prepared meals with iron-rich foods. Furthermore, only 34.5% of the subjects reported good practices on maternal nutrition during pregnancy. Moreover, in this study, the findings showed that there was a significant association between attitude ($p = < 0.001$) with maternal nutrition knowledge during pregnancy. The odds of good nutritional knowledge were 5.50 times higher in positive attitude mothers as compared to negative attitude mothers with 95% CI (3.12 – 9.67). Besides, subjects' nutritional practices during

pregnancy also showed a significant association with their knowledge on maternal nutrition during pregnancy ($p < 0.001$). The odds of good nutritional practice among mothers were 5.5 times higher in mothers with good nutritional knowledge as compared with mothers without good nutritional knowledge with 95% CI (3.12-9.67). Then, there was a significant association between the mothers nutritional practices with both attitude and knowledge ($p < 0.001$). The odds of good nutritional practices among mothers were 5.5 times higher in mothers with good nutritional mother and 2.34 times higher in mothers with positive attitude. These findings indicated that improving knowledge could help in improving the mothers practice but in changing the mothers' attitude to change their practices could be a slow improvement. However for this study it did not determine the subjects' knowledge on anaemia but focused more on the overall general knowledge of maternal nutrition during pregnancy.

Another cross-sectional study was carried out to determine factors that influenced knowledge and attitude towards anaemia during pregnancy in 1500 randomly selected subjects who delivered babies within 6 months of the survey taken in the South-eastern Nigeria (Onyeneho and Subramanian, 2016). These subjects were recruited from 12 community randomly selected from adjusted clusters. KAP questionnaire was used and this study stated that 75.5% of the urban subjects, 76.9% of the rural subjects and 80.6% of the suburban subjects were aware that anaemia occurred mostly during pregnancy and it was seen as normal and not serious. However, 79.1% of them reported the cause of anaemia during pregnancy was due to diet low in blood-giving food. Then, almost all of

the subjects (97.3%) believed anaemia during pregnancy could be prevented in which 63.1% of them reported that in order to prevent this condition fruits were required to consume daily, 57.3% of them than reported that consumed iron-rich food were needed and 56.5% reported consumed protein-rich foods could help to prevent anaemia during pregnancy. 74.7% of the subjects perceived ways in dealing anaemia during pregnancy by reporting it to health workers, 39.3% by drinking iron syrup and 31.9% by taking folic acid supplements. Moreover, 75.3% of the subjects had reported to eat fresh or dried fruits, 58.5% had eaten protein-rich food, 55.4% had consumed grain sources of food and 50.0% had taken iron-rich food daily to prevent anaemia during their last pregnancy. Living close to health facility ($\chi^2=3.666$; $p=0.031$), having post-secondary education ($\chi^2=18.318$; $p<0.001$), paid employment ($\chi^2=4.715$; $p=0.017$) and older women ($\chi^2=14.203$; $p=0.027$) were associated with the knowledge of anaemia in pregnancy. Furthermore, higher level of mothers' education ($\chi^2=6.783$; $p=0.034$) and having good knowledge on anaemia during pregnancy ($\chi^2=117.190$; $p<0.001$) were associated with good practice in preventing and managing anaemia in pregnancy. Unlike the latter study stated (Zelalem, Mikyas & Erdaw, 2018), this study determined KAP on anaemia and determined relationship between the knowledge and practice on anaemia of the pregnant women.

More cross-sectional study by Harb, Haidar and Yazbeck (2018) was carried out in which had determined the nutrition situation by looking at the KAP level among recently delivered Syrian refugee women. Hundred participants aged 18 years old and above from one of the government hospital in Beirut, Lebanon were recruited. In this study, data were

collected for 2 months using KAP questionnaire. The findings showed that 56% of them had little knowledge about nutrition during pregnancy due to lack of exposure and ignorance toward the importance of healthier diet practice during pregnancy. Nonetheless, 76% of them had positive attitude toward maternal nutrition. Although more than half of them had positive attitude but 47% of them still had poor practice of healthier diet and bad dietary habits during pregnancy with inadequate energy, protein and iron intakes from food. These could be due to the socio-demographic factors which could contribute to the prevalence of anaemia. Thus, the prevalence of anaemia stated was 57.5%, however, the finding was self-reported by the subjects which could introduce bias. Furthermore, the use of the KAP questionnaire did not investigate specifically on anaemia. It was more to determine the women's perception on the importance of nutrition and supplementation, women's attitude on antenatal care and maternal and infant nutrition as well as mother's dietary practices as general. However, this study found that although the attitude level was high, it did not indicate that the practice level of the subjects would be high too. Thus, determining the attitude and practice on anaemia specifically was needed and the added information on the association with haemoglobin level would be an added finding to the study.

2.6. Association between KAP and haemoglobin level

A cross-sectional study was carried out to determine nutritional status and nutritional knowledge of 236 Malay pregnant women at 2 selected private hospitals in Kuala Lumpur and Selangor. The data was collected from March 2011 to June 2011 (Abdul Manaf et al., 2014). The 72.0% of the subjects had tertiary education, 57.2% of them were in their third trimester of pregnancy and 33.5% of the subjects were anaemic with mean haemoglobin level of 10.4 g/dl which was less than 11.0 g/dl as recommended by WHO. The nutritional knowledge were assessed via 68 items of self-administered nutritional KAP questionnaire. The findings showed that there was a significant association between nutritional knowledge score ($r=0.203$, $p=0.009$) with the haemoglobin level. However, the questionnaire used were more on general KAP of nutrition and not specifically designed to determine KAP on anaemia.

Referring to Zekarias, Meleko, Hayder, Nigatu and Yetagessu (2017), a cross-sectional study was carried out to determine the prevalence and factors associated with anaemia among 306 pregnant women attended antenatal care in one of the hospitals in Ethiopia. Data were collected from April the 3rd to May the 3rd 2017. The findings from this study showed that 68.3% of the subjects were not aware of anaemia and only 53.6% of them had self-reportedly taken iron supplement. Thus, 76.5% of them had haematocrit level below 33% and the prevalence of anaemia with haemoglobin less than 11g/dl was 23.5%. It was found that 52.9% of them ate meat less than once a week, 92.2% of them only ate fruits and vegetables after meal at least once per day, 43.8% of them had the habit

of drinking tea immediately after meal less than once per day and 74.2% of the subjects had the habit of drinking coffee immediately after meal at least once a day. Furthermore, as confounding factors (family monthly income, maternal age, educational level, parity, gestational age, diet practices and antenatal care visits follow-up) were accounted, the result showed that there was significant association ($p < 0.05$) between knowledge on anaemia with the haemoglobin level. The odds of developing anaemia were 0.22 times higher for mothers without good knowledge on anaemia as compared to mothers with the knowledge of 95% CI (0.09-0.52). Although, the relationship was significant but the outcome indicated a weak impact to haemoglobin level. This showed that by having the knowledge, it might not improve the condition. Similar to the previous study stated, this study did not stated clearly the types of questionnaire used to determine the knowledge and practice of the subjects. Moreover, this study did not assess the subjects' attitude which could help in explaining more on the obtained findings.

In summary, there were studies that showed knowledge, attitude and practice had relationship between one another. As without the knowledge, it would not shape the attitude and the practice. Likewise as with the knowledge and without the right attitude and appropriate practice, these could too affect the health. However, there was few of local studies that used KAP questionnaire on iron and determined the relationship with haemoglobin level. Thus, this study enable to provide information on the level of subjects' KAP on iron and anaemia which can be useful for the future development of intervention strategies to be focused on for this specific target population.

CHAPTER 3

METHODOLOGY

3.1. The study design

A cross-sectional study was carried out. All data were collected on the day of data collection with no follow-up visit over a period of 2 months started from February to March 2019. The self-administered questionnaire was distributed to the selected subjects that took them to complete it approximately 15 to 20 minutes. Data on demography, socioeconomic status, pregnancy history, anaemia related symptoms, dietary iron intake and KAP on iron were collected. The haemoglobin level was determined by retrieving the information from their medical or antenatal record.

All information which were collected about the subjects during the course of the study would be kept strictly confidential and anonymised so that only the investigators carried out the research would have the access to such information. The identification number which was the reference number in the questionnaire had been used on subject data sheets instead of patient identifiers such as name. The data would be anonymised and stored into a computer that were password protected and maintained for a minimum of 5 years after the completion of the study until destroyed. After the completion of the

study, a sheet summarising the findings of the study would be sent to the subjects via post or email if required. Data from the study were written up into a dissertation for a Final Year Project thesis and potential publications. During publication, no personal information of patients involved in this study would be disclosed in the thesis or paper to ensure their privacy and confidentiality.

3.2. Location of the study

The study was carried out in antenatal clinics in district of Seremban, Negeri Sembilan. Negeri Sembilan is located in the centre of peninsula of Malaysia. It is divided into 7 districts which are Seremban with 95,360.71 hectares, Port Dickson, Kuala Pilah, Rembau, Jelebu, Jempol and Tampin (State Government of Negeri Sembilan Official Portal, 2018). In 2016, the number of antenatal attendances to antenatal clinics in Negeri Sembilan was 253,177 (Ministry of Health Malaysia, 2017). In district of Seremban, there are 12 public health clinics together with antenatal clinics which include Klinik Kesihatan Seremban 2, Ampangan, Desa Rhu, Lenggeng, Mantin, Rantau, Senawang, Sendayan, Seremban, Sikamat, Nilai and KLIA (Portal Rasmi Kementerian Kesihatan Malaysia, 2018).

3.3. Sampling method

The study location for collecting the data was purposively selected depending on the approval from Pejabat Kesihatan Daerah Seremban as well as the clinic management after gaining ethical approval from the Medical Research and Ethics Committee (MREC), Malaysia. Hence, there were 6 antenatal clinics purposively selected in district of Seremban, Negeri Sembilan after the approval. The 6 selected antenatal clinics were Klinik Kesihatan (KK) Seremban 2, Seremban, Senawang, Sikamat, Desa Rhu and Ampangan as shown in Figure 3.1.

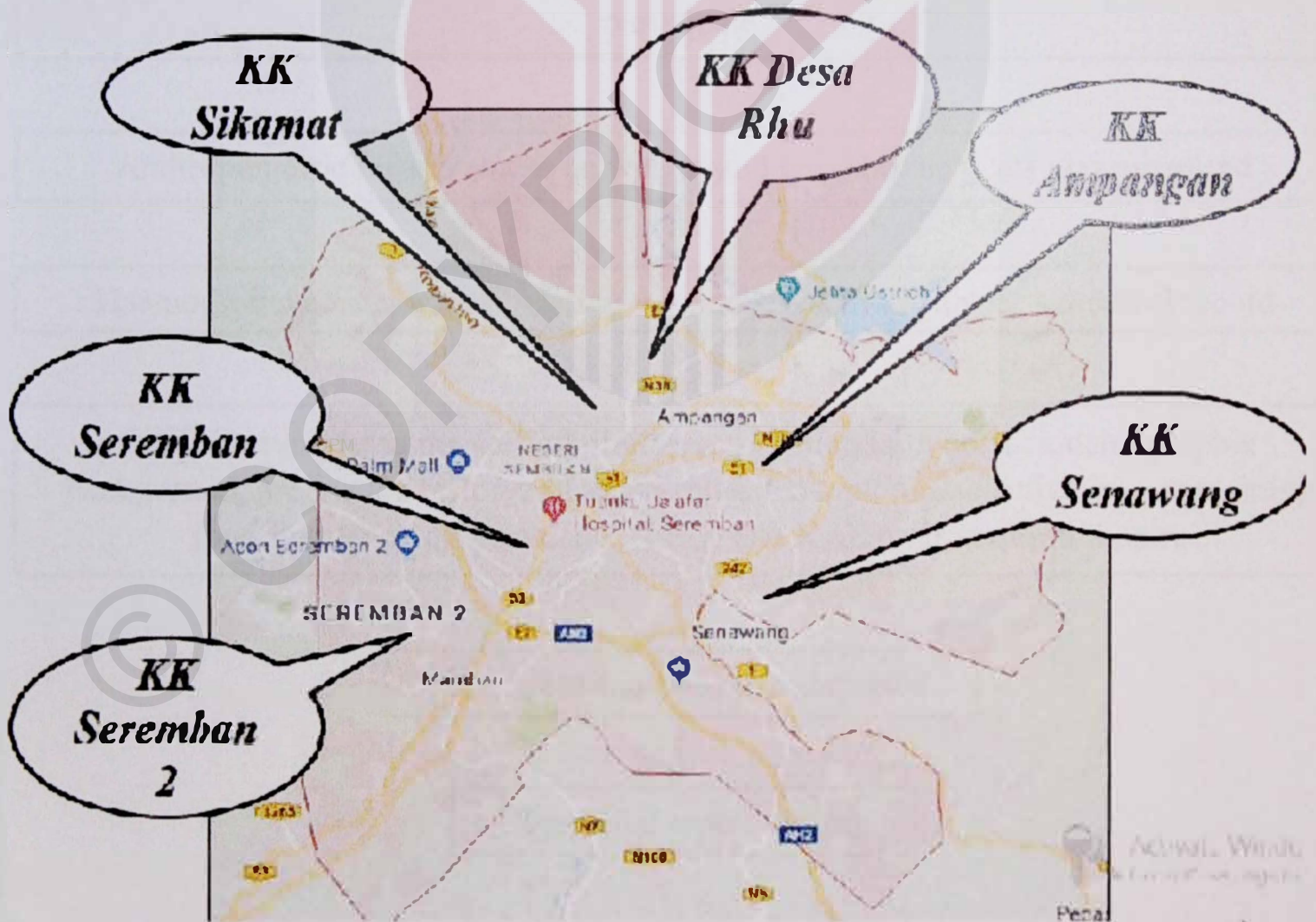


Figure 3.1: The selected antenatal clinics in district of Seremban, Negeri Sembilan (Source: Google Map, 2018)

The subjects for this study were recruited using convenience sampling in which any of the pregnant women who fulfilled the inclusion or exclusion criteria attended these 6 antenatal clinics were selected. If the selected pregnant women met all the required criteria, consent form was provided prior the start of study. The flow chart of the study protocol was summarised in the following **Figure 3.2**.

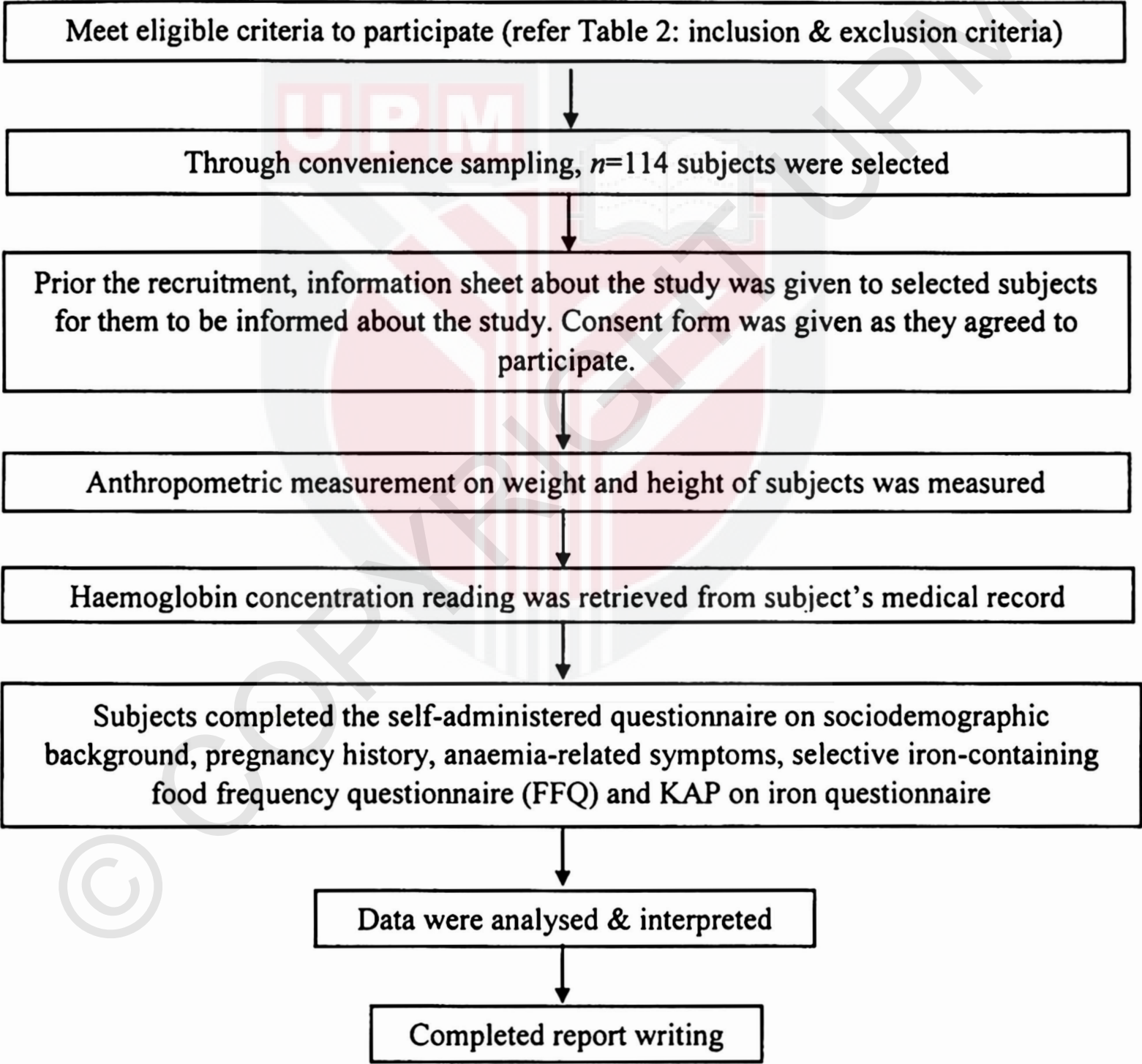


Figure 3.2: The study protocol

3.4. Sample size of the study

Sample size was estimated using sample size formula for correlation study by Cole (1997) in which the findings from Adznam et al. (2018) on association between pregnant women's attitude with the practice regarding anaemia were used. The study reported r value of 0.33 with p value of less than 0.01. The formula and calculation of the sample size as follows; which the significance level α was set at 5% and the power $(1-\beta)$ was set at 90%. These gave $(Z_{1-\frac{\alpha}{2}} + Z_{1-\beta}) = 10.5$ which calculated a sample size of 90.9 or 91. According to National Health and Morbidity Survey 2014 (IPH, 2014) the achieved survey response rate was 76.8% in urban area and 84.4% in rural area. In accounting of the expected response rate of 80%, the final sample size required for the study was 113.6 or **114 subjects**. Therefore, in the selected 6 antenatal clinics, 20 subjects were conveniently recruited in each of the clinic to achieve the total number of required subjects.

$$n = \frac{(Z_{1-\alpha} + Z_{1-\beta})^2}{\left(\frac{r^2}{1-r^2}\right)} + 5 \quad n = \frac{10.5}{\left(\frac{0.33^2}{1-0.33^2}\right)} + 5 \quad n = 90.9 \text{ or } 91$$
$$91 \div 0.8 = 113.6 \text{ or } 114$$

3.5. Subjects characteristics of the study

A total of 114 pregnant women attended antenatal clinics in district of Seremban, Negeri Sembilan were included in the study. The eligible criteria were described in the following Table 3.1. Prior subjects’ participation in this study, a written informed consent was provided to them.

Table 3.1: Inclusion and exclusion criteria of subjects

Inclusion Criteria	Exclusion Criteria
Malaysian citizen	Non-Malaysian citizen
Pregnant women attended for antenatal care check-up	Seriously ill due to other medical condition such as inflammatory bowel disease, Chron’s disease, Celiac disease and thalassemia
19 to 49 years of age	Mentally ill
Literate	Used of additional supplements other than prescribed in antenatal clinics
Have antenatal record in the selected clinics	

3.6. Self-administered questionnaire

The questionnaire was consisted of socioeconomic status (SES) (age, ethnicity, religion, education level, employment status, household income), pregnancy history and health problems (number of pregnancy, number of children, number of deliveries, current pregnancy week, delivery due date, frequency of antenatal care visits, prenatal pills intake & other supplements intake). These data were descriptively presented as the findings of the study.

3.7. FACT-An questionnaire

This questionnaire was acquired and adapted from Functional Assessment of Cancer Therapy-Anemia (FACT-An) Version 4. From the full questionnaire, only the Additional Concerns section was used to determine if the subjects were having symptoms related to anaemia. Only 16 items out of 20 items that are related to anaemia were included in the questionnaire (Cella, 2010). The findings would allow to measure the pregnant subjects’ functional status. In Table 3.2 showed the listed items in FACT-An questionnaire that were used in the study:

Table 3.2: Items in FACT-An questionnaire

No.	Item
1.	I feel listless (“washed out”)
2.	I feel tired
3.	I have trouble <u>starting</u> things because I am tired
4.	I have trouble <u>finishing</u> things because I am tired
5.	I have energy
6.	I have trouble walking
7.	I am able to do my usual activities
8.	I need to sleep during the day
9.	I feel lightheaded (dizzy)
10.	I get headaches
11.	I have pain in my chest
12.	I am too tired to eat
13.	I am motivated to do my usual activities
14.	I need help doing my usual activities
15.	I am frustrated by being too tired to do the things I want to do
16.	I have to limit my social activity because I am tired

3.7.1. Scoring method of FACT-An questionnaire

Reversal scoring was performed for each of the items as shown in Table 3.3. After completing the reversal score, all of the values were totalled up. Then multiplied the total by 16 and divided by the number of items answered to obtain the overall score. The higher the score, the less the symptoms of anaemia experienced by the pregnant subjects (Cella, 2010).

Table 3.3: FACT-An items scoring method

No.	Item	Reverse Item	Item Response
1.	I feel listless (“washed out”)	4 -	(0/1/2/3/4)
2.	I feel tired	4 -	(0/1/2/3/4)
3.	I have trouble <u>starting</u> things because I am tired	4 -	(0/1/2/3/4)
4.	I have trouble <u>finishing</u> things because I am tired	4 -	(0/1/2/3/4)
5.	I have energy	0 +	(0/1/2/3/4)
6.	I have trouble walking	4 -	(0/1/2/3/4)
7.	I am able to do my usual activities	0 +	(0/1/2/3/4)
8.	I need to sleep during the day	4 -	(0/1/2/3/4)
9.	I feel lightheaded (dizzy)	4 -	(0/1/2/3/4)
10.	I get headaches	4 -	(0/1/2/3/4)
11.	I have pain in my chest	4 -	(0/1/2/3/4)
12.	I am too tired to eat	4 -	(0/1/2/3/4)
13.	I am motivated to do my usual activities	0 +	(0/1/2/3/4)
14.	I need help doing my usual activities	4 -	(0/1/2/3/4)
15.	I am frustrated by being too tired to do the things I want to do	4 -	(0/1/2/3/4)
16.	I have to limit my social activity because I am tired	4 -	(0/1/2/3/4)

3.8. Selective Iron-Containing Food frequency questionnaire (FFQ)

This FFQ was adapted from National Health and Morbidity Survey (NHMS) 2014 (IPH, 2014). Only items containing iron were included in the FFQ through calculating the cumulative percent distribution of iron for each of the food until it reached around 90% (Fatimah et al., 2015). A total of 83 items from the FFQ in NHMS (IPH, 2014) were included. These iron-containing foods are the food that commonly consumed by Malaysian population. The amount of iron content in the foods were obtained by referring the amount in Nutrient Composition of Malaysian Foods (Tee, Ismail, Nasir & Katijah, 1997) and ASEAN Food Composition Database (Institute of Nutrition, Mahidol University, 2014). Thus, this FFQ enabled to determine the subjects' food habits in consuming iron-containing foods. This food habit was evaluated over the previous month intake.

The portion size of the food item was determined using local household units such as plate, bowl, tablespoon, etc, based on the Nutrient Composition of Malaysian Foods and the Atlas of Food Exchanges and Portion Sizes (Suzana et al., 2009). The frequency consumption of each item was analysed by turning it into a conversion factor as stated in Table 3.4. The amount of daily food intake for each item was calculated using a formula (Fatimah et al., 2015): frequency of intake (conversion factor, Table 3.4) x serving size x total number of servings x weight of food in one serving. Nutritionist Pro 2.2 Software by First DataBank (2005) was used to obtain the total iron consumption from the foods by the subjects. This was compared to the recommended value of iron consumption for

pregnant women as stated in Recommended Nutrient Intakes (RNI) for Malaysia. As for pre-menopause women aged 19 years and above, the iron requirement is estimated around 29 mg/day for 10% bioavailability value and 20 mg/day for 15% bioavailability value. While for pregnant women, the daily iron requirement is increased to 0.8 mg up to around 10 mg during the last six weeks of pregnancy (NCCFN, 2017).

Table 3.4: Conversion factors for frequencies of intake reported in the FFQ	
Frequency of intake	Conversion factor (formula)
Per day	
1	1.00 (1.0/1)
2-3	2.50 (2.5/1)
≥ 4	4.00 (4.0/1)
Per week	
1	0.14 (1.0/7)
2-4	0.43 (3.0/7)
5-6	0.79 (5.5/7)
Per month	
1	0.02 (0.5/30)
1-3	0.07 (2.0/30)
Never	
0	0

3.9. KAP questionnaire on iron

The questionnaire was adapted from Food and Agriculture Organization (FAO) of the United Nations (Marias & Glasauer, 2014) on anaemia. There were 17 items which were on the knowledge (8 items), practice (3 items) and attitude (6 items). Multiple choice answers were provided which allowed it to be self-administered by the subjects. Table 3.5 showed the listed items for each section of knowledge, attitude and practice that were included in the questionnaire:

Table 3.5: Items in KAP questionnaire on iron

Knowledge	
No.	Item
1.	Have you heard about anaemia? - If “Yes”, how can you recognise someone who has anaemia?
2.	What are the health risks for infant and young children of a lack of iron in the diet?
3.	What are the health risks for pregnant women of a lack of iron in the diet?
4.	What causes anaemia?
5.	How can anaemia be prevented?
6.	Which of the foods listed are rich in iron?
7.	When taken during meals, certain foods help the body absorb and use iron. What are those foods?
8.	Some beverages decrease iron absorption when taken with meals. Which ones?
Practice	
No.	Item
9.	Yesterday, during the day and night, did you eat any of the following foods?
10.	Do you usually eat fresh fruits, such as orange, guava, kiwis, lemons, lychees, papayas, strawberry or drink juice made by them? - If “Yes”, is it everyday? - When do you usually eat fresh citrus fruits?
11.	Do you usually drink coffee or tea? - If “Yes”, is it everyday? - When do you usually drink coffee or tea?
Attitude	
No.	Item
12.	How likely do you think you are to be anaemic?
13.	How serious do you think anaemia during pregnancy is?
14.	How good do you think it is to prepare meals with iron-rich foods such as beef, chicken or liver?
15.	How difficult is it for you to prepare meals with iron-rich foods?
16.	How confident do you feel in preparing meals with iron-rich foods?
17.	How much do you like the taste of iron-rich food item or meal?

3.9.1. Scoring method of KAP questionnaire on iron

In Table 3.6 was the scoring method for each item in the sections included in the KAP questionnaire (Marias & Glasauer, 2014; Shahzad et al., 2017):

Table 3.6: Scoring method of the KAP questionnaire		
Knowledge		
No.	Item	Answer Option / Remarks
1.	Have you heard about anaemia? - If “Yes”, how can you recognise someone who has anaemia?	Yes, No, Don’t know/no answer (Score of 1 for ‘Yes’ and Score of 0 for ‘No’ or ‘Don’t know/no answer’) (Score of 1 for each of correct answer.) Score of 0 if answer ‘do not know’)
2.	What are the health risks for infant and young children of a lack of iron in the diet?	Score of 1 for each of correct answer. Score of 0 if answer ‘do not know’
3.	What are the health risks for pregnant women of a lack of iron in the diet?	
4.	What causes anaemia?	
5.	How can anaemia be prevented?	
6.	Which of the foods listed are rich in iron?	Score of 0 indicates lack of knowledge Score of 1 indicates optimum knowledge Maximum score for knowledge is 43
7.	When taken during meals, certain foods help the body absorb and use iron. What are those foods?	
8.	Some beverages decrease iron absorption when taken with meals. Which ones?	
Practice		
No.	Item	Answer Option / Remarks
9.	Yesterday, during the day and night, did you eat any of the following foods?	Score of 2 if tick one of the foods listed from any category of foods Score of 0 if none of the foods listed is consumed, skip to Question 12 on Attitudes

Table 3.6 (Cont.)

Practice		
No.	Item	Answer Option / Remarks
10.	Do you usually eat fresh fruits, such as orange, guava, kiwis, lemons, lychees, papayas, strawberry or drink juice made by them?	Score of 2 if 'Yes', Score of 0 if 'No'
	- If "Yes", is it everyday?	Score of 2 if 'Yes', Score of 1 if 'No'
	- When do you usually eat fresh citrus fruits?	Score of 2 if choose options 'before, during or after meal', Score of 0 if 'Do not know' or 'No answer'
11.	Do you usually drink coffee or tea?	Score of 0 if 'Yes', Score of 2 if 'No'
	- If "Yes", is it everyday?	Score of 0 if 'Yes', Score of 1 if 'No'
	- When do you usually drink coffee or tea?	Score of 2 if answer 'Never', Score of 1 if choose options '2 hours or more after meal or before meal'
		Score of 0 for the other listed options
		Score of 0 indicates poor practices, Score of 1 indicates good practices & Score of 2 indicates excellent practices
		Maximum score for practice is 12
Attitude		
No.	Item	Answer Option / Remarks
12.	How likely do you think you are to be anaemic?	Score of 1 if choose 1 st answer option of each of the item which indicates poor attitude
13.	How serious do you think anaemia during pregnancy is?	
14.	How good do you think it is to prepare meals with iron-rich foods such as beef, chicken or liver?	Score of 2 if choose 2 nd answer option of each of the item which indicates average attitude
15.	How difficult is it for you to prepare meals with iron-rich foods?	
16.	How confident do you feel in preparing meals with iron-rich foods?	Score of 3 if choose 3 rd answer option of each of the item which indicates good desired attitude
17.	How much do you like the taste of iron-rich food item or meal?	
		Maximum score for attitude is 18

Pre-testing was carried out 1 month before the real date of data collection. The main goal of this pre-testing was to identify the clarity and sequence of the questions before it was used in the selected target population. A total of 30 subjects was planned to be recruited, however, due to the difficulty of reaching and obtaining consensus from pregnant women other than in the antenatal clinics to pre-test the questionnaire, only 10 subjects were able to be recruited in the area of Seremban. The recruited subjects had met the inclusion and exclusion criteria of subject population (Table 3.1). These subjects were excluded from the actual study period. From the pre-testing, most of the subjects were able to complete the compiled questionnaires within 15 to 20 minutes. It was reported that more than half of the subjects had difficulty in administering the FFQ. Therefore during the distribution of the questionnaire, prior the administering of the questionnaire, the researcher had to first explain ways of answering the questionnaire and monitored them completing the FFQ.

3.10. Anthropometry measurement

Subjects' pre-pregnancy weight was retrieved from the medical record. The current weight at any gestational week or trimester was assessed using TANITA digital weight scale HD-314 (Tanita Corporation, Japan) placed on firm flooring. Prior weighing, shoes and heavy clothing were removed. Then, the weight was recorded to the nearest 1 decimal point. The height was assessed using *seca* 213 Portable stadiometer (*seca*, Germany). Prior the measuring, shoes and hair ornaments that interfere with the measurement were removed. The stadiometer was placed on a flat floor and against a flat

surface of wall. While, the back of subjects' feet were against the base of the stadiometer. Subjects' legs had to be straight, arms at the sides of the body, shoulders were level, and looked straight ahead in which the line of sight will be parallel with the floor. When measurement had to be taken, investigator eyes should be parallel to the headpiece. The height were recorded to the nearest 0.1 cm. The initial weight and height during the first trimester as well as pre-pregnancy BMI were retrieved from the medical record. These data were reported as descriptive findings of the selected target population.

3.11. Haemoglobin level assessment

Haemoglobin level was assessed at any gestational week or trimester using HemoCue photometer (HemoCue AB, Sweden) in which a finger prick had to be done to obtain the blood. The site of finger prick should be cleaned with alcohol swab. Then, the finger was pricked with the needle and filled the cuvette with the blood. Once the cuvette was filled, cleaned and compressed the finger pricked site with cotton. Wiped the cuvette with lint-free wipe to clean excess blood. Next, the cuvette in HemoCue was placed in photometer to obtain the result of haemoglobin concentration (CDC, n.d.).

An intravenous blood collection as to obtain subjects' Full Blood Count (FBC) was also done in the antenatal clinics. This procedure allowed to not just determine the haemoglobin level but also other blood types, its quantity and proportion present in the

blood stream. It provided more information on the size, shape and maturity of the blood cells. These procedures were done by the nurses in the clinic during subjects' routine antenatal care visit. A secondary data was obtained on the haemoglobin level.

3.12. Statistical analysis used

The statistical analysis was performed using IBM SPSS Statistics 23. A univariate analysis was used to analyse descriptive data. For categorical variables; frequencies and percentages were determined while for continuous variables, mean and standard deviation were determined.

The distribution of the data was tested using Normality test in SPSS. The results from running the Normality Test indicated a normal distribution of data for the independent variables which were the knowledge, attitude and practice on iron score as well as the dependent variable which was the haemoglobin level. A skewness of between ± 2 was determined for each of the correlated variables indicated the normal distribution of data. Thus, Pearson Product moment correlation was used to determine the association between the knowledge, attitude and practice on anaemia with haemoglobin level in pregnant women. The level of statistical significance was set at $p < 0.05$.

CHAPTER 4

RESULTS AND DISCUSSION

4.1. Sociodemographic background of study population

Table 4.1 showed the sociodemographic background of the study population. More than half of the subjects were in the age group of 30 to 40 years old (55.3%) with mean $\pm$ SD age of 30 ± 4.54 years old. Majority of the study population was Malay (72.8%) followed by Indian (15.8%) and Chinese (10.5%). Majority of the subjects were also Islam (72.8%) followed by Hindu (12.3%), Buddha (10.5%) and Christian (3.5%). As for the subjects' education level, more than half of them had tertiary education (57.0%) as their highest education level. Nearly half of them were non-government personnel (46.5%) and 27.2% of them were unemployed followed by government personnel (20.2%).

Only 77 of the subjects' information were able to be retrieved on monthly household income. Others chose to not report the details due to confidentiality. It was categorised into 3 range groups based on the information by Department of Statistics Malaysia (2019) on monthly mean income of household in Malaysia for 2016. For household B40, the monthly mean income was estimated to be around RM 2848, around RM 6502 for M40 household and RM 16088 for T20 household. Approximately, 75.3% of the subjects were in less or equal than RM 5000 monthly household income with mean value of RM 4344.16 $\pm$ 2942.05 based on Table 4.1.

Table 4.1: Sociodemographic background of study population (n=114)		
Variables	n (%)	Mean $\pm$ SD
Age (years)		30.27 $\pm$ 4.54
19 – 29	51 (44.7)	
30 – 40	63 (55.3)	
Ethnicity		
Malay	83 (72.8)	
Indian	18 (15.8)	
Chinese	12 (10.5)	
Others	1 (0.9)	
Religion		
Islam	83 (72.8)	
Hindu	14 (12.3)	
Buddha	12 (10.5)	
Christian	4 (3.5)	
Others	1 (0.9)	
Highest Education Level		
Tertiary Education	65 (57.0)	
Secondary School	49 (43.0)	
Employment Status		
Non-government	53 (46.5)	
Unemployed	31 (27.2)	
Government	23 (20.2)	
Others	7 (6.1)	
Monthly Household Income (RM) (n=77)		4344.16 $\pm$ 2942.05
$\leq$ 5000	58 (75.3)	
>5000 – 10,000	15 (19.5)	
>10,000	4 (5.2)	

4.2. Pregnancy background of study population

Table 4.2 showed that more than half of the subjects (57.7%) were in their third trimester with the mean $\pm$ SD gestational age of 26 ± 8.54 weeks. Moreover, the findings also found that more than half of the subjects (57.7%) had experienced in pregnancy before and the mean $\pm$ SD number of pregnancy of 2 ± 1.20 .

Table 4.2: Pregnancy characteristics of study population (n=114)

Variables	n (%)	Mean $\pm$ SD
Trimester category (weeks)		26.15 $\pm$ 8.54
1 st trimester	10 (8.8)	
2 nd trimester	38 (33.5)	
3 rd trimester	66 (57.7)	
Pregnancy Status/no. of pregnancy		2.18 $\pm$ 1.20
1 st pregnancy	40 (35.1)	
Not a 1 st pregnancy	66 (57.7)	
Age of first pregnancy subjects (years old) (n=40)		27.31 $\pm$ 4.88
19 – 24	10 (25.0)	
25 – 29	17 (42.5)	
30 – 35	13 (32.5)	
Frequency of antenatal care visit(s) (n=82)		
First Trimester		
1 – 5 times	10 (100.0)	2.75 $\pm$ 1.48
Second Trimester		
1 – 5 times	30 (85.8)	4.00 $\pm$ 2.00
6 – 10 times	5 (14.3)	
Third Trimester		
1 – 5 times	4 (10.8)	9.00 $\pm$ 3.46
6 – 10 times	25 (67.5)	
11 – 15 times	8 (21.6)	

The subjects who experienced first pregnancy (n=40), the mean $\pm$ SD age was 27 $\pm$ 4.88 years old as a higher proportion of them were in 25 to 29 years old (42.5%). This finding was similar to the finding on mean age of mother at first live births which was 27.7 years old from Vital Statistics Malaysia in 2017 (DOSM, 2018).

First trimester subjects had a mean $\pm$ SD frequency of visits of 3 $\pm$ 1.48 times to antenatal clinic. Whilst for 2nd trimester subjects, the mean $\pm$ SD was 4 $\pm$ 2.00 times of visit and for the 3rd trimester subjects the mean $\pm$ SD was 9 $\pm$ 3.46 times of visit. It showed that as the gestational age was increased, the number of visits to antenatal clinic for antenatal care was increased too. According to WHO (2016), in order to improve subjects antenatal care experiences and reduce perinatal mortality, pregnant women should go for antenatal care visits for at least 8 visits throughout the pregnancy. If compared with subjects in third trimester, the mean visit was 9 times which indicated a lot of them was able to get a good antenatal care experiences.

4.3. Anaemia-related symptoms experienced by subjects

The total FACT-An score that the subjects be able to obtain was 64 which indicates that they experienced no symptoms related to anaemia. The closer the score to the total of 64, the less of the symptoms related to anaemia experienced by the subjects. To report the results, the mean ± SD score was divided into 3 quartiles, the lower quartile (0-20) indicated subjects experienced more symptoms related to anaemia, while the mid-quartile (21-42) indicated moderate experience of the symptoms and the upper quartile (43-64) indicated less experience of the symptoms. It is reported in this present study as quartile due to no established cut-off was developed to classify the score. According to **Table 4.3**, the mean ± SD score achieved by the subjects was 46 ± 8.13 with the highest proportion of subject (70.2%) in the upper quartile category which indicated most of the subjects were experiencing less symptoms of anaemia.

Table 4.3: FACT-An score of subjects (n=94)

Variable	n (%)	Mean ± SD
FACT-An Score		46.43 ± 8.13
0 – 20	-	
21 – 42	28 (23.4)	
43 – 64	66 (70.2)	

Table 4.3(a) summarise the findings on anaemia-related symptoms experienced by the subjects. A higher proportion of subjects reported that they were ‘somewhat’ feeling listless, tired, had trouble starting things and slept during the day. Moreover, most

of the subjects reported that they were ‘not at all’ had trouble in walking, felt lightheaded, had headache, had pain in chest, too tired to eat, needed help to do usual activities, frustrated by being too tired and limited their social activity. Most of them were also reported ‘quite a bit’ in having energy, able to do their usual activities and were motivated to do the activities. Hence, majority of the reported subjects indicated of experiencing less symptoms of anaemia and had good functional status. A few of them were unable to report due to the insufficient time they had to complete the questionnaire and due to the antenatal care they needed to attend to which explains the number of subjects completed the questionnaire (n=94).

Table 4.3(a): Subjects’ rated responses for FACT-An items (n=94)

Variables (n=94)	n (%)				
	Not at all	A little bit	Some-what	Quite a bit	Very much
I feel listless (washed out)	14 (14.9)	25 (26.6)	52 (55.3)	3 (3.2)	-
I feel tired	9 (9.6)	19 (20.2)	52 (55.3)	13 (13.8)	1 (1.1)
I have trouble starting things because I am tired	21 (22.3)	32 (34.0)	36 (38.3)	5 (5.3)	-
I have trouble finishing things because I am tired	23 (24.5)	40 (42.6)	25 (26.6)	6 (6.4)	-
I have energy	1 (1.1)	6 (6.4)	26 (27.7)	40 (42.6)	21 (22.3)
I have trouble walking	44 (46.8)	20 (21.3)	22 (23.4)	6 (6.4)	2 (2.1)
I am able to do my usual activities	5 (5.3)	4 (4.3)	16 (17.0)	40 (42.6)	29 (30.9)
I need to sleep during the day	18 (19.1)	16 (17.0)	43 (45.7)	12 (12.8)	5 (5.3)
I feel lightheaded (dizzy)	37 (39.4)	33 (35.1)	20 (21.3)	4 (4.3)	-
I get headaches	33 (35.1)	27 (28.7)	25 (26.6)	6 (6.4)	3 (3.2)
I have pain in my chest	53 (56.4)	25 (26.6)	14 (14.9)	1 (1.1)	1 (1.1)
I am too tired to eat	53 (56.4)	28 (29.8)	13 (13.8)	-	-
I am motivated to do my usual activities	4 (4.3)	6 (6.4)	24 (25.5)	38 (40.4)	22 (23.4)
I need help doing my usual activities	41 (43.6)	31 (33.0)	15 (16.0)	6 (6.4)	1 (1.1)
I am frustrated by being too tired to do the things I want to do	59 (62.8)	23 (24.5)	11 (11.7)	1 (1.1)	-
I have to limit my social activity because I am tired	36 (38.3)	24 (25.5)	30 (31.9)	3 (3.2)	1 (1.1)

There was a negative weak but not significant association between anaemia-related symptoms experienced by the subjects and their haemoglobin level ($r = -0.035$, $p = 0.740$) (Table 4.4, Figure 4.1).

Table 4.4: Association between subjects' FACT-An score and haemoglobin level (n=94)

Variables	Haemoglobin level	
	r	p-value
FACT-An score	-0.035	0.740

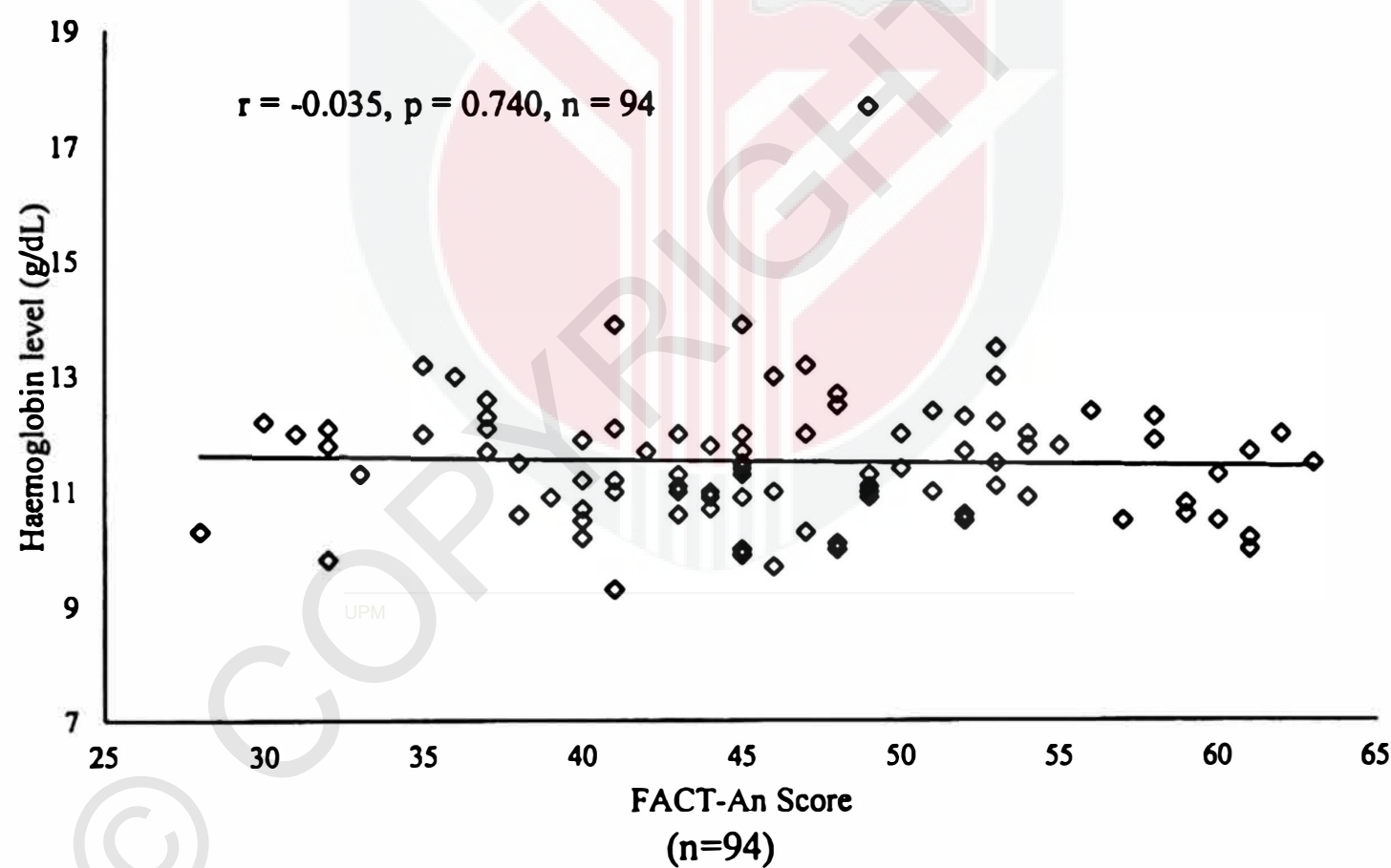


Figure 4.1: Scatterplot of association between FACT-An score and haemoglobin level

According to Your Guide to Anaemia (NHLB, 2011), the experienced symptoms of anaemia depended on the severity of the anaemia condition. The more severe the condition, the worst and obvious the symptoms experienced by the subjects. Besides,

many of the symptoms of anaemia such as tiredness, weakness and pale had also occurred due to other condition such as pregnancy which was our subjects' criteria and not due to anaemia (NHLB, 2011). Hence, subjects would probably reported their symptoms not due to being anaemia but due to the pregnancy.

Plus, rating the symptoms was a subjective matter and it could lead to underestimated or overestimated reporting by the subjects. Moreover, referring to this guideline, it was stated that subjects with mild anaemia could experience no symptoms and for this study population, most of the anaemic subjects were in the mild category (Table 4.9) which may lead to not significantly associated findings between the anaemic-related symptoms and the haemoglobin level.

4.4. Dietary iron intake of the subjects

Table 4.5 summarise the findings on subjects' intake of dietary iron. For both of the bioavailability values, majority of the reported subjects were unable to meet the recommended iron intake requirement, 68.1% (15% bioavailability) with mean $\pm$ SD of 12.25 ± 4.11 mg/day and 90.4% (10% bioavailability) with mean $\pm$ SD of 11.01 ± 5.32 mg/day. A few of the subjects were unable to complete the section due to insufficient time of completing the questionnaire and they had to spend longer time for their antenatal care procedure instead.

Table 4.5: Subjects' daily dietary iron intake based on iron bioavailability value (n=99)

Variables	Iron Bioavailability		Iron Bioavailability	
	15% n (%)	Mean $\pm$ SD	10% n (%)	Mean $\pm$ SD
Dietary Iron Intake (mg/day)				
Less than recommendation	32 (68.1)	12.25 $\pm$ 4.11	47 (90.4)	11.01 $\pm$ 5.32
Meet the recommendation	15 (31.9)	23.25 $\pm$ 3.82	5 (9.6)	32.30 $\pm$ 1.79

Note: Less than recommended dietary iron intake for 15% iron bioavailability is <20mg/day. Meeting the recommendation for 15% iron bioavailability is 20 – 45mg/day. Less than recommended dietary iron intake for 10% iron bioavailability is <29mg/day. Meeting the recommendation for 10% bioavailability is 29 – 45mg/day.

Furthermore, Table 4.6 showed that the subjects' mean $\pm$ SD dietary iron intake was 14.61 $\pm$ 7.85 mg/day. Subjects took more frequently cereal and cereal products (M=3.79 $\pm$ 3.80 mg/day) which was nearly equal amount as meat and meat products (3.75 $\pm$ 3.39 mg/day). Cereal and cereal products contributed to the overall total of daily dietary iron intake as many as the dietary iron contribution from meat and meat products. It was a culture for Malaysian and other South-east Asian population to consume cereal and cereal products such as rice and bread as their staple foods (Lipoeto, Lin & Angeles-agdeppa, 2012).

Table 4.6: Subjects' dietary iron intake in each food groups (n=99)	
Variables	Mean ± SD
Overall Dietary Iron Intake (mg/day)	14.61 ± 7.85
Food groups Dietary Iron Intake (mg/day)	
Cereal and cereal products	3.79 ± 3.80
Meat and meat products	3.75 ± 3.39
Fish and seafood	1.34 ± 1.58
Fruits	1.25 ± 1.75
Vegetables	1.13 ± 1.08
Legume and legume products	0.85 ± 1.48
Eggs	0.81 ± 0.95
Fast foods	0.78 ± 1.39
Confectionaries	0.49 ± 0.63
Milk and milk products	0.20 ± 0.26
Drinks	0.10 ± 0.11
Bread Spread	0.08 ± 0.14
Flavours	0.07 ± 0.10

There was a negative weak but not significant association between subjects' dietary iron intake and their haemoglobin level ($r = -0.110$, $p = 0.279$) (Table 4.7, Figure 4.2). From the FFQ, we could only obtain information on how much of food items consumed. However, the information gathered will not determine how the food items were consumed. Those information was important as the absorption of dietary iron could be inhibited by inhibitors such as phytate which was highly found in Asian diet than western diets (Norhaizan & Nor Faizadatul Ain, 2009). Hence, although the recommended intake of dietary iron was able to be met, not all of the dietary iron are able to be absorbed due to the present of inhibitors. According to Abbaspour, Hurrell and Kelishadi (2014), plant-based foods such as the cereal and legumes containing phytate are the main dose-dependent iron inhibitor. Polyphenols from vegetables, fruits, cereal, legume and beverages such as tea, coffee and wine influenced the iron absorption too. Moreover,

calcium from milk products as well as animal proteins such as milk protein, egg protein – and albumin could also reduce the iron absorption.

Table 4.7: Association between subjects’ dietary iron intake and their haemoglobin level (n=99)

Variables	Haemoglobin level	
	r	p-value
Dietary Iron Intake	-0.110	0.279

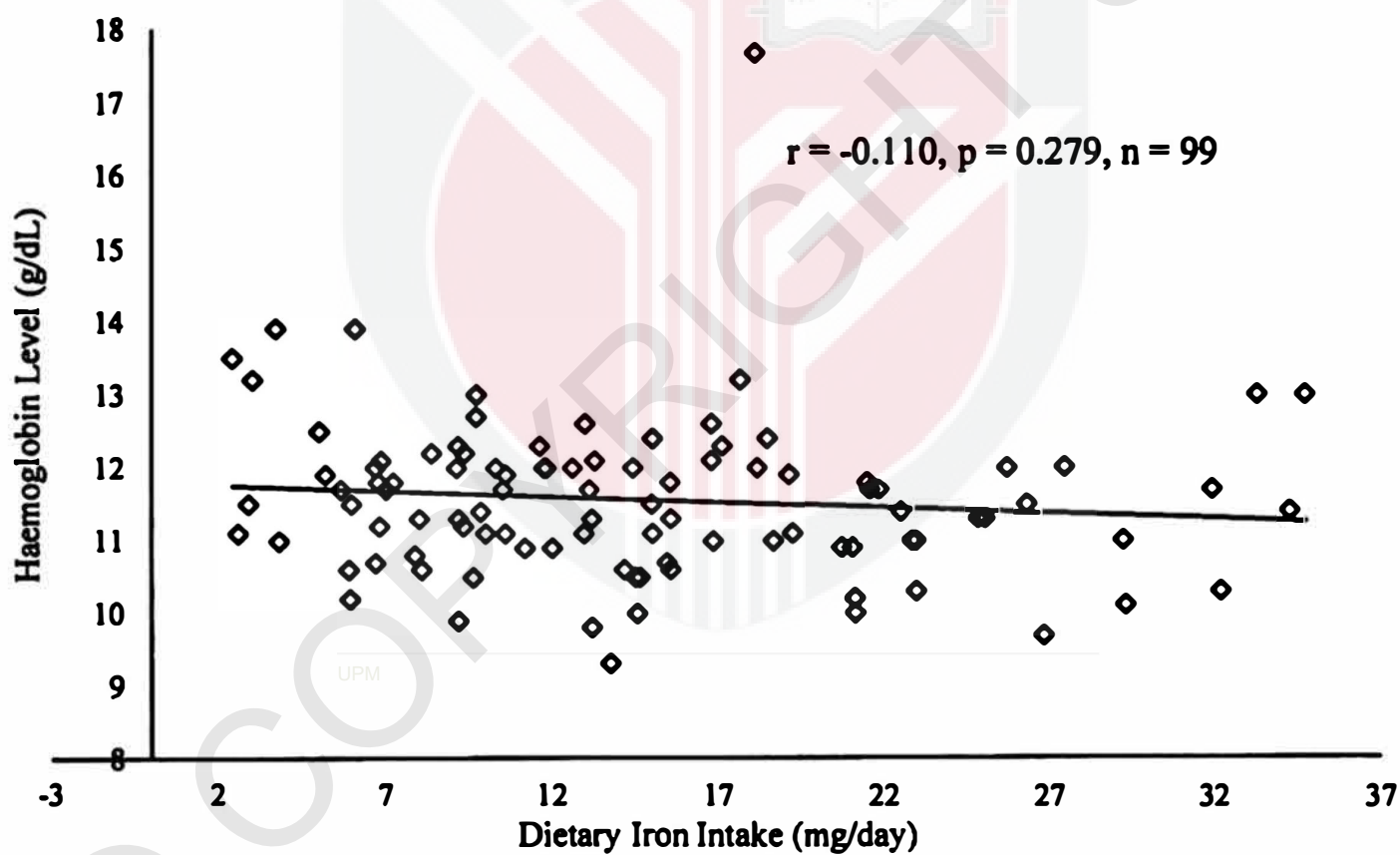


Figure 4.2: Scatterplot of association between subjects’ dietary iron intake and haemoglobin level (n=99)

4.5. Anthropometry measurement of the subjects

Subjects’ pre-pregnancy body mass index (BMI) was calculated and reported by retrieving information on their initial weight during the early stage of pregnancy. Based on Table 4.8, the subjects’ mean $\pm$ SD of pre-pregnancy BMI was 24.70 ± 5.39 kg/m² which was in the category of ideal weight but almost closer to overweight. The highest proportion of subjects (47.4%) was in ideal weight between 18.5 to 24.9 kg/m².

Table 4.8: Pre-pregnancy and current pregnancy BMI of subjects (n=114)

Variable	n (%)	Mean $\pm$ SD
Pre-pregnancy BMI category (kg/m ²)		24.70 $\pm$ 5.39
Underweight (<18.5)	10 (8.8)	
Ideal weight (18.5 – 24.9)	54 (47.4)	
Overweight (25 – 29.9)	35 (30.7)	
Obese ($\geq$ 30)	15 (13.2)	

Table 4.8(a) and Figure 3 showed that there was weak negative but non-significant association between pre-pregnancy BMI and haemoglobin level. This more likely indicated that the early pregnancy weight would not influence the haemoglobin level throughout the pregnancy. There was also a finding that found no significant association between BMI and iron deficiency anaemia (Jamshidi, Karimi, Seif & Vazini, 2017). While another study found that low BMI independently predicted anaemia among pregnant women as the odds of being anaemic was 9.82 times higher for low BMI compared to other categories of BMI with 95% CI (7.79 – 22.18) (Gedefaw et. al, 2015). However, not all underweight subjects had micronutrient deficiency such as dietary iron

and contributed to anaemia. Other factors such as their diet pattern in determining the iron bioavailability as well as their adherences to the prescribed iron supplementation could also contribute to anaemia (Ramakrishnan et. al, 2012).

Table 4.8(a): Association between subjects’ pre-pregnancy BMI and haemoglobin level (n=114)

Variables	Haemoglobin level	
	r	p-value
Pre-pregnancy BMI	-0.028	0.765

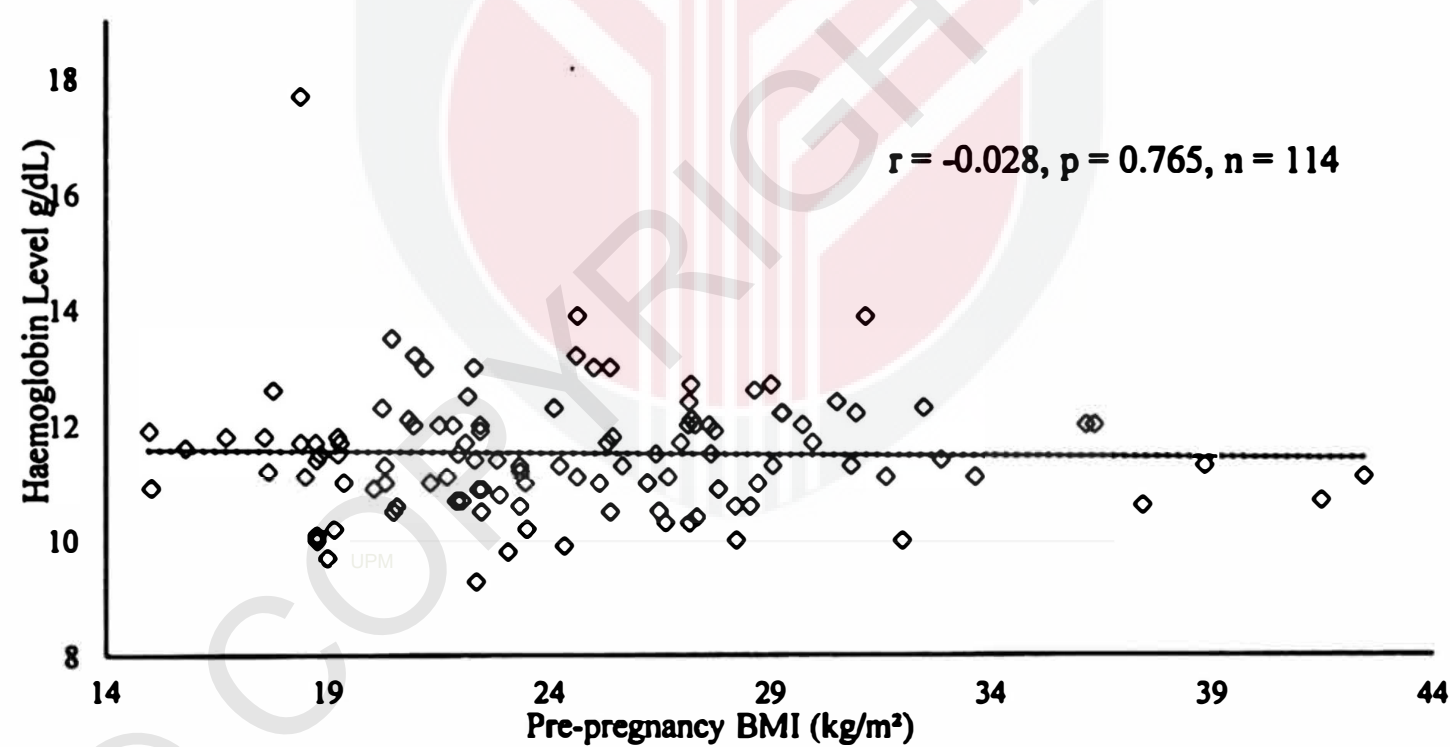


Figure 4.3: Scatterplot of association between subjects’ pre-pregnancy BMI and haemoglobin level (n=114)

4.6. Haemoglobin level of subjects

Based on Table 4.9, the subjects’ current mean $\pm$ SD haemoglobin level at any gestational week was 11.52 ± 1.07 g/dL. Majority of them were non-anaemic. Furthermore, the reported anaemic subjects ($n=31$), there were Malays, Indians and Chinese. However, considering the unequal portion of group of ethnicity in this population, ratio was used to indicate the percentage of anaemic condition in each of ethnicity group depending on the total of subjects for each of the group. In considering to that, the findings showed that the highest percentage of ethnicity having anaemia for this study population was Indian with 50% (9 out of 18 subjects) followed by Chinese with 25% (3 out of 12 subjects) and Malay with 22.9% (19 out of 83 subjects). These findings was similar to study by Soh, et al (2015) on anaemia among 217 subjects of antenatal mothers in urban areas of Malaysia in which the anaemic (<11 g/ dL) subjects were 73 of them. Out of these 73 subjects, Indian was predominant of being anaemic (60%), followed by Chinese (36%) and Malay with 29.5% of them.

Table 4.9: Haemoglobin level of subjects (n=114)

Variable	n (%)	Mean $\pm$ SD
Current Haemoglobin Level (g/dL)		11.52 $\pm$ 1.07
Anaemia		
Mild (10.9 – 10.0)	27 (23.7)	
Moderate (9.9 – 7.0)	4 (3.5)	
Non-anaemia (≥ 11.0)	83 (72.8)	
Anaemic Current Hb level (n=31)		
Malay	19 (61.3)	
Indian	9 (29.0)	
Chinese	3 (9.7)	

4.7. Subjects' Knowledge, Attitude and Practice on iron

Based on Table 4.10, the mean $\pm$ SD total score of knowledge items on iron was 12.81 ± 6.31 out of total of 43. The score was considered as a low level of knowledge as the score was divided into 3 quartiles. The lower quartile knowledge score was between 0 to 15, while the mid-quartile knowledge score was between 16 to 29, and the upper quartile knowledge score was between 30 to 43. Although the knowledge score was considered as low, but in Table 4.11, there was high proportion of subjects who had optimum knowledge for each of the listed items in which they did not choose 'do not know' option as their answer.

The mean $\pm$ SD total score of attitude items on iron was 14.22 ± 1.94 out of total 18. The score was considered as a high level of attitude on iron as the score was also divided into 3 quartiles. The lower quartile attitude score was between 0 to 6, while the mid-quartile knowledge score was between 7 to 12, and the upper quartile knowledge score was between 13 to 18.

The mean $\pm$ SD total score of practice on iron was 8.08 ± 4.16 out of total 12. The score was considered as a medium level of practice on iron as the score was divided into 3 quartiles. The lower quartile attitude score was between 0 to 4, while the mid-quartile knowledge score was between 5 to 8, and the upper quartile knowledge score was between 9 to 12.

Table 4.10: Subjects' Total Mean Score of KAP on Iron (n=114)	
Variables	Mean $\pm$ SD
Total score of knowledge items on iron	12.81 $\pm$ 6.31
Total score of attitude items on iron	14.22 $\pm$ 1.94
Total score of practice items on iron	8.08 $\pm$ 4.16

In Table 4.11, regarding subjects' awareness on anaemia, 22.8% of them were still never heard about it before. While, as for symptoms of anaemia, about half of the subjects (53.5%) recognised 'less energy or weak' is the symptoms of someone having anaemia. Nonetheless, around a third of the population (34.2%) reported that they did not recognise the symptoms and signs. More than half of the subjects (60.5%) did know one of the health risks for infant and young children in lacking of dietary iron intake was the delay in physical development. However, 28.1% of the mother-to-be subjects were not aware of the effects. As for knowledge on health risks of contracting anaemia during pregnancy, 54.4% of them did aware that it would lead to a difficult delivery. Nonetheless, there were still subjects who were unaware of these risks (21.9%).

A highest proportion of subjects did know that one of the causes of anaemia was due to lack intake of iron in the diet (75.4%). However, 24.6% of them were still unsure or unable to recognise the causes of anaemia. Moreover, nearly three quarter of the subjects (74.6%) had the knowledge to prevent anaemia. They had stated that by having iron-rich foods diet could prevent the condition. Nevertheless, 19.3% of the subjects were unable to identify any ways of preventing the condition. Majority of the subjects were able to determine that liver is one of the iron-rich containing foods (74.6%), followed by cockles (62.3%). These are the top 2 foods high in iron. Only 10.5% of the subjects who were unable to identify the iron-rich containing foods. More than half of the subjects (59.6%) identified guava as one of the foods that could improve the iron absorption due to presence of vitamin C. However, 19.3% of the subjects were unable to determine it. Majority of them (75.4%) were aware that coffee could decrease the absorption of iron. These indicated that most of the subjects had good knowledge acquired about the foods.

Table 4.11: Subjects' responses on knowledge on iron related items (n=144).

Knowledge Items	n (%)
Have you heard about anaemia?	
Yes	88 (77.2)
No	15 (13.2)
Do not know	11 (9.6)
If "Yes", how can you recognise someone who has anaemia?	
Less energy/weakness	61 (53.5)
Paleness/pallor	55 (48.2)
More likely to become sick	14 (12.3)
Koilonychias/Spoon, bent nails	2 (1.8)
Do not know	39 (34.2)
What are the health risks for infant and young children of a lack of iron in the diet?	
Delay physical development	69 (60.5)
Delay mental development	38 (33.3)
Do not know	32 (28.1)
What are the health risks for pregnant women of a lack of iron in the diet?	
Difficult delivery	62 (54.4)
Risk of dying during or after pregnancy	52 (45.6)
Do not know	25 (21.9)
What causes anaemia?	
Lack of iron in the diet/Eat too little, not much	86 (75.4)
Heavy bleeding during menstruation	4 (3.5)
Sickness/Infection (malaria, hookworm, HIV/AIDS)	3 (2.6)
Do not know	28 (24.6)
How can anaemia be prevented?	
Eat/feed iron-rich foods / having a diet rich in iron	85 (74.6)
Take / give iron supplements if prescribed	53 (46.5)
Eat / give vitamin C rich foods during or right after meals	26 (22.8)
Treat other causes of anaemia (diseases and infections)-seek health care assistance	26 (22.8)
Continue breastfeeding for infants 6-23 months old	6 (5.3)
Do not know	22 (19.3)

Table 4.11 (Cont.)

Knowledge Items	n (%)
Which of the foods listed are rich in iron?	
Liver	85 (74.6)
Cockles	71 (62.3)
Fresh fish	62 (54.4)
Beef	59 (51.8)
Chicken	39 (34.2)
Mutton	23 (20.2)
Lungs	15 (13.2)
Clam	15 (13.2)
Prawn	13 (11.4)
Heart	7 (6.1)
Kidney	5 (4.4)
Pork	5 (4.4)
Dried fish	3 (2.6)
Do not know	12 (10.5)
When taken during meals, certain foods help the body absorb and use iron. What are those foods?	
Guava	68 (59.6)
Papaya	28 (24.6)
Mango	20 (17.5)
Orange	20 (17.5)
Kiwi	19 (16.7)
Strawberry	16 (14.0)
Tomato	15 (13.2)
Soursop	12 (10.5)
Capsicum	4 (3.5)
Do not know	22 (19.3)
Some beverages decrease iron absorption when taken with meals. What are those beverages?	
Coffee	86 (75.4)
Tea	46 (40.3)
Do not know	22 (19.3)

Table 4.12 presented findings of subjects' responses on attitude on iron intake.

The first item which was on 'How likely do you think you are to be anaemic?' nearly half of subjects (40.4%) had an average attitude towards the likelihood of becoming anaemic.

While, subjects' responses on seriousness of anaemia during pregnancy showed more than half of the subjects (56.1%) had a good desired attitude. For their responses towards the

benefits of preparing meals containing iron-rich foods, majority of the subjects (78.9%) had a good desired attitude towards it as they thought it was beneficial for them. Besides, their responses on own confident level preparing the iron-rich meals, nearly half of them (45.6%) had average attitude towards it. Similar to their responses on the difficulty of preparing iron-rich meals in which more than half of them (54.4%) had also an average attitude towards it. Nevertheless, a highest proportion of subjects (65.8%) had a good desired attitude towards the taste of the iron-rich foods or meals.

Table 4.12: Subjects' responses on attitude on iron intake related items (n=144).

Attitude Items	n (%)
How likely do you think you are to be anaemic?	
Not likely	44 (38.6)
I'm not sure	46 (40.4)
Likely	24 (21.1)
How serious do you think anaemia during pregnancy is?	
Not serious	13 (11.4)
I'm not sure	37 (32.5)
Serious	64 (56.1)
How good do you think it is to prepare meals with iron-rich foods?	
Not good	4 (3.5)
I'm not sure	20 (17.5)
Good	90 (78.9)
How difficult is it for you to prepare meals with iron-rich foods?	
Difficult	10 (8.8)
So-so	62 (54.4)
Not Difficult	42 (36.8)
How confident do you feel in preparing meals with iron-rich foods?	
Not confident	14 (12.3)
So-so	52 (45.6)
Confident	48 (42.1)
How much do you like the taste of iron-rich food item or meal?	
Dislike	5 (4.4)
I'm not sure	34 (29.8)
Like	75 (65.8)

On the other hand, the findings on subjects' responses of their practice affecting the iron absorption were presented in Table 4.13. The first item of practice was to determine their previous day consumption of heme-iron rich foods. The findings stated that the highest proportion of subjects (64.9%) had chicken on the previous day, followed by fresh fish (37.7%) but 14.0% of them had none of the heme-iron foods on their previous day. From this finding, it indicated that the subjects were preferring to consume chicken rather than a lot higher iron content foods such as beef, cockles or liver.

As for citrus fruit consumption which were high in Vitamin C that helped in iron absorption and increase the bioavailability, the findings in Table 4.13 showed that majority of the subjects (72.8%) had reported to usually consume citrus fruits. However only 31.6% of them were consumed it daily and a higher proportion of them (39.5%) consumed it after they had their meal.

Regarding practice of coffee or tea consumption that could inhibit the absorption of iron, the findings in Table 4.13 showed only a third of the subjects (33.3%) were usually consumed coffee and tea and only 11.4% of them consumed the beverages daily. As on their habit of consuming the beverages, 10.5% of them consumed coffee and tea during the meal, 7.9% of them consumed right after meal and 0.9% right before meal. Besides that, 13.2% of the subjects who had coffee and tea were following the recommended ways of drinking them which was 2 hours before or after the meal.

Table 4.13: <u>Subjects' responses on practice on iron intake related items (n=144).</u>	
Practice Items	n (%)
Yesterday, during the day and night, did you eat any of the following foods?	
None	16 (14.0)
Chicken	74 (64.9)
Fresh fish	43 (37.7)
Beef	14 (12.3)
Liver	14 (12.3)
Cockles	9 (7.9)
Prawn	6 (5.3)
Mutton	3 (2.6)
Dried fish	2 (1.8)
Pork	1 (0.9)
Lungs	1 (0.9)
Do you usually eat fresh citrus fruits, such as orange, guava, kiwis, orange, papayas, strawberry or drink juice made by them?	
Yes	83 (72.8)
No	15 (13.2)
No answer/ Do not know	16 (14.0)
If Yes, is it everyday?	
Yes	36 (31.6)
No	47 (41.2)
No answer/ Do not know	31 (27.2)
When do you usually eat fresh citrus fruits?	
Before a meal	22 (19.3)
During the meal	4 (3.5)
After a meal	45 (39.5)
Before and after a meal	9 (7.9)
Before and during a meal	1 (0.9)
No answer / Do not know	33 (28.9)
Do you usually drink coffee or tea?	
Yes	38 (33.3)
No	60 (52.6)
No answer / Do not know	16 (14.0)
If Yes, is it everyday?	
Yes	13 (11.4)
No	25 (21.9)
No answer / Do not know	76 (66.7)

Table 4.13 (Cont.)

Practice Items	n (%)
When do you usually drink coffee or tea?	
2 hours or more before a meal	5 (4.4)
Right before a meal	1 (0.9)
During the meal	12 (10.5)
Right after a meal	9 (7.9)
2 hours or more after a meal	9 (7.9)
2 hour or more before or after a meal	1 (0.9)
Right before or after a meal	1 (0.9)
Never	60 (52.6)
No answer / Do not know	16 (14.0)

As previous studies' findings had showed that subjects' knowledge on nutrition could influence their attitude and practice in improving their health status. Hence, this present study's findings in Table 4.10(a) had also showed that there was a significant positive association between subjects' knowledge on iron with subjects' attitude and practice ($p < 0.01$). The higher the subjects' knowledge on iron, the better their attitude on the iron as well as their practice in managing or preventing the condition. Similarly to the finding of a study that found having a good knowledge of anaemia in pregnancy would lead to good practice in improving the condition (Onyeneho & Subramanian, 2016). However, it was in contrast to other study in which there was a non-significant association between knowledge and practice (Adznam, Sedek & Mohd Kasim, 2018 and Abdul Manaf et. al, 2014). Moreover referring to Zelalem, Mikyas and Erdaw (2018), nutritional knowledge of mothers was favourable to their nutritional attitudes during pregnancy. However, with subjects' attitude only, it would not influence the subject's practice as the findings indicated a non-significant positive association. This indicated that for this study population, without the knowledge of iron, although with good reported attitude, it would

hardly influence the subjects in nutritional practicing to improve and manage the condition.

Table 4.10(a): Association between knowledge, attitude and practice on iron		
Variables	r value	
	Attitude on iron	Practice on iron
Knowledge on iron	0.569**	0.245**
Attitude on iron	-	0.140

**Correlation is significant at p<0.01

4.8. Association of subjects’ KAP on iron and their haemoglobin level

Based on Table 4.14, the finding indicated that there was a weak negative significant association between knowledge on iron and haemoglobin level (r=-0.190, p=0.042).

Table 4.14: Association between KAP on iron and haemoglobin level (n=114)		
Variables	Haemoglobin level	
	r	p-value
Total score of knowledge on iron	-0.190	0.042*
Total score of attitude	-0.135	0.152
Total score of practice	0.067	0.480

*Correlation is significant at p<0.05

From this result it showed that as the subjects' knowledge on iron was increased or improved, inversely the haemoglobin level was decreased significantly. The finding was in contrast as other study had showed significant positive association between pregnant women's knowledge on anaemia and incidence of anaemia ($p < 0.05$) (Lestari et. al, 2018). Similarly another study showed that there was also a significant positive association between pregnant women's nutritional knowledge and haemoglobin level ($p < 0.05$) (Abdul Manaf et. al, 2014). As in Table 4.10(a), the findings indicated that knowledge and attitude was significantly associated and although the attitude was at a good level but without good level of knowledge, the practice would be influenced in which would affect the haemoglobin level. Similarly, if the subjects had a good knowledge on iron but without a good attitude towards managing it, it would also influence their practice and consequently the haemoglobin level. However, other factors could also influence the knowledge level on iron. A study found that living close to health facility ($\chi^2 = 3.666$, $p = 0.031$), education level ($\chi^2 = 18.318$, $p < 0.001$), being employed ($\chi^2 = 4.715$, $p = 0.017$) and being older ($\chi^2 = 14.203$, $p = 0.027$) could influence the knowledge level on anaemia in pregnancy (Onyeneho & Subramaniam, 2016). A local study found similar findings in which other factors such as monthly household income, education level and gestational age could influence the knowledge level. Kruskal-Wallis H test was done and found significant different between monthly household income ($p < 0.001$), educational level ($p < 0.001$) and gestational age ($p < 0.05$) on the subjects' nutritional knowledge level (Abdul Manaf et. al, 2014).

As for the association between attitude on iron and haemoglobin level, the finding in Table 4.14 showed that there was a non-significant weak negative association ($r=-0.135$, $p=0.152$). From this finding, the association indicated that as the subjects' attitude on iron was improved, the haemoglobin level was not improve. This finding was similar to Shahzad et al (2017), the study had determined non-significant weak negative association between those two variables. However, another study showed that a significant positive association between attitude and haemoglobin level (Jose, Anthony & Isaac, 2016) in which it indicated that the better the subjects' attitude towards the condition, the higher the haemoglobin level. In contrast to present study, referring to Table 4.12, a highest proportion of the subjects did know anaemia was a serious condition but they did not aware that being pregnant were putting them at risk of having the condition. According to an experimental study, there was a significant difference between experimental and control groups in perceived susceptibility in which if the subjects believed that they may be at risk of anaemia, it would lead to adoption of healthy practices by the subjects (Baharzadeh, Marashi, Saki & Zare, 2017). Moreover, in the present study, although they indicated that the iron-rich foods were good for them and they were in favour of the taste, but the findings showed average attitude or uncertainty in the ability of preparing the foods themselves which could influence subjects' practice. A study had found that social support from subjects' husbands, mothers, mothers-in-law, sisters and other family as well as their friends could significantly help them in having a positive attitude towards utilizing and adhering to the practice on managing and preventing anaemia (Tinago, Ingram, Blake & Frongillo, 2016). However, the non-significant finding suggested that attitude would not have influence the haemoglobin level.

The findings in Table 4.14 showed that there was non-significant weak positive association between practice on iron and haemoglobin level ($r=0.067$, $p=0.480$). This indicated that as the subjects' practice improved the iron bioavailability so do the haemoglobin level. A study found a significant positive association between subjects' diet and being anaemic among pregnant women ($p<0.05$) (Lestari et. al, 2018) and similarly a study had found association between dietary habits and haemoglobin level for anaemic subjects ($p<0.01$) (Kankanamge, Ariyanthna & Perera, 2017). Study by Lestari et. al (2018) had greater percentage of anaemic subjects (60.0%) compared to present study (27.0%) while the other study was populated with anaemic subjects could contribute to the significant finding. Practice could be influenced by other factors such as monthly income for the subjects to utilize the iron rich foods ($p<0.001$) (Pak, Mohannad, Rizvi & Irfan, 2012). Hence, the present study although majority of the subject had optimum knowledge on source of dietary iron, but considering the monthly household income which majority of the subjects were below than RM5000 per month could influence their practice on managing or preventing anaemia.

CHAPTER 5

CONCLUSION, LIMITATION AND FUTURE RECOMMENDATION

5.1. Conclusion

Majority of the subjects (72.8%) were non-anaemic with mean $\pm$ SD haemoglobin level of 11.52 ± 1.07 g/dL. Only 27.2% of the study population have been identified as anaemic and majority of them were in a mild state of anaemia.

This present study has found a significant weak inverse association between knowledge on iron and haemoglobin level ($r = -0.190$, $p=0.042$). Whereas, a non-significant weak inverse association has found between attitude on iron and haemoglobin level ($r = -0.135$, $p=0.152$). Similarly, this present study also has found a non-significant weak positive association between practice on iron and haemoglobin level ($r=0.067$, $p=0.480$).

Overall, this study has found that knowledge could influence haemoglobin level. Therefore, nutrition education for pregnant women should continue progressively as it can also influence their attitude and practice in preventing and managing anaemia during pregnancy. This present study has showed that there is inter-association between each knowledge, attitude and practice on iron. Furthermore, the findings enable to know the present subjects' level of knowledge, attitude and practice on iron which could help in setting a different approach for future nutrition education program. However, a lot more gaps have been identified on factors that need to be explored such as social background and social support that can influence each knowledge, attitude and practice for this particular study population. Hence, more integrated nutrition education program during antenatal check-up can be established in the future either the pregnant women are anaemic or non-anaemic and not just focusing on pregnant women but also individuals that are supporting them such as their spouse, mothers, mother-in-laws and peers.

5.2. Limitation and recommendation of this study

The subjects in this study were recruited at any gestational week or trimester. Hence, the subjects were not distributed at an equal proportion depending on the trimester group. This unable to do further comparison between the different trimester group of the target population. Therefore, in the future study this variable can be considered to control.

The subjects for this study was conveniently selected which causing the study to be highly populated with one ethnicity. This leads to lack of understanding of other ethnicity and further comparison study between different ethnicity from this study cannot be carried out. Hence, a cluster random selection of subjects for each of the ethnicity especially the major 3 ethnic groups which consist of Malay, Indian and Chinese evenly.

A self-administered questionnaire is used in this study to retrieve information from the subjects. Self-reported data could introduce bias in reporting due to social desirability bias in which the subjects want to look pleasant for others and being exaggerated in answering the questionnaire. However, this method is the most convenient way in collecting data. As for recommendation, under and over-reporting data analysis could be used to identify the biases. Furthermore, data from more subjects should be collected than the calculated sample size to cover up the under and over-reporting subjects.

Only quantitative data has been collected in this study which restricting the exploration in explaining the data clearly. Therefore, the future study should also include qualitative methods such as focus group session or individual interviews to get more depth understanding on the outcome of the data as well as able to understand more the characteristics of the study population.

A multi-regression analysis can be done as the extension of this study for factors on sociodemographic and pregnancy history. Thus, the data could be adjusted and mediators could be identified in influencing the association between KAP and haemoglobin level.

A lot more other factors should be looking into especially the underlying factors that could have an effect to the health outcome especially the one that can be changeable or improved.

An extension of this study could be carried out by looking into specific cut-off of haemoglobin level depending on the different trimester due to physiological process of hemodilution as to prevent from overestimating the prevalence of anaemia in pregnant women. Referring to WHO (1998), for first and third trimester, the haemoglobin level cut off to consider as anaemic is less than 11 g/dL. While, for the second trimester, the cut-off has been lowered down to less than 10.5 g/dL.

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Makluman Ringkas Projek Penyelidikan

Ringkasan Projek Penyelidikan

Tajuk Penyelidikan: Knowledge, attitude and practice (KAP) on Iron and its link to haemoglobin level: A cross-sectional study in pregnant women attending antenatal clinics in Seremban, Negeri Sembilan

Nama dan Jabatan Ketua Penyelidik: Nuratiqah Binti Shafizal, Pelajar Sarjana Muda Sains Pemakanan dan Kesihatan Komuniti, Jabatan Pemakanan dan Dietetik, Fakulti Perubatan dan Sains Kesihatan, Universiti Putra Malaysia

Nombor pendaftaran NMRR: NMRR-18-3195-45019

Rujukan kelulusan MREC: KKM.NIHSEC.P18-2498(6) & KKM.NIHSEC.P18-2498(7)

Tarikh mula penyelidikan: November 2018

Tarikh tamat penyelidikan: June 2019

Objektif penyelidikan:

- a) Untuk mengenalpasti status demografi, sejarah kehamilan dan simptom anemia di kalangan wanita hamil di Klinik Kesihatan Ibu dan Anak di daerah Seremban, Negeri Sembilan
- b) Untuk mengenalpasti pengambilan pemakanan yang mengandungi zat besi di kalangan wanita hamil di Klinik Ibu dan Anak di daerah Seremban, Negeri Sembilan
- c) Untuk mengenalpasti pengukuran antropometri (berat badan dan tinggi) di kalangan wanita hamil di Klinik Kesihatan Ibu dan Anak di daerah Seremban, Negeri Sembilan
- d) Untuk mengenalpasti paras hemoglobin di kalangan wanita hamil di Klinik Kesihatan Ibu dan Anak di daerah Seremban, Negeri Sembilan
- e) Untuk mengenalpasti pengetahuan, sikap dan praktik berkenaan zat besi dalam pemakanan dan anemia di kalangan wanita hamil di Klinik Kesihatan Ibu dan Anak di daerah Seremban, Negeri Sembilan
- f) Menentukan hubungan antara pengetahuan, sikap dan praktik berkenaan zat besi dalam pemakanan dan anemia dengan paras hemoglobin di kalangan wanita hamil di Klinik Kesihatan Ibu dan Anak di daerah Seremban, Negeri Sembilan

Ringkasan metodologi penyelidikan: Pengumpulan data melalui borang soal selidik, pengukuran antropometri dan rekod perubatan



(Medical Research & Ethics Committee)
KEMENTERIAN KESIHATAN MALAYSIA
d/a Institut Pengurusan Kesihatan
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Ruj.Kamt. KKM.NIHSEC. P18-2498 (8)
Tarikh : 15-Januari-2019

NURATIQA BINTI SHAFIZAL
PENYELIDIK UTAMA
UNIVERSITY PUTRA MALAYSIA (UPM)

Dato' / Tuan / Puan,

SURAT KELULUSAN ETIKA: NMRR-18-3195-45019 (IIR)
KNOWLEDGE, ATTITUDE AND PRACTICE (KAP) ON IRON AND ITS LINK TO HAEMOGLOBIN
LEVEL: A CROSS-SECTIONAL STUDY IN PREGNANT WOMEN ATTENDING ANTENATAL
CLINICS IN SEREMBAN, NEGERI SEMBILAN

Dengan hormatnya perkara di atas adalah dirujuk.

2. Bersama dengan surat ini dilampirkan surat kelulusan saintifik dan etika bagi projek ini. Segala rekod dan data subjek adalah SULIT dan hanya digunakan untuk tujuan kajian dan semua itu serta prosedur mengenai *data confidentiality* mesti dipatuhi. Kebenaran daripada Pengerah Hospital / Institusi di mana kajian akan dijalankan mesti diperolehi terlebih dahulu sebelum kajian dijalankan. Dato' / Tuan / Puan perlu akur dan mematuhi keputusan tersebut dan undang-undang lain yang berkaitan, termasuklah Akta Akses Kepada Sumber Biologi dan Perkongsian Faedah 2017.

3. Penyelidik- penyelidik yang terlibat ialah:

PEJABAT KESIHATAN DAERAH SEREMBAN
Nuratiqa Binti Shafizal (Penyelidik Utama)

4. Adalah dimaklumkan bahawa kelulusan ini adalah sah sehingga 14 Januari-2020. Tuan/Puan perlu menghantar dokumen-dokumen seperti berikut selepas mendapat kelulusan etika. Borang-borang berkaitan boleh dimuat turun daripada laman web Jawatankuasa Etika & Penyelidikan Perubatan (JEPP) (<http://www.nih.gov.my/mrec>).

- i. *Continuing Review Form* selawat-lewatnya dalam tempoh 2 bulan (60 hari) sebelum tamat tempoh kelulusan ini bagi memperbaharui kelulusan etika.
- ii. *Study Final Report* pada penghujung kajian.
- iii. Mendapat kelulusan etika sekiranya terdapat pindaan ke atas sebarang dokumen kajian / ickesi kajian / penyelidik. Pihak JEPP mempunyai hak untuk menarik balik kelulusan etika sekiranya terdapat perubahan dokumen kajian yang tidak dilsyiharkan.

5. Kajian tersebut hanya melibatkan pengumpulan data melalui:

- i. Borang soal selidik
- ii. Pengukuran antropometri
- iii. Rekod perubatan



(Medical Research & Ethics Committee)
KEMENTERIAN KESIHATAN MALAYSIA
612 Institut Pengurusan Kesihatan
Jalan Rumah Sihat, Bangsar
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Fax: 03-2232 6015

Ref: KKM NHEC. P19-2498 (7)
Date 15-January-2019

NURATIQA BINTI SHAFIZAL
PRINCIPAL / COORDINATING INVESTIGATOR
UNIVERSITY PUTRA MALAYSIA (UPM)

Dear Sir / Madam,

ETHICS INITIAL APPROVAL: NMRR-18-3195-45019 (IIR)
KNOWLEDGE, ATTITUDE AND PRACTICE (KAP) ON IRON AND ITS LINK TO HAEMOGLOBIN
LEVEL: A CROSS-SECTIONAL STUDY IN PREGNANT WOMEN ATTENDING ANTENATAL
CLINICS IN SEREMBAN, NEGERI SEMBILAN

This letter is made in reference to the above matter.

2. The Medical Research and Ethics Committee (MREC), Ministry of Health Malaysia (MOH) has provided ethical approval for this study. Please take note that all records and data are to be kept strictly **CONFIDENTIAL** and can only be used for the purpose of this study. All precautions are to be taken to maintain data confidentiality. Permission from the District Health Officer / Hospital Administrator / Hospital Director and all relevant heads of departments / units where the study will be carried out must be obtained prior to the study. You are required to follow and comply with their decision and all other relevant regulations, including the Access to Biological and Benefit Sharing Act 2017.

3. The investigators involved in this study are:

PEJABAT KESIHATAN DAERAH SEREMBAN
Nuratiqah Binti Shafizal (Principal / Coordinating Investigator)

4. The following study documents have been received and reviewed with reference to the above study:

Documents received and reviewed with reference to the above study:

- | | | | | |
|---|------------|---|--------------|------------|
| 1. Study Protocol | Version No | 4 | Version Date | 14-01-2019 |
| 2. Patient information sheet (English) & Informed Consent Form (English) | Version No | 2 | Version Date | 26-12-2018 |
| 3. Patient information sheet (BM) & Informed Consent Form (BM) | Version No | 2 | Version Date | 26-12-2018 |
| 4. Questionnaire | Version No | 5 | Version Date | 14-01-2019 |
| 5. Investigator's documents: Declaration of Conflict of Interest (COI), IA-HCD-IA and CV of: Nuratiqah Binti Shafizal | | | | |

5. Please note that the approval is valid until 14-January-2020. The following are to be reported upon receiving ethical approval. Required forms can be obtained from the Medical Research Ethics Committee (MREC) website (<http://www.nih.gov.my/mrec>).

APPENDIX B

PATIENT INFORMATION SHEET AND INFORMED CONSENT FORM *(for adult subjects and interventional studies)*

- 1. Title of study:** Knowledge, attitude and practice (KAP) on iron and its link to haemoglobin level: A cross-sectional study in pregnant women attending antenatal clinics in Seremban, Negeri Sembilan.
- 2. Name of investigator and institution:** Nuratiqah Binti Shafizal, antenatal clinics in district of Seremban, Negeri Sembilan.
- 3. Name of sponsor:** The study is not funded by any agencies/bodies/institution or grants.
- 4. Introduction:**

You are invited to participate in a research study because previous studies have showed that there is a risk of anaemia in pregnant women that requires determination of current level of knowledge, attitude and practice on iron in pregnant women with its link to haemoglobin level that may help in planning future intervention strategies to overcome anaemia issue in pregnant women. The details of the research trial are described in this document. It is important that you understand why the research is being done and what it will involve. Please take your time to read through and consider this information carefully before you decide if you are willing to participate. Ask the investigator if anything is unclear or if you like more information. After you are properly satisfied that you understand this study, and that you wish to participate, you must sign this informed consent form.

Your participation in this study is voluntary. You do not have to be in this study if you do not want to. You may also refuse to answer any questions you do not want to answer. If you volunteer to be in this study, you may withdraw from it at any time. If you withdraw, any data collected from you up to your withdrawal will still be used for the study. Your refusal to participate or withdrawal will not affect any medical or health benefits to which you are otherwise entitled.

This study has been approved by the Medical Research and Ethics Committee, Ministry of Health Malaysia.

5. What is the purpose of the study?

The purpose of this study is to determine the association of knowledge, attitude and practice on iron and its link to haemoglobin level in pregnant women attending antenatal clinics in Seremban, Negeri Sembilan. This research is necessary because according to World Health Organisation (WHO), pregnant women is at risk of anaemia and this can increase the risk of having low birth weight baby, maternal and perinatal mortality.

In 2016, around 40% of pregnant women worldwide were anaemic with haemoglobin level less than 11g/dl. In 2015, there had been reported around 8.2% of pregnant women were anaemic in Malaysia. There were extensive overseas studies showed the association between knowledge, attitude and practice on iron with the improvement of haemoglobin level. However, few local studies had been carried out in this respective area. This study will then enable to determine the current level of knowledge, attitude and practice on iron in local pregnant women. The findings from this study will further help in providing information that can be used for planning future intervention programs such as nutritional education.

A total of 114 pregnant women attending antenatal clinics in Seremban, Negeri Sembilan will be conveniently selected. The whole study will last about 2 months from February to March 2019 and your participation will be about 15 to 20 minutes.

6. What kind of study procedures will I receive?

You will first be screened to assess your eligibility to take part in the study. The inclusion criteria will include Malaysian citizen, pregnant women who come for routine antenatal check-up, childbearing age between 15 to 49 years old, able to read and write, have antenatal record in the clinic, not mentally ill, not taking any additional supplements other than the one prescribed by Doctor for your anaemic condition, not seriously ill and not having medical conditions such as chronic inflammatory bowel disease, Chron's disease, Celiac disease and thalassemia. If you are deemed suitable, you will then be required to answer a set of questionnaire to obtain information on your sociodemographic background, pregnancy history, experiences on related anaemic symptoms, dietary iron intake and level of knowledge, attitude and practice on iron. Weight and height will be measured. Haemoglobin level will be retrieved from your medical record by the researcher.

7. What will happen if I decide to take part?

If you decide to take part you will be given this information sheet to keep and be asked to sign a consent form. If you decide to take part you are still free to withdraw at any time and without giving a reason. A decision to withdraw at any time, or a decision not to take part, will not affect you in any way.

8. When will I receive the trial product and how should it be kept?

There will be no trial product involved in this research study. Instruments used will only be a questionnaire.

9. What are my responsibilities when taking part in this study?

It is important that you answer all of the questions asked in the questionnaire honestly and completely

10. What kind of treatment will I receive after my participation in the trial?

There will be no treatment involved and received after the participation in the research study. You are only required to answer a set of questionnaire.

11. What are the potential risks and side effects of being in this study?

There are no potential risks and side effects foreseen in taking part in the study as there are no activities involving biological sampling such as blood, urine sample or others. You only have to answer the provided questionnaire. The weight and height will be measured.

12. What are the benefits of being in this study?

There may or may not be any benefits to you. Information obtained from this study will contribute to the development knowledge on the association between knowledge, attitude and practice on iron and its link to haemoglobin level in pregnant women.

13. What if I am injured during this study?

There are no disadvantages, including injury foreseen in taking part in this study as there are no activities involving biological sampling such as blood, urine sample or others. You only have to answer the provided questionnaire. The weight and height will be measured.

14. What are my alternatives if I do not participate in this study?

It is up to you to decide whether or not to take part. If you decide to take part you are still free to withdraw at any time and without giving a reason. A decision to withdraw at any time, or a decision not to take part, will not affect you in any way.

15. Who is funding the research?

The study is not funded by any agencies/bodies/institutions or grants. Therefore, unfortunately, it will not be possible to reimburse any travel or other expenses incurred in taking part in the study.

16. Can the research or my participation be terminated early?

If the research or your participation is terminated earlier, for any reason you will be informed. The researcher may stop the study or your participation at any time due to concerns for your safety.

17. Will my medical information be kept private?

All your information obtained in this study will be kept and handled in a confidential manner, in accordance with applicable laws and/or regulations. When publishing or presenting the study results, your identity will not be revealed without your expressed consent. All information which is collected about you during the course of the research will be kept strictly confidential and

anonymised so that only the researcher carrying out the research will have access to such information. The researcher will also not provide any participant information to any party without the consent of participants. After the completion of the study, a sheet summarising the findings of the study will be sent to the participants via post or email if required.

Data from the study will be written up into a dissertation for a Final Year Project thesis and potential publications but your identity will not be revealed at any time.

18. Who should I call if I have questions?

If you have any questions about the study or if you think you have a study related injury and you want information about the study, please contact the researcher, Nuratiqah Shafizal at telephone number 014-6605154 or nuratiqahs@yahoo.com or my research supervisor, Dr Salma Faeza Bt Ahmad Fuzi at 03-86092974 or salmafaeza@upm.edu.my

If you have any questions about your rights as a participant in this study, please contact: The Secretary, Medical Research & Ethics Committee, Ministry of Health Malaysia, at telephone number 03-2287 4032.

INFORMED CONSENT FORM

Title of Study: Knowledge, attitude and practice (KAP) on iron and its link to haemoglobin level: A cross-sectional study in pregnant women attending antenatal clinics in Seremban, Negeri Sembilan.

By signing below I confirm the following:

- I have been given oral and written information for the above study and have read and understood the information given.
- I have had sufficient time to consider participation in the study and have had the opportunity to ask questions and all my questions have been answered satisfactorily.

I understand that my participation is voluntary and I can at anytime free withdraw from the study without giving a reason and this will in no way affect my future treatment. I am not taking part in any other research study at this time. I understand the risks and benefits, and I freely give my informed consent to participate under the conditions stated. I understand that I must follow the study doctor's (investigator's) instructions related to my participation in the study.

- I understand that study staff, qualified monitors and auditors, the sponsor or its affiliates, and governmental or regulatory authorities, have direct access to my medical record in order to make sure that the study is conducted correctly and the data are recorded correctly. All personal details will be treated as STRICTLY CONFIDENTIAL
- I will receive a copy of this subject information/informed consent form signed and dated to bring home.
- I agree/disagree* for my family doctor to be informed of my participation in this study. (*delete which is not applicable)

Subject:

Signature:

I/C number:

Name:

Date:

Investigator conducting informed consent:

Signature:

I/C number:

Name:

Date:

Impartial witness: *(Required if subject is illiterate and contents of patient information sheet is orally communicated to subject)*

Signature:

I/C number:

Name:

Date:

**RISALAH MAKLUMAT PESAKIT DAN BORANG
PERSETUJUAN atau KEIZINAN PESAKIT (*untuk
subjek dewasa dan penyelidikan intervensi*)**

1. **Tajuk penyelidikan:** Hubungan antara pengetahuan, sikap dan praktik berkenaan zat besi dan kaitan dengan paras haemoglobin: Kajian keratan rentas di kalangan wanita hamil di Klinik Kesihatan Ibu dan Anak di daerah Seremban, Negeri Sembilan.
2. **Nama Institusi and nama penyelidik:** Klinik Kesihatan Ibu dan Anak di daerah Seremban, Negeri Sembilan, Nuratiqah Binti Shafizal.
3. **Nama penaja:** Kajian ini tidak ditaja oleh mana-mana agensi/badan/ institusi atau geran.
4. **Pengenalan:**

Anda telah dijemput untuk menyertai penyelidikan ini kerana kajian-kajian sebelum ini telah menyatakan bahawa terdapat risiko anemia di kalangan wanita hamil. Penentuan pengetahuan, sikap dan praktik semasa di kalangan wanita hamil mengenai zat besi dan kaitannya dengan paras hemoglobin dapat membantu dalam melaksanakan program intervensi di masa hadapan untuk menangani masalah anemia di kalangan wanita hamil. Risalah ini menjelaskan hal-hal berkenaan penyelidikan tersebut dengan lebih mendalam dan terperinci. Amat penting untuk anda memahami mengapa penyelidikan ini dilakukan dan apa yang dilakukan dalam penyelidikan ini. Sila ambil masa yang secukupnya untuk membaca dan mempertimbangkan dengan teliti penerangan yang diberi sebelum anda bersetuju untuk menyertai penyelidikan ini. Jika ada sebarang kemusykilan ataupun maklumat lanjut yang anda ingin tahu, anda boleh bertanya dengan penyelidik yang terlibat dalam penyelidikan ini. Setelah anda berpuashati bahawa anda memahami penyelidikan ini, dan anda berminat untuk turut serta, anda dikehendaki untuk menandatangani Borang Persetujuan atau Keizinan Pesakit, pada muka surat akhir risalah ini.

Penyertaan anda dalam penyelidikan ini adalah secara sukarela. Anda tidak perlu menyertai penyelidikan ini jika anda tidak mahu. Anda juga mempunyai hak untuk tidak menjawab manamana soalan yang anda tidak mahu jawab. Anda juga boleh menarik diri daripada penyelidikan ini pada bila-bila masa. Jika anda menarik diri, segala maklumat yang telah diperolehi sebelum anda menarik diri tetap akan digunakan dalam penyelidikan ini. Jika anda tidak mahu menyertai ataupun menarik diri dari penyelidikan ini, tindakan anda tidak akan menjejaskan segala hak dan keistimewaan perkhidmatan perubatan dan kesihatan yang selayaknya anda terima.

Penyelidikan ini telah mendapat kelulusan Jawatankuasa Etika dan Penyelidikan Perubatan, Kementerian Kesihatan Malaysia.

5. **Apakah tujuan penyelidikan ini dilakukan?**

Tujuan penyelidikan ini dilakukan adalah untuk menyelidik hubungan antara pengetahuan, sikap dan praktik berkenaan zat besi dan kaitannya dengan paras hemoglobin di kalangan wanita hamil di Klinik Kesihatan Ibu dan Anak di daerah Seremban, Negeri Sembilan. Penyelidikan ini diperlukan kerana menurut *World Health Organisation (WHO)*, wanita hamil berisiko mengalami anemia. Kondisi ini kemudian meningkatkan risiko untuk mendapat bayi kurang berat badan, kematian maternal dan perinatal.

Pada 2016, 40% wanita hamil di seluruh dunia mengalami masalah anemia di mana paras hemoglobin mereka adalah di bawah 11g/dl. Di Malaysia pada tahun 2015, 8.2% wanita hamil mengalami masalah anemia. Kebanyakan kajian Luar Negara telah menyatakan bahawa terdapat hubungan di antara pengetahuan, sikap dan praktik berkenaan zat besi dan kaitannya dengan paras haemoglobin. Walaubagaimanapun, kajian seperti ini amat kurang dijalankan di Malaysia. Tambahan pula, dengan mengenalpasti tahap pengetahuan, sikap dan praktik berkenaan zat besi di kalangan wanita hamil ini, ia dapat membantu memberi maklumat untuk melaksanakan program intervensi di masa hadapan bagi mengurangkan lagi kejadian anemia di kalangan wanita hamil.

Sejumlah 114 wanita hamil yang hadir ke klinik untuk menjalani pemeriksaan antenatal akan dijemput untuk menyertai penyelidikan ini. Penyelidikan ini akan berlangsung selama 2 bulan iaitu dari Februari hingga Mac 2019 dan tempoh pembabitan anda dianggarkan selama 20 minit.

6. Apakah prosedur penyelidikan yang akan saya terima?

Penilaian akan dijalankan untuk menentu kelayakan anda dalam mengambil bahagian dalam kajian ini. Kriteria inklusi adalah warganegara Malaysia, ibu mengandung yang hadir untuk menjalani pemeriksaan rutin antenatal, berumur 15 ke 49 tahun, boleh membaca dan menulis, mempunyai rekod antenatal di klinik tersebut, mempunyai kesihatan mental yang baik, tidak mengambil suplemen tambahan selain dari yang diberikan oleh Doktor, tidak mempunyai penyakit yang serius dan kronik seperti penyakit radang usus, penyakit *Chron's*, penyakit *Celiac* dan talasemia. Sekiranya anda didapati sesuai, anda akan dipilih untuk mengisi borang soal selidik yang mengandungi beberapa soalan mengenai status demografi, sejarah kehamilan, simptom anemia, pengambilan makanan mengandungi zat besi dan tahap pengetahuan, sikap dan praktis berkenaan zat besi. Berat dan tinggi anda akan diukur. Paras hemoglobin anda akan dilihat oleh penyelidik melalui buku kesihatan anda.

7. Apakah yang terjadi kepada saya sekiranya saya bersetuju untuk menyertai penyelidikan ini?

Sekiranya anda membuat keputusan untuk mengambil bahagian, anda akan diberikan borang penerangan dan persetujuan dan diminta untuk menandatangani borang tersebut. Sekiranya anda membuat keputusan untuk mengambil bahagian, anda berhak untuk menarik diri pada bila-bila masa. Keputusan untuk menarik diri pada bila-bila masa, atau keputusan untuk tidak mengambil bahagian, tidak akan menjejaskan anda.

8. Bilakah saya akan menerima produk penyelidikan dan bagaimana cara menyimpannya?

Di dalam kajian ini tiada produk penyelidikan akan diberikan. Hanya borang soal selidik yang akan digunakan di dalam penyelidikan ini.

9. Apakah tanggungjawab saya sewaktu menyertai penyelidikan ini?

Amat penting anda menjawab kesemua soalan di dalam borang soal selidik yang diberikan oleh penyelidik dengan jujur dan lengkap.

10. Apakah jenis rawatan yang akan saya terima selepas menyertai penyelidikan ini?

Tiada rawatan yang akan diberikan atau diterima selepas menyertai penyelidikan ini. Anda hanya dikehendaki untuk melengkapkan borang soal selidik yang diberikan.

11. Apakah risiko dan kesan-kesan sampingan menyertai penyelidikan ini?

Kajian ini tidak mendatangkan apa-apa kesan berbahaya kepada peserta kerana tiada prosedur invasif yang digunakan. Tiada aktiviti yang melibatkan pensampelan biologi seperti darah, sampel air kencing dan lain-lain. Anda hanya perlu menjawab soal selidik yang telah disediakan, berat dan ketinggian akan diukur oleh penyelidik.

12. Apakah manfaatnya saya menyertai kajian ini?

Penyelidikan ini mungkin akan mendatangkan manfaat ataupun langsung tiada memberi apa-apa manfaat kepada anda. Segala maklumat yang diperolehi daripada penyelidikan ini akan dapat membantu dalam menyumbang maklumat kepada perkembangan pengetahuan mengenai hubungan antara pengetahuan, sikap dan praktik berkenaan zat besi dan kaitannya dengan paras hemoglobin di kalangan wanita hamil.

13. Apakah yang akan terjadi sekiranya saya tercedera semasa menyertai kajian ini?

Kajian ini tidak mendatangkan apa-apa kesan berbahaya kepada peserta kerana tiada prosedur invasif yang digunakan. Tiada aktiviti yang melibatkan pensampelan biologi seperti darah, sampel air kencing dan lain-lain. Anda hanya perlu menjawab borang soal selidik yang disediakan, berat dan ketinggian anda akan diukur oleh penyelidik.

14. Apakah rawatan alternatif lain sekiranya saya tidak menyertai penyelidikan ini?

Terpulang kepada anda untuk membuat keputusan sama ada untuk mengambil bahagian atau tidak. Sekiranya anda membuat keputusan untuk mengambil bahagian, anda akan diberikan borang penerangan dan persetujuan dan diminta untuk menandatangani borang tersebut. Sekiranya anda membuat keputusan untuk mengambil bahagian, anda berhak untuk menarik diri pada bila-bila masa. Keputusan untuk menarik diri pada bila-bila masa, atau keputusan untuk tidak mengambil bahagian, tidak akan menjejaskan anda.

15. Siapakah yang membiayai penyelidikan ini?

Pengajian ini tidak mendapat sebarang penajaan dari mana-mana agensi/badan/institusi atau geran. Tiada sebarang bentuk bayaran terhadap tuntutan perjalanan atau kos pengangkutan yang anda belanjakan untuk menyertai penyelidikan ini.

16. Bolehkah penyelidikan ataupun penyertaan saya ditamatkan lebih awal daripada yang dirancang?

Jika penyelidikan ini dihentikan ataupun penyertaan anda ditamatkan terlebih awal, di atas sebabsebab tertentu, anda akan dimaklumkan. Penyertaan anda akan ditamatkan oleh penyelidik ini pada bila-bila masa jika ia perlu demi keselamatan anda.

17. Adakah maklumat perubatan saya akan dirahsiakan?

Segala maklumat anda yang diperolehi dalam penyelidikan ini akan disimpan dan dikendalikan secara sulit, bersesuaian dengan peraturan-peraturan dan/ atau undang-undang yang berkenaan. Sekiranya hasil penyelidikan ini diterbitkan atau dibentangkan kepada orang ramai, identiti anda tidak akan didedahkan tanpa kebenaran anda terlebih dahulu. Semua maklumat yang diberikan akan disimpan dan digunakan secara sulit dan hanya penyelidik yang menjalankan penyelidikan akan mendapat akses kepada maklumat tersebut. Penyelidik juga tidak akan memberikan sebarang maklumat peserta kepada mana-mana pihak tanpa persetujuan peserta. Setelah selesai kajian, satu ringkasan penemuan kajian akan dihantar kepada peserta melalui pos atau e-mel jika diperlukan.

Segala data yang berkaitan dengan penyelidikan ini akan dilaporkan di dalam tesis Projek Tahun Akhir dan berpotensi untuk diterbitkan tetapi identiti anda tidak akan didedahkan sama sekali pada bila-bila masa.

18. Siapakah yang perlu saya hubungi sekiranya saya mempunyai sebarang pertanyaan?

Anda boleh menghubungi penyelidik ini Nuratiqah Shafizal pada sambungan telefon 0146605154 atau nuratiqahs@yahoo.com atau penyelia penyelidikan, Dr Salma Faeza Bt Ahmad Fuzi pada sambungan telefon 03-86092974 atau salmafaeza@upm.edu.my sekiranya anda mempunyai sebarang pertanyaan mengenai penyelidikan ini atau jika anda mengesyaki anda mengalami kecederaan yang terhasil daripada penyelidikan ini dan anda mahukan maklumat tentang penyelidikan ini.

Jika anda mempunyai sebarang pertanyaan berkaitan dengan hak-hak anda sebagai pesakit dalam penyelidikan ini, sila hubungi: Setiausaha, Jawatankuasa Etika & Penyelidikan Perubatan, Kementerian Kesihatan Malaysia, melalui talian telefon 03-2287 4032.

BORANG PERSETUJUAN/ KEIZINAN PESAKIT

Tajuk Penyelidikan: Hubungan antara pengetahuan, sikap dan praktik berkenaan zat besi dan kaitan dengan paras hemoglobin: Kajian keratan rentas di kalangan wanita hamil di Klinik Kesihatan Ibu dan Anak di daerah Seremban, Negeri Sembilan.

Dengan menandatangani di bawah, saya mengesahkan bahawa:

Saya telah diberi maklumat tentang penyelidikan di atas secara lisan dan bertulis and saya telah membaca dan memahami segala maklumat yang diberikan dalam risalah ini.

Saya telah diberikan masa yang secukupnya untuk mempertimbangkan penyertaan saya dalam penyelidikan ini dan telah diberi peluang untuk bertanya soal dan semua persoalan saya telah dijawab dengan sempurna dan memuaskan.

Saya juga faham bahawa penyertaan saya adalah secara sukarela dan pada bila-bila masa saya bebas menarik diri daripada penyelidikan ini tanpa harus memberi sebarang alasan dan ianya sama sekali tidak akan menjejaskan rawatan perubatan saya pada masa akan datang. Saya tidak mengambil bahagian dalam mana-mana penyelidikan lain pada masa ini. Saya juga memahami tentang risiko dan manfaat penyelidikan ini dan saya secara sukarela memberi persetujuan untuk menyertai penyelidikan ini di bawah syarat-syarat yang telah dinyatakan di atas. Saya faham saya harus mematuhi nasihat dan arahan yang berkaitan dengan penyertaan saya dalam penyelidikan ini daripada doktor penyelidikan (penyelidik). Saya faham bahawa kakitangan penyelidikan, pemantau dan juruaudit terlatih, pihak penaja atau gabungannya, dan pihak berkuasa kerajaan atau undang-undang, mempunyai akses langsung dan boleh menyemak laporan perubatan saya bagi memastikan penyelidikan ini dijalankan dengan betul dan data direkodkan dengan betul. Segala maklumat dan data peribadi akan dianggap sebagai SULIT.

Saya akan menerima satu salinan 'Risalah Maklumat Pesakit dan Borang Persetujuan atau Keizinan Pesakit' yang telah lengkap dengan tarikh dan tandatangan untuk dibawa pulang ke rumah.

Saya bersetuju/ tidak bersetuju* untuk doktor yang biasa merawat saya diberitahu tentang penyertaan saya dalam penyelidikan ini. (*Potong mana yang tidak berkenaan)

Subjek:

Tandatangan:

Nama:

Nombor K/P:

Tarikh :

Penyelidik yang mengendalikan proses menandatangani borang keizinan:

Tandatangan:

Nama:

Nombor K/P:

Tarikh :

Saksi tidak-berpihak/adil: (Diperlukan; jika subjek adalah buta huruf dan kandungan risalah maklumat pesakit disampaikan secara lisan kepada subjek)

Tandatangan:

Nama:

Nombor K/P:

Tarikh :



Fakulti Perubatan dan Sains Kesihatan
Faculty of Medicine and Health Sciences
Jabatan Pemakanan dan Dietetik
Department of Nutrition and Dietetics

PKK 4999
PROJEK ILMIAH TAHUN AKHIR
FINAL YEAR PROJECT

SULIT
CONFIDENTIAL

Soal Selidik
Questionnaire

Hubungan antara pengetahuan, sikap dan praktik berkenaan zat besi dan kaitan dengan paras haemoglobin: Kajian keratan rentas di kalangan wanita hamil di Klinik Kesihatan Ibu dan Anak di daerah Seremban, Negeri Sembilan.
Knowledge, attitude and practice (KAP) on iron and its link to haemoglobin level: A cross-sectional study in pregnant women attending antenatal clinics in Seremban, Negeri Sembilan

Penyelidik	/ <i>Researcher</i>	: Nuratiqah binti Shafizal
Program	/ <i>Programme</i>	: B. Sc. (Nutrition & Community Health)
Penyelia	/ <i>Supervisor</i>	: Dr Salma Faeza Ahmad Fuzi

Semua maklumat yang diberikan di sini adalah dirahsiakan dan hanya digunakan untuk tujuan akademik sahaja. Kejayaan kajian ini amat bergantung kepada kerjasama pihak tuan/puan dalam menjawab kesemua soalan yang dikemukakan. Segala kerjasam yang tuan/puan berikan saya didahului dengan ribuan terima kasih.

Your personal information given in this questionnaire is for research purpose only. It will be kept strictly confidential. I would be grateful if you could help me by completing this questionnaire.

Seksyen A / Section A: Sociodemografi / Sociodemography

Maklumat peribadi individu / Personal background information

No.	Maklumat / Information	Pilihan / Options
1.	Umur / Age	tahun / years old
2.	Tarikh lahir / Date of birth	 (hh-bb-tttt) / (dd-mm-yyyy)
3.	Kaum / Ethnicity	☐ Melayu / Malay ☐ Cina / Chinese ☐ India / Indian ☐ Lain-lain / Others, nyatakan / please state:
4.	Agama / Religion	☐ Islam / Islam ☐ Buddha / Buddha ☐ Hindu / Hindu ☐ Kristian / Christian ☐ Lain-lain / Others, nyatakan / please state:
5.	Tahap pendidikan tertinggi / Highest level of education	☐ Tiada pendidikan formal / No formal education ☐ Sekolah Rendah / Primary School ☐ Sekolah Menengah / Secondary School ☐ Institut Pengajian Tinggi/ Tertiary Education ☐ Lain-lain / Others, Nyatakan / please state:
6.	Status bekerja / Employment status	☐ Kerajaan / Government ☐ Bukan Kerajaan / Non-government ☐ Tidak bekerja / Unemployed ☐ Lain-lain / Others, Nyatakan / please state: _____
7.	Pendapatan isi rumah bulanan / Monthly household income	RM _____

Seksyen B / Section B: Sejarah kehamilan & Masalah kesihatan / Pregnancy history & Health problems

No.	Maklumat / Information	Pilihan / Options								
1.	Minggu kandungan anda sekarang / <i>Current pregnancy week</i>	_____ minggu / week								
2.	Tarikh dijangka bersalin / <i>Estimated delivery due date</i>	<table><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table> (hh-bb-tttt) / (dd-mm-yyyy)								
3.	Bilangan no. lawatan terkini ke klinik untuk pemeriksaan kandungan / <i>Current number of visits to clinic for pregnancy check-up</i>	_____ kali / time(s)								
4.	Ada mengambil pil pre-natal (asid folik / zat besi) dari klinik kesihatan? <i>Take any pre-natal pills (folic acid / iron) from the health clinic?</i>	☐ Ya / Yes (tanda √ jika ambil / mark √ if take it) ☐ Asid folik / Folic acid ☐ Zat besi / Iron ☐ Tidak / No								
5.	Ada mengambil ubat-ubatan, supplemen tambahan, vitamin atau jamu? / <i>Take any medication, supplementation, vitamins or home remedies?</i>	☐ Ya / Yes (sila nyatakan / please state) 1. _____ 2. _____ 3. _____ 4. _____ 5. _____ ☐ Tidak / No								
6.	Adakah anda mempunyai masalah kesihatan atau penyakit sebelum kehamilan? / <i>Do you have any health problems or medical condition not related to pregnancy?</i>	☐ Ya / Yes (sila nyatakan / please state) 1. _____ 2. _____ 3. _____ 4. _____ 5. _____ ☐ Tidak / No								
7.	Kehamilan pertama / <i>First pregnancy</i>	☐ Ya / Yes (Jika Ya, sila jawab soalan di Seksyen C / <i>If Yes, please answer question in Section C</i>) ☐ Tidak / No (Jika Tidak, sila jawab soalan no.8 dan seterusnya / <i>If No, please answer question no.8 and complete this section</i>)								
8.	Bilangan kehamilan terkini/ <i>Current no. of pregnancy</i>	<table><tr><td></td><td></td></tr></table>								
9.	Bilangan kelahiran terkini/ <i>Curent no. of delivery</i>	<table><tr><td></td><td></td></tr></table>								
10.	Bilangan anak yang masih hidup / <i>No. of living children</i>	<table><tr><td></td><td></td></tr></table> orang / children								

Seksyen C / Section C: Tanda-tanda keletihan & anemia / Symptoms of fatigue & anaemia

Sila bulat salah satu nombor pada setiap kenyataan di bawah berdasarkan keadaan yang anda alami **7 hari yang lalu**. *Please circle or mark one number per line to indicate your response as it applies to the past 7 days.*

No	Kenyataan / Staement	Tidak sama sekali / Not at all	Jarang sekali / A little bit	Kadang-kadang / Somewhat	Agak kerap / Quite a bit	Sangat kerap / Very much
1.	Saya berasa tidak bermaya ("kehabisan tenaga") / <i>I feel listless ("washed out")</i>	0	1	2	3	4
2.	Saya berasa penat / <i>I feel tired</i>	0	1	2	3	4
3.	Saya susah hendak <u>memulakan</u> sesuatu sebab saya penat/ <i>I have trouble starting things because I am tired</i>	0	1	2	3	4
4.	Saya susah hendak <u>menyudahkan</u> sesuatu sebab saya penat/ <i>I have trouble finishing things because I am tired</i>	0	1	2	3	4
5.	Saya ada tenaga / <i>I have energy</i>	0	1	2	3	4
6.	Saya susah hendak berjalan/ <i>I have trouble walking</i>	0	1	2	3	4
7.	Saya boleh melakukan kegiatan biasa saya/ <i>I am able to do my usual activities</i>	0	1	2	3	4
8.	Saya perlu tidur pada siang hari / <i>I need to sleep during the day</i>	0	1	2	3	4
9.	Saya berasa seperti hendak pitam (pening) / <i>I feel lightheaded (dizzy)</i>	0	1	2	3	4
10.	Saya mengalami sakit kepala / <i>I get headaches</i>	0	1	2	3	4

11.	Saya ada rasa sakit di bahagian dada / <i>I have pain in my chest</i>	0	1	2	3	4
12.	Saya terlalu penat untuk makan / <i>I am too tired to eat</i>	0	1	2	3	4
13.	Saya ada semangat untuk melakukan kegiatan biasa saya / <i>I am motivated to do my usual activities</i>	0	1	2	3	4
14.	Saya memerlukan bantuan untuk melakukan kegiatan biasa saya / <i>I need help doing my usual activities</i>	0	1	2	3	4
15.	Saya kecewa sebab terlalu penat untuk melakukan apaapa yang saya mahu	0	1	2	3	4
16.	Saya terpaksa mengehadkan kegiatan sosial saya sebab saya penat	0	1	2	3	4

Seksyen D / Section D: Amalan pemakanan / Food habit

Sila isi ruangan kotak ‘Berapa kali kekerapan pengambilan setiap makanan tersebut’ dan ‘jumlah sajian yang diambil setiap kali anda makan’.

Please fill in the box on how frequent each type of food was taken and how much of serving was eaten each time.

Jenis Makanan <i>Type of food</i>	Berapa kali kekerapan pengambilan makanan (Isikan dalam salah satu kolum sahaja) <i>How frequent each food was taken (Fill in one of the columns only)</i>			Rujukan saiz hidangan <i>Reference of meal size</i>	Jumlah Sajian (setiap kali makan) <i>Total servings (each time eaten)</i>
	Sehari/ <i>Daily</i>	Seminggu/ <i>Weekly</i>	Sebulan/ <i>Monthly</i>		
Bijirin dan hasil bijirin/ <i>Cereals and cereals product</i>					
Bijirin sarapan pagi (Cornflakes, koko crunch, honeystar dsb.)/ Breakfast cereal				cawan/ <i>cup</i>	
Bijirin tersedia perlu dibancuh (Nestum, quaker oats, dsb.)/ <i>Cereal grains prepared with water</i>				cawan/ <i>cup</i>	
Roti bijirin penuh/ <i>Wholemeal bread</i>				keping/ <i>slices</i>	
Roti/ <i>Bread</i>				keping/ <i>slices</i>	
Roti bun/ <i>Bread bun</i>				biji/ <i>pieces</i>	
Capati				keping/ <i>slices</i>	
Nasi beras perang/ <i>Brown rice</i>				cawan/ <i>cup</i>	
Nasi berperisa (Nasi briyani, nasi goreng dsb.)/ <i>Flavoured rice</i>				cawan/ <i>cup</i>	
Mee kuning/ Mee siput/ Mee segera/ Noodles				cawan/ <i>cup</i>	
Pulut/ <i>Glutinous rice</i>				cawan/ <i>cup</i>	
Roti canai (termasuk roti telur, roti sardine, roti bawang,, roti pisang, murtabak)				keping/ <i>slices</i>	
Tosai				keping/ <i>slices</i>	
Pasta				cawan/ <i>cup</i>	
Jagung/ <i>Corn</i>				tongkol	
Jenis Makanan <i>Type of food</i>	Berapa kali kekerapan pengambilan makanan (Isikan dalam salah satu kolum sahaja) <i>How frequent each food was taken (Fill in one of the columns only)</i>			Rujukan saiz hidangan <i>Reference of meal size</i>	Jumlah Sajian (setiap kali makan) <i>Total servings (each time eaten)</i>
	Sehari/	Seminggu/	Sebulan/		
Makanan segera/ <i>Fast food</i>					

Jenis Makanan <i>Type of food</i>	Berapa kali kekerapan pengambilan makanan (Isikan dalam salah satu kolom sahaja) <i>How frequent each food was taken (Fill in one of the columns only)</i>			Rujukan saiz hidangan <i>Reference of meal size</i>	Jumlah Sajian (setiap kali makan) <i>Total servings (each time eaten)</i>
	Sehari/ <i>Daily</i>	Seminggu/ <i>Weekly</i>	Sebulan/ <i>Monthly</i>		
Bijirin dan hasil bijirin/ <i>Cereals and cereals product</i>					
Bijirin sarapan pagi (Cornflakes, koko crunch, honeystar dsb.)/ <i>Breakfast cereal</i>				cawan/ <i>cup</i>	
Bijirin tersedia perlu dibancuh (Nestum, quaker oats, dsb.)/ <i>Cereal grains prepared with water</i>				cawan/ <i>cup</i>	
Roti bijirin penuh/ <i>Wholemeal bread</i>				keping/ <i>slices</i>	
Roti/ <i>Bread</i>				keping/ <i>slices</i>	
Roti bun/ <i>Bread bun</i>				biji/ <i>pieces</i>	
Capati				keping/ <i>slices</i>	
Nasi beras perang/ <i>Brown rice</i>				cawan/ <i>cup</i>	
Nasi berperisa (Nasi briyani, nasi goreng dsb.)/ <i>Flavoured rice</i>				cawan/ <i>cup</i>	
Mee kuning/ Mee siput/ Mee segera/ <i>Noodles</i>				cawan/ <i>cup</i>	
Pulut/ <i>Glutinous rice</i>				cawan/ <i>cup</i>	
Roti canai (termasuk roti telur, roti sardine, roti bawang,, roti pisang, murtabak)				keping/ <i>slices</i>	
Tosai				keping/ <i>slices</i>	
Pasta				cawan/ <i>cup</i>	
	<i>Daily</i>	<i>Weekly</i>	<i>Monthly</i>		
Kentang Lenyek/ <i>Mashed potatoes</i>				bekas kecil/ <i>small container</i>	
Kentang Goreng/ <i>French fries</i>				cawan/ <i>cup</i>	
Sosej/ Hotdog/ <i>Frankfurter</i>				keping/ <i>slices</i>	
Coleslaw				bekas kecil/ <i>small container</i>	
Nugget				ketul/ <i>pieces</i>	
Ayam Goreng/ <i>Fried chicken</i>				ketul/ <i>pieces</i>	
Burger				biji/ <i>pieces</i>	
Pizza				keping/ <i>slices</i>	

Jenis Makanan <i>Type of food</i>	Berapa kali kekerapan pengambilan makanan (Isikan dalam salah satu kolom sahaja) <i>How frequent each food was taken (Fill in one of the columns only)</i>			Rujukan saiz hidangan <i>Reference of meal size</i>	Jumlah Sajian (setiap kali makan) <i>Total servings (each time eaten)</i>
	Sehari/ <i>Daily</i>	Seminggu/ <i>Weekly</i>	Sebulan/ <i>Monthly</i>		
Daging dan hasil daging/ <i>Meat and meat product</i> *Bagi peserta bukan Islam					
*Ham				keping/ <i>slices</i>	
*Daging khinzir/babi/ <i>pork</i>				kotak mancis/ <i>matchbox size</i>	
*Luncheon meat				keping/ <i>slices</i>	
*Bacon				keping/ <i>slices</i>	
Jenis Makanan <i>Type of food</i>	Berapa kali kekerapan pengambilan makanan (Isikan dalam salah satu kolom sahaja) <i>How frequent each food was taken (Fill in one of the columns only)</i>			Rujukan saiz hidangan <i>Reference of meal size</i>	Jumlah Sajian (setiap kali makan) <i>Total servings (each time eaten)</i>
Daging dan hasil daging/ <i>Meat and meat product</i>	Sehari/ <i>Daily</i>	Seminggu/ <i>Weekly</i>	Sebulan/ <i>Monthly</i>		
Organ dalaman (Hati/limpa, paru)/ <i>Internal organs (liver, spleen, lungs)</i>				kotak mancis/ <i>matchbox size</i>	
Lembu/ Kerbau/ <i>Beef</i>				kotak mancis/ <i>matchbox size</i>	
Kambing/ <i>Mutton</i>				kotak mancis/ <i>matchbox size</i>	
Ayam/ <i>Chicken</i>				ketul/ <i>pieces</i>	
Itik/ <i>Duck</i>				ketul/ <i>pieces</i>	
Bebola ayam/daging/ <i>Chicken/meat ball</i>				ketul/ <i>pieces</i>	
Jenis Makanan <i>Type of food</i>	Berapa kali kekerapan pengambilan makanan (Isikan dalam salah satu kolom sahaja) <i>How frequent each food was taken (Fill in one of the columns only)</i>			Rujukan saiz hidangan <i>Reference of meal size</i>	Jumlah Sajian (setiap kali makan) <i>Total servings (each time eaten)</i>
Ikan dan makanan laut/ <i>Fish and seafoods</i>	Sehari/ <i>Daily</i>	Seminggu/ <i>Weekly</i>	Sebulan/ <i>Monthly</i>		
Kekerang (kerang, lala, remis, kupang, mentarang dsb.)/ <i>Shellfish</i>				sudu makan/ <i>tablespoon</i>	
Siput sedut (belitung, siput buluh dsb.)/ <i>Snail</i>				sudu makan/ <i>tablespoon</i>	
Ikan jeruk/ Pekasam/ <i>Pickled fish</i>				keping/ <i>pieces</i>	

Ikan bilis/ <i>Anchovy</i>				sudu makan/ <i>tablespoon</i>	
Ikan laut/ <i>Marine fish</i>				ekor/ <i>whole</i>	
Ikan air tawar/ <i>Freshwater fish</i>				ekor/ <i>whole</i>	
Ikan kering/ <i>Dried fish</i>				ekor/ <i>whole</i>	
Ikan dalam tin/ <i>Canned fish</i>				ekor/ <i>whole</i>	
Keropok ikan/ udang/ /sotong/ ketam/ <i>Fish/ prawn/ squid/ crab crackers</i>				keping/ <i>slices</i>	
Sotong kering/ <i>Dried squid</i>				keping/ <i>pieces</i>	
Ketam/ <i>Crab</i>				ekor/ <i>whole</i>	
Udang basah/ <i>Prawn</i>				ekor/ <i>whole</i>	
Bebola/kek ikan/ udang/ sotong/ ketam/ <i>fish/ prawn/ squid/ crab ball or cake</i>				ketul/ <i>pieces</i>	
Jenis Makanan <i>Type of food</i>	Berapa kali kekerapan pengambilan makanan (Isikan dalam salah satu kolum sahaja) <i>How frequent each food was taken</i> <i>(Fill in one of the columns only)</i>			Rujukan saiz hidangan <i>Reference of meal size</i>	Jumlah Sajian (setiap kali makan) <i>Total servings</i> <i>(each time eaten)</i>
Telur/ <i>Eggs</i>	Sehari/ <i>Daily</i>	Seminggu/ <i>Weekly</i>	Sebulan/ <i>Monthly</i>		
Telur itik (masak lemak/ gulai, telur dadar)/ <i>Duck eggs</i> <i>(cooked with coconut milk</i> <i>gravy, omelette)</i>				biji/ <i>whole</i>	
Telur puyuh (rebus/ masak sambal)/ <i>Quail eggs (boiled/ with chillies)</i>				biji/ <i>pieces</i>	
Telur masin/ <i>Salted eggs</i>				biji/ <i>pieces</i>	
Telur ayam (mata kerbau/ telur dadar/ telur rebus/ telur masak sambal/ telur pindang)/ <i>Hen eggs (bulls</i> <i>eye, omelette, boiled with</i> <i>chillies or herbs)</i>				biji/ <i>pieces</i>	
Jenis Makanan <i>Type of food</i>	Berapa kali kekerapan pengambilan makanan (Isikan dalam salah satu kolum sahaja) <i>How frequent each food was taken</i> <i>(Fill in one of the columns only)</i>			Rujukan saiz hidangan <i>Reference of meal size</i>	Jumlah Sajian (setiap kali makan) <i>Total servings</i> <i>(each time eaten)</i>
Kecacang dan hasilnya/ <i>Legumes and legumes</i> <i>product</i>	Sehari/ <i>Daily</i>	Seminggu/ <i>Weekly</i>	Sebulan/ <i>Monthly</i>		

Kekacang (kacang hijau/ parang/ kuda/ merah dsb.)/ <i>Legumes</i>				sudu makan/ <i>tablespoon</i>	
Kacang tanah/ <i>Groundnuts</i>				sudu makan/ <i>tablespoon</i>	
Tauhu				keping/ <i>slices</i>	
Tempe/ <i>Fermented soy beans</i>				keping/ <i>slices</i>	
Jenis Makanan <i>Type of food</i>	Berapa kali kekerapan pengambilan makanan (Isikan dalam salah satu kolom sahaja) <i>How frequent each food was taken (Fill in one of the columns only)</i>			Rujukan saiz hidangan <i>Reference of meal size</i>	Jumlah Sajian (setiap kali makan) <i>Total servings (each time eaten)</i>
Susu dan hasil tenusu/ <i>Milk and milk products</i>	Sehari/ <i>Daily</i>	Seminggu/ <i>Weekly</i>	Sebulan/ <i>Monthly</i>		
Susu tepung/ <i>Powdered milk</i>				sudu makan/ <i>tablespoon</i>	
Jenis Makanan <i>Type of food</i>	Berapa kali kekerapan pengambilan makanan (Isikan dalam salah satu kolom sahaja) <i>How frequent each food was taken (Fill in one of the columns only)</i>			Rujukan saiz hidangan <i>Reference of meal size</i>	Jumlah Sajian (setiap kali makan) <i>Total servings (each time eaten)</i>
Sayur-sayuran/ <i>Vegetables</i>	Sehari/ <i>Daily</i>	Seminggu/ <i>Weekly</i>	Sebulan/ <i>Monthly</i>		
Sayuran berdaun hijau (bayam, kangkung, kalian, dsb.)/ <i>Leafy vegetables</i>				sudu makan/ <i>tablespoon</i>	
Ulam-ulaman/ <i>Local fresh salad</i>				sudu makan/ <i>tablespoon</i>	
Cendawan kering/ <i>Dried mushrooms</i>				sudu makan/ <i>tablespoon</i>	
Taugeh/ <i>Bean sprout</i>				sudu makan/ <i>tablespoon</i>	
Bendi/ <i>Ladies finger</i>				sudu makan/ <i>tablespoon</i>	
Cili/ <i>Chilies</i>				sudu makan/ <i>tablespoon</i>	
Tomato/ <i>Tomatoes</i>				sudu makan/ <i>tablespoon</i>	
Cendawan basah/ <i>Mushrooms</i>				sudu makan/ <i>tablespoon</i>	
Sayuran berubi (kentang, keladi, keledak)/ <i>Tubers (potatoes, sweet potatoes, yam)</i>				sudu makan/ <i>tablespoon</i>	

Sayuran kekacang lain (kacang panjang, kacang buncis, kacang botol dsb.)/ <i>Other type of legumes</i>				sudu makan/ <i>tablespoon</i>	
Jenis Makanan <i>Type of food</i>	Berapa kali kekerapan pengambilan makanan (Isikan dalam salah satu kolum sahaja) <i>How frequent each food was taken (Fill in one of the columns only)</i>			Rujukan saiz hidangan <i>Reference of meal size</i>	Jumlah Sajian (setiap kali makan) <i>Total servings (each time eaten)</i>
Buah-buahan/ <i>Fruits</i>	Sehari/ <i>Daily</i>	Seminggu/ <i>Weekly</i>	Sebulan/ <i>Monthly</i>		
Buahan kering (kurma, prun, kismis dsb.)/ <i>Dried fruits</i>				sudu makan/ <i>tablespoon</i>	
Rambutan				biji/ <i>pieces</i>	
Durian				ulas/ <i>pieces</i>	
Nangka / Cempedak/ <i>Jackfruit</i>				biji/ <i>pieces</i>	
Kelapa muda/ <i>Young coconut</i>				sudu makan/ <i>tablespoon</i>	
Nenas/ <i>Pineapple</i>				potong/ <i>slices</i>	
Jambu batu/ <i>Guava</i>				keping/ <i>slices</i>	
Manggis/ <i>Mangosteen</i>				biji/ <i>pieces</i>	
Buahan jeruk/ Acar/ <i>Pickled fruits</i>				sudu makan/ <i>tablespoon</i>	
Jenis Makanan <i>Type of food</i>	Berapa kali kekerapan pengambilan makanan (Isikan dalam salah satu kolum sahaja) <i>How frequent each food was taken (Fill in one of the columns only)</i>			Rujukan saiz hidangan <i>Reference of meal size</i>	Jumlah Sajian (setiap kali makan) <i>Total servings (each time eaten)</i>
Minuman/ <i>Drinks</i>	Sehari/ <i>Daily</i>	Seminggu/ <i>Weekly</i>	Sebulan/ <i>Monthly</i>		
Minuman bermalt (milo, Horlick dsb.)/ <i>Malted drink</i>				cawan/ <i>cup</i>	
Jenis Makanan <i>Type of food</i>	Berapa kali kekerapan pengambilan makanan (Isikan dalam salah satu kolum sahaja) <i>How frequent each food was taken (Fill in one of the columns only)</i>			Rujukan saiz hidangan <i>Reference of meal size</i>	Jumlah Sajian (setiap kali makan) <i>Total servings (each time eaten)</i>
Konfeksi/ <i>Confectionaries</i>	Sehari/ <i>Daily</i>	Seminggu/ <i>Weekly</i>	Sebulan/ <i>Monthly</i>		
Kuih-muih/ <i>Local kuih</i>				ketul/ <i>pieces</i>	
Kek/ <i>Cake</i>				potong/ <i>slices</i>	
Jenis Makanan <i>Type of food</i>	Berapa kali kekerapan pengambilan makanan			Rujukan saiz hidangan	Jumlah Sajian (setiap kali makan)

	(Isikan dalam salah satu kolom sahaja) <i>How frequent each food was taken</i> (Fill in one of the columns only)			<i>Reference of meal size</i>	<i>Total servings (each time eaten)</i>
Sapuan Roti/ <i>Bread Spread</i>	Sehari/ <i>Daily</i>	Seminggu/ <i>Weekly</i>	Sebulan/ <i>Monthly</i>		
Sapuan coklat/ <i>Chocolate spread</i>				sudu makan/ <i>tablespoon</i>	
Mentega kacang / <i>Peanut butter</i>				sudu makan/ <i>tablespoon</i>	
Jenis Makanan <i>Type of food</i>	Berapa kali kekerapan pengambilan makanan (Isikan dalam salah satu kolom sahaja) <i>How frequent each food was taken</i> (Fill in one of the columns only)			Rujukan saiz hidangan <i>Reference of meal size</i>	Jumlah Sajian (setiap kali makan) <i>Total servings (each time eaten)</i>
Perencah/ Perasa/ <i>Flavours</i>	Sehari/ <i>Daily</i>	Seminggu/ <i>Weekly</i>	Sebulan/ <i>Monthly</i>		
Sos ikan/ <i>Fish sauce</i>				sudu teh/ <i>teaspoon</i>	
Budu				sudu teh/ <i>teaspoon</i>	
Sos tiram/ <i>Oyster sauce</i>				sudu teh/ <i>teaspoon</i>	
Sos tomato/ <i>Tomato ketchup</i>				sudu teh/ <i>teaspoon</i>	
Sos cili/ <i>Chilli sauce</i>				sudu teh/ <i>teaspoon</i>	

**Seksyen E / Section E: Pengetahuan, sikap & amalan berkenaan zat besi /
Knowledge, attitude & practice on iron**

Sila jawab semua soalan. Tandakan (✓) pada jawapan yang betul. Tanda satu atau lebih dari satu jawapan.

Please answer all the questions. Tick (✓) for the correct answer. You can tick more than one option of answers.

1.	Pernakah anda dengar tentang anemia? / <i>Have you heard about anaemia?</i> i) Jika Ya, bagaimana anda mengenalpasti jika seseorang itu menghadapi anemia? / <i>If Yes, how can you recognise someone who has anaemia?</i>	☐ Ya / <i>Yes</i> ☐ Tidak / <i>No</i> ☐ Tidak tahu / <i>Do not know</i> ☐ Kurang tenaga/lemah (<i>Less energy/weakness</i>) ☐ Pucat (<i>Paleness/pallor</i>) ☐ Kuku berbentuk sudu/bengkok (koilonychias) (<i>Spoon/Bent nails</i>) ☐ Senang jatuh sakit (<i>More likely to become sick</i>) ☐ Tidak tahu (<i>Do not know</i>)
2.	Apakah risiko dari segi kesihatan pada bayi dan kanak-kanak kecil jika kekurangan pengambilan zat besi di dalam pemakanan mereka? / <i>What are the health risks for infant and young children of a lack of iron in the diet?</i>	☐ Melewatkan perkembangan mental (<i>Delay mental development</i>) ☐ Melewatkan perkembangan fizikal (<i>Delay physical development</i>) ☐ Tidak tahu (<i>Do not know</i>)
3.	Apakah risiko dari segi kesihatan bagi wanita hamil jika kekurangan zat besi di dalam pemakanan mereka? / <i>What are the health risks for pregnant women of a lack of iron in the diet?</i>	☐ Risiko kematian ketika atau selepas hamil (<i>Risk of dying during or after pregnancy</i>) ☐ Komplikasi ketika bersalin (<i>Difficult delivery</i>) ☐ Tidak tahu (<i>Do not know</i>)
4.	Apakah penyebab anemia? / <i>What causes anaemia?</i>	☐ Kurang pengambilan zat besi di dalam makanan/Makan terlalu sedikit/Kurang makan (<i>Lack of iron in the diet/Eat too little, not much</i>) ☐ Penyakit/Jangkitan (malaria, cacing kerawit, HIV/AIDS) (<i>Sickness/Infection (malaria, hookworm, HIV/AIDS)</i>) ☐ Pendarahan haid yang banyak (<i>Heavy bleeding during menstruation</i>) ☐ Tidak tahu (<i>Do not know</i>)
5.	Bagaimana anemia boleh dielakkan? / <i>How can anaemia be prevented?</i>	☐ Makan atau memberi makanan kaya dengan zat besi / mengamalkan pemakanan kaya dengan zat besi (<i>Eat/feed iron-rich foods / having a diet rich in iron</i>) ☐ Makan / memberi makanan kaya dengan vitamin C semasa atau sejurus selepas makan (<i>Eat / give vitamin C rich foods during or right after meals</i>) ☐ Mengambil / memberi suplemen zat besi mengikut arahan Doktor (<i>Take / give iron supplements if prescribed</i>) ☐ Merawat penyebab anemia (penyakit atau jangkitan lain) dengan mendapatkan nasihat perubatan (<i>Treat other causes</i>)

		<i>of anaemia (diseases and infections)-seek health care assistance)</i> ☐ Meneruskan penyusuan susu ibu bagi bayi berumur 6-23 bulan (<i>Continue breastfeeding for infants 6-23 months old</i>) ☐ Tidak tahu (<i>Do not know</i>)	
6.	Makanan manakah yang kaya dengan zat besi? / Which of the foods listed are rich in iron?	Daging organ dalaman / Organ meat ☐ Hati / Liver ☐ Buah pinggang / Kidney ☐ Jantung / Heart ☐ Paru-paru / Lungs Isi daging / Flesh meat ☐ Lembu / beef ☐ Khinzir / pork ☐ Kambing / mutton ☐ Ayam / chicken	☐ Itik / duck Ikan & hasil lautan / Fish & Seafood ☐ Ikan segar / Fresh fish ☐ Ikan kering / Dried fish ☐ Ikan dalam tin / Canned fish ☐ Lala / Clam ☐ Kerang / Cockles ☐ Udang / Prawn ☐ Tidak tahu / Do not know
7.	Ketika makan, ada beberapa makanan yang membantu penyerapan zat besi, apakah makanan tersebut? / <i>When taken during meals, certain foods help the body absorb and use iron. What are those foods?</i>	☐ Jambu batu / Guava ☐ Buah kiwi / Kiwi fruit ☐ Mangga / Mango ☐ Limau manis / Orange ☐ Betik / Papaya	☐ Strawberi / Strawberry ☐ Durian belanda / Soursop ☐ Lada benggala / Capsicum ☐ Tomato ☐ Tidak tahu / Do not know
8.	Terdapat minuman yang akan mengurangkan penyerapan zat besi jika diambil bersama makanan lain. Apakah minuman tersebut? / <i>Some beverages decrease iron absorption when taken with meals. What are those beverages?</i>	☐ Kopi / Coffee ☐ Teh / Tea ☐ Tidak tahu / Do not know	
9.	Semalam, pada waktu pagi dan malam, adakah anda mengambil makanan tersebut? Sila tandakan (✓) pada makanan yang diambil. Jika anda tidak mengambil langsung makanan yang dinyatakan, sila terus ke Soalan no. 12 / <i>Yesterday, during the day and night, did you eat any of the following foods? (Read the list of the foods and tick (✓) for the one that you consumed. If none of the foods were consumed, please move to Question no. 12)</i>	Daging organ dalaman / Organ meat ☐ Hati / Liver ☐ Buah pinggang / Kidney ☐ Jantung / Heart ☐ Paru-paru / Lungs Isi daging / Flesh meat ☐ Lembu / beef ☐ Khinzir / pork ☐ Kambing / mutton	☐ Ayam / chicken ☐ Itik / duck Ikan & hasil lautan / Fish & Seafood ☐ Ikan segar / Fresh fish ☐ Ikan kering / Dried fish ☐ Ikan dalam tin / Canned fish ☐ Lala / Clam ☐ Kerang / Cockles ☐ Udang / Prawn

10.	Adakah satu kebiasaan bagi anda mengambil buah-buahan sitrus yang segar seperti oren, jambu, kiwi, lemon, laici, betik, strawberi atau jus buah-buahan ini? / <i>Do you usually eat fresh citrus fruits, such as orange, guava, kiwis, orange, papayas, strawberry or drink juice made by them?</i> i) Jika Ya, adakah anda mengambilnya setiap hari? / <i>If Yes, is it everyday?</i> ii) Bilakah kebiasaan anda mengambil buah-buahan segar sitrus ini? / <i>When do you usually eat fresh citrus fruits?</i>	☐ Ya / Yes ☐ Tidak / No ☐ Tidak tahu / Tiada jawapan (<i>Do not know / No answer</i>) ☐ Ya / Yes ☐ Tidak / No ☐ Tidak tahu / Tiada jawapan (<i>Do not know / No answer</i>) ☐ Sebelum Makan / <i>Before a meal</i> ☐ Bersama makanan yang lain / <i>During the meal</i> ☐ Selepas makan / <i>After a meal</i> ☐ Tidak tahu / Tiada jawapan (<i>Do not know / No answer</i>)
11.	Adakah satu kebiasaan bagi anda mengambil minuman seperti kopi atau teh? / <i>Do you usually drink coffee or tea?</i> i) Jika Ya, adakah anda mengambilnya setiap hari? / <i>If Yes, is it everyday?</i> ii) Bilakah kebiasaan anda mengambil minuman seperti kopi atau teh? / <i>When do you usually drink coffee or tea?</i>	☐ Ya / Yes ☐ Tidak / No ☐ Tidak tahu / Tiada jawapan (<i>Do not know / No answer</i>) ☐ Ya / Yes ☐ Tidak / No ☐ Tidak tahu / Tiada jawapan (<i>Do not know / No answer</i>) ☐ 2 jam atau lebih sebelum makan / <i>2 hours or more before a meal</i> ☐ Sejurus sebelum makan / <i>Right before a meal</i> ☐ Bersama makanan yang lain / <i>During the meal</i> ☐ Sejurus selepas makan / <i>Right after a meal</i> ☐ 2 jam atau lebih selepas makan / <i>2 hours or more after a meal</i> ☐ Tidak pernah / <i>Never</i> ☐ Tidak tahu / Tiada jawapan (<i>Do not know / No answer</i>)
12.	Mungkinkah anda mengalami anemia? / <i>How likely do you think you are to be anaemic?</i>	☐ Tidak mungkin / <i>Not likely</i> ☐ Kurang pasti / <i>I'm not sure</i> ☐ Mungkin / <i>Likely</i>
13.	Seriuskah anemia ketika hamil? / <i>How serious do you think anaemia during pregnancy is?</i>	☐ Tidak serius / <i>Not serious</i> ☐ Kurang pasti / <i>I'm not sure</i> ☐ Serius / <i>Serious</i>
14.	Bagi pendapat anda, adakah ia bagus untuk menyediakan makanan yang mengandungi zat besi yang tinggi seperti daging	☐ Tidak bagus / <i>Not good</i> ☐ Kurang pasti / <i>I'm not sure</i> ☐ Bagus / <i>Good</i>

	lembu, ayam atau hati? / <i>How good do you think it is to prepare meals with iron-rich foods such as beef, chicken or liver?</i>	
15.	Adakah ia sukar bagi anda untuk menyediakan makanan yang mengandungi zat besi yang tinggi? / <i>How difficult is it for you to prepare meals with iron-rich foods?</i>	☐ Sukar / <i>Difficult</i> ☐ Biasa sahaja / <i>So-so</i> ☐ Tidak sukar / <i>Not difficult</i>
16.	Adakah anda yakin dalam menyediakan makanan yang mengandungi zat besi yang tinggi? / <i>How confident do you feel in preparing meals with iron-rich foods?</i>	☐ Tidak yakin / <i>Not confident</i> ☐ Biasa sahaja/so-so ☐ Yakin / <i>Confident</i>
17.	Adakah anda suka dengan rasa makanan yang mengandungi zat besi yang tinggi? <i>How much do you like the taste of iron-rich food item or meal?</i>	☐ Tidak suka / <i>Dislike</i> ☐ Kurang pasti / <i>I am not sure</i> ☐ Suka / <i>Like</i>

Seksyen F / Section F (akan diisi oleh penyelidik / *fill in by researcher*)

Pengukuran / <i>Measurement</i>	Bacaan awal kehamilan / <i>First gestation reading</i>	Bacaan terkini / <i>Current reading</i>
Berat / <i>Weight</i> (kg)		
Tinggi / <i>Height</i> (cm)		
Indeks Jisim Tubuh / <i>Body Mass Index</i> (kg/m ²)		

Seksyen F / Section F (akan diisi oleh penyelidik / *fill in by researcher*)

Paras Hemoglobin / <i>Haemoglobin level</i> (g/dl)	Yang terawal / <i>Initial</i> : _____ @ minggu kehamilan / <i>gestation week</i> : _____ Yang terkini / <i>Current</i> : _____ @ minggu kehamilan / <i>gestation week</i> : _____
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Soalan tamat di sini. Terima kasih atas penyertaan anda. *The questions end here. Thank you for participating.*

APPENDIX E

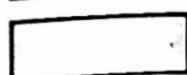
Gantt chart

Table 8 below indicates the timeline and activities that are involved in this study.

Table 8: Timeline of the study process

Task	Year of 2018				Year of 2019						
	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	July
Literature Review											
Decide Research topic											
Decide methodology											
Proposal Write Up											
Study proposal submission to MREC											
Gain ethical approval from MREC											
Finalise methodology from approved amendment by MREC											
Data collection											
Interpret & analyse data											
Document the findings/produce a report											
Disseminate the findings if required											

Guideline:



Planned frame-time task



Completed task