



**UNIVERSITI PUTRA MALAYSIA**

***COFFEE CONSUMPTION HABITS AND HAEMOGLOBIN LEVEL:  
A CROSS-SECTIONAL STUDY IN PREGNANT WOMEN ATTENDING  
ANTENATAL CLINICS IN WILAYAH PERSEKUTUAN, KUALA  
LUMPUR***

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**BY  
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Medicine and Health Sciences, Universiti Putra Malaysia**

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## LIST OF ABBREVIATION

<b>HB</b>	<b>Haemoglobin level</b>
<b>BMI</b>	<b>Body Mass Index</b>
<b>WHO</b>	<b>World Health Organization</b>
<b>SF</b>	<b>Serum ferritin</b>
<b>TIBC</b>	<b>Total iron binding capacity</b>
<b>FFQ</b>	<b>Food Frequency Questionnaire</b>
<b>NCCFN</b>	<b>National Coordinating Committee on Food and Nutrition</b>
<b>MANS</b>	<b>Malaysian Adults Nutrition Survey</b>



## ABSTRACT

### Coffee Consumption Habits and Haemoglobin Level: A Cross-Sectional Study in Pregnant Women Attending Antenatal Clinics in Wilayah Persekutuan Kuala Lumpur

Nur Syafiqah binti Ghazali

Iron is an essential component that can be found in haemoglobin. Lack of iron stores in the body may lead to anaemia, a condition which few number of red blood cells functioning in carrying oxygen throughout the body. Based on World Health Organisation, the proportion of worldwide prevalence of anaemia was high among women and children where 57% of pregnant women, 48% of non-pregnant women and 68% of preschool children. Coffee has been shown to be one of dietary inhibitors that can inhibit iron absorption. Therefore, the study was carried out to investigated the association between coffee consumption habits with haemoglobin level in pregnant women. A total of 176 pregnant women with mean±SD age of 29.30 ± 4.28 with range between 25 to 29 years old attending antenatal clinics in Wilayah Persekutuan, Kuala Lumpur were involved in this study. Questionnaire on sociodemographic, pregnancy history, symptom of anaemia ,dietary iron intake and caffeine consumption habits were used. The weight, height, BMI and haemoglobin level were retrieved from antenatal medical records. From the findings, 93.6% of participants were non-anaemic with mean±SD haemoglobin of 11.99 ± 1.06mg/dl, 54% were choosing medium size cup of coffee and 68.8% drink one cup of coffee per day. However, there is no significant negative association between frequency of coffee intake ( $r=-0.052$ ,  $p=0.495$ ) and amount of coffee intake ( $r= -0.018$ ,  $p= 0.813$ ) with haemoglobin level. Thus, the findings highlighted that habitual coffee consumption is not a major factor that lead to low haemoglobin level in pregnant women. Early nutritional education in pregnant women could reduced the prevalence of anaemia in future.

## ABSTRAK

Hubungan Antara Kekekapan Pengambilan Kopi dan Kaitannya Dengan Paras Hemoglobin: Kajian Keratan Rentas di Kalangan Wanita Hamil di Klinik Kesihatan Ibu dan Anak di Kawasan Wilayah Persekutuan, Kuala Lumpur

Nur Syafiqah binti Ghazali

Zat besi adalah komponen penting yang terdapat dalam hemoglobin. Kekurangan penyimpanan zat besi di dalam badan boleh mengakibatkan anemia. Anemia adalah keadaan di mana kekurangan jumlah sel darah merah yang berfungsi untuk membawa oksigen ke seluruh tubuh. Menurut Pertubuhan Kesihatan Sedunia (2008), wanita dan kanak-kanak mempunyai kadar kelaziman anemia tertinggi di seluruh dunia, di mana 57% adalah dalam kalangan wanita hamil, 48% wanita tidak hamil dan 68% adalah kanak-kanak pra-sekolah. Perencat pemakanan adalah salah satu faktor yang boleh menghalang penyerapan zat besi dalam tubuh. Oleh itu, tujuan penyelidikan ini dilakukan adalah untuk mengenalpasti hubungan antara kekekapan pengambilan kopi dan kaitannya dengan paras hemoglobin di kalangan wanita hamil. Sejumlah 176 wanita hamil yang hadir ke klinik di kawasan Wilayah Persekutuan, Kuala Lumpur adalah berumur diantara 25 hingga 29 tahun telah mengambil bahagian dalam kajian ini. Borang soal selidik mengenai status demografi, sejarah kehamilan, simptom anemia, pengambilan makanan mengandungi zat besi dan kekekapan pengambilan kopi telah digunakan bagi menilai peserta. Ketinggian, berat badan dan paras hemoglobin diambil melalui buku kesihatan peserta. Korelasi Pearson telah dilakukan bagi menentukan hubungan antara pembolehubah. Hasil penemuan menunjukkan 93.6% peserta tidak mempunyai anemia ( $11.99\text{mg/dl} \pm 1.06$ ) dan 54% memilih cawan kopi bersaiz sederhana, manakala 68.8% mengambil secawan kopi sehari. Bagaimanapun, tiada perkaitan yang signifikan di antara kekekapan pengambilan kopi ( $r = -0.052$ ,  $p = 0.495$ ) dan jumlah pengambilan kopi ( $r = -0.018$ ,  $p = 0.813$ ) dengan paras hemoglobin. Berdasarkan keputusan kajian, kopi adalah bukan faktor utama yang menyebabkan paras hemoglobin rendah di kalangan wanita hamil. Hasil kajian menunjukkan, kepentingan pemberian pendidikan awal mengenai pemakanan di kalangan wanita hamil dapat mengurangkan kelaziman anemia pada masa akan datang.

## CHAPTER 1

### 1.0 INTRODUCTION

#### 1.1 Background of the Study

Iron is an essential micronutrient that is important in human organism. Iron plays major roles in variety of metabolic processes in body such as oxygen transport, DNA synthesis, electron transport and cellular functioning (Gupta, 2014). Most of the body iron presents as haemoglobin and myoglobin that transport oxygen from lungs to tissue (Lonnerdal, 2013). There were two main sources of dietary iron: haem and non-haem iron. Haem iron can be derived from animal product such as meat, poultry, and seafood, whilst non-haem iron is found in plant based food products such as grains, legumes, nuts and fruits. Absorption of non-haem iron depends on its bioavailability. Haem iron had better absorption compared to non-heme iron due its higher bioavailability. There were various factors that affected bioavailability of iron including enhancer such as vitamin C and inhibitor such as polyphenol and dietary fiber (Hoppe, Brun, Larsson, Moraeus, & Hulthen, 2013). Low iron intake or blood loss will cause depleted of iron stores and may result in anemia (Jimenez, Kulnigg-Dabsch, & Gasche, 2015).

Anaemia has become globally public health problem and the prevalence rate was reached the alarming especially in Africa (57.1%), South-East Asia (48.2%), Europe (25.1%) and Western Pasific (30.7%) (Nik & Mohd, 2012). According to WHO (2008), approximately 1.62 billion people which equivalent to 24.8% of the population were anemic. Anaemia can affect all ages, but the most affected and vulnerable groups includes pregnant women and young children. WHO has estimated that 75% of the pregnant women in the world have haemoglobin level below than 11g/dl which indicates anaemia (Messenger & Lim, 2016).

In Malaysia approximately 38% of pregnant women have anaemia and the prevalence was high in Indian and Malay (NH Nik & S Mohd, 2012). A retrospective study of anaemia during pregnancy in rural Kelantan was carried out to identify the factor associated with anaemia. The study involved 9,860 pregnant women who came for their antenatal care at one of the 102 rural health clinics selected. Photocalorimetic methods or Sahliis method was used to assess the haemoglobin level. Data on pregnancy and maternal haemoglobin level on first and last antenatal visit also were retrieved from antenatal records The findings showed that 47.5% of pregnant women was diagnosed with anaemia with haemoglobin level less than 11 mg/dl (Ahmad et al., 1997).

There were several main risk factors for anaemia including low dietary intake of iron, poor absorption of iron from diet that is high in phytate or phenolic compounds, heavy bleeding and chronic infections. However, there were also several compounds that have been recognized as iron absorption inhibitor such as polyphenol, phytate, methylxanthine, oxalate, and calcium (Jaramillo et al., 2015).

Coffee was one of the most widely consumed beverages worldwide with approximately 85% of Americans was reported to consume one cup of coffee per day (Bech et al., 2005). Findings from the Malaysian Adult Nutrition Survey (2014) also showed that, coffee was the third drinks that commonly consumed by Malaysian adults. The percentage of drinking coffee was approximately 1.5 to 2 times higher in 2014 (Noraida et al., 2018). Coffee contained more than 1,000 of bioactive compounds and one of them was polyphenol. Polyphenol in coffee has been demonstrated to inhibit non-haem iron absorption by binding to the iron and form insoluble complex, thus preventing iron from absorbed through the gastrointestinal tract. Therefore, coffee had been showed one of the risk factors on poor iron absorption in the body (Kim, Ham, Shigenaga, & Han, 2008).

Other than that, coffee also contained methylxanthine which can easily be absorbed and might affected the haemoglobin concentrations. Fetus has low level enzymes that can metabolize the caffeine and coffee has being recognized as one of the iron inhibitor that might interfere with the cellular function of iron in fetus including blood production (Bech et al., 2005).

Consumption of coffee simultaneously with iron food source may reduced absorption by up to 80% (Jin et al., 2016). Hence, due to increased demand of irons during pregnancy, pregnant women should limit their coffee intake with no more than 200 mg per day, one or two cups of coffee per day to reduce various adverse effects on pregnancy outcomes (Ju, 2015).

A cohort study within the Danish National Birth Cohort was aimed to investigate the association between coffee consumption during pregnancy and the risk of fetal death due to low haemoglobin level among 88,482 pregnant women in Denmark. The information on coffee consumption were retrieved by telephone interview. It was identified that coffee has been showed various effect on pregnancy outcomes, including fetal death and still birth. The risk was increased with the increasing number of cups of coffee per day. The adjusted hazard ratios for fetal death associated with coffee consumption of ½-3, 4-7, and >8 cups of coffee per day were 1.03 (95% CI: 0.89, 1.19), 1.33 (95% CI: 1.08, 1.63), and 1.59 (95% CI: 1.19, 2.13) respectively. The risk of stillbirth due to placental dysfunction also was increased among pregnant women that consume 4 or more cups of coffee per day (hazard ratio= 2.27, 95% CI: 1.21, 4.28) (Bech et al., 2005). Another cross sectional study was carried out on 465 pregnant women age 18-47 years in Kuwaiti to determined the risk factors of anaemia and iron deficiency. It has been showed that haemoglobin concentration in pregnant women in Kuwait was found to be associated with coffee ( $r = -0.115$ ,  $p = 0.013$ ) (Ahmed & Al-Sumaie, 2011).

There were still lack of studies on anaemia among pregnant women in Malaysia especially related to the effect of coffee on absorption of iron and haemoglobin level. Previous study did not specifically focused on coffee consumption with its link to haemoglobin level, but mainly on other dietary factors and its link to serum ferritin. Further studies should be carried out locally to investigate the effect of dietary iron inhibitor on haemoglobin level among pregnant women. Therefore, the aim of this study is to investigate the coffee consumption habits and its link to haemoglobin level in pregnant women attending antenatal clinics in Wilayah Persekutuan area, Kuala Lumpur.

## **1.2 Objective**

### **1.2.1 General Objective**

To determine the association between coffee consumption habits with haemoglobin level in pregnant women attending antenatal clinics in Wilayah Persekutuan, Kuala Lumpur.

### **1.2.2 Specific Objectives**

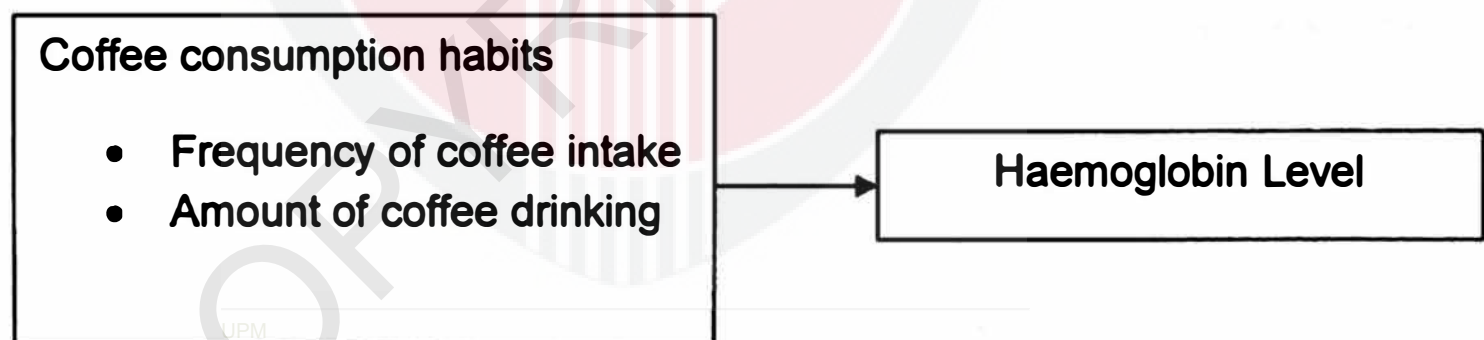
1. To determine sociodemographic background, pregnancy history and anaemia symptom in pregnant women attending antenatal clinics in Wilayah Persekutuan, Kuala Lumpur.
2. To determine dietary iron intake in pregnant women attending antenatal clinics in Wilayah Persekutuan, Kuala Lumpur.
3. To assess anthropometric measurement in pregnant women attending antenatal clinics in Wilayah Persekutuan, Kuala Lumpur.
4. To assess haemoglobin level in pregnant women attending antenatal clinics in Wilayah Persekutuan, Kuala Lumpur.
5. To determine coffee consumption habits in pregnant women attending antenatal clinics in Wilayah Persekutuan, Kuala Lumpur.
6. To determine association between coffee consumption habits with haemoglobin level in pregnant women attending antenatal clinics in Wilayah Persekutuan, Kuala Lumpur.

### 1.3 Hypothesis

H1: There is association between coffee consumption habits with haemoglobin level in pregnant women attending antenatal clinics in Wilayah Persekutuan, Kuala Lumpur.

H0: There is no association between coffee consumption habits with haemoglobin level in pregnant women attending antenatal clinics in Wilayah Persekutuan, Kuala Lumpur.

### 1.4 Conceptual Framework



## CHAPTER 2

### 2.0 Literature Review

#### 2.1 Iron

Iron is an essential nutrient that play major role in basic body function and it can be found in every cell of the body. Iron is a substance that involved in cellular replication, immune system and act as essential element for blood production by transporting oxygen through the body. It also important during early life for the growth and development of the spinal cord and brain (Shamah et al., 2016).

The source of iron can be found in diet. There were two type of dietary source of iron which are haem and non-haem iron. Haem iron can be found in animal-based food such as meat, poultry or fish, whereas non-haem iron can be found in plant-based food such as grains, beans, and vegetables (Brissot et al., 2018). Haem iron provide more function towards body especially in supplies oxygen as haemoglobin and myoglobin, whereas non-haem would be inorganic

iron, very abundant in vegetables foods and common used for fortification of food. Hence, non-haem iron also has much smaller bioavailability in body compared to haem iron (Lo, 2004).

Both of these iron source will be absorbed in inversed proportion to body stores. Haem iron absorbed more efficiently compared to non-haem iron. Non-haem iron absorption can vary from 0.1% to >35% whereas haem iron was from 20% to 50% (Lonnerdal, 2013). The amount of iron absorption by the body were depends on the content of iron in the diet, the size of body stores, the balance between dietary enhancers and inhibitors of iron absorption. Therefore, stores iron in body should be balanced between iron absorption and excretion (Shamah et al., 2016).

However, excessive absorbed of iron from dietary might lead to hemochromatosis or toxic because of the body regulatory system unable to excreted the excessed of iron. These excessed of iron will accumulated and deposited in tissues or organ. Later, it can caused heart failure, diabetes or cirrhosis (Beutler & Lee 2010). In fact, inadequate of iron store in body may lead to anaemia due to reduction of the haemoglobin concentration. Haemoglobin acts as oxygen transport in body where it will carried oxygen from the lung to the tissue. There were several risk factor that might reduce the haemoglobin concentration including genetic, infectious disease or dietary intake (Cogswell et al., 2008).

## 2.2 Anaemia

According to WHO (2011), anaemia was a condition which body has decreased in number of red blood cell or haemoglobin to met body physiological needs. Due to reduction of oxygen capacity in organ and tissues, several symptom will be experienced by anemic people. Anaemia has become most common public health problem throughout the world where it can be risk at all staged of group especially among women, children, and vegetarian (Viana, Raggio, & Valeria, 2013). The cut-off points for haemoglobin level is presented in Table 3.1. The consequences of anaemia includes general fatigue, weakness and shortness of breath (Lee, 2016). Inadequate intake of diet, reduced absorption of iron, infections, and excessive blood loss was determined as predictors of anaemia (Pundkar et al, 2017).

Table 3.1: Cut-Off Point of Haemoglobin Level (g/dl)

<b>Categories</b>	<b>Cut-Off Point of Haemoglobin Level (g/dl)</b>
Men	<13.0
Female, non pregnant	<12.0
Pregnant women	<11.0
Children (6 months to 6 years)	<11.0
Children (6-14 years)	<12.0

Source: WHO (2001)

Anaemia was affected 25% to 50% of the population entire world and most predemontly among children and women (Barjasteh et al., 2015). The prevalence was high in preschool-age children (47%), followed by pregnant women (41%), non-pregnant women (30%), school-age children (25%) and older age (24%) whereas men become the least affected group on anaemia which only 12%. According to National Family Health Survey of India (NFHS), there were 56% of women age between 15 and 49 years that living in rural Maharastra had greater prevalence of anaemia.

Global data showed that 76% of pregnant women in developing countries had anaemia. The prevalence was high among pregnant women in Sub-Saharan Arica (57%), followed by Southeast Asia (48%) And South America (24%) (Stephen et al., 2018). In Asia, it was estimated around 7.26% average of mortality is due to anaemia. Thus, anaemia also has been found to increased maternal mortality and morbidity (Ahankari et al., 2017). In Malaysia, prevalence of anaemia among pregnant women and non pregnant women was 38.3% and 30.1%. Compared between ethnicities in Malaysia, Indians had the highest prevalence of anaemia which is 30.84% compared to Malays and Chinese (Maria et al., 2017).

Nowadays, women had been associated with anaemia during pregnancy by having low haemoglobin concentration less than 11g/dl. There were three types of classification for anaemia, mild anaemia (Hb 10.0-10.9g/dl), moderate anaemia

(Hb 7.0-9.9g/dl) and severe anaemia (Hb<7.0g/dl). However, the prevalence of anaemia in pregnancy varies due to differences in socioeconomic status, lifestyle and health seeking behaviors (Triharini et al., 2018). Besides, anaemia in pregnancy may result with poor pregnancy outcome and complication that threaten life of both mother and fetus such as preterm delivery, low birth weight, stillbirth or neonatal death. During pregnancy, demanding for requirement of iron was increased from 0.8 mg per day in first trimester to 7.5 mg per day in the third trimester due to the expansion of cell-mass, development and maintenance of the maternal placental parts (Balarajan et al., 2011).

### 2.3 Haemoglobin

Haemoglobin is made up of from four globin chains that connected together. Each globulin chain contained important iron known as haem which reversibly will binds to oxygen. Haemoglobin was present in blood at concentration of 13.5-18.0 g/dl in and 11.5-16.0 g/dl in women. Each erythrocyte contains around 200-300 million molecules of haemoglobin. Haemoglobin also plays important role in maintaining the shape of red blood cells, however, abnormal haemoglobin structure can disrupted the shape of red blood cells thus impaired the function and flow through blood vessels. There were several functions of haemoglobin including

transported of oxygen from lung to tissues, carried carbon dioxide from tissues to lungs, and presence in nitric oxide metabolism (Thomas & Andrew, 2012).

Low haemoglobin level can caused anaemia due to iron deficiency where it affects the ability to produced haem molecule. There were also other disease related with abnormalities of haemoglobin such as sickle cell anaemia, thalassemia and prophyria. This disease and conditions may caused the body produced fewer red blood cells than normal or destroyed red blood cells more than produced (Bernard & Franklin, 2013).

## **2.4 Caffeine**

Caffeine is one of the substance that available in coffee, tea, chocolate, soft drinks, and energy drinks which can give physiological effect. Coffee was one of dietary inhibitor that will reduced iron absorption and contained more caffeine than other beverages. Coffee was most popular beverage consumed where about one-third of the world's population in large amount other than any beverage. According to Health Canada (2010), there were specific recommendation on coffee intake that safe to be use which were <400mg/d for adult, 45-85mg/d for children age 6-12 years, 2.5mg/d for children age >12 years and pregnant women <300mg/d. In the United States, more than 75% of pregnant women reported intake of caffeine-containing products. (Mitchell et al., 2014).

There are several chemical composition in coffee that provided health benefits including polyphenol. Coffee had the highest total polyphenol content in beverages followed by green tea. Polyphenol in coffee may contributed to flavours and aroma (Yamagata, 2018). However, high consumption of coffee was known to inhibit iron absorption especially non-haem iron. Dietary polyphenols were not necessarily the most active within the body due to lower intrinsic activity, poorly absorbed from intestine, highly metabolized or easily eliminated (Ma, Kim, Lindsay, & Han, 2012). Consuming 20-50 mg of polyphenol with meal may reduce 50-70% of iron absorption, whereas 100-400 mg of polyphenol reduce iron absorption 60-

90%. It was noticed that single serving of instant coffee contained 120 mg of polyphenols (Mascitelli & Goldstein, 2011).

#### **2.4.1 Caffeine with haemoglobin level**

The association between daily food intake and habitual coffee consumption was investigated in a cross-sectional study carried out by Ginting et al., (2018) in 115 former leprosy patient which a group of people that at risk of anaemia. To assess nutrient consumption, a 24-hr dietary recall and coffee drinking habits questionnaire was used. The incidence of anaemia were obtained through haemoglobin level. Daily coffee consumption have significant associated with the incidence of anaemia (OR=2.689, 95% CI:1.109-6.521; p=0.035).

:

A cross sectional study on the factors influencing anaemia among adolescent girls was carried out by Verma et al., (2004) in of pre-adolescent and adolescent girl age 6-18 years from the slums of Ahmedabad City. The questionnaire related on knowledge about anaemia, status of menstruation and dietary habit factors were used. The blood samples were withdrawn to assess the haemoglobin level. Findings reported that, 81.8% of girls were anaemic and it was significantly higher among adolescent who drinking tea or coffee after meal (94.4%) (p<0.01). This study also support by Sumitra & Kumari (2017) on the

association between dietary habits of drinking tea immediately after meal with anaemia. A cross sectional study was carried out in 280 pregnant women attending antenatal clinics in Kathmandu, India. The habitual drinking tea among pregnant women were 6.47 times more likely to occur anaemia compared with pregnant women who did not drinking tea (OR=6.476, 95%CI=1.950-21.501, p=0.001) and there is a significant association between pregnant women who drinking tea immediately after meal with anaemia (OR=8.303, 95%CI=1.935-35.638, p=0.001).

On the contrary, the association between dietary patterns and haemoglobin concentration was investigated in a cross sectional study carried out by Kankanamge, Ariyaratna, & Perera (2017) in 304 of healthy females aged between 20-50 in Southern province of Sri Lanka. Interviewer administered questionnaire was used to assess dietary patterns. It was demonstrated that dietary pattern have less effect on the haemoglobin level. Thus, findings reported that there is no significant difference was observed between intake of tea (p=0.296), coffee (p=0.755) or plain tea (p=0.806) with haemoglobin concentration among females.

This is support by another cross-sectional study that has been carried out among 500 medical students at Hodeidah University, Yemen between ages of 17 and 25 years. The questionnaire on dietary drink habits, socioeconomic status, demographic information, and medical history was collected. The complete blood

counts (CBC), serum ferritin (SF), serum iron (SI) and total iron binding capacity (TIBC) were measured by using hematology analyzer. Findings from this study showed that 30.4% of students were anemic where 47.1% are female and 21.5% are male with mean $\pm$ SD of haemoglobin level for anemic female was 12.00g/dl $\pm$ 0.80 and male was 10.82g/dl $\pm$ 0.63. There was a low statistically significant compared to non-anaemic female and male ( $p < 0.001$ ). It also found that there was no statistically significant difference between consume coffee after meal with anaemia ( $r = 0.427$ ,  $p = 0.513$ ) (Al-alimi, Bashanfer, & Morish, 2018).

A cross-sectional study on the prevalence of anaemia among pregnant women was carried out by Tewabech & Alemayehu (2014) in 395 pregnant women who had attending antenatal care at Addis Ababa Ethiopia. Interview administered questionnaire was used to assess sociodemographic, obstetrics and dietary factor related to anaemia. Findings showed that 84% of pregnant women were anaemic, where 80.95% of them were mildly anaemic, 17.86% moderately anaemic and 1.19% were severely anaemic. However, drinking coffee immediately after meal did not showed significant association with anaemia ( $p = 0.069$ ).

#### **2.4.2 Caffeine and other risk factors**

A prospective longitudinal observational study on the maternal caffeine intake during pregnancy and risk of fetal growth restriction was carried out by Konje & Cade (2008) in 2635 low risk pregnant women between 8-12 weeks of pregnancy at United Kingdom hospital maternity units. The total caffeine intake was taken from 4 weeks before conception and throughout pregnancy was taken with a validated caffeine assessment tool. Caffeine half-life was determined by measuring caffeine in saliva after a caffeine challenge. Findings showed that caffeine consumption throughout pregnancy was associated with increased risk of fetal growth restriction ( $p=0.02$ ). It showed that having caffeine intake of 100-199 mg/day will increased in fetal growth restricted up (OR=1.2, 95% CI: 0.9-1.6), for intake 200-299 mg/day was (OR=1.5, 95% CI: 1.1 to 2.1), and (OR=1.4, 95%CI: 1.0 to 2.0) for intakes >300mg/day compared to <100mg/day. The reduction in birth weight was high which about 60-70g with significant trend for higher caffeine intake ( $p=0.004$ ).

Daily consumption of coffee either 1 to 2 cups during pregnancy was associated with low birth weight because caffeine has been found can be pass through placenta barriers and may influenced fetal growth by reducing villous blood flow. A cross sectional study was carried out by Xue et al., (2008) investigated on parental predictors of birthweight. The study involved 34,063 participants from the

Nurse's Mother's Cohort. The questionnaire was used to assess parental behavior and maternal diet during pregnancy. It was reported that maternal diet on certain food especially milk, coffee and seafood have been showed the risk of low birth weight. Daily consumption of coffee was associated with a decreased 10g in birthweight ( $p < 0.0001$ ). Drinking 1 to 2, 3 to 4, and more than 5 cups of coffee daily was associated with a 28% (95% CI: 0.12, 0.47), 30% (95% CI: 0.10, 0.55) and 65% (95% CI: 0.25, 1.12) increased risk of low birth weight compared to non-drinker coffee.

Drinking coffee has significant association with undernutrition among pregnant women. A cross-sectional study was carried out in 940 pregnant women in Gondar town, Northwest Ethiopia. One on one interview was administered to pregnant women at household level. From the findings, it showed that, the risk of undernutrition was decreased among pregnant women who consumed coffee sometimes (AOR: 0.57; 95% CI: 0.36-0.89;  $p = 0.06$ ) as compared to daily consumers. Pregnant women who frequently drinking coffee were 43% less likely to develop undernutrition compared to those who taking daily consumption (Abel & Hanna, 2019).

A cross-sectional study on prevalence and risk factors for urinary incontinence was carried out in 450 healthy pregnant Brazilian women age between 19 to 49 years old. The questionnaire was used to assess the

**sociodemographic and main risk factors related to urinary incontinence among women at reproductive age. The findings showed healthy pregnant women who consumed two or more cups of coffee per day have increased the risk of urinary incontinence during pregnancy ( $p=0.008$ ) (Martins, Soler, & Moore, 2010).**



## CHAPTER 3

### 3.0 Methodology

#### 3.1 Study design

A cross sectional study was carried out in 176 pregnant women attending antenatal clinics in Wilayah Persekutuan, Kuala Lumpur to determine the association between coffee consumption habits and its link to hemoglobin level in pregnant women. The data was collected after obtaining the approval from the Medical Research and Ethics Committee (MREC) and Jawatankuasa Etika Universiti (JKE), UPM. On the day of data collection, participants was approached by researcher while waiting for their turn in the antenatal clinics. Researcher will briefly explain the purpose of the study. Participants who decide to voluntarily partake in the study was provided with the information sheet, consent form, and a set of questionnaire. Sufficient time was allowed for participants to considered their participation in the study prior signing the informed consent. A set of questionnaire were takes approximately 15 to 20 minutes to be completed. All the data were collected on the day of data collection with no follow up visit required. Data were

collected within a two month from January until February 2019 at the selected antenatal clinics. Pretesting were carried out on 30 pregnant women before the actual data collection to check the clarity, reliability, and understanding of the questionnaire. The following **Figure 3.1** summarizes the study design.

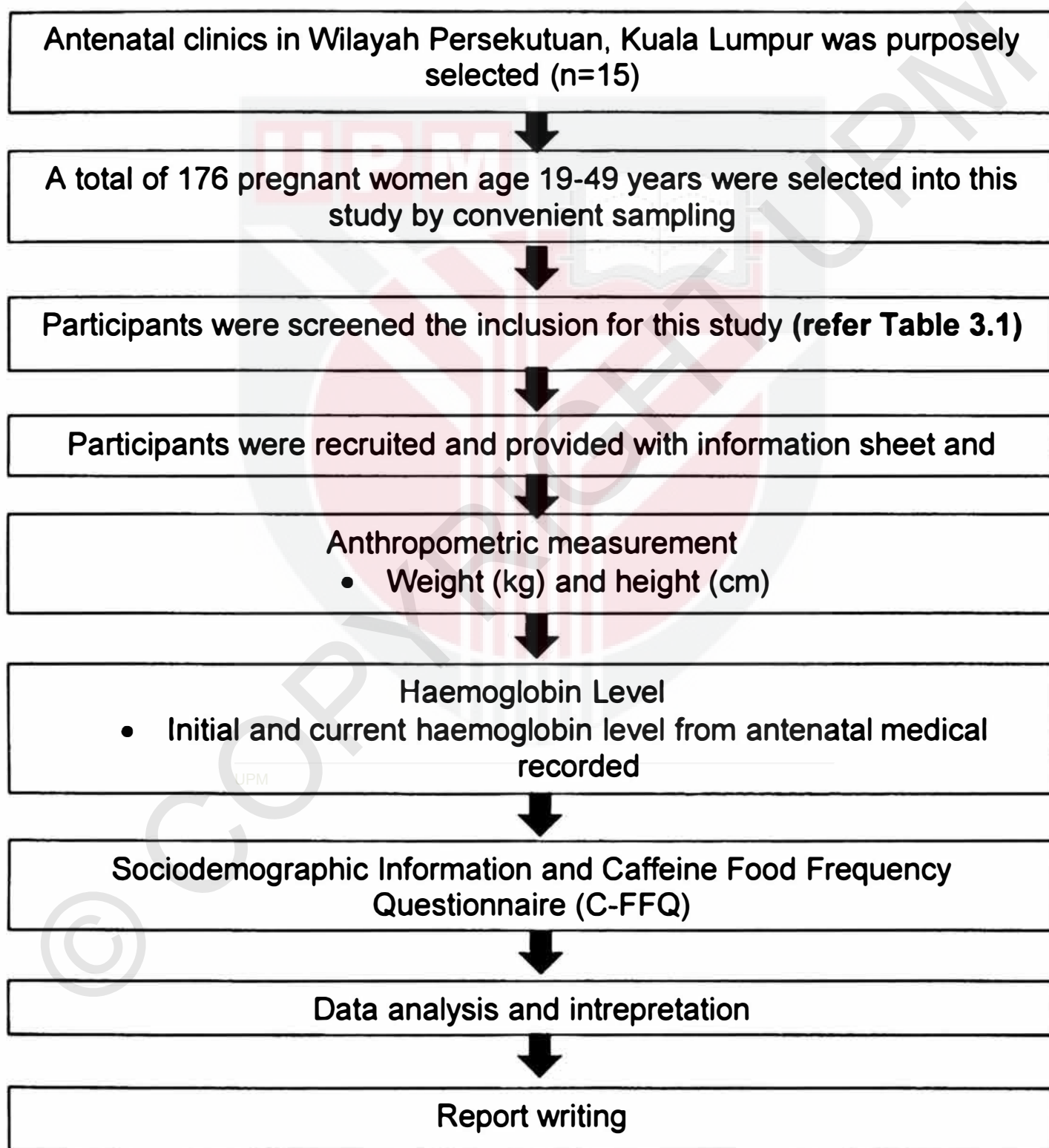


Figure 3.1: Study Design

All information which was collected during the course of the study were kept strictly confidential and anonymised so that only the investigators carrying out the research will have access to such information. The identification number which was the reference number in the questionnaire was used on participants data sheets instead of patient identifiers such as name. The data was anonymised and stored into a computer that is password protected and maintained for a minimum of 5 years after completion of the study until destroyed. Upon completion of study, participants may contacted the researcher via email or telephone number as stated in the information sheet to request a sheet summarising the findings of the study if required. Data from the study was written up into a dissertation for a Final Year Project thesis and potential publications. No personal information of participants involved in this study will be disclosed to ensure privacy and confidentiality.

### **3.2 Study sample and location**

There were 6 antenatal clinics that purposely selected from 15 health clinics in Wilayah Persekutuan Kuala Lumpur area including (KKIA Kampung Pandan, KKIA Cheras, KKIA Setiawangsa, KKIA Segambut, KKIA Bandar Tun Razak, KKIA Taman Tun Dr Ismail) after gaining approval from the clinic management and

Medical Research Ethic Committee (MREC). **Figure 3.2** illustrates location of antenatal clinics in Wilayah Persekutuan, Kuala Lumpur.

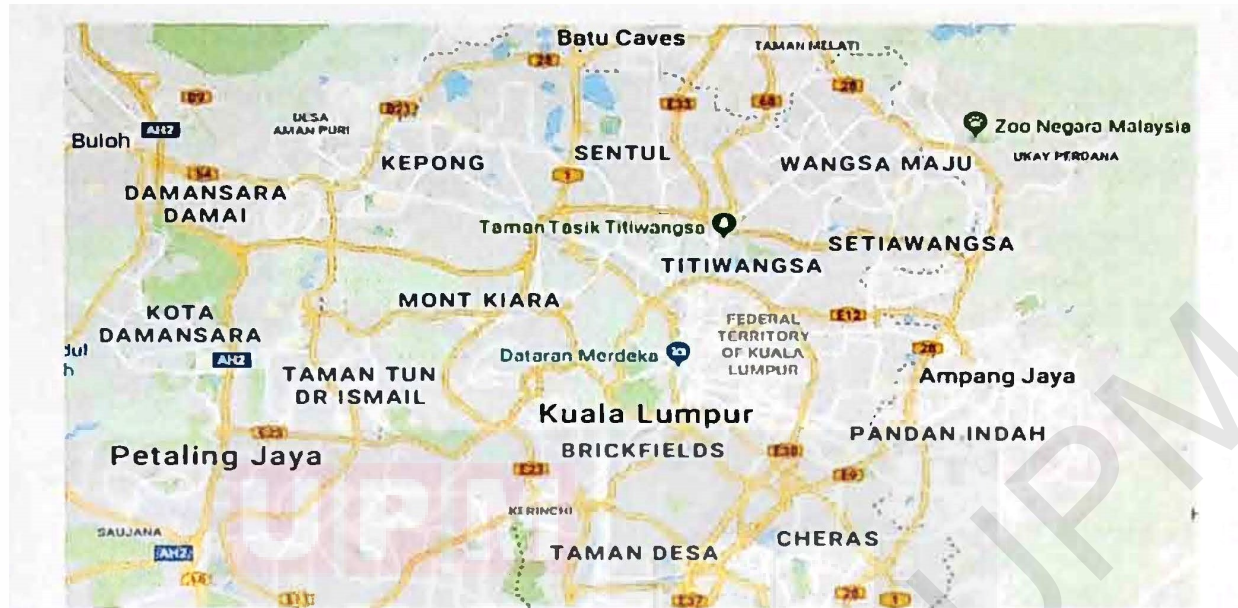


Figure 3.2: Location of antenatal clinics in Wilayah Persekutuan (Source: Google Maps, 2019)

### **3.3 Participants**

The convenient sampling method was used for selecting participants in this study. A total 183 pregnant women who register in health clinics will be included in this study. Informed consent will be obtained from the participants before partaking in this study. The inclusion and exclusion criteria were described in **Table 3.1**

Table 3.2: Inclusion and exclusion criteria of participants

Inclusion criteria	Exclusion criteria
<ul style="list-style-type: none"> <li>• Malaysian</li> <li>• Pregnant women age 19-49 years old</li> <li>• Healthy</li> <li>• Any trimester of pregnancy</li> <li>• Literate</li> <li>• Coffee consumer</li> </ul>	<ul style="list-style-type: none"> <li>• Non-Malaysian</li> <li>• Pregnant women with any acute illness (inflammatory bowel disease, Chron's disease, thalessemia and celiac disease)</li> <li>• Pregnant women that use additional nutritional oral supplements other than prescribed in clinics</li> </ul>

### 3.4 Sample size

The sample size was estimated using formula  $N = [(Z_{\alpha} + Z_{\beta})/C]^2 + 3$  (Hully et al., 2013). Thankachan et al., (2015) found that blood hemoglobin was significantly correlated with the intake of coffee ( $r = -0.23$ ,  $p < 0.05$ ). An analysis of the etiology of anaemia and iron deficiency in young women from low socioeconomic status in Bangalore, India was assessed by various factors including dietary intake which also contributed to anaemia and iron deficiency among Indian women. The study involved 100 non pregnant and non lactating women age 18 to 35 years who live in poor urban area. Data were obtained on demography, socioeconomic status,

anthropometry, 24-hour dietary recalls on three days, blood haemoglobin, hemoglobinopathies, serum ferritin, serum C-reactive protein and stool parasites.

From the following formula, the calculation as shown below:

$$N = [(Z_{\alpha} + Z_{\beta})/C]^2 + 3$$

The standard normal deviate for  $\alpha = Z_{\alpha} = 1.96$

The standard normal deviate for  $\beta = Z_{\beta} = 0.84$

$$C = 0.5 * \ln[(1+r)/(1-r)]$$

$$N = [(1.96 + 0.84)/0.238]^2 + 3$$

$$= 141$$

So, the total of sample size required among pregnant women is 141. However, an extra 20% of participant were recruited to account for a missing data. Hence, a total 176 participants were required in this study.

### **3.5 Tools of Assessment**

#### **3.5.1 Self Administered Questionnaire**

A self administered questionnaire was used to assessed sociodemographic status (age, ethnicity, religions, educational level, employment status, monthly household) and pregnancy history (number of children, current number of pregnancy, health problem, nutritional supplement and gestational age of participant).

#### **3.5.2 FACT-An Questionnaire**

An adapted and modified FACT-An questionnaire was used in this study. FACT-An questionnaire was designed to assessed fatigue and anaemia in cancer patient (Cella et al., 2010). This questionnaire was used to measured a symptom of anaemia. It consisted of 16 item related to the symptom of anaemia as shown in **Table 3.3**

Table 3.3: FACT-An Questionnaire

No.	Item
1	I feel listless ('washed out')
2	I feel tired
3	I have trouble starting things because I am tired
4	I have trouble finishing 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

As shown in Table 3.4, the answer of scoring from the questionnaire were recorded in item response column. Then, all the individual item scores were sum to obtained a score. The sum of item score will be multiply by 16 and divided by number of items answered. The higher the score, indicated the less symptom of anaemia.

Table 3.4: Scoring of FACT-An

No	Item	Reverse Item	Item Response	Item scores
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 starting things because I am tired	4	- (0/1/2/3/4)	
4	I have trouble finishing 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)	

### **3.5.3 Caffeine Food Frequency Questionnaire (C-FFQ)**

Adapted and modified Caffeine Food Frequency Questionnaire (C-FFQ) (Irons et al., 2016) was used to assess consumption of coffee among pregnant women. Participants were asked on the frequency of drinking coffee, serving sizes of cups, category of coffee, brands of coffee, method on preparation of coffee and duration of consumption coffee to estimate the habitual total consumption of coffee. Participants were also asked on attitude and awareness of coffee consumption.

A 4-point Likert scale was used with statements about coffee consumption and the participant was able to select from 'strongly agree', 'agree', 'disagree', and 'strongly disagree' (Karli, 2015) as shown in Table 3.5. The total of the scoring on Likert scale were calculated on percentage. The higher of percentage showed preference of participants on coffee.

Table 3.5: A 4-point Likert scale statements

No	Statement	Strongly agree	Agree	Disagree	Strongly disagree
1	You always consume the same type of coffee				
2	Price is the most important factor for you in the choice of coffee product				
3	You need coffee to give energy throughout the day				
4	Your peers influence which type of coffee you consume				
5	Promotions and discounts are important to you when choosing a coffee				
6	TV advertisement are effective in persuading you to buy a coffee				
7	Consuming too much coffee is unhealthy				
8	Coffee give more benefits than risks				
9	You do not pay attention on how much caffeine in the drinks you consume				
10	You drink coffee mostly late at night				
11	You always go to the same store to get a coffee				

Table 3.5(cont): A 4-point Likert scale statements

No	Statement	Strongly agree	Agree	Disagree	Strongly disagree
12	You consider yourself as brand loyal to specific coffee				

#### **3.5.4 Selective Iron-containing Food Frequency Questionnaire (FFQ)**

The food frequency questionnaire was adapted from Malaysian Adult Nutrition Survey (MANS) which consisted of 165 food items. The developed food frequency questionnaire includes food item that has higher content of iron with cumulative percent of 90% (Fatimah et al., 2015). The amount of iron content in the foods were obtained from Nutrient Composition of Malaysian Foods and ASEAN Food Composition Database. After process of extraction and calculation of cumulative percentage, a total of 83 food items were included in the modified FFQ. This food habit was evaluated on participant previous month of food intake. Participants need to answer the frequency of food intake and the portion size of food items. One on one interview were carried out to enhanced the data accuracy, by using appropriate graphics of food items household measures. Participants were briefed on how to determine the frequency intake of food items during the one on one session.

The amount of daily food intake were calculated from the FFQ according to the following formula: frequency of intake (conversion factor) x serving size x total number of servings x weight of food in one serving (Fatimah et al., 2015). The conversion factor used to estimated food intake were based on the frequency intake as shown in **Table 3.6**. The findings were compared with the recommended value of iron for pregnant women in Recommended Nutrient Intake Malaysia 2017 (NCCFN, 2017).

Table 3.6: Conversion factor of frequency food intake

Frequency of intake	Conversion factor (formula)
<b>Per day</b>	
1	1.00 (1.0/1)
2-3	2.50 (2.5/1)
>4	4.00 (4.0/1)
<b>Per week</b>	
1	0.14 (1.0/7)
2-4	0.43 (3.0/7)
5-6	0.79 (5.5/7)
<b>Per month</b>	
1	0.02 (0.5/30)
1-3	0.07 (2.0/30)
<b>Never</b>	
0	0

### **3.6 Anthropometric Measurement**

Body weight and height were measured using by calibrated instrument. For the weight, TANITA digital weighing scale (Tanita Corporation, Japan) was used. The participants were instructed to remove heavy garments, take off the shoes and empty pockets. The digital scale was tared or set to zero. Participants should be stand in the center of the scale platform with feet close together, hands at the sides and looking straight ahead. The weight measurement will be recorded in kilograms to two decimal places (CDC, 2007).

Height was measured using a tape wall Seca body meter (SECA, Germany). To measured height, participants were instructed to remove shoes, heavy outer garments and hair ornaments. The head was aligned in the Frankfort horizontal plane, feet together and knees straight. Participant should be stands with the back of the head, shoulder blades, buttocks and heels are touching the stadiometer. For both measurement the value was recorder to the nearest 0.1 and the measurement was performed twice (CDC, 2007). BMI was calculated by dividing weight with height squared ( $\text{kg}/\text{m}^2$ ). BMI of pre-pregnancy were taken from the antenatal medical recorded according on their first antenatal visit. The BMI classification of the participants were based on WHO classification as shown in **Table 3.7**

Table 3.7: BMI classification

<b>Classification</b>	<b>Cut off point (kg/m<sup>2</sup>)</b>
Underweight	<18.5
Normal weight	18.5-24.9
Overweight	25-29.9
Obesity class I	30-34.9
Obesity class II	35-39.9
Obesity class III	>40

Source: WHO (2000)

### 3.7 Haemoglobin Level

Initial and current reading of haemoglobin level was retrieved from the antenatal medical recorded. The initial reading of haemoglobin was taken based on their first antenatal visits and the current reading was taken on the day of data collection. Participant recorded on haemoglobin level was compared with the standard cut-off haemoglobin level for anemia in pregnancy as shown in **Table 3.8**

Table 3.8: Hemoglobin levels to diagnosed anaemia (g/dl)

Categories of anemia	Haemoglobin level (g/dl)
Normal	11 or higher
Mild anemia	10-10.99
Moderate anemia	7-9.99
Severe anemia	<7

Source: WHO (2011)

Venipuncture was a procedure that usually used for drawing a blood. The participants tube will be labelled and tourniquet was put on the participant about 3 to 4 above the venipuncture site. Participants need to form a fist so veins are more prominent. After finding the vein, the venipuncture site was cleaned with alcohol using circular motion. The needle and vacuum tube holder was assembled, meanwhile the collection tube was insert into the holder until the tube reached the needle. The cap was removed from needle and thumb was used to draw skin tight about 1-2' below the venipuncture site. Next, the needle was insert into the vein, the tube was completely push into the needle and blood was flow into the tube until vacuum tourniquet was exhausted. The tourniquet was released and dry gauge was placed over the venipuncture site. The bandage was applied and all contaminated supplied was properly disposed in biohazard container (WHO, 2005).

### **3.8 Statistical analysis**

All the data will be analyzed by using IBM SPSS Statistical Software (Version 25). The results were expressed as mean and standard deviation for frequency of drinking coffee per day, amount of coffee intake (cups), duration of consumption coffee and haemoglobin level. Attitude and awareness on coffee consumption were analysed using percentage. The mean, standard or percentage of variable were depend on Normality test in order to determine association between coffee consumption with haemoglobin level among pregnant women, the Pearson's correlation was used. A p-value  $<0.05$  was considered to indicated statistical significance.

## CHAPTER 4

### 4.0 Results and Discussion

#### 4.1 Sociodemographic characteristic

This study was carried out in 176 pregnant women attending antenatal clinics in Wilayah Persekutuan, Kuala Lumpur with mean $\pm$ SD age of 29.30  $\pm$  4.28 with range between 25 to 29 years old. The ethnicity was unevenly distributed where Malay participants is higher in proportion than other ethnicities (62.0%) followed by Chinese (21.0%) and Indian (17.0%). Approximately 60.8% of participants have tertiary education, whilst most of them are working with non-government sector (43.8%). Most of the participants had monthly household income between RM 1000 to RM 2999 with mean $\pm$ SD of monthly income of 3861.93  $\pm$  2388.369. **Table 3.9** summarises the sociodemographic of participants.

Table 3.9: Sociodemographic characteristic of pregnant women (n=176)

<b>Variables</b>	<b>n</b>	<b>(%)</b>	<b>Mean ± SD</b>
<b>Age (years)</b>			<b>29.30 ± 4.28</b>
20-24	17	9.7	
25-29	84	50.1	
30-34	48	27.2	
35-39	26	14.7	
40-44	1	0.6	
<b>Ethnicity</b>			
Malay	109	62.0	
Chinese	37	21.0	
Indian	30	17.0	
<b>Religion</b>			
Islam	109	62.0	
Buddha	29	16.5	
Hindu	27	15.3	
Christian	11	6.2	
<b>Level of education</b>			
Primary school	1	0.6	
Secondary school	68	38.6	
Tertiary education	107	60.8	
<b>Employment status</b>			
Government	37	21.0	
Non-government	77	43.8	
Unemployed	52	29.5	
Others	10	5.7	

**Table 3.9(Cont): Sociodemographic characteristic of pregnant women (n=176)**

<b>Variables</b>	<b>n</b>	<b>(%)</b>	<b>Mean ± SD</b>
Household income			3861.93 ± 2388.369
<RM 900	2	1.4	
RM 1000-2999	59	41.9	
RM 3000-4999	40	28.5	
>RM 5000	39	27.7	



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## 4.2 Pregnancy history

Approximately 46.0% of participants had gestational weeks about 20 to 29 weeks with mean $\pm$ SD of 23.22  $\pm$  7.04. More than half of participants attended antenatal clinics 0 to 5 times for medical check-up with mean $\pm$ SD of 4.23  $\pm$  2.31. The current number of pregnancy showed 48.9% of participants had first pregnancy. Table 4.0 summarises pregnancy history of pregnant women.

Table 4.0: Pregnancy history of pregnant women (n=176)

Variables	n	%	Mean $\pm$ SD
Gestational weeks			23.22 $\pm$ 7.04
10-19	57	32.3	
20-29	81	46.0	
30-39	38	21.7	
Pregnancy check-up(times)			4.23 $\pm$ 2.31
0-5	129	79.1	
6-11	32	18.2	
12-18	2	1.2	
Current number of pregnancy			2.00 $\pm$ 1.05
1	86	48.9	
2	44	25.0	
3	30	17.0	
4	13	7.4	
5	3	1.7	

### 4.3 Symptom of anaemia

The result showed that 102 of participants had the score on symptom of anaemia within 45 to 65 with mean $\pm$ SD of 44.35  $\pm$  7.78. The higher the score, indicate the less symptom of anaemia. There were any recommendation cut-off for the score on symptom of anaemia. Therefore, the score had been divided into quartile which are low (0-21), medium (22-43) and high (44-65). Screening and providing counseling on iron nutrition and oral iron supplementation during pregnancy may prevented or controlled the risk of anaemia (Marie, Harvey, & Clavel, 2016). Table 4.1 showed the total score symptom of anaemia among study population.

Table 4.1: Total score symptom of anaemia in pregnant women (n=176)

Variable	n	%	Mean $\pm$ SD
Total score symptom of anaemia			44.35 $\pm$ 7.78
0-21 (Low)	2	1.2	
22-43 (Medium)	72	41	
44-65 (High)	102	48.3	

Data in Table 4.2 showed study population not at all felt lack of energy, having trouble on working and finishing things because of tired, need to sleep during the day and help doing usual activity, too tired to eating, feel lightheaded, headaches, and chest pain, frustered in doing thing and limit their social activity because of tired. Study population also feel a little bit trouble on starting things because of tired. However, pregnant women in this study queit a bit have energy, feel motivated and able to do usual activities.

Table 4.2: Frequency and percentage symptom of anaemia in pregnant women (n=176)

Items	n (%)				
	Not at all	A little bit	Somewhat	Quiet a bit	Very much
I feel listless ("washed out")	77 (43.8)	30 (17.0)	52 (29.5)	15 (8.5)	2 (1.1)
I feel tired	36 (20.5)	44 (25.0)	60 (34.1)	31 (17.6)	5 (2.8)
I have trouble starting things because I am tired	55 (31.3)	58 (33.0)	41 (23.3)	20 (11.4)	2 (1.1)
I have trouble finishing things because I am tired	59 (33.5)	49 (27.8)	45 (25.6)	19 (10.8)	4 (2.3)
I have energy	19 (10.8)	14 (8.0)	46 (26.1)	77 (43.8)	20 (11.4)
I have trouble walking	91 (51.7)	41 (23.3)	35 (19.9)	8 (4.5)	1 (0.6)
I am able to do my usual activities	20 (11.4)	11 (6.3)	32 (18.2)	76 (43.2)	37 (21.0)

Table 4.4(cont'): Frequency and percentage symptom of anaemia in pregnant women (n=176)

Items	n (%)				
	Not at all	A little bit	Somewhat	Quiet a bit	Very much
I need to sleep during the day	72 (40.9)	38 (21.6)	49 (27.8)	12 (6.8)	5 (2.8)
I feel lightheaded (dizzy)	71 (40.3)	56 (31.8)	32(18.2)	12 (6.8)	5 (2.8)
I get headaches	124 (70.5)	34 (19.3)	12 (6.8)	3(1.7)	3 (1.7)
I have pain in my chest	114 (64.8)	31 (17.6)	22 (12.5)	5 (2.8)	4 (2.3)
I am too tired to eat	90 (51.1)	42 (23.9)	29 (16.5)	10 (5.7)	4 (2.3)
I am motivated to do my usual activities	19 (10.8)	15 (8.5)	56 (31.8)	66 (37.5)	20 (11.4)
I need help doing my usual activities	85 (48.3)	40 (22.7)	40 (22.7)	11 (6.3)	5 (3.9)
I am frustrated by being too tired to do the things I want to do	94 (53.4)	37 (21.0)	37 (21.0)	3 (1.7)	5 (2.8)
I have to limit my social activity because I am tired	85 (48.3)	30 (17.0)	47 (26.7)	10 (5.7)	3 (1.7)

## **4.4 Anthropometric measurement**

### **4.4.1 Pre-pregnancy BMI**

As shown in Table 4.3, the mean $\pm$ SD pre-pregnancy was 24.99  $\pm$  5.00. Almost 50% of study population had normal weight on pre-pregnancy, followed by 26.7% was overweight, 17.6% obese and 5.7% underweight.

Table 4.3: Body mass index of pre-pregnancy and during pregnancy (n=176)

<b>Variables</b>	<b>n</b>	<b>%</b>	<b>Mean <math>\pm</math> SD</b>
Pre-pregnancy BMI			24.99 $\pm$ 5.00
Underweight	10	5.7	
Normal	88	50.0	
Overweight	47	26.7	
Obese	31	17.6	

#### **4.5 Haemoglobin level**

According to classification of haemoglobin level, there were 92.6% of study population had normal haemoglobin level with mean $\pm$ SD was 11.99  $\pm$  1.06, whilst 7.4% of them had mild anaemia as stated in Table 4.4

Table 4.4: Haemoglobin level of pregnant women (n=176)

<b>Variables</b>	<b>n</b>	<b>%</b>	<b>Mean <math>\pm</math> SD</b>
Hemoglobin level of pregnant women			11.99 $\pm$ 1.06
Normal	163	92.6	
Mild anaemia	13	7.4	
Moderate anaemia	-	-	
Severe anaemia	-	-	

#### **4.6 Dietary iron intake**

The findings in Table 4.5 showed 95.5% study population did not meet the iron recommendation for haem and 90.9% for non-haem when compared with Recommended Nutrient Intake (RNI) Malaysia. In this present study, the dietary iron intake may not meet recommendation due to limited list of food data that contained iron. However, the information on other dietary constituents such as enhancers and inhibitors food were also not included which may be difficult to estimated the requirement.

Besides, sociodemographic factor included household income and living area may affect the dietary diversity. Individual who living in urban area with low to middle income may had difficulties to meet adequate dietary diversity by choosing poor diets with less nutrients (Desta, Akibu, & Tesfaye, 2019). Other than that, pregnant women who had inadequate general nutritional knowledge could be a main reason of their dietary intake did not meet all the nutritional requirements of pregnancy (Taddese & Sibhatu, 2018).

Table 4.5: Dietary iron intake in pregnant women (n=176)

Variables	Iron bioavailability			
	15 n (%)	Mean ± SD	10 n (%)	Mean ± SD
Dietary iron intake (mg/day)		10.40 ± 0.19		10.91 ± 0.28
Below iron recommended	168 (95.5)		159 (90.9)	
Meet iron recommended	7 (4.0)		16 (9.1)	

#### 4.6.1 Food group intake

Findings in Table 4.6 showed the food group that highly consumed by study population were cereal and cereal products ( $3.66 \pm 2.89$ mg/d), meat and meat products ( $1.92 \pm 1.70$ ), legume and legume products ( $1.53 \pm 0.99$ ). The least food group consume by study population was bread spread ( $0.25 \pm 0.22$ ).

Based on finding from MANS 2003, the top ten food that daily consumed by Malaysians were rice, sugar, marine fish, green leafy vegetables, sweetened condensed milk, powdered milk, bread, biscuit, *local kuih* and chicken eggs. Rice known as primary source of food and staple food among Malaysians because they believed that higher energy intake may derived from rice (Noraida et al., 2018) Increasing in food prices may cause meat and meat products, fish and seafoods, fruits and vegetables moderately consumed in this study population. Foods that considered healthy were expensive that maay not be afforded by study populations, hence most of them consumed the cheaper foods to meet their needs (Azahari & Badari, 2009). However, animal-based food was classify as haem iron which more easily absorbed approximately 50-87% than non-haem iron (Adrian & Philip, 2008).

Table 4.6: Food group intake in pregnant women (n=176)

Food group	Mean $\pm$ SD
Cereal and cereal products	3.66 $\pm$ 2.89
Fast food	0.93 $\pm$ 0.91
Meat and meat products	1.92 $\pm$ 1.70
Fish and seafoods	1.35 $\pm$ 1.07
Eggs	0.90 $\pm$ 0.54
Legume and legume products	1.53 $\pm$ 0.99
Milk and milk products	0.46 $\pm$ 0.38
Vegetables	1.45 $\pm$ 1.40
Fruits	0.89 $\pm$ 0.69
Drinks	1.34 $\pm$ 0.76
Confectionaries	0.58 $\pm$ 0.41
Bread spread	0.25 $\pm$ 0.22
Flavours	0.53 $\pm$ 0.28

#### 4.7 Coffee consumption habits

##### 4.7.1 Coffee consumption habits in pregnant women

Findings in Table 4.7 showed that, 68.8% of study population drinking one cup of coffee per day with mean $\pm$ SD was 1.34  $\pm$  0.54. Almost 54% of participants chose the medium size cups of coffee with mean $\pm$ SD was 194.34  $\pm$  69.00ml and they not drinking coffee every day. Approximately 45.5% were drinking coffee after the meals, however drinking a cup of coffee after meal may reduced thirty-nine

percent of iron absorption (Sung, 2018). Most of study population preferred latte flavor of coffee and Nescafe as a brand that they usually drink.

The reason of study population drinking a coffee because of its taste. Coffee contained caffeine as a stimulant effect that makes people want to consume more coffee. People who were genetically sensitive to the bitter taste of coffee will drink more coffee than those who were less sensitive (Rachel & Michael, 2017). Most of study population were aware of the recommended intake of coffee during pregnancy, however they still lack knowledge of side effects of coffee consumption toward pregnancy health.

Table 4.7.: Coffee consumption habits among pregnant women (n=176)

Variable	n	%	Mean ± SD
Frequency intake of coffee per day			1.34 ± 0.543
1	121	68.8	
2	51	29.0	
3	3	1.7	
4	1	0.6	
Amount of coffee intake (cups)			194.34 ± 69.00
Small (118 ml)	68	38.4	
Medium (227 ml)	95	54.0	
Large (355 ml)	13	7.4	
Drinking coffee everyday			
Yes	80	45.5	
No	96	54.5	
Time of drinking coffee			
Before meal	60	34.1	
During the meal	27	15.3	
After meal	80	45.5	
2hour/more before meal	3	1.7	
2hour/more after meal	6	3.4	
Type of coffee preferred			
Cappucino	28	15.9	
Espresso	10	5.7	
Americano	4	2.3	
Mocha	38	21.6	
Latte	40	22.7	
Macchiato	3	1.7	
Iced coffee	27	15.3	
Others	26	14.8	

Table 4.9 (cont'): Coffee consumption habits among pregnant women (n=176)

Variable	n	%	Mean ± SD
<b>Brand of coffee preferred</b>			
Nescafe	81	46.0	
Indo Coffee	7	4.0	
Kopi Kapal Api	5	2.8	
Kopiko LA Coffee	7	4.0	
Kopi Hang Tuah	14	8.0	
Power Root	1	0.6	
Old Town White Coffee	21	11.9	
Wonda Coffee	9	5.1	
Others	31	17.6	
<b>Reason of drinking coffee</b>			
To get energy	32	18.2	
Because of the taste	104	59.1	
Coffee is easily available	14	8.0	
To replace meal	4	2.3	
Others	22	12.5	
<b>Awareness on recommended intake of coffee during pregnancy</b>			
Yes	99	56.3	
No	74	42.0	
Do not know	3	1.7	
<b>Knowledge on the side effect of coffee toward pregnancy health</b>			
Yes	82	46.6	
No	93	52.8	
Do not know	1	0.6	

#### **4.7.2 Coffee preferences among pregnant women**

Almost all study population stated their preference on coffee were agreed that always consume the same type of coffee (54.5%) and considered themselves as brand loyal on specific coffee (44.9%), while 58.5% disagree that price were important factor in making choice of coffee product. Approximately 57.4% and 61.9% of study population disagree that drinking coffee to give energy throughout the day and peers influenced the type of coffee they consumed. There were also disagree that promotion and discounts were important on choosing a coffee, whilst advertisement on television were not persuade them to buy a coffee. Eighty-seven of study population were agreed that consuming too much coffee was unhealthy and coffee give more benefits than risks. There were 67.0% of study population did not know on total of caffeine in their drinks. Besides, study population were also disagree on consuming coffee mostly during late night and always went to the same store to buy a coffee. Table 4.8 summarises the coffee preference in pregnant women.

Table 4.8: Coffee preferences among pregnant women (n=176)

Coffee preferences	4 Likert-scale			
	n (%)			
	Strongly agree	Agree	Disagree	Strongly disagree
You always consume the same type of coffee	22 (12.5)	96 (54.5)	46 (26.1)	12 (6.8)
Price is the most important factor for you in coffee product choice	7 (4.0)	48 (27.3)	103 (58.5)	18 (10.2)
You need coffee to give energy throughout the day	4 (2.3)	48 (27.3)	101 (57.4)	23 (13.1)
Peers influence the type of coffee that you consume	2 (1.1)	37 (21)	109 (61.9)	28 (15.9)
Promotions and discounts are important when you are choosing a coffee	5 (2.8)	53 (30.1)	97 (55.1)	21 (11.9)
Advertisement on television are effective in persuading you to buy a coffee	2 (1.1)	38 (21.6)	106 (60.2)	30 (17.0)
Consuming too much coffee is unhealthy	29 (16.5)	87 (49.4)	52 (29.5)	8 (4.5)
Coffee give more benefits than risks	4 (2.3)	87 (49.4)	71 (40.3)	14 (8.0)

Table 4.8(cont'): Coffee preferences among pregnant women (n=176)

Coffee preferences	4 Likert-scale			
	n (%)			
	Strongly agree	Agree	Disagree	Strongly disagree
You do not know on how much of caffeine in the drinks you consume	7 (4.0)	118 (67.0)	41 (23.3)	10 (5.7)
You drink coffee mostly during late night	2 (1.1)	31 (17.6)	107 (60.8)	36 (20.5)
You always go to the same store to buy a coffee	4 (2.3)	67 (38.1)	84 (47.7)	21 (11.9)
You consider yourself as brand loyal on specific coffee	15 (8.5)	79 (44.9)	59 (33.5)	23 (13.1)

#### **4.8 Association between coffee consumption habits with haemoglobin level**

The finding on frequency of coffee intake showed, there was no significant negative association between frequency intake of coffee with haemoglobin level ( $r=-0.052$ ,  $p=0.495$ ) as shown in Table 4.9. Due to small sample size, it may affected the association between these variable compared to other study which has more than 200 sample size had found the association between frequency intake coffee with haemoglobin level (Weldekidan et al., 2018).

Coffee consumption may affect iron absorption due to polyphenols contained in a coffee, where polyphenol will bind with iron and form insoluble iron in the body. However, this mechanism will only occur in non-haem iron, while haem iron was not affected (Sung et al., 2018). Beck et al., (2014) also found that coffee consumption does not appear to affect iron status in populations who had adequate iron intake. A study on association between coffee intake with anemia showed that five cups of coffee consumption was negatively associated with anemia by odd ratios 0.975 (95% CI 0.975-0.976) (Sung, 2018).

Kumera et al., (2018) found that pregnant women who consumed >3 cups of coffee per day was associated with lower level of haemoglobin. In this present study, 121 of participants consumed 1 cup of coffee per day which showed the frequency intake were too small to make the associations with haemoglobin level. Besides, study population also had aware and practiced on the recommended coffee intake during pregnancy by taking <200mg/day equivalent to 1 to 2 cups of coffee per/day. Shahzad et al., (2017) stated that good practices on caffeine consumption can lead to good haemoglobin level. Other than that, nutrition education and counseling during antenatal visits also could improve maternal knowledge regarding on iron rich food and diet poor in iron (Ram et al., 2019).

Next, dietary intake may also influence the haemoglobin level. In this present study, study population may consume food that contained ascorbic acid

which were not listed in the dietary iron intake food frequency questionnaire. Ascorbic acid was an effective enhancer of non-heme iron absorption which may lead to reduced incidence of anaemia among pregnant women. Therefore, consuming one or two cups of coffee per day may not affected haemoglobin concentration if pregnant had adequate dietary intake of ascorbic acid (Beck et al., 2014).

There was no significant negative association between size cups of coffee with haemoglobin level ( $r = -0.018$ ,  $p = 0.813$ ). In this present study, most of study population chose medium cups of coffee for daily intake, however Maria et al., (2016) found that coffee consumer usually chose large cup of coffee for their daily intake. Therefore, consuming dietary polyphenol (coffee and tea) either high or low may not affected the iron absorption (Delimont, Haub, & Lindshield, 2012). However, Hurrell, Reddy, & James (2016) found that drinking 150 to 250ml of coffee with a meal has been found to inhibit 24 to 73% of iron absorption.

Table 4.8: Association between frequency and size cups of coffee intake with haemoglobin level (n=176)

Variable	Haemoglobin level	
	r	p-value
Frequency of coffee intake	-0.052	0.495
Amount of coffee intake (cups)	-0.018	0.813

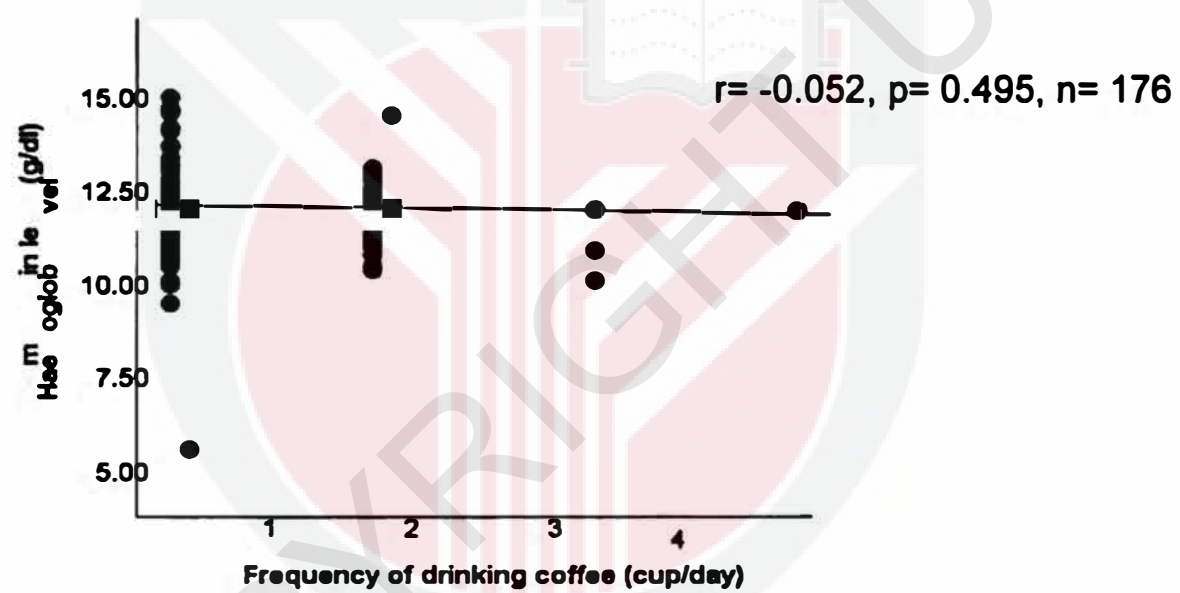


Figure 3.3: Association between frequency of coffee intake with haemoglobin level

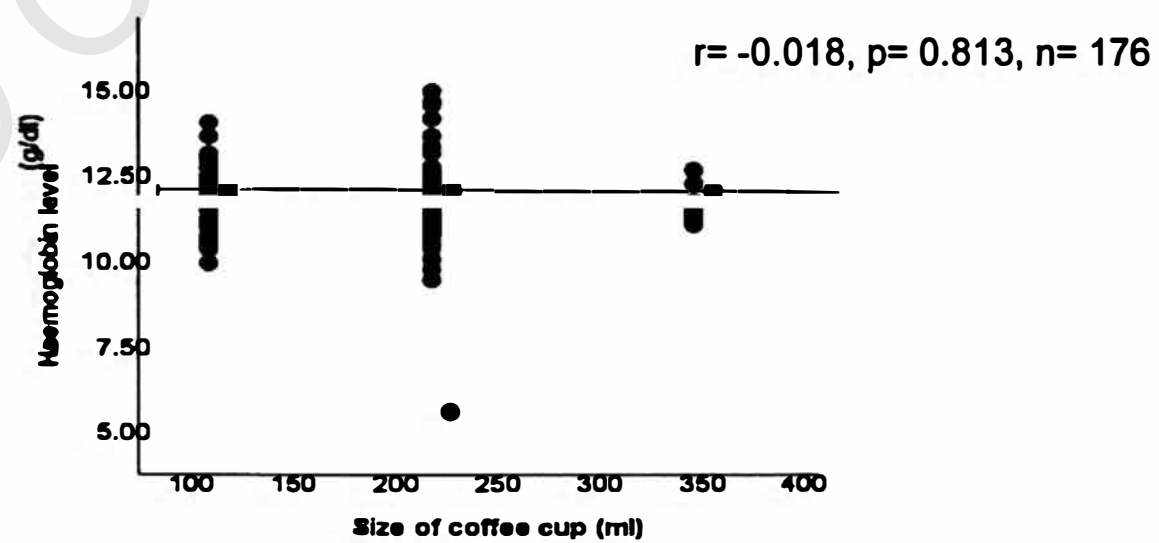


Figure 3.4: Association between amount of coffee intake (cups) with haemoglobin level

## CHAPTER 5

### 5.0 Conclusion and Recommendation

#### 5.1 Conclusion

This study investigated the association between coffee consumption habits with haemoglobin level in pregnant women attending antenatal clinics in Wilayah Persekutuan, Kuala Lumpur. A total of 176 pregnant women had participated in this study with mean $\pm$ SD age of  $29.30 \pm 4.28$  and approximately 62.0% of study population were Malay ethnic. Almost all of study population were non-anaemic and had the higher score on symptom of anaemia. The higher the scorer, the less symptom of anaemia.

In this present study also demonstrated that study population drink one cup of coffee per day and using medium size of cup. Approximately eighty of study population were taking coffee after their meals. However, habitual coffee consumption was not a major factor that affect the concentration haemoglobin among pregnant women. There were no significant negative association between frequency of coffee intake ( $r=-0.052$ ,  $p=0.495$ ) and amount of coffee intake( $r= -$

0.018,  $p= 0.813$ ) with haemoglobin level. Study population also aware on the recommended intake of coffee which advised by World Health Organization that pregnant women should consume 1 to 2 cups of coffee per day.

Providing nutrition education and counselling at the early stage may reduced the incidence of anaemia in future. Therefore, effective nutrition intervention especially related on iron should be identified and implemented in order to combat anaemia issues in Malaysia especially in at-risk groups. There were limited data related on dietary iron inhibitors especially in Malaysia, hence, the findings from this study can definitely provide a baseline data for monitoring the further studies to investigated the association between habitual coffee consumption with haemoglobin level. These present study also could improve nutrition knowledge and awareness related on anaemia in pregnant women.

## 5.2 Limitations

There were few limitation in this study that should be concerned. The design of the study is cross sectional, which only show the descriptive relationship and no conclusion on causality can be showed from the data collection. The number of women with anaemia is small in this study which is probably the main reason for lack of statistically significant results. Since the study include food frequency question, it may affect the result due to the food include in the FFQ may not be those that usually eaten by participants and recalling frequency of food intake may

cause bias. Measuring the frequency of coffee intake and amount of coffee intake by cups become a limitation of this study because it may not showed the actual amount of caffeine level.

### **5.3 Recommendation**

The recommendation is needed for future research. The causal relationships between maternal coffee consumption during pregnancy and anaemia should be further investigated with strong study design. Dietary intervention by profesional for treating anaemia should also consider on intervention of meals including the iron content, enhancers and inhibitors of iron absorption that may be consumed with the meal. These interventions should include women who have low iron stores, but are not anaemic. Other than measuring size cups of coffee, researcher can also measure the amount of caffeine in a coffee for more reliability and further study is needed related on consumption of decaffeinated coffee during pregnancy toward haemoglobin level.

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## APPENDIX A



**JAWATANKUASA ETIKA & PENYELIDIKAN PERUBATAN**  
*(Medical Research & Ethics Committee)*  
KEMENTERIAN KESIHATAN MALAYSIA  
d/a Institut Pengurusan Kesihatan  
Jalan Rumah Sakit, Bangsar  
59000 Kuala Lumpur



Tel: 03-2287 4032/2282 0491/2282 9065  
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Ref : KKM.NIHSEC. P18-2484 ( 7 )  
Date: 14-January-2019

**NUR SYAFIQAH BINTI GHAZALI**  
PRINCIPAL / COORDINATING INVESTIGATOR  
UNIVERSITY PUTRA MALAYSIA (UPM)

Dear Sir / Mdm,

**ETHICS INITIAL APPROVAL: NMRR-18-3197-45023 (IIR)**  
**COFFEE CONSUMPTION HABITS AND ITS LINK TO HAEMOGLOBIN LEVEL: A CROSS-SECTIONAL STUDY IN PREGNANT WOMEN ATTENDING ANTENATAL CLINIC IN WILAYAH PERSEKUTUAN, KUALA LUMPUR**

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:

**KEPONG HEALTH DISTRICT OFFICE**  
Nur Syafiqah Binti Ghazali (Principal / Coordinating Investigator)

**KLINIK KESIHATAN IBU DAN ANAK BANDAR TUN RAZAK**  
Nur Syafiqah Binti Ghazali (Principal / Coordinating Investigator)

**KLINIK KESIHATAN IBU DAN ANAK CHERAS MAKMUR**  
Nur Syafiqah Binti Ghazali (Principal / Coordinating Investigator)

**KLINIK KESIHATAN IBU DAN ANAK DATO' KERAMAT (SETIAWANGSA)**  
Nur Syafiqah Binti Ghazali (Principal / Coordinating Investigator)

**KLINIK KESIHATAN IBU DAN ANAK KAMPUNG PANDAN**  
Nur Syafiqah Binti Ghazali (Principal / Coordinating Investigator)

**KLINIK KESIHATAN IBU DAN ANAK SALAK SELATAN**  
Nur Syafiqah Binti Ghazali (Principal / Coordinating Investigator)

**KLINIK KESIHATAN IBU DAN ANAK SEGAMBUT**  
Nur Syafiqah Binti Ghazali (Principal / Coordinating Investigator)

**KLINIK KESIHATAN IBU DAN ANAK TAMAN SRI SENTOSA**  
Nur Syafiqah Binti Ghazali (Principal / Coordinating Investigator)

KKM.NIHSEC. P18-2464 ( 6 )

**KLINIK KESIHATAN IBU DAN ANAK TAMAN TUN DR ISMAIL**  
Nur Syafiqah Binti Ghazali (Principal / Coordinating Investigator)

**KLINIK KESIHATAN SETAPAK**  
Nur Syafiqah Binti Ghazali (Principal / Coordinating Investigator)

**PEJABAT KESIHATAN CHERAS**  
Nur Syafiqah Binti Ghazali (Principal / Coordinating Investigator)

**PEJABAT KESIHATAN DAERAH TITIWANGSA**  
Nur Syafiqah Binti Ghazali (Principal / Coordinating Investigator)

**PEJABAT KESIHATAN LEMBAH PANTAI**  
Nur Syafiqah Binti Ghazali (Principal / Coordinating Investigator)

**KLINIK KESIHATAN IBU DAN ANAK TAMAN PANTAI INDAH**  
Dr Salma Faeza binti Ahmad Fuzi

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      11-01-2019
2. Patient information sheet (English) & Informed Consent Form (English)    Version No 3  
Version Date      11-01-2019
3. Patient information sheet (BM) & Informed Consent Form (BM)    Version No 3  
Version Date      11-01-2019
4. Questionnaire    Version No      4    Version Date      11-01-2019
5. Follow-up Review Report    Version No    2    Version Date      11-01-2019
6. Investigator's documents : Declaration of Conflict of Interest (COI) and CV of:  
Nur Syafiqah Binti Ghazali  
Dr Salma Faeza binti Ahmad Fuzi
7. Investigator's documents : IA-HOD-IA of:  
Nur Syafiqah Binti Ghazali

5. Please note that the approval is valid until **13-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>).

- i. **Continuing Review Form** has to be submitted to MREC within 2 month (60 days) prior to the expiry of ethical approval.
- ii. **Study Final Report** upon study completion to the MREC.
- iii. Ethical approval is required in the case of **amendments / changes to the study documents/ study sites/ study team**. MREC reserves the right to withdraw ethical approval if changes to study documents are not completely declared.

6. This study involves the following methods:

- i. **Survey**
- ii. **Anthropometric measurement**
- iii. **Medical record**

## APPENDIX B



**JABATAN KESIHATAN WILAYAH PERSEKUTUAN  
KUALA LUMPUR DAN PUTRAJAYA**  
Jalan Cenderasari  
50590 KUALA LUMPUR  
MALAYSIA



Tel : 03-2288 7333  
Fax : 03-2288 7555  
Laman Web : jknklmah.gov.my

Ruj. Kami : Bil. ( 14 ) dlm. JKWPKL/2014 Bhg. 3  
Tarikh : 11 Februari 2019

Puan Nur Syafiqah binti Ghazali  
Jabatan Pemakanan dan Dietetik,  
Fakulti Perubatan dan Sains Kesihatan,  
Universiti Putra Malaysia,  
43400 UPM Serdang,  
Selangor Darul Ehsan.

Puan,

**MAKLUMBALAS PERMOHONAN KELULUSAN UNTUK MENJALANI  
PENYELIDIKAN BAGI PROJEK ILMIAH TAHUN AKHIR (PKK 4999) BS  
PEMAKANAN DAN KESIHATAN KOMUNITI, UNIVERSITI PUTRA MALAYSIA DI  
KLINIK KESIHATAN IBU DAN ANAK DI WILAYAH PERSEKUTUAN, KUALA  
LUMPUR**

**TAJUK KAJIAN : HUBUNGAN ANTARA TABIAT PENGAMBILAN KOPI DENGAN  
PARAS HEMOGLOBIN: KAJIAN KERATAN RENTAS DI  
KALANGAN WANITA HAMIL DI KLINIK KESIHATAN IBU DAN  
ANAK DI WILAYAH PERSEKUTUAN, KUALA LUMPUR**

**NMRR ID : NMRR-18-3197-46023(IIR)**

Dengan hormatnya saya menujuk kepada perkara di atas dan surat puan bertarikh 25 Januari 2019 adalah berkaitan.

2. Sukacita dimaklumkan bahawa pihak kami tiada halangan untuk membenarkan puan menjalankan penyelidikan seperti di atas pada 18 Februari 2019 hingga 30 April 2019. Lokasi penyelidikan yang diberi kelulusan adalah seperti berikut-

- a. Klinik Kesihatan Ibu dan Anak Bandar Tun Razak
- b. Klinik Kesihatan Ibu dan Anak Cheras Makmur
- c. Klinik Kesihatan Ibu dan Anak Salak Selatan
- d. Klinik Kesihatan Ibu dan Anak Dato' Keramat (Setiawangsa)
- e. Klinik Kesihatan Ibu dan Anak Kampung Pandan
- f. Klinik Kesihatan Ibu dan Anak Cheras
- g. Klinik Kesihatan Ibu dan Anak Segambut
- h. Klinik Kesihatan Ibu dan Anak Taman Pantai Indah
- i. Klinik Kesihatan Ibu dan Anak Jalan Bangsar
- j. Klinik Kesihatan Ibu dan Anak Taman Tun Dr Ismail
- k. Klinik Kesihatan Ibu dan Anak Taman Sri Serdang

...1/2



Pengurusan (Fax: 03-2288 7555), Kesihatan Asam (Fax: 03-2337 3005), Perubatan (Fax: 03-2288 5710),  
Klinikal & Kualiti Malaya (Fax: 03-2288 0000), Farmasi (Fax: 03-2288 9770) & P. (Fax: 03-2288 0000)

**MAKLUMBALAS PERMOHONAN KELULUSAN UNTUK MENJALANI PENYELIDIKAN BAGI PROJEK ILMIAH TAHUN AKHIR (PKK 4999) BS PEMAKANAN DAN KESIHATAN KOMUNITI, UNIVERSITI PUTRA MALAYSIA DI KLINIK KESIHATAN IBU DAN ANAK DI WILAYAH PERSEKUTUAN, KUALA LUMPUR**

**TAJUK KAJIAN : HUBUNGAN ANTARA TABIAT PENGAMBILAN KOPI DENGAN PARAS HEMOGLOBIN: KAJIAN KERATAN RENTAS DI KALANGAN WANITA HAMIL DI KLINIK KESIHATAN IBU DAN ANAK DI WILAYAH PERSEKUTUAN, KUALA LUMPUR**

**NMRR ID : NMRR-18-3197-45023(IIR)**

3. Untuk makluman, pihak puan dimohon agar mematuhi ~~peraturan-peraturan~~ berikut semasa menjalankan kajian di fasiliti kesihatan Jabatan Kesihatan Wilayah Persekutuan Kuala Lumpur & Putrajaya:-

- 3.1 Sebarang bentuk kajian yang dijalankan tidak mengganggu kelancaran perkhidmatan klinik dan tugas hakiki pegawai yang terlibat.
- 3.2 Bagi sebarang permohonan penyelidikan akan datang, pihak puan diingatkan agar menghantar permohonan penyelidikan kepada JKWPKL&P selawat-lewatnya sebulan sebelum tarikh penyelidikan dijalankan bagi memastikan maklumbalas dapat diberikan dalam tempoh masa yang sepatutnya.
- 3.3 Perlu mengikut segala perundangan dan prosedur yang telah ditetapkan oleh Kerajaan Malaysia, Kementerian Kesihatan Malaysia (KKM), Pejabat Kesihatan Daerah (PKD) dan Klinik Kesihatan.
- 3.4 Membentangkan hasil kajian kepada pihak kami setelah kajian selesai.
- 3.5 Memberikan sesalinan hasil kajian kepada pihak kami sebagai bahan bacaan dan rujukan pegawai-pegawai di jabatan ini.
- 3.6 Sebarang penerbitan atau diseminasi hasil penyelidikan tersebut sama ada melalui penulisan, pengiklanan, pembentangan atau untuk ke media perlu mendapat kelulusan Ketua Pengarah Kesihatan Malaysia terlebih dahulu.

Puan boleh merujuk kepada garis panduan Institut Kesihatan Negara mengenai penyelidikan di institusi dan fasiliti Kementerian Kesihatan Malaysia (Pindaan 01/2015).

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## APPENDIX C

### PATIENT INFORMATION SHEET AND INFORMED CONSENT FORM

*(for adult subjects and interventional studies)*

- 1. Title of study:** Coffee consumption habits and its link to haemoglobin level: A cross-sectional study in pregnant women attending antenatal clinics in Wilayah Persekutuan, Kuala Lumpur
- 2. Name of investigator and institution:** Nur Syafiqah Binti Ghazali, antenatal clinics in Wilayah Persekutuan area, Kuala Lumpur.
- 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 habitual coffee consumption 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 coffee consumption habits and its link to haemoglobin level in pregnant women attending antenatal clinics in Wilayah Persekutuan, Kuala Lumpur. This research is necessary because according

to World Health Organisation (WHO), pregnant women is at risk of anaemia which about 75% of them had haemoglobin level below than 11g/dl.

In Malaysia, there had been reported around 38% of pregnant women were anaemic. Anemic pregnant women can increase the risk of having low birth weight baby, maternal and perinatal mortality. There were several main risk factor for anaemia including dietary habits. Based on Malaysian Adult Nutrition Survey 2014, coffee was the third commonly drink consumed in Malaysia. Higher coffee consumption may cause poor iron absorption.

Several overseas studies have showed the association between coffee consumption habits with haemoglobin level. However, there were lack of study being carried out in Malaysia among pregnant women. Hence, the findings obtain from this study will further help in implement strategies to provide nutrition education in tackling anaemia issues among pregnant women in Malaysia in future.

A total of 176 pregnant women attending antenatal clinics in Wilayah Persekutuan, Kuala Lumpur will be conveniently selected. The whole study will last about 2 months from January to February 2019 and your participation will be about 15-20 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 age between 19 to 49 years old who come for routine antenatal check-up, can read and write, coffee consumer, not taking any additional supplements other than the prescribed by doctor, 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 anemic symptoms, dietary iron intake and coffee consumption habits. 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. However, if there is new/additional information relevant to the consent, you will be notified and asked to re-consent.

#### **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 low 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 of dietary habits knowledge on the association between coffee consumption habits and its link to haemoglobin level in pregnant women. Participants may contact the researcher via email or telephone number as stated in the information sheet to request a sheet summarising the findings of the study if required. Unfortunately, it will not be possible to reimburse any travel or other expenses incurred in taking part in the study.

**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?**

The researcher may stop the study or your participation at any time due to concerns for your safety. You will be notified if you are being terminated from the study.

**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.

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, Nur Syafiqah Bt Ghazali at telephone number 017-9064290 or syafiqahghazali93@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: Coffee consumption habits and its link to haemoglobin level: A cross-sectional studies in pregnant women attending antenatal clinics in Wilayah Persekutuan, Kuala Lumpur.

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:

## APPENDIX D



**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 kekerapan pengambilan kopi dan kaitannya dengan paras hemoglobin:  
Kajian rentas di kalangan wanita hamil di Klinik Kesihatan Ibu dan Anak di Wilayah  
Persekutuan, Kuala Lumpur.**

*Coffee consumption habits and its link to haemoglobin level: A cross-sectional study in pregnant  
women attending antenatal clinics in Wilayah Persekutuan, Kuala Lumpur*

Penyelidik / *Researcher* : Nur Syafiqah Binti Ghazali  
Program / *Programme* : B. Sc. (Nutrition & Community Health)  
Penyelia / *Supervisor* : 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 kerjasama yang tuan/puan berikan saya diahului 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.*

No Rajukan  
Reference Number

**Sekyen A / Section A: Sociodemografi / Sociodemography**

**Maklumat peribadi individu / Personal background information**

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

No Rujukan  
Reference Number

**Selaryen 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>	_____ _____ _____ _____ _____ _____ _____ _____  (hh-bb-tnn) / (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>	<input type="checkbox"/> Ya / Yes (tanda √ jika ambil / mark √ if take it) <input type="radio"/> Asid folik / <i>Folic acid</i> <input type="radio"/> Zat besi / <i>Iron</i> <input type="checkbox"/> Tidak / No
5.	Ada mengambil ubat-ubatan, supplemen tambahan, vitamin atau jamu? / <i>Take any medication, supplementation, vitamins or home remedies?</i>	<input type="checkbox"/> Ya / Yes (sila nyatakan / <i>please state</i> ) 1. _____ 2. _____ 3. _____ 4. _____ 5. _____ <input type="checkbox"/> 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>	<input type="checkbox"/> Ya / Yes (sila nyatakan / <i>please state</i> ) 1. _____ 2. _____ 3. _____ 4. _____ 5. _____ <input type="checkbox"/> Tidak / No
7.	Kehamilan pertama / <i>First pregnancy</i>	<input type="checkbox"/> Ya / Yes (Jika Ya, sila jawab soalan di Selaryen C / <i>If Yes, please answer question in Section C</i> ) <input type="checkbox"/> 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>	_____ _____
9.	Bilangan kelahiran terkini / <i>Current no. of delivery</i>	_____ _____
10.	Bilangan anak yang masih hidup / <i>No. of living children</i>	_____ _____  orang / <i>children</i>

No Rujukan 

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Reference Number

**Seksyen C (1) / Section C (1): Soal selidik Kekurangan Pengambilan Kafein / Caffeine Food Frequency Questionnaire**

Sila jawab semua soalan. Tandakan (✓) pada jawapan yang dipilih.  
Please answer all the questions. Tick (✓) for the chosen answer.

1.	Adakah anda selalu minum kopi? / Do you usually drink coffee?	<input type="checkbox"/> Ya / Yes <input type="checkbox"/> Tidak / No <input type="checkbox"/> Tidak tahu / Do not know
2.	Adakah anda minum kopi setiap hari? / Do you drink coffee every day?	<input type="checkbox"/> Ya / Yes <input type="checkbox"/> Tidak / No <input type="checkbox"/> Tidak tahu / Do not know
3.	Bilakah anda selalu minum kopi? / When do you usually drink coffee?	<input type="checkbox"/> Sebelum makan / Before meal <input type="checkbox"/> Semasa makan / During the meal <input type="checkbox"/> Selepas makan / After meal <input type="checkbox"/> 2 jam/lebih sebelum makan / 2 hour/more before meal <input type="checkbox"/> 2 jam/lebih selepas makan / 2 hour/more after meal <input type="checkbox"/> Tidak tahu / Do not know
4.	Berapa cawan kopi yang anda minum dalam sehari? / How many cups of coffee do you drink per day?	_____ cawan/hari / cup/day
5.	Manakah saiz cawan yang anda gunakan untuk minum kopi? / Which size of the cup that you usually use to drink coffee?	<input type="checkbox"/> Small / Kecil <input type="checkbox"/> Medium / Sederhana <input type="checkbox"/> Large / Besar
6.	Apakah jenis kopi yang anda gemar? / Which type of coffee do you prefer?	<input type="checkbox"/> Cappuccino / Klaten <input type="checkbox"/> Espresso <input type="checkbox"/> Americano <input type="checkbox"/> Mocha <input type="checkbox"/> Latte <input type="checkbox"/> Macchiato <input type="checkbox"/> Iced coffee / Kopi Ais <input type="checkbox"/> Lain-lain / Others
7.	Apakah jenama kopi yang anda selalu minum? / What brand of coffee do you usually drink?	<input type="checkbox"/> Nescafe <input type="checkbox"/> Indo Coffee <input type="checkbox"/> Radix <input type="checkbox"/> Kopi Kapal Api <input type="checkbox"/> Kopiko LA Coffee <input type="checkbox"/> Kopi Hang Tuah <input type="checkbox"/> PowerRoot <input type="checkbox"/> Old Town White Coffee <input type="checkbox"/> Wonda Coffee <input type="checkbox"/> Lain-lain / Others
8.	Mengapakah anda minum kopi? / Why do you drink a coffee?	<input type="checkbox"/> Untuk mendapatkan tenaga / To get energy <input type="checkbox"/> Kerana rasa / Because of the taste <input type="checkbox"/> Kerana anda terpengaruh dengan iklan / Because you feel influenced by advertising <input type="checkbox"/> Kerana kopi mudah didapati / Because coffee is easily available <input type="checkbox"/> Untuk menggantikan makanan / To replace food or meal <input type="checkbox"/> Lain-lain / Others
9.	Adakah anda menganggap diri anda sebagai penggemar kopi? / Do you consider yourself as coffee addict?	<input type="checkbox"/> Ya / Yes <input type="checkbox"/> Tidak / No <input type="checkbox"/> Tidak tahu / Tiada jawapan (Do not know / No answer)
10.	Adakah anda mengetahui tentang pengambilan kopi yang disarankan semasa mengandung? / Do you aware on the recommended intake of coffee during pregnancy?	<input type="checkbox"/> Ya / Yes <input type="checkbox"/> Tidak / No <input type="checkbox"/> Tidak tahu / Tiada jawapan (Do not know / No answer)
11.	Adakah anda rasa kopi akan memberi kesan sampingan terhadap kesihatan anda? / Do you think coffee will give side effect on your health?	<input type="checkbox"/> Ya / Yes <input type="checkbox"/> Tidak / No <input type="checkbox"/> Tidak tahu / Tiada jawapan (Do not know / No answer)

No Rujukan     
 Reference Number

**Seksyen C (2) / Section C (2): Soal selidik Kekerapan Pengambilan Kafein / Caffeine Food Frequency Questionnaire**

Baca pernyataan berikut dan pilih sama ada anda 'sangat setuju', 'bersetuju', 'tidak setuju' atau 'sangat tidak setuju'. Tandakan (✓) pada jawapan yang dipilih.

Read the following statement and choose whether you 'agree', 'strongly agree', 'disagree' or 'strongly disagree'. Tick (✓) for the chosen answer.

	Pernyataan / Statements	Sangat setuju / Strongly agree	Bersetuju / Agree	Tidak setuju / Disagree	Sangat tidak setuju / Strongly disagree
1	Anda selalu minum jenis kopi yang sama / You always consume the same type of coffee				
2	Harga merupakan factor yang penting bagi anda dalam pemilihan kopi / Price is the most important factor for you in coffee product choice				
3	Anda memerlukan kopi untuk memberi tenaga sepanjang hari / You need coffee to give energy throughout the day				
4	Rakan anda mempengaruhi jenis kopi yang anda minum / Your peers influence which type of coffee you consume				
5	Promosi dan diskaun merupakan perkara penting bagi anda dalam pemilihan kopi / Promotions and discounts are important to you when choosing a coffee				
6	Iklan televisyen adalah berkesan untuk memujuk anda untuk membeli kopi / TV advertisement are effective in persuading you to buy a coffee				
7	Pengambilan kopi terlalu banyak adalah tidak sihat / Consuming too much coffee is unhealthy				
8	Kopi dapat memberi lebih banyak manfaat berbanding risiko / Coffee give more benefits than risks				
9	Anda tidak mengambil tahu mengenai jumlah kafein yang terdapat dalam minuman kopi anda / You do not pay attention on how much caffeine in the drinks you consume				
10	Anda selalu minum kopi pada lewat malam / You drink coffee mostly late at night				
11	Anda selalu pergi ke kedai yang sama untuk membeli kopi / You always go to the same store to get a coffee				
12	Anda menganggap diri anda sebagai pengguna setia untuk jenama kopi yang tertentu / You consider yourself as brand loyal to specific coffee				

No Rujukan     
 Reference Number

**Seksyen D / Section D: 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 / Statement	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 rasa tidak bermaya / I feel listless ("washed out")	0	1	2	3	4
2.	Saya rasa penat / I feel tired	0	1	2	3	4
3.	Agak sukar bagi saya untuk memulakan sesuatu pekerjaan disebabkan kepenatan yang dialami / I have trouble starting things because I am tired	0	1	2	3	4
4.	Agak sukar bagi saya untuk menyiapkan sesuatu pekerjaan disebabkan kepenatan yang dialami / I have trouble finishing things because I am tired	0	1	2	3	4
5.	Saya bertenaga / I have energy	0	1	2	3	4
6.	Saya mengalami kesukaran untuk berjalan / I have trouble walking	0	1	2	3	4
7.	Saya boleh melakukan aktiviti harian seperti biasa / I am able to do my usual activities	0	1	2	3	4
8.	Saya perlu tidur di siang hari / I need to sleep during the day	0	1	2	3	4
9.	Saya rasa pening / I feel lightheaded (dizzy)	0	1	2	3	4
10.	Saya mengalami sakit kepala / I get headaches	0	1	2	3	4
11.	Saya mengalami kesakitan di dada / I have pain in my chest	0	1	2	3	4
12.	Saya sangat penat untuk makan / I am too tired to eat	0	1	2	3	4
13.	Saya bersemangat dalam melakukan aktiviti harian saya / I am motivated to do my usual activities	0	1	2	3	4
14.	Saya perlukan bantuan dalam melakukan aktiviti harian / I need help doing my usual activities	0	1	2	3	4
15.	Saya kecewa kerana tidak dapat melakukan sesuatu yang diinginkan kerana kepenatan yang dialami / I am frustrated by being too tired to do the things I want to do	0	1	2	3	4
16.	Saya perlu mengurangkan aktiviti sosial kerana kepenatan yang dialami / I have to limit my social activity because I am tired	0	1	2	3	4

No Rujukan  
Reference Number

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

Jenis Makanan Type of food	Berapa kali kekerapan pengambilan makanan (Isikan dalam salah satu kolom sahaja) How frequent each food was taken (Fill in one of the columns only)			Rujukan saiz hidangan Reference of meal size	Jumlah Sajian (setiap kali makan) Total servings (each time eaten)
	Sehari/ Daily	Seminggu/ Weekly	Sebulan/ Monthly		
Makanan segera/ Fast food					
Kentang Lempok/ Mashed potatoes				bekas kecil/ small container	
Kentang Goreng/ French fries				cawan/ cup	
Sosej/ Hotdog/ Frankfurter				keping/ slices	
Colasew				bekas kecil/ small container	
Nugget				keping/ pieces	
Ayam Goreng/ Fried chicken				keping/ pieces	
Burger				biji/ pieces	
Pizza				keping/ slices	

No Rujukan     
 Reference Number

Jenis Makanan Type of food	Berapa kali kekerapan pengambilan makanan (Isikan dalam salah satu kolom sahaja) How frequent each food was taken (Fill in one of the columns only)			Rujukan saiz hidangan Reference of meal size	Jumlah Sajian (setiap kali makan) Total servings (each time eaten)
	Sehari/ Daily	Seminggu/ Weekly	Sebulan/ Monthly		
Daging dan hasil daging/ Meat and meat products					
Organ dalaman (Hati/limpa, paru)/ Internal organs (liver, spleen, lungs)				kotak mancis/ matchbox size	
Lembu/ Kerbau/ Beef				kotak mancis/ matchbox size	
Kambing/ Mutton				kotak mancis/ matchbox size	
Ayam/ Chicken				ketul/ pieces	
Itik/ Duck				ketul/ pieces	
Bebola ayam/daging/ Chicken/meat ball				ketul/ pieces	

Jenis Makanan Type of food	Berapa kali kekerapan pengambilan makanan (Isikan dalam salah satu kolom sahaja) How frequent each food was taken (Fill in one of the columns only)			Rujukan saiz hidangan Reference of meal size	Jumlah Sajian (setiap kali makan) Total servings (each time eaten)
	Sehari/ Daily	Seminggu/ Weekly	Sebulan/ Monthly		
Daging dan hasil daging/ Meat and meat product *Bagi peserta bukan Islam					
*Ham				keping/ slices	
*Daging khinzir/babi/ pork				kotak mancis/ matchbox size	
*Luncheon meat				keping/ slices	
*Bacon				keping/ slices	

No Rujukan  
Reference Number

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>		
Ikan dan makanan laut/ <i>Fish and seafoods</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/ <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>				kecil/ <i>pieces</i>	

No Rujukan  
Reference Number

Jenis Makanan —Type of food—	Berapa kali kekerapan pengambilan makanan (Isikan dalam salah satu kolom sahaja) How frequent each food was taken (Fill in one of the columns only)			Rujukan saiz hidangan Reference of meal size	Jumlah Sajian (setiap kali makan) Total servings (each time eaten)
	Sehari/ Daily	Seminggu/ Weekly	Sebulan/ Monthly		
Telur/ Eggs					
Telur itik (masak lemak/ gulai, telur dadar)/ Duck eggs (cooked with coconut milk gravy, omelette)				biji/ whole	
Telur puyuh (rebus/ masak sambal)/ Quail eggs (boiled/ with chillies)				biji/ pieces	
Telur masin/ Salted eggs				biji/ pieces	
Telur ayam (mata kerbau/ telur dadar/ telur rebus/ telur masak sambal/ telur pinggang)/ Hen eggs (bulls eye, omelette, boiled with chillies or herbs)				biji/ pieces	

Jenis Makanan Type of food	Berapa kali kekerapan pengambilan makanan (Isikan dalam salah satu kolom sahaja) How frequent each food was taken (Fill in one of the columns only)			Rujukan saiz hidangan Reference of meal size	Jumlah Sajian (setiap kali makan) Total servings (each time eaten)
	Sehari/ Daily	Seminggu/ Weekly	Sebulan/ Monthly		
Kekacang dan hasilnya/ Legumes and legumes product					
Kekacang (kacang hijau/ parang/ kuda/ merah dsb.)/ Legumes				sudu makan/ tablespoon	
Kacang tanah/ Groundnuts				sudu makan/ tablespoon	
Tauhu				keping/ slices	
Tempe/ Fermented soy beans				keping/ slices	

Jenis Makanan —Type of food—	Berapa kali kekerapan pengambilan makanan (Isikan dalam salah satu kolom sahaja) How frequent each food was taken (Fill in one of the columns only)			Rujukan saiz hidangan Reference of meal size	Jumlah Sajian (setiap kali makan) Total servings (each time eaten)
	Sehari/ Daily	Seminggu/ Weekly	Sebulan/ Monthly		
Susu dan hasil terusnya/ Milk and milk products					
Susu tepung/ Powdered milk				sudu makan/ tablespoon	

No Rujukan  
Reference Number

Jenis Makanan Type of food	Berapa kali kekerapan pengambilan makanan (Isikan dalam salah satu kolom sahaja) How frequent each food was taken (Fill in one of the columns only)			Rujukan saiz hidangan Reference of meal size	Jumlah Sajian (setiap kali makan) Total servings (each time eaten)
	Sehari/ Daily	Seinggu/ Weekly	Sebulan/ Monthly		
Sayur-sayuran/ Vegetables					
Sayuran berdaun hijau (bayam, kangkung, kaliam, dsb.)/ Leafy vegetables				sudu makan/ tablespoon	
Ulam-ulaman/ Local fresh salad				sudu makan/ tablespoon	
Cendawan kering/ Dried mushrooms				sudu makan/ tablespoon	
Taugeh/ Bean sprout				sudu makan/ tablespoon	
Bendi/ Ladies finger				sudu makan/ tablespoon	
Cili/ Chillies				sudu makan/ tablespoon	
Tamatol/ Tomatoes				sudu makan/ tablespoon	
Cendawan basah/ Mushrooms				sudu makan/ tablespoon	
Sayuran berubi (kentang, keladi, keledek)/ Tubers (potatoes, sweet potatoes, yam)				sudu makan/ tablespoon	
Sayuran kekacang lain (kacang panjang, kacang buncis, kacang botol dsb.)/ Other type of legumes				sudu makan/ tablespoon	

No Rujukan  
Reference Number

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</i> (each time eaten)
	Sehari/ <i>Daily</i>	Seminggu/ <i>Weekly</i>	Sebulan/ <i>Monthly</i>		
Buah-buahan/ <i>Fruits</i>					
Buahan kering (kurma, prun, kismis dsb.)/ <i>Dried fruits</i>				sudu makan/ <i>tablespoon</i>	
Rarabutan				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/ <i>Acid Pickled fruits</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</i> (each time eaten)
	Sehari/ <i>Daily</i>	Seminggu/ <i>Weekly</i>	Sebulan/ <i>Monthly</i>		
Minuman/ <i>Drinks</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 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</i> (each time eaten)
	Sehari/ <i>Daily</i>	Seminggu/ <i>Weekly</i>	Sebulan/ <i>Monthly</i>		
Konfeksi/ <i>Confectionaries</i>					
Kuih-muih/ <i>Local kuih</i>				ketul/ <i>cup</i>	
Kek/ <i>Cake</i>				potong/ <i>slices</i>	

No Rujukan  
Reference Number

Jenis Makanan Type of food	Berapa kali kekerapan pengambilan makanan (Isikan dalam salah satu kolom sahaja) How frequent each food was taken (Fill in one of the columns only)			Rujukan saiz hidangan Reference of meal size	Jumlah Sajian (setiap kali makan) Total servings (each time eaten)
	Sahari/ Daily	Seminggu/ Weekly	Sebulan/ Monthly		
Sapuan Roti/ Bread Spread					
Sapuan coklat/ Chocolate spread				sudu makan/ tablespoon	
Mentega kacang / Peanut butter				sudu makan/ tablespoon	

Jenis Makanan Type of food	Berapa kali kekerapan pengambilan makanan (Isikan dalam salah satu kolom sahaja) How frequent each food was taken (Fill in one of the columns only)			Rujukan saiz hidangan Reference of meal size	Jumlah Sajian (setiap kali makan) Total servings (each time eaten)
	Sahari/ Daily	Seminggu/ Weekly	Sebulan/ Monthly		
Pencacah/ Pcrasa/ Flavours					
Sos ikan/ Fish sauce				sudu teh/ teaspoon	
Budu				sudu teh/ teaspoon	
Sos tiram/ Oyster sauce				sudu teh/ teaspoon	
Sos tomato/ Tomato ketchup				sudu teh/ teaspoon	
Sos cili/ Chilli sauce				sudu teh/ teaspoon	

No Rujukan  
Reference Number

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

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

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

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