



UNIVERSITI PUTRA MALAYSIA

***FOOD INSECURITY AND ITS LINK TO HAEMOGLOBIN LEVEL: A
CROSS-SECTIONAL STUDY IN PREGNANT WOMEN
ATTENDING ANTENATAL CLINICS IN WILAYAH
PERSEKUTUAN, KUALA LUMPUR***

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**FOOD INSECURITY AND ITS LINK TO HAEMOGLOBIN LEVEL: A CROSS-
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CLINICS IN WILAYAH PERSEKUTUAN, KUALA LUMPUR**

BY

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**A project submitted as a partial fulfillment of the requirement for the degree of
Bachelor of Science (Nutrition and Community Health) from the Faculty of
Medicine and Health Sciences, Universiti Putra Malaysia**

APPROVAL

This project entitled ‘Food Insecurity and Its Link to Haemoglobin Level: A Cross-Sectional Study in Pregnant Women Attending Antenatal Clinics in Wilayah Persekutuan, Kuala Lumpur’ was prepared by Che Nadhatul Ilani binti Mohd Nordin and submitted to the Faculty of Medicine and Health Sciences as a partial fulfillment of the requirement for the degree of Bachelor of Science (Nutrition and Community Health) from the Faculty of Medicine and Health Sciences, Universiti Putra Malaysia.

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LIST OF ABBREVIATION

BMI	Body mass index
ELCSA	Latin American and Caribbean Food Security Scale
FANTA	Food and Nutrition Technical Assistance
FAO	Food and Agriculture Organisation
FFQ	Food frequency questionnaire
FSS	Food security status
HFI	Household food insecurity
HFIAS	Household Food Insecurity Access Scale
HFSSM	Household Food Security Survey Module
IDA	Iron deficiency anaemia
MANS	Malaysian Adult Nutrition Survey
MREC	Medical Research and Ethics Committee
NHANES	National Health and Nutrition Examination Survey
NHMS	National Health and Morbidity Survey
RNI	Recommended Nutrient Intake
USDA	United State Department of Agriculture
WHO	World Health Organisation

ABSTRACT

Food Insecurity And Its Link To Haemoglobin Level: A Cross-Sectional Study In Pregnant Women Attending Antenatal Clinics In Wilayah Persekutuan, Kuala Lumpur

Che Nadhatul Ilani binti Mohd Nordin

National Health and Morbidity Survey 2015 estimated that the prevalence of anaemia in Malaysian adults was 24.6%, whereas Kuala Lumpur with 27.6% was the 4th federal with the highest prevalence of anaemia. Pregnant women is vulnerable to anaemia since pregnancy is often associated with increased iron demand. The prevalence of anaemia in pregnant women in Malaysia was 38.3%, and 48.8% of them were from Kuala Lumpur. There are many factors that might affect haemoglobin level and food security status, and socio-demographic factors have been shown to be the factors that might affect haemoglobin level. Therefore, the study was aimed to investigate the associations between food security status, socio-demographic factors and haemoglobin level in pregnant women in Kuala Lumpur. A total of 183 pregnant women who went for antenatal check-up in antenatal clinics in Kuala Lumpur with a mean age of 29.33 ± 4.60 years completed a questionnaire on socio-demographic and food security status. Haemoglobin levels were retrieved from the medical records. A Pearson coefficient correlation and Chi-squared test were used to determine the association between the variables. Haemoglobin level was found to be associated with food security status ($r=-0.297$, $p<0.01$), age ($r=0.217$, $p=0.003$), and monthly household income ($r=0.280$, $p<0.01$). However, there was no significant association found between ethnicity, gravidity, parity, and educational level with haemoglobin level. Based on the findings, food security status, age, and monthly household income affects the haemoglobin level during pregnancy. These findings highlighted that financial constraint may lead to food insecurity which then affects the haemoglobin level of pregnant women.

ABSTRAK

Hubungan Antara Kekurangan Makanan Dan Kaitannya Dengan Paras Hemoglobin: Kajian Keratan Rentas Di Kalangan Wanita Hamil Di Klinik Kesihatan Ibu Dan Anak Di Kawasan Wilayah Persekutuan, Kuala Lumpur

Che Nadhatul Ilani binti Mohd Nordin

Bancian Kesihatan dan Morbiditi Negara 2015 menganggarkan kekerapan anemia di kalangan dewasa di Malaysia adalah sebanyak 24.6%, manakala Kuala Lumpur sebanyak 27.6% yang menjadikannya sebagai negeri keempat tertinggi dengan kekerapan anemia. Wanita hamil merupakan kumpulan yang sering terdedah pada anemia memandangkan kehamilan sering dikaitkan dengan permintaan zat besi yang lebih tinggi. Kekerapan anemia dalam kalangan wanita hamil di Malaysia adalah sebanyak 38.3%, dan 48.8% daripada mereka adalah dari Kuala Lumpur. Terdapat beberapa faktor yang menjejaskan paras hemoglobin dan status kekurangan makanan serta faktor sosio-demografi merupakan salah satu faktor yang mungkin menjejaskan paras hemoglobin. Oleh itu, kajian ini bertujuan untuk menyiasat perhubungan antara status kekurangan makanan dan faktor sosio-demografi dengan paras hemoglobin di kalangan wanita hamil di Kuala Lumpur. Sebanyak 183 wanita hamil yang melakukan pemeriksaan kehamilan di klinik kesihatan Kuala Lumpur dengan purata umur 29.33 ± 4.60 telah melengkapkan borang soal selidik mengenai sosio-demografi dan status kekurangan makanan. Paras hemoglobin diambil daripada rekod perubatan. Paras hemoglobin menunjukkan perkaitan dengan status kekurangan makanan status ($r=-0.297$, $p<0.01$), umur ($r=0.217$, $p=0.003$), dan pendapatan isi rumah bulanan ($r=0.280$, $p<0.01$). Manakala, tiada perkaitan yang signifikan di antara etnik, bilangan kehamilan, bilangan kelahiran, dan tahap pendidikan dengan paras hemoglobin. Berdasarkan keputusan kajian, status kekurangan makanan, umur, dan pendapatan isi rumah bulanan boleh menjejaskan paras hemoglobin semasa kehamilan. Hasil kajian ini menunjukkan masalah kewangan mendorong kepada kekurangan makanan yang boleh menjejaskan paras hemoglobin di kalangan wanita hamil.

CHAPTER 1

1.0 INTRODUCTION

World Health Organisation (WHO) defines anaemia as a condition in which insufficient number of red blood cell or their oxygen-carrying capacity to meet the physiologic needs. The conditions are vary by age, sex, altitude, smoking, and pregnancy status (WHO, 2018). Haemoglobin level are considered respectively low for males and females when it is below than 13g/dl and 12g/dl (Abu-Ouf & Jan, 2015). WHO Global Database shows that anaemia affects 1.62 billion people, which corresponds to approximately 24.8% of the population globally from year 1993 to 2005, whilst approximately 14.9% of the South East Asia population were estimated to be affected by anaemia (McLean, Cogswell, Egli, Wojdyla, & de Benoist, 2009). The prevalence of anaemia in Malaysian adults was 24.6%, and it was estimated to be 27.6% in Kuala Lumpur; ranked as the 4th state in Malaysia with highest prevalence of anaemia (NHMS, 2015).

Pregnant women is particularly vulnerable to anaemia (WHO, 2018). The prevalence of pregnant women with anaemia globally is 41.8% which equates to approximately 56 million people; whilst in South East Asia countries, nearly 48.2% of pregnant women were affected with anaemia (McLean, Cogswell, Egli, Wojdyla, & de Benoist, 2009). Pregnancy is often associated with increased iron demand, which increased the risk of anaemia. Due to

the physiological changes in pregnancy, haemoglobin level that is lower than 11g/dl are considered abnormal for pregnant women (Abu-Ouf & Jan, 2015; Ahmad et al., 1997). Over the years, the consequences of low haemoglobin level in pregnancy have been identified and discussed (Adanikin & Awoleke, 2015). It has been shown that in pregnancy, anaemia may increase the risk of both maternal and fetal morbidities and mortalities (Ahmad et al., 1997). Once anaemia is recognised, the possibility of iron deficiency must be considered (Abu-Ouf & Jan, 2015).

Anaemia is generally defined based on haemoglobin levels, which may vary due to different factors (Abu-Ouf & Jan, 2015). Food insecurity has been shown to lead to various deficiency disorders, and anaemia is one that stands out as the most prevalent one (Ghose et al., 2016). Food insecurities can be defined as a limited or uncertain access to sufficient amounts of safe and nutritious food for normal growth and healthy life. In 2010, the global measurement of food insecurity showed that more than 1 billion people were estimated to have insufficient dietary energy availability; hence food security status is currently a growing concern worldwide (Moradi et al., 2018).

Several studies carried out in different settings showed that food security status (FSS) was associated with occurrence of anaemia. A study by Park & Eicher-Miller (2014) showed that pregnant women had three times higher chances of developing anaemia if they were in food insecurity situation as it will also lead to the lower intake of nutritional iron. It was reported that pregnant women who had food insecurity had a higher anaemia prevalence (31.0%) compared to those who were not (22.0%) ($p = 0.0025$).

Another study by Ghose et al. (2016) showed that the impact of food insecurity and anaemia has been a big issue in reproductive women especially to those women who were pregnant. Looking at the anaemia prevalence among pregnant women, the number of those who were food insecure were higher (86.3%) compared to those food secure (13.7%) ($p < 0.001$). Mastiholi et al. (2018) observed similar findings where the prevalence of mild anaemia was higher in those who were food insecure (21.3%) than food secure (13.2%) ($p = 0.00001$).

Sholeye et al. (2017) carried out a study to determine the associated factors of anaemia and found that there was a significant association between FSS and anaemia ($\chi^2 = 9.545$, $p = 0.044$). Another findings by Demetrio et al. (2017) highlighted that food insecurity situation increased 2.63 times chances of developing anaemia among pregnant women as those who were food insecure were more likely to consume less nutritious food. Hence, pregnant women who were food insecure had higher chances to develop anaemia due to inadequate intake of essential micronutrients.

Apart from food security status, socio-demographic factors were reported to be associated with anaemia. Ethnicity is one of the factors that may affect haemoglobin level. This is because few studies that were carried out previously found that there were association between haemoglobin level and ethnicity (Gaskell et al., 2008; Adanikin & Awoleke, 2015; Yusof et al., 2018). The haemoglobin level varies among different ethnics may be due to the culture practiced by the ethnic itself. For example, every ethnic may have different food

culture that may affects the haemoglobin level. Prevalence of anaemia was also shown to be higher among pregnant women who were older (Ahmad et al., 1997; Adanikin & Awoleke, 2015; Chowdhury, 2015). As the women getting older, they might had less time to do physical activity that may affect the iron absorption as well as the haemoglobin level.

Another study carried out by Ma et al. (2009) and Chowdhury et al. (2015) reported that the prevalence of anaemia was higher among those pregnant women with lower educational level. Plus, Alene and Dohe (2014) found that pregnant women from lower socio-economic status were at higher risk of developing anaemia than those in higher socio-economic status. Their study showed that as the wealth quintiles increase from lowest to second lowest, the risk of developing anaemia reduced by 57.0%. These study were supported by Soh et al. (2015) as it showed that there was a negative association between education level and socio-economic status with prevalence of anaemia. This is because lower educational level and socio-economic status might have led to poor nutritional education, yet practiced unbalanced diet which then lead to anaemia.

Krupp et al. (2018) found that pregnant women who had more pregnancy history were more likely to develop anaemia; severe anaemia (59.0%) compared to mild anaemia (57.5%). Studies showed that gravidity (number of pregnancy) was found to be associated with haemoglobin level (Ahmad et al., 1997; Alene & Dohe, 2014). At the same time, previous studies reported that the higher the number of parity (giving birth), the higher the chances of being anaemic (Ahmad et al., 1997; Taner et al., 2015). Soh et al. (2015) also found the similar results as the prevalence of anaemia was higher among those who were

multipara (43.0%) compared to those who were primigravida (32.0%). Inadequate child spacing may lead to anaemia as women only have little time to build up their iron levels between pregnancies (Ahmad et al., 1997).

Most of the overseas studies and few of local studies showed that there was association between food security status and haemoglobin level among pregnant women. Other than that, socio-demographic factors including ethnicity, age, education level, monthly income, gravidity, and parity were found to be associated with haemoglobin level. Therefore, the study was aimed to determine the association between food security status, and socio-demographic factors with haemoglobin level among pregnant women attending antenatal clinics in Wilayah Persekutuan, Kuala Lumpur to address the following research question:

1. Is there any association between food security status with haemoglobin level in pregnant women attending antenatal clinics in Wilayah Persekutuan, Kuala Lumpur?
2. Is there any association between socio-demographic factors (ethnicity, age, education level, monthly income, gravidity, parity) with haemoglobin level in pregnant women attending antenatal clinics in Wilayah Persekutuan, Kuala Lumpur?

1.1 Significance of Study

This study is important to determine the association of food security status, socio-demographic factors (ethnicity, age, education level, income, gravidity, parity), and haemoglobin level among pregnant women. This study can be used to add to the body of knowledge on anaemia and current issues regarding to this problem. It can provide valuable knowledge and in-depth information on anaemia issues among Malaysian.

Besides, this study also can be served as a baseline for future research and fill the gaps between anaemia and its associated factors among Malaysian pregnant women. Other than that, it can help to provide information as an awareness to all the women to practice healthy eating by taking moderate and various type of food for their own benefit in the future. All of Malaysian women may know the importance of practicing healthy eating and adequate nutrient intake for their own benefit during pregnancy as well as for their babies.

The findings of this study may help to improve Malaysian's awareness and knowledge regarding anaemia. Through this findings, it can help to improve the nutrient intake in daily life so that they may improve their quality of life in terms of health. This can improve the pregnant women's haemoglobin level and lead to a better health outcome.

1.2 Objectives

1.2.1 General Objective

To determine the association between food security status, and socio-demographic factors (ethnicity, age, education level, monthly income, gravidity, parity) with haemoglobin level among pregnant women in Kuala Lumpur.

1.2.2 Specific Objectives

1. To determine the haemoglobin level of pregnant women attending antenatal clinics in Wilayah Persekutuan, Kuala Lumpur.
2. To determine the socio-demographic factors (ethnicity, age, education level, monthly income, gravidity, parity), pregnancy history, anaemia symptoms, and food security status among pregnant women attending antenatal clinics in Wilayah Persekutuan, Kuala Lumpur.
3. To determine the intake of foods containing iron among pregnant women attending antenatal clinics in Wilayah Persekutuan, Kuala Lumpur.
4. To determine the anthropometric measurement (weight and height) among pregnant women attending antenatal clinics in Wilayah Persekutuan, Kuala Lumpur.
5. To determine the association between food security status with haemoglobin level in pregnant women attending antenatal clinics in Wilayah Persekutuan, Kuala Lumpur.
6. To determine the association between socio-demographic factors with haemoglobin level in pregnant women attending antenatal clinics in Wilayah Persekutuan, Kuala Lumpur.

1.3 Null Hypothesis

H₀₁ : There is no association between food security status with haemoglobin level among pregnant women in Kuala Lumpur.

H₀₂ : There are no associations between socio-demographic factors (ethnicity, age, educational level, monthly income, gravidity, parity) with haemoglobin level among pregnant women in Kuala Lumpur.

1.4 Conceptual Framework

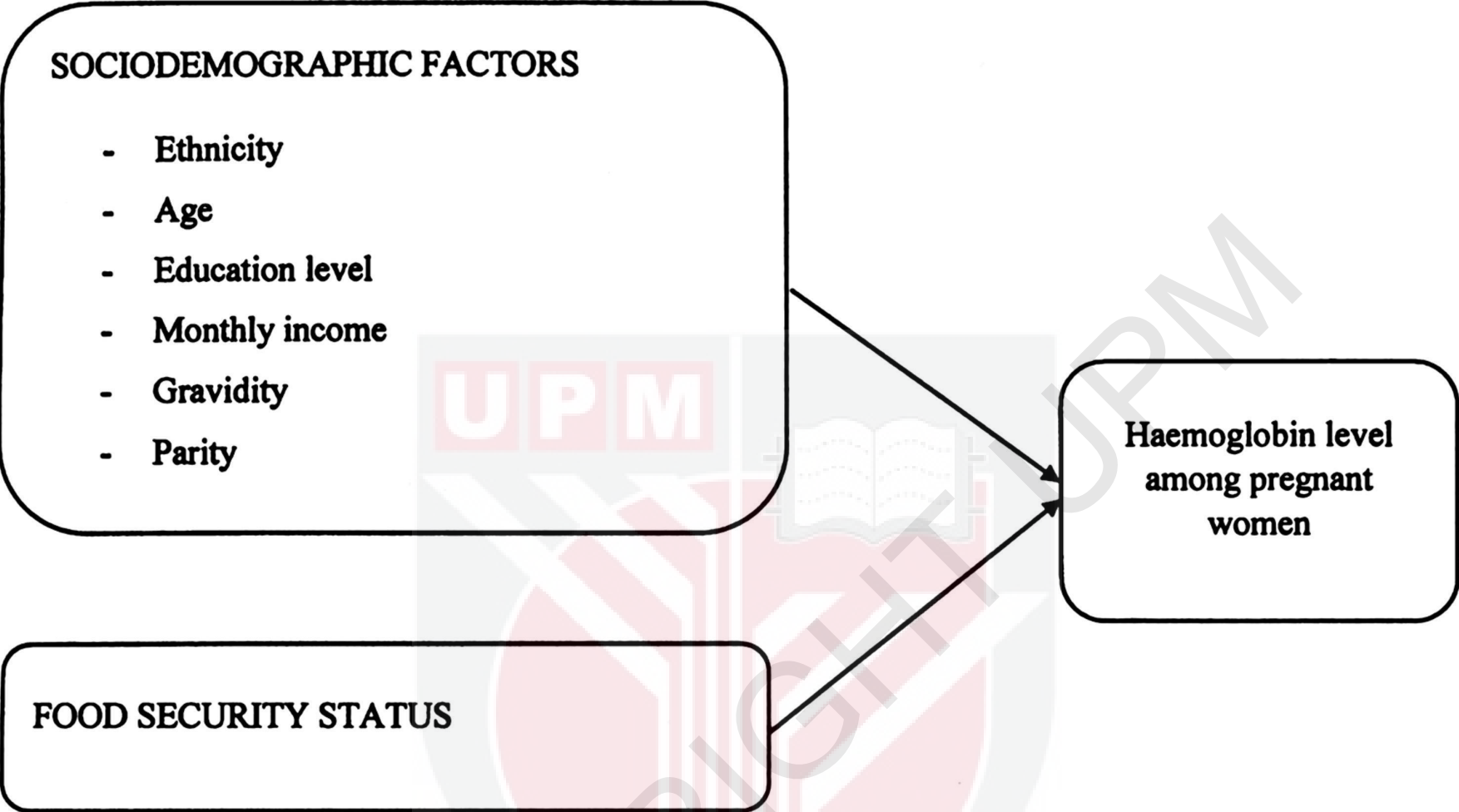


Figure 1.1: Conceptual framework

CHAPTER 2

2.0 LITERATURE REVIEW

2.1 Anaemia

2.1.1 Definition and classification

Anaemia can be defined as a condition in which insufficient number of red blood cell or their oxygen-carrying capacity to meet the physiologic needs, where the conditions are vary by age, sex, altitude, smoking, and pregnancy status (World Health Organisation, 2018). Whereas, anaemia in pregnancy is often associated with the increased iron demand due to the physiological changes (Abu-Ouf & Jan, 2015). The cut-off point for haemoglobin level is presented in Table 2.1.

Table 2.1: Cut-off Point for Haemoglobin Level

Cut-Off Point for Haemoglobin Level (g/dL)	
Men	< 13.0
Women	< 12.0
Pregnant women	< 11.0

Source: World Health Organisation (2018)

2.1.2 Anaemia in pregnancy

Anaemia in pregnancy has been associated with several risk factors that were investigated in previous studies (Ahmad et al., 1997; McLean et al., 2009; Ghose et al., 2016; Moradi et al., 2018; Yusof et al., 2018; Mastiholi et al., 2018). The risk factors of anaemia in pregnancy were low intake of iron, food insecurity status, socio-demographic factors including age, ethnicity, educational level, monthly income, occupation, types of residence, number of children, number of pregnancy, and number of giving birth (Fischer et al., 2014; Adanikin & Awoleke, 2015; Sholeye, Animasahun, & Shorunmu, 2017).

Previous studies reported that anaemia during pregnancy may result into various complication; which include the risk of poor intrauterine growth which may lead to low birth weight or premature birth, as well as higher risk of maternal or infant mortality rate (Ahmad et al., 1997; Brabin, B.J., Hakimi, M., Pelletier, 2001; Srouf, Aqel, Srouf, Younis, & Samarah, 2018).

2.2 Food Security Status

A study carried out by Jones et al. (2017) aimed to determine the association between household food insecurity (HFI) and the co-occurrence of overweight and anaemia among women of reproductive age in Mexico. Latin American and Caribbean Food Security Scale (ELCSA) was used to assess the HFI, whilst portable HemoCue photometers was used to assess the haemoglobin level. The adjusted analyses showed that anaemia was associated

with mild food insecurity ($p < 0.05$, AOR = 1.3, 95% CI; 1.1, 1.6), and moderate food insecurity ($p < 0.01$, AOR = 1.5, 95% CI; 1.1, 1.9) among adult women of reproductive age (20-49 years old). Plus, there was a significant association between mild food insecurity with overweight ($p < 0.05$, AOR = 1.2, 95% CI; 1.0, 1.4).

Another cross-sectional study by Hoseini et al. (2018) was carried out among women after childbirth between December 2016 and December 2017 in the Qazvin province. The study aimed to investigate the prevalence of household insecurity in pregnant women and its association with pregnancy complication. Household Food Insecurity Access Scale (HFIAS) was used to determine the FSS and pregnancy outcomes were investigated. The study found that women who experienced food insecurity increased the chances of developing gestational hypertension (24.0%), pregnancy anaemia (24.0%), and gestational diabetes (63.0%) compared to those women who are food secure.

These studies showed that people who were in food insecure situation were more likely to develop various health complication. Hence, it was estimated that food insecurity increase the chances of developing pregnancy complications, and one of it that stand out the most is anaemia.

2.2.1 Previous studies on the association between food security status and haemoglobin level

A study by Fischer et al. (2014) investigated the association between household food insecurity (HFI) with iron deficiency anaemia (IDA) among 16,944 Mexican women of reproductive age (12-49 years). These subjects were divided into two groups; adolescents (12-20 years) and adult women (21-49 years). The HFI was measured using the Latin American and Caribbean Food Security Scale (ELCSA), and haemoglobin level was measured using HemoCue photometer. From the study, only 26.5% of subjects were food secure, while the prevalence of IDA was 11.8%. As for pregnant women, the prevalence of IDA was 25.9%. Adolescents group showed no association between HFI and IDA ($p = 0.24$). However, the prevalence of IDA were 33.0% higher among adult women living in moderate HFI, and 36.0% higher among those living in severe HFI compared to those who are food secure ($p < 0.05$).

Another study carried out by Park and Eicher-Miller (2014) aimed to examine the association between FSS and iron intake from food, beverages, and supplements. National Health and Nutrition Examination Survey (NHANES) data collected during 1999-2010 among 1,045 females aged 13 to 54 years were used in this study. Dietary and energy intake information was obtained from the 24-h dietary recall, while mean daily supplemental iron intake was calculated from the 30-d dietary supplement questionnaire. Total iron intake was obtained by sum up the 24-h dietary iron intake and mean daily supplemental iron intake. FSS was then assessed using the US Food Security Survey Module. Results showed that 881 were food secure, and 164 were food insecure. Dietary iron intake showed no association

with food security status; however the mean daily iron intake from supplements was 10 mg/day higher among food secure pregnant females as they may have more awareness and access to iron supplements. As for that, the total iron intake from food secure pregnant females was higher compared to those who are food insecure ($p = 0.002$), plus the prevalence of iron deficiency was higher among food insecure females ($p = 0.0025$).

Weigel et al. (2016) carried out a study among 794 adult women living in a households with children aged 6 to 12 years in low-income neighborhoods in Quito to investigate the association between household food insecurity with nutritional status. Face-to-face interviews were conducted to obtain the data on socio-demographic characteristics, and anthropometric indicators. A standard format of food frequency questionnaire (FFQ) was used to assess commonly consumed food and beverages, and US Household Food Security Survey Module (HFSSM) was used to assess the household food security status prior 12 months. Whilst a sample of fingertip capillary blood was collected to obtain the blood haemoglobin level. From the results, 81% of the women participated in the study had food insecurity during the past 12 months. Plus, it also showed that the haemoglobin level were significantly lower among women from households with food insecure (12.3 ± 1.7 g/dL) compared to those from food secure (13 ± 1.4 g/dL) ($p=0.001$).

Metallinos-Katsaras et al. (2016) once carried out a longitudinal study to examine the association between household FSS among 17,831 low-income infants during the 12 months preceding the 1-year visit, and anaemia at age 18 months. This study was carried out from August 2001 to November 2009 in Massachusetts. Household FSS data was obtained

from parents/caregiver responses to the questions from Food Security Module developed by US Department of Agriculture (USDA) and inquired about the prior 12-month period. The haemoglobin level were obtained from the Medical Referral Form. This study also collected the data on socio-demographic and health-related variables from the parents/caregiver. The study found that infants from households reporting low food secure were 42% more likely to develop anaemia by age 18 months. Same percentage were obtained among those non-anaemic infants during aged 12 months, however those infants who lived in the households that were food insecure had 33% higher risk of anaemia.

A study carried out by Ghose et al. (2016) demonstrated the association between food insecurity and anaemia among women of childbearing age in Bangladesh. This study involved 5,666 married women aged between 13 and 40 years. Their demographics, socioeconomics, and anaemia status were all obtained from the Bangladesh Demographic and Health Survey (BDHS 2011), while food insecurity were assessed using the Household Food Insecurity Access Scale (HFIAS). From the study, the prevalence of anaemia was 41.7% among the subjects, and one-fifth of them were living in food insecure condition. This study supported that women who reported food insecurity had higher risks of developing anaemia as it showed positive association ($p < 0.001$) between this two variables.

Demetrio et al. (2017) carried out a study to identify the prevalence of anaemia and its relation to food insecurity and other determinants in pregnant women. Method used in the study was cross-sectional, cohort-nested from the urban zone of municipality of Santo Antonio de Jesus, Bahia, Brazil from February 2014 until February 2015. Structured

questionnaire and short version of United State Department of Agriculture (USDA) Food Security Scale was used to assess the participants. Results of the study showed that the prevalence of anaemia among pregnant women was 21.8%. For the food security status, 71.84% of the households with pregnant women were in food security situation, while another 28.16% were in food insecurity situation with 3.68% of them were in hunger situation. The study found that the anaemia prevalence was higher among pregnant women who are in a situation of food insecurity ($p < 0.0001$). Another finding showed that food insecurity situation increased 2.63 times the chance of developing anaemia among pregnant women.

A study by (Sholeye et al., 2017) was carried out to determine the prevalence of anaemia and its associated factors among 400 pregnant women in Sagamu, Nigeria between January and April 2013. A semi-structured, interviewer-administered questionnaire was used, as well as weighing scale, stadiometer, measuring tape, and haemoglobinometer. The study found that there was a significant association between food security status with anaemia ($\chi^2 = 9.545$, $p = 0.044$) as those who were food insecure (58.5%) were more likely to be anaemic than those who were food secure (41.5%).

Another study carried out by Gonete et al. (2018) aimed to assess the prevalence and associated factors of anaemia among 462 late adolescents aged 15 to 19 attending high schools in Dembia District, northwest Ethiopia. A structured questionnaire was used to collect data on socio-demographic and economic characteristics of parents/caretaker, while a standardised food security questionnaire from FANTA 2007 was used to collect data on

household food security status. Haemoglobin status was measured using Hemacue M+201. Results showed that the overall anaemia prevalence was 25.5%; where 92.4% had mild anaemia, 5.9% had moderate anaemia, and 1.7% had severe anaemia. From the results, household food insecurity was significantly associated with anaemia ($p < 0.05$, AOR = 1.9, 95% CI; 1.1, 3.5), yet the prevalence of anaemia was 1.9 times higher among those who were food insecure compared to those who were food secure.

Mastiholi et al. (2018) carried out a cross-sectional study aimed to assess the food insecurity and nutritional status of preconception women in rural population of north Karnataka, India. Data of socio-economic status, food insecurity, and obstetric history were collected from a total of 770 preconception women. Anthropometric measurements and haemoglobin estimation were also recorded. The results showed that the prevalence of moderate anaemia was higher in food secure (82.6%) than in food insecure women (67.8%). Whereas, the prevalence of mild anaemia was higher among food insecure women (21.3%) compared to food secure women (13.2%) ($p = 0.00001$).

A study carried out by Mara et al. (2018) aimed to analyse the association of food security status with haemoglobin level, as well as the prevalence of anaemia in preschool age children. The study was carried out in Sao Paulo, Brazil among 306 children of preschool age. A questionnaire was sent to parents of children to obtain the socioeconomics information; whilst food security status was assessed using Brazilian Household Food Insecurity Measurement Scale (EBIA). Anthropometric measurements were performed according to SISVAN Anthropometric Indicators Measurement, and haemoglobin level of

the children was obtained using a portable haemoglobinometer. From the results, 41.2% of the children were categorised as food insecure, where 26.6% were mild FI, 12.7% were moderately FI, and 1.9% were severe FI. Also, children with mild FI showed the association with anaemia ($p < 0.05$) where these group of children had 1.9 times more risks to be anaemic.

Overall, most of the previous studies agreed that food security status was associated with haemoglobin level, where those pregnant women who experienced food insecurity were more likely to have lower haemoglobin level. Majority people who experienced food insecurity comes from a low- or middle-income population as economic status plays an important role in obtaining household needs. As for that, it can be concluded that economic status may have categorised the pregnant women into food secure and food insecure groups, hence the living condition affected the haemoglobin level.

2.3 Socio-Demographic Factors

2.3.1 Previous studies on the association between ethnicity and haemoglobin level

A cross-sectional study by Awaluddin et al. (2017) aimed to describe the prevalence of anemia among Malaysian adults. Data of 19,908 respondents aged 15 years and above were obtained from the National Health and Morbidity Survey (NHMS) 2015, whilst the haemoglobin level was measured using HemoCue haemoglobinometer (HemoCue Hb 201+ System). Ethnicity was divided into three major ethnics in Malaysia; and from there, the

study found that the prevalence of anaemia was highest among Indian (30.8%), followed by Malay (25.3%), other Bumi's (23.4%), Chinese (22.8%), and non-citizen (17.7%).

Another study by Metallinos-Katsaras et al. (2016) (described under section 2.2.1) found that ethnicity was associated with anaemia ($p < 0.001$, AOR = 1.76, 95% CI = 1.18-1.48). From the results, ethnicity consists of non-Hispanic black, Hispanic, and Asian infants were 76%, 32%, and 39% more likely to be anaemic compared to non-Hispanic white infants.

Overall, ethnicity showed an association with haemoglobin level may be due to the food habit practiced by the culture itself. For example, some culture may practice to be a vegetarian, which then lead to higher risks of anaemia if the food habit was practiced in a proper way. Hence, knowledge about the intake of micronutrients were also important so that anaemia problems can be reduced.

2.3.2 Previous studies on the association between age and haemoglobin level

Ahmad et al (1997) carried out a study of anaemia during pregnancy and the factors associated with it among rural mothers in Kelantan. Participants consists of 9860 mothers who had antenatal care at one of the 102 selected rural health clinics, and had delivered a live baby. Haemoglobin levels obtained were both at first and last antenatal care visit, and were assessed using either photocalorimetric method or Sahli's method. Other relevant data

of pregnancy was obtained from the antenatal records. Factors associated with anaemia that was discussed in this study include the mothers' age, where 56.6% of those who aged above 40 years had higher risks of anaemia compared to those aged less than 20 (47.4%) and aged 20 to 40 (46.8%) ($p < 0.01$).

Chowdhury et al. (2015) carried out a study to determine the factors associated with anaemia among pregnant women. This cross-sectional study was carried out among 224 pregnant women aged between 20 to 35 years with 2nd and 3rd trimester who went for antenatal check-up at the Marie Stopes Clinic in Dhaka, Bangladesh. Pretested semi-structured questionnaire was used to collect data on the socio-demographic characteristics, reproductive, and medical history of the participants; whilst colometric method was used to measure the haemoglobin level. From the study, 37% of the pregnant women were anaemic, where 26% of them suffered mild anaemia and 11% of them suffered moderate anaemia. The results showed that the prevalence of anaemia was higher among those who aged 25 and above (55.0%) compared to those aged less than 25 (45.0%) ($\chi^2 = 4.674$, $p = 0.036$).

A study carried out by Taner et al. (2015) aimed to identify the prevalence of anaemia and the predisposing factors contributing to anaemia in pregnant women prior to delivery. This study was carried out retrospectively with 1221 women who had delivered at a care center between July 2014 and January 2015. Questionnaire was used to collect their socioeconomic and demographic data, while other information was obtained from the computerised medical record system. Results of the study showed that the prevalence of anaemia was higher among women who aged 35 and above ($p = 0.029$). A study by Fischer

(2014) (described under section 2.2.1) found similar results where the prevalence of IDA increased as the age increased.

However, a study by Ghose et al. (2016) (described under section 2.2.1) found that there was no association between age and haemoglobin level ($p = 0.064$), and this findings was supported by Demetrio et al. (2017) and Sholeye et al. (2017) (both described under section 2.2.1) which these studies also found no association between age and haemoglobin level ($p = 0.12$; $p = 0.187$).

Overall, the prevalence of anaemia increases with age might be due to the progressive depletion of iron stores in women as aging occurs. However, several studies found that there was no association between age and haemoglobin level may be due to the knowledge they obtained during the antenatal checkup.

2.3.3 Previous studies on the association between educational level and haemoglobin level

A study carried out by Ma et al. (2009) aimed to investigate the current prevalence of anaemia among pregnant women in different areas of China, and the association with birth weight and educational level. This cross-sectional study was conducted among 6,413 pregnant women between 1999 and 2003 in five areas of China. The socio-demographic data was collected using questionnaires, and venous blood sample were collected within 1-2

weeks before delivery for haemoglobin analysis. As for the results, the overall prevalence of anaemia was 58.6%. Also, the study found that there was a positive association between level of education and haemoglobin level ($p < 0.005$). The anaemia prevalence was highest among pregnant women with primary education (66.5%), followed by secondary school (62.4%), and lastly college (52.9%).

Another study carried out by Soh et al. (2015) would like to determine the haemoglobin levels for antenatal mothers and their association with various socio-economics characteristics. It was a cross-sectional study carried out at three polyclinics in Selangor, Malaysia. Participants were pregnant mothers who attended their first antenatal check-up at the selected polyclinics from November 2007 until January 2008. Self-administered questionnaire was used to collect demographic characteristics and haemoglobin data. Next, either photo calorimetric method or by the Sahliis method were used to determine anaemia in pregnancy. Results showed that there was significant association between haemoglobin level with educational level ($\chi^2 = 13.10$, $p = 0.001$).

A prospective cohort study carried out by Krupp et al. (2018) aimed to investigate the relationship between anaemia with socio-economic and health-related factors among pregnant women in Mysore, India. It was carried out from January 2009 until January 2012. For this study, 1654 subjects had to complete an interviewer-administrated questionnaire, physical examination by a doctor, and complete laboratory investigations. Subjects were then followed-up after childbirth. Results showed that two out of three pregnant women were anaemic; 32.7% had mild anaemia, 64.0% had moderate anaemia, and 3.3% had severe

anaemia. This study found that there was no association between women's educational level with anaemia ($p = 0.289$), however those women whose husbands received less than secondary education had higher cases of mild anaemia (88.1%) compared to whose husband received secondary education and above (11.8%) ($p = 0.021$).

Chowdhury et al. (2015) (described under section 2.3.2) found that pregnant women who received educational level only up to 8th grade were more anaemic (36.0%) compared to those who received secondary education and above (28.0%) ($\chi^2 = 8.451$, $p = 0.015$). Ghose et al. (2016) study (described under section 2.2.1) also found that women with less than 6 years of education (76.2%) were more likely to develop anaemia than those who received education for 6 years and above (23.8%) ($p < 0.001$). Another study by Taner et al. (2015) (described under section 2.3.2) showed that the anaemia prevalence reduced as the educational level increase ($p = 0.002$).

Overall, it can be conclude that pregnant women with lower educational level might have poor nutritional education, yet practiced unbalanced diet. On the other hand, pregnant women with higher education level might have more awareness on anaemia issue and being more concerned about their health. Also, husband's education plays an important role as higher education may help to provide higher household income for the family.

2.3.4 Previous studies on the association between monthly income and haemoglobin level

Mo (2012) carried out a study to determine the prevalence of anaemia in pregnancy, and to identify the possible associations between socio-demographic factors with anaemia in pregnancy. A total of 350 pregnant women aged 17 to 42 years were recruited. This study was carried out between July and October 2009 at the Baptist Medical Centre, Nigeria. Participants were interviewed using a structured pre-tested questionnaire to get the data on socio-demographic status. From the study, 58.0% of the participants were anaemic. Results showed that the prevalence of moderate anaemia was highest among those in lower class (52.9%), followed by middle class (35.3%), and upper class (11.8%) ($\chi^2 = 64.020$, $p = 0.001$).

Another study by Adanikin and Awoleke (2015) aimed to identify modifiable socio-demographic factors that predict anaemia before the starting of antenatal care. This study was a cross-sectional study which conducted among 232 women who registered for antenatal clinic in Nigeria between 1 October and 31 December 2013. Trained medical interns used a proforma to collect the data on socio-demographic characteristics; whilst the haemoglobin level were taken from the hospital files. Results showed that 51.3% of the pregnant women were diagnosed with anaemia at the time of booking; where 37.5% had mild anaemia and 13.8% had moderate anaemia. Study also found that occupation of women was associated with the presence of anaemia ($\chi^2 = 13.97$, $p=0.007$).

A study by Soh et al. (2015) (described under section 2.3.3) showed that there was a significant association between haemoglobin level with occupational ($\chi^2 = 6.54$, $p = 0.01$), and income ($\chi^2 = 9.91$, $p = 0.007$). Ma et al. (2009) study (described under section 2.3.3) found similar result where the prevalence of anaemia was less among pregnant women with a mental job (52.3%) than those with manual job (61.1%) ($p < 0.001$). Those who were in mental jobs happened to have higher income and most of them lived in urban areas with a better living condition. Mastiholi et al. (2018) study (described under section 2.2.1) found the anaemia prevalence was 94.1%, and it was higher among those from lower-middle (73%) and lower (82.8%) income families. Whereas, Chowdhury et al. (2015) (described under section 2.3.2) ($\chi^2 = 7.993$, $p = 0.018$) and Krupp et al. (2018) (described under section 2.3.3) ($p = 0.022$) supported that the prevalence of anaemia was higher among those with lower income compared to higher income.

Overall, it can be concluded that pregnant women in low-resource setting were more likely to be anaemic since good nutrition and healthcare is depending on the financial empowerment. This is because higher income may prevent a person from facing financial constraint, yet afford to access to good healthcare services, as well as allow them to get better nutrients that they needed.

2.3.5 Previous studies on the association between gravidity and haemoglobin level

A study by Mo (2012) (described under section 2.3.4) showed that there were negative association between anaemia in pregnancy with pregnancy interval ($\chi^2 = 12.120$, p

= 0.007). Pregnant women with pregnancy interval less than one year showed the highest risk of anaemia (81.4%), while the lowest were those with one to two years of pregnancy interval (51.0%). Another study by Krupp et al. (2018) (described under section 2.3.3) found that the prevalence of severe anaemia (59.0%), and mild anaemia (57.5%) were higher compared to non-anaemia (49.9%) among the pregnant women who had experienced pregnancy ($p = 0.004$).

Fischer (2014) (described under section 2.2.1) also found that the number of women with 3 to 5 pregnancies were higher in the IDA group (38.09%) compared to non-IDA group (29.33%) ($p < 0.001$). Hence, the study concluded that women who experienced more than three pregnancies had more risks to develop IDA. Overall, previous studies showed that the risks of developing anaemia increased with the number of pregnancy. This may happen as the women's body may not get enough time to recover from the previous pregnancy if the interval is too short.

2.3.6 Previous studies on the association between parity and haemoglobin level

A study by Ahmad et al. (1997) (described under section 2.3.2) found that mothers who had higher number of children may had higher risks of anaemia. The prevalence of anaemia was highest among those great-grandmultipara (64.0%), followed by grandmultipara (52.9%), multigravida (47.1%), and primigravida (37.5%) ($p < 0.01$). Krupp et al. (2018) (described under section 2.3.3) also found similar results which the anaemia

prevalence among pregnant women was higher among those who had higher number of children ($p = 0.001$).

Another study by Fischer (2014) (described under section 2.2.1) found that women without IDA were more likely to be nulliparous ($p < 0.001$). From the total respondent, only 22.68% of nulliparous women experienced IDA, whilst another 77.32% cases came from those who had children. Whilst, Taner et al. (2015) (described under section 2.3.2) reported that the prevalence of anaemia increased for those who gave birth for more than 3 times ($p < 0.001$). Demetrio et al. (2017) study (described under section 2.2.1) reported that the higher the number of giving birth, the higher the anaemia prevalence ($p = 0.04$).

Overall, higher number of giving birth showed that women had go through higher number of pregnancy as well. Hence, the body should be fully recovered from the previous pregnancy, and women should be more aware and make any early preparation if they are planning to be pregnant.

CHAPTER 3

3.0 METHODOLOGY

3.1 Study Design

The study was a cross-sectional study which was aimed to determine the association between food insecurity, and socio-demographic factors with haemoglobin level in pregnant women in Kuala Lumpur. The data collection was carried out from March 2019 until April 2019 at Klinik Kesihatan Ibu dan Anak Dato' Keramat, Cheras Makmur, Titiwangsa, and Taman Pantai Indah, Kuala Lumpur.

3.1.1 Study Protocol

Prior to data collection, Medical Research and Ethics Committee (MREC) approval for the study protocol was obtained. Notification was sent to JKEUPM. Participants who agreed to take part in this study was provided with an information sheet explaining the purpose of the study, together with a consent form before the administration of questionnaire. Participants' socio-demographic status, pregnancy history and health problems, symptoms of fatigue and anaemia, food habit, as well as food insecurity status were assessed.

Anthropometric measurements (height and weight) were performed and recorded, whilst hemoglobin level of participants were retrieved from the medical record. **Figure 3.4** shows the summary of study protocol.

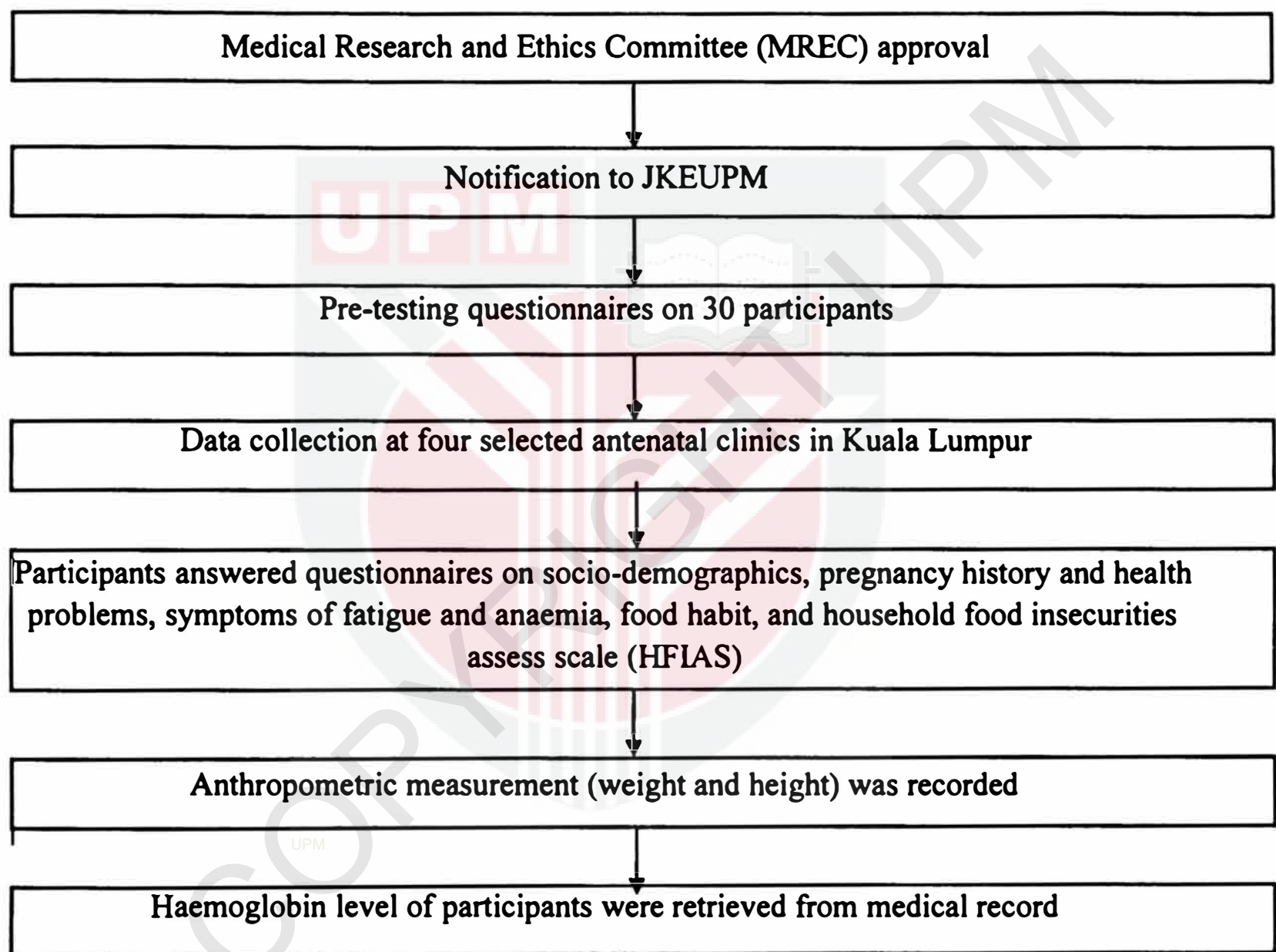


Figure 3.2: Study Protocol

All information collected from the questionnaire during the study were kept strictly confidential. The data were anonymized and stored on a password-detected database, and information will be maintained for a minimum 5 years after the completion of study until destroyed. After the completion of study, a summarized findings of study was sent to participant via email by request.

3.2 Participants

The participants selected in this study were all pregnant women who went for antenatal check-up at the four selected antenatal clinics; Klinik Kesihatan Ibu dan Anak Dato' Keramat, Titiwangsa, Cheras Makmur, and Taman Pantai Indah. Participants were selected based on the inclusion and exclusion criteria as follows (Table 3.1):-

Table 3.1: Inclusion and exclusion criteria for selection of participants

Inclusion Criteria	Exclusion Criteria
1. Malaysian	1. Non-Malaysian
2. Pregnant women from all trimesters	2.Pregnant women with physical disability
3. Age 19 – 49 years old	3. Pregnant women with chronic disease
4. Able to read Malay or English	leading to anaemia such as renal, cardiac, lung diseases, and haemoglobinopathy.

3.3 Sample Size

A formula by Hulley et al. (2013) was used to determine the sample size of this study. The formula used as follow:

$$N = [(Z\alpha + Z\beta) / C]^2 + 3$$
$$C = 0.5 * \ln [(1+r) / (1-r)]$$

The standard normal deviate for $\alpha = Z\alpha = 1.960$

The standard normal deviate for $B = Z\beta = 0.842$

Table 3.2: Additional adjustment in computing the sample size

Variable	Value	Calculation (n)	Source
Multilevel analysis of determinants of anaemia prevalence among children aged 6 – 59 months in Ethiopia: classical and Bayesian approaches	r = 0.2624	112	Kawo, Asfaw, & Yohannes (2018)

Several adjustments were required to potentially reduce the dropout rate. Hence, the adjustment involved were sample effect and response rate 80%. The adjustment was calculated by using $n = 146$.

Adjustment in computing the sample size:

i. Sample Size Effect = $DEFF = 1.3$

$$= 112 \times 1.3$$

$$= 145.6$$

ii. Response rate (80%) = $\frac{146}{80} \times 100$

$$= 182.5$$

$$= 182.5 \sim 183 \text{ participants}$$

So, from the calculation, the sample size required for this study was 183 participants.

3.4 Sampling Design

Simple random sampling method was used in this study to select the clinics. There were 16 antenatal governments clinics (Klinik Kesihatan Ibu dan Anak) under the administration of the Jabatan Kesihatan Wilayah Persekutuan Kuala Lumpur and Putrajaya. Four out of 16 antenatal government clinics in Kuala Lumpur were randomly selected for the data collection. These clinics include Klinik Kesihatan Ibu dan Anak Dato’ Keramat, Cheras Makmur, Titiwangsa, and Taman Pantai Indah. Convenience sampling was used to recruit the participants where all the pregnant women who went to the clinics for antenatal check-up and met the inclusion criteria were invited to participate in this study. Figure 3.3 shows the sampling method for the selection of participants.

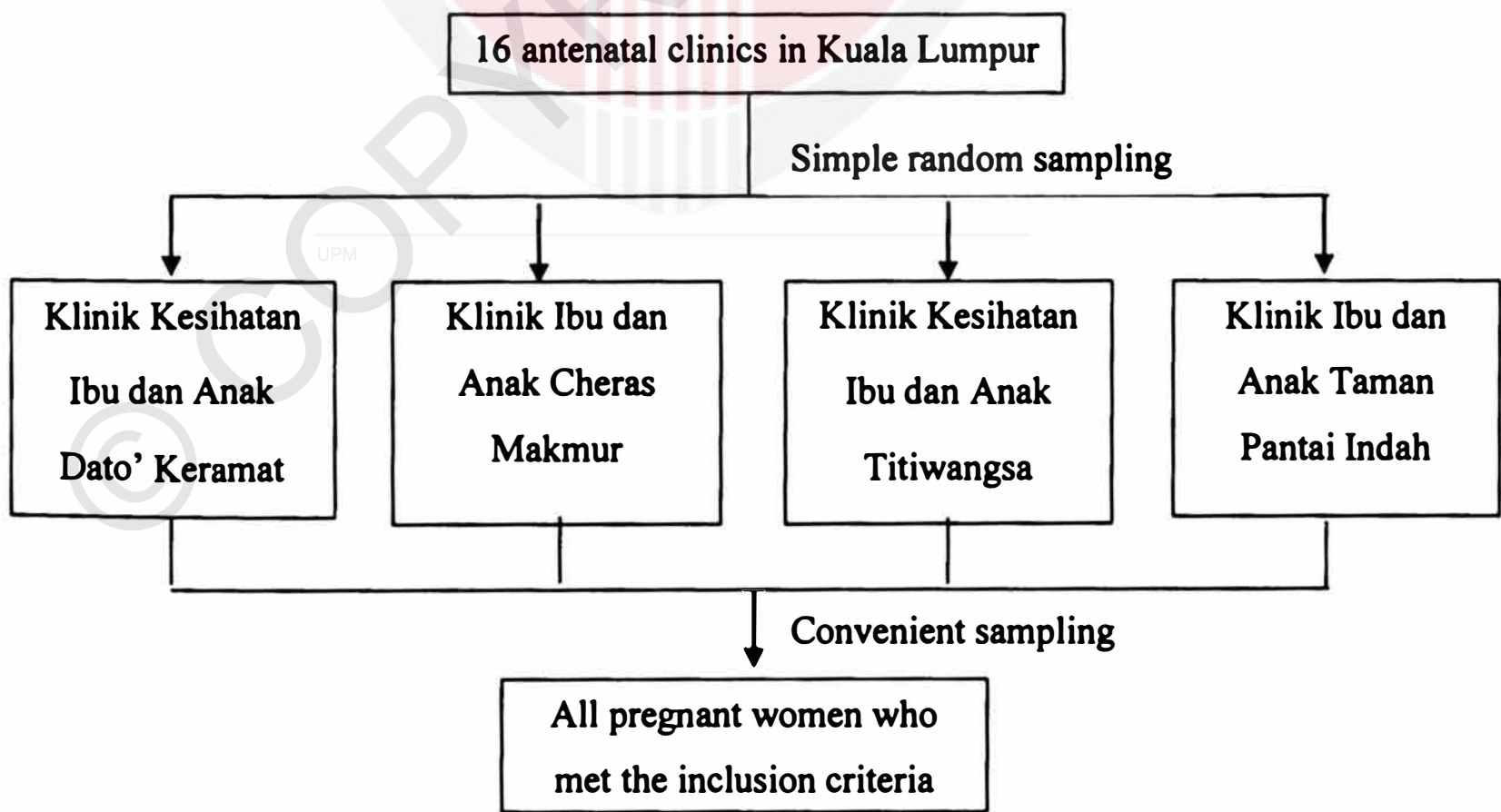


Figure 3.1: Sampling design

3.5 Self-Administered Questionnaire

Self-administered questionnaire was used to determine the socio-demographic factors, as well as the pregnancy history and health problems of the pregnant women. Section A includes personal background information of the participants which consists of age, date of birth, ethnicity, religion, education level, employment status, and monthly household income. Section B includes 10 items regarding pregnancy history and health problems. The 10 items include were gestational age, estimated delivery date, number of antenatal check-up, usage of supplements, health/medical problems, first pregnancy, gravidity, parity, and number of living children.

3.6 FACT-An Questionnaire

3.6.1 Description of Questionnaire

FACT-An Questionnaire is a validated questionnaire that was developed to assess the impact of anaemia on the quality of life in patients with cancer-associated anaemia (Finkelstein, van Nooten, Wiklund, Trundell, & Cella, 2018). The Functional Assessment of Cancer Therapy-Anaemia (FACT-An) questionnaire used in the study was incorporated as part of section C in the general self-administered questionnaire. Overall, there were 16 items included in this questionnaire. Malay version of the questionnaire was self-translated. Originally, there were five subscales under the FACT-An Questionnaire; physical well-being (PWB), social/family well-being (SWB), emotional well-being (EWB), functional well-being (FWB), and anaemia subscale (AnS). As this study focused on the clinical aspects

of anaemia, only anaemia subscale was selected and measured. There were five response options which 0 = not at all, 1 = a little bit, 2 = somewhat, 3 = quite a bit, and 4 = very much for each question included.

3.6.2 Scoring Method

Table 3.3 shows the calculation of FACT-An questionnaire. Questions with reverse item 4 will have to minus the item responses in order to get the item score, while those questions with reverse item 0 will have to sum with the item response. The item score then were sum up and the maximum score was 80. The total item score were multiplied with 16, and next divided by the number of items answered which supposedly 16.

3.6.3 Interpretation of Findings

Based on the scoring, the symptoms of anaemia was classified as less if the score is high.

Table 3.3: Guideline for FACT-An scoring

Item	Question	Reverse	Sign	Item	Item
Code		Item		Response	Score
An1	I feel listless (“washed out”)	4	Minus	0/1/2/3/4	4/3/2/1/0
An2	I feel tired	4	Minus	0/1/2/3/4	4/3/2/1/0
An3	I have trouble starting things because I am tired	4	Minus	0/1/2/3/4	4/3/2/1/0
An4	I have trouble finishing things because I am tired	4	Minus	0/1/2/3/4	4/3/2/1/0
An5	I have energy	0	Add	0/1/2/3/4	0/1/2/3/4
An6	I have trouble walking	4	Minus	0/1/2/3/4	4/3/2/1/0
An7	I am able to do my usual activities	0	Add	0/1/2/3/4	0/1/2/3/4
An8	I need to sleep during the day	4	Minus	0/1/2/3/4	4/3/2/1/0
An9	I feel lightheaded	4	Minus	0/1/2/3/4	4/3/2/1/0
An10	I get headaches	4	Minus	0/1/2/3/4	4/3/2/1/0
An11	I have pain in my chest	4	Minus	0/1/2/3/4	4/3/2/1/0
An12	I am too tired to eat	4	Minus	0/1/2/3/4	4/3/2/1/0
An13	I am motivated to do my usual activities	0	Add	0/1/2/3/4	0/1/2/3/4
An14	I need help doing my usual activities	4	Minus	0/1/2/3/4	4/3/2/1/0
An15	I am frustrated by being too tired to do things I want to do	4	Minus	0/1/2/3/4	4/3/2/1/0
An16	I have to limit my social activity because I am tired	4	Minus	0/1/2/3/4	4/3/2/1/0

3.7 Food Frequency Questionnaire (FFQ)

3.7.1 Description of Questionnaire

The original Food Frequency Questionnaire (FFQ) used in the study was validated to be used in Malaysian Adult Nutrition Survey (MANS) (2003). FFQ was typically designed to estimate the usual eating pattern of an individual and it was used to assess participants' food habit in this study. The frequency of intake of each food was asked in this questionnaire, and participants had to answer either daily, weekly, or monthly. Participants were also asked to respond to the number of servings consumed each time they consume the foods listed.

The foods listed in the FFQ were all obtained and extracted out from the RNI 2017 and Malaysian Food Composition database. Hence, a total of 83 items from 165 items from the original MANS FFQ was included in this study as these items are high in iron, where it showed an amount of more than 90% of cumulative percentage (Fatimah et al., 2015). The type of foods and the items of food groups included in this study were cereals and cereals product (14), fast food (8), meat and meat product (10), fish and seafood (13), eggs (4), legumes and legumes product (4), milk and milk product (1), vegetables (10), fruits (9), drinks (1), confectionaries (2), bread spread (2), and flavours (5). All the dietary data collected was analysed using Nutritionist Pro, version 2.5 (First Databank, California, USA).

3.7.2 Scoring Method

The food frequencies were converted into the amount of food intake. A conversion factor was used to estimate the amount of food intake based on the frequency of intake (Norimah et al., 2008). Conversion of food frequency was carried out using the formula by Wessex Institute of Public Health (1995) as follows:

$$\text{Amount of food (g) per day} = \text{frequency of intake (conversion factor)} * \text{serving size} * \text{total number of servings} * \text{weight of food in one serving}$$

Table 3.4 shows the conversion of food frequency to amount of food intake.

Table 3.4: The conversion of food frequency to amount of food intake

Frequency of intake	Frequency	Conversion factor
Daily	1x	1
	2x	2
	3x	3
Weekly	1x	0.14 (1/7)
	2x	0.29 (2/7)
	3x	0.43 (3/7)
Monthly	1x	0.03 (1/30)
	2x	0.07 (2/30)
	3x	0.10 (3/30)

3.7.3 Interpretation of Findings

The total amount of food intake (g) per day obtained was then converted into (mg) to be compared with the RNI (2017) according to the age group. Table 3.5 shows the recommended nutrients intake (RNI) for iron according to age group.

Table 3.5: Recommended Nutrients Intake (RNI) for iron according to age group

Age group	RNI adults, mg/day (% bioavailability)	
	10%	15%
19 - 50 years	29	20

Source: Recommended Nutrient Intake (2017)

3.8 Household Food Insecurity Access Scale (HFIAS)

3.8.1 Description of Questionnaire

Household Food Insecurity Access Scale (HFIAS) questionnaire was validated and originally developed by USAID funded Food and Nutrition Technical Assistance (FANTA) project (Ghose, Tang, Yaya, & Feng, 2016), and had been refined to address the recommendations of the Nutrition and Consumer Protection Division, Food and Agriculture Organization of the United Nations (FAO) (Coates, Swindale, & Bilinsky, 2007). This

questionnaire was used to measure the prevalence and degree of household food insecurity (Ghose, Tang, Yaya, & Feng, 2016). The Malay version questionnaires were obtained from Cooper (2009).

There were nine occurrence questions regarding specific condition associated with the experience of food insecurity which ever occurred during the previous four weeks (30 days). Several of the questions consists of participants' perceptions of food vulnerability or stress, whilst the remaining questions were related to participants' behavioral responses to insecurity. There were two response options for these nine occurrence questions which are 0 (no) and 1 (yes). Participants were considered to be food secure if they answered 0 (no) to all questions, whereas food insecure if they answered 1 (yes) to one or more questions.

Participants who answered 1 (yes) for the occurrence questions were required to answer the frequency-of-occurrence questions, which consists on how often a reported condition occurred during the previous four weeks. There were three response options representing a range of frequencies which are 1 (rarely/occurred once or twice in the past four weeks), 2 (sometimes/occurred three to ten times in the past four weeks), and 3 (often/occurred more than ten times in the past four weeks).

3.8.2 Scoring

Scores ranges from 0 to 27; if participants response to ‘often’ for all the none frequency-of-occurrence questions. Table 3.6 shows the guideline for HFIAS scoring.

3.8.3 Interpretation of Findings

The higher the score, the higher the experience of household food insecurities (Coates et al., 2007).

Table 3.6: Guideline for HFIAS scoring

No.	Question	Responses		
1	In the past four weeks, did you worry that your household would not have enough food?	0	1	
1.a	How often did this happen?	1	2	3
2	In the past four weeks, were you or any household member not able to eat kinds of foods you preferred because of a lack of resources?	0	1	
2.a	How often did this happen?	1	2	3
3	In the past four weeks, did you or any household member have to eat a limited variety of foods due to a lack of resources?	0	1	
3.a	How often did this happen?	1	2	3

4	In the past four weeks, did you or any household member have to eat the same foods that you really did not want to eat because of a lack of resources to obtain other types of food?	0	1	
4.a	How often did this happen?	1	2	3
5	In the past four weeks, did you or any household member have to eat a smaller meal that you felt you needed because there was not enough food?	0	1	
5.a	How often did this happen?	1	2	3
6	In the past four weeks, did you or any other household member have to eat fewer meals in a day because there was not enough food?	0	1	
6.a	How often did this happen?	1	2	3
7	In the past four weeks, was there ever no food to eat of any kind in your household because of lack of resources to get food?	0	1	
7.a	How often did this happen?	1	2	3
8	In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food?	0	1	
8.a	How often did this happen?	1	2	3
9	In the past four weeks, did you or any household member go a whole day and night without eating anything because there was not enough food?	0	1	
9.a	How often did this happen?	1	2	3

3.9 Anthropometric Measurements

Body weight was measured using a TANITA Digital Weight Scale HD-319 (Tanita Corporation USA) to the nearest 0.1 kg. Firstly, the scale was set to zero. Shoes and any heavy clothes as well as any heavy objects on participants were removed before they were asked to stand still on the centre of the scale with their arms hanging loosely at their sides. The weight displayed were recorded. The procedure was repeated twice. Whereas height of the participants were measured without shoes using a SECA Portable Stadiometer (SECA 213, Germany) to the nearest 0.1 cm. Hairstyles were adjusted and hair accessories were removed if it interfere with the measurement. Participants were asked to stand straight on the stadiometer and two measurements were taken.

The pre-pregnancy BMI of participants were retrieved from the medical records from their first visit. The BMI of participants then were calculated using the formula $BMI = \text{weight (kg)} / \text{height (m}^2\text{)}$. The average weight and height were used in the calculation. Body weight status of participants were classified according to World Health Organisation (WHO) standard value which are underweight, normal weight, pre-obesity, obesity class I, obesity class II, and obesity class III (WHO, 2018). Table 3.7 shows the cut-off point for pre-pregnancy BMI used in this study.

Table 3.7: Cut-off point for BMI

Nutritional status	WHO cut-off point
Underweight	<18.5
Normal weight	18.5 – 24.9
Pre-obesity	25 – 29.9
Obesity class I	30 – 34.9
Obesity class II	35 – 39.9
Obesity class III	≥ 40

Source: WHO (2018)

3.10 HemoCue Hb 201+

HemoCue Hb 201+ apparatus measured the haemoglobin level in undiluted capillary or venous blood. This system also comparable to standard laboratory techniques for haemoglobin level measurement in normal and anemic individual (Parker et al., 2018). The blood sample of participants were obtained by finger prick. The blood then drained into cuvette by capillary action and mixed with the reagents contained in the microcuvettes. Absorbance were read in the HemoCue photometer. Trained nurses collected the blood sample to measure the haemoglobin level of participants, and the data were only retrieved from their medical records. Table 3.8 shows the cut-off point for haemoglobin level among pregnant women.

Table 3.8: Cut-off point for haemoglobin level among pregnant women

Haemoglobin level	WHO cut-off point (mg/dl)
Non-anaemia	≥ 11.0
Mild anaemia	10.0 – 10.9
Moderate anaemia	7.0 – 9.9
Severe anaemia	< 7.0

Source: WHO (2018)

3.11 Statistical Analysis

All the statistical analysis were performed using IBM SPSS Statistics 22. Univariate data were described using descriptive statistics such as mean, frequencies, standard deviation and percentages. The results were presented in the form of frequencies and percentages for nominal and ordinal variables such as ethnicity and education level. Means and standard deviation were calculated from the analyses of interval and ratio variables such as age, income, gravidity and parity. Bivariate data analyses were used to test the association between socio-demographic factors and food insecurity with haemoglobin level. Chi-squared test were used to determine the association between ethnicity, educational level, gravidity, and parity with haemoglobin level. Whilst Pearson correlation were used to determine the association between food security status, age, and monthly household income with haemoglobin level.

CHAPTER 4

4.0 RESULTS AND DISCUSSION

4.1 Socio-Demographic Characteristics

A total of 183 pregnant women who went for antenatal checkup at antenatal clinics in Wilayah Persekutuan, Kuala Lumpur with a mean age of 29.33 ± 4.60 with range between 20 and 45 years old were included in this study. The largest proportion was among Malay participants (88.5%), followed by Chinese (7.1%), and Indian (4.4%). Hence, participants was mostly Islam (89.6%), followed by Buddha (6.0%), Hindu (3.8%), and Christian (0.5%). Most of the participants had tertiary education (60.1%) and worked in a non-government industry (39.3%). The mean + SD for monthly household income was RM 3902.19 ± 1975.93 and majority of the participants (43.7%) had monthly household income ranged from RM 2000 to RM 3999. Table 4.1 shows the distribution of socio-demographic characteristics of the participants.

Table 4.1: Socio-demographic characteristics of participants (n = 183)

Characteristics	Participants (n=183)	
	n (%)	Mean $\pm$ SD
Age		29.33 <u>±</u> 4.60
Ethnicity		
Malay	162 (88.5)	
Chinese	13 (7.1)	
Indian	8 (4.4)	
Religion		
Islam	164 (89.6)	
Buddha	11 (6.0)	
Hindu	7 (3.8)	
Christian	1 (0.5)	
Level of Education		
Primary school	3 (1.6)	
Secondary school	70 (38.3)	
Tertiary education	110 (60.1)	
Employment status		
Government	39 (21.3)	
Non-government	72 (39.3)	
Unemployed	65 (35.5)	
Others	7 (3.8)	
Monthly household income (RM)		3902.19 <u>±</u> 1975.93
<2000	18 (9.8)	
2000 – 3999	80 (43.7)	
4000 – 5999	52 (28.4)	
6000 – 7999	21 (11.5)	
8000 - 10000	12 (6.6)	

4.2 Pregnancy History

In this study, more than half of the participants were in their third trimester (54.6%), followed by second trimester (37.7%) and first trimester (7.7%). The mean $\pm$ SD for number of antenatal visit was 5.52 $\pm$ 2.50 and number of living children was 1.04 $\pm$ 1.24. Most of the participants (83.1%) consumed both folic acid and iron supplements prescribed by doctors, whilst only 4.4% of them did not consumed any of those supplements. Majority of the participants experienced their first pregnancy (44.3%), followed by third and above pregnancy (33.3%), and second pregnancy (22.4%). Majority of the participants never gave birth (43.7%). Table 4.2 shows the pregnancy history of the participants.

Table 4.2: Pregnancy history of participants (n = 183)

Characteristics	Participants (n=183)	
	n (%)	Mean ± SD
Pregnancy week		25.45±8.47
1 st trimester	14 (7.7)	
2 nd trimester	69 (37.7)	
3 rd trimester	100 (54.6)	
Number of visit to antenatal clinic		5.52±2.50
Take any prenatal pills from antenatal clinics		
Yes		
Folic acid & Iron	152 (83.1)	
Folic acid	20 (10.9)	
Iron	3 (1.6)	
No	8 (4.4)	
Gravidity		2.17±1.47
1	81 (44.3)	
2	41 (22.4)	
3 and above	61 (33.3)	
Parity		1.13±1.33
0	80 (43.7)	
1	40 (21.9)	
2	41 (22.4)	
3 and above	22 (12.0)	
Number of living children		1.04±1.24

4.3 Anaemia Symptoms

The mean + SD of scores for the symptoms of anaemia was 43.32+9.59. Table 4.3 illustrates the scores for anaemia symptoms of participants, whilst Table 4.4 shows the frequency of anaemia symptoms.

Most participant answered ‘not at all’ for the questions number 11 (I have pain in my chest), 12 (I am too tired to eat), 14 (I need help doing my usual activities), and 15 (I am frustrated by being too tired to do the things I want to do). The ‘a little bit’ answer was found highest in questions number 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), 9 (I feel lightheaded), 10 (I get headaches), and 16 (I have to limit my social activity because I am tired). ‘somewhat’ was answered the most in questions number 1 (I feel listless), 2 (I feel tired), 8 (I need to sleep during the day), and 13 (I am motivated to do my usual activities). Only question number 7 (I am able to do my usual activities) had highest answer for ‘quite a bit’, whilst there was no highest answer for ‘very much’.

Table 4.3: Scores for anaemia symptoms of participants

Characteristic	Participants (n=183)
	Mean ± SD
Symptoms of anaemia	43.32±9.59

Table 4.4: Frequency of anaemia symptoms (n = 183)

Statement	Not at all n (%)	A little bit n (%)	Somewhat n (%)	Quite a bit n (%)	Very much n (%)
I feel listless (washed out)	34 (18.6)	43 (23.5)	86 (47.0)	17 (9.3)	3 (1.6)
I feel tired	18 (9.8)	24 (13.1)	97 (53.0)	41 (22.4)	3 (1.6)
I have trouble starting things because I am tired	35 (19.1)	71 (38.8)	60 (32.8)	16 (8.7)	1 (0.5)
I have trouble finishing things because I am tired	41 (22.4)	71 (38.8)	56 (30.6)	15 (8.2)	0 (0)
I have energy	6 (3.2)	11 (6.0)	76 (41.5)	74 (40.4)	16 (8.7)
I have trouble walking	61 (33.3)	65 (35.5)	45 (24.6)	10 (5.5)	2 (1.1)
I am able to do my usual activities	5 (2.7)	15 (8.2)	51 (27.9)	68 (37.2)	44 (24.0)
I need to sleep during the day	19 (10.4)	40 (21.9)	85 (46.4)	31 (16.9)	8 (4.4)
I feel lightheaded (dizzy)	39 (21.3)	70 (38.3)	47 (25.7)	20 (10.9)	7 (3.8)
I get headaches	52 (28.4)	60 (32.8)	52 (28.4)	14 (7.7)	5 (2.7)
I have pain in my chest	96 (52.5)	56 (30.6)	22 (12.0)	9 (4.9)	0 (0)
I am too tired to eat	95 (51.9)	48 (26.2)	29 (15.8)	10 (5.5)	1 (0.5)
I am motivated to do my usual activities	9 (4.9)	27 (14.8)	65 (35.5)	60 (32.8)	22 (12.0)
I need help doing my usual activities	62 (33.9)	49 (26.8)	58 (31.7)	13 (7.1)	1 (0.5)
I am frustrated by being too tired to do the things I want to do	76 (41.5)	53 (29.0)	41 (22.4)	10 (5.5)	3 (1.6)
I have to limit my social activity because I am tired	58 (31.7)	60 (32.8)	47 (25.7)	16 (8.7)	2 (1.1)

4.4 Anthropometric Measurement

From this study, the pre-pregnancy BMI of the participants was 25.07 ± 5.71 kg/m². Majority of the participants (48.6%) had a normal pre-pregnancy BMI, followed by overweight (24.0%), obese (19.1%), and lastly underweight (8.2%). Table 4.5 illustrate the pre-pregnancy BMI of the participants.

Table 4.5: Pre-pregnancy BMI of participants (n = 183)

Characteristics	Participants (n=183)	
	n (%)	Mean $\pm$ SD
Pre-pregnancy BMI		25.07 $\pm$ 5.71
Underweight	15 (8.2)	
Normal	89 (48.6)	
Overweight	44 (24.0)	
Obese	35 (19.1)	

4.5 Dietary Iron Intake

The dietary iron intake of participants were divided into two sections; (1) 15% iron bioavailability and (2) 10% iron bioavailability. The mean $\pm$ SD iron intake for the 15% iron bioavailability was 16.77 ± 8.48 mg/day, whilst for 10% iron bioavailability was 14.12 ± 6.97 mg/day. Table 4.6 shows the dietary iron intake of participants, and Table 4.7 shows the dietary iron intake according to food groups. Overall, this study found that most of the participants did not meet the iron recommendation.

Table 4.6: Dietary iron intake of participants (n = 183)

Variables	Iron bioavailability			
	15%	Mean $\pm$ SD	10%	Mean $\pm$ SD
	n (%)		n (%)	
Dietary iron intake (mg/day)		16.77 ± 8.48		14.12 ± 6.97
Less than recommendation	139 (76.0)		170 (92.9)	
Meet recommendation	44 (24.0)		13 (7.1)	

The findings showed that the highest iron intake was from cereal and cereal products (7.40 ± 6.19 mg/day), followed by meat products (1.62 ± 1.08 mg/day), fish and seafood (1.28 ± 1.24 mg/day), legumes products (1.15 ± 1.46 mg/day), and vegetables (1.10 ± 1.02 mg/day). These foods were mostly consumed may be due to the food availability, as well as due to Malaysian culture. Malaysian from all ages preferred to eat rice at least twice a day; whilst the side dishes preferred was chicken, followed by fish.

Also, the study reported that most of Malay and Chinese also preferred eggs, whilst most Indian preferred legumes.

Norimah et al. (2008) supported that rice is Malaysian's staple food as 97.1% of Malaysian population consumed rice twice a day. The study found that the other nine foods that were mostly consumed by Malaysian are marine fish (40.7%), green leafy vegetables (39.9%), sweetened condensed milk (35.3%), powdered milk (17.1%), bread (17.1%), biscuits (16.3%), local kuih (16.3%), chicken egg (12.1%), and anchovies (11.9%); where these food items were eaten daily, but in a smaller proportion. The study highlighted that most foods consumed by Malaysian were from cereal products and meat products. Hence, present study found similar findings where the most of the participants were more likely to consume cereal and cereal products, as well as meat products.

Table 4.7: Dietary iron intake of participants according to food groups (n = 183)

Characteristic	Participants (n=183)
	Mean $\pm$ SD
Food habit	15.77$\pm$8.05
Cereal and cereal products	7.40 $\pm$ 6.19
Meat products	1.62 $\pm$ 1.08
Fish and seafood	1.28 $\pm$ 1.24
Legumes products	1.15 $\pm$ 1.46
Vegetables	1.10 $\pm$ 1.02
Fast food	0.80 $\pm$ 1.90
Eggs	0.74 $\pm$ 0.74
Fruits	0.63 $\pm$ 0.82
Drinks	0.50 $\pm$ 0.53
Confectionaries	0.27 $\pm$ 0.30
Milk products	0.19 $\pm$ 0.23
Flavors	0.05 $\pm$ 0.07
Bread spread	0.04 $\pm$ 0.06
Meat products for non-muslim	0.02 $\pm$ 0.12

4.6 Haemoglobin Level

Majority of the participants were non-anaemic (73.8%) where the mean $\pm$ SD of haemoglobin level was 11.54 $\pm$ 1.05 g/dL. Whereas, the number of participants with low haemoglobin level was 26.2%. Table 4.8 shows the haemoglobin level of participants.

Table 4.8: Haemoglobin level of participants (n = 183)

Anaemia status	Participants (n=183)	
	n (%)	Mean $\pm$ SD
Haemoglobin level (g/dl)		11.54 $\pm$ 1.05
Moderate anaemia	9 (4.9)	
Mild anaemia	39 (21.3)	
Non-anaemia	135 (73.8)	

WHO (2018) reported that the prevalence of anaemia among pregnant women in Malaysia was 37.1% in year 2016, whereas NHMS (2015) reported that Kuala Lumpur as the 4th state in Malaysia with highest anaemia prevalence among Malaysian adults (27.6%). Present study found that the percentage of participants with anaemia cases was almost similar with the anaemia prevalence in Kuala Lumpur.

4.7 Food Security Status

In this study, the number of participants who were food secure (56.3%) were higher than those who were food insecure (43.7%). Figure 4.1 illustrates the food security status of the participants. Rusidah et al. (2015) reported that the prevalence of food insecurity among Malaysian adults was higher in East Malaysia (34.5%) compared to Peninsular Malaysia (14.8%); and the total prevalence of food insecurity was 49.2%. Hence, both study by Rusidah et al. (2015) and present study found that the prevalence of food secure was higher than food insecure.

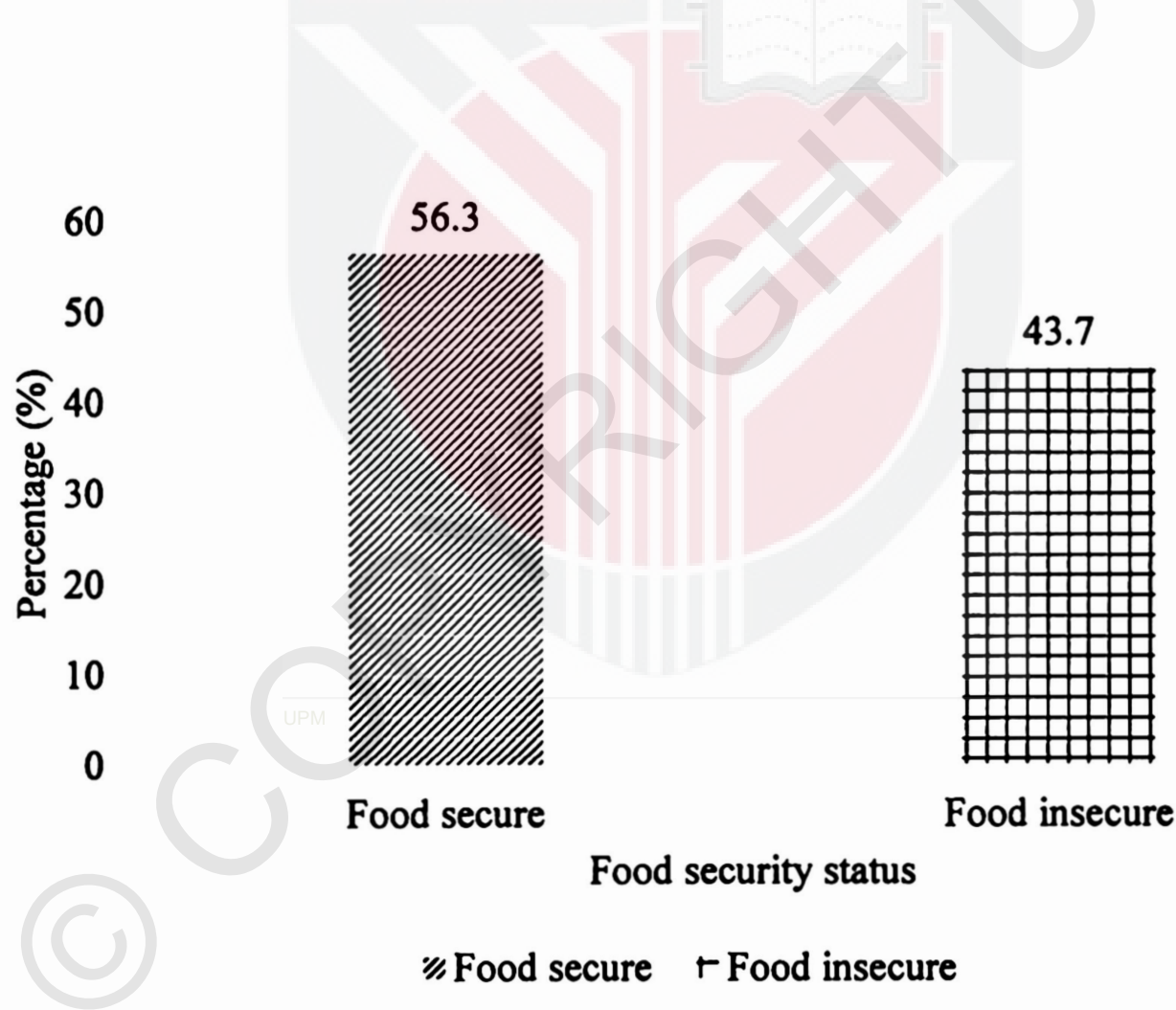


Figure 4.1: Food security status of participants (n = 183)

4.8 Association between Food Security Status and Haemoglobin Level

Table 4.9 shows the association between food security status with haemoglobin level. There was a negative and weak association between food security status with haemoglobin level ($r = -0.297$, $p < 0.01$).

Table 4.9: Association between food security status with haemoglobin level (n = 183)

Variable	Haemoglobin level (g/dl)	
	r	p-value
Food security status	-0.297	< 0.01*

*significant value where $p < 0.05$

A cross-sectional study by Sholeye et al. (2017) reported similar findings where the number of the participants with anaemia was higher among food insecure women (58.5%) compared to food secure women (41.5%). The study also found that the anemia prevalence increased as the food insecurity level increased. Lebso, Anato, & Loha (2017) also found an association between food insecurity status with anaemia during pregnancy which was consistent with the findings of this study.

Present study showed similar findings with most of previous studies; where the haemoglobin level reduced among pregnant women who were food insecure compared to those who were food secure. Pregnant women who were food insecure were more likely to face difficulties in obtaining nutritious food especially foods that are high in

iron. The foods consumed may provide energy to the body, however the nutrient content of the foods consumed especially iron may not meet the recommendation. The financial constraint of those who food insecure may have lead them to buy the foods that were affordable by them.

A study by Mastiholi et al. (2018) which found a negative association between food security status and haemoglobin level. However, the study highlighted that food security was not a protective factor to prevent anemia as food security did not ensure food quality. Foods consumed did not necessarily provided enough nutrients needed by the body. Weigel et al. (2016) also supported that those who lived in food insecure situation were more likely to have lower quality and less diverse diets as the study found that lower haemoglobin level was more common among women whose diets contained less different foods.

Ghose et al. (2016) reported that the prevalence of anaemia was higher among those who lived in food insecure situation. The study highlighted that the wealth status of the participants categorised them as whether in food secure or food insecure group. Those who were food insecure were more likely to be anaemic due to inadequate intake of micronutrients as a results of under-consumption of food, or over-consumption of energy-dense but nutrient-poor food.

Demetrio et al. (2017) found similar findings, where the haemoglobin level was low among women in food insecure situation. As the author considered food insecurity

as a factor of anaemia, the study also highlighted that the availability of food may reduced by a higher number of household members.

4.9 Association between Socio-Demographic Factors and Haemoglobin Level

The association between socio-demographic factors with haemoglobin level are shown in Table 4.10 (age and monthly household income) and Table 4.11 (ethnicity, educational level, gravidity, and parity). There was a positive and weak association between both age and monthly household income with haemoglobin level ($r = 0.217$, $p = 0.003$; $r = 0.280$, $p < 0.01$). However, there was no association found between haemoglobin level with ethnicity ($\chi^2 = 1.103$, $p = 0.294$), educational level ($\chi^2 = 1.792$, $p = 0.232$), gravidity ($\chi^2 = 2.108$, $p = 0.348$), and parity ($\chi^2 = 2.399$, $p = 0.494$).

Table 4.10: Association between socio-demographic factors with haemoglobin level (n = 183)

Variable	Haemoglobin level (g/dl)	
	r	p-value
Age	0.217	0.003*
Monthly household income	0.280	< 0.01*

*significant value where $p < 0.05$

Table 4.11: Association between socio-demographic factors with haemoglobin level (n = 183)

Variable	Haemoglobin level (g/dl) category		X ²	p-value
	Anaemia n (%)	Non-anaemia n (%)		
Ethnicity			1.103	0.294
Malay	40 (83.3)	122 (90.4)		
Non-malay	8 (16.7)	13 (9.6)		
Gravidity			2.108	0.348
1	17 (35.4)	64 (47.4)		
2	12 (25.0)	29 (21.5)		
3 and above	19 (39.6)	42 (31.1)		
Parity			2.399	0.494
0	17 (35.4)	63 (46.7)		
1	11 (22.9)	29 (21.5)		
2	14 (29.2)	27 (20.0)		
3 and above	6 (12.5)	16 (11.9)		
Education level				0.232 ^a
Less than tertiary education	2 (8.7)	1 (2.0)		
Tertiary education	21 (91.3)	49 (98.0)		

a = fischer exact

*significant value where p<0.05

The findings from this study observed that participants with higher age had higher haemoglobin level. Most of previous studies found that there was a significant association between age and haemoglobin level, however the direction of the association should be that the higher the age, the lower the haemoglobin level (Lin et al., 2018; Adanikin & Awoleke, 2015). The depletion of iron stores may happened as a person aged, hence this will affects the haemoglobin level.

This study somehow found a positive association between age and haemoglobin level may be due to the knowledge of participants. Ma et al. (2009) reported that haemoglobin level increased with educational level. Most of the participants of this study received tertiary education. As for that, they may have received the knowledge on anaemia during their study. Counselling with the doctors also may increase the knowledge on anemia among the participants.

Another significant finding was found between monthly household income and haemoglobin level. This study found that the haemoglobin level increased with monthly household income which was similar with most of previous studies. Low-income group of participants comprised a higher proportion of anaemic pregnant women compared to those from high-income group (Chowdhury et al., 2015; Alene & Dohe, 2014). Higher household income may help to avoid financial constraint. Higher income also helped pregnant women to access more nutritious foods, as well as good healthcare services.

A study carried out by Mo et al. (2012) found a significant association between income and haemoglobin level, where anaemia prevalence was higher among pregnant women in middle- (78.3%) and lower-socioeconomic (80.3%) classes. This finding was similar to the finding of this study. Mo highlighted in the study that lower income causes pregnant women to face difficulties to access to nutritious food and health services, which then may lead to the development of anaemia.

This study found that there was no significant association between ethnicity and haemoglobin level. This finding was supported by a study carried out by Sumitra and Kumari (2017) which also found no association between ethnicity and haemoglobin level. There was no association found between ethnicity and haemoglobin level from this study may be due to the distribution of respondents were not equal. Majority of the respondent from this study was Malay, and the distribution of non-malay was too small that no association can be found with haemoglobin level.

Contradict with this study, Awaluddin et al. (2017) found that there was association between ethnicity and haemoglobin level. The study also reported that the prevalence of anaemia was highest among Indian (30.8%) in Malaysia compared to other ethnics. Similar results found by Metallinos-Katsaras et al. (2016) which there was an association between ethnicity and anaemia prevalence among child. Each ethnic have their own food culture, which may affect the food preferences of an individual, yet contributed to the haemoglobin level.

This study found that there was no association between educational level and haemoglobin level which contradict from most of previous studies. A previous study by Soh et al. (2015) found that as the educational level increased, the prevalence of anaemia decreased. Pregnant women with higher education could be more concerned about their health, as well as the health of the child. Hence, pregnant women with higher education may have more awareness regarding the consequences of anaemia to their pregnancy. So, these women might have taken any initiative to maintain their haemoglobin level at the acceptable level.

Ma et al. (2009) also reported that lower educational level might have lead a person to have poor nutritional knowledge, yet practiced unbalanced diet which then increase the risks of developing anaemia. However, there were also studies that found no association between educational level and haemoglobin level (Sholeye et al., 2017; Fischer, 2014). A study by Ihab et al. (2013) reported that Malaysian government was giving their effort to bridge the educational gap which may help those without higher education to receive knowledge from other media. For example, participants may gain the knowledge on anaemia during their antenatal check-up with the doctors.

Gravidity showed no association with haemoglobin level in this study, which was supported by results found by Stephen et al. (2018). Contradict with the study by Alene and Dohe (2014) which reported that pregnant women who had 3 to 5 pregnancies were 1.95 times more likely to be anaemic. Different findings obtained may be because the gap between pregnancies were not too close that women may had enough time to recover their body from the previous pregnancy, hence showed no association in this study. Plus,

women who planned to be pregnant may have prepared themselves by consulting the doctors and consumed iron supplements to increase the haemoglobin level.

There was also no association found between parity and haemoglobin level in this study. Similar findings was found in a study by Sholeye et al. (2017). Another cross-sectional study by Srour et al. (2018) found that there was no association between the number of children and prevalence of anaemia. The lacking of association may be due to the high pregnancies interval which was not reported in this study. Also, women with pregnancies experience may have some knowledge on how to increase and maintain their haemoglobin level at the acceptable level.

CHAPTER 5

5.0 CONCLUSION & RECOMMENDATION

5.1 Conclusion

This cross-sectional study investigated the association between food security status, and socio-demographic factors (ethnicity, age, educational level, monthly income, gravidity, and parity) with haemoglobin level. A total of 183 pregnant women with mean + SD aged of 29.33+4.60 years the study.

The study found that food security status was associated with haemoglobin level. The prevalence of anaemia among pregnant women was higher among those who experienced food insecurities (39.8%) compared to those who are food secure (6.8%). Financial constraint lead to food insecurity which affected the haemoglobin level of pregnant women. Also, this situation may reduce the iron-containing foods consumption among the pregnant women. Hence food security status was found to be associated with haemoglobin level among pregnant women.

The study also found that there was a significant association between age and monthly household income with haemoglobin level. Haemoglobin level may increase with age may be due to the knowledge received by the participants. Whereas, household income was an important indicator for pregnant women to consume nutritious food and obtain good healthcare services. Pregnant women who consumed more nutritious food and foods containing iron may increase the haemoglobin level, as well as reducing the anaemia prevalence.

The findings from this study could provide a new insight on the association between food security status, and socio-demographic factors with haemoglobin level. This findings will provide a baseline data to be used by future researchers to further investigate the risk factors of anaemia among pregnant women in Malaysia. Plus, this study may raise the awareness on the risk factors that might affects the haemoglobin level among pregnant women. Hence, this study may also raise the awareness among the government and policy maker to make sure that all Malaysian status should be food secure to reduce the possibility of developing anaemia especially among pregnant women.

5.2 Limitations

There are some limitations in this study which should be highlighted for future research. This was a cross-sectional study which can only be used to investigate the prevalence and association, but not the causal-effect relationship as the data was collected at one point of time. Data that was collected could not indicate the causality of

haemoglobin level changes. Plus, questionnaires used to obtain the information was a self-reporting questionnaire which may lead to under-reporting or over-reporting. There are also possibilities where participants may not fully understood the questions included in the questionnaires.

5.3 Recommendations

There are a few recommendations that may be applied for future research. A prospective cohort study or a randomized control trial study design should be used as these study design are able to determine the cause and effect of the risk factors of anaemia. The study also should carried out an in-depth interview or face-to-face interview with the participants so that researchers may be able to explain the questions to participants, and obtain a better results.

REFERENCES

- Abu-Ouf, N. M., & Jan, M. M. (2015). The impact of maternal iron deficiency and iron deficiency anemia on child's health. *Saudi Medical Journal*, 36(2), 146–149.
- Adanikin, A. I., & Awoleke, J. O. (2015). Sociodemographic factors associated with anaemia in pregnancy at booking for antenatal care. *Journal of Obstetrics and Gynaecology*, 1–4.
- Ahmad, Z., Jaafar, R., Mohd Hassan, M., Othman, M., & Hashim, A. (1997). Anaemia during pregnancy in rural Kelantan. *Malaysian Journal of Nutrition*, 3(1), 83–90.
- Norimah, A., Safiah, M., Jamal, K., Haslinda, S., Zuhaida, H., Rohida, S., & Fatimah, S. (2008). Food Consumption Patterns : Findings from the Malaysian Adult Food Consumption Patterns : Findings from the Malaysian Adult Nutrition Survey (MANS). *Malaysian Journal of Nutrition*, (March).
- Alene, K. A., & Dohe, A. M. (2014). Prevalence of Anemia and Associated Factors among Pregnant Women in an Urban Area of Eastern Ethiopia, 2014(May 2013).
- Awaluddin, S.M., Ahmad, N.A., Naidu, B.M., Mohamad, M.S., Yusof, M., Razak, M.A., Salleh, R., Mohd Y.M.F., Aris, T. (2017). Journal of Community Medicine & A Population-based Anaemia Screening using Point-of-care in Estimating Prevalence of Anaemia in Malaysian Adults : Findings from a Nationwide Survey, 7(2).
- Brabin, B.J., Hakimi, M., Pelletier, D. (2001). An Analysis of Anemia and Pregnancy-Related Maternal Mortality. *The Journal of Nutrition*, 131, 616–635.
- Chowdhury, H. A., Ahmed, K. R., Jebunessa, F., Akter, J., & Hossain, S. (2015). Factors associated with maternal anaemia among pregnant women in Dhaka city. *BMC Women's Health*, 1–6.

Demétrio, F., Antônio De Souza Teles-Santos, C., Barbosa, D., & Santos, D. (2017). Food Insecurity, Prenatal Care and Other Anemia Determinants in Pregnant Women from the NISAMI Cohort, Brazil: Hierarchical Model Concept. *Rev Bras Ginecol Obstet*, 39, 384–396.

Fischer, N. C. (2014). Household Food Insecurity And Iron Deficiency Anemia In Mexican Women Of Reproductive Age, (January).

Gaskell, H., Derry, S., Andrew Moore, R., & McQuay, H. J. (2008). Prevalence of anaemia in older persons: Systematic review. *BMC Geriatrics*, 8, 1–8.

Ghose, B., Tang, S., Yaya, S., & Feng, Z. (2016). Association between food insecurity and anemia among women of reproductive age, 1–12.

Gonete, K. A., Tariku, A., Wami, S. D., & Derso, T. (2018). Prevalence and associated factors of anemia among adolescent girls attending high schools in Dembia District , Northwest. *Archives of Public Health*, 1–9.

Hoseini, K.S., Kazemi, F., Alimoradi, Z., Oskoei, S.S.S., Alijani, H., Zolghadr, S. (2018). Association between Household Food Security and Pregnancy Complications. *Social Health and Behavior*, 1(1), 26–30.

Ihab, A. N., Rohana, A. J., Manan, W. M. W., Suriati, W. N. W., Zalilah, M. S., & Rusli, A. M. (2013). Nutritional Outcomes Related to Household Food Insecurity among Mothers in Rural Malaysia. *J Health Popul Nutr*, 31(4), 480–489.

Jones, A.D., Mundo-Rosas, V., Cantoral, A., Levy, T. S. (2017). Household food insecurity in Mexico is associated with the co-occurrence of overweight and anemia among women of reproductive age, but not female adolescents. *Maternal and Child*

Nutrition, 13(4), 1–13.

Krupp, K., Placek, C.D., Wilcox, M., Rvi, K., Srivinas, V., Arun, A., & Madhivanan, P. (2018). Financial decision making power is associated with moderate to severe anemia : A prospective cohort study among pregnant women in rural South India. *Midwifery*, 61(January), 15–21.

Lebso, M., Anato, A., & Loha, E. (2017). Prevalence of anemia and associated factors among pregnant women in Southern Ethiopia : A community based cross-sectional study, 1–11.

Lin, L., Wei, Y., Zhu, W., Wang, C., Su, R., Feng, H., & Yang, H. (2018). Prevalence , risk factors and associated adverse pregnancy outcomes of anaemia in Chinese pregnant women : a multicentre retrospective study, 1–8.

Ma, A.G., Schouten, E., Wang, Y., Xu, R.X., Zheng, M.C., Li, Y., Sun, Y.Y., Wang, Q. Z. (2009). Anemia Prevalence among Pregnant Women and Birth Weight in Five Areas in China. *Medical Principles and Practice*, 368–372.

Mara, É., Rocha, B., Abreu, L. C. De, Lopes, A. F., Leone, C., Vieira, P. D., Szarfarc, S. C. (2018). Relation of Food Insecurity and Hemoglobin Level in Preschool Aged Children, 2018.

Mastiholi et al. (2018). Food Insecurity and Nutritional Status of Preconception Women in a Rural Population of North Karnataka, India. *Reproductive Health*, 15(Suppl 1(Suppl 1)).

McLean, E., Cogswell, M., Egli, I., Wojdyla, D., & de Benoist, B. (2009). Worldwide prevalence of anaemia, WHO Vitamin and Mineral Nutrition Information System,

1993-2005. *Public Health Nutr.*, 12(4), 444–454.

Metallinos-Katsaras, E., Colchamiro, R., Edelstein, S., & Siu, E. (2016). Household Food Security Status Is Associated with Anemia Risk at Age 18 Months among Low-Income Infants in Massachusetts. *Journal of the Academy of Nutrition and Dietetics*, 116(11), 1760–1766.

Mo, O. (2012). Sociodemographic factors in anaemia in pregnancy in south-western Nigeria, 54(3), 222–227.

Moradi, S., Arghavani, H., Issah, A., Mohammadi, H., & Mirzaei, K. (2018). Food insecurity and anaemia risk: a systematic review and meta-analysis. *Public Health Nutrition*, (1), 1–13.

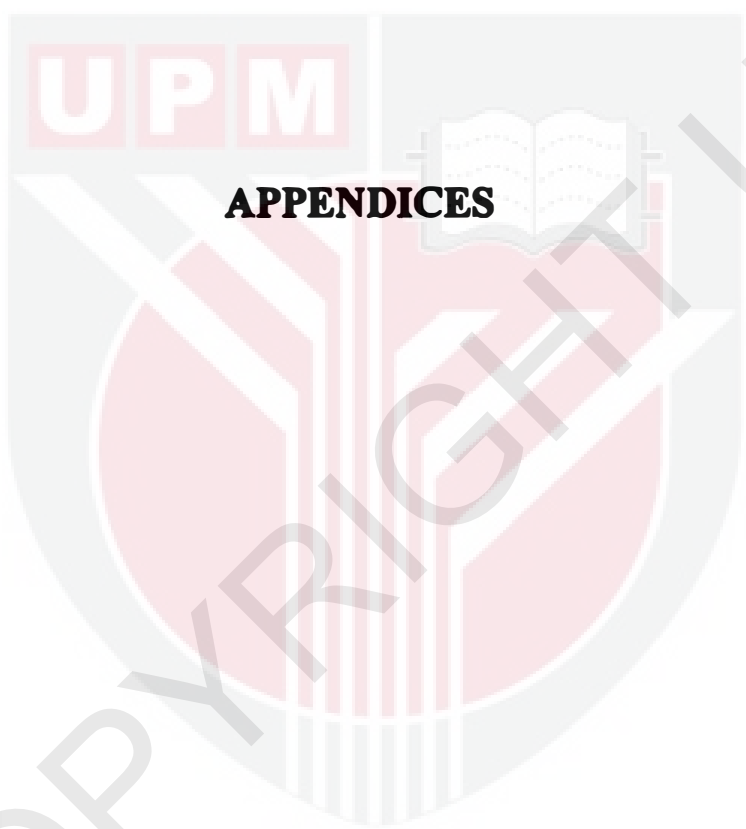
Park, C. Y., & Eicher-Miller, H. A. (2014). Iron Deficiency Is Associated with Food Insecurity in Pregnant Females in the United States: National Health and Nutrition Examination Survey 1999-2010. *Journal of the Academy of Nutrition and Dietetics*, 114(12), 1967–1973.

Sholeye, O. O., Animasahun, V. J., & Shorunmu, T. O. (2017). Anemia in pregnancy and its associated factors among primary care clients in Sagamu, Southwest, Nigeria: A facility-based study. *Journal of Family Medicine and Primary Care*, 6(2), 323–329.

Soh, K. L., Rahayu, E., Tohit, M., Japar, S., Geok, S. K., Binti, N., Raman, R. A. (2015). Anemia among Antenatal Mother in Urban Malaysia. *Journal of Biosciences and Medicines*, (March), 6–11.

Srour, M. A., Aqel, S. S., Srour, K. M., Younis, K. R., & Samarah, F. (2018). Prevalence of Anemia and Iron Deficiency among Palestinian Pregnant Women and Its Association with Pregnancy Outcome, 2018.

- Stephen, G., Mgongo, M., Hashim, T. H., Katanga, J., Stray-pedersen, B., & Msuya, S. E. (2018). Anaemia in Pregnancy : Prevalence , Risk Factors , and Adverse Perinatal Outcomes in Northern Tanzania, 2018.
- Taner, C. E., Ekin, A., Solmaz, U., Gezer, C., Çetin, B., Keleşoğlu, M., Özeren, M. (2015). Prevalence and risk factors of anemia among pregnant women attending a high-volume tertiary care center for delivery. *Journal of the Turkish German Gynecology Association*, 16(4), 231–236.
- Weigel, M. M., Armijos, R. X., Racines, M., & Cevallos, W. (2016). Food Insecurity Is Associated with Undernutrition but Not Overnutrition in Ecuadorian Women from Low-Income Urban Neighborhoods, 2016.
- Yusof, M., Awaluddin, S. M., Omar, M., Ahmad, N. A., Abdul Aziz, F. A., Jamaluddin, R., Tan, M. P. (2018). Prevalence of Anaemia among the Elderly in Malaysia and Its Associated Factors: Does Ethnicity Matter? *Journal of Environmental and Public Health*, 2018.



APPENDICES

UPM



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



Tel : 03-2268 7333
Fax : 03-2268 7555
Laman Web : jknkl.moh.gov.my

Ruj. Kami : Bil. (12) dlm. JKWPKL/203/4 Bhg. 3
Tarikh : 2 April 2019

Puan Che Nadhatul Ilani Binti Mohd Nordin
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 KEKURANGAN MAKANAN DAN
KAITANNYA DENGAN PARAS HEMOGLOBIN: KAJIAN
KERATAN RENTAS DI KALANGAN WANITA HAMIL DI
KLINIK KESIHATAN IBU DAN ANAK DI KAWASAN
WILAYAH PERSEKUTUAN, KUALA LUMPUR**

NMRR ID : NMRR-18-3193-44937(IIR)

Dengan hormatnya saya merujuk kepada perkara di atas dan surat puan bertarih
26 Mac 2019 adalah berkaitan.

2. Sukacita dimaklumkan bahawa pihak kami tiada halangan untuk
membenarkan puan menjalankan penyelidikan seperti di atas pada 08 April 2019
hingga 06 Mei 2019. Lokasi penyelidikan yang diberi kelulusan adalah seperti
berikut:-

- a. Klinik Kesihatan Ibu dan Anak Cheras Makmur
- b. Klinik Kesihatan Ibu dan Anak Dato' Keramat (Setiawangsa)
- c. Klinik Kesihatan Ibu dan Anak Taman Pantai Indah
- d. Klinik Kesihatan Kuala Lumpur

3. Untuk makluman, pihak puan dimohon agar mematuhi perkara-perkara
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.**

IKAM SEDIA MELAYANU



SIRIM
PERSEKUTUAN IBU DAN ANAK
NO. 1001 - AR 0113

...1/2

Penggunaan (Fax: 03-2268 7555), Kesihatan Awam (Fax: 03-2897 3009), Perubatan (Fax: 03-2893 8783),
Keselamatan & Kualiti Makanan (Fax: 03-2891 0263), Farmasi (Fax: 03-2893 8778) & Pengajian (Fax: 03-2894 8030)

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 KEKURANGAN MAKANAN DAN KAITANNYA DENGAN PARAS HEMOGLOBIN: KAJIAN KERATAN RENTAS DI KALANGAN WANITA HAMIL DI KLINIK KESIHATAN IBU DAN ANAK DI KAWASAN WILAYAH PERSEKUTUAN, KUALA LUMPUR

NMRR ID : NMRR-18-3193-44937(IIR)

- 3.2** Bagi sebarang permohonan penyelidikan akan datang, pihak puan diingatkan agar menghantar permohonan penyelidikan kepada JKWPKL&P selewat-lewatnya sebulan sebelum tarikh penyelidikan dijalankan bagi memastikan maklumbalas dapat diberikan dalam tempoh masa yang sepatutnya.
- 3.4** Membentangkan hasil kajian kepada pihak kami setelah kajian selesai.
- 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).

- 4.** Untuk perbincangan lanjut, pihak puan perlu berhubung terus dengan Pegawai Kesihatan Lembah Pantai (No. Telefon: 03-22687452), Pegawai Kesihatan Cheras (No. Telefon: 03-91320020) dan Pejabat Kesihatan Titiwangsa (No. Telefon: 03-26980282) sebelum penyelidikan bermula bagi memastikan kelancaran penyelidikan tersebut.



PEJABAT KESIHATAN DAERAH TITIWANGSA
JALAN RAJA ABDULLAH
KAMPUNG BARU
50300 KUALA LUMPUR

Tel : 03 2698 8580
Fax: 03-2698 8885
Email: pk.ttwangsa@moh.gov.my

Ruj. Kami : Bil (124) PKTTW 600/2/1/7 Jld.4

Tarikh : 9 April 2019

Puan Che Nadhatul Ilani binti Mohd Nordin
Jabatan Pemakanan dan Dietetik
Fakulti Perubatan dan Sains Kesihatan
Universiti Putra Malaysia
43400 UPM Serdang
Selangor Darul Ehsan

Puan,

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

TAJUK KAJIAN : HUBUNGAN ANTARA KEKURANGAN MAKANAN DAN
KAITANNYA DENGAN PARAS HEMOGLOBIN: KAJIAN
KERATAN RENTAS DI KALANGAN WANITA HAMIL DI
KLINIK KESIHATAN IBU DAN ANAK DI KAWASAN
WILAYAH PERSEKUTUAN, KUALA LUMPUR

NMRR ID : NMRR-18-3193-44937 (IIR)

Dengan hormatnya saya merujuk kepada perkara di atas dan surat dari Jabatan
Kesihatan Wilayah Persekutuan Kuala Lumpur dan Putrajaya (JKWPKL&P) no.
rujukan Bil.(12) dlm JKWPKL/203/4 Bhg.3 bertarikh 2 April 2019 adalah berkaitan.

2. Pihak kami telah maklum bahawa pihak JKWPKL&P tiada halangan untuk
membenarkan penyelidikan puan seperti yang dinyatakan di atas. Di sini kami ingin
sertakan maklumat Klinik Kesihatan Ibu dan Anak di bawah seliaan kami serta
pegawai perubatan yang boleh dihubungi terus.

a) Klinik Kesihatan Kuala Lumpur :-

Dr. Razila Farra binti Razali

Emel: kkkl@moh.gov.my / dr.razila@moh.gov.my

No. Telefon: 03-26183200

b) Klinik Kesihatan Dato' Keramat :-

Dr. Suhana bt. Sulaiman

Emel: kkdkeramat@moh.gov.my / drsuhana.s@moh.gov.my

No. Telefon: 03-42573333

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

1. **Title of study:** Food insecurity 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:** Che Nadharul Imani binti Mohd Nordin, Universiti Putra Malaysia.
3. **Name of sponsor:** Self-sponsored

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. Hence, a study to determine the food security status in pregnant women with haemoglobin level may help in planning future intervention strategies to overcome anaemia issue in pregnant women. The details of the research study 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 between food insecurity with haemoglobin level in pregnant women attending antenatal clinics in Wilayah Persekutuan, Kuala Lumpur. This research is necessary because globally, the percentage of pregnant women with anaemia is 41.8% which equates to approximately 56 million people.

In South East Asia, approximately 14.9% of the population were affected by anaemia while in Malaysia, there had been reported around 38% of pregnant women were anaemic. Anaemic pregnant women can increase the risk of having low birth weight baby, as well as risk of death of mother and baby. There were several main risk factor for anaemia including food insecurity. Food insecurity is defined as a limited or uncertain access to sufficient amounts of safe and nutritious food for normal growth and healthy life. Food insecurity status may

cause poor intake of food high in iron as the global measurement of food insecurity in 2010 showed that more than 1 billion people were estimated to not have consumed enough energy.

Previous studies have showed the association between food insecurity with haemoglobin level. However, there were still lack of study being carried out in Malaysia among pregnant women. Hence, the findings obtained from this study will further help in implementing strategies to provide nutrition education in tackling anaemia issues among pregnant women in Malaysia in future.

A total of 183 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, not a physically disabled person, not seriously ill and not having chronic diseases leading to anaemia such as renal, cardiac, lung diseases, and abnormal haemoglobin structure. 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 food insecurity status. 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. Also, any new information relevant to the consent will be informed and you will be asked to re-consent. If you decide to take part you are still free to withdraw at any time and without giving a reason. A decision to withdraw at any time, or a decision not to take part, will not affect you in any way.

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

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

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

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

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

There will be no additional or new treatment involved in this 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 minimal additional 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 food insecurity and its link to haemoglobin level in pregnant women. The summary of study findings will be sent to you if you required.

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. Hence, it is self-funded. Therefore, 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 and 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, the supervisor, qualified monitors and auditors, as well as the governmental or regulatory authorities will have access to such information. The study is a self-sponsored study, so there is no sponsorship or its affiliates are include in the study. The researcher will also not provide any participant information to any party without the consent of participants.

3

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.

14. 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, Che Nadharul Ilani binti Mohd Nordin at telephone number 018-2239840 or nadharul01@gmail.com or my research supervisor, Dr Salma Faiza Bt Ahmad Fuzi at 03-86092974 or salmafaiza@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 03-3362 5407/8205/8888 or at the address: Jawatankuasa Etika & Penyelidikan Perubatan (Medical Research & Ethics Committee) Kementerian Kesihatan Malaysia, Kompleks Institut Kesihatan Negara (NIH), No. 1, Jalan Setia Murni U13/52, Seksyen U13 Bandar Setia Alam, 40170 Shah Alam, Selangor.



UPM

INFORMED CONSENT FORM

Title of Study: Food insecurity 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 freely 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 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:

IC number:

Name:

Date:

Investigator conducting informed consent:

Signature:

IC number:

Name:

Date:

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

Signature:

UPM

IC number:

Name:

Date:

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

1. **Tajuk penyelidikan:** Hubungan antara kekurangan makanan dan kairannya dengan paras haemoglobin: Kajian keratan rentas di kalangan wanita hamil di Klinik Kesihatan Ibu dan Anak di kawasan Wilayah Persekutuan, Kuala Lumpur.
2. **Nama Institusi and nama penyelidik:** Universiti Putra Malaysia, Che Nadhanul Ilari binti Mohd Nordin.
3. **Nama penasja:** Tajam sendiri.
4. **Pengenalan:**

Anda telah dijemput untuk menyertai penyelidikan ini kerana kajian terdahulu menunjukkan terdapat risiko anemia di kalangan wanita hamil. Oleh itu, kajian untuk menemunkan status kekurangan makanan di kalangan wanita hamil dan paras hemoglobin dapat membantu dalam melaksanakan program intervensi di masa hadapan bagi menangani masalah anemia di kalangan wanita hamil. Risalah ini menjelaskan hal-hal berkenaan penyelidikan tersebut dengan lebih mendalam dan terperinci. Amat penting untuk anda memahami mengapa penyelidikan ini dilakukan dan apa yang dilakukan dalam penyelidikan ini. Sila ambil masa yang secukupnya untuk membaca dan mempertimbangkan dengan teliti penerangan yang diberi sebelum anda bersetuju untuk menyertai penyelidikan ini. Jika ada sebarang kemusykilan atau maklumat lanjut yang anda ingin tahu, anda boleh bertanya dengan penyelidik yang terlibat dalam penyelidikan ini. Setelah anda berpuas hati bahawa anda memahami penyelidikan ini dan berminat untuk turut serta, anda dikehendaki untuk menandatangani Borang Persetujuan atau Keizinan Pesakit, pada muka surat akhir risalah ini.

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

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

5. Apakah tujuan penyelidikan ini dilakukan?

Tujuan penyelidikan ini dilakukan adalah untuk mengenalpasti hubungan antara kekurangan makanan dan kairannya dengan paras hemoglobin di kalangan wanita hamil di Klinik Kesihatan Ibu dan Anak, di kawasan Wilayah Persekutuan, Kuala Lumpur. Penyelidikan ini adalah perlu kerana secara global, jumlah wanita mengandung yang dilaporkan anemia adalah sebanyak 41.8% yang bersamaan dengan lebih kurang 56 juta populasi.

Di Asia Tenggara, anggaran sebanyak 14.9% populasi dilaporkan mengalami masalah anemia manakala di Malaysia, sebanyak 38% wanita hamil dilaporkan mengalami masalah anemia. Wanita hamil yang mempunyai masalah anemia akan meningkatkan risiko terhadap kematian ibu dan bayi serta mendapat bayi kurang berat badan. Terdapat banyak faktor utama yang mempengaruhi masalah anemia termasuklah kekurangan makanan. Kekurangan makanan boleh didefinisikan sebagai keadaan yang terhad untuk mendapatkan makanan yang selamat dan bernutrisi dalam kuantiti yang cukup untuk membesarkan yang normal dan kehidupan yang sihat. Kekurangan makanan boleh menyebabkan kurangnya pengambilan makanan yang tinggi dengan zat besi, seperti yang dilaporkan oleh pengukuran global pada tahun 2010 bahawa lebih daripada 1 bilion populasi dianggarkan mempunyai masalah dengan pengambilan tenaga yang tidak mencukupi.

Kajian terdahulu banyak menunjukkan hubungan antara kekurangan makanan dan kaitannya dengan paras hemoglobin. Walaupun bagaimanapun, kajian seperti ini masih kurang dijalankan di Malaysia. Justeru, data yang diperolehi dari kajian ini akan membantu dalam melaksanakan strategi untuk memberi pendidikan mengenai pemakanan bagi menangani masalah anemia di kalangan wanita hamil di Malaysia pada masa akan datang.

Sejumlah 183 wanita hamil yang hadir ke klinik di kawasan Wilayah Persekutuan, Kuala Lumpur akan dijemput untuk menyertai penyelidikan ini. Penyelidikan ini akan berlangsung selama 2 bulan iaitu dari Januari hingga Februari 2019 dan tempoh pembabitan anda dianggarkan selama 15-20 minit.

6. Apakah prosedur penyelidikan yang akan saya terima?

Penilaian akan dijalankan untuk menentu kelayakan anda dalam mengambil bahagian dalam kajian ini. Kriteria inklusi adalah warganegara Malaysia, ibu mengandung yang berumur 19 ke 49 tahun yang hadir ke klinik kesihatan untuk pemeriksaan kesihatan, tidak mengalami kecacatan fizikal tidak mempunyai penyakit yang serius dan kronik yang boleh membawa kepada masalah anemia seperti penyakit buah pinggang, jantung, dan paru-paru serta struktur hemoglobin yang tidak normal. Sekiranya anda didapati sesuai, anda akan dipilih untuk mengisi borang soal selidik yang mengandungi beberapa soalan mengenai status demografi, sejarah kehamilan, simptom anemia, pengambilan makanan mengandungi zat besi dan status kekurangan makanan. Berat dan tinggi anda akan diukur. Paras hemoglobin anda akan dicatat oleh penyelidik melalui buku kesihatan anda.

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

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

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

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

9. Apakah tanggungjawab saya sewaktu menyertai penyelidikan ini?

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

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

Tiada rawatan tambahan atau rawatan baru yang terlibat dalam penyelidikan ini. Anda hanya dikehendaki untuk melengkapkan borang soal selidik yang diberikan.

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

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

12. Apakah manfaatnya saya menyertai kajian ini?

Penyelidikan ini mungkin akan mendatangkan manfaat ataupun langsung tiada memberi apa-apa manfaat kepada anda. Segala maklumat yang diperolehi daripada penyelidikan ini akan dapat membantu dalam menyumbang kepada pengetahuan tentang tabiat pemakanan mengenai kekurangan makanan dan kaitannya dengan paras hemoglobin di kalangan wanita hamil. Dapatan penyelidikan ini boleh dimaklumkan sekiranya peserta berminat untuk tahu.

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

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

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

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

15. Siapakah yang membiayai penyelidikan ini?

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

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

Penyertaan anda akan ditamatkan oleh penyelidik ini pada bila-bila masa jika ia perlu demi keselamatan anda.

17. Adakah maklumat perubatan saya akan dirahsiakan?

Segala maklumat anda yang diperolehi dalam penyelidikan ini akan disimpan dan dikendalikan secara sulit, bersesuaian dengan peraturan-peraturan dan/atau undang-undang yang berkenaan. Sekiranya hasil penyelidikan ini diterbitkan atau dibentangkan kepada orang ramai, identiti anda tidak akan didedahkan tanpa kebenaran anda terlebih dahulu. Semua maklumat yang diberikan akan disimpan dan digunakan secara sulit dan hanya penyelidik yang menjalankan penyelidikan, penyelia, juruaudit yang berkecualan, serta pihak berkuasa kerajaan atau pengawal selia yang akan mendapat akses kepada maklumat tersebut. Kajian ini merupakan tajaan sendiri, maka tiada mana-mana tajaan yang terlibat di dalam kajian ini. Penyelidik juga tidak akan memberikan sebarang maklumat peserta kepada mana-mana pihak tanpa persetujuan peserta.

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

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

Anda boleh menghubungi penyelidik ini Che Nadhatul Bani binti Mohd Nordin di talian 018-2239840/nadhatul01@gmail.com atau penyelia penyelidikan Dr Salma Faeza Bt Ahmad Fuzi di talian 03-8609297/salmafaeza@upm.edu.my sekiranya anda mempunyai sebarang pertanyaan mengenai penyelidikan ini atau jika anda mengesyaki anda mengalami kecederaan yang terhasil daripada penyelidikan ini dan anda mahukan maklumat tentang penyelidikan ini.

Jika anda mempunyai sebarang pertanyaan berkaitan dengan hak-hak anda sebagai pesakit dalam penyelidikan ini, sila hubungi: Setiausaha Jawatankuasa Etika & Penyelidikan Perubatan, Kementerian Kesihatan Malaysia, melalui talian telefon 03-3362 8407/8305/8838 atau alamat: Jawatankuasa Etika & Penyelidikan Perubatan (Medical Research & Ethics Committee) Kementerian Kesihatan Malaysia, Kompleks Institut Kesihatan Negara (NIH), No. 1, Jalan Setia Murni U13/52, Seksyen U13 Bandar Setia Alam, 40170 Shah Alam, Selangor

BORANG PERSETUJUAN/ KEIZINAN PESAKIT

Tajuk Penyelidikan: Hubungan antara kekurangan makanan dan kaitannya dengan paras hemoglobin: Kajian keratan rentas di kalangan wanita hamil di Klinik Kesihatan Ibu dan Anak di kawasan Wilayah Persekutuan, Kuala Lumpur

Dengan menandatangani di bawah, saya mengesahkan bahawa:

- Saya telah diberi maklumat tentang penyelidikan di atas secara lisan dan bertulis and saya telah membaca dan memahami segala maklumat yang diberikan dalam risalah ini. Saya telah diberikan masa yang secukupnya untuk mempertimbangkan penyertaan saya dalam penyelidikan ini dan telah diberi peluang untuk bertanyakan soalan dan semua persoalan saya telah dijawab dengan sempurna dan memuaskan
- Saya juga faham bahawa penyertaan saya adalah secara sukarela dan pada bila-bila masa saya bebas menarik diri daripada penyelidikan ini tanpa harus memberi sebarang alasan dan ianya sama sekali tidak akan menjejaskan rawatan perubatan saya pada masa akan datang. Saya tidak mengambil bahagian dalam mana-mana penyelidikan lain pada masa ini. Saya juga memahami tentang risiko dan manfaat penyelidikan ini dan saya secara sukarela memberi persetujuan untuk menyertai penyelidikan ini di bawah syarat-syarat yang telah dinyatakan di atas. Saya faham saya harus mematuhi nasihat dan arahan yang berkaitan dengan penyertaan saya dalam penyelidikan ini. Saya faham bahawa kakitangan penyelidikan, pemantau dan juruaudit terlatih, pihak penaja atau gabungannya, dan pihak berkuasa kerajaan atau undang-undang, mempunyai akses langsung dan boleh menyemak laporan perubatan saya bagi memastikan penyelidikan ini dijalankan dengan betul dan data direkodkan dengan betul. Segala maklumat dan data peribadi akan dianggap sebagai SULIT. Saya akan menerima satu salinan 'Risalah Maklumat Pesakit dan Borang Persetujuan atau Keizinan Pesakit' yang telah lengkap dengan tarikh dan tandatangan untuk dibawa pulang ke rumah.
- Saya bersetuju/ tidak bersetuju* untuk doktor yang biasa merawat saya diberitahu tentang penyertaan saya dalam penyelidikan ini. (*Pilih mana yang tidak berkenaan)

Subjek:

Tandatangan:

Nombor K/P:

Nama:

Tarikh:

Penyelidik yang mengendalikan proses menandatangani borang keizinan:

Tandatangan:

Nombor K/P:

Nama:

Tarikh:

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

Tandatangan:

Nombor K/P:

Nama:

Tarikh:

Appendix 1



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 kekurangan makanan dan kaitannya dengan paras haemoglobin:
Kajian keratan rentas di kalangan wanita hamil di Klinik Kesihatan Ibu dan Anak
di kawasan Wilayah Persekutuan, Kuala Lumpur
*Food insecurity and its link to haemoglobin level: A cross-sectional study in pregnant women
attending antenatal clinics in Wilayah Persekutuan, Kuala Lumpur*

Penyelidik : *Researcher* : Che Nadhatul Imani binti Mohd Nordin
Program : *Programme* : B. Sc. (Nutrition & Community Health)
Penyelia : *Supervisor* : Dr Sahma Faeza Ahmad Fuzi

Sebagai maklumat yang diberikan di sini adalah dirahsiakan dan hanya digunakan untuk tujuan
akademik sahaja. Kerjaan kaftan ini amat bergantung kepada kerjasama pihak tuan/puan dalam
menjawab beberapa soalan yang ditanyakan. Segala kerjaan yang tuan/puan berikan saya
dibahagikan dengan ribuan terima kasih.

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

Seksyen A / Section A: Sosiodemografi / Sociodemography

Maklumat peribadi individu / Personal background information

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

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

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

No Rajukan
Reference Number

Sekyen C / Section C: Tanda-tanda keletihan & anemia / Symptoms of fatigue & anemia
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	Jurang sekali / A little bit	Kadang-kadang / Sometimes	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 menamatkan 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 pusing / 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

Seksyen D / Section D: Amalan pemakanan / Food habit
Sila isi ruangan kotak 'Berapa kali kekerapan pengambilan setiap makanan tersebut' dan jumlah sajian yang diambil setiap kali anda makan.
Please fill in the box on how frequent each type of food was taken and how much of serving was eaten each time.

Jenis Makanan 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)			Rajukan saiz hidangan Reference of meal size	Jumlah Sajian (setiap kali makan) Total servings (each time eaten)
	Sahari Daily	Seminggu Weekly	Sebulan Monthly		
Bijirin dan hasil bijirin (Cereals and cereal's products)					
Bijirin sarapan pagi (Cornflakes, koko crunch, honeystar dsb.) Breakfast cereal				cup	
Bijirin serelia perlu dibancuh (Nestum, quaker oats, dsb.) Cereal grains prepared with water				cup	
Roti bijirin penuh (Wholemeal bread)				slices	
Roti Bread				slices	
Roti bun Bread bun				pieces	
Capati				slices	
Nasi beras perang Brown rice				cup	
Nasi berperisa (Nasi briyani, nasi goreng dsb.) Flavored rice				cup	
Mee kuning, Mee siput, Mee segera Noodles				cup	
Pulut Glutinous rice				cup	
Roti canai (termasuk roti telur, roti sardin, roti bawang, roti pisang, murtabak)				slices	
Tamai				slices	
Pasta				cup	
Jagung Corn				bagkol	

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	Semingga Weekly	Sebulan Monthly		
Makanan segera Fast food					
Kentang Lempuk Mashed potatoes				bekas kecil small container	
Kentang Goreng French fries				cawan cup	
Sosaj Hotdog Frankfurter				keping slices	
Colislaw				bekas kecil small container	
Nugget				kecil pieces	
Ayam Goreng Fried chicken				kecil pieces	
Burger				biji pieces	
Pizza				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	Semingga 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	
* Lunch meat				keping slices	
* Bacon				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	Setinggu Weekly	Sebulan Monthly		
Daging dan hasil daging: Meat and meat product					
Organ dalaman (Hati, limpa, paru): Internal organs (liver, spleen, lungs)				kotak mancis: matchbox size	
Lumba: Karbon: Reef				kotak mancis: matchbox size	
Kambing: Mutton				kotak mancis: matchbox size	
Ayam: Chicken				kotak: pieces	
Itik: Duck				kotak: pieces	
Bebola ayam: daging: Chicken meat ball				kotak: 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	Sehari Daily	Sebulan Monthly		
Ikan dan makanan laut: Fish and seafoods					
Kekering (kerang, lala, remis, kupang, mantar, dsb.): Shellfish				sendok makan: tablespoon	
Siput sedut (belitang, siput buluh dsb.): Snail				sendok makan: tablespoon	
Ikan jeruk: Pickled fish				keping: pieces	
Ikan bilis: Anchovy				sendok makan: tablespoon	
Ikan laut: Marine fish				ekam: whole	
Ikan air tawar: Freshwater fish				ekam: whole	

No Rujukan
Reference Number

Ikan kering' Dried fish				ekor' whole	
Ikan dalam tin' Canned fish				ekor' whole	
Keropok ikan' udang' totong' ketam' Fish' prawn' squid' crab crackers				keping' slices	
Sotong kering' Dried squid				keping' pieces	
Ketam' Crab				ekor' whole	
Udang basah' Prawn				ekor' whole	
Bebola'kak ikan' udang' sotong' ketam' fish' prawn' squid' crab ball or cake				kepal' 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	Sehari' Daily	Sabulan' 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 chilies)				biji' pieces	
Telur masin' Salted eggs				biji' pieces	
Telur ayam (mata kerbau' telur dadar' telur rebus' telur masak sambal' telur pindang)' Hen eggs (bull's eye, omelette, boiled with chilies 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)
Kekacang dan hasilnya' Legumes and legumes products	Sahari' Daily	Sahari' Daily	Sebulan' Monthly		
Kekacang (kacang hijau' paku' kudu' merah dsb.)' Legumes				sendu makan' tablespoon	
Karang tanah' Groundnuts				sendu makan' tablespoon	
Tahu				kepingi' slices	
Tampe' Fermented soy beans				kepingi' 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)
Susu dan hasil tenusu' Milk and milk products	Sahari' Daily	Sahari' Daily	Sebulan' Monthly		
Susu tepung' Powdered milk				sendu 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)
Sayur-sayuran' Vegetables	Sahari' Daily	Sahari' Daily	Sebulan' Monthly		
Sayuran berdaun hijau (bayam, kangkung, kaliam, dsb.)' Leafy vegetables				sendu makan' tablespoon	
Ulam-ulaman' Local fresh salad				sendu makan' tablespoon	
Cendawan kering' Dried mushrooms				sendu makan' tablespoon	

No Rujukan
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Tenggah' Bean sprout				sedu makan' tablespoon	
Bendi' Zucchini				sedu makan' tablespoon	
Cili' Chilies				sedu makan' tablespoon	
Tomato' Tomatoes				sedu makan' tablespoon	
Cendawan basah' Mushrooms				sedu makan' tablespoon	
Sayuran berubi (kentang, keladi, kolodak)' Tubers (potatoes, sweet potatoes, yam)				sedu makan' tablespoon	
Sayuran kekacang lain (kacang panjang, kacang buncis, kacang botol dsb.)' Other type of legumes				sedu 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 (selepas kali makan) Total servings (each time eaten)
Buah-buahan' Fruits	Sehari' Daily	Sehari' Daily	Sabtuah' Monthly		
Buahan kering (kurma, prun, kismis dsb.)' Dried fruits				sedu makan' tablespoon	
Rambutan				biju' pieces	
Durian				ulat' pieces	
Nangka' Cempedak' Jackfruit				biju' pieces	
Kelapa muda' Young coconut				sedu makan' tablespoon	
Nanas' Pineapple				potong' slices	
Jambu batu' Guava				leping' slices	

No Rujukan
Reference Number

Manggis: Mangosteen				biji: pieces	
Bahan jerak: Acer: Pickled fruits				sedu makan: tablespoons	

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)
Minuman: Drinks	Sahari: Daily	Sahari: Daily	Sebulan: Monthly		
Minuman berminyak (milo, Horlick dsb.): Milked drink				cairan: cup	

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)
Konfeksi: Confectionaries	Sahari: Daily	Sahari: Daily	Sebulan: Monthly		
Kuih-muih: Local kuit				ketul: cup	
Kek: Cake				potong: 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)
Suprem Roti: Bread Spread	Sahari: Daily	Sahari: Daily	Sebulan: Monthly		
Suprem coklat: Chocolate spread				sedu makan: tablespoons	
Mentega kacang: Peanut butter				sedu makan: tablespoons	

No Rujukan
Reference Number

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Jenis Makanan Type of food	Berapa kali keberapaa 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)
Perncah' Pesta' Flavours	Sehari' Daily	Sehari' Daily	Sebulan' Monthly		
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	

Sekyen E / Section E: Skala menilai kekurangan makanan isi rumah / Household food insecurity assess scale

Kertas soalan ini mengandungi dua jenis soalan yang berkait Partaman, terdapat sembilan yang bertanyakan mengenai keadaan rumah yang berkaitan dengan pengalaman kekurangan makanan yang pernah dialami sejak empat minggu yang lepas (30 hari). Terdapat dua pilihan jawapan (0 = tidak, 1 = ya). Setiap soalan diikuti dengan soalan kekerapan, yang bertanyakan mengenai berapa kerapkah pengalaman yang dilaporkan sejak empat minggu yang lepas. Terdapat tiga pilihan jawapan mewakili julai kekerapan:

- 1 = jarang : sekali / dua kali dalam empat minggu lepas
- 2 = kadang-kadang : tiga hingga sepuluh kali dalam empat minggu lepas
- 3 = kerap : lebih dari sepuluh kali dalam empat minggu lepas

This questionnaire consists of two types of related questions. Firstly, there are nine occurrence questions that ask whether a specific condition associated with the experience of food insecurity ever occurred during the previous four weeks (30 days). There are two response options (0 - no, 1 - yes). Each severity question is followed by a frequency-of-occurrence question, which asks how often a reported condition occurred during the previous four weeks. There are three response options representing a range of frequencies:

- 1 - rarely : once / twice in the past four weeks
- 2 - sometimes : three to ten times in the past four weeks
- 3 - often : more than ten times in the past four weeks

No.	Soalan (Question)	Pilihan jawapan Response options
1.	Dalam empat minggu lepas, adakah anda bimbang bahawa keluarga anda tidak cukup makanan? <i>In the past four weeks, did you worry that your household would not have enough food?</i>	0 = Tidak (terus ke Q2); No (skip to Q2) 1 = Ya; Yes
1.a	Berapa kerapkah ini berlaku? <i>How often did this happen?</i>	1 = Jarang; Rarely 2 = Kadang-kadang; Sometimes 3 = Kerap; Often
2.	Dalam empat minggu lepas, adakah anda atau iai rumah yang lain tidak dapat makan makanan yang disukai kerana kekurangan sumber makanan tersebut? <i>In the past four weeks, were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?</i>	0 = Tidak (terus ke Q3); No (skip to Q3) 1 = Ya; Yes
2.a	Berapa kerapkah ini berlaku? <i>How often did this happen?</i>	1 = Jarang; Rarely 2 = Kadang-kadang; Sometimes 3 = Kerap; Often

3.	Dalam empat minggu yang lepas, adakah anda atau isi rumah yang lain menghadkan kepelbagaian makanan kerana kekurangan sumber makanan tertentu? <i>In the past four weeks, did you or any household member have to eat a limited variety of foods due to a lack of resources?</i>	0 = Tidak (terus ke Q4); No (skip to Q4) 1 = Ya; Yes
3.a	Berapa kerapkah ini berlaku? <i>How often did this happen?</i>	1 = Jarang; Rarely 2 = Kadang-kadang; Sometimes 3 = kerap; Often
4.	Dalam empat minggu yang lepas, adakah anda atau isi rumah yang lain perlu makan makanan yang sama kerana tidak mampu membeli makanan lain? <i>In the past four weeks, did you or any household member have to eat the same foods that you really did not want to eat because of a lack of resources to obtain other types of food?</i>	0 = Tidak (terus ke Q5); No (skip to Q5) 1 = Ya; Yes
4.a	Berapa kerapkah ini berlaku? <i>How often did this happen?</i>	1 = Jarang; Rarely 2 = Kadang-kadang; Sometimes 3 = kerap; Often
5.	Dalam empat minggu yang lepas, adakah anda atau isi rumah yang lain perlu makan hidangan yang kurang dari keperluan kerana tidak cukup makanan? <i>In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?</i>	0 = Tidak (terus ke Q6); No (skip to Q6) 1 = Ya; Yes
5.a	Berapa kerapkah ini berlaku? <i>How often did this happen?</i>	1 = Jarang; Rarely 2 = Kadang-kadang; Sometimes 3 = kerap; Often
6.	Dalam empat minggu yang lepas, adakah anda atau isi rumah yang lain perlu mengurangkan kekerapan hidangan dalam sehari kerana tidak cukup makanan? <i>In the past four weeks, did you or any other household member have to eat fewer meals in a day because there was not enough food?</i>	0 = Tidak (terus ke Q7); No (skip to Q7) 1 = Ya; Yes

6.a	Berapa kerapkah ini berlaku? <i>How often did this happen?</i>	1 = Jarang/Rarely 2 = Kadang-kadang/Sometimes 3 = kerap/Often
7.	Dalam empat minggu yang lepas, pernahkah terjadi keadaan tiada makanan untuk dimakan di dalam rumah kerana kekurangan sumber untuk mendapatkan makanan? <i>In the past four weeks, was there ever no food to eat of any kind in your household because of lack of resources to get food?</i>	0 = Tidak (lulus ke Q8)/No (skip to Q8) 1 = Ya/Yes
7.a	Berapa kerapkah ini berlaku? <i>How often did this happen?</i>	1 = Jarang/Rarely 2 = Kadang-kadang/Sometimes 3 = kerap/Often
8.	Dalam empat minggu yang lepas, adakah anda atau ini rumah yang lain pernah tidur pada waktu malam dalam keadaan lapar kerana tidak cukup makanan? <i>In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food?</i>	0 = Tidak (lulus ke Q3)/No (skip to Q3) 1 = Ya/Yes
8.a	Berapa kerapkah ini berlaku? <i>How often did this happen?</i>	1 = Jarang/Rarely 2 = Kadang-kadang/Sometimes 3 = kerap/Often
9.	Dalam empat minggu yang lepas, adakah anda atau ini rumah yang lain menjalani kehidupan seharian tanpa mengambil apa-apa makanan kerana kekurangan makanan? <i>In the past four weeks, did you or any household member go a whole day and night without eating anything because there was not enough food?</i>	0 = Tidak (soalan berakhir di sini)/No (question ends here) 1 = Ya/Yes
9.a	Berapa kerapkah ini berlaku? <i>How often did this happen?</i>	1 = Jarang/Rarely 2 = Kadang-kadang/Sometimes 3 = kerap/Often

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
Barat / Weight (kg)		
Tinggi / Height (cm)		
Indeks Jisim Tubuh / Body Mass Index (kg/m ²)		

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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Sekian tamat di sini. Terima kasih atas penyertaan anda. The questions end here. Thank you for participating.



UPM