



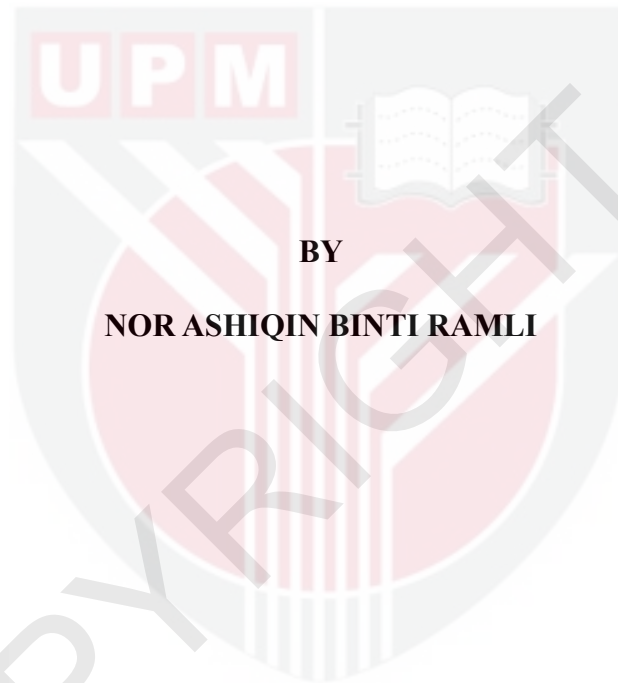
UNIVERSITI PUTRA MALAYSIA

***ASSOCIATIONS BETWEEN KNOWLEDGE ON NUTRITION,
ATTITUDE ON GESTATIONAL WEIGHT GAIN, CULTURAL BELIEFS
(FOOD TABOOS) PRACTICE WITH GESTATIONAL WEIGHT GAIN
AMONG MALAY PREGNANT WOMEN IN MALAYSIA***

NOR ASHIQIN BINTI RAMLI

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**ASSOCIATIONS BETWEEN KNOWLEDGE ON NUTRITION, ATTITUDE ON
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PRACTICE WITH GESTATIONAL WEIGHT GAIN AMONG MALAY PREGNANT
WOMEN IN MALAYSIA**



BY

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A project submitted as a partial fulfilment of the requirement for the degree of

Bachelor of Science (Nutrition and Community Health) from the


Faculty of Medicine and Health Sciences,

Universiti Putra Malaysia (UPM)

APPROVAL

This project entitles “The Associations of Knowledge on Nutrition, Attitude on Gestational Weight Gain, Cultural Beliefs (Food Taboos) Practice with Gestational Weight Gain among Malay Pregnant Women in Malaysia” was prepared by Nor Ashiqin Binti Ramli and submitted to the Faculty of Medicine and Health Sciences as a partial fulfilment for the degree of Bachelor of Science (Nutrition and Community Health) from the Faculty of Medicine and Health Sciences, Universiti Putra Malaysia (UPM).

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ABSTRACT

THE ASSOCIATIONS OF KNOWLEDGE ON NUTRITION, ATTITUDE ON GESTATIONAL WEIGHT GAIN, CULTURAL BELIEFS (FOOD TABOOS) PRACTICE WITH GESTATIONAL WEIGHT GAIN AMONG MALAY PREGNANT WOMEN IN MALAYSIA

Gestational weight gain (GWG) is defined as the difference between the last available antenatal weight and pre-pregnancy weight. Excessive and inadequate GWG is associated with multiple chronic diseases and complications. There are mixed findings on several factors that were found to contribute to GWG status. Hence, this cross-sectional study aimed to determine the associations between knowledge on nutrition, attitude on gestational weight gain, cultural beliefs (food taboos) practice and GWG among Malay pregnant women in Malaysia. A set of self-administered-questionnaire that assesses sociodemographic background, nutrition knowledge, attitude on GWG, cultural beliefs (food taboos) practice during pregnancy, and self-reported anthropometry data on pre-pregnancy BMI and total GWG were completed by respondents. All the data were analysed using IBM SPSS Statistics. A total of 100 pregnant women with a mean age of 29.95 ± 4.76 years, mean parity of 1.27 ± 1.16 children and mean gestational age of 38.58 ± 0.82 weeks, were recruited in this study. A total of 51.0% of the respondents had abnormal pre-pregnancy BMI, which 38.0% were overweight and obese and 13.0% were underweight. Meanwhile, most of the respondents were classified as having inadequate gestational weight gain (44%), followed by excessive gestational weight gain (29%). Majority of the pregnant women had good knowledge on nutrition (78.0%), negative attitude towards GWG (91.0%) and did practice on food taboos during their pregnancy (50.0%). However, results showed that there were

significant correlations between parity ($r=-0.292$, $p=0.003$), pre-pregnancy BMI ($r=-0.246$, $p=0.014$) and attitude on weight gain ($r=-0.284$, $p=0.004$) with GWG. Advocating for normal pre-pregnancy BMI and positive attitude towards weight gain during pregnancy are recommended among pregnant women to improve their total GWG status. Thus, this study provided the policy makers and healthcare professionals a better view for future intervention planning.



ABSTRAK

HUBUNGAN ANTARA PENGETAHUAN TENTANG PEMAKANAN, SIKAP TERHADAP KENAIKAN BERAT BADAN, AMALAN TERHADAP KEPERCAYAAN BUDAYA (PANTANG LARANG MAKANAN) DENGAN STATUS KENAIKAN BERAT BADAN SEMASA HAMIL DALAM KALANGAN WANITA HAMIL BERBANGSA MELAYU DI MALAYSIA

Kenaikan berat badan sewaktu hamil ditakrifkan sebagai perbezaan antara berat badan sebelum pada hujung minggu kehamilan dan berat sebelum hamil. Kenaikan berat badan yang berlebihan dan tidak mencukupi dikaitkan dengan pelbagai penyakit kronik dan komplikasi. Terdapat pelbagai penemuan mengenai beberapa faktor yang didapati menyumbang kepada status kenaikan berat badan sewaktu hamil. Oleh itu, kajian keratan rentas ini bertujuan untuk menentukan hubungan antara pengetahuan tentang pemakanan, sikap terhadap kenaikan berat badan, amalan terhadap kepercayaan budaya (pantang larang makanan) dengan status kenaikan berat badan semasa hamil dalam kalangan wanita hamil berbangsa Melayu di Malaysia. Satu set soal selidik sendiri yang menilai latar belakang sosiodemografi, pengetahuan mengenai pemakanan, sikap terhadap kenaikan berat badan sewaktu hamil, amalan kepercayaan budaya (pantang larang makanan) semasa hamil serta data antropometri yang dilaporkan sendiri mengenai BMI pra-kehamilan dan jumlah kenaikan berat badan dilengkapkan oleh responden. Semua data dianalisis menggunakan IBM SPSS Statistics. Sebanyak 100 wanita hamil dengan min usia adalah 29.95 ± 4.76 tahun, min pariti adalah 1.27 ± 1.16 anak dan min usia kehamilan adalah 38.58 ± 0.82 minggu, direkrut dalam kajian ini. Sebanyak 51.0% responden mempunyai BMI sebelum kehamilan yang tidak normal, yang mana 38.0% mempunyai berat badan berlebihan dan obes dan

13.0% kurang berat badan. Kebanyakan responden diklasifikasikan mempunyai kenaikan berat badan kehamilan yang tidak mencukupi (44%), diikuti dengan kenaikan berat badan kehamilan yang berlebihan (29%). Sebilangan besar wanita hamil mempunyai pengetahuan yang baik mengenai pemakanan (78.0%), sikap negatif terhadap kenaikan berat badan sewaktu hamil (91.0%) dan melakukan amalan pantang larang makanan semasa kehamilan mereka (50.0%). Walau bagaimanapun, hasil menunjukkan bahawa terdapat hubungan yang signifikan antara pariti ($r = 0.292$, $p = 0.003$), BMI sebelum kehamilan ($r = -0.246$, $p = 0.014$) dan sikap terhadap kenaikan berat badan ($r = -0.284$, $p = 0.004$) dengan status kenaikan berat badan sewaktu hamil. Program intervensi yang menganjurkan BMI pra-kehamilan normal dan sikap positif terhadap kenaikan berat badan semasa kehamilan disarankan dalam kalangan wanita hamil untuk menambahbaik status kenaikan berat badan mereka. Oleh itu, kajian ini memberikan pandangan yang lebih baik kepada pembuat polisi dan profesional penjagaan kesihatan mengenai perancangan intervensi masa depan.

CHAPTER 1

INTRODUCTION

1.1 Background of The Study

Pregnancy is defined as a period in which women develop a fetus inside the womb or uterus (National Institutes of Health, 2017). Meanwhile, gestational weight gain (GWG) which is experienced by pregnant women is a complex and unique biological phenomenon that aids in the development and growth of the fetus. According to Ruifrok et al. (2014), gestational weight gain is defined as the difference between the last available antenatal weight usually around delivery and pre-pregnancy weight. The overall amount of weight gained which also known as gestational weight gain is varies from woman to woman in normal-term pregnancies. According to the 2009 IOM guidelines, which use the World Health Organization (WHO) BMI categories, the optimal GWG is 12.5–18 kg, 11.5–16 kg, 7–11.5 kg, and 5–9 kg for underweight, normal weight, overweight, and obese women, respectively, during pre-pregnancy (Institute of Medicine, 2009).

There are several factors contributing to pregnancy weight gain, which may explain the variations in patterns of weight gain between population subgroups. Major potential determinants of gestational weight gain include maternal pre-pregnancy body mass index (BMI), diet, physical activity, smoking status and sociodemographic factors (Akgun, Keskin, Ustuner, Pekcan, & Avsar, 2017). In addition, Slack, Brandon and Heslehurst (2018), they suggest that there are also several possible determinants of gestational weight gain which is social and environmental factors, maternal factors and energy balance. These factors associated with maternal weight gain during pregnancy are crucial because it can be an indicator of health status between the mother and her developing fetus (Nikolopoulos, Mayan, MacIsaac, Miller & Bell, 2017).

Knowledge on nutrition is also a crucial factor during pregnancy because good nutrition towards a healthy diet is critical to pregnant women's health and well-being (Bookari, 2017). This is due to that healthy diet is not only affect mothers' health, but also the health and development of their unborn babies. In fact, study has shown that knowledge about diet and nutrition is essential in promoting healthy eating and lifestyles which in hope will reduce the prevalence of obesity (Putri, Wan, Jan, & Mohamed, 2017) in which can reduce the occurrence of excessive GWG as well. Other factors that have an association with GWG status is attitude on weight gain during pregnancy. This is due to that during pregnancy, women must deal with significant physical changes such as GWG, which can affect their body image or internal representation (Skouteris et al., 2005) in which is influenced by attitudes, perceptions and behaviors (Grogan, 2016). Despite the fact that GWG is necessary for a healthy pregnancy, the significant weight changes during this time period might contribute to or intensify poor body image towards one's body (Desmecht & Achim, 2016).

Other than that, cultural beliefs are also possible determinants of GWG among pregnant women (Slack, Brandon & Heslehurst, 2018) and practices of food taboos are one of the common issues in cultural belief. Many of these cultural traditions tend to avoid potentially troublesome situations (Martin, 2001), and as a result, women are encouraged to adjust their eating habits during pregnancy in order to make delivery smoother or to avoid scarring or deformity in the child. In addition, cultural beliefs also can influence food choice and dietary preferences among pregnant women (Chakona & Shackleton, 2019) which can possibly affect pregnant women GWG status as well. Previous studies have reported that abnormal GWG can greatly affect the pregnancy outcomes for both short-term (Suliga et al., 2018) and also for the long-term health of the offspring (Freitas-Vilela et al., 2018) and the mother itself (Mannan, Doi, & Mamun, 2013). Viswanathan

et al. in 2008, they reported that excess or inadequate GWG were associated with higher rates of unfavourable pregnancy outcomes that includes preterm birth, macrosomia and caesarean delivery. Meanwhile, another study stated that although inadequate GWG is associated with low birth weight and preterm birth, excessive GWG also often leads to higher rates of maternal and perinatal complications, disease, and sometimes even death (Nikolopoulos, Mayan, MacIsaac, Miller & Bell, 2017).

1.2 Problem Statement

Globally, 2/3 of pregnant women had excessive rate of gestational weight gain, while about 1/5 had inadequate rate of gestational weight gain (Goldstein et al., 2018). This shows that GWG status among pregnant women is a concerning issue when excessive and inadequate GWG among pregnant women is still prevalent in different countries around the world. Based on the revised GWG guidelines from the US Institute of Medicine (IOM) in 2009, almost three quarters of women residing in the USA are now gaining weight outside of these guidelines (Goldstein, et al., 2017).

In addition, other recent study also reported that there were 71.1% of pregnant women in the United Arab Emirates reported having abnormal GWG consisting 31.6% from participants recorded to have inadequate GWG and 39.5% to have excessive GWG (Hashim et al., 2019). In Malaysia, according to National Health & Morbidity Survey in 2016, they reported that the prevalence of maternal obesity was increasing to 14.6% with the highest rates especially among those from Malays ethnic. This is a worrying issue because obese women are more prone to have higher pre-pregnancy BMI which has proven to be associated with higher risk of excessive GWG (Holowko, Mishra & Koupil, 2014) which can cause many complications such as hypertensive disorders, caesarean birth and postpartum weight retention (McDowell, Cain & Brumley, 2019).

Several studies have been conducted locally that assess the prevalence of inadequate and excessive GWG among pregnant women. For instance, a study conducted by Yaw, Shariff and Shahdan (2017) found that 30.1% and 27.7% of pregnant women in Seremban, Negeri Sembilan gained inadequate and excessive GWG respectively. Another study also showed that the prevalence of inadequate GWG is 54.5% and 13.0% for excessive GWG (Farhana, Rohana & Alina, 2015). In fact, another recent study stated that 53.3% of pregnant women in Batu Pahat district had excessive GWG rate, meanwhile 28.9% had inadequate GWG rate (Chee, Si & Siew, 2019).

Several factors may cause poor GWG status among pregnant women. Based on study conducted by Akgun, Keskin, Ustuner, Pekcan, & Avsar (2017), they state that the major determinants of GWG are maternal pre-pregnancy body mass index (BMI), socio-demographic factors, dietary pattern, physical activity and smoking status. However, the association of sociodemographic factors with GWG remains unclear. Next, having good nutrition knowledge may contribute to positive pregnancy outcomes (Zalilah et al., 2008; Mugyja et al., 2016). Higher score in nutrition knowledge among mothers shows reduction in pregnancy complication and optimal GWG (Lim et al., 2018). However, having good nutrition knowledge alone is not sufficient to change behavior and achieve positive pregnancy results (Sapp et al., 2002). In order to combat excessive GWG, it is recommended to decrease energy intake in combination with the consumption of sufficient quantities of nutrient-dense foods from each of the five food groups and to maximise physical activity (National Health and Medical Research Council, 2013). However, many pregnant women may not comply with these guidelines and poor nutrition awareness may be a contributing factor (Downs, Savage, & Rauff, 2014). One approach to control GWG is to engage in healthy eating behaviour however, little is known regarding pregnant women's knowledge of nutrition in relation to GWG.

In addition, Hill, Skouteris, McCabe and FullerTyszkiewicz (2013) found that feeling overweight in late pregnancy was associated with lower GWG, whereas feeling unattractive in early and mid-pregnancy was associated with higher GWG. These data indicate that the sense of females' attractiveness may influence the increase in gestational weight, which often influenced by culture and society. Apart from that, having negative body image concerns also can lead to lowered self-esteem, depression and eating disorders in pregnant women (Shloimpo et al., 2015; Silveira et al., 2015). Given the health consequences of body image issues that also influence mothers to gain optimal weight during pregnancy, however, such studies are limited in Malaysia.

Furthermore, social and environment factors such as cultural beliefs, maternal factors (e.g. genetics, ethnicity and comorbidities) and energy balance are reported as possible determinants of GWG. These factors are found to explain some of the discrepancies reported in the weight gain trends between subgroups of the population (Slack, Brandon & Heslehurst, 2018). Acknowledging these cultural beliefs and perceptions are a significant global health factor that improving maternal and child health outcomes (Lowe, Chen, & Huang, 2016), however, a review of literature reveals that there are few research specifically focused on food taboos during pregnancy and its relationship with GWG (SA, Nilan & Germov, 2012; Bolton, 1972) as well as its relationship with total GWG status. Thus, this research is important to determine the association between sociodemographic characteristics, anthropometric measurement, knowledge on nutrition, attitude on GWG, cultural beliefs (food taboos) practice with gestational weight gain status among Malay pregnant women in Malaysia.

Research questions:

1. What is the gestational weight gain status among Malay pregnant women in Malaysia?
2. What is the knowledge on nutrition score of Malay pregnant women in Malaysia?
3. What is the attitude on GWG of Malay pregnant women in Malaysia?
4. What is the types of food taboos practice of Malay pregnant women in Malaysia?
5. What are the association between sociodemographic characteristics, anthropometric measurement, knowledge on nutrition, attitude on GWG, cultural beliefs (food taboos) practice with gestational weight gain among Malay pregnant women in Malaysia?

1.3 Significance of the study

Studies on factors that cause pregnant women to gain weight throughout their pregnancy have been conducted in foreign countries as well as Malaysia, however, studies that focus on the knowledge on nutrition, attitude on gestational weight gain and cultural beliefs (food taboos) practice during pregnancy and its effects on the GWG status were found limited in Malaysia. Further understanding of this knowledge on nutrition, attitude on gestational weight gain and cultural beliefs (food taboos) practice during pregnancy and its influence on GWG among Malay pregnant women in Malaysia are needed because the findings remain unclear. Therefore, this study is conducted to determine the association of sociodemographic characteristics, anthropometric measurement, knowledge on nutrition, attitude on gestational weight gain, cultural beliefs (food taboos) practice with gestational weight gain status among Malay pregnant women in Malaysia.

Moreover, studies have proved that poor gestational weight gain can adversely affect not only the moms, but the birth of the infant also. In fact, cultural beliefs and perceptions are one of the contributors that may influence poor gestational weight gain. Hence, this study is important to tackle these cultural beliefs and perceptions and its effects on gestational weight gain in order to intervene the poor gestational weight gain problem in Malaysia. The results of this study can serve as baseline data for researchers to have future interventions in improving gestational weight gain among pregnant mothers in Malaysia.

1.4 Research Objectives

1.4.1 General objective

To determine factors associated with gestational weight gain among Malay pregnant women in Malaysia.

1.4.2 Specific objectives

1. To determine sociodemographic characteristics (gestational week, parity, marital status, education level, employment status and household income per month) among Malay pregnant women in Malaysia.
2. To determine gestational weight gain status among Malay pregnant women in Malaysia.
3. To determine the knowledge on nutrition among Malay pregnant women in Malaysia.
4. To determine the attitude on gestational weight gain among Malay pregnant women in Malaysia.
5. To determine the types of cultural beliefs (food taboos) practice and its reason for avoidance among Malay pregnant women in Malaysia.
6. To determine the association of sociodemographic characteristics, anthropometric measurement, knowledge on nutrition, attitude on GWG, cultural beliefs (food taboos) practice with gestational weight gain

1.5 Research Hypotheses

H1 : There is an association of sociodemographic characteristics, anthropometric measurement, knowledge on nutrition, attitude on GWG, cultural beliefs (food taboos) practice with gestational weight gain among Malay pregnant women in Malaysia.

1.6 Conceptual Framework

Figure 1 shows the research framework of the of the study, whereby the independent variables include socio-demographic factors (age, gestational week, parity, marital status, education level, employment status, household income per month), anthropometric measures (pre-pregnancy BMI), knowledge on nutrition, attitude on GWG and cultural beliefs (food taboos) practice during pregnancy. The dependent variable of this study is gestational weight gain among Malay pregnant women in Malaysia.

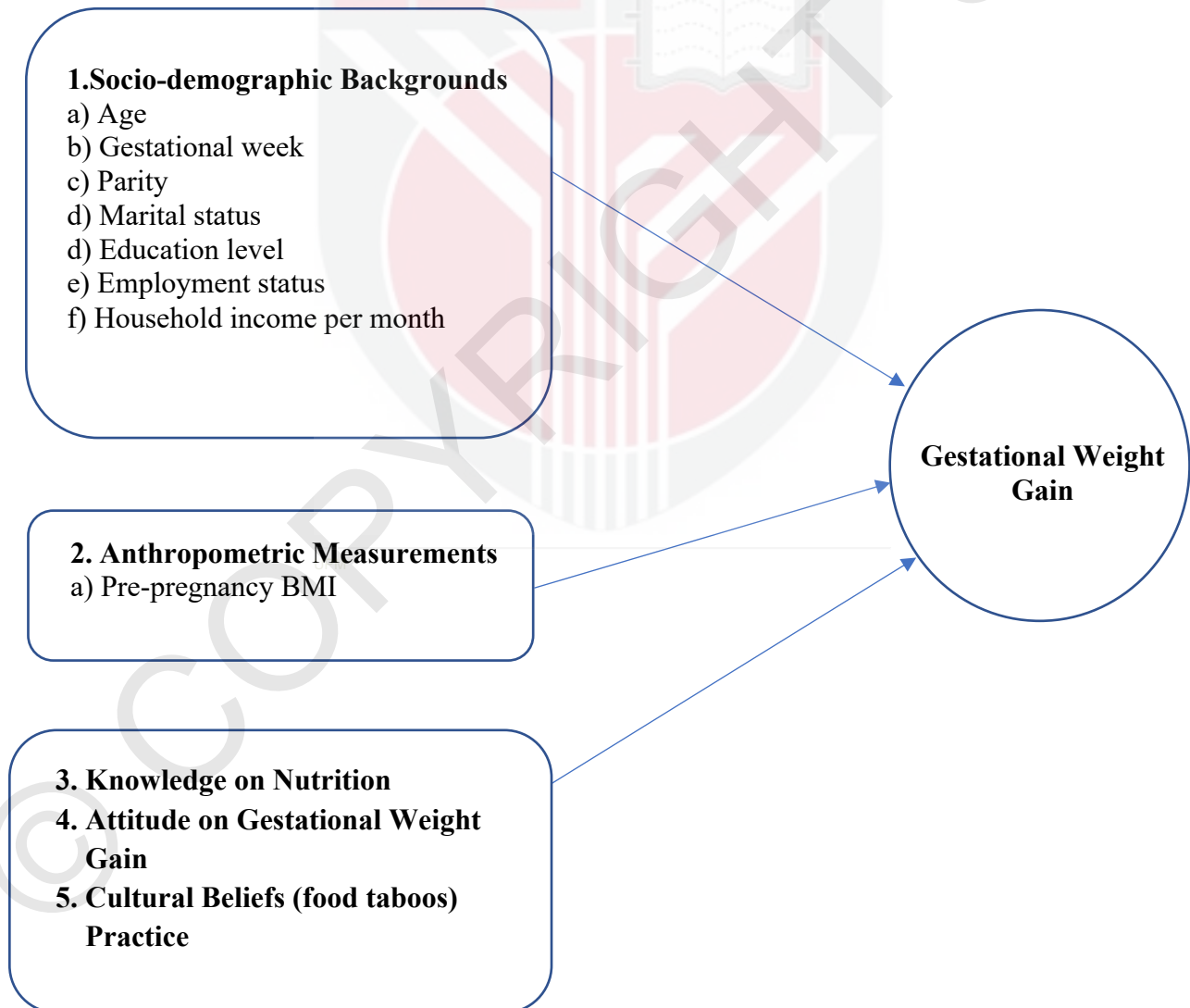


Figure 1 shows the conceptual framework for this study

CHAPTER 2

LITERATURE REVIEW

2.1 Overview on Gestational Weight Gain

Abnormal gestational weight gain (GWG) is a major obstetric problem at present. According to the 2009 IOM guidelines, the optimal GWG for underweight, normal weight, overweight and obese pregnant women is 12.5–18 kg, 11.5–16 kg, 7–11.5 kg and 5–9 kg respectively based on their pre-pregnancy World Health Organization (WHO) BMI categories. The prevalence of inadequate and excessive GWG among pregnant women is prevalent in different countries. For instance, in the US, half proportion of the mothers were having abnormal GWG where 48% of the mothers gain excessively, while in 21% of the mothers, the weight gain was reported lower than the recommendations set by the US Institute of Medicine (IOM) (Centers for Disease Control and Prevention, 2016). This is similar with a recent study conducted over 18,000 women in rural Pennsylvania between 2006 and 2015 which they found that only 25.3% of women in this population gained weight within the suggested recommendations, meanwhile 21.3% of pregnant mothers obtained inadequately and 52.9% exceed the recommendations (Power, Lott, Mackeen, DiBari & Schulkin, 2018). In addition, a sample of over 14,000 Italian women which their GWG were inadequate (30.1%) and excessive (29.1%) compared to the gestational weight gain recommendations (Alberico et al., 2014). In German surveys conducted by Beyerlein et al. (2014) documented that, 37.0% of women in this population had excessive GWG and 27.4% had insufficient GWG. Other previous study in Poland have shown that 40-48% of pregnant mothers achieve a GWG above the guidelines and 14-23% achieve a GWG below the guidelines (Suliga & Adamczyk-Gruszka, 2015).

In Malaysia, the situation is similar where the prevalence of pregnant mothers with poor gestational weight gain status is a concerning issue. For instance, a study conducted in Seremban, Negeri Sembilan reported that 30.1% and 27.7% of pregnant women gained inadequate and excessive GWG respectively (Yaw, Shariff & Shahdan, 2017). This indicates that more than half of the population from Seremban, Negeri Sembilan has GWG status that does not meet the 2009 IOM recommendations. Another study conducted in rural areas in Kelantan showed that 50% of them experienced poor gestational weight gain in which 54.5% of them gained inadequately and 13.0% of pregnant women gained excessively (Farhana, Rohana & Alina, 2015). In fact, another recent study stated that 53.3% of pregnant women in Batu Pahat, Johor had excessive GWG rate and 28.9% had inadequate GWG rate (Chee, Si & Siew, 2019). Hence, these previous studies have proven that the prevalence of inadequate and excessive GWG is still a worrying issue in Malaysia and needs to be addressed immediately.

2.2 Association of Sociodemographic Status and Gestational Weight Gain

2.2.1 Age

There were limited studies reported on age and GWG and the existing findings are inconsistent. According to Wang, Wang and Yang (2017), they stated that age is an independent risk factor for the adverse effects of pregnancy outcomes among mothers. This means that pregnant women at advanced maternal age (AMA) is at high risk for developing health complications for themselves and their offspring. Advanced maternal age (AMA) is generally described as being 35 years or older (Dekker & Breakey, 2016). The largest and most comprehensive systematic analysis that examines the relationship between advanced maternal age (AMA) and pregnancy outcomes reported that AMA is correlated with stillbirth, fetal growth restrictions (FGR) rates and other

pregnancy complications, despite the broad degree of heterogeneity (Lean, Derricott, Jones, & Heazell, 2017). In addition, another national cohort study conducted by Frederiksen et al. (2018) in Denmark found a correlation between AMA and increased risk of chromosomal abnormalities, miscarriages and premature birth. There was an association with stillbirth in women aged 35-39, while in women aged 40 or above, there was no increased risk of congenital malformations in the two advanced maternal age groups.

Furthermore, advanced maternal age is linked to numerous economic, social and health problems for the mother and the fetus as well (Maeruf et al., 2020). Various research on this topic have shown that the consequences of advanced maternal age (AMA) are closely related to the incidence of pregnancy-induced hypertension, DM, maternal near-miss, increased caesarean delivery, malpresentation and maternal death. In addition, neonatal complications such as Low Apgar score, NICU admission, premature delivery, low birth weight, birth defects, chromosome disorders and perinatal death also arise from AMA (Johnson et al., 2012). Therefore, advanced-maternal-age pregnancy management is very crucial to improve pregnancy outcomes as well as to prevent from all the complications stated above.

In addition, as studies have shown a strong association between AMA and adverse outcomes for health, however a very few studies in the past have highlighted the association between age and GWG. For instance, a study conducted by Restall et al. (2014) found that in older women, the risk of getting low GWG is higher, but the findings obtained from this study typically concern among women who aged more than 35 and not >30. However, this is contradicting with a study that has been previously reported that there were no direct associations between age and GWG (Papazian et al., 2017). Thus, mixed findings on the association between age and total GWG was shown in previous studies.

2.2.2 Educational Level

Education is a significant social determining factor of many health outcomes, however the association between education levels and the amount of weight gained over the course of a woman's pregnancy (GWG) has not been clearly defined (Cohen et al., 2016). According to Cohen and Syme (2013), they found that educational level which act as an underlying social determinant, may have the potential to affect the health of women over the life course.

One American study has investigated the relationship between education levels and GWG. For instance, a study conducted by Chu, Callaghan, Bish and D'Angel (2009) revealed that women with the highest educational level gained more weight than those with fewer than 12 years of education. However, this is contradictory to a recent study by Deputy, Sharma, Kim and Hinkle (2015), which they concluded that pregnant women who were underweight before pregnancy with lower education was associated with greater risks of excessive GWG and pregnant women with less than high school education had better risks of insufficient GWG. In addition, another U.S. study (Chu et al., 2009) reveals that pregnant women gain more weight on average when they are highly educated. Besides, women with high school or some college education in New York City were more likely to gain more than 40 pounds during pregnancy than those with less education (Huynh, Borrel & Chambers, 2014).

Two recent Swedish studies have also been carried out. One discovered that education among healthy women who have either their first or second singleton births was inversely correlated with excessive GWG (Holowko et al., 2015). Another study found that those with elementary or secondary education had a greater risk of excessive GWG than those with higher education among those with a balanced pre-pregnancy BMI (Holowko, Mishra, & Koupil, 2014). In fact, several studies that have been conducted on the predictors of gestational weight gain in the

United States, Brazil, Korea, California found that there is no direct association between education levels and gestational weight gain among pregnant women (Caulfield, Witter, & Stoltzfus, 1996; Chaffee, Abrams, Cohen, & Rehkopf, 2015; Drehmer, Duncan, Kac, & Schmidt, 2013; Kleinman et al., 2007; Krukowski, Bursac, McGehee, & West, 2013; Park et al., 2011; Sridhar et al., 2014).

2.2.3 Household Income

There are several sociodemographic factors determining the overall amount of weight gain during pregnancy, including household income as one of the key components. For instance, other studies conducted on the effect of socio-economic factors on GWG show that, compared to women with higher incomes, women with lower incomes gained more than the recommended weight in the US populations (Olson & Strawderman, 2003). Another study conducted by Kowal, Kuk and Tamim (2012) among Canadian women reported that more than half of overweight and obese pregnant women with lower household income were more likely to exceed the GWG recommendations. In addition, previous research performed in New York found that women with family incomes lower than the federal poverty line were 2.6 times more likely to exceed the upper limit of the IOM gestational weight gain recommendation than women with higher incomes. This indicates a significant association between low income and large food intakes among pregnant women, which is attributable to the fact that low household income did not significantly impact pregnant women's food consumption throughout pregnancy. (Olson & Strawderman, 2003).

A recent study by Reis, Maia de Sousa, Oliveira, Maioli, and Dos Santos (2019) found that socioeconomic and dietary factors are associated with excessive GWG. They reported that there was a greater prevalence of excessive GWG between mothers with higher per capita income, cesarean delivery, lower limb edema, and pre-pregnancy excess weight. Another study conducted

by Lindberg et al., (2016) indicates that even after adjusting for race, pre-pregnancy BMI, and other confounding factors, both individual and neighborhood economic indicators independently predicted weight gain. However, findings in this study are contrary to other previous studies which in particular, low socioeconomic status has increased the risk of inadequate weight gain, while high socioeconomic status has increased the risk of excess weight gain. Nonetheless, previous studies have reported the relation between socioeconomic status and gestational weight gain was inconsistent.

2.2.4 Parity

Parity is defined as the number of times pregnant women have given birth to a fetus with a gestational age of 24 weeks or more, regardless of whether the child was born alive or was stillborn. Based on a retrospective observational cohort study of 27,771 women with their first and second births in North Carolina's Pregnancy Nutrition Surveillance System, the findings from this study reported that the pattern of GWG is consistent with other evidence that for the first baby, women gain more weight and with each subsequent pregnancy, pregnant women gain less (Chin et al., 2010). In addition, among other things to consider, most previous research investigating gestational weight gain predictors was limited to singleton pregnancies. A new finding in this research conducted by Lindberg et al. (2016), they suggested that women carrying a single fetus were more likely to gain excess weight, but less likely to gain inadequate weight than those carrying twins. Nevertheless, the high risk of insufficient weight gain among twin pregnancies is noteworthy given that shorter gestations and lower twin birth weights have been associated with insufficient weight gain (National Research Council, 2010).

The most recent systematic review on association between parity and gestational weight gain was carried out by Hill et al. (2017) and 34 past studies were profiled in their study. There were significant inconsistencies reported in their results. Based on their systematic review and meta-analyses study, 14 studies found that primiparous women were more likely to gain weight and experience excessive GWG than multiparous women. For instance, a prospective study on Australian adult women of childbearing age reported that women with higher pre pregnancy BMI and who previously had one child was substantially more likely to exceed the GWG guidelines (Hill, Skouteris, McCabe, & Fuller-Tyszkiewicz, 2013). Another data was analyzed from a national cohort study of 822 primiparous and 2055 multiparous American woman who participating Infant Feeding Practices Study II (2005-2007) and in their findings they reported that primiparous women gained more weight and that the risk of excessive GWG occurring is greater compared to their multiparous counterparts (Lan-Pidhainy, Nohr, & Rasmussen, 2013).

On the other hand, 10 studies found that multiparous women had a higher risk of excessive gestational weight gain. However, this is contrary to a study conducted in Canada which conversely, being an immigrant, multiparous, and having health issues during pregnancy has been linked with lower weight gain during pregnancy as well as higher chances of gaining insufficient weight to reach the minimum weight gain guideline (Kowal, Kuk, & Tamim, 2012). Nevertheless, nine additional studies from the systematic review have found no significant relation between parity and GWG, and two further studies have used a nulliparous study. To date, literature examining the independent parity effect on GWG focuses primarily on secondary effects analysis and parity as a covariate. Parity therefore plays a critical role in promoting a healthy weight of pregnancy, achieving sufficient and healthy GWG and henceforth hindering obesity in these women and their offspring.

2.3 Association of Pre-Pregnancy BMI and Gestational Weight Gain

A recent study conducted by Suliga et al. (2018) found that pre-pregnancy BMI, smoking and parity were the factors linked to insufficient GWG. Being pre-pregnancy underweight was associated with gaining too little weight compared to the recommendation of gestational weight gain. It is widely stressed that being underweight at the time of pregnancy results in a higher risk of inadequate GWG, whereas being overweight and/or obese is associated with a higher risk of excessive weight gain (Bärebring et al., 2016). In addition, Fontaine, Hellerstedt, Dayman, Wall, and Sherwood (2012) showed that 33 to 50% of women with a healthy weight and 50 to 75% who are overweight and obese have excessive GWG. This means that more than half of overweight and obese women are at risk of getting excessive GWG compared to women with normal weight. In fact, Heerman, Bian, Shintani and Barkin (2014) found that there is an excessive GWG happened in 55.0% of mothers who were overweight before pregnancy, in 43.7% of those who were obese, and only in 37.5% of mothers who were underweight prior to pregnancy. Based on a study conducted by Akgun, Keskin, Ustuner, Pekcan, & Avsar (2017), they found that women who were obese or overweight before pregnancy were considerably more likely to exceed the recommendations for weight gain.

A recent review of the literature found that the strongest indicator of excessive GWG was the BMI of a woman at the time of conception. A research of 4619 postpartum women in Arkansas, United States, looked at the associations between excessive GWG and age, race, parity, education, nutrition aid or government-subsidized medical care and prenatal care. The study documented that the strongest predictor of gestational weight gain was pre-pregnancy BMI, and women who were overweight or obese prior to pregnancy were far more likely to surpass the guideline weight gain (Krukowski, Bursac, McGehee & West, 2013). The association of early pregnancy BMI with

excessive GWG was supported by findings from an Australian prospective multicenter cohort study in 1950 nulliparous women. These researchers found that women who were overweight were 3 times more likely to surpass the recommended levels of weight gain whereas obese women were 2.5 times as likely (Chung et al., 2013). Intriguingly, obese women had an absolute weight gain in this study that was 2 kg lower than women in other BMI categories, but they were also more likely to surpass the recommended gestational weight gain due to stricter weight gain guidelines (Restall et al., 2014). The health implications are very crucial to mothers and infant born because the increased risk of getting fetal complications related to childbirth and macrosomia and a higher long-term probability of being overweight or obese after delivery were associated with baseline overweight level combined with mothers who have excessive GWG (Mamun et al., 2010).

However, this is contrary to other studies reported that GWG is generally inversely proportional to maternal BMI on the basis of epidemiological studies. For instance, Voigt et al. (2007) recorded that overall, relatively short and heavy women had lower GWGs than tall and thin women in a study of over 2.3 million deliveries in Germany from 1995-2000. Chu et al. (2009) reported that overall, with increasing BMI, GWG decreased. They discovered that obese women gained less weight during pregnancy than healthy or overweight women when they were stratified by BMI; yet about one-fourth of obese women still gained 35 pounds or more. Nonetheless, research led by Moore Simas et al. (2012) has shown that managing weight gain during pregnancy is of great significance for reducing the risk of SGA and LGA, regardless of the pre-pregnancy body mass index. Therefore, to ensure regular birth weights for newborns as well as the mother's health, paying attention to pre-pregnancy BMIs and GWGs is of great importance.

2.4 Overview of Cultural Beliefs

There is no ultimate definition of culture, nor is there a consensus among experts as to what the concept should contain exactly. However, prior research reported that there are two aspects of a culture: the recognized meanings and directions to which its members are trained; the new observations and meanings offered and tested (Miraglia, Law, & Collins, 1996). In their study, they also found that the principal component of the culture of a society consists of the values and belief systems that become characteristic of that society. Belief/value systems overlap too often with other cultural systems components, mostly because beliefs and values are so common in culture. The systems of belief consist of stories or myths, which can provide people with the insights into how they should feel, think and behave. Any system of belief in which the interpretation of stories may affect people's behavior. Meanwhile value systems differ people from false feelings, thoughts and behavior. Generally, a value is identified as something that one favors over something else. In addition, according to Carpenter and Dunung (2013), they stated that culture is a community of people's beliefs, values, behaviors and practices. It encompasses the patterns of behavior and expectations of a certain group — the rules, the assumptions, the perceptions and the logic of a group. However, based on a study conducted by Floyd (2011), he discovered that culture is taught and acquired through interpersonal interactions with one's surrounding area, such as family and societal context. Furthermore, learned cultural practices are linked to health since culture has a considerable influence on lifestyle, which can affect health (Napier et al. 2014). The practice of food restriction is one of the typical cultural norms that can have an impact on health during the perinatal period. (Swasono, 1998).

2.5 Pregnant Women Knowledge on Nutrition

Knowledge on nutrition is also one of the crucial factors during pregnancy because good nutrition towards healthy diet is critical to one's health and well-being and this is especially true when women are expecting a child (Bookari, 2017). This is because healthy diet affects not only mothers' health, but also the health and development of their unborn babies, as well as the health of their children as adults later on. Besides, according to Zalilah et al. (2008); Mugyia et al. (2016), they also revealed that knowledge on nutrition is a vital element to ensure positive pregnancy outcome. This is because having nutritional knowledge during pregnancy is necessary to ensure optimal gestational weight gain and reduces complications (Lim et al., 2018). Lack of nutritional knowledge and awareness of the effects of malnutrition in pregnant women can lead to a lot of food indiscretion, which can lead to energy deficit or excess, as well as an abnormal pregnancy course (Kozłowska-Wojciechowska & Wujec, 2002).

Next, misperception and knowledge gaps for pregnant women or maternity caregivers may be other reasons why many women especially those who start pregnancy with overweight or obese, find it difficult to control their GWG within the recommended limits (Herring et al., 2010). On the other side, a popular myth in pregnancy that can have the opposite impact for pregnant mothers is “eating for two” phrases and this has been mentioned in the Philippine and Italian journals (Guggino et al., 2016; Reotutar & Bermio, 2017). Gestational diabetes mellitus, gestational hypertension, pre-eclampsia, large gestational aged babies and childhood obesity are found to be associated with maternal obesity and increased weight gain during pregnancy that could arise from this specific myth (Gaillard et al., 2013). In fact, according to Kraschnewski and Chuang (2014), they stated that many women think pregnancy means "eating for two," therefore pregnant women

almost double their caloric intake as a result. Due to this belief, pregnant women are at high risk of getting excessive GWG.

Other than that, these misbeliefs and misperceptions are varied across different countries. In India, Parmar, Khanpara, and Kartha (2013) recorded that 31.7% of respondents thought that consuming saffron resulted in a child's skin being fairer. While saffron has a beneficial medicinal effect of its own, exposure to very high doses of saffron due to its uterotonic properties can increase the risk of miscarriage (Bostan, Mehri, & Hosseinzadeh, 2017). In addition, some fruits and vegetables are also considered bad for consumption during pregnancy. For instance, several studies in India and Malaysia documented that the fruits and vegetables believed to cause miscarriages include papaya, jackfruit, bitter gourd and pineapple (Mohamad & Ling, 2016; Parmar, Khanpara, & Kartha, 2013; Gogoi, 2016). Meanwhile in Italy, sugar is perceived to be the remedy for dizziness and fatigue during pregnancy (Guggino et al., 2016). Besides, another study conducted among pregnant women in Egypt shows that pregnant women in this study had misinformation about the adverse effects of these taboo foods as they perceive food such as junk food can cause miscarriage, salty foods can cause allergies, burning of the chest, form salty stones in the body and acidic or spicy foods can cause hemorrhoids or constipation. These cultural beliefs that they hold tightly might be due to the lack of awareness and knowledge on nutrition and the actual healthy eating lifestyles. Hence, this pregnant women's knowledge on maternal diet should be addressed for a better health status.

2.6 Pregnant Women Attitudes on Gestational Weight Gain

Weight gain in pregnancy occurs within a complex social environment and is affected by intrapersonal, interpersonal, social, structural, and environmental factors. Gutierrez (1999)

discovered that those who had lost their typical pregnancy-related cultural norms had more unfavorable attitudes toward weight gain, according to a qualitative analysis of 46 Mexican teenagers. In addition, another recent study reported that most women did not consider guidelines for weight gain to be relevant. This is because the majority of the women in this survey stated that having a healthy baby and a good pregnancy were their top priorities, but that having a healthy baby had nothing to do with weight gain during pregnancy or following weight gain guidelines. (Tovar, Chasan-Taber, Bermudez, Hyatt, & Must, 2010).

Apart from that, higher pre-pregnancy BMI and GWG have been linked to unfavorable body image attitudes among pregnant women in previous studies (Roomruangwong et al., 2017; Skouteris et al., 2018; Shloim et al., 2019). Higher BMI before pregnancy desire a smaller body post pregnancy, which is considered to be negative attitudes (Shloim et al., 2019). This is because during pregnancy, GWG was associated with greater body dissatisfaction (Roomruangwong et al., 2017), thus they were having the negative idea about their appearance during pregnancy. In fact, another study by Heery et al. (2016) concluded that excess GWG has also been linked to negative attitudes, such as an increased fear for weight gain.

2.7 Cultural Beliefs and Perceptions among Pregnant Women

Pregnancy weight gain is likely to be influenced by personal, family and cultural views and attitudes regarding weight and its association to health and disease in women, particularly minorities (Thornton et al., 2006; Gutierrez, 1999; Kieffer, Willis, Arellano, & Guzman, 2002). A study conducted that related to cultural beliefs and perceptions and gestational weight gain among the pregnant women in Egypt reported that the women agree that to achieve a healthy pregnancy, they should practice a diet low in carbohydrates and high in proteins, essential vitamins and

minerals (Kavle et al., 2014). This is due to their belief that carbohydrates, as a food group have been seen as not beneficial for pregnancy and were considered to cause bloating and excessive weight gain for the mother. Whereas women in Southwest Nigeria consumed herbal concoctions to have ease of delivery and smaller babies (Okafor, Sekoni, Ezeiru, Ugboaja, & Inem, 2014).

Other than that, practices of food taboos are also one of the common issues in cultural belief. In fact, according to Mohamad and Ling (2016) they reported that the correlation between food taboos and the rate of weekly weight gain among pregnant women is significant. Apparently, for those who practice food taboo, the percentages of not gaining the recommended weekly weight gain were considerably higher than those who did not adhere to the practice. This result is almost identical to a study in Nigeria which found that almost three-quarters of pregnant women did not gain enough to achieve the recommended weekly weight gain due to traditional beliefs of avoiding food during pregnancy.

2.8 Conclusion

In summary, sociodemographic, pre-pregnancy BMI, knowledge on nutrition, attitude on GWG and cultural beliefs (food taboos) practice might be the factors that associated with gestational weight gain among Malay pregnant women in Malaysia. However, there are mixed findings and limited studies specifically reported on these factors and its association with GWG. Therefore, this study will focus on these factors to determine the relationship with GWG among pregnant women in Malaysia.

CHAPTER 3

METHODOLOGY

3.1 Study Design

This was a descriptive cross-sectional study aimed to determine the association of sociodemographic characteristics, anthropometric measurement, knowledge on nutrition, attitude on gestational weight gain, cultural beliefs (food taboos) practice with gestational weight gain among Malay pregnant women in Malaysia.

3.2 Study Location

This present study was conducted online aimed on all regions in Malaysia which consisted of 14 states all over Malaysia. The purpose of these all states from Malaysia was chosen is because it may represent a whole society with various differences in terms of their socio-economic status, lifestyles, beliefs and understandings in life. In addition, due to the enforcement of MCO, there was no physical data collection disclosed in this study as this study was conducted online using 'GoogleForm' platform.

3.3 Study Population

The respondents for this study were Malay pregnant women from all regions in Malaysia. Promotion of the research was blasted online through all social media platforms such as pregnant mother's groups in Facebook, promotion of the respondents' recruitment through Twitter, Instagram, Whatsapp groups and others. After that, all the respondents were filtered based on the inclusion and exclusion criteria as stated in Table 3.1.

Table 3.1: Inclusion and exclusion criteria for the selection of respondents

Inclusion criteria	Exclusion criteria
<ul style="list-style-type: none">• Malay pregnant women• Pregnant women age 18-45 years old• Singleton pregnancy• Gestational age at 38-40 weeks• Signed the consent form	<ul style="list-style-type: none">• Physical or mental handicapped• Pregnancy with cognitive disorder• Pregnancy with medical conditions or chronic diseases (e.g; gestational diabetes mellitus and pre-eclampsia) or chronic diseases (e.g. heart disease, renal disease and diabetes mellitus)

3.4 Sample Size Determination

Study sample size was estimated by calculation based on the Prevalence Study (Lwanga & Lemeshow, 1991) formula as shown in Table 3.2.

Prevalence Study Formula:

$$n = z_{1-\alpha/2}^2 P(1 - P)/d^2$$

Where

n = sample size

$Z_{1-\alpha/2}$ = z score at 1- $\alpha/2$ confidence level

P = expected prevalence or proportion (in proportion of one; if 20%, P = 0.2)

d = precision (in proportion of one; if 5%, d = 0.05)

Table 3.2: Sample size calculation based on the previous studies.

Independent variables	P value	r value	Sample size, n
The prevalence of excessive gestational weight gain among pregnant women (Chee, Si & Siew, 2019)	P = 0.533		$n = z_{1-\alpha/2}^2 P(1-P)/d^2$ $= (1.96)^2 (0.533)(1-0.533)/(0.1)^2$ $= 95.6$ $= 96$

The highest number of sample size was selected as the sample size of this study, which was 96 respondents based on Table 3.2. As shown in Table 3.3, the additional adjustment was done in computing the required sample size.

Table 3.3: Additional adjustment in computing the sample size.

Criteria	Adjustment	Sample size, n
Adjust for the expected proportion response rate	Response rate = .80 therefore $n = 96 / .80$	120
Adjust for the expected proportion eligible	% Eligible = .90 therefore $n = 120 / .90$	133

After consideration of the design effect and response rate, the final sample size required for this study was **133 respondents**.

3.5 Sampling Design

The sampling design for this study was purposive sampling. As this study was conducted online and focused on total gestational weight gain, the researcher purposely selected Malay pregnant women from all social media platforms who were at their 38-40 weeks of gestation. Respondents who did not meet the inclusion and exclusion criteria were excluded. In addition, to facilitate the screening of respondents, at the beginning of the questionnaires, it was highlighted that this study only chose pregnant women at 38, 39 and 40 weeks of gestation only. Respondents who are at <38 weeks of gestation were excluded from the study.

3.6 Study Instruments

Respondents' data were obtained through an online survey using the Google Form. The respondents of this study were required to respond to a self-administered bilingual English-Malay version of the survey on socio-demographic characteristics, anthropometric measurements, knowledge on nutrition, attitude on gestational weight gain and cultural beliefs (food taboos) practice towards maternal diet during pregnancy.

Socio-demographic Characteristics

The first section of the questionnaire was to assess socio-demographic characteristics of the respondents. This section consists of 8 questions that require respondents to provide data on their state of living, age, gestational week at interview, parity, marital status, education level, employment status and household income per month. This section was a self-reported questionnaire and data from this section provided a clearer understanding of certain background characteristics of the respondents.

Anthropometric Measurement

The second section of the questionnaire required data on pre-pregnancy weight, height and current gestational weight of the respondents. These data were collected in order to perform calculations on the pre pregnancy BMI as well as total gestational weight gain experienced by the respondents. Respondents were requested to do self-recall on their pre-pregnancy body weight and height (current pregnancy). Pre-pregnancy BMI (kg/m^2) was calculated by the researcher using a formula; pre-pregnancy weight in kilograms divided by height in square meters, and then was categorized using World Health Organization (WHO)'s cut-off points respectively: Underweight ($< 18.5 \text{ kg}/\text{m}^2$), normal weight ($18.5\text{--}22.9 \text{ kg}/\text{m}^2$), overweight ($23.0\text{--}24.9 \text{ kg}/\text{m}^2$), and obese ($\geq 25.0 \text{ kg}/\text{m}^2$). As for current gestational weight, pregnant women were needed to self-report their current gestational weight (current pregnancy). Total gestational weight gain was calculated and estimated by the researcher by subtracting the pre-pregnancy weight from the last-measured weight before delivery. Based on the pre-pregnancy BMI, total GWG was classified as gaining below (inadequate GWG), within (adequate GWG), or above (excessive GWG) the recommendation of Institute of Medicine (2009) by the researcher. According to the IOM guidelines, which use the World Health Organization (WHO) BMI categories, the optimal GWG is 12.5–18 kg, 11.5–16 kg, 7–11.5 kg, and 5–9 kg for underweight, normal weight, overweight, and obese women, respectively, during pre-pregnancy.

Knowledge on Nutrition

The third section of the self-administered questionnaires consisted of 21 questions that evaluated pregnant women's knowledge about nutrition during pregnancy. These questions are adopted from Technical Working Group on Research (TWG-R) and are comprised of 5 components which are nutrient function, energy of food, nutrient insufficiency, food selection and supplies of nutrients. The answers for this section were assessed using a multiple-choice answer. A score of 1 was given for the correct answer and 0 for the wrong answer. After all knowledge related questions had been answered and analyzed, respondents were scored on a scale ranging from 0 to 15. The knowledge scores were categorized as good ($\geq 75\%$), moderate (51% to 74%) and poor ($\leq 50\%$) as suggested by the Technical Working Group on Research Ministry of Health, Malaysia (Norimah et al., 2008). This questionnaire has been tested for validity and reliability with Cronbach α knowledge = 0.819.

Attitudes on Gestational Weight Gain

The Pregnancy Weight Gain and Attitude Scale (PWGAS) was used to evaluate pregnant women's attitudes towards weight gain, physical appearance, and self-esteem. Questions from this instrument helped to determine how these attitudes may affect actual weight gain during pregnancy (Palmer, Jennings, & Massey, 1985). PWGAS consisted of 18 items with 15 questions related to weight and three questions related to behavior (DiPietro, Millet, Costigan, Gurewitsch & Caulfield, 2003). Each response from respondents was rated on a four-point Likert Scale items from "Strongly Disagree" to "Strongly Agree". For each positive statement, a maximum of 4 points was awarded for the "strongly agree" answer, while inverse scoring was performed for negative statements. Then, total respondents' points were calculated and average score was calculated for each respondent based on all of the items in the scale; with an average score of three or greater indicating a positive attitude during pregnancy and less than three scores indicating a

negative attitude. The scale had moderate reliability using the split-half reliability method ($r=0.67$). Another study conducted using this instrument showed similar internal consistency reliability ($r=0.663-0.824$) over the course of pregnancy as well as good test-retest reliability ($\alpha=0.657-0.788$).

Cultural Beliefs (food taboos) Practice

The last section of the self-administered questionnaires consisted of 10 questions (Appendix D) in which the respondents were asked questions about their cultural beliefs, perceptions and food taboos on maternal diet during pregnancy. All the questions were adapted from previous studies who studied on food taboos and cultural beliefs among Malay pregnant women during pregnancy and postpartum period (Mohamad & Ling, 2016; Ghani & Salehudin, 2018). There were two types of answers for this section which was by using a dichotomous response of 'Yes' or 'No and open-ended answer. Open ended answers were needed in order to provide a broad spectrum of answers on the reasons for certain cultural beliefs and food taboos that being practiced and avoided by respondents.

3.7 Pre-test

Prior to the actual data collection, the pre-test was conducted on 10 pregnant women who met the inclusion and exclusion criteria. These pregnant women were selected to perform the pre-testing on the prepared sets of questionnaires. After they have done answering all the questions, these 10 pregnant women were excluded from the study sample. The pre-test was carried out in order to check the face validity of the instrument, estimate the time needed for respondents to complete the questionnaire and determine the questionnaire's suitability. The clarity of instructions and understanding of questions from the survey was assessed also. After the pre-test, the problems

experienced by the pre-test respondents in answering the questionnaire were evaluated and modified on the basis of their comments and suggestions.

3.8 Data Collection Procedure

Prior to data collection, ethical approval was obtained from the Ethics Committee for Research Involving Human Subjects in Universiti Putra Malaysia (JKEUPM). The proposed time frame for the data collection for this study was from February to April 2021. Due to the enforcement of PKPB (Perintah Kawalan Pergerakan Bersyarat) and other related policies, constraints and unforeseen challenges, students were not encouraged to do physical data collection at the government health clinics. This was confirmed after contacting Jabatan Kesihatan Negeri Selangor, they did not recommend students to do research in high-risk places such as government health clinics (Klinik Kesihatan) in the meantime in order to reduce the risk of infection. Hence, online self-structured questionnaires were conducted through online platforms such as google form.

Self-structured questionnaires. The promotion of the research was blasted online through all social media platforms such as pregnant mother groups in Facebook, promotion of the respondents' recruitment through Twitter, Instagram, Whatsapp groups and others. All pregnant women who met the inclusion criteria (Malay, aged 18 to 45 years, singleton pregnancy, gestational week at 38-40 weeks, without the history of chronic complications) were invited to participate in an on-line Google Form survey. A total of at least 133 number of pregnant women were recruited to fulfill the study's sample size and a consent form was obtained from all pregnant women who agreed to participate in the study. A self-structured questionnaire was used to obtain respondents'

information on sociodemographic background, anthropometry measurement, knowledge on nutrition, attitude on gestational weight gain and cultural beliefs (food taboos) practice towards maternal diet during pregnancy. At the end of the self-structured-questionnaires after they had completed all the questions, respondents were sent to the screen, thanking them for their involvement in this study and they were informed that their participation in this study could qualify them to participate in the lucky draw. Several respondents were randomly selected to win the lucky draw and they were notified via email to claim the prize from the researcher. The estimated time for respondents to answer all the questions is within 10-15 minutes.

3.9 Data Analysis

Data from the self-structured questionnaires was analyzed using IBM SPSS Statistics 26.0 (IBM Corp., Armonk, NY). Descriptive analysis such as frequencies and percentages were presented for the categorical variables (sociodemographic, knowledge on nutrition, attitude on gestational weight gain, cultural beliefs (food taboos) practice and gestational weight gain status), meanwhile continuous variables (anthropometric measurement) were presented in the form of mean and standard deviation. Chi-square Independence test was used to evaluate any correlation between categorical variables (e.g. education level and gestational weight gain status). Meanwhile, Pearson Product-Moment Correlation or Spearman's Rank Correlation was used to determine the association between two continuous variables (e.g. pre-pregnancy BMI and total gestational weight gain). The significance level was set at $p < 0.05$.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Sociodemographic Factors

Table 4.1 shows the sociodemographic background of the respondents involved in the study. Among 100 pregnant women who participated in the current study, most of them were from Central Region (57%) which consisted of Selangor (41%), followed by Kuala Lumpur (12%) and Negeri Sembilan (4%). Meanwhile, Southern Region contributed to the 19% of respondents which are states of Johor (13%) and Melaka (6%). This is followed by Northern Region (14%) which are Perak (9%), Kedah (4%) and Perlis (1%). Most of the respondents were in the age group under 35 years old (85%) and the mean age of the respondents was 29.95 ± 4.76 years. Majority of them were in their 38 weeks of gestation (63.0%) while 16.0% of them were in 39 weeks of gestation, 21.0% were in 40 weeks of gestation and the mean gestational age of the participants was 1.58 ± 0.82 weeks. Most of the respondents had one child (43.0%), while 29% were pregnant for the first time and 28% had two and more children with the mean parity of 1.12 ± 1.03 . In addition, majority of the participants were married (100%). About 86.0% of the respondents had attained their tertiary education and the remaining 14.0% had only attained secondary school. Next, more than half of the respondents were employed (68.0%). According to Household Income and Basic Amenities Survey Report, Department of Statistics (2019), 61.0% of respondents had monthly household income less than RM4,850 which lied under the category of B40 followed by 6.0% of respondents had monthly household income between RM4,850 and RM 10,959 which lied under the category of M40 and 33.0% of the respondents were classified as T20 with monthly household income more than RM 10,959.

Table 4.1: Distribution of respondents by sociodemographic background (n=100)

Characteristics	n (%)	Mean \pm SD
States		
Northern Region	14 (14.0)	
East Coast Region	8 (8.0)	
Central Region	57 (57.0)	
Southern Region	19 (19.0)	
East Malaysia	2 (2.0)	
Age (year)		
		29.95 \pm 4.76
18-35	85 (85.0)	
>35	15 (15.0)	
Gestational age (week)		
		38.58 \pm 0.82
38 weeks	63 (63.0)	
39 weeks	16 (16.0)	
40 weeks	21 (21.0)	
Parity		
		1.27 \pm 1.16
0	29 (29.0)	
1	43 (43.0)	
≥ 2	28 (28.0)	
Education level		
Secondary	14 (14.0)	
Tertiary (STPM/ Diploma/ Degree/ Master/ Phd)	86 (86.0)	
Employment status		
Unemployed	32 (32.0)	
Employed (Full time/ Part time/ Self-employed)	68 (68.0)	
Household income		
Less than RM4,850	61 (61.0)	
RM4,850 - RM 10,959	6 (6.0)	
More than RM 10,959	33 (33.0)	

4.2 Anthropometric Measurements

Anthropometric measurements of participants were tabulated in Table 4.2. The mean of respondents weight and height before pregnant were 57.83 ± 11.78 kg and 1.56 ± 0.06 m respectively. The mean BMI of the respondents was 23.88 ± 5.09 kg/m² which fall under the overweight category. The data demonstrated that a total of 38% of the respondents were classified as having overweight and obese BMI classification, while 13% of them were classified as underweight. This shows that half of the respondents in this study had abnormal pre-pregnancy BMI and the prevalence of being overweight and obese before pregnancy is higher compared to being underweight among Malay pregnant women in Malaysia. This finding was paralleled with a recent study in Seremban, Negeri Sembilan which indicated that 43.5% of pregnant women in Seremban had overweight and obese pre-pregnancy BMI, while only 10.6% of them were underweight (Yong et al., 2021). Furthermore, another study conducted by Yong et al. (2016) also observed that among pregnant women in Selangor and Negeri Sembilan, 35.7% had overweight and obese pre-pregnancy BMI while 12.2% had underweight BMI. Malaysia has been encountering an increased prevalence of overweight and obesity that threatens the health of Malaysians (Lee & Muda, 2019). According to National Health Morbidity Survey (NHMS) in 2019, an increasing trend of overweight and obesity among Malaysians adult aged 18 years and above was observed where they demonstrated that one in two adults in Malaysia were overweight and obese. It is reported that obesity is more prevalent among women than men that will subsequently contribute to maternal obesity. In fact, according to NHMS (2019), they also demonstrated that the prevalence of maternal obesity was increasing to 14.6% with the highest rates among those from Malays ethnic. The high proportion of adult women with obesity issue may explain the greater prevalence of maternal obesity among pregnant women.

Next, respondents' mean of weight and height at 38-40 weeks of gestation were 68.64 ± 12.44 kg and 1.56 ± 0.06 m respectively. The mean of the total gestational weight gain by the respondents were 10.94 ± 5.29 kg. Most of the respondents were classified as having inadequate gestational weight gain (44%), followed by excessive gestational weight gain (29%) and only 27% achieved adequate gestational weight gain. The data (refer Table 4.2) shows that more than half of the participants reported not achieving the Institute of Medicine (IOM, 2009) recommendation during their pregnancy. Highest proportion of inadequate GWG was reported followed by excessive GWG. This finding was aligned with a study assessing the prevalence of gestational weight gain among pregnant women in Kelantan where they found that high proportion of inadequate GWG (54.5%) was reported among pregnant women in Kelantan (Farhana, Rohana & Alina, 2015). However, this contradicts a study by Chee et al. (2019) where they reported that the prevalence of excessive GWG (53.3%) among pregnant women in Batu Pahat, Johor is higher than inadequate GWG. Nonetheless, the data from our study showed that there is high prevalence of inadequate GWG among pregnant women despite the high prevalence of obesity issue on respondents pre-pregnancy BMI. This might be due to that obese pregnant women are afraid to gain more weight during pregnancy because pregnancy is a time when women are more prone to reconsider their body image and attitudes, thus they gained inadequately. In fact, dissatisfaction with one's body image during pregnancy has been linked to unhealthy eating habits such as intermittent fasting, which may lead to insufficient GWG (Vartanian & Porter, 2016).

Table 4.2: Distribution of respondents by anthropometric measurements (n=100)

Variables	n (%)	Mean ± SD
Pre-pregnancy weight (kg)		57.83 ± 11.78
Pre-pregnancy height (m)		1.56 ± 0.06
BMI (kg/m²) before pregnant		23.88 ± 5.09
Underweight (< 18.5 kg/m ²),	13 (13.0)	
Normal Weight (18.5–22.9 kg/m ²)	49 (49.0)	
Overweight (23.0–24.9 kg/m ²)	28 (28.0)	
Obese (≥25.0 kg/m ²)	10 (10.0)	
Weight at 38-40 weeks (kg)		68.64 ± 12.44
Height at 38-40 weeks (m)		1.56 ± 0.06
Total gestational weight gain (kg)		10.94 ± 5.29
Inadequate GWG	44 (44.0)	
Adequate GWG	27 (27.0)	
Excessive GWG	29 (29.0)	

BMI – Body Mass Index; GWG – Gestational Weight Gain

4.3 Knowledge on Nutrition during Pregnancy

Based on Table 4.3(a), the overall mean score of nutrition knowledge among respondents is 78.0 ± 9.05 . Knowledge on nutrition level among respondents were divided into three levels which is poor, moderate and good. Majority of the respondents were reported to have good nutrition knowledge (78.0%), meanwhile 20% of them had moderate and only 2% had poor nutrition knowledge. This finding is similar to a study conducted by Lim et al. (2018) which they found out more than half (63.6%) of the pregnant women had good nutritional knowledge score during their pregnancy. However, contradicted with Appiah et al. (2021) which reported that less than half (44.9%) of the pregnant women had high nutritional knowledge during pregnancy. Nevertheless, majority of respondents in our study was highly educated women with tertiary

educational level. Highly educated women are more concerned and aware about health (Smith-Greenaway, 2013) such as the awareness of healthy eating behaviour that may lead to better knowledge of nutrition and overall health.

Table 4.3(a) : The overall mean score of nutrition knowledge among respondents

Variables	n (%)	Mean ± SD
Knowledge on Nutrition Score		78.0 ± 9.05
Poor	2 (2.0)	
Moderate	20 (20.0)	
Good	78 (78.0)	

From the responses in Table 4.3(b), there are 21 nutrition questions that were asked and the distribution of subjects' responses on knowledge towards nutrition during pregnancy were tabulated in the table. For knowledge on the food pyramid, almost all respondents (99%) answered they know about food pyramid. In addition, all respondents (100%) reported to answer correctly that obesity will increase risk to heart disease and the risk of eating foods high in sugar is diabetes mellitus. Moreover, for questions regarding on ways in preparing food that will increase the fat content is frying, majority of the respondents (97%) answered correctly for this question. However, for the last question which respondents were asked to arrange the following foods according to their cholesterol content, only 2% of the subjects answered correctly, meanwhile the remaining 98% of the respondents didn't know about cholesterol content of the following foods. Besides, more than half of the respondents (82%) didn't know that the nutrient that provides us with the most energy (calories) is fat. Other than that, for question that asked which food that we can eat the most based on the food pyramid, only few of the respondents (23%) answered it correctly that food such as rice, other cereals and tuber should be consumed the most while majority of them (77%) answered it wrongly.

Table 4.3(b) : Distribution of subjects' responses on knowledge towards nutrition during pregnancy (n=100)

Statements	Number of subjects with correct answers n (%)
1. In the list below, the food with highest content of protein is fish.	93 (93)
2. Among the food listed below, food has the highest content of fiber are vegetables and beans.	90 (90)
3. The food that are rich in vitamin, mineral and fiber are vegetables and fruits.	82 (82)
4. Foods listed below contains the highest amount of cholesterol is coconut milk.	35 (35)
5. The food with a lot of salt is soya sauce.	86 (86)
6. A balance diet has the following nutrients which are carbohydrate, fat, protein and mineral.	92 (92)
7. Do you know about food pyramid.	99 (99)
8. According to the food pyramid, the food you know are advised to take the least is fat, oil and sugar.	91 (91)
9. According to the food pyramid, the food that you can eat the most is rice, other cereals and tuber.	23 (23)
10. The nutrient which will helps to build our body is protein.	82 (82)
11. You can get all the required nutrient by eating a variety of food.	93 (93)
12. The nutrient that provides us with the most energy (calories) is fat.	18 (18)
13. In the list below, the food with highest carbohydrate contents is bread.	91 (91)
14. Body mass index is an indicator for body weight status.	87 (87)
15. Aerobic exercise (e.g; jogging, cycling, aerobic dance, fast walking and swimming) are importance for a healthy heart.	92 (92)

Table 4.3(b) : Distribution of subjects' responses on knowledge towards nutrition during pregnancy (n=100) (Continue)

Statements	Number of subjects with
	correct answers n (%)
16. Over consumption of energy (calories) can lead to obesity.	95 (95)
17. In order to avoid obesity and maintain desirable body weight, we have to balance our food intake with physical activities.	90 (90)
18. One of the ways in preparing food that will increase the fat content is frying.	97 (97)
19. Obesity will increase risk to the following disease such as heart disease.	100 (100)
20. The risk of consuming food with excessive sugar is diabetes mellitus.	100 (100)
21. Arrange the following foods according to their cholesterol content by choosing number No 1 is the highest cholesterol content and no 5 is the lowest cholesterol content.	2 (2)
Total	100

4.4 Attitude on Gestational Weight Gain during Pregnancy

Based on Table 4.4(a), the overall attitude on weight gain score among respondents is 2.52 ± 0.34 . In terms of attitude level on gestational weight gain, the subscale was divided into two levels which are negative and positive level. For attitude on gestational weight gain level, majority of the participants (91%) are reported to have negative level on their attitude towards gestational weight gain during pregnancy, meanwhile the remaining participants (9%) are shown to have positive attitude level towards gestational weight gain during pregnancy. This result was refuted with a report by Haakstad, Voldner and Bø (2015) which demonstrated that 76% of pregnant

women reported to be satisfied with their pregnancy weight gain while only 24% were dissatisfied. In addition, a study by Stevens-Simon et al. (1993) also reported the same where most of the pregnant women in their study (83.8%) had a positive attitude regarding pregnancy weight gain. This might be due to pregnancy is thought to be a special moment in women's lives when they are more likely to be encouraged to make lifestyle changes, such as reducing excessive weight. (Ronnberg & Nilsson, 2010). Hence, they would think that by having positive attitude towards weight gain, they could have good probability of succeeding in intervening themselves from experiencing poor GWG outcomes.

Table 4.4(a): Attitude on Gestational Weight Gain

Variables	n (%)	Mean ± SD
Attitude on Gestational Weight Gain Score		2.52 ± 0.34
Negative	91 (91.0)	
Positive	9 (9.0)	

Next, the distributions of respondents' responses are reported in Table 4.4(b). Only half of the subjects (52%) were proud of looking pregnant and also only half of the participants (49%) thought that pregnant woman is beautiful. This indicates that another half of the respondents did not find themselves beautiful and this is because women are more vulnerable to negative body image during the perinatal period especially living in an era where the use of social media is so widespread. Social media promotes the idea that a thin body is the most desired appearance and study has shown that negative social media pressure has been connected to body image issues in pregnant women (Grabe et al., 2008).

In addition, most of the respondents (63%) agreed that they worried that they may get fat during this pregnancy and this is supported by the responses from respondents reported that almost half of them (90%) agreed that women have to be especially careful about getting fat during

pregnancy. Women are influenced by the propaganda brought by social media about the “thin-deal” idea and as a result pregnant women are more prone to accept the idea that their worth is linked on appearance and they compare themselves to unrealistically slim targets (Rodgers, McLean, & Paxton, 2015; Te’eni-Harari & Eyal, 2015).

Furthermore, a total of the subjects (80%) reported that they agree that if they gain too much weight in one month, they tried to keep from gaining weight the next month, while only a total of 20% are against this statement. Throughout pregnancy and postpartum, since the early 1990s, celebrities have been increasingly featured by the media, with an emphasis usually placed upon how the celebrities’ pregnant body looks, how quickly a celebrity can shed their pregnancy weight and criticism of celebrities who take longer than 2 to 3 months to lose their pregnancy weight after giving birth (Cunningham, 2002; Gentile, 2011). Female media consumers may be negatively affected by these strict portrayals set by media and this makes them swayed by this idea and as a result it makes them afraid to gain weight at optimum level.

Table 4.4(b): Distribution of subjects' responses on attitude towards gestational weight gain during pregnancy (n=100)

Statements	1	2	3	4
	Strongly Disagree	Disagree	Agree	Strongly Agree
	n (%)			
I am proud of looking pregnant	2 (2)	16 (16)	52 (52)	30 (30)
I think a pregnant woman is beautiful	4 (4)	7 (7)	49 (49)	40 (40)
I like maternity clothes	4 (4)	21 (21)	43 (43)	32 (32)
I worry that I may get fat during this pregnancy	16 (16)	21 (21)	36 (36)	27 (27)
I feel that women have to be especially careful about getting fat during pregnancy	3 (3)	7 (7)	41 (41)	49 (49)
The weight I've gained during this pregnancy makes me feel unattractive	22 (22)	29 (29)	30 (30)	19 (19)
I'm embarrassed whenever the nurse weighs me	38 (38)	38 (38)	14 (14)	10 (10)
It bothers me that I can't wear what's in style while I'm pregnant	37 (37)	32 (32)	13 (13)	18 (18)
I am embarrassed at how big I have gotten during this pregnancy	37 (37)	38 (38)	14 (14)	11 (11)
I would gain 35 pounds (15.9 kg) if it meant my baby would be healthier	25 (25)	30 (30)	32 (32)	13 (13)
I would gain 40 pounds (18.0 kg) if it meant my baby would be healthier	30 (30)	35 (35)	23 (23)	12 (12)
As long as I'm eating a well-balanced diet, I don't care how much I gain	10 (10)	13 (13)	46 (46)	31 (31)
I like being able to gain weight for a change	19 (19)	36 (36)	33 (33)	12 (12)
I would like to gain between 21–30 pounds (9.5 kg – 13.6 kg) during this pregnancy	25 (25)	34 (34)	24 (24)	17 (17)

Table 4.4(b): Distribution of subjects' responses on attitude towards gestational weight gain during pregnancy (n=100) (Continue)

Statements	1	2	3	4
	Strongly Disagree	Disagree	Agree	Strongly Agree
	n (%)			
I would like to gain between 11–20 pounds (5.0 kg – 9.0 kg) during this pregnancy	23 (23)	32 (32)	28 (28)	17 (17)
If I gain too much weight in one month, I try to keep from gaining the next month	12 (12)	8 (8)	54 (54)	26 (26)
I tried to keep my weight down so I didn't look pregnant earlier on	55 (55)	30 (30)	8 (8)	7 (7)
Just before going to the doctor, I try not to eat	50 (50)	34 (34)	9 (9)	7 (7)

4.5 Types of cultural beliefs and food taboos

Table 4.5(a) briefly presents the types of cultural beliefs and food taboos among Malay pregnant women and the examples of food and its reasons for its avoidance will be described in detail in the next paragraph. Based on the table, more than half of the respondents (55%) reported to practice any food taboos during their pregnancy. Majority of the participants did not prohibit themselves from eating cold food (90%) and hot food (94%). However, half of the respondents (50%) reported that they prohibited themselves from eating pineapple, while the remaining 50% of subjects did not avoid it. From 100 respondents, 43 respondents (43%) avoided from eating sugarcane juice and 44 respondents (44%) also avoided from eating bamboo shoots during their pregnancy. In addition, almost three quarters (70%) of the respondents did avoid consuming carbonated drinks. In terms of food such as 'tapai' (fermented rice/cassava), half of the respondents

(54%) did prohibit themselves to eat during pregnancy. However, food such as soy sauce, was not avoided by most respondents (94%). In conclusion, majority of the respondents reported to avoid carbonated drinks (70%), tapai (54%) and pineapple (50%) during pregnancy. These findings were in agreement with a study conducted among Malay pregnant women in Riau, Indonesia which they reported the same findings where soda beverages, pineapple, “*tape*” (fermented cassava) alongside with local delicacies such as “*angek*” (cow's trotter/skin), “*cubodak*” (jackfruit), “*cipuik*” (snail), were reported to be among the common food that being avoided during pregnancy (Tobing, Afiyanti & Rachmawati, 2019). Another local study by Mohamad and Ling (2016) also demonstrated that pineapple, carbonated drink and tapai were among the most avoided food during pregnancy.

Table 4.5(a): Types of cultural beliefs and food taboos among Malay pregnant women.

Statements	Yes n (%)
1. Do you practice any food taboos during pregnancy?	55 (55)
2. Do you prohibit yourself from eating cold food?	10 (10)
3. Do you prohibit yourself from eating hot food?	6 (6)
4. Do you prohibit yourself from eating pineapple?	50 (50)
5. Do you prohibit yourself from eating sugarcane juice?	43 (43)
6. Do you prohibit yourself from drinking carbonated drinks?	70 (70)
7. Do you prohibit yourself from eating tapai?	54 (54)
8. Do you prohibit yourself from eating bamboo shoots?	44 (44)
9. Do you prohibit yourself from eating soy sauce?	6 (6)

Table 4.5(b) reported the reasons and examples of food given by the respondents regarding on certain foods that were avoided by them during pregnancy. The details answers and responses from respondents are attached in *Appendix E*. The respondents who voted yes believed that cold food should be avoided during pregnancy and the most common reasons for its avoidance are this kind of food may contain bacteria as it is a half-cooked food, can cause body aches or discomfort, may harm the mother and unborn baby' health and some respondents just didn't prefer this food. However, only a few respondents gave these reasons on avoidance (6%), while the remaining 94% were actually not avoiding any "cold food" during pregnancy. Among Asians, pregnancy is traditionally thought to be a "hot" state, requiring women to consume more "cool" foods to maintain the "hot-cold balance" in order to stay healthy (Nag, 1994). Some of the examples of cold food given by the respondents are such as ice, raw salmon, sushi and others. This finding was similar to a previous study where they also reported that 12.5% of the respondents avoided cold foods (Mohamad & Ling, 2016). However, the food listed in our study were differ from previous reported study on cold food (eg., cabbage, coconut water and cucumber). In addition, vine, creeper and climber plants, as well as fruits and vegetables that were juicy, sour and exuded viscous matter such as "lendir" were considered cold foods as well (Laderman, 1983). These mixed results on the list of cold foods stated by respondents due to that even though the concept of 'hot' and 'cold' foods are generally recognised and well-known, however the underlying criteria for classification are frequently unclear (Moni, 1994).

Next, only a few from respondents that avoided hot food during pregnancy. Durian is one of the most common hot food answered by the participants, followed by tapai, chilies, pineapple, sugarcane juice and spicy food. The reasons on why they avoided this kind of hot food are because of it is high in calories, to avoid miscarriage, they followed the taboos from elderly and others.

The restriction of hot food among Malay pregnant women in the current study are due to the assumption on eating these foods would result in abortion, severe bleeding during childbirth and a baby born with abnormalities (Mohamad & Ling, 2016). In fact, according to Pamidimarri and Reddy (2014), they also revealed that the Malay believe that consuming a 'hot' substance can result in traumatic uterine contractions which can lead to miscarriage as well. Other than that, 50 out of 100 respondents reported that they avoided to consume pineapple during pregnancy and the most widely received answer is that they believed that pineapple can cause miscarriage and it acts as a spiky fruit that can cause harm. This is similar with previous study by Mohamad and Ling (2016) where they indicated that the most cited reason was “can cause miscarriage” because the respondents believe that pineapple can cause strong uterine contraction (Pamidimarri & Reddy, 2014). In addition, carbonated drink is also one of the foods that being avoided mostly by the respondents. Although majority of the respondents avoided carbonated drinks, but the most cited reasons was of its high sugar content, instead of adherence to cultural beliefs or food taboos. Next, the respondents who voted yes that they did avoid sugarcane juice during their pregnancy were because mostly believed that this kind of drink is a spiky drink, they didn't prefer this drink and also they wanted to avoid from experiencing miscarriage. Other reasons for avoidance such as can cause body aches and high in sugar content. As for tapai food, which is a common dish among Malay, half of the respondents prohibited themselves from consuming it during their pregnancy. The most cited reason to avoid it was this dish was not preferred by them, can cause miscarriage, act as a spiky food that may cause harm, cause body discomfort such as wheezing, heartburn and, gassy feelings. This is similar to the previous study by Tobing, Afiyanti and Rachmawati (2019) where they revealed that this type of food is commonly being avoided during pregnancy due to the beliefs that it might trigger abortion. Even so, eating “*tape*” is advised after giving birth because

it is thought to improve milk production. In terms of bamboo shoots, the most common answers on reasons for its avoidance is that the respondents did not know and never eat this food before, did not like it and they wanted to protect their pregnancy from any harm. However, based on a previous study, some foods are considered as taboo because of the character or appearance they transmit onto the mother or kid. For instance, during pregnancy, consuming bamboo shoots with a 'hairy' appearance is thought to result in a 'hairy' baby (Tobing, Afiyanti & Rachmawati, 2019). Lastly, as for soy sauce food, only a very few respondents reported avoiding this food. Their reasons were they believed that eating soy sauce will turn the skin dark, not good for health especially during pregnancy, didn't like it and also can act as endocrine disruptor. Limited studies found the reasons on the avoidance of soy sauce during pregnancy, however study by Shukri, Basir, Rahman and Bakar (2018) reported that it is forbidden to eat soy sauce during post-partum period because it will cause the childbirth scar to "darken" and "not heal properly."

Table 4.5(b): List of common avoided food and its reasons for avoidance

Yes n (%)	Reasons for avoidance & examples of food
Cold food (10.0)	<ul style="list-style-type: none"> - Not or half cooked food may contain bacteria (n=4) - Cause body aches and discomfort (n=3) - Can affect the health of the mother and unborn baby (n=3) - Didn't prefer to eat cold food (n=3) - Produce a lot of mucus (n=1) - Example of foods: ice (n=3), raw salmon (n=2), sushi (n=2) and others
Hot food (6.0)	<ul style="list-style-type: none"> - High in calories (n=1) - Cause stomach pain (n=1) - Follow the taboos from elderly (n=1) - Can't handle spicy food (n=1) - To avoid miscarriage (n=1) - Example of foods: durian (n=4), tapai, chilies, pineapple, sugarcane juice, spicy food
Pineapple (50.0)	<ul style="list-style-type: none"> - Cause miscarriage (n=15), - Spiky fruit (n=11), - Didn't like and didn't eat pineapple (n=5) - Pose risks for the pregnancy (n=4) - Cause itchy tongue (n=1),
Sugarcane juice (43.0)	<ul style="list-style-type: none"> - Spiky drink (n=15) - Didn't like and didn't prefer sugarcane (n=10) - To avoid miscarriage (n=9) - Cause body aches (n=3) - High in sugar (n=2) - Less hygienic (n=1) - High in furadan poison (n=1)
Carbonated drinks (70.0)	<ul style="list-style-type: none"> - High sugar content (n=44) - Not good for pregnancy and unborn baby (n=10) - Cause gassy feeling (n=2) - To avoid bone decay (n=1) - Followed health professional advice (n=1)

Table 4.5(b): Avoided food and its reasons for avoidance (Continue)

Yes n (%)	Reasons for avoidance
Tapai (54.0)	<ul style="list-style-type: none"> - Not preferable (n=15) - Cause miscarriage (n=12) - Spiky food (n=8) - Contains alcohol (n=4) - It's acidic (n=4) - Cause body discomfort (n=4) wheezing heartburn gassy Allergic - It's a hot food (n=3) - High sugar content (n=2) - It's a cold food (n=1)
Bamboo shoots (44.0)	<ul style="list-style-type: none"> - Didn't know and never eat it before (n=19) - Didn't like it (n=6) - To protect pregnancy (n=6) - Cause GDM (n=1) - Cause sore to the veins (n=1) - High pesticides content (n=1)
Soy sauce (6.0)	<ul style="list-style-type: none"> - Eating soy sauce will turn the skin dark (n=2) - Endocrine disruptor (n=1) - Didn't like it (n=1) - Not good for health during pregnancy (n=1)

4.6 Hypothesis testing

Associations between socio-demographic characteristics and gestational weight gain

Pearson Product-Moment Correlation test was used to assess the associations between socio-demographic characteristics and GWG. Based on Table 4.6, the result shows that parity ($r=-0.292$, $p<0.05$) was negatively and significantly associated with gestational weight gain. This finding was consistent with study by Park et al. (2011) Primiparous women were more likely to gain weight and experience excessive GWG than multiparous women. Another data from a national cohort study who participating in Infant Feeding Practices Study II (2005-2007) also reported that primiparous women gained more weight and that the risk of excessive GWG occurring is greater compared to their multiparous counterparts (Lan-Pidhainy, Nohr, & Rasmussen, 2013). Also, although primiparous women felt more attractive during pregnancy than multiparous women, unfavourable body attitudes such as a lack of strength and fitness were linked to increased GWG in primiparous women. Negative body impressions, specifically feeling unhappy with the body's appearance during pregnancy, appear to have a significant impact on GWG, leading to increased weight gain during pregnancy in primiparous women (Hartley et al., 2016). In fact, many pregnant women were unaware of the GWG recommendations, which might result from gaining weight outside the recommendations (Nikolopoulos et al., 2017).

The result also reported that age have negative correlation and was not significantly associated with gestational weight gain ($r=-0.158$, $p>0.05$). A study conducted by Restall et al. (2014) found that in older women, the risk of getting inadequate GWG is higher. However, this contradicts with our study as it shows that there was no significant association and the prevalence of inadequate GWG were higher among younger age pregnant women compared to advanced maternal age (AMA). The absence of significant association between age and GWG is because

age may not be one of the significant factors to GWG. This is because younger women may enter pregnancy with low BMI because they are younger and may be leaner than older women, who lose fat-free mass more and gain body fat percentage more (He et al., 2018). In fact, compared to young women, generally, women at later age enter pregnancy with high BMI due to the weight retention after experienced multiple pregnancies and this is proven by Siega-Riz et al. (2010), where they also has confirmed on this when they found that weight retention is associated and usually higher among multiparous women.

Table 4.6: Associations between socio-demographic characteristics and gestational weight gain (n=100)

Variable	Gestational Weight Gain (GWG)	
	r	p-value
Socio-demographic characteristics		
Age (years)	-0.158	0.116
Parity	-0.292	0.003*

*Association is significant at $p < 0.05$

As shown in Table 4.7, there was no significant association between education level and GWG ($p > 0.05$) and this was also reported by other previous studies (Drehmer, Duncan, Kac & Schmidt, 2013; Sridhar et al., 2014). Even though there is no significant association, it is interesting to note that in the present study, the proportion of excessive and inadequate GWG was higher among tertiary educated level women. This indicates that the respondents might have high educational benefit, but as shown in our descriptive data, most of the respondents were in B40 category, which demonstrated that their living environment also might affect this non-significant findings. This insignificant association in this study was in line with previous study that revealed that socioeconomic factors also can act as influence to the risk of inappropriate GWG in the different populations (Suliga et al. 2018) and low-income neighbourhoods also offered greater access to food sources that promote unhealthy eating which result in inappropriate GWG outcomes (Hilmers, Hilmers & Dave, 2012). However, this finding was contradicted with previous study by

Huynh, Borrel and Chambers (2014) which they revealed that high education pregnant women were associated with excessive GWG after adjusted for their ethnicity (Hispanic or non-Hispanic) and neighbourhood socioeconomic status (SES). This indicates that high education pregnant women who are Hispanic and live in low-income society are at risk of gaining excessively. This is because, despite the possibility of them having the knowledge on how to maintain a healthy weight, the disadvantages of living in a low-income community may outweigh their educational benefits. In addition, according to Abbasalizad Farhangi (2016), in Iran, women with high education also have significantly higher levels of GWG compared with low educated women.

Other than that, no significant association was found between employment status and GWG ($X^2=0.628$, $p>0.05$). The non-significant association between employment status and GWG was found to refute other research exploring the connection between employment status and GWG which they reported that being unemployed was significantly associated to inadequate GWG (Heery et al., 2015). However, previous studies conducted in the general population show that employment is associated with better health status as compared to being unemployed (Jin, Shah, & Svoboda, 1995; Mathers & Schofield, 1998; Weich & Lewis, 1998) and this phenomenon is called as 'healthy worker effect' (Schuring, Burdorf, Kuns & Mackenbach, 2007). This is because, compared to being employed, study has shown that being unemployed leads to a decrease in fruit and vegetable and an increase in unhealthy food consumption such as snacks and fast food (Dave & Kelly, 2012).

Moreover, household income was also found to be not associated with GWG ($p>0.05$). This finding was consistent with previous study which showed no significant association between household income and GWG (Kowal, Kuk & Tamim, 2012). Even though there is no significant association, it is worth mentioning that in our study, there was a high proportion of abnormal GWG

reported among mothers who came from low-income category which is B40 category. These findings indicated that women with lower incomes gained more than the recommended weight gain compared to higher incomes, similar to the previous study by Olson and Strawderman (2003). This is due to that women with lower incomes have an increased risk for poor GWG status such as excessive GWG because of poor access to healthy food, lack of physical activity opportunities and lower health literacy regarding nutritional food choices (Baker et al., 2006; Franco et al., 2008).

Table 4.7: Associations between socio-demographic characteristics and gestational weight gain (n=100)

Characteristics	Gestational weight gain (GWG)			χ^2	p-value
	Inadequate n (%)	Adequate n (%)	Excessive n (%)		
Education level					
Secondary	8 (18.2)	1 (3.7)	5 (17.2)	€	0.197
Tertiary (STPM/ Diploma/ Degree/ Master/ PhD)	36 (81.8)	26 (96.3)	24 (82.8)		
Employment status					
Unemployed	15 (34.1)	7 (25.9)	10 (34.5)	0.628	0.730
Employed (Full time/ part time/ self-employed)	29 (65.9)	20 (74.1)	19 (65.5)		
Household income per month					
Less than RM4,850	27 (61.4)	15 (55.6)	19 (65.5)	€	0.792
RM4,850 - RM 10,959	2 (4.5)	3 (11.1)	1 (3.4)		
More than RM 10,959	15 (34.1)	9 (33.3)	9 (31.0)		

*€: Fisher Exact Test analysis

Associations between pre-pregnancy BMI and gestational weight gain

As shown in Table 4.8, there was a negative and significant association found between pre-pregnancy body mass index (BMI) and GWG ($r=-0.246$, $p=0.014$). This finding was in good agreement with other several studies which showed significant association. For instance, a study by Suliga et al. (2018) found that being pre-pregnancy underweight was significantly associated with gaining inadequately compared to the recommendation of gestational weight gain by IOM (2009). Study by Bärebring et al. (2016) also widely stressed that being underweight at the time of pregnancy results in a higher risk of inadequate GWG, whereas being overweight and/or obese is associated with a higher risk of excessive weight gain. Although our data agrees with previous studies that showed significant correlation, however our study shows a negative correlation. This indicates that pregnant women who started their pregnancy with underweight BMI are in high prevalence of gaining excessively, meanwhile overweight and obese BMI are in high prevalence to gain inadequately during their pregnancy. This is contradicted by a recent study from Akgun, Keskin, Ustuner, Pekcan, & Avsar (2017) where they inferred that women who were obese or overweight before pregnancy were considerably more likely to exceed the recommendations for weight gain. Another study also documented that the strongest predictor of gestational weight gain was pre-pregnancy BMI, and women who were overweight or obese prior to pregnancy were far more likely to surpass the guideline weight gain (Krukowski, Bursac, McGehee & West, 2013). Previous findings mostly emphasized that women who had overweight or obese pre-pregnancy BMI were far more likely to exceed the GWG guideline. As our findings showed a negative correlation, lower pre-pregnancy BMI was significantly associated with higher GWG. This is due to that past study has shown that underweight group indicated to eat more than usual during positive emotional states or situations (Geliebter & Aversa, 2003). These positive emotional states

experienced by pregnant women might be a result to the feeling of overjoyed about having a baby among pregnant women which led them to eat more during their pregnancy days. Nevertheless, according to Institute of Medicine (2009), pregnancy is the time in women's life when they are most aware of their health and therefore, expected mothers usually change their behaviour in order to reflect a lifestyle that is healthier. A "fit pregnancy" can occur if a woman is able to balance the energy consumption and energy expenditure to achieve an optimal gestational weight gain (IOM, 2009). Hence, gaining weight outside the recommendations during pregnancy was preventable by practising healthy lifestyle among pregnant women.

Table 4.8: Associations between pre-pregnancy BMI and gestational weight gain

Characteristics	r	p-value
Pre-pregnancy BMI	-0.246	0.014*

*Association is significant at $p < 0.05$

Associations between knowledge on nutrition and gestational weight gain

Pearson-Moment Correlation test was performed to determine the association between knowledge on nutrition and gestational weight gain. Based on the descriptive data (Table 4.3a), 2% of pregnant women were classified as having poor nutrition knowledge, 20% were classified as having moderate and 78% were classified as having good nutrition knowledge. Table 4.9 shows that there was positive correlation but no significant association between knowledge on nutrition and GWG ($r=0.165$, $p>0.05$). This finding was contradicted to past study by Manaf et al. (2014) which reported that nutritional knowledge score was positively correlated with gestational weight gain ($r = 0.166$, $p < 0.05$). However, based on our study, it is interesting to note that among pregnant mothers with good nutrition knowledge, the prevalence of inadequate and excessive

gestational weight gain was still higher compared to normal gestational weight gain among them. This significant indifference indicates that good knowledge in nutrition was not really associated with optimal GWG because there could be that the pregnant women may have the knowledge but they didn't practice it. This is due to knowledge alone is not enough to improve one's dietary behaviour, but it can play a crucial role in initiating such changes (Sapp, 2002). In addition, a study from Bookari (2017) also found that although with good nutrition knowledge, pregnant women actually were lack with the crucial information to achieve healthy diet and healthy weight gain goals. In their search for information, women were highly driven and confident with a strong indication of intent to change. However, if they do not receive the support and an encouragement they required and to apply it to their everyday practices, this momentum may fade. Apart from that, poor nutrition knowledge also has been linked to poor diet quality and, as a result, poor health outcomes (McLeod, Campbell & Hesketh, 2011). These poor health outcomes could be in terms of inappropriate gestational weight gain during pregnancy.

Table 4.9: Associations between knowledge on nutrition and gestational weight gain

Characteristics	r	p-value
Knowledge on Nutrition	0.165	0.101

Associations between attitude on gestational weight gain and gestational weight gain

There were negative and significant association between attitude on weight gain and total GWG ($r = -0.284$, $p < 0.05$) (Table 4.10). These findings from the present study agreed with a previous study done by Palmer et al. (1985) which also showed that negative attitudes towards pregnancy weight gain were associated with weight gains. Significant association between attitude on gestational weight gain with GWG were also reported from several studies conducted by Swann

et al. (2009), Strychar et al. (2000). This can conclude that their findings found that greater worry about weight gain during pregnancy among pregnant women was associated with higher absolute GWG (Swann et al., 2000) which is similar to our study. This is because pregnant women who are dissatisfied with their bodies are more likely to gain weight excessively. (Hill, Skouteris, McCabe & Fuller-Tyszkiewicz, 2013). In fact, pregnancy is a time when women are prone to reconsider their body image and attitudes due to the fast changes in their body size, shape and weight that occur over a relatively short (40 week) period. Pregnancy also is the time in a woman's life when weight gain is encouraged and expected, yet our society still glorifies the standard beauty of female body. Likewise, dissatisfaction with one's body image during pregnancy has also been linked to negative impacts on the mother's health, such as depression and anxiety (Lee, Williams, & Burke, 2019; Roomruangwong, Kanchanatawan, Sirivichayakul, & Maes, 2017), as well as unhealthy eating habits including binge eating or intermittent fasting (Vartanian & Porter, 2016) and poor control of gestational weight gain (Hartley, McPhie, Skouteris, Fuller-Tyszkiewicz & Hill, 2015) which can lead to gaining weight excessively during pregnancy. Nevertheless, study has shown that behavioral interventions during pregnancy, such as perceived weight gain have been found to help women to achieve the optimum GWG guidelines.

Table 4.10: Associations between attitude on gestational weight gain and gestational weight gain

Characteristics	r	p-value
Attitude on Gestational Weight Gain	-0.284	0.004*

*Association is significant at $p < 0.05$

Associations between food taboos and gestational weight gain

Based on Table 4.11, the Chi Square test results between food taboos practice and gestational weight gain shows that there was no significant association. The non-significant association between food taboos and gestational weight gain in this study contradicts other research (Mohamad & Ling, 2016). As stated in the Table 4.11, although not significant, our finding shows that among pregnant women who had inadequate and excessive GWG, 50% and 58.6% of them were practicing any food taboos during their pregnancy respectively. This indicates that those who follow the food taboo had a relatively higher proportion of not achieving the recommended gestational weight gain. This finding was similar to one study from Nigeria, where nearly three-quarters of pregnant women failed to gain enough weight to meet the recommended weekly weight gain due to traditional beliefs about avoiding food during pregnancy, rather than the most commonly cited reasons such as poverty and food insecurity (Ojofeitimi & Tanimowo, 1980). Apart from food taboos that may affect weight gain during pregnancy, cultural beliefs and food taboos, may also impact the overall health of the mothers and children during pregnancy and postnatal stage. Cultural beliefs and food taboos that against particular healthy food, may introduce to high risk of malnutrition (Chakona & Shackleton, 2019). Pregnant women especially in developing countries who were at high risk of malnutrition due practice of food taboos were also at high risk of developing negative pregnancy outcomes such as abnormal gestational weight gain, premature birth, small-for-gestational-age delivery and others. Kariuki, Lambert, Purwestri, Maundu and Biesalski (2017) also found that one of the factors contributing to maternal undernutrition during pregnancy has been identified as food taboos. In fact, Islam and Ullah (2005), reported that severe food avoidance may deprive the body from essential nutrients during

pregnancy, which can have a negative impact on pregnancy and birth outcomes. This impact on pregnancy outcomes might be on inadequate or excessive gestational weight gain.

Table 4.11: Associations between food taboos and gestational weight gain

Characteristics	Inadequate GWG	Adequate GWG	Excessive GWG	χ^2	p-value
	n (%)	n (%)	n (%)		
Do you practice any food taboos during pregnancy?					
Yes	22 (50.0)	16 (59.3)	17 (58.6)	0.80	0.672
No	22 (50.0)	11 (40.7)	12 (41.4)		

CHAPTER 5

CONCLUSION, LIMITATION AND RECOMMENDATION

5.1 Conclusion

This study had recruited a total of 100 Malay pregnant women across all regions in Malaysia. In general, 51.0% of pregnant women had abnormal pre-pregnancy BMI which 38.0% of them were overweight and obese and 13.0% were underweight. In addition, the prevalence of inadequate GWG among pregnant women was 44.0% followed by excessive GWG (29.0%). Majority of the pregnant women had good nutrition knowledge score (78.0%) and almost all of the respondents had negative attitude towards GWG (91.0%). In terms of cultural beliefs (food taboos) practice, more than half of the respondents (55%) reported to practice any food taboos during their pregnancy with the most foods reported to be avoided by pregnant women were carbonated drinks (70%), tapai (54%) and pineapple (50%). Apart from that, there were no associations between age, education level, employment status and household monthly income with GWG among pregnant women. Parity was found to be negatively correlated with GWG. In addition, there was a negative and significant correlation between pre-pregnancy BMI and attitude on GWG with GWG status. There was no correlation between knowledge on nutrition and GWG which can be partly explained by the facts that even high proportion of respondents may have good knowledge, but they did not practice it. Also, it can reflect that knowledge alone is not enough to improve one's dietary behavior. For cultural beliefs (food taboos) practice, this study also found no significant association of it with respondents GWG. However, those who follow the food taboos had a relatively higher proportion of not achieving the recommended gestational weight gain.

Nevertheless, the factors that may influence GWG of the pregnant women should be studied in depth in order to better understand these correlations. In fact, the current study discovered that factors such as parity, pre-pregnancy BMI, and attitude toward GWG may have an impact on a mother's GWG status. Considering this association, future study in this area could assist health policymakers in determining how these factors influenced the GWG status of pregnant women in Malaysia.

5.2 Strength and limitation

The key strength of our study were variables such as psychosocial and cultural factors were measured together to assess the association with total GWG among Malay pregnant women. To our best, these measured factors were found to be less studied at the local level. Thus, in this way, it could serve as a baseline for future research in the field of GWG among pregnant women in Malaysia. Meanwhile, there are also several limitations to this study. The present study design is a cross-sectional study which does not permit the causal relationship between the dependent and independent variables. Secondly, this study did not assess any dietary intake, physical activity levels and sedentary behavior of the respondents that could be the confounding variables that could contribute to the actual pre-pregnancy BMI and total GWG status among pregnant women. Thirdly, this study has relatively small sample size and unequal distribution of respondents that the findings from this study cannot be generalized to all pregnant women in Malaysia.

Fourthly, this study used validated and reliable self-administered questionnaire and self-reported anthropometric data through online form. This is due to pandemic and enhanced movement control order (EMCO), researchers were not allowed to have direct contact with the respondents, thus alternative approach such as online form was used. Online data collection were

somehow safe and effective because it has helped researcher to reach respondents easier. However, some of the participants would have been unable to understand the questionnaire completely and may cause underestimate or overestimate response, meanwhile as the subjects mostly recalled their pre-pregnancy weight, this could also lead to risk of misreporting and recall bias. Lastly, for the cultural beliefs (food taboos) practice section, the food asked in the section were the commonly known foods and consumed by Malays. However, it was challenging for most respondents to complete it since it required them to think and recall, especially when they were asked to give reasons for avoidance on foods they avoided. The questions in this part were primarily open-ended, relying heavily on the respondents' cooperation, opinions and comprehension.

5.3 Recommendation

The findings from this study showed significant association on attitude towards GWG with gestational weight gain. This data could be used by healthcare professionals to focus on the attitude towards GWG level to ensure a better understanding of pregnant women regarding their weight gain during pregnancy. Therefore, future intervention programs are suggested to emphasize on advocating positive attitude towards weight gain during pregnancy in order to improve total GWG status of pregnant women. In addition, for future studies, it is recommended to use a larger sample size to better represent all pregnant women in Malaysia and include other ethnicities as well because different ethnicities may have different findings. Other than that, this present study did not measure the dietary intake, level of physical activity and sedentary behavior of respondents, therefore future studies should include such variables that might contribute to higher or lower level of overweight and obesity pre-pregnancy BMI and excessive GWG among study subjects.

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APPENDICES

APPENDIX A

JKEUPM APPROVAL LETTER

Ref. no: UPM/TNCPI/RMC/JKEUPM/1.4.18.2 (JKEUPM)

Date: 24 March 2021

Dear Prof./Dr./Mr./Ms.,

APPLICATION FOR JKEUPM ETHICAL CLEARANCE: APPROVED

With reference to the above, I am pleased to inform you that your application for ethical clearance for the research project entitled **'The Associations of Knowledge and Cultural Beliefs on Maternal Diet and Attitude on Gestational Weight Gain with Gestational Weight Gain in Malaysia'** has been approved.

Please note that the official letter of approval will be issued as soon as possible. However, the ethical clearance is considered effective from the date of this email, and you may now proceed with your research.

Kindly remind the ethical approval is required in the case of amendments/ changes to the study documents/ study sites/ study team.

Researchers should also complete a Study Final Report upon study completion. The form can be obtained from the Ethics Committee for Research Involving Human Subjects (JKEUPM) website (<http://www.tncpi.upm.edu.my/faildokumen>).

If you have any enquiries, please contact Ms. Nurulhasanah Ishak (03-97691605) or Ms. Nor Ellia Abd Ajis (03-97691244).

Note: Please use this reference number for any transaction:- **JKEUPM-2020-506**

Thank you.

Yours faithfully,

Prof. Dr. Zamberi Sekawi
Chair
Ethics Committee for Research Involving Human Subjects
Universiti Putra Malaysia

APPENDIX B

RESPONDENT'S INFORMATION SHEET



**JAWATANKUASA ETIKA UNIVERSITI UNTUK
PENYELIDIKAN MELIBATKAN MANUSIA (JKEUPM)
UNIVERSITI PUTRA MALAYSIA, 43400 UPM
SERDANG, SELANGOR, MALAYSIA**

FORM 2.4: RESPONDENT'S INFORMATION SHEET AND INFORMED CONSENT FORM

Please read the following information carefully and do not hesitate to discuss any questions you may have with the researcher.

1. STUDY TITLE:

The Associations of Knowledge on Nutrition, Attitude on Gestational Weight Gain, Cultural Beliefs (Food Taboos) Practice with Gestational Weight Gain among Malay Pregnant Women in Malaysia

2. INTRODUCTION:

I am fourth year student of Bachelor of Science (Nutrition and Community Health) from Department of Nutrition, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia. I plan to conduct a research to study Associations of Knowledge on Nutrition, Attitude on Gestational Weight Gain, Cultural Beliefs (Food Taboos) Practice with Gestational Weight Gain among Malay Pregnant Women in Malaysia

3. WHAT WILL YOU HAVE TO DO?

Respondents are required to answer a questionnaire which includes sociodemographic, anthropometric measurements, knowledge on nutrition, attitude on gestational weight gain and cultural beliefs (food taboos) practice during pregnancy. Each respondent is required to complete all the components in the questionnaires.

4. WHO SHOULD NOT PARTICIPATE IN THE STUDY?

Respondents who are pregnant with physical and mental handicapped, cognitive disorder and medical conditions (e.g. gestational diabetes mellitus and pre-eclampsia) will be excluded from this research. In addition, respondents who are at <38 weeks of gestation will not be included in this study as this study receive respondents at 38, 39 and 40 weeks of gestation only.

5. WHAT WILL BE THE BENEFITS OF THE STUDY:

(a) TO YOU AS THE SUBJECT?

Respondents will be informed about their results on the level of knowledge nutrition, attitude on gestational weight gain, cultural beliefs (food taboos) practice on maternal diet and their weight gain status during pregnancy if they wish to know.

(b) TO THE INVESTIGATOR?

The results of this research will be used by health care professionals as reference to determine knowledge on nutrition, attitude on gestational weight gain and cultural beliefs (food taboos) practice during pregnancy among Malay pregnant women in Malaysia.

6. WHAT ARE THE POSSIBLE RISKS?

There is no negative impact on respondents in this research.

7. WILL THE INFORMATION THAT YOU PROVIDE AND YOUR IDENTITY REMAIN CONFIDENTIAL?

Any information obtained from the questionnaire will remain confidential and it will used only for this research. The results of this research may be distributed or published while respondent's identity will not be identified. If you have decided to withdraw from this research, you are allowed to do so at any time without providing any explanation.

8. WHO SHOULD YOU CONTACT IF YOU HAVE ADDITIONAL QUESTIONS DURING THE COURSE OF THE RESEARCH?

If you have additional questions regarding the research, you may contact our principal investigator Dr. Nurzalinda bt Zalbahar @ Zabaha at 603-97692960 (office number) or email to nurzalinda@upm.edu.my or representative of co-investigator Miss Nor Ashiqin Ramli at 6018-2779498 (H/P) or email to 192450@student.upm.edu.my

Please initial here if you have read and understood the contents of this page _____

APPENDIX C

INFORMED CONSENT FORM

9. CONSENT

I Identity Card No.
address.....
.....

.....hereby voluntarily agree to take part in the research stated above *(clinical /drug trial/video recording/ focus group/interview-based/questionnaire-based).

I have been informed about the nature of the research in terms of methodology, possible adverse effects and complications (as written in the Respondent's Information Sheet). I understand that I have the right to withdraw from this research at any time without giving any reason whatsoever. I also understand that this study is confidential and all information provided with regard to my identity will remain private and confidential.

I* wish / do not wish to know the results related to my participation in the research

I agree/do not agree that the images/photos/video recordings/voice recordings related to me be used in any form of publication or presentation (if applicable)

* delete where necessary

Signature Signature..... (Respondent)
(Witness)

Date :..... Name :.....

I/C No. :.....

I confirm that I have Explained to the respondent the nature and purpose of the above-mentioned research.

Date Signature
(Researcher)

APPENDIX D

QUESTIONNAIRES

SECTION 1 : SOCIODEMOGRAPHIC

Please fill in the following details. *Sila isi butiran berikut.*

1.	State of living/ <i>Menetap di negeri</i>	_____
2.	Ethnicity/ <i>Etnik</i>	<input type="checkbox"/> Malay/ <i>Melayu</i> <input type="checkbox"/> Chinese/ <i>Cina</i> <input type="checkbox"/> Indian/ <i>India</i>
3.	Age (Years)/ <i>Umur (Tahun)</i>	_____ Years/ <i>Tahun</i>
4.	Gestational week/ <i>Minggu kehamilan</i>	<input type="checkbox"/> 38 weeks/ <i>38 minggu</i> <input type="checkbox"/> 39 weeks/ <i>39 minggu</i> <input type="checkbox"/> 40 weeks/ <i>40 minggu</i>
5.	Parity; How many children do you have? <i>Berapakah bilangan anak anda?</i>	<input type="checkbox"/> First Pregnancy/ <i>Kehamilan pertama</i> <input type="checkbox"/> Number of children/ <i>Bilangan anak:</i> _____
6.	Marital status/ <i>Status perkahwinan</i>	<input type="checkbox"/> Married/ <i>Berkahwin</i>

		<input type="checkbox"/> Single/ <i>Bujang</i> <input type="checkbox"/> Divorced/ <i>Bercerai</i> <input type="checkbox"/> Widowed/ <i>Balu</i>
7.	Education Level/ <i>Tahap pendidikan</i>	<input type="checkbox"/> Primary/ <i>Sekolah rendah</i> <input type="checkbox"/> Secondary/ <i>Sekolah menengah</i> <input type="checkbox"/> Tertiary/ <i>Institut pengajian tinggi</i>
8.	Employment status/ <i>Status pekerjaan</i>	<input type="checkbox"/> Full time/ <i>Sepenuh masa</i> <input type="checkbox"/> Part time/ <i>Separuh masa</i> <input type="checkbox"/> Self employed/ <i>Bekerja sendiri</i> <input type="checkbox"/> Housewives/ <i>Surirumah tangga</i> <input type="checkbox"/> Not Employed/ <i>Tidak bekerja</i>
9.	Household income per month/ <i>Pendapatan bulanan isi rumah</i>	<input type="checkbox"/> Less than RM4,850 / <i>Kurang daripada RM4,850</i> <input type="checkbox"/> RM4,850 - RM 10,959 <input type="checkbox"/> More than RM 10,959 / <i>Lebih daripada RM 10,959</i>

10.	Presence of any disease/ <i>Kehadiran penyakit</i>	<input type="checkbox"/> Yes/ <i>Ya</i> <input type="checkbox"/> No/ <i>Tidak</i> If yes, please specify: _____
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SECTION 2: ANTHROPOMETRY MEASUREMENT/PENGUKURAN

ANTHROPOMETRI

Pre pregnancy information/ <i>Maklumat pra kehamilan</i>	
Do you know your weight before pregnant?/ <i>Adakah anda tahu berat badan anda sebelum hamil?</i>	<input type="checkbox"/> Yes/ <i>Ya</i> <input type="checkbox"/> No/ <i>Tidak</i> If “Yes”, what is your weight? Please choose one measurement only/ <i>Sekiranya "Ya", berapa berat badan anda? Sila pilih satu ukuran sahaja.</i> ____ . ____ kg or ____ lb
Do you know your height before pregnant?/ <i>Adakah anda tahu ketinggian anda sebelum hamil?</i>	<input type="checkbox"/> Yes/ <i>Ya</i> <input type="checkbox"/> No/ <i>Tidak</i> If “Yes”, what is your height? Please choose one measurement only/ <i>Sekiranya "Ya", berapa berat badan anda? Sila pilih satu ukuran sahaja</i> __ . __ m or __ feet/ <i>kaki</i> or __ inches/ <i>inci</i>
Current gestational weight/ <i>Berat badan & tinggi sekarang semasa hamil</i>	

Weight (kg)/ <i>Berat (kg)</i>	
Height (m)/ <i>Tinggi (m)</i>	

**SECTION 3: KNOWLEDGE ON NURITION DURING PREGNANCY/ PENGETAHUAN
TENTANG PEMAKANAN SEWAKTU HAMIL**

1. In the list below, the food with highest content of protein / Yang manakah mempunyai kandungan protein yang paling tinggi
 - a. Rice/ Nasi
 - b. Bread and biscuits/ Roti dan biskut
 - c. Fruits/ Buah-buahan
 - d. Fish/ Ikan**
 - e. Do not know/ Tidak tahu

2. Among the food listed below, which one has the highest content of fiber / Yang manakah mempunyai kandungan fiber yang paling tinggi:
 - a. Vegetables and beans / Sayur-sayuran dan kekacang**
 - b. Milk and dairy products / Susu dan produk tenusu
 - c. Meat, chicken and duck / Daging lembu, ayam dan daging itik
 - d. Fish and seafood / Ikan dan makanan laut
 - e. Do not know / Tidak tahu

3. The food that are rich in vitamin, mineral and fiber are / Makanan yang tinggi dengan vitamin, mineral dan fiber adalah:
 - a. Meat, fish and chicken / Daging, ikan dan ayam
 - b. Vegetables and fruits / Sayur-sayuran dan buah-buahan**
 - c. Fat, oil and sugar / Lemak, minyak dan gula
 - d. Rice, other cereals and tuber / Nasi, kanji dan ubi
 - e. Do not know/ Tidak tahu

4. Which one of the foods listed below contains the highest amount of cholesterol /
Yang manakah mempunyai nilai kolesterol yang tinggi:
- Durian / Durian
 - Coconut milk / Santan**
 - Beef / Daging lembu
 - Mutton / Daging kambing
 - Egg yolk / Telur kuning
 - Do not know / Tidak tahu
5. The food with a lot of salt / Makanan yang tinggi garam
- Soya sauce / Kicap soya**
 - Beef / Daging lembu
 - Swamp cabbage / Kangkung
 - Canned soft drinks / Minuman bertin
 - Do not know / Tidak tahu
6. A balance diet has the following nutrients / Diet yang seimbang mempunyai kandungan nutrien berikut:
- Carbohydrate and fats / Karbohidrat dan lemak
 - Vitamin and minerals / Vitamin dan mineral
 - Carbohydrate, fat, protein and mineral / Karbohidrat, lemak, protein dan mineral**
 - Do not know / Tidak tahu
7. Do you know about food pyramid / Adakah anda tahu mengenai piramid makanan:
- Yes / Ya**
 - No / Tidak

If yes, continue with question 8. If no, directly go to question 10.

8. According to the food pyramid, the food you know are advised to take the least /
Menurut piramid makanan, makanan yang digalakkan untuk mengambil dengan paling sedikit adalah:
- Meat, fish and chicken / Daging, ikan dan ayam
 - Vegetables and fruits / Sayur-sayuran dan buah-buahan
 - Fat, oil and sugar / Lemak, minyak dan gula**
 - Rice, other cereals and tuber / Nasi, kanji dan ubi
 - Do not know/ Tidak tahu

9. According to the food pyramid, the food that you can eat the most/ Menurut piramid makanan, makanan yang anda boleh makan paling banyak adalah:
- Meat, fish and chicken / Daging, ikan dan ayam
 - Vegetables and fruits / Sayur-sayuran dan buah-buahan
 - Fat, oil and sugar / Lemak, minyak dan gula
 - Rice, other cereals and tuber / Nasi, kanji dan ubi**
 - Do not know/ Tidak tahu
10. The nutrient which will helps to build our body / Nutrien yang dapat membantu membina badan adalah:
- Protein / Protein**
 - Vitamin and mineral / Vitamin dan minera/
 - Fat / Lemak
 - Carbohydrate / Karbohidrat
 - Do not know / Tidak tahu
11. You can get all the required nutrient by: / Anda boleh mendapatkan semua nutrien yang diperlukan dengan:
- Eating a lot of food / Makan banyak makanan
 - Eating a lot of meat / Makan daging dengan banyak
 - Eating a variety of food / Makan pelbagai jenis makanan**
 - Eating expensive food / Makan makanan mahal
 - Do not know / Tidak tahu
12. The nutrient that provides us with the most energy (calories) / Nutrien yang membekalkan kita dengan tenaga (kalori) paling banyak adalah
- Protein / Protein
 - Vitamin and mineral / Vitamin dan mineral
 - Fat / Lemak**
 - Carbohydrate / Karbohidrat
 - Do not know / Tidak tahu
13. In the list below, the food with highest carbohydrate contents / Yang manakah mempunyai kandungan karbohidrat yang paling banyak:
- Chicken / Ayam
 - Bread / Roti**
 - Vegetables / Sayur-sayuran
 - Fruits / Buah-buahan
 - Do not know / Tidak tahu

14. Body mass index is an indicator for / Indeks jisim badan merupakan penunjuk untuk
- Body height status / Status ketinggian badan
 - Body height status / Status ketinggian badan
 - Condition of food intake / Pengambilan makanan
 - Body weight status / Status berat badan**
 - Do not know / Tidak tahu
15. Aerobic exercise (e.g; jogging, cycling, aerobic dance, fast walking and swimming) are importance for / Senaman aerobik (e.g; berjoging, berbasikal, menari aerobik, jalan secara laju dan berenang) adalah penting untuk:
- Strengthen the bone / Menguatkan tulang
 - Digestion of food / Penghadaman makanan
 - Beauty of the body / Kecantikan badan
 - A healthy heart / Jantung yang sihat**
 - Do not know / Tidak tahu
16. Over consumption of energy (calories) can lead to / Pengambilan tenaga (kalori) yang berlebihan akan menyebabkan
- Skin disease / Penyakit kulit
 - Tuberculosis (T.B) / Batuk kering (tuberculosis)
 - Obesity / Obesiti**
 - Dengue / Demam denggi
 - Do not know / Tidak tahu
17. In order to avoid obesity and maintain desirable body weight, we have to balance our food intake with / Bagi mengelakkan dari obesiti dan dapat memastikan berat badan unggul, kita kena seimbangkan pengambilan makanan dengan:
- Types of drink / Jenis minuman
 - Our knowledge / Pengetahuan kita
 - Physical activities / Aktiviti fizikal**
 - Our income / Pendapatan kita
 - Do not know / Tidak tahu
18. Which of the following ways of preparing food will increase the fat content / Cara masakan yang manakah dapat meningkatkan kandungan lemak dalam makanan:
- Steam / Kukus
 - Fry / Goreng**

- c. Roast /Panggang
 - d. Boil / Rebus
 - e. Do not know / Tidak tahu
19. Obesity will increase risk to the following disease / Obesiti dapat meningkat risiko kepada penyakit berikut:
- a. Malaria / Malaria
 - b. Heart disease / Penyakit jantung**
 - c. Tuberculosis (T.B) / Batuk kering (tuberculosis)
 - d. Dengue / Demam denggi
 - e. Do not know / Tidak tahu
20. The risk of consuming food with excessive sugar is / Pengambilan gula yang berlebihan dapat meningkatkan risiko:
- a. Skin disease / Penyakit kulit
 - b. Tuberculosis (T.B) / Batuk kering (tuberculosis)
 - c. High blood pressure / Tekanan darah tinggi
 - d. Diabetes mellitus / Kencing manis**
 - e. Do not know / Tidak tahu
21. Arrange the following foods according to their cholesterol content by choosing number 1, 2, 3, 4 or 5 in the columns provided. No 1 is the highest cholesterol content and no 5 is the lowest cholesterol content.

Each number can be used once.

Susun senarai makanan di bawah mengikut kandungan kolesterol dalam makanan dengan menandakan nombor 1,2,3,4 atau 5 di dalam ruangan yang disediakan. Nombor 1 adalah makanan yang paling tinggi kolesterol dan nombor 5 adalah makanan paling rendah kolesterol.

Setiap nombor hanya boleh digunakan sekali sahaja.

Fish, cheese, milk / ikan, keju, susu	4
Prawn, cuttlefish, butter / udang, sotong, mentega	2
Chicken, beef, mutton / ayam, daging lembu, daging kambing	3
Brain, liver, egg yolk / otak, hati, telur kuning	1
Coconut oil, coconut milk / minyak kelapa, santan	5

**SECTION 4: ATTITUDE ON GESTATIONAL WEIGHT GAIN/ SIKAP TERHADAP
KENAIKAN BERAT BADAN SEWAKTU MENGANDUNG**

Statements	Strongly Disagree	Disagree	Agree	Strongly Agree
1. I am proud of looking pregnant/ <i>Saya bangga kelihatan hamil</i>				
2. I think a pregnant woman is beautiful/ <i>Saya rasa perempuan mengandung adalah cantik</i>				
3. I like maternity clothes/ <i>Saya suka pakaian wanita mengandung</i>				
4. I worry that I may get fat during this pregnancy/ <i>Saya bimbang saya mungkin akan menjadi gemuk semasa mengandung ini</i>				
5. I feel that women have to be especially careful about getting fat during pregnancy/ <i>Saya merasakan bahawa wanita harus sangat berhati-hati tentang kenaikan berat badan semasa hamil</i>				
6. The weight I've gained during this pregnancy makes me feel unattractive/ <i>Berat badan yang saya peroleh sepanjang kehamilan ini membuatkan saya berasa tidak menarik</i>				
7. I'm embarrassed whenever the nurse weighs me/ <i>Saya berasa malu setiap kali jururawat menimbang berat badan saya</i>				
8. It bothers me that I can't wear what's in style while I'm pregnant/ <i>Ia mengganggu saya apabila saya tidak boleh memakai pakaian yang bergaya semasa saya mengandung</i>				

9. I am embarrassed at how big I have gotten during this pregnancy/ <i>Saya malu dengan keadaan badan saya yang membesar dalam tempoh kehamilan ini</i>				
10. I would gain 35 pounds (15.9 kg) if it meant my baby would be healthier/ <i>Saya akan menambah berat badan sebanyak 35 paun (15.9 kg) sekiranya itu bermakna bayi saya akan lebih sihat</i>				
11. I would gain 40 pounds (18.0 kg) if it meant my baby would be healthier/ <i>Saya akan menambah berat badan sebanyak 40 paun (18.0 kg) sekiranya itu bermakna bayi saya akan lebih sihat</i>				
12. As long as I'm eating a well-balanced diet, I don't care how much I gain/ <i>Selagi saya makan makanan yang seimbang, saya tidak peduli berapa banyak berat saya naik</i>				
13. I like being able to gain weight for a change/ <i>Saya suka dapat menambah berat badan untuk sebuah perubahan</i>				
14. If I gain too much weight in one month, I try to keep from gaining the next month/ <i>Sekiranya berat badan saya bertambah secara berlebihan dalam sebulan, saya berusaha untuk menjaga berat badan saya dari bertambah di bulan hadapan</i>				
15. I tried to keep my weight down so I didn't look pregnant earlier on/ <i>Saya cuba untuk menurunkan berat badan saya sehingga saya tidak kelihatan hamil</i>				
16. Just before going to the doctor, I try not to eat/ <i>Sebelum berjumpa doktor, saya cuba untuk tidak makan</i>				

17. I would like to gain between 21–30 pounds (9.5 kg – 13.6 kg) during this pregnancy/ <i>Saya ingin menambah berat badan antara 21–30 paun (9.5 kg – 13.6 kg) sewaktu mengandung ini</i>				
18. I would like to gain between 11–20 pounds (5.0 kg – 9.0 kg) during this pregnancy/ <i>Saya ingin menambah berat badan antara 11-20 paun (5.0 kg – 9.0 kg) sewaktu mengandung ini</i>				

SECTION 5: CULTURAL BELIEFS (FOOD TABOOS) PRACTICE/ AMALAN TERHADAP KEPERCAYAAN BUDAYA (PANTANG LARANG MAKANAN)

Please answer the questions with Yes/No answers that you think best to describe your beliefs and perceptions on maternal diet during pregnancy. Note that there is no right or wrong answer in this section.

Sila jawab soalan-soalan tersebut dengan jawapan Ya / Tidak yang anda fikirkan terbaik untuk menggambarkan kepercayaan dan persepsi anda mengenai diet wanita semasa mengandung. Suka diingatkan bahawa tiada jawapan betul atau salah di bahagian ini.

No.	Statements/Pernyataan	Yes/Ya	No/Tidak
1.	Do you practice any food taboos during pregnancy? / <i>Adakah anda mengamalkan pantang larang makanan semasa mengandung?</i>		
2.	Do you prohibit yourself from eating cold food?/ <i>Adakah anda melarang diri anda daripada makan makanan sejuk?</i> Please provide a list of cold foods that you avoid during Pregnancy/ <i>Sila nyatakan senarai makanan sejuk yang anda hindari semasa mengandung:</i> _____ Reasons for its avoidance/ <i>Sebab-sebab menghindarinya:</i> _____		
3.	Do you prohibit yourself from eating hot food?/ <i>Adakah anda melarang diri anda daripada makan makanan panas?</i>		

	<p>Please provide a list of hot foods that you avoid during pregnancy/ <i>Sila nyatakan senarai makanan panas yang anda hindari semasa mengandung:</i> _____</p> <p>Reasons for its avoidance/ <i>Sebab-sebab menghindarinya:</i> _____</p>		
4.	<p>Do you prohibit yourself from eating pineapple?/ <i>Adakah anda melarang diri anda daripada memakan buah nenas?</i></p> <p>Reasons for its avoidance/ <i>Sebab-sebab menghindarinya:</i> _____</p>		
5.	<p>Do you prohibit yourself from eating sugarcane juice?/ <i>Adakah anda melarang diri anda daripada memakan jus tebu?</i></p> <p>Reasons for its avoidance/ <i>Sebab-sebab menghindarinya:</i> _____</p>		
6.	<p>Do you prohibit yourself from drinking carbonated drinks?/ <i>Adakah anda melarang diri anda daripada minum minuman bergas atau bikarbonat?</i></p> <p>Reasons for its avoidance/ <i>Sebab-sebab menghindarinya:</i> _____</p>		
7.	<p>Do you prohibit yourself from eating tapai?/ <i>Adakah anda melarang diri anda daripada memakan tapai?</i></p> <p>Reasons for its avoidance/ <i>Sebab-sebab menghindarinya:</i> _____</p>		
8.	<p>Do you prohibit yourself from eating bamboo shoots?/ <i>Adakah anda melarang diri anda daripada memakan akar tebu?</i></p> <p>Reasons for its avoidance/ <i>Sebab-sebab menghindarinya:</i> _____</p>		
9.	<p>Do you prohibit yourself from eating soy sauce?/ <i>Adakah anda melarang diri anda daripada memakan kicap soya?</i></p> <p>Reasons for its avoidance/ <i>Sebab-sebab menghindarinya:</i> _____</p>		

10.	<p>Do you believe in “eating for two” phrase for pregnant women?/ <i>Adakah anda percaya pada frasa "makan untuk dua orang" bagi wanita hamil?</i></p> <p>Why?/ <i>Mengapa?</i> _____</p>		
11.	<p>Is there any other food that you prohibit yourself from eating and what are the food?/ <i>Adakah terdapat makanan-makanan lain yang anda hindari dan apakah makanan tersebut?</i></p> <p>Please state/ <i>Sila nyatakan:</i> _____</p> <p>Reasons for its avoidance/ <i>Sebab-sebab menghindarinya:</i> _____</p>		

***** END OF QUESTIONNAIRE *****

APPENDIX E

LIST OF DETAILS ANSWER ON FOOD TABOOS AND ITS REASONS

FOR AVOIDANCE

		Frequency	Percent
Please provide a list of cold foods that you avoid during pregnancy	Air tebu, carbonated drinks, tapai	1	1.0
	Ais	2	2.0
	Ais batu	1	1.0
	ais,	1	1.0
	Cucumber	1	1.0
	Kangkung. kobis..jantung pisang..sayur nangka..	1	1.0
	Durian	1	1.0
	Makanan segera dan caffeine	1	1.0
	Raw salmon	1	1.0
	Sushi	1	1.0
	Sushi, sashimi	1	1.0
	Nasi sejuk	1	1.0
	Watermelon	1	1.0
	Nil	1	1.0
	No	1	1.0
	None	1	1.0
	Saya makan semua makanan tiada	14	14.0
	Tiada	66	66.0
Tiads	1	1.0	
Tidak	1	1.0	
Reasons for its avoidance	akan menyebabkan sakit badan	1	1.0
	Dikhuatiri bayi besar	1	1.0
	I once get really string cramps after consuming them while being pregnant	1	1.0
	Kaki selalu kerem	1	1.0
	Heard that it is not good to take raw fish	1	1.0
	Sejui	1	1.0
	Tak suka makan makanan yg sejuk	1	1.0
	Lendir banyak keluar Makan timun	1	1.0
	Tidak bagus diambil waktu mengandung bole jejasakan bayi dalam kandungan	1	1.0

	Tidak baik utk kesihatan ibu & perkembangan bayi	1	1.0
	Mkanan separuh masak	1	1.0
	My stomach feel uneasy	1	1.0
	Tak suka durian	1	1.0
	Not cooked mighh have bacteria	1	1.0
	Seafood, raw food	1	1.0
	Nil	1	1.0
	No	1	1.0
	None	1	1.0
	tiada	14	14.0
	Tiada	67	67.0
	Tidak	1	1.0
Please provide a list of hot foods that you avoid during pregnancy	Cili	1	1.0
	Rojak oedas, mee segera oedas, ayam goreng pedas, sambal	1	1.0
	durian	1	1.0
	Durian	1	1.0
	durian, tapai	1	1.0
	Pineapple, durian. Sugarcane juice	1	1.0
	Nil	1	1.0
	No	1	1.0
	None	2	2.0
	tiada	13	13.0
	Tiada	73	73.0
	Tidak	2	2.0
	Tisda	1	1.0
Reasons for its avoidance	Tuada	1	1.0
	High in calorie	1	1.0
	pantang larang orang tua-tua	1	1.0
	Perut saya pedih setiap kali makan pedas berlebihan	1	1.0
	Tidak tahan pedas	1	1.0
	To avoid miscarriage	1	1.0
	Nil	1	1.0
	Nine	1	1.0
	No	1	1.0
	None	1	1.0
	tiada	14	14.0
	Tiada	74	74.0

	Tidak	2	2.0
	Tuada	1	1.0
Reasons for its avoidance	Afraid of miscarriage	1	1.0
	Could lead to misscarriage	1	1.0
	gugur	1	1.0
	Bimbang kandungan tidak kuat	1	1.0
	Keguguran	1	1.0
	Mengelakkan daripada keguguran	1	1.0
	Menyebabkan keguguran	1	1.0
	Nenas tajam, takut keguguran	1	1.0
	takot keguguran	1	1.0
	takut keguguran	1	1.0
	Tidak baik untuk bayi bole mnyebabkan keguguran.	1	1.0
	To avoid miscarriage	1	1.0
	Too much can cause miscarriage	1	1.0
	Ambil secara Sederhana	1	1.0
	Kawan marsh..tapi sy mkn jugakk dgn Kadar sedikit	1	1.0
	Makan secara bersederhana	1	1.0
	Awal kehamilan sahaja	1	1.0
	Elak keguguran di peringkat awal	1	1.0
	Heard that it may cause miscarriage if consume it at early pregnancy	1	1.0
	Berhati hati takut akan keguguran kerana kehamilan pertama	1	1.0
	buah nenas kurang baik bg ibu mengandung	1	1.0
	Katanya tajam. Avoid to eat at early stage, tapi bila da start 2nd tri ada je makan tapi berpada. Tak makan banyak	1	1.0
	Bush Nenas tajam	1	1.0
	Nenas bersifat asid,tajam	1	1.0
	Nenas makanan yg tajam, pd awal kehamilan perlu dielakkan mengikut taboos	1	1.0
	Nenas tajam	1	1.0
	sbb tajam bg kandungan	1	1.0
	tajam	2	2.0
	Tajam	6	6.0
	Tajam ?	1	1.0
	Tajam dan gastrik	1	1.0
	Tajam utk kandungan	1	1.0

	Dont feel like eating it.	1	1.0
	I don't eat pineapple even before pregnant	1	1.0
	Sebab memang tak suka nenas dari dulu	1	1.0
	I dont like raw pineapple.	1	1.0
	tidak berminat	1	1.0
	Gatal lidah	1	1.0
	I don't want to risk my pregnancy risiko di awal kehamilan	1	1.0
	Menjaga kandunga	1	1.0
	Pantang larang org dulu2	1	1.0
	Pantang org tua	1	1.0
	Nil	1	1.0
	No	1	1.0
	tiada	5	5.0
	Tiada	42	42.0
	Tidak	1	1.0
	Yiada	1	1.0
Reasons for its avoidance	Air tebu blh buat bisa pd tubuh@urat	1	1.0
	penyebab sakit urat	1	1.0
	Air tebu tajam	1	1.0
	Bersifat tajam	1	1.0
	tajam	3	3.0
	Tajam	7	7.0
	Tajam serupa nenas	1	1.0
	Tajam utk kandungan	1	1.0
	Tebu pun tajam, takbagus untuk kandungan	1	1.0
	Ambil secara Sederhana	1	1.0
	Awal kehamilan sahaja	1	1.0
	To avoid miscarriage	1	1.0
	keguguran	1	1.0
	Elak keguguran di peringkat awal gugur	1	1.0
	Heard that it may cause miscarriage if consume it at early	1	1.0
	Gdm	1	1.0
	high in sugar	1	1.0
	Cus I don't drink it	1	1.0
	I don't like to drink any sugarcane even before pregnant	1	1.0
	I dont like it to begin with.	1	1.0
	I just don't like it	1	1.0

	Mak tak bagi plus memang tak suka	1	1.0
	Not my preference	1	1.0
	Sebab saya memang tidak suka air tebu	1	1.0
	Sebab tak minat tebu dari dulu	1	1.0
	Tidak gemar	1	1.0
	Tidak suka	1	1.0
	kurang baik untuk ibu mengandung	1	1.0
	Orang tua tak vagi	1	1.0
	Pantang org tua	1	1.0
	Sharp shooting pain and cramps after chugging a tall glass	1	1.0
	Not hygiene	1	1.0
	Tinggi racun furadan	1	1.0
	No	1	1.0
	Saya	1	1.0
	Tak tahu	1	1.0
	tiada	7	7.0
	Tiada	47	47.0
	Tidak	1	1.0
Reasons for its avoidance	Akan mengalami kencing manis	1	1.0
	gdm	1	1.0
	GDM & avoid UTI	1	1.0
	Risiko gdm	1	1.0
	Takun kena kencing manus	1	1.0
	takut tekanan gula dalam darah yang tinggi	1	1.0
	untuk mengelak daripada terkena gdm	1	1.0
	Utk mengelakkan dari GDM	1	1.0
	Bergas	2	2.0
	Jururawat suruh	1	1.0
	Excessive sugar	1	1.0
	Its too sweet and unhealthy. Also makes me gassy.	1	1.0
	Penuh gula penyebab berat badan naik	1	1.0
	Gula tinggi	1	1.0
	gula yang berlebihan	1	1.0
	High in sugar	1	1.0
	High in sugar level	1	1.0
	high sugar	1	1.0
	High sugar	5	5.0
	High sugar content	2	2.0
	High sugar content/ i dont like carbonated drinks	1	1.0

High sugar. Lagi pun saya memang sangat jarang minum air gas	1	1.0
Kandungan gula	1	1.0
Kandungan gula tinggi	2	2.0
Kandungan gula yang tinggi	1	1.0
Kandungan gula yang tinggi, memang tidak minum	1	1.0
Kandungn gula tinggi	1	1.0
Kerana makanan bergas tinggi gula	1	1.0
Manis	1	1.0
Manis & X suka rasanya	1	1.0
Manis sgt	1	1.0
Manis,kandungan gula tinggi	1	1.0
Tinggi gula	4	4.0
Tinggi kandungan gula. Menyebabkan risiko gdm	1	1.0
Too much sugar	1	1.0
Too sweet and carbonated. Try to avoid it	1	1.0
Unhealthy drink. Too much sugar	1	1.0
I didn't drink carbonated drinks even before pregnant	1	1.0
Memang tak suka	1	1.0
Memang tak suka minum	1	1.0
Jenis bukan penggemar air bergas dari sebelum kahwin	1	1.0
saya tidak suke minuman bergas	1	1.0
Minuman bergas adalah minuman tidak sihat	1	1.0
Not good for pregnancy	1	1.0
Tak baik utk kesihatan bayi dan ibu	1	1.0
Tak berkhasiat	1	1.0
Takbagus.	1	1.0
tidak bagus untuk kesihatan dan pertumbuhan bayi	1	1.0
tidak berkhasiat untuk ibu hamil	1	1.0
tidak sihat	1	1.0
Untuk kesihatan ibu dan anak dalam kandungan	1	1.0
dangerous to baby	1	1.0
tajam	1	1.0
Tajam	2	2.0
Untuk mengelak pereputan tulang dri lebih pantas	1	1.0

	menyebabkan angin semasa kehamilan	1	1.0
	Pantang org tua	1	1.0
	Perut terasa pedih bila minum	1	1.0
	Same as above	1	1.0
	No	1	1.0
	I dont avoid it. I love it.	1	1.0
	tiada	4	4.0
	Tiada	23	23.0
	Tiada but saya mmg x minum carbonated drink	1	1.0
Reasons for its avoidance	Ada alkohol	1	1.0
	ada kandungan alkohol?	1	1.0
	Contain alcohol	1	1.0
	Kandungan alkohol	1	1.0
	Aina mengalami keguguran	1	1.0
	gugur	1	1.0
	keguguran	1	1.0
	alah	1	1.0
	Asid	1	1.0
	Berasid, blh menyebabkan sakit urat	1	1.0
	Tinggi asid	1	1.0
	Too acidic	1	1.0
	Awal kehamilan sahaja	1	1.0
	panas	1	1.0
	Panas	1	1.0
	tapai bersifat panas..	1	1.0
	berangin	1	1.0
	risiko bagi kehamilan	1	1.0
	Tidak bagus	1	1.0
	Untuk keselamatan kandungan	1	1.0
	Untuk kesihatan kandungan	1	1.0
	Memang tak suka makan	1	1.0
	Cus I don't eat it	1	1.0
	didnt like	1	1.0
	Saya tak pernah makan dari dulu dan tak minat	1	1.0
	saya tidak mengambil makanan ini	1	1.0
	Saya xmkn tapai	1	1.0
	Tak makan	1	1.0
	Tak makan tapai	1	1.0
	Tak minat	1	1.0
	Tak suka, tak sedap	1	1.0

	Takbagus untuk kandungan, dan memang taksuka pun	1	1.0
	Tidak makan	1	1.0
	I don't like tapai	1	1.0
	I dont like it.	1	1.0
	Heart burn	1	1.0
	Kandungn gula tinggi	1	1.0
	Kerana makanan bergas tinggi gula	1	1.0
	Mak xbagi	1	1.0
	Nasihat dari orang yang lebih tua.	1	1.0
	Orang tua tak bagi	1	1.0
	Pantang org tua mudah semput	1	1.0
	Sejuk	1	1.0
	Tajam	8	8.0
	Same as above	1	1.0
	Nil	1	1.0
	No	1	1.0
	tiada	5	5.0
	Tiada	38	38.0
	Tiada sebab	1	1.0
Reasons for its avoidance	Actually x pernah makan	1	1.0
	I don't eat it	1	1.0
	I dont eat it.	1	1.0
	Never try	1	1.0
	Tidak makan	1	1.0
	saya tidak mengambil makanan ini	1	1.0
	Saya xrasa nk mkn rebung masa pregnant	1	1.0
	Tak pernah makan.	1	1.0
	Tak pernah rasa dan tak mahu makan	1	1.0
	Tidak pernah makan	1	1.0
	Akar boleh makan ke	1	1.0
	Akar tebu ?	1	1.0
	didnt know	1	1.0
	Tak pernah dgr	1	1.0
	Tak pernah tahu akar tebu	1	1.0
	Tak pernah tahu boleh makan	1	1.0
	TAK pernah tau yang akar tebu boleh makan ke	1	1.0
	Tak tahu	1	1.0
	Tak tahu apa ni	1	1.0
	gdm	1	1.0

	Bukan kesukaan	1	1.0
	I dont like it	1	1.0
	Tak minat	1	1.0
	Tidak minat	1	1.0
	Tidak suka	1	1.0
	High pescticides	1	1.0
	Jaga kandungan	1	1.0
	Menjaga kesihatan	1	1.0
	Untuk kesihatan kandungan	1	1.0
	sakit urat	1	1.0
	Pantang org tua	1	1.0
	Mak xbagi	1	1.0
	Taboos	1	1.0
	Tak sedap kot	1	1.0
	tajam	1	1.0
	Tajam	4	4.0
	No	1	1.0
	tiada	11	11.0
	Tiada	48	48.0
	Tiada, x pernah try pun	1	1.0
Reasons for its avoidance	Serupa tak bgus utk kesihatan waktu hamil	1	1.0
	Alan dapat Sarah tinggi	1	1.0
	didnt like	1	1.0
	Endocrine dysruptor	1	1.0
	Kemungkinan anak akan gelap	1	1.0
	kulit jadi hitam	1	1.0
	I love it.	1	1.0
	No	1	1.0
	None	1	1.0
	tiada	15	15.0
	Tiada	73	73.0
	Tidak	2	2.0
	Yiada	1	1.0
If "Yes", why?	apa yang ibu makan anak akan dapat zat nya	1	1.0
	bagi saya anak dalam kandungan akan mendapat nutrient daripada makanan ibu	1	1.0
	Cus baby is sucking out nutrients for their growth so we should be eating for two. As in for two people's adequate nutrients	1	1.0

Kena makanan yang lebih berzat BG menampung keihatan kandungan	1	1.0
Keperluan nutrition	1	1.0
Kerana bayi dlm kandungan memerlukan sumber makanam dari ibu	1	1.0
Memerlukan lebih zat utk ibu dan anak	1	1.0
Perlukan khasiat utk menmpung 2 nyawa	1	1.0
Sbb percaya bayi dapat sumber nutrisi drpd pemakanan ibu	1	1.0
Sebab bayi di dalam perut memerlukan nutrisi yang mencukupi	1	1.0
Sebab setiap nutrien yg kita makan juga akan tersalur kepada anak dalam kandungan	1	1.0
You eat for yourself and baby gets the benefit.	1	1.0
Because I often feel lightheaded and shaky whenever I'm not eating in between meals	1	1.0
Bila makan baby becoming active	1	1.0
Sebab bila makan bayi senang aktif	1	1.0
Cepat lapar 😊	1	1.0
I get very hungry	1	1.0
Kalau makan sedikit rasa xkenyang	1	1.0
Kerap lapar	1	1.0
Sepanjang kehamilan rasa lapar tu datang 3x ganda dari sebelum hamil xD	1	1.0
Extra calorie needed for featus development. I tend to eat less if it just for me	1	1.0
Penambahan kalori semasa hamil hanya sedikit sahaja	1	1.0
Kerana saya perlu makan lebih untuk kesihatan kandungan bayi	1	1.0
Perlu makan utk tumbesaran janin	1	1.0
sbb makanan juga untuk tumbledaran bayi dalam kandungan	1	1.0
Utk anak dlm kandungan	1	1.0
Hormon mungkin	1	1.0
Nafsu ketika hamil sukat d kawal	1	1.0
Sebab makan yang banyak	1	1.0
Sebab saya nak makan banyak	1	1.0
wanita hamil berbagi makanan dengan bayi yang dikandung	1	1.0

	makan makanan sihat sudah mencukupi	1	1.0
	Makan untuk tenaga dn nuterian untuk bayi cukup sahaja jadi makan sedikit tapi selalu itu penting untuk elak peruk masuk angin	1	1.0
	N/a	1	1.0
	No	1	1.0
	None	1	1.0
	tiada	12	12.0
	Tiada	50	50.0
	Tiafa	1	1.0
	Tidak	1	1.0
11. Is there any other food that you prohibit yourself from eating and what are the food? Please state and the reasons for its avoidance		18	18.0
	air kelapa	1	1.0
	Banyak, selalu buat research dulu makanan apa yang boleh dimakan&takboleh sewaktu hamil.	1	1.0
	buah tembikai kerana buah ininakan menyebabkan saya sakit badan dan mudah batuk	1	1.0
	Caffeinated drinks	1	1.0
	Coconut because im allergic to it during pregnancy	1	1.0
	Fast food takut tak baik untk baby	1	1.0
	Fast food, process food and caffeine	1	1.0
	Fast food. Not good for baby health.	1	1.0
	Fast foods; high sodium, cholesterol etc.	1	1.0
	Memang tidak berapa makan.		
	Fastfood ..lebih makan real food untuk hindar anak kuning dan juga jaga bmi ketika hamil	1	1.0
	Half boiled egg due to not fully cooked	1	1.0
	Half boiled eggs, sushi, cold pressed juice	1	1.0
	I am not avoid any food but i take it less	1	1.0
	Ikan keli	1	1.0
	Instead of nenas/ peria/ durian/ ikan pari or binatang yg ada bisa ktk hayatnya..	1	1.0
	Junk. Colourful. White sugar. Canned food. Preservatives. Dairy. Gluten. For healthy gut microbiome	1	1.0

Maggi, fast food. Tinggi kandungan garam	1	1.0
Mee segera sebab makanan tinggi MSG tak bagus utk kandungan	1	1.0
Mee segera sebab tak elok untuk kesihatan	1	1.0
Mengelakkan daripada keguguran	1	1.0
Milk. I will vomit every time i consume milky product. Eg : teh ais, susu kotak.	1	1.0
Nenas, sebab takut keguguran, but pernah termakan sikit sebelum ni tiada Ada APA yg berlaku but just be careful	1	1.0
No	2	2.0
None. I still eat raw fish during my pregnancy, as long as it is prepared by a professional chef	1	1.0
Perut rasa tak selesa	1	1.0
Pulut	1	1.0
Pulut - mainly because I feel gassy/angin after I eat	1	1.0
Rebung . Takut naik gatal gatal	1	1.0
Salmon, half boiled eggs	1	1.0
Seafood	1	1.0
Seafood, alergi	1	1.0
Sometimes spicy food because i have gastric.	1	1.0
Sushi (raw salmon)/ telur separuh masak. Risau beri kesan kepada kandungan kerana makanan tidak masak dengan sepenuhnya.	1	1.0
Sushi, half boiled egg, half cook or uncook dish	1	1.0
Sushi, runny egg yolk, basically uncooked foor because of salmonella	1	1.0
Tak ingat	1	1.0
tiada	11	11.0
Tiada	29	29.0
Tiada.	2	2.0
Tiada. Semua makan dalam kuantiti sikit, berpada pada. Asal dapat rasa masuk tekak cukup la	1	1.0
Tidak	1	1.0
Tidak ingat	1	1.0
Total	100	100.0