UNIVERSITI PUTRA MALAYSIA

DIET QUALITY AND OTHER FACTORS INFLUENCING BODY WEIGHT CHANGES DURING COVID-19 PANDEMIC AMONG LOW-INCOME ADULTS IN SELANGOR, MALAYSIA

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BY

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

This project entitled “Diet quality and other factors influencing body weight changes during COVID-19 pandemic among low-income adults in Selangor, Malaysia” was prepared by Tee Jia Ying and has been submitted to the Faculty of Medicine and Health Sciences as a partial fulfillment of the requirements for the degree of Bachelor of Science (Nutrition and Community Health) from the Faculty of Medicine and Health Sciences, Universiti Putra Malaysia.

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ABSTRACT

DIET QUALITY AND OTHER FACTORS INFLUENCING BODY WEIGHT CHANGES DURING COVID-19 PANDEMIC AMONG LOW-INCOME ADULTS IN SELANGOR, MALAYSIA

Tee Jia Ying

Body weight changes can be either weight gain or weight loss. Both modifiable and non-modifiable factors can contribute to this fluctuation of body weight. The outbreak of the COVID-19 pandemic had altered the lifestyle and brought along the new norms since 2020. In Malaysia, the implementation of the Movement Control Order (MCO), CMCO, RMCO, EMCO, and FMCO hit the economy harshly and therefore affected the low-income adults or the B40 households the most. With such, this cross-sectional study aimed to determine the associations between sociodemographic factors, lifestyle factors, emotional factors, and body weight changes during the COVID-19 pandemic among low-income adults in Selangor, Malaysia. A total of 142 respondents were included in the analysis with the majority of them were female, Chinese, and students at the mean age of 28.73 ± 8.26 years. About 84.4% of the respondents (n = 141) experienced weight changes during this pandemic with more than half of them (51.1%) gained weight while another 33.3% of them lost weight. It was found that age (r = -0.226, p = 0.007) and gender (χ^2 = 11.000, p = 0.004) were significantly associated with body weight changes at which female who was at a younger age tended to experience weight change. Meanwhile, 'fruits' (r = -0.200, p = 0.026) and 'sugar-rich foods' (r = 0.317, p = 0.038) from the diet quality index had found significantly correlated to the overall body weight changes and weight loss respectively, indicating that increased consumption of fruits helped in regulating body weight while decreased foods high in sugar managed to lose weight. Stress was also significantly and positively correlated with overall body weight changes (r = 0.180, p = 0.045), suggesting that the respondents might tend to consume sweet foods when stressed as a significant correlation was found between stress and 'sugar-rich foods' score (r = -0.209, p = 0.020). In conclusion, the findings found that the majority of the respondents experienced weight change during the pandemic and therefore weight management program is needed. Those who were females, at a younger age, consumed fewer fruits and more sugary foods as well as in stress were more likely to experience either weight gain or weight loss. Future studies are recommended to include questions on changes in income and/or occupation to provide a better overview of the impact of the pandemic and how these changes would then in turn reflecting on their body weight changes.

ABSTRAK

KUALITI DIET DAN FAKTOR-FAKTOR LAIN YANG MEMPENGARUHI PERUBAHAN BERAT BADAN SEMASA PANDEMIK COVID-19 DALAM KALANGAN ORANG DEWASA YANG BERPENDAPATAN RENDAH DI SELANGOR, MALAYSIA

Tee Jia Ying

Perubahan berat badan merujuk kepada kenaikan atau penurunan berat badan. Faktor-faktor yang boleh menyumbang kepada perubahan berat badan ini termasuklah faktor yang boleh diubah suai dan faktor yang tidak boleh diubah suai. Penularan wabak COVID-19 telah mengubah gaya hidup dan membawa norma baru sejak tahun 2020. Di Malaysia, pelaksanaan Perintah Kawalan Pergerakan (PKP), Perintah Kawalan Pergerakan Bersyarat (PKPB), Perintah Kawalan Pergerakan Pemulihan (PKPP), Perintah Kawalan Pergerakan Diperketatkan (PKPD), dan Perintah Kawalan Pergerakan Menyeluruh telah menyebabkan kesan negatif terhadap ekonomi negara dan ianya secara majoriti mempengaruhi orang dewasa yang berpendapatan rendah ataupun kumpulan isi rumah B40. Dengan demikian, kajian ini bertujuan untuk mengenalpasti hubungan antara faktor sosiodemografi, faktor gaya hidup, faktor emosi, dan perubahan berat badan semasa pandemik COVID-19 dalam kalangan orang dewasa yang berpendapatan rendah di Selangor, Malaysia. Seramai 142 orang responden yang terlibat dalam kajian ini. Majoritinya adalah wanita, bangsa Cina, dan pelajar yang berusia 28.73 ± 8.26 tahun secara purata berdasarkan analisis. Sejumlah 84.4% responden (n = 141) telah mengalami perubahan berat badan semasa pandemik ini, di mana lebih separuh daripada mereka (51.1%) mengalami kenaikan berat badan, manakala 33.3% responden mengalami penurunan berat badan. Usia (r = -0.226, p = 0.007) dan jantina (χ^2 = 11.000, p = 0.004) didapati mempunyai perkaitan dengan perubahan berat badan, di mana wanita yang berusia muda lebih cenderung mengalami perubahan berat badan. Sementara itu, 'buah-buahan' (r = -0.200, p = 0.026) dan 'makanan tinggi kandungan gula' (r = 0.317, p = 0.038) dari indeks kualiti diet telah didapati mempunyai perkaitan dengan perubahan berat badan secara keseluruhan dan penurunan berat badan masing-masing. Hal ini menunjukkan bahawa pengambilan buah-buahan yang banyak dapat membantu mengawal berat badan, manakala pengurangan makanan tinggi gula dapat menurunkan berat badan. Tekanan juga menunjukkan korelasi yang ketara dan positif dengan perubahan berat badan secara keseluruhan (r = 0.180, p = 0.045). Responden berkemungkinan mengambil makanan manis semasa tertekan. Hal ini kerana tekanan berhubung kait dengan ketara dengan skor 'makanan tinggi kandungan gula' (r = -0.209, p = 0.020). Secara kesimpulannya, hasil kajian ini mendapati bahawa sejumlah besar responden mengalami perubahan berat badan semasa pandemik ini. Oleh itu, program pengurusan berat perlu diadakan. Faktor wanita yang berusia lebih muda, kurang mengambil buah-buahan dan banyak mengambil makanan tinggi gula serta individu yang kerap mengalami tekanan lebih cenderung mengalami kenaikan atau penurunan berat badan. Untuk cadangan kajian masa hadapan, pertanyaan mengenai perubahan pendapatan dan pekerjaan boleh ditambah supaya dapat membantu lebih memahami kesan pandemik seterusnya dapat mengenali kesannya terhadap perubahan berat badan.

CHAPTER 1: INTRODUCTION

1.1 BACKGROUND

Body weight changes can be either the gain or loss in total body weight (Walker et al., 1990). Body weight would be affected if there is an imbalance between the energy intake and energy expenditure (Chow & Hall, 2008). The factors contributing to the changes in body weight can be either modifiable or non-modifiable. Non-modifiable factors included the age, gender, genetics, and the determinants of development. On the other hand, modifiable factors comprised of diet, physical activity level, environmental and social factors (Institute of Medicine (US) Subcommittee on Military Weight Management, 2004). In this study, the factors to be identified are modifiable factors where the individuals can control in weight management.

According to the World Health Organization (WHO), adults are defined as those older than 19 years of age provided the nation laws did not have an earlier age definition. In Malaysia, the Age of Majority Act 1971 defined adults as those aged 18 years and above. Malaysians are classified into three categories based on the monthly household income; B40, M40, and T20 who represent the bottom 40%, middle 40%, and the top 20% of income earners. According to the Household Income & Basic Amenities Survey Report 2019, the low-income earners, or the B40 group, are those who earned RM4,849 and below while the threshold for M40 and T20 groups was from RM4,850 to RM10,959 and more than RM10,959 respectively. Therefore, low-income adults in this study are defined as those from the B40 group.

In 2020, the COVID-19 pandemic caused by the SARS-CoV-2 strain of coronavirus had affected the world (Lipsitch et al., 2020). As of 24th of December, 2020, the cumulative cases of COVID-19 in Malaysia had surpassed 100,000 cases since the first case reported in Malaysia in January of the same year (*Situasi Terkini COVID-19 di Malaysia 24 Disember 2020*, 2020). Several countries had entered a lockdown, imposing national quarantine in order to prevent the further spreading of COVID-19. In Malaysia, the Prime Minister, Tan Sri Muhyiddin Yassin declared the whole nation to be on a Movement Control Order (MCO) (‘*Perintah Kawalan Pergerakan’*) which started from the 18th of March, 2020 until the 31st of March, 2020 due to the spike in COVID-19 cases. The MCO was extended thrice after the 31st of March, from the 1st of April until the 12th of May, 2020. The MCO was lifted to the Conditional Movement Control Order (CMCO) starting from the 4th of May and entered the Recovery Movement Control Order (RMCO) starting from the 10th of June until the 31st of December, 2020. Several states or areas were imposed with the Enhanced Movement Control Order (EMCO) or CMCO throughout the second half-year of 2020 if there were clusters or large numbers of positive cases reported. The RMCO was extended until the 31st of March, 2021 and the MCO was reimplemented twice in 2021 and Full Movement Control Order (FMCO) was implemented starting from June due to the drastic increment of positive cases up to 8000 cases daily.

During the MCO, all premises were closed except for those providing essential services (for instance, banking and finance, healthcare and medical) and involved in selling basic necessities (for example, convenience stores, supermarkets, and public markets). Sports facilities and recreational parks were closed, however, supermarkets and grocery stores were still allowed to open as well as the food premises which provided only

the ‘take-away’ or ‘delivery’ services (Malaysian National Security Council, 2020a). People were only allowed to travel alone for the daily necessities purposes within a 10km radius from the residential area (Bernama, 2020). Such restrictions were removed followed by the lifting of the MCO to the RMCO, yet, the areas where the EMCO or CMCO were implemented still following the order or had to alter the operation hours for certain premises. For instance, sports and recreational activities were not allowed if the involvement of crowds is required and physical social distance is hard to be controlled during the CMCO implemented in Kuala Lumpur, Sabah, Selangor, Pulau Pinang, Negeri Sembilan, and Johor in December of 2020 (Malaysian National Security Council, 2020b).

As premises were closed or shortened their operation hours during the COVID-19 pandemic, the most affected would be the B40 group since they might earn lesser or even lost their jobs. A working paper revealed that more than half of the B40 group suffered a negative cash-flow during the MCO period (Flanders et al., 2020). The Nielsen Company also revealed that those from lower income tried to cut down their expenses and seek cheaper options when purchasing under this situation (Recalibrated Consumption Dynamics in a COVID-19 Altered World, 2020). As the food expenses contributed to the second-largest household expenditure, hence, there might be possibilities that people would cut down the expenses on food which in turn affect their body weight as food prices and body weight are correlated (Department of Statistic Malaysia, 2020; Grossman et al., 2014).

During this pandemic, all individuals’ lifestyle was affected whereby the regular sports routine of individuals was affected. The sports facilities were closed and the movement was restricted, thus, most of the individuals tended to be less physically active

and the screen time might be prolonged (Bas et al., 2020). Such conditions have actually worsened the mental health as well since the individuals were experiencing the changes from the normal social life. As a result, the eating habit might be altered whereby there is an increased tendency of comfort eating as a way of relieving stress (Khan & Moverley Smith, 2020). The relationship between physical activity and body weight was well-established and with the forced restriction of movement there is a higher chance of weight gaining rather than weight losing. In China, there was a study conducted to assess the body weight changes during the semi-lockdown period after the COVID-19 outbreak and the results showed that normal-weight individuals and overweight or obese females gained weight while the overweight or obese males lost weight (He et al., 2020). Limited studies were found in Malaysia in identifying the body weight changes during the COVID-19 pandemic, thus, this study will be focusing on the factors associated with the body weight changes during this emergency, particularly among the low-income adults.

1.2 PROBLEM STATEMENT

Daily body weight fluctuation is normal as the body composition is dynamic. However, a significant body weight change can be either beneficial or detrimental to body health. For an overweight or obese individual, a weight loss is beneficial to lower the risk of other comorbidities, yet, it might be detrimental to normal body weight or underweight individuals. Meanwhile, it is good for the underweight individual to gain weight but not for the individual with normal or excess body weight.

The COVID-19 pandemic was a global issue whereby it brought away uncountable lives and led to economic loss which affected those with lower income the most. Meanwhile, the implementation of the MCO, CMCO, EMCO, or RMCO was an effective way to prevent the further spread of COVID-19. It helped to break the transmission of the virus by minimising the physical contact between individuals. It managed to halt the further spreading of the COVID-19, yet, raised up another health issue that needs to pay attention to as the lifestyles of individuals had been altered. It was suggested that low-income earners had a higher tendency to be obese or gain weight (Andoy-Galvan et al., 2020; Ball & Crawford, 2005). Therefore, there is a need to identify whether the pandemic of COVID-19 did affect these low-income earners' body weight change, to be more specific, weight gain.

The relationship between lifestyle behaviours and body weight was long established at which it was well-known that physically inactive and poor diet quality will contribute to weight gain (Martin et al., 2019; Mozaffarian et al., 2011). Restriction on movements not only affected individuals' physical health but also the mental health (Bas

et al., 2020). Several studies had shown that stress, anxiety, and depression may contribute to weight changes among adults (Haidar et al., 2018; Richardson et al., 2015; Sahle et al., 2019).

It was suggested that the COVID-19 lockdown would contribute to weight changes (Bas et al., 2020; Bhutani & Cooper, 2020; Khan & Moverley Smith, 2020), specifically weight gain. To date, there are several studies conducted in foreign countries to investigate the body weight changes related to the altered lifestyle during the COVID-19 pandemic but not yet in Malaysia (ALMughamis et al., 2020; Drywień et al., 2020; He et al., 2020; Kriaucioniene et al., 2020; Pellegrini et al., 2020; Reyes-Olavarría et al., 2020; Xia et al., 2020; Zachary et al., 2020). The effects of previously established factors on the body weight changes among the Malaysian population remained unclear. Therefore, this study is aimed to identify the factors associated with body weight changes during the COVID-19 pandemic among low-income adults in Selangor.

Research Questions:

1. Are there any body weight changes among the low-income adults in Selangor during the COVID-19 pandemic?
2. Which of these factors, sociodemographic factors, lifestyle factors, emotional factors, associated with body weight changes?

1.3 SIGNIFICANCE OF THE STUDY

The COVID-19 pandemic altered the normal lifestyle and the implementation of the MCO or lockdown restricting the freedom of individuals was a new measure. In the history of Malaysia, this situation had never been experienced, not even during the Severe Acute Respiratory Syndrome (SARS) nor the Middle East Respiratory Syndrome (MERS) outbreak. Previous studies had shown that decreased physical activity level and poor diet quality contributed to weight gain, however, the relationship was made under the usual daily life. Hence, this study can help the researchers, nutritionists, and other health professionals to understand this relationship during the emergency or pandemic in order to come out with some planning which can assist the population to have a healthy lifestyle under this situation, especially the low-income earners.

Meanwhile, it was known that low-income adults were highly affected during the COVID-19 pandemic due to decreased income or even jobless. This study is aimed to serve as baseline data in identifying the effects of pandemic towards this vulnerable group. The data can help the government or related agencies in developing intervention strategies or programs that can benefit the group and improve their life. It can also prepare the related agencies in facing this kind of emergency in the future.

In addition, studies about lockdown during the COVID-19 pandemic and the body weight changes were limited. Such studies were conducted in other countries, for example, China. In Malaysia, limited studies were found in identifying body weight changes during the COVID-19 pandemic. After conducting this study, the body weight changes during the COVID-19 pandemic and the contributing factors can be determined among the low-

income adults in Selangor, Malaysia. The data collected can be used by the government, the health care professionals, or even the non-government organisations (NGOs) to prepare suitable programmes and help low-income individuals to tackle the problems.

1.4 OBJECTIVES

1.4.1 GENERAL OBJECTIVE

To determine the associations between sociodemographic factors (age, gender, ethnicity, education level, occupation, income status, food expenses, household size), lifestyle factors (physical activity level, diet quality, habitual food intake), emotional factors (anxiety, depression, stress) and body weight changes during the COVID-19 pandemic among low-income adults in Selangor, Malaysia.

1.4.2 SPECIFIC OBJECTIVES

1. To determine the sociodemographic factors (age, gender, ethnicity, education level, occupation, income status, food expenses, household size), lifestyle factors (physical activity level, diet quality, habitual food intake), and emotional factors (anxiety, depression, stress) among respondents.
2. To determine the body weight changes during the COVID-19 pandemic among respondents.
3. To examine the associations between sociodemographic factors, lifestyle factors, emotional factors, and body weight changes among respondents.

1.5 RESEARCH HYPOTHESIS

1. There is a significant association between sociodemographic factors and body weight changes among respondents.
2. There is a significant association between lifestyle factors and body weight changes among respondents.
3. There is a significant association between emotional factors and body weight changes among respondents.

1.6 CONCEPTUAL FRAMEWORK

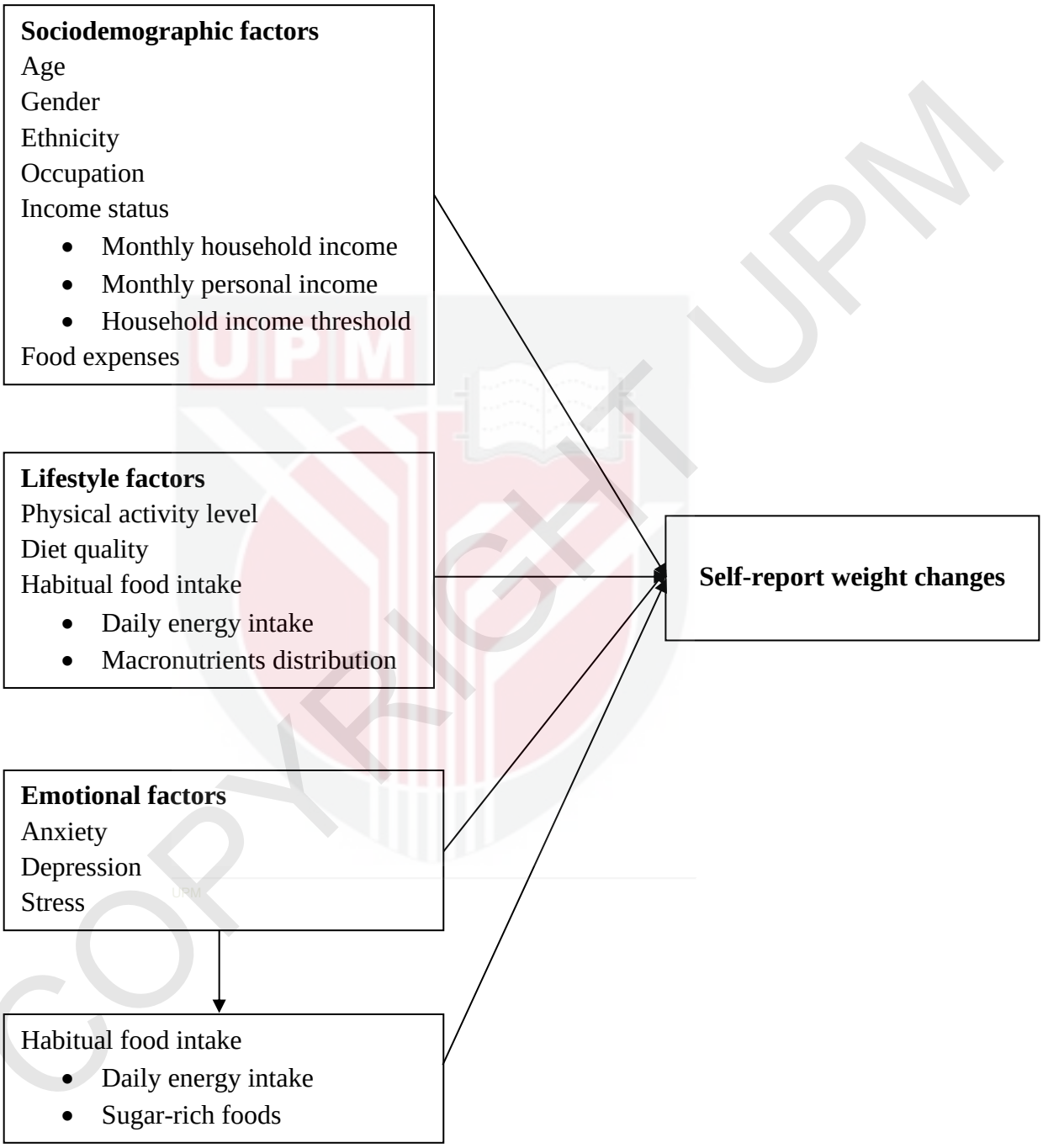

Figure 1.1 Conceptual framework of the study

CHAPTER 2: LITERATURE REVIEW

2.1 OVERVIEW OF WEIGHT CHANGES

Body weight changes have resulted from an imbalance between energy intake and energy expenditure. It can be either weight gain or weight loss. Globally, weight gain is on a trend whereby in 2016 the prevalence of overweight among adults was 39% for both males and females (Overweight and obesity, 2018). In Malaysia, 50.1% or 1 in 2 adults are either overweight or obese (Institute for Public Health (IPH), 2020). Regardless of weight gain or weight loss, the fluctuation of body weight can be affected by several factors. In this literature review, the factors which affect the change in body weight will be discussed.

2.1.1 OVERVIEW OF WEIGHT CHANGES DURING COVID-19 PANDEMIC

The COVID-19 pandemic hit the world with uncountable deaths and altered everyone's lifestyle. A lockdown, either fully or semi, limited the movements of individuals, turned the individuals to become more sedentary. Meanwhile, tremendous changes in lifestyle not only affected the individuals physically but also emotionally. These changes were reflected in the body weight of the individuals. Several studies were conducted overseas, showing that during the pandemic, most of the individuals experienced either weight gain or weight loss resulted from the lifestyle changes (ALMughamis et al., 2020; Drywień et al., 2020; He et al., 2020; Kriaucioniene et al., 2020; Pellegrini et al., 2020; Reyes-Olavarría et al., 2020; Xia et al., 2020; Zachary et al., 2020).

The studies were conducted in Chile, China, Poland, Italy, Lithuania, and Kuwait respectively to identify the effects of lifestyle alteration during the unusual event or confinement towards the body weight changes. In the study conducted among 339 adults in China, He et al. (2020) classified the respondents based on their gender and BMI category whereby BMI <24kg/m^2 was considered as low BMI while BMI ≥24kg/m^2 was high BMI. It showed that adults with low BMI and females with high BMI gained weight while males with high BMI lost weight during the semi-lockdown period in China (He et al., 2020).

There was another online survey conducted among 530 adults in China showed that almost half of them gained weight during the self-quarantine period (Xia et al., 2020). The mean weight change of the respondents was 0.822 ± 3.31kg (Xia et al., 2020). Notably, nearly half (43.77%) of the respondents experienced weight gain during the lockdown with the mean of 2.99 ± 2.29kg (Xia et al., 2020). However, there were also about 30% of the respondents lost weight with a mean of 2.88 ± 1.99kg in reduction (Xia et al., 2020). The study found that respondents with normal BMI had a higher tendency to gain weight than obese respondents (p = 0.001), yet, it may due to the lesser number of obese respondents (Xia et al., 2020).

Meanwhile, another study conducted among 700 Chilean adults showed that 25.6% of the men (n = 172) and 38.1% of the women (n = 528) gained weight during the COVID-19 confinement action in Chile (Reyes-Olavarría et al., 2020). At the same time, more than half of the adults reported having a reduction in their physical activity levels during the period of confinement (Reyes-Olavarría et al., 2020). Meanwhile, Reyes-Olavarría et

al. (2020) also found that there was a relationship between food habits and body weight increment during the study period.

A population study conducted among women (n = 1,769) in Poland showed that the respondents gained weight with a mean of 0.4kg whereby 33.6% of the women gained weight in the study period (Drywień et al., 2020). Drywień et al. (2020) divided the respondents according to their BMI category and notably, the majority of the respondents in each subgroup lost weight except the "obesity group" where weight gain was dominant. It was found that being obese before the pandemic had about 1.65 times (95% CI = 1.18, 2.32, $p < 0.01$) or 1.64 times (95% CI = 1.15, 2.32, $p < 0.01$) of gaining weight, either with or without adjustments (Drywień et al., 2020). The possible reason for such dominance may be explained by the negative dietary alteration, for instance, taking unhealthy foods such as confectionery, commercial pastry, and fast food as snacks where overweight and obese subjects were the most prone to such alteration (Drywień et al., 2020).

In Northern Italy, a retrospective study was conducted among 150 adults with obesity to determine the dietary habits and body weight changes after a lockdown lasted for 1 month. Body weight of the respondents was collected based on a self-reported approach and Pellegrini et al. (2020) found that there was a significant weight gain among the respondents. On average, the respondents gained 1.51kg ($p < 0.001$) during the 1 month-lockdown (Pellegrini et al., 2020). Lower education, anxiety/depression (self-reported), and not consuming healthy food were found to be related to weight gain among the respondents (Pellegrini et al., 2020).

An online cross-sectional survey was conducted among the Lithuanians in order to identify the COVID-19 quarantine impacts on their lifestyle habits and the association between such habits and changes in weight (Kriaucioniene et al., 2020). The study involved 2,447 adults of which 31.5% of them self-reported gained weight during the quarantine (Kriaucioniene et al., 2020). It was found that BMI was positively associated with weight gain whereby overweight and obese respondents gained more weight than normal BMI respondents ($p < 0.05$) (Kriaucioniene et al., 2020). This may be due to the alteration in the diet to a negative direction, which was, reduced consumption of healthy foods such as fruits and vegetables, and increased consumption of unhealthy foods and snacks (Kriaucioniene et al., 2020).

Similar to other studies, a cross-sectional survey conducted in Kuwait found that there was a significant change in body weight before and during the COVID-19 quarantine (ALMughamis et al., 2020). The mean weight of the respondents (n = 462) increased from 75.03 ± 16.85kg to 75.74 ± 17.54kg during the quarantine period, showing a significant increment in body weight (Mean difference = -1.13, SD = 5.39, $p < 0.001$) (ALMughamis et al., 2020). Such gaining in body weight was explained by unhealthy eating habits and being sedentary during the quarantine period (ALMughamis et al., 2020).

In addition, a cross-sectional survey that used Facebook to reach out its possible respondents found that self-quarantine due to the COVID-19 pandemic had led to body weight changes among the respondents. A total of 173 respondents was recruited and about 41% of the respondents had experienced weight change during their self-quarantine period (Zachary et al., 2020). The percentage of weight gaining and weight losing was similar, which were 22% and 19% respectively (Zachary et al., 2020). On average, the

respondents gained or lost 5 to 10 pounds during the period (Zachary et al., 2020). However, 4% of the respondents lost even more weight which were more than 10 pounds (Zachary et al., 2020).

2.2 ASSOCIATION OF SOCIODEMOGRAPHIC FACTORS AND BODY WEIGHT CHANGES

There is an association of sociodemographic factors and body weight changes and such association had been proved by several studies whereby the body weight of an individual can be influenced by his or her sociodemographic background (Buder, 2020; Pengpid & Peltzer, 2020). In this study, sociodemographic factors such as age, education level, occupation, income status, and food expenses are reviewed to determine their associations with body weight changes.

2.2.1 AGE

Age is well-known for its association with body weight changes. As an individual grows older, the tendency of gaining weight will be higher due to the redistribution of body fat (Rosenbaum et al., 2000; Sasaki, 2015). A follow-up study on 131 college students noted that 70.2% of the respondents gained weight at the end of the senior year if compared to the beginning of their freshman year (Gropper et al., 2012). In the study, the respondents increased an average of 3.0kg in their body weight whereby males (5.9kg) gained more weight than their counterparts (1.7kg) ($p < 0.0005$) (Gropper et al., 2012).

On the other hand, another cohort study showed that the amount of weight change was different at different age range and BMI. The study presented the weight change data according to gender and age range which were 18-35 years, 35-50 years, and 50-baseline age (Renehan et al., 2012). The baseline age here was referred to the transformation to the late adulthood among the men respondents and to the postmenopausal years among the

women respondents (Renehan et al., 2012). Renehan et al. (2012) noted that men at 18-50 years gained weight 1 year after the baseline regardless of their baseline body weight status while men at 50 years to baseline age (late adulthood) gained weight only for 23.0kg/m^2 and above. For their counterparts, underweight women (< 18.5kg/m^2) lost weight for both 18-35 years and 35-50 years women while normal weight and overweight/obese women (18.5kg/m^2 onwards) gained weight (Renehan et al., 2012). Women with BMI ≤ 21.9kg/m^2 lost weight for those aged 50 years and above those with BMI ≥ 22.0kg/m^2 experienced weight gain for the women within this age range (Renehan et al., 2012). Therefore, it can be said that weight gain is dominant at different age range.

During the pandemic of COVID-19, age was found to be in relation to body weight changes. A cross-sectional online survey on Poland women found that being older had less tendency to lose weight in the period of COVID-19 quarantine in Poland (Drywień et al., 2020). The study analysed that being older age had about a 22% lesser chance of losing weight after adjustments (aOR = 0.78, 95% CI = 0.69, 0.89, p < 0.001), possibly due to the perimenopause which resulted in metabolic changes (Drywień et al., 2020).

In a Lithuanian study, it was found that older age increased the odds of gaining weight in association with other variables (Kriaucioniene et al., 2020). There was no association between age and weight gain solely, however, when incorporated with other variables that were related to food consumptions, a significant association was established (Kriaucioniene et al., 2020). It was found that those who aged 36 to 50 years (OR = 1.36, (1.06 - 1.73), p = 0.014) and ≥ 51 years (OR = 1.80 (1.35 - 2.39), p = 0.001) had higher odds of weight gain if compared to those aged 18 to 35 years (Kriaucioniene et al., 2020).

In Spain, a cross-sectional study found that age was related to body weight changes during the COVID-19 pandemic. Out of 675 respondents, 38.8% of them gained weight while another 31.1% lost weight during the lockdown period in Spain (López-Moreno et al., 2020). Significantly, age was correlated to weight variation during the lockdown (R_s = 0.138, $p < 0.01$) (López-Moreno et al., 2020). In more specific, those who aged 30 to 65 years experienced a positive weight change of 0.27kg while those who were 18 to 30 years and more than 65 years lost 0.26kg and 0.14kg respectively (p = 0.012) (López-Moreno et al., 2020).

2.2.2 EDUCATION LEVEL

The education level of an individual can influence his or her body weight change. A cohort study, namely the Young Finns Study was conducted in Finland whereby the respondents were chosen during their childhood age and follow-up examinations were carried out during their young adulthood and middle age (Kaikkonen et al., 2015). The study found that education level was negatively associated with weight change among women (n = 923, r = -0.097, $p < 0.01$) at which low-educated women were more susceptible to weight change, specifically weight gain (Kaikkonen et al., 2015). Meanwhile, Kaikkonen et al. (2015) noted that the education level was also associated with weight change among men (n = 792, r = -0.04) though the correlation was not significant.

While identifying the relationship between education level and body weight changes among the adults during the COVID-19 pandemic, it was identified that education

level was one of the factors contributing to weight changes. A sum of 150 obese adults was recruited in Northern Italy to determine the factors contributing to weight change during the 1-month confinement implemented in Italy (Pellegrini et al., 2020). There was a significant difference between those with at least secondary school education level (weight gain = 2.53kg) and none secondary school education level (weight gain = 0.89kg, p = 0.013) (Pellegrini et al., 2020). The multiple regression analysis also found that education level was negatively associated with body weight changes at which a lower education level was related to increased weight during the 1-month lockdown (β = -1.15 (-2.13 - -0.17), p = 0.022) (Pellegrini et al., 2020). This low education level may indicate a low socioeconomic level which may then affecting food choice for purchasing more longer shelf life but highly processed foods in order to cut down the budget (Pellegrini et al., 2020).

Meanwhile, according to the French NutriNet-Santé cohort study, it was found that education level was associated with weight loss in men (Deschasaux-Tanguy et al., 2020). A number of 37,252 respondents were involved in this study, with 52.3% of them were women (Deschasaux-Tanguy et al., 2020). There were 35% of the respondents gained weight in a 2-month duration of lockdown while 23% of the respondents lost weight during the period (Deschasaux-Tanguy et al., 2020). When further identifying, those who lost weight were most likely to have a high-school (OR = 1.24 (1.09 - 1.41)) or undergraduate degree (OR = 1.13 (1.01, 1.26)), if compared to those with an education level lower than high school degree (Deschasaux-Tanguy et al., 2020).

2.2.3 OCCUPATION

The type of occupation can influence the body weight of an individual as occupation can affect one's physical activity level. There was a study in United States (U.S.) on the trend of occupation-related physical activity in associated with obesity over 50 years (Church et al., 2011). The study analysed energy expenditure of the adults from U.S. private industry starting from 1960 (Church et al., 2011). It found that nearly 50% of the jobs needed moderate intensity physical activity at minimum but reduced to less than 20% of the jobs which are moderately intense in recent years (Church et al., 2011). As a result, there was a reduction in the energy expenditure related to daily occupation for more than 100 calories, hence, accounting for the increase in average body weight among the U.S. population (Church et al., 2011).

There was a systematic review on determining how the shift work exposure affects the body weight change among the working adults. In the review, shift work was referred to work that not following the regular working hours which is the daytime hours during weekdays, including the night work (van Drongelen et al., 2011). The review found that shift work were related to body weight change with or without adjusted (van Drongelen et al., 2011). Another cross-sectional study in Korea also revealed that night work influenced weight change either in gaining or losing weight. The data of the study was taken from the fifth Korea National Health and Nutrition Examination Survey (KNHANES) with national representative sample (Kwon et al., 2016). Kwon et al. (2016) noted that night work caused males to experience weight loss (OR = 0.34). On the other hand, night work was associated with both weight gain (OR = 2.83) and weight loss (OR = 1.95) among the females (Kwon et al., 2016).

As lockdown, circuit breaker measures, movement control, or any form of home confinements being implemented globally, the policy of 'work from home' or 'study at home' was adapted during the COVID-19 pandemic. In the PLifeCOVID-19 Study conducted among 1,769 women in Poland, Drywień et al. (2020) found that nearly half of the women (49.7%) who lost weight were either working or studying at home. The study found that women who worked or studied at home had a 2 times-higher chance of losing weight compared to those working as usual (aOR = 2.01 (1.27 - 3.18), $p < 0.01$) (Drywień et al., 2020). Such changes may be resulted from the increased interest in healthy eating and reduction of social gatherings which were more often resulting in increased food intake (Drywień et al., 2020).

Similarly, the change of working mode during the COVID-19 pandemic was found to increase the perception of gaining weight among the Italians (Di Renzo et al., 2020). The COVID-19 pandemic altered the mode of working in Italy where the work may come to a halt or change to remote working (Di Renzo et al., 2020). The study had shown that Italians who had altered mode of working, either stopped from the usual work or work remotely, were more likely to perceive themselves gained weight during the confinement if compared to those who remained their mode of working (OR = 1.25, $p = 0.037$), though such perception did not being discussed by the authors (Di Renzo et al., 2020).

2.2.4 INCOME STATUS

The income status of an individual or a household can affect the individual's body weight changes. It was found that the prevalence of obesity was higher among the low-income population (Drewnowski & Specter, 2004). Besides, the study from Templin et al. (2019) also revealed that there was an increasing trend in the prevalence of overweight among the poor in low- and middle-income countries. In Japan, women who came from household with lower income was more likely to be overweight and obesity (Nakamura et al., 2018).

In addition, there was a study on identifying the factors affecting weight loss among the obese adults who were at the prediabetic stage. The study collected the data from 1973 adults prospectively and analysed the factors using stepwise multiple regression analyses (Hansen et al., 2018). It found that adult with a higher income experienced greater weight loss than the low income earner (Hansen et al., 2018).

During the COVID-19 pandemic, economic loss was another issue being discussed and income may be a factor related to weight changes among the adults. It was found that the middle socioeconomic level was significantly associated with weight gain in an online survey conducted in Chile in 2020 (OR = 1.48 (1.04 - 2.10), $p = 0.027$) (Reyes-Olavarría et al., 2020). It may due to the flexibility to make healthy choices in relation to financial support and occupation (Reyes-Olavarría et al., 2020).

2.2.5 FOOD EXPENSES

Expenditure or investment on food can somehow affect body weight changes in an individual because it directly affects the dietary intake and diet quality which in turn reflect in the body weight. A cohort study was carried out prospectively in Spain to identify the impacts of food expenditure changes on the body weight changes among the adult population (Schröder et al., 2016). A sample of 3058 adults aged 25 to 74 years were enrolled in 2000 with a follow-up rate of 80.3% in 2009 and the final sample size was 2112 after eliminated the missing data (Schröder et al., 2016). There was an increase in the food expenditure throughout these 10 years, therefore, improving the diet quality (Schröder et al., 2016). In the study, Schröder et al. (2016) found that increasing 1€ per 8.36MJ energy intake was related to a reduction of 0.3kg body weight ($p = 0.02$) using the multiple linear regression analysis.

Meanwhile, healthy foods tend to have a higher price than unhealthy foods whereby this factor may affect those who have less purchasing power while making food choices. They will tend to buy unhealthy foods which are mostly energy-dense to save costs. There was a study in Italy identified that increased healthy food prices shifted the food consumption to unhealthy foods which reflected on body weight among the poor with low education levels (Pieroni et al., 2013). The study used the data from the Italian Household Budget surveys (IHBS) (1997 – 2005) to formulate the model explaining the trend of food prices and body weight (Pieroni et al., 2013). It was found that Italians consumed more unhealthy foods such as pork and other fatty meats, butter, and lard in response to the increase in healthy food prices and these unhealthy foods were higher in

calories (Pieroni et al., 2013). The increasing trend of healthy food prices explained body weight gain among Italians (Pieroni et al., 2013).

As the COVID-19 pandemic hit the economy as well, in response to the economic crisis, people tried to cut down their expenses. The adult equivalent was calculated at which those who aged above 14 in a household weighed 1 while those who under 14 years weighed 0.25 (Mahmud & Riley, 2021). There was a change in food expenses among 1,277 households in rural Uganda at which the authors observed a 40% reduction in food expenses per adult equivalent (Mean at baseline = US$ 178.59, Mean reduction after lockdown = US$ 72.675 PPP, SD = US$ 8.844 PPP, $p < 0.01$) (Mahmud & Riley, 2021). The COVID-19 led to a decrease in monthly household income, therefore, the respondents chose to cut down their expenses on food (Mahmud & Riley, 2021).

2.3 ASSOCIATION OF LIFESTYLE FACTORS AND BODY WEIGHT CHANGES

Lifestyle factors are always associated with body weight in which they are modifiable and these are the focus of health practitioners in organising a health promotion program. Lifestyle factors include physical activity, dietary intake, smoking, and alcohol intake (Rizzuto & Fratiglioni, 2014). In this study, physical activity and dietary intake are included as the independent variables of body weight changes.

2.3.1 PHYSICAL ACTIVITY LEVEL

The association of physical activity level with body weight had been well established since years ago whereby a lower physical activity level is always related to a tendency of weight gaining. A randomized control study proved that a higher level of physical activity can help to prevent weight gain among a group of young adults. There were 599 young adults who were assigned into 3 groups at which different treatments were provided to these 3 groups respectively (Unick et al., 2017). The treatments were a reduction of calorie intake by 100kcal/day in addition to an extra 2000 steps/day (Small Changes), a reduction of 2.3 to 4.5kg initially with an increase of physical activity to $\geqslant$ 250 minutes/week (Large Changes), or control condition (Self-guided) (Unick et al., 2017). The body weight, daily steps, and bout-related moderate-to-vigorous intensity physical activity (MVPA) of the participants were recorded at baseline, 4 months, 1 and 2 years of the study (Unick et al., 2017). Overall, the study found that participants who gained more than 1 pound had a lesser bout-related MVPA in each time point if compared to those not

gaining more than 1 pound within the study duration (Unick et al., 2017). Therefore, the study concluded an increase in bout-related MVPA could help to prevent weight gain (Unick et al., 2017).

As a measure of preventing the spread of the COVID-19, most of the countries restricted and encouraged individuals to stay indoors. Such measures limited the physical movements of the individuals which in turn promoted a sedentary lifestyle. In addition, the work-from-home policy also increased the screen time of the individuals, making individuals become more inactive. A study was conducted in China to determine the effect of semi-lockdown implementation on the changes in physical activity towards body weight. Among 339 adults who participated in the study, both males and females with a BMI <24kg/m^2 gained weight during the semi-lockdown implementation period due to a significant reduction in daily steps and exercise time (He et al., 2020). It was found that both average steps (Males: R_s = -0.323, p < 0.001; Females: R_s = -0.203, p = 0.006) and average time allocated for moderate/vigorous exercise (Males: R_s = -0.194, p = 0.063; Females: R_s = -0.193, p = 0.009) were negatively associated with body weight for both males and females, though the association between males and average time for exercise was not significant (He et al., 2020). The group of adults who gained weight was physically active before the pandemic, thus, maintaining a normal body weight status (He et al., 2020). The study showed that the COVID-19 pandemic altered the physical activity level of an individual resulting in changes in body weight.

Another cross-sectional survey conducted in India also found that the COVID-19 situation had led to a decline in physical activity level. The online survey collected data from 995 respondents and it found that there were a significant decrease in moderate-

intensity aerobic exercises practice ($p < 0.05$) as well as leisure-related activities ($p < 0.001$) (Chopra et al., 2020). Meanwhile, there was an increase in screen time and also sitting time at work whereby the increments were significant ($p < 0.001$) (Chopra et al., 2020). The survey showed that half of the respondents did not perform regular exercise during the COVID-19 pandemic (Chopra et al., 2020). According to Chopra et al. (2020), such a reduction of involvement in physical activity was due to limited access to facilities, followed by time limitation and motivation. Therefore, the survey once again proved that the COVID-19 impacted the physical activity level of the individuals and this may then affect the body weight of the individuals.

In Chile, physical activity was reported to be a protective factor against weight gain during the COVID-19 pandemic. The median of physical activity times and minutes for the 700 respondents were 2 times/week and 30 minutes/session respectively and it was found that half of the respondents (54.4%) spent ≥ 6 hours daily (Reyes-Olavarría et al., 2020). Significant associations were found between physical activity-related parameters and weight gain. Active breaks (OR = 0.72 (0.53 - 0.99), $p = 0.04$), mixed physical activity (OR = 0.63 (0.40 - 0.99), $p = 0.048$), 30-60 minutes of exercise session (OR = 0.61 (0.42 - 0.90), $p = 0.011$), yoga and Pilates (OR = 0.53 (0.31 - 0.90), $p = 0.021$), more than 60 minutes exercise session (OR = 0.52 (0.31 - 0.88), $p = 0.01$) and ≥ 4 times physical activity per week (OR = 0.51 (0.34 - 0.75), $p = 0.001$) had lowered the risk of gaining weight during the self-confinement period (Reyes-Olavarría et al., 2020). On the other hand, being sedentary for ≥ 6 hours per day contributed to nearly 2-fold of the risk for weight gain (OR = 1.85 (1.13 - 3.03), $p = 0.01$) (Reyes-Olavarría et al., 2020).

According to an online survey conducted regardless of nationality, a reduction in physical activity time had led to an increment in body weight during the COVID-19 pandemic. The study recruited 173 respondents with a majority of them were White or Caucasian and it found that there was a decrease in physical activity time even though outdoor activities may not be restricted in some areas (Zachary et al., 2020). Averagely, the respondents reported practicing physical activity for about 2.7±3.5 hours per week (Zachary et al., 2020). Zachary et al. (2020) discovered that physical activity time was negatively associated with gaining body weight during this pandemic ($r = -0.155$, $p = 0.034$). This study agreed with the other studies that cutting of physical activity can lead to weight gain.

On contrary, a population-based study in Italy found that there was a slight increase in physical activity among the Italians. Similar to the survey conducted in India, this study collected the data via an online platform and a total of 3533 responses were collected (Di Renzo et al., 2020). It showed that there was a slight increment in physical activity during the COVID-19 situation as there were 38.3% of respondents performed bodyweight training (Di Renzo et al., 2020). Di Renzo et al. (2020) found that the North and the Center of Italy had shown an increase in physical activity. Despite such improvement in these two parts of Italy, people in these areas perceived to have weight gain during the COVID-19 emergency (Di Renzo et al., 2020). Hence, the physical activity level is not the sole factor that affects body weight changes.

2.3.2 DIET QUALITY

Diet quality can influence body weight changes. A study analysed the 4-year change in diet quality in association with the body weight change of the same period. Fung et al. (2015) collected the data from the Nurses' Health Study (NHS), the Health Professionals Follow-Up Study (HPFS), and the Nurses' Health Study II (NHS II) at which the diet of the respondents was measured every 4 years. There were three instruments used in accessing the diet quality of the respondents; the Alternate Mediterranean Diet (aMed), the Alternate Healthy Eating Index-2010 (AHEI-2010), and the Dietary Approaches to Stop Hypertension (DASH) adherence scores (Fung et al., 2015). Even though these three instruments had different total scores, the scoring methods were actually similar to each other whereby higher scores will be allocated for the consumption of foods that are good for health, for example, the consumption of fruits and vegetables (Fung et al., 2015). Overall, there was an increase in the mean body weight of the three cohorts (Fung et al., 2015). The study found that an increase in diet quality score per standard deviation was significantly associated with less weight gain in both genders (Fung et al., 2015). Such association was the strongest in the NHS II cohort that was younger than the NHS and HPFS cohorts (Fung et al., 2015).

Another cohort study conducted in the Netherlands also found that poor diet quality was associated with weight gain and the association was specified by age and gender. The study used the Lifelines Diet Score (LLDS) to determine the diet quality of the respondents at which there were 9 food groups providing positive health effects and 3 food groups bringing negative health effects in the LLDS (Vinke et al., 2020). A higher score will be awarded for more consumption of food from positive food groups and less

consumption from negative food groups (Vinke et al., 2020). The total LLDS were then categorised into 5 quintiles and Q1 was the respondents with the lowest diet quality while Q5 was the respondents with the highest diet quality (Vinke et al., 2020). After adjusted for the confounders, Vinke et al. (2020) found that both males [β = 0.154kg/year (0.104 - 0.204)] and females from Q1 [β = 0.118kg/year (0.071 - 0.164)] gained the most weight compared to other quintiles. Among the males, the youngest age group (18-29 years) [β = 0.320kg/year (0.270 - 0.371)] showed the highest annual weight gain while the females aged 40 to 49 years gained the weight the most yearly [β = 0.154kg/year (0.118 - 0.190)] (Vinke et al., 2020).

Moreover, good diet quality managed to improve body weight status, which can help to maintain weight loss sustainably among obese subjects. A retrospective study conducted in the United States used the data from Foodsmart, a digital platform in assisting modification of behavioural change for their users via services such as personalised menu planning and healthy food choices (Hu et al., 2021). The data of 1,740 obese adults were analysed and they had self-reported their dietary intake through the dietary questionnaire available in Foodsmart (Hu et al., 2021). The diet quality of the respondents was calculated based on the Nutriscore developed by the Foodsmart research team and a higher scoring indicating a good diet quality (Hu et al., 2021). It was found that there was an increase for the mean Nutriscore from 30.3 ± 8.5 to 33.7 ± 8.6 and a reduction in body weight by 2.5% on average over a 36-month duration (Hu et al., 2021). While determining the factors contributing to sustained weight loss through the multivariate logistic regression models, a 2-point increase in both baseline and change in Nutriscore was significantly predicting sustained weight loss (Hu et al., 2021). A 2-point

increase in baseline Nutriscore was possibly to sustain weight loss among the respondents by 6% (OR = 1.06 (1.02 - 1.09), $p < 0.001$) and a 2-point improvement in change in Nutriscore even managed to sustain weight loss by 10% (OR = 1.10 (1.07 - 1.14), $p < 0.001$) (Hu et al., 2021). Therefore, proving that diet quality plays an important role in managing body weight.

During the COVID-19 pandemic, diet quality gets affected as well, most probably due to the food choices available and access to food. A cross-sectional study conducted in France through an online platform found that there was a negative impact of the COVID-19 lockdown on the diet quality of the French accessed by using the simplified Programme National Nutrition Santé-Guidelines Score 2 (sPNNS-GS2) index in reflecting the adherence of the dietary intake to the French dietary recommendations (Marty et al., 2021). The mean sPNNS-GS2 score decreased significantly before (M = 1.2, SD = 2.5) and during the lockdown in France (M = 0.8, SD = 2.8, $p < 0.001$) (Marty et al., 2021). Even though there was an increased intake of fruit and vegetables, pulses, fish, and seafood, the intake of processed meat, sweet stuff, sugar-sweetened beverages, and alcoholic beverages also increased, therefore leading to a decrease in the overall diet quality (Marty et al., 2021). Though the study did not identify the body weight changes before and during the pandemic, Marty et al. (2021) found that weight control did influence the difference in diet quality between before and during the lockdown after adjusted for age, gender, BMI, and highest educational qualification ($\beta = 0.99$, $R^2 = 0.076$, $p = < 0.001$).

Similarly, the Brisighella Heart Study from a rural area in Northern Italy found that the diet quality of the respondents had decreased due to the COVID-19 pandemic (Cicero et al., 2021). The study assessed the diet quality of the respondents by using the

Dietary Quality Index (DQI) questionnaire and it found that there was a decrease in the mean DQI score before (M = 42.4, SD = 4.1) and during the lockdown implemented in Italy (M = 37.8, SD = 4.7, $p = 0.011$) (Cicero et al., 2021). Despite there were significantly increased intakes of fruits, greens, and other vegetables, as well as healthy vegetable oils, the intake of sugars, sweets, and alcoholic drinks increased too, with the significant reduction in fish, mussels, and legumes during the lockdown (Cicero et al., 2021). Hence, the overall diet quality of the respondents was decreased. Yet, the study did not determine if there were any changes in body weight before and during the lockdown. Assumption can be made that there may be a possibility of weight changes due to the significant increment in energy intake in the study.

Besides, the PLifeCOVID-19 Study from Poland determined the diet quality of 1,769 women by using the Diet Quality Score (DQS) calculated from the intakes of 6 food and drinks (vegetables, fruit, fish and seafood, sugar-sweetened beverages, water, and alcohol) reported by the respondents (Drywień et al., 2020). A higher score of DQS indicated a better diet quality and the study and the mean DQS among the women who lost weight (M = 2.1, SD = 1.5) was higher compared to those who gained weight (M = 1.7, SD = 1.7, $p < 0.049$) (Drywień et al., 2020). While conducting the univariate regression analysis, the DQS was found to be negatively associated with weight change whereby a higher value resulted in weight loss ($\beta = -0.093$, $R^2 = 0.01$, $p < 0.001$) (Drywień et al., 2020). However, there was no significant effect of the diet quality on the body weight changes after taking into consideration with dietary changes, negative and positive lifestyle changes (Drywień et al., 2020).

In addition, a cross-sectional and international online study also found a significant correlation between diet quality and body weight changes during the COVID-19 pandemic. A total number of 3793 subjects was collected by Kaufman-Shriqui et al. (2021) and the MedDiet score was determined to identify the degree to how an individual's diet is similar to the Mediterranean Diet. It ranged from 0 to 17 points whereby a median of 9 (3) MedDiet Score was found among the subjects. The majority of the subjects claimed to change their diet quality to be healthier while 26.6% of them declared to have no difference, 13.0% of them stated get healthier with pandemic and a 0.6% did not respond (Kaufman-Shriqui et al., 2021). Weight gain was observed among 24.5% of the subjects (Md = 2 (1.5)) while 17.2% of them experienced weight loss (Md = -2 (2)) (Kaufman-Shriqui et al., 2021). The study found that there was a significant correlation between MedDiet score and body weight changes at which a negative correlation was found (r_s = -0.129, $p < 0.0001$) (Kaufman-Shriqui et al., 2021).

2.3.3 HABITUAL FOOD INTAKE

The habitual food intake had been well-known for its association with body weight as food provides energy and the imbalance between energy intake and energy expenditure affects body weight. Long-term consumption of certain foods will impact body weight, for example, fruit and vegetable consumption helps to reduce weight gain due to the fiber content. A systematic review was conducted to determine the relationship between fruit and vegetable consumption with anthropometry measurements (body weight and waist circumference). Schwingshackl et al. (2015) found that higher consumption of fruit intake decreased body weight. A decrease of 13.68g body weight per year (95% CI = -22.97, -4.40) was found for each increase of 100g consumption of fruits after pooling the studies (Schwingshackl et al., 2015).

As the COVID-19 lockdown altered the lifestyle of individuals and food availability, eventually, it also changed the eating habits of the individuals. A cross-sectional study conducted in Lithuania, Spain found that the COVID-19 pandemic altered the eating habits of the Lithuanians and the changes reflected on the body weight. A total of 2447 respondents were recruited in the study and 31.5% of them gained weight during the lockdown (Kriaucioniene et al., 2020). 84.3% of the weight gainers ate more during the lockdown and the association was significant (OR = 10.70, $p < 0.01$) (Kriaucioniene et al., 2020). Significant associations were found between reduced fruits (OR = 1.55 (1.23 - 1.95), $p < 0.001$) and vegetables (OR = 1.94 (1.55 - 2.44), $p < 0.001$) consumption, increase in the intakes of red meat (OR = 2.78 (2.17 - 3.56), $p < 0.001$), carbonated/sweetened beverages (OR = 3.01, (2.26 - 4.02), $p < 0.001$), homemade pastries (OR = 2.48(2.08 - 2.95), $p < 0.001$), commercial pastries (OR = 2.99 (2.43 - 3.68), $p <$

0.001), snacks (OR = 5.85 (4.84 - 7.08), $p < 0.001$), fast food (OR = 3.22 (2.33 - 4.44), $p < 0.001$), fried food (OR = 2.71 (2.22 - 3.32), $p < 0.001$), and increased alcohol intake (OR = 2.10 (1.66 - 2.64), $p < 0.001$) with weight gain (Kriaucioniene et al., 2020).

In China, a retrospective study found that food intake during the lockdown or confinement may affect the changes in body weight. The study by Xia et al. (2020) discovered that there were 26.2% of the respondents (n = 530) increased their food intakes while self-confined at home. 37.9% of the weight gainers self-reported having a significantly increased food intake during the period ($p < 0.001$) (Xia et al., 2020). The study identified that food intake was one of the significant factors contributing to weight gain ($\beta = -0.39$, $p = 0.004$) and weight loss ($\beta = 0.62$, $p = 0.004$), proving that altered food consumption did affect body weight during the COVID-19 pandemic (Xia et al., 2020).

On the other side of the Earth, a Chilean study identified habitual food intake during the home confinement period does impact body weight. Among the 700 respondents, 68.2% self-reported consume at least one time of fried food per week, the majority of them (83.6%) consumed legumes 1 to 2 times per week, and 75% of them consume junk food for at least 1 time per week (Reyes-Olavarría et al., 2020). Notably, fried food consumption for ≥ 3 times per week (OR = 1.48 (1.04 - 2.10), $p < 0.001$), consumption of legumes ≤ 1 time per week (OR = 2.27 (1.05 - 4.92), $p = 0.03$), and ≥ 3 times of junk food intake per week (OR = 1.76 (1.02 - 3.00), $p = 0.04$) were significantly related to weight gaining during the COVID-19 confinement (Reyes-Olavarría et al., 2020). Meanwhile, consumption of fish at least 1 to 2 times a week may protect the respondents from gaining weight (OR = 0.67 (0.46 - 0.97), $p = 0.03$) and it was found that there were 21.4% of the respondents did not consume fish during the study period (Reyes-

Olavarría et al., 2020). The majority of the respondents also consumed legumes less than recommended intake (at least two times per week), therefore, explaining the reason for weight gain among the respondents (Reyes-Olavarría et al., 2020).

Another retrospective Italian study found that there was an alteration in food consumption among the respondents during the COVID-19 pandemic. The study showed that respondents who ate more than usual during the quarantine period gained the most weight (weight gain = 3.14kg) if compared to those with no/minimal changes (weight gain = 0.86kg) and reduced food intake (weight lost = 1.17kg, $p < 0.001$) (Pellegrini et al., 2020). Pellegrini et al. (2020) found out the respondents self-reported consuming more snacks and sweets than the period before quarantine and these contributed to weight gain of 2.14kg and 2.24kg respectively for those who consumed in usual or higher amount. Meanwhile, respondents who did not consume healthy foods were found to have a weight gain of 3.70kg on average and this variable was significantly predicted the weight changes among the respondents, more specifically weight gain ($\beta = 1.48$ (0.19, 2.77), $p = 0.026$) (Pellegrini et al., 2020).

In Kuwait, weight gain was found among 462 Kuwaitis when comparing their body weight before and during the COVID-19 pandemic (ALMughamis et al., 2020). The study found that respondents who shifted their diet to be unhealthier had about 4.51 times to gain weight compared to those with a healthy diet (OR = 4.51 (2.45 - 8.30), $p < 0.001$) (ALMughamis et al., 2020). In addition to that, snacking more than 3 times per day also resulted in 3.27 times increased odds of weight gaining (OR = 3.27 (1.24 - 8.61), $p = 0.016$) (ALMughamis et al., 2020). Even though the respondents assumed their diet was healthy,

yet, increased snacking frequency was significant associated with weight gain (ALMughamis et al., 2020).

Furthermore, the EHLC-COVID19 project from Italy found that consumption of healthy food and junk food did affect the perception of the respondents on their body weight (Di Renzo et al., 2020). Respondents with increased junk food intake were more likely to perceive themselves to have increased body weight (OR = 3.122, $p < 0.001$). (Di Renzo et al., 2020). On the other hand, consuming healthy food was less likely to result in weight gaining (OR = 0.805, $p = 0.002$) (Di Renzo et al., 2020).

In terms of energy intake, it was found that the energy intake was increased during the pandemic, especially among the female university students in Australia. Gallo et al. (2020) recruited the third-year university students and did follow-up them since 2018 with a total of 150 students included in the current study. The study found that energy intake during the pandemic was significantly higher among the female students if compared to combined years of 2018/2019 (n = 82, increment: 19.5%, $p < 0.01$) (Gallo et al., 2020). However, there was no significant difference for their male counterpart (n = 64) (Gallo et al., 2020).

2.4 ASSOCIATION OF EMOTIONAL FACTORS AND BODY WEIGHT CHANGES

The emotion state of an individual can bring effects to his or her body weight over a long period due to the physiological and behavioural changes (Ayanian et al., 2009; Konttinen et al., 2019; Rieke et al., 2014; Robinson et al., 2020; Xie et al., 2019). In this review, anxiety, depression, and stress will be focused in relation to body weight changes.

2.4.1 ANXIETY

Anxiety can affect body weight changes. A cohort study was conducted prospectively using the Nord-Trøndelag Health Study (HUNT), a population health survey in Norway (Brumpton et al., 2013). The study involved only the adult population who participated in both HUNT 2 (1995-1997) and HUNT 3 (2006-2008) and aged less than 65 years in HUNT 3 (Brumpton et al., 2013). A total number of 25,180 respondents were recruited and Brumpton et al. (2013) found that individuals with anxiety had a greater weight gain than those with no anxiety. After being adjusted for sociodemographic factors (age, education, economic difficulties, and social benefit), lifestyle-related factors (smoking, alcohol consumption, and physical activity), and insomnia, men with anxiety (Mean = 5.19kg) gained 0.95kg [(95% CI = 0.34, 1.55), $p < 0.001$] body weight more than men without anxiety (Mean = 4.24kg) after 11 years (Brumpton et al., 2013). A similar result was found in women as well whereby women with anxiety had a mean weight gain of 5.16kg which was 1.12kg [(95% CI = 0.60, 1.64), $p < 0.001$] more than women without anxiety (Mean = 4.04kg) (Brumpton et al., 2013).

There was another prospective study also found that anxiety was related to weight gain. The Netherlands Study of Depression and Anxiety (NESDA) measured body weight of 2,447 respondents at both baseline and 2 years later (de Wit et al., 2015). According to de Wit et al. (2020), a significant weight change was defined when there was at least one standard deviation that equivalent to a 5kg change in body weight, either weight loss or weight gain over a 2-year period. De Wit et al. (2015) revealed that the severity of anxiety had influenced the weight gain whereby there were 1.03 times increase in weight gain per increment in anxiety score [(95% CI = 1.02, 1.05), $p < 0.001$].

During the COVID-19 pandemic, people were encouraged to stay at home as a way of preventing the spread of the virus. The global prevalence of anxiety during this COVID-19 pandemic was 25% (95% CI 21% - 29%) based on a meta-analysis of 43 studies among the general population (Santabárbara et al., 2021). Several factors associated with anxiety during this pandemic, including being younger due to the uncertainties in jobs and careers as well as financial resources (Horesh et al., 2020; Kazmi et al., 2020; Santabárbara et al., 2021). Moreover, those who were unemployed or experienced a change of working mode, either work remotely or pause of work, were found to have higher anxiety levels (Banna et al., 2020; Choi et al., 2020; Kazmi et al., 2020; Papandreou et al., 2020; Paulino et al., 2021; Pieh et al., 2020; Santabárbara et al., 2021; Solomou & Constantinidou, 2020).

This COVID-19 situation was stressful and made people got anxious which in turn affecting their eating behaviours that may lead to body weight changes. A cross-sectional study conducted in Lebanon found that anxiety was positively associated with eating behaviours (Haddad et al., 2020). Out of the 407 respondents recruited online, nearly half

of them (n = 197) had higher anxiety (Haddad et al., 2020). It was found that there was a significant association between anxiety and concerns on eating, shape, and weight scores along with other variables; fear of COVID-19, lack of interest, and anger (Haddad et al., 2020). Though the present study did not identify the impact of anxiety on the body weight of Lebanese, it was known that eating behaviour did affect the body weight of individuals.

Meanwhile, an Italian study discovered that eating habits were impacted by anxiety/depression during the 1-month lockdown implemented in Italy, therefore resulting in weight gain among the 150 respondents (Pellegrini et al., 2020). The study incorporated anxiety and depression into one condition in regards to their effects on eating habits. Pellegrini et al. (2020) proved that those with anxiety/depression gained more weight (weight gain = 3.18kg) than those without anxiety/depression (weight gain = 0.49, $p < 0.001$). This variable predicted weight gain among the respondents significantly at which was the strongest predictor for weight gain in this study ($\beta = 1.61$ (0.53 - 2.69), $p = 0.004$) (Pellegrini et al., 2020). The COVID-19 pandemic affected emotions where people were anxious or depressed, hence, influencing eating habits and resulting in weight changes (Pellegrini et al., 2020).

In Kuwait, the majority of the respondents (n = 462) felt anxious during the COVID-19 pandemic (ALMughamis et al., 2020). More than half of the respondents (63.8%) felt anxious sometimes and 25.5% of the respondents even always in an anxiety state during the COVID-19 pandemic (ALMughamis et al., 2020). After conducting the stepwise logistic regression, ALMughamis et al. (2020) found that being anxious always had more than a 2-fold possibility of gaining weight (OR = 2.45 (1.11 - 5.41), $p = 0.026$).

Being anxious contributed to binge eating and the impact had resulted in body weight (ALMughamis et al., 2020).

2.4.2 DEPRESSION

Depression is found in relation to body weight changes. A randomized clinical trial on 472 adults with body mass index (BMI) more than 30kg/m^2 found that depression was significantly correlated with weight loss (Elder et al., 2012). The Personal Health Questionnaire – Depression Subscale (PHQ-8) was used to accessed the depression level of the respondents whereby the higher scorer was more depressive in the previous 2 weeks (Elder et al., 2012). Elder et al. (2012) found that weight loss was lesser when the respondents depressed (r = 0.223, p = 0.035).

Another prospective study conducted among the Finland population also found that depression is associated with long-term body weight changes with emotional eating as a mediating variable. The study conducted among 5,024 respondents at baseline in 2007 with 74.3% (n = 3,735) of them kept following-up in 2014 (Konttinen et al., 2019). At baseline, height and body weight were measured by trained personnel while at follow-up the BMI of the respondents was taken based on both trained personnel and self-reported (Konttinen et al., 2019). Konttinen et al. (2019) found that there was a positive association between depression and emotional eating, therefore predicting an increase of BMI in 7 years timeframe. Depression predicted higher BMI changes over 7 years with emotional eating as a mediating variable [std. β = 0.025 (0.009 - 0.038), p = 0.001] (Konttinen et al., 2019). In addition, Konttinen et al. (2019) also found that depression was directly

predicting 7 years-BMI changes and the effect was significant [std. β = 0.09 (0.04 - 0.12), $p < .001$].

Depression can impact the appetite of an individual, either leading him or her to have less appetite or overeating, which in turn affecting body weight. An online survey was conducted among the Australian adults aged 18 years and above and it was found that 53.6% of them (n = 13,829) were affected by either poor appetite or overeating in the past 2 weeks of the survey period (Owen et al., 2020). After identifying the factors leading to such problems, it was found that depression was one of the factors whereby a clinically significant depression score (Patient Health Questionnaire-9 scores ≥ 10) was associated with poor appetite or overeating among the respondents [OR = 10.58 (9.12 - 12.27), $p < 0.001$] (Owen et al., 2020). The survey proved that individuals with depression had 10.58 times of being less appetite or overeating which may then causing fluctuations in body weight, though the current survey did not determine it.

Meanwhile, van Strien et al. (2016) recruited 592 fathers or mothers to identify the relationship between depression and body weight changes with emotional eating, external eating, and restrained eating as mediators. It was found that the total association between depression and increase in BMI was not significant neither in the mothers (β = 0.31, $p = 0.171$) nor the fathers (β = 0.25, $p = 0.068$), though the association was positive (van Strien et al., 2016). However, with only emotional eating as a mediator, the indirect effect of depression on the gain in BMI was significant among mothers (β = 0.18, $p = 0.026$) but not the fathers (β = 0.02, $p = 0.638$) (van Strien et al., 2016).

In the midst of lockdown or movement restriction due to the COVID-19 pandemic, an individual was more vulnerable to get depressed. The ECLB-COVID19 study was a multi-countries survey that recruited 1,047 respondents globally with the majority of the respondents from North Africa (40%) (Ammar et al., 2021). The study found that the total depression monitoring questionnaire score increased by 44.9% comparing the period during the confinement with before the confinement (t = 14.12, p < 0.001, d = 0.43) (Ammar et al., 2021). There was an increase in people developing symptoms or state of depressive, by 10%, during the confinement period (Ammar et al., 2021). Hence, proving that the COVID-19 pandemic did make people depressed which in turn bringing other negative impacts.

When identifying the factors contributing to depression, one of the possible factors would be unemployment, either direct or the members in the household. The Household Pulse Survey (HPS) from the United States found that 58.7% (n = 4,852) were unemployed or had a member from their household unemployed in the midst of the COVID-19 pandemic (Ganson et al., 2021). The HPS found out 64.0% of the respondents were depressed, feeling down, or hopeless in any past 7 days during the data collection (Ganson et al., 2021). It showed that direct unemployment or unemployment among household members increased the risk of depression by 25% (adjusted RR = 1.25, (1.13 - 1.37), p < 0.001) (Ganson et al., 2021).

An online survey conducted in China found that depression was related to weight changes during the COVID-19 pandemic, more specifically weight gain. The online survey recruited 530 respondents and it found that depression was positively related to weight gain (Xia et al., 2020). Based on the multiple linear regression model in the study,

self-reported depression (p = 0.002) was significantly associated with weight gain along with being male, irregular or increased food intake, and reduced daily steps (Xia et al., 2020). The study proved that depression was one of the risk factors for weight gaining even during the pandemic.

In Spain, 4379 adults were recruited and half of them (52.88%) self-reported to have no weight changes during the COVID-19 pandemic while 25.82% of them experienced weight gain and another 21.27% experienced weight loss (Fernandez-Rio et al., 2020). The study suggested that depressive symptoms triggered by the COVID-19 stressors had led to over- or restrictive eating, which was then reflecting on the body weight, resulted in large weight changes (Fernandez-Rio et al., 2020).

2.4.3 STRESS

Perceived stress level can affect one's body weight. A randomised controlled trial conducted among African American Women found that stress management was important while conducting a weight loss intervention program. The study recruited 44 women who were overweight or obese to go through either behavioural lifestyle intervention ('lifestyle' group) or stress management-augmented lifestyle intervention ('lifestyle + stress' group) (Cox et al., 2013). Cox et al. (2013) revealed that women from the 'lifestyle + stress' group lost more weight than the 'lifestyle' group with a percentage of 2.7% compared to baseline (p = 0.17). According to Cox et al. (2013), there was an inverse association between weight loss and follow-up Perceived Stress Score (PSS) (r = -0.35, p =0.030),

indicating the respondents lost more weight when the follow-up PSS was low whereby the respondents' stress levels were lower than during baseline.

Another randomised control trial also found that stress was associated with weight change. The two-phase LIFE study focused on non-randomised behavioural weight loss intervention in the 1st phase followed by randomised weight loss maintenance in the 2nd phase (Elder et al., 2012). A total of 472 obese adults were recruited in the study (Elder et al., 2012). Elder et al. (2012) found that an increase in perceived stress level caused lesser weight loss among the respondents. Stress showed a significant correlation with change in weight loss after 6 months of intervention ($r = 0.159$, $p = 0.048$) (Elder et al., 2012). Hence, it can be concluded that managing stress can help to reduce more weight among overweight or obese individuals.

The COVID-19 pandemic disrupted not only health and economy but also mental health. The pandemic may have contributed substantial stress to the population. In France, an online survey was conducted during the confinement and 11,391 respondents were recruited (Rolland et al., 2020). The French population showed a mean general stress score of 4.84 ± 2.43 using the Visual Analog Scale (VAS) (Rolland et al., 2020). The increment in the general stress score was significantly associated increased consumption of caloric/salty food (aOR = 1.07 (1.05 - 1.10), $p < 0.001$) (Rolland et al., 2020). Though the study did not further identify whether there were weight changes among the population, an increase in caloric/salty foods did impact body weight.

Besides, an online survey found that stress altered an individual's eating behaviour during the COVID-19 pandemic and therefore contributed to weight gain. Zachary et al.

(2020) recruited 173 adults globally using Facebook and they found that half of the respondents (52%) self-reported had increased eating in response to stress. About 22% of the respondents reported to have an increase of 5 to 10 pounds in body weight during the lockdown and the percentage of respondents who increased eating in large amount while stressed was significantly higher (p = 0.041) if compared to those with no changes in eating while stressed (Zachary et al., 2020). Interestingly, the respondents showed a mean Perceived Stress Scale (PSS) score of 13 ± 11 that indicating a moderate stress level, PSS was not significantly correlated to weight gain (p = 0.653) (Zachary et al., 2020). Perhaps there were stress coping mechanisms other than eating in response to stress and stress did impact body weight only among those having food to distress (Zachary et al., 2020).

Meanwhile, the study by Dun et al. (2020) found that stress was only associated with body weight changes during the COVID-19 pandemic when the individuals were severely stressed. In the study conducted among 12,889 university students, a 4-month weight gain due to the COVID-19 confinement was observed at which the mean weight gain was 2.6kg for males and 2.1kg for females (Dun et al., 2020). After adjusted for sex, age, baseline weight, change in exercise volume, dietary habits, alcohol, smoking, and anxiety score, it was found that only a severe degree of stress was significant associated with body weight changes [Mean = 0.551kg (0.254 – 0.847kg), p < 0.001] (Dun et al., 2020). Mild to major degrees of stress level was not significant associated with body weight changes (Dun et al., 2020).

2.5 SUMMARY

In a nutshell, sociodemographic factors, lifestyle factors, and emotional factors did affect an individual's body weight, either weight gain or weight loss. During the COVID-19 pandemic, the lifestyle and emotions of most of the individuals had been altered and affected. The pandemic also hit economics globally at which individuals from the certain sociodemographic background, specifically low-income earners. Therefore, this study is conducted to determine the association of sociodemographic factors, lifestyle factors, and emotional factors with body weight changes during the COVID-19 pandemic, particularly, the low-income adults or the B40 group.

CHAPTER 3: METHODOLOGY

3.1 STUDY DESIGN

This was a cross-sectional survey that aimed to determine the factors associated with body weight changes during the COVID-19 pandemic among low-income adults in Selangor, Malaysia.

3.2 STUDY LOCATION

This study was carried out in Selangor, Malaysia. Selangor is a state located on the west coast of Peninsular Malaysia, bordered with other states; Perak to the north, Pahang to the east, and Negeri Sembilan to the south. The federal territories of Malaysia, Kuala Lumpur and Putrajaya were surrounded by Selangor. In the first quarter of 2020, the population of Selangor was 6,569.5 thousand and it consisted of 1623.1 thousand households in 2019 (*Demographic Statistics First Quarter 2020,* 2020; Department of Statistics Malaysia, 2020). The B40 group is comprised of 649.3 thousand households which is equivalent to 17.0% of the total households in Selangor (Department of Statistics Malaysia, 2020).

3.3 SAMPLE SIZE DETERMINATION

The sample size in this study was calculated based on the formula designed by Hulley, Cummings, Browner, Grady, and Newman (2013). Table 3.1 shows the

calculation of sample size for each independent variables based on the previous study in identifying the factors associated with body weight changes.

$$N = \left[\frac{(Z_\alpha + Z_\beta)}{c}\right]^2 + 3$$

whereby $c = 0.5 \times \ln\left[\frac{(1+r)}{(1-r)}\right]$

Z_α = the standard normal deviate for α = 1.96

Z_β = the standard normal deviate for β = 0.84

r = the expected correlation coefficient

Table 3.1. Sample size calculation of each independent variables based on the previous studies in identifying factors influencing body weight changes

Independent variables	Correlation, r	Sample size, n
Diet quality (Fung et al., 2015)	-0.47	$c = 0.5 \times \ln\left\{\frac{[1+(-0.47)]}{[1-(-0.47)]}\right\} = 0.13$ $N = \left[\frac{(1.96+0.84)}{0.13}\right]^2 + 3 = 33.13 \approx 34$
Depression (Aro et al., 2021)	0.223	$c = 0.5 \times \ln\left\{\frac{[1+0.223]}{[1-0.223]}\right\} = 0.23$ $N = \left[\frac{(1.96+0.84)}{0.23}\right]^2 + 3 = 155.40 \approx 155$
Stress (Cox et al., 2013)	-0.35	$c = 0.5 \times \ln\left\{\frac{[1+(-0.35)]}{[1-(-0.35)]}\right\} = -0.37$ $N = \left[\frac{(1.96+0.84)}{-0.37}\right]^2 + 3 = 61.70 \approx 62$

Limited studies on providing the correlation coefficient of factors influencing the body weight changes as most of the studies provided odd ratios or adjusted ratios. The highest number of sample size was selected, which was 155 respondents. Additional adjustment was made as shown in Table 3.2.

Table 3.2. Additional adjustment in computing the sample size

Criteria	Adjustment	Sample size, n
Adjust for the expected proportion response rate	Response rate = 0.90	171
Adjust for the expected proportion of eligible	Eligible rate = 0.90	188

After considering the response rate and eligible rate, the final sample size required for this study was 188 respondents.

3.4 RESPONDENTS

All the Selangor residents were invited to participate in this study if they met the criteria. Malaysians who currently live in Selangor, aged 18 years old and above, and from a household with a monthly income ≤ RM4,849 were included in this study. Meanwhile, individuals who are handicapped or with a physical disability, cognitive disorder, self-reported to have a chronic disease such as cardiovascular disease, hypertension, and diabetes, and pregnant women were excluded.

3.5 SAMPLING DESIGN

At first, purposive sampling was applied in this study whereby 1 out of the 9 districts from Selangor was chosen by using simple random sampling via Microsoft Excel. The chosen district was Petaling. With such, the Program Perumahan Rakyat (PPR) within the Petaling district was screened as PPR is an initiative by the government in helping the B40 household and therefore fulfilling the inclusion criteria of this study. 2 PPRs were chosen which were PPR Kota Damansara and PPR Kampung Baru Hicom since both of these PPRs were under the management of Perumahan dan Hartanah Selangor Sdn. Bhd. (PHSSB) within the Petaling district. The flow of the sampling is as shown in Figure 3.1.

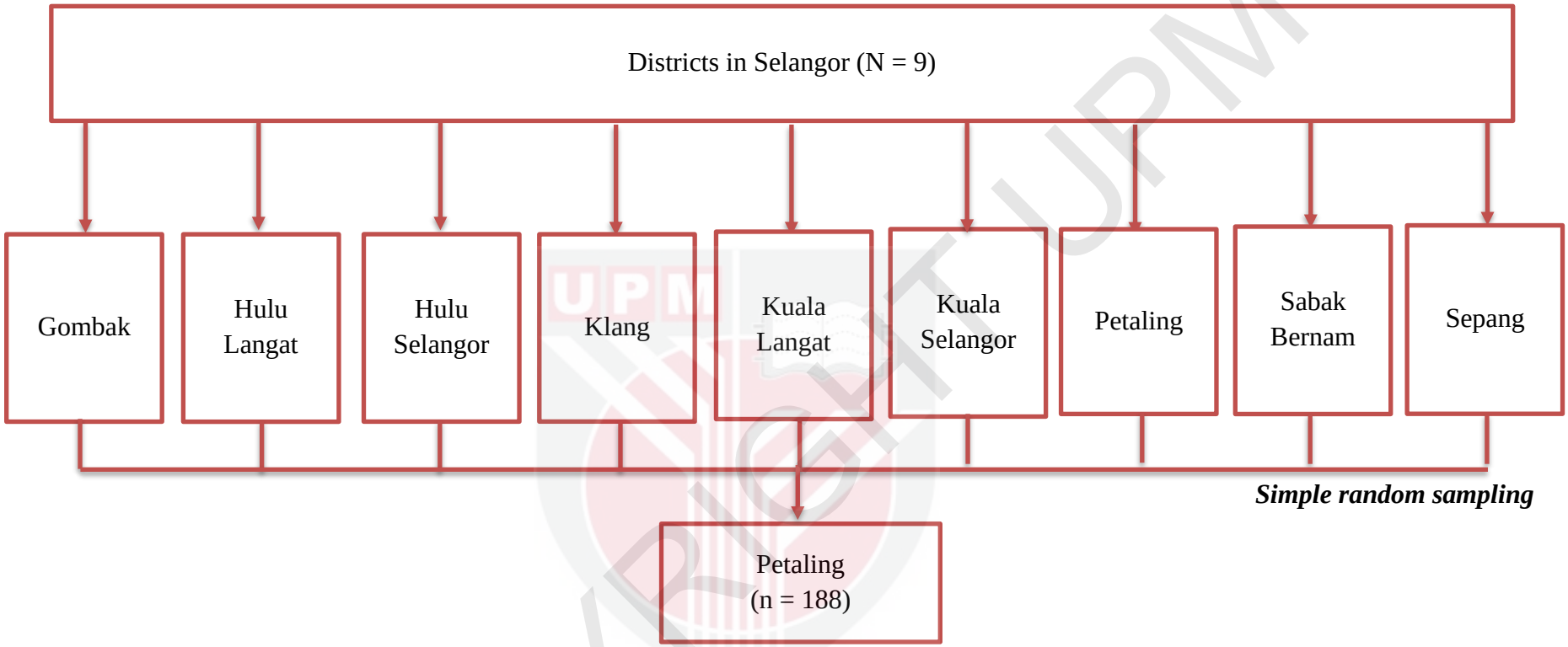

Figure 3.1. The flow of sampling design in this study

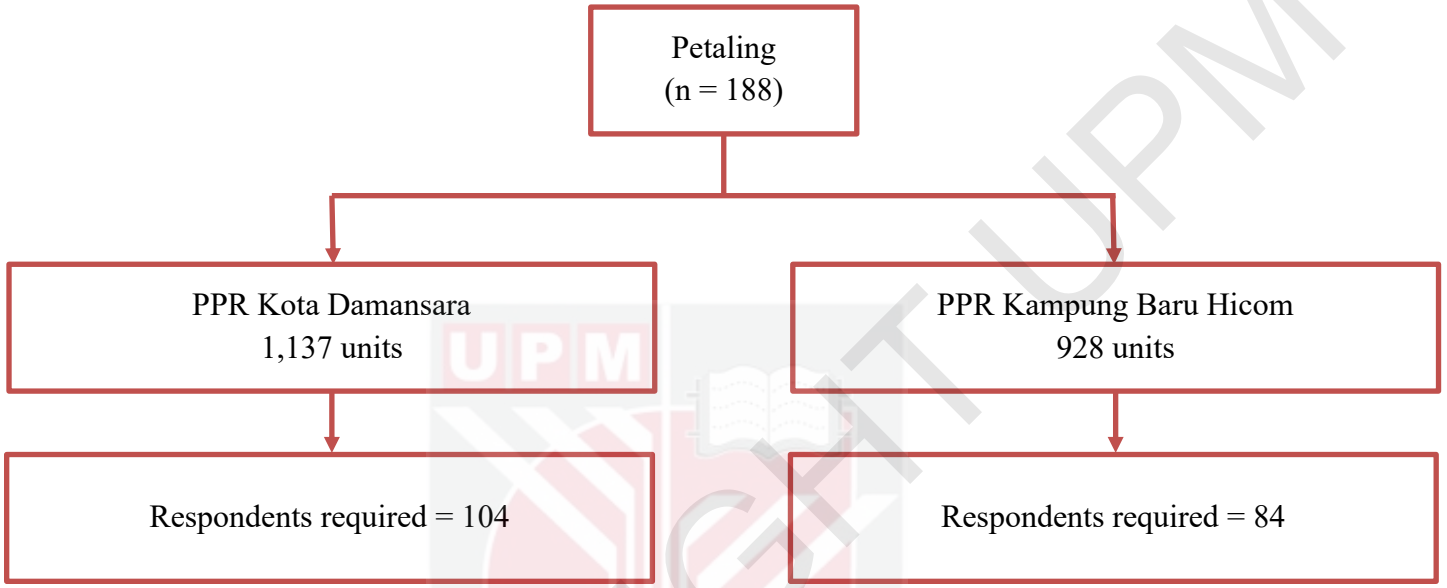

Figure 3.1 (Cont.). The flow of sampling design in this study

However, the sampling design was changed due to the poor response rate from the chosen PPRs. The internet coverage at the chosen PPRs was poor, hence, affecting the response rate and the rising COVID-19 cases and implementation of MCO and FMCO halted the face-to-face data collection. Therefore, convenience sampling was applied in this study. The Google Form link of the online questionnaire was disseminated on social media such as Facebook, Instagram, Twitter, and Whatsapp in order to reach the potential respondents. Only the Selangor respondents who fulfilled the inclusion criteria were invited to participate in this study. The change in sampling design was approved by the Ethic Committee for Research Involving Human Subjects Universiti Putra Malaysia (JKEUPM).

3.6 STUDY INSTRUMENTS

A self-administered questionnaire in bilingual was used in this study. The questionnaire consisted of sociodemographic background, self-reported body weight and height, physical activity, diet quality, habitual food intake, and emotions.

3.6.1 SELF-ADMINISTERED QUESTIONNAIRE

3.6.1.1 SOCIODEMOGRAPHIC BACKGROUND

The sociodemographic factors were determined via a self-administered questionnaire that consisted of 11 questions in total. The questions included the date of birth, age, gender, ethnicity, education level, occupation, household size, monthly household income, monthly personal income, monthly household expenses, and food expenditure (Refer to Section A of Appendix E). All the questions were single questions except the food expenditure that consisted of 12 sub-questions.

For the questions regarding food expenditure, the respondents were asked to indicate the brand at the provided space to ease the researcher's reference while referring to the price indicated with the price on-market.

3.6.1.2 SELF-REPORTED BODY WEIGHT AND HEIGHT

The respondents were required to provide their body weight measured at the beginning of the October of the year 2020 and present body weight along with their height (as shown in Section B of Appendix E).

3.6.1.3 PHYSICAL ACTIVITY

The physical activity level of the respondents was determined via the Global Physical Activity Questionnaire (GPAQ) (Refer to Section C of Appendix E). The GPAQ was developed by the World Health Organization (WHO) in the year of 2002 for the surveillance of physical activity as part of the non-communicable diseases and mental health prevention strategies (World Health Organization, 2005). The GPAQ consisted of 16 questions that covered 3 domains which were 'Activity at work', 'Travel to and from places', and 'Recreational activities (World Health Organization, n.d.-b). These 3 domains can be furthered divided into 6 sub-domains; 'Vigorous work', 'Moderate work', 'Travel', 'Vigorous recreation', 'Moderate recreation', and 'Sitting' (World Health Organization, n.d.-a). The respondents were required to answer the questions based on the situation since the CMCO implemented in the October of 2020.

The GPAQ calculation was based on the Metabolic Equivalent (MET) values depending on the intensity of the activity. MET is the ratio of one's working metabolic rate to the resting metabolic rate. It assumes that sitting quietly will consume 1kcal/kg/hour of energy and moderate activity will consume 4 times the sitting energy consumption while vigorous activity will spend 8 times it. For the work and recreation

domains, the MET value for moderate activities was 4.0 while the MET value for vigorous activities was 8.0 (World Health Organization, n.d.-a). The total physical activity MET-minutes per week was calculated as the following formula:

$$\textit{Total physical activity MET-minutes/week} = \sum \textit{[time spent on an activity/day} \times \textit{days on doing that activity/week} \times \textit{MET value] in three domains}$$

The physical activity level of the respondents was classified based on the GPAQ categorical scoring criteria as shown in Table 3.3 (Herrmann et al., 2013).

Table 3.3. Categorical criteria of physical activity

Category	Criteria
High	Vigorous-intensity activity on ≥ 3 days per week and accumulating at least 1,500 MET-minutes per week Or ≥ 7 days of any combination of walking, moderate-intensity, or vigorous-intensity activities achieving ≥ 3,000 MET-minutes per week
Moderate	≥ 3 days per week of vigorous-intensity activity totaling 60 minutes Or ≥ 5 days per week of moderate-intensity activity of ≥ 150 minutes Or ≥ 5 days per week of any combination of walking, moderate-intensity, or vigorous-intensity activities achieving ≥ 600 total MET-minutes per week
Low	Does not meet the criteria for the moderate or high

Source: Herrmann et al. (2013)

The validity and reliability of the GPAQ had been proven in the previous study (Cleland et al., 2014). In Malaysia, the Malay version of GPAQ (GPAQ-M) had been validated among 100 adults aged 20 to 58 years (Soo et al., 2015). Therefore, GPAQ-M will be used in this study.

3.6.1.4 DIET QUALITY

The diet quality of the respondents was assessed using the Malaysian diet quality index (as shown in Section D of Appendix E) developed by Fokeena, Jamaluddin, and Khaza'ai (2016). The diet quality index was formulated based on the Malaysian Dietary Guidelines and the Malaysian Food Pyramid recommendations with the food examples selected from the Malaysian Adult Nutrition Survey Food Frequency Questionnaire (MANS FFQ) as well as the two guidelines mentioned (Fokeena et al., 2016). There are 12 food groups included in the index along with their respective food examples. The respondents were asked to recall their consumptions of these food groups during the COVID-19 pandemic, more specifically, during the CMCO that happened in October 2020 onwards. The frequency of the consumption included 'Daily with the recommended serving size for each food groups' or 'More than once daily' or 'Once daily', '2 to 6 times per week', 'Once per week', '1 to 3 times per month', and 'Rarely/Never'.

The scoring criteria of each food group are similar, yet, depending on the food groups. The scoring criteria for each food group are shown in Table 3.4.

Table 3.4. Scoring criteria for each food group

Food group	Frequency of consumption	Score
Cereals, cereal products and tubers	Daily (4 to 8 servings)	5
	Daily (> recommended serving)/ Daily (< recommended serving)	4
	2 to 6 times per week	3
	Once per week	2
	1 to 3 times per month	1
	Rarely/Never	0

Table 3.4. Scoring criteria for each food group *(cont')*

Food group	Frequency of consumption	Score
Cereals, cereal products and tubers	Daily (4 to 8 servings)	5
	Daily (> recommended serving)/ Daily (< recommended serving)	4
	2 to 6 times per week	3
	Once per week	2
	1 to 3 times per month	1
	Rarely/Never	0
Wholegrain cereals	Daily (≥ ½ of recommended serving)	5
	Daily (< ½ of recommended serving or exceeding recommended serving)	4
	2 to 6 times per week	3
	Once per week	2
	1 to 3 times per month	1
	Rarely/Never	0
Fruits	Daily (≥ 2 servings)	5
	Daily (< 2 servings)	4
	2 to 6 times per week	3
	Once per week	2
	1 to 3 times per month	1
	Rarely/Never	0
Vegetables	Daily (≥ 3 servings)	5
	Daily (< 3 servings)	4
	2 to 6 times per week	3
	Once per week	2
	1 to 3 times per month	1
	Rarely/Never	0
Milk and dairy products	Daily (1 to 3 servings)	5
	Daily (> recommended serving)/ Daily (< recommended serving)	4
	2 to 6 times per week	3
	Once per week	2
	1 to 3 times per month	1
	Rarely/Never	0
Legumes and their products	Daily (½ to 1 serving)	5
	Daily (> recommended serving)/ Daily (< recommended serving)	4
	2 to 6 times per week	3
	Once per week	2
	1 to 3 times per month	1
	Rarely/Never	0

Table 3.4. Scoring criteria for each food group *(cont')*

Food group	Frequency of consumption	Score
Fish	Daily (1 serving)	5
	Daily (> 1 serving)/ Daily (< 1 serving)	4
	2 to 6 times per week	3
	Once per week	2
	1 to 3 times per month	1
	Rarely/Never	0
Poultry, meat, egg	Daily (½ to 2 servings)	5
	Daily (> recommended serving)/ Daily (< recommended serving)	4
	2 to 6 times per week	3
	Once per week	2
	1 to 3 times per month	1
	Rarely/Never	0
High fat protein foods	Rarely/Never	5
	1 to 3 times per month	4
	Once per week	3
	2 to 6 times per week	2
	Once daily	1
	More than once daily	0
Fat-rich foods	Rarely/Never	5
	1 to 3 times per month	4
	Once per week	3
	2 to 6 times per week	2
	Once daily	1
	More than once daily	0
Salt-rich foods	Rarely/Never	5
	1 to 3 times per month	4
	Once per week	3
	2 to 6 times per week	2
	Once daily	1
	More than once daily	0
Sugar-rich foods	Rarely/Never	5
	1 to 3 times per month	4
	Once per week	3
	2 to 6 times per week	2
	Once daily	1
	More than once daily	0

Source: Fokeena et al. (2016)

The sum of the food groups was calculated to further classify the diet quality of the respondents into - 'at risk' and 'at lower risk' of poor diet quality with the cut-off value of 30. A sum of more than 30 was classified as at a lower risk of poor diet quality and vice

versa. The diet quality index had been used among Malaysian university students with a Cronbach's alpha value of 0.780 (Fokeena et al., 2016).

3.6.1.5 HABITUAL FOOD INTAKE

The habitual food intake of the respondents was determined using the Malaysian Adult Nutrition Survey Food Frequency Questionnaire (MANS FFQ) (Refer to Section E in Appendix E) (Institute for Public Health, 2014). The FFQ consisted of a list of foods and beverages categorised into their respective food groups. The respondents were asked to recall their habitual food intake during the COVID-19 pandemic by answering the usual frequency and portion size of each food item during the CMCO started from October 2020. The FFQ included 165 items of foods and beverages along with 12 items of household consumption on condiments. In this study, only the foods and beverages were asked and analysed. The FFQ was then analysed using the Nutritionist Pro software to determine the energy intake and macronutrient consumption of the respondents during the COVID-19 pandemic.

3.6.1.6 EMOTIONAL FACTORS

The Depression, Anxiety, and Stress Scale (DASS-21) (Refer to Section F in Appendix E) was used to determine the depression, anxiety, and stress levels of the respondents during the COVID-19 pandemic in this study. It is a simplified version to the DASS-42, the original version. The DASS-21 consisted of 21 items that covered 3

subscales; depression, anxiety, and stress. Each subscale consists of 7 items and the rating scale is shown as in Table 3.5. The respondents had to answer the DASS-21 based on the CMCO which started from October 2020 onwards.

Table 3.5. Rating scale of the DASS-21

Description	Score
Did not apply to me at all	0
Applied to me to some degree, or some of the time	1
Applied to me to a considerable degree, or a good part of time	2
Applied to me very much, or most of the time	3

Source: Lovibond & Lovibond (1995)

The sum of each subscale was calculated and multiplied with 2 as the DASS-21 is a short form to the original DASS-42 long form. The severity of each subscale is shown in Table 3.6. The validity and reliability of the DASS-21 had been proven and its Malay version had been used in the National Health and Morbidity Survey 2017 (Coker et al., 2018; Institute for Public Health, 2017).

Table 3.6. DASS-21 severity ratings

Severity	Depression	Anxiety	Stress
Normal	0 – 9	0 – 7	0 – 14
Mild	10 – 13	8 – 9	15 – 18
Moderate	14 – 20	10 – 14	19 – 25
Severe	21- 27	15 – 19	26 – 33
Extremely severe	28+	20+	34+

Source: Lovibond & Lovibond (1995)

3.6.2 BODY WEIGHT CHANGES

In this study, an approximately 3 to 6 months body weight change due to the COVID-19 pandemic was determined. The body weight changes of the respondents were

presented in percentage using the formula developed by Blackburn et al. (1977). The formula was modified to obtain an only positive value of the percentage as shown:

$$\boldsymbol{Percentage\ of\ body\ weight\ changes}$$

$$= \left|\frac{(Present\ body\ weight - Body\ weight\ in\ October\ 2020)}{Present\ body\ weight}\right| \times 100\%$$

3.7 STUDY APPROVAL

Ethics approval was applied from the Ethics Committee for Research Involving Human Respondents in Universiti Putra Malaysia (JKEUPM) prior to data collection. The reference number for the ethical approval was JKEUPM-2020-478 (Refer to Appendix A). As the sampling design was changed from purposive sampling to convenience sampling, approval was sought with regard to such changes and the committee agreed to the justification on the changing of sampling design (Refer to Appendix B).

3.8 PRE-TEST

A pre-test was conducted prior to data collection. The purpose of the pre-test was to assess the suitability of the questionnaire and also to estimate the time required to complete the questionnaire. A total of 15 respondents were recruited in the pre-test. It took the respondent approximately 40 to 50 minutes to complete a set of questionnaires. Minor adjustments were made on the presentation of the questionnaire, for example, the method

in entering birthday, food photos in answering diet quality, and examples in answering the food frequency questionnaire.

3.9 DATA COLLECTION

The data collection was planned to be conducted during February and March of 2021 on-site. In view of the rising cases of the COVID-19 in Malaysia, on-site data collection was not able to conduct as planned. Therefore, an online questionnaire was prepared using the Google Form. The link of this questionnaire was shared through the Facebook groups, Whatsapp Group Chat, and any other social media platform to reach the respondents in Selangor. The anthropometric data were obtained through self-reporting as the researcher was not allowed to contact the respondents in person. No token of appreciation was provided to the respondents.

All the data and questionnaires collected were kept confidential and the identity of the respondents would not be revealed to any parties other than the researcher.

3.10 STATISTICAL ANALYSIS

Statistical analysis was performed using the IBM SPSS Statistics 25 (IBM Corp., Armonk, NY). The data was screened for completeness once finished collecting and the normality of the data was checked. Categorical variables were presented in the form of frequencies and percentages while continuous variables were presented in the form of means and standard deviations. In this study, the significance level was set at $p < .05$ to test the hypothesis. The associations between the independent variables and the dependent

variable were determined by using the Pearson's product-moment correlation test and Spearman's rank order correlation test. Table 3.7 shows the analyses used for each specific objective.

Table 3.7. Analyses for each specific objective

Objective	Analysis
To determine the sociodemographic factors (age, gender, ethnicity, education level, occupation, income status, food expenses, household size), lifestyle factors (physical activity level, diet quality, habitual food intake), and emotional factors (anxiety, depression, stress) among respondents.	Univariate analysis • Means and standard deviations for age, income status, household size, physical activity level, diet quality, habitual food intake, anxiety, depression, stress • Median and interquartile range for food expenses, physical activity level • Frequency and percentage for age range, gender, ethnicity, education level, occupation, household size, physical activity level, diet quality, anxiety, depression, stress Bivariate analysis • Mann-Whitney U test for the differences in physical activity level, habitual food intake (% of protein, mean fat intake) by gender • Independent-samples *t*-test for the differences in diet quality score, habitual food intake, anxiety, depression, stress by gender
To determine the body weight changes during the COVID-19 pandemic among respondents.	Univariate analysis • Means and standard deviations for body weight measured during the October of 2020, recent body weight, percentage of body weight changes (weight loss) • Median and interquartile range for percentage of body weight changes (weight gain) • Frequency and percentage for respondents who gained weight, lost weight, and with no changes Bivariate analysis • Paired-samples *t*-test for difference in body weight changes by gender
To determine the associations between sociodemographic factors, lifestyle factors, emotional factors, and body weight changes among respondents	Bivariate analysis • Pearson's product-moment correlation for the association between sociodemographic factors (age, income status), lifestyle factors (diet quality, habitual food intake), emotional factors (anxiety, depression, stress), and body weight changes • Spearman's rank order correlation for the association between sociodemographic factor (food expenses),

	lifestyle factors (physical activity level), and body weight changes • Chi-Square Test of Independence for the association between sociodemographic factor (income threshold) and body weight changes

CHAPTER 4: RESULTS & DISCUSSION

4.1 SCREENING AND RECRUITMENT OF RESPONDENTS

The data collection was conducted from April of 2021 to early May of 2021. Respondents were recruited by disseminating the Google link of online questionnaire through the Whatsapp, Facebook groups, Instagram, and Twitter posts by the researcher. A total of 181 respondents filled in the online questionnaire, however, there were 2 respondents who disagreed to participate in this study and therefore the response rate was 98.9%. After screening the data, 142 respondents fulfilled the inclusion criteria with some parts of the questionnaire incomplete. Therefore, a different sample size was used in each variable and analysis.

4.2 SOCIODEMOGRAPHIC CHARACTERISTICS

Table 4.1 shows the sociodemographic characteristics of the respondents. The mean age of the respondents was 28.73 ± 8.26 years and half of them (n = 142) were less than 25 years. The majority of the respondents were female (71.1%), Chinese (60.6%), with or pursuing Bachelor degree (66.2%), and students (39.7%). On average, the monthly household income of the respondents was RM3108.20 ± 1287.69 and the majority of them (35.9%) from the B4 threshold (RM3,970 – RM4,849). On a weekly basis, the respondents spent RM115.55 (104.50) on food. Meanwhile, the mean household size of the

respondents was 4.00 ± 2.17 whereby 38.7% of them from a household size with 5 and more.

Table 4.1 Sociodemographic characteristics of the respondents

Characteristics	n (%)	Mean ± SD	Median (IQR)
Age (years) (*n* = 142)		28.73 ± 8.26	
< 25	71 (50.0)		
≥ 25	71 (50.0)		
Gender (*n* = 142)			
Male	41 (28.9)		
Female	101 (71.1)		
Ethnics (*n* = 142)			
Malay	49 (34.5)		
Chinese	86 (60.6)		
Indian	5 (3.5)		
Others	2 (1.4)		
Education level (*n* = 142)			
Primary school	1 (0.7)		
Secondary school	17 (12.0)		
Diploma	17 (12.0)		
Bachelor degree	94 (66.2)		
Master degree	11 (7.7)		
PhD degree	2 (1.4)		
Occupation[#] (*n* = 141)			
Managers	3 (2.1)		
Professionals	42 (29.8)		
Technician and associate professionals	5 (3.5)		
Clerical support workers	12 (8.5)		
Service and sales workers	6 (4.3)		
Skilled agricultural, forestry, livestock and fishery workers	1 (0.7)		
Craft and related trades workers	4 (2.8)		
Plant and machine operators and assemblers	1 (0.7)		
Unemployed	11 (7.8)		
Students	56 (39.7)		

[#]Classification based on the Malaysia Standard Classification of Occupations (MASCO) 2020

Table 4.1 Sociodemographic characteristics of the respondents *(con't)*

Characteristics	n (%)	Mean ± SD	Median (IQR)
Income status (RM)			
Monthly household income (*n* = 142)		3108.20 ± 1287.69	
Monthly household income threshold[##] (*n* = 142)			
B1 (< RM2,500)	47 (33.1)		
B2 (RM2,501 – RM3,169)	20 (14.1)		
B3 (RM3,170 – RM3,969)	24 (16.9)		
B4 (RM3,970 – RM4,849)	51 (35.9)		
Monthly personal income (*n* = 141)		1629.19 ± 1550.94	
Weekly food expenses (RM) (*n* = 142)			115.55 (104.50)
Household size (*n* = 141)		4.00 ± 2.17	
1	24 (21.6)		
2	8 (7.2)		
3	14 (12.6)		
4	22 (19.8)		
5 and more	43 (38.7)		

[##]Classification based on the Household Income & Basic Amenities Survey Report 2019

4.3 SELF-REPORTED BODY WEIGHT CHANGES

Table 4.2 shows the body weight record of the respondents. The respondents were asked to self-report their body weight in October of 2020 and the most recent body weight, respectively. An approximate 6 to 9 months body weight change was observed based on the self-reported data. The respondents recorded a mean of 60.85 ± 14.38kg body weight in the past October and a mean of 61.20 ± 14.40kg body weight recently as of the data collection date, yet the difference was not significant (t = -1.305, p = 0.194). After computing, a 3.85 ± 3.55% body weight change was observed, regardless of gaining or losing weight. When further investigated, it was found that weight gain was more dominant than weight loss among the respondents. It can be observed that half of the respondents (51.1%) experienced weight gain during the pandemic while another 33.3%

of the respondents experienced weight loss. Such findings are similar to other countries where more respondents gained weight during the lockdown or confinement period; for instance, China, Chile, Poland, Italy, Lithuania, Spain and Kuwait (ALMughamis et al., 2020; Drywień et al., 2020; He et al., 2020; Kriaucioniene et al., 2020; Pellegrini et al., 2020; Reyes-Olavarría et al., 2020; Sánchez et al., 2021; Xia et al., 2020).

Table 4.2. Self-reported body weight by the respondents

Characteristics	n (%)	Mean ± SD	Median (IQR)	*t-value*	*p*-value
Self-reported body weight (kg) (*n* = 141)				-1.305	0.194
In October of 2020		60.85 ± 14.38			
Recent		61.20 ± 14.40			
Self-reported body weight changes (%) (*n* = 141)		3.85 ± 3.55			
Weight loss	47 (33.3)	4.72 ± 2.95			
No changes	22 (15.6)	0			
Weight gain	72 (51.1)		3.30 (3.43)		

Table 4.3 shows the differences in body weight changes of the respondents by gender. Female (Median = 3.08%, IQR = 3.82%) was found to have higher body weight changes than male (Median = 3.15%, IQR = 4.22%), yet, there was no significant difference between gender with the body weight changes (Z = -0.062, p = 0.951).

Table 4.3. Difference in body weight changes according to gender (n = 141)

Characteristics	Body Weight Changes (%)			*Z-value*	*p*-value
	N	Mean rank	Median (IQR)		
Gender (*n* = 141)				-0.062	0.951
Male	40	70.66	3.15 (4.22)		
Female	101	71.13	3.08 (3.82)		

4.4 PHYSICAL ACTIVITY

Table 4.4 shows the physical activity level of the respondents based on the GPAQ. The majority of the respondents did not perform the vigorous-intensity activity (79.7%) at their workplace. Out of the 26 respondents who performed vigorous-intensity activity at their workplace, the median working days spent was 3.50 (3.00) days with the median time spent of 90.00 (90.00) minutes on a typical day. Meanwhile, the distribution of respondents between those who practised and those who did not practise moderate-intensity activity at their workplace was similar; 47.7% of them had moderate-intensity activity while working and in the meantime, 52.3% of them did not have so. On average, the respondents (n = 61) spent 4.31 ± 1.89 days per week with a median of 120.00 (120.00) minutes spent on a typical day.

Likewise, 47.7% of the respondents walked or cycled to and from places for at least 10 minutes continuously while another 52.3% did not do so. There was an average of 4.48 ± 1.86 days in a week for those who walked or cycled in order to travel from one place to another (n = 61). A median of 45.00 (100.00) minutes was allocated for such traveling on a particular day.

About 57.0% of the respondents had vigorous-intensity activity during their leisure time. These 73 respondents recorded a mean of 3.00 ± 1.56 days per week on having vigorous exercises. On a typical day, they spent a median of 45.00 (30.00) minutes on vigorous-intensity activity. More than half of the respondents (63.8%) practised moderate-intensity activities during their leisure time with a mean of 2.74 ± 1.58 days in a typical week. The median time spent for it was 35.00 (30.00) minutes on a typical day. The respondents spent an average of 469.64 ± 325.23 minutes of sitting in a day.

Table 4.4. The GPAQ results of the respondents

Characteristics	n (%)	Mean ± SD	Median (IQR)
Physical activity at work			
Vigorous-intensity (*n* = 128)			
Yes	26 (20.3)		
No	102 (79.7)		
Number of days in a typical week (*n* = 26)			3.50 (3.00)
1	5 (19.2)		
2	2 (7.7)		
3	6 (23.1)		
4	3 (11.5)		
5	7 (26.9)		
6	1 (3.8)		
7	2 (7.7)		
Total time spent in a typical day (mins) (*n* = 26)			95.00 (112.50)
Moderate-intensity (*n* = 128)			
Yes	61 (47.7)		
No	67 (52.3)		
Number of days in a typical week (*n* = 61)		4.31 ± 1.89	
1	4 (6.6)		
2	8 (13.1)		
3	12 (19.7)		
4	6 (9.8)		
5	16 (26.2)		
6	2 (3.3)		
7	13 (21.3)		
Total time spent in a typical day (mins) (*n* = 61)			120.00 (120.00)

Table 4.4. The GPAQ results of the respondents *(cont')*

Characteristics	n (%)	Mean ± SD	Median (IQR)
Travel to and from places by walking or bicycling (*n* = 128)			
Yes	61 (47.7)		
No	67 (52.3)		
Number of days in a typical week (*n* = 61)		4.48 ± 1.86	
1	5 (8.2)		
2	8 (13.1)		
3	6 (9.8)		
4	2 (3.3)		
5	24 (39.3)		
6	6 (9.8)		
7	10 (16.4)		
Total time spent in a typical day (mins) (*n* = 61)			45.00 (100.00)
Recreational Activity			
Vigorous-intensity (*n* = 128)			
Yes	73 (57.0)		
No	55 (43.0)		
Number of days in a typical week (*n* = 73)		3.00 ± 1.56	
1	10 (13.7)		
2	23 (31.5)		
3	20 (27.4)		
4	6 (8.2)		
5	8 (11.0)		
6	3 (2.1)		
7	3 (2.1)		
Total time spent in a typical day (mins) (*n* = 73)			45.00 (30.00)

Table 4.4. The GPAQ results of the respondents *(cont')*

Characteristics	n (%)	Mean ± SD	Median (IQR)
Moderate-intensity (*n* = 128)			
Yes	81 (63.8)		
No	46 (36.2)		
Number of days in a typical week (*n* = 81)		2.74 ± 1.58	
1	16 (19.8)		
2	29 (35.8)		
3	19 (23.5)		
4	4 (4.9)		
5	6 (7.4)		
6	4 (4.9)		
7	3 (3.7)		
Total time spent in a typical day (mins) (*n* = 81)			35.00 (30.00)
Sedentary behaviour (*n* = 126)			
Time spent in a typical day (mins)		469.64 ± 325.23	

Overall, the respondents portrayed high physical activity levels with a median of 2350.00 (5080.00) MET-mins per week, fulfilling the WHO recommendation for adults. More than half of the respondents (60.2%) were reported to have high physical activity levels, meanwhile, 25.0% of the respondents were physically less active in their daily life.

Table 4.5. Physical activity level classification of the respondents based on the GPAQ

Physical activity	n (%)	Median (IQR)
MET-mins/week (*n* = 128)		2350.00 (5080.00)
High (≥ 1500)	77 (60.2)	
Moderate (≥ 600)	19 (14.8)	
Low (< 600)	32 (25.0)	

In contrast to the study by Beck et al. (2021) which used the same tool in assessing physical activity level, it found that the median MET-mins per week among both rural and non-rural population in the United States was 142.50 (600) MET-mins per week. Such huge difference may due to the income status between the United States and Malaysia which resulted in the difference in physical activity level at which the WHO suggested

that the high-income countries are more physically inactive compared to middle- or low-income countries (*Physical activity*, 2020).

Table 4.6. Difference in the physical activity level of the respondents according to gender

Characteristics	**Physical activity level (MET-mins/week)**			***Z-value***	***p*-value**
	N	**Mean Rank**	**Median (IQR)**		
Gender (*n* = 128)					
Male	36	76.78	2880.00 (6471.00)	-2.344	0.019*
Female	92	58.98	1860.00 (4830.00)		

*Significant at $p < 0.05$

Table 4.6 shows the difference in the physical activity of the respondents according to gender. Male (Median = 2880.00 MET-mins/week, IQR = 6471.00 MET-mins/week) was reported to have a higher physical activity level significantly if compared to their female counterpart (Median = 1860.00 MET-mins/week, IQR = 4830.00 MET-mins/week, $Z = -2.344$, $p = 0.019$).

As the present study referred to the respondents' physical activity during the period of CMCO in 2020 and MCO in 2021, the SOPs were not as strict as the first MCO in 2020. Hence, the respondents had less restriction to travel or to practise physical activity. A study in Poland also found that there was an increase in physical activity level among the adult students if compared between the lockdown and the period when the lockdown was lifted ($p = 0.029$) (Rutkowska et al., 2021).

4.5 DIET QUALITY

Table 4.7 shows the diet quality score of the respondents at which the respondents scored 36.43 ± 5.77 on average, out of the total score of 60, indicating the respondents were in slightly lower risk of poor diet quality. The majority of the respondents (83.1%) were at lower risk of getting poor diet quality with a cut-off score of 30. On the other hand, another 16.9% of the respondents (n = 21) were at risk of poor diet quality.

When further investigated, it was observed that the respondents consumed cereals, cereal products, and/or tubers daily but not following the recommended servings (4 to 8 servings) and the majority of them (60.5%) did not consume wholegrain cereals on a daily basis. The respondents were reported to consume fruits 2 to 6 times per week on average (M = 3.15, SD = 1.21) and they consumed vegetables daily but not achieving the recommended servings (M = 3.90, SD = 1.03).

Notably, the respondents consumed less milk and dairy products as well as legumes and their products with a mean score of 2.71 ± 1.59 and 2.45 ± 1.34 respectively, indicating that the consumptions of these sources of animal protein and plant protein were at least once per week. Likewise, the respondents scored an average of 2.70 ± 1.28 for fish consumption, and the majority of them (46.8%) only consumed fish 2 to 6 times a week. The respondents consumed poultry, meat, and eggs on a daily basis but less than the recommended servings which were ½ to 2 servings per day (M = 3.80, SD = 1.07). This indicates that the main protein source of the respondents was poultry, meat, and eggs rather than the other protein-rich food groups.

On the other hand, it was found that the respondents consumed quite often the foods that bring negative impacts to health, at least once per week. The mean scores for the high-fat protein foods, fat-rich foods, and sugar-rich foods were 3.13 ± 1.45, 3.06 ± 1.25, and 2.79 ± 1.36 respectively, reflecting that the respondents took in these foods once per week. At the same time, the mean score for the salt-rich foods intake of the respondents was 2.43 ± 1.40 whereby the respondents self-reported consuming these foods 2 to 6 times per week.

The present study used a similar method to a Poland study in assessing the diet quality score of the respondents; the compliance of the food intake with the national dietary guidelines (Drywień et al., 2020). Both studies showed a similar result in which the mean diet quality of the respondents was just barely complying with the dietary guidelines despite the Polish study included lesser food groups in their assessment tool (Drywień et al., 2020).

Table 4.7. Diet quality score of the respondents (n = 124)

Food groups	**n (%)**	**Mean ± SD**
Cereals, cereal products and tubers		3.90 ± 1.04
Daily (4 to 8 servings)	35 (28.2)	
Daily (> recommended serving)/ Daily (< recommended serving)	57 (46.0)	
2 to 6 times per week	23 (18.5)	
Once per week	5 (4.0)	
1 to 3 times per month	1 (0.8)	
Rarely/Never	3 (2.4)	
Wholegrain cereals		2.42 ± 1.71
Daily (≥ ½ of recommended serving)	18 (14.5)	
Daily (< ½ of recommended serving or exceeding recommended serving)	31 (25.0)	
2 to 6 times per week	4 (3.2)	
Once per week	15 (12.1)	
1 to 3 times per month	44 (35.5)	
Rarely/Never	12 (9.7)	

Table 4.7. Diet quality score of the respondents (*n* = 124) *(cont')*

Food groups	n (%)	Mean ± SD
Fruits		3.15 ± 1.21
Daily (≥ 2 servings)	18 (14.5)	
Daily (< 2 servings)	27 (21.8)	
2 to 6 times per week	50 (40.3)	
Once per week	17 (13.7)	
1 to 3 times per month	8 (6.5)	
Rarely/Never	4 (3.2)	
Vegetables		3.90 ± 1.03
Daily (≥ 3 servings)	36 (29.0)	
Daily (< 3 servings)	56 (45.2)	
2 to 6 times per week	20 (16.1)	
Once per week	8 (6.5)	
1 to 3 times per month	3 (2.4)	
Rarely/Never	1 (0.8)	
Milk and dairy products		2.71 ± 1.59
Daily (1 to 3 servings)	21 (16.9)	
Daily (> recommended serving)/ Daily (< recommended serving)	18 (14.5)	
2 to 6 times per week	34 (27.4)	
Once per week	22 (17.7)	
1 to 3 times per month	13 (10.5)	
Rarely/Never	16 (12.9)	
Legumes and their products		2.45 ± 1.34
Daily (½ to 1 serving)	9 (7.3)	
Daily (> recommended serving)/ Daily (< recommended serving)	18 (14.5)	
2 to 6 times per week	34 (27.4)	
Once per week	31 (25.0)	
1 to 3 times per month	23 (18.5)	
Rarely/Never	9 (7.3)	
Fish		2.70 ± 1.28
Daily (1 serving)	13 (10.5)	
Daily (> 1 serving)/ Daily (< 1 serving)	10 (8.1)	
2 to 6 times per week	58 (46.8)	
Once per week	21 (16.9)	
1 to 3 times per month	14 (11.3)	
Rarely/Never	8 (6.5)	

Table 4.7. Diet quality score of the respondents (*n* = 124) *(cont')*

Food groups	n (%)	Mean ± SD
Poultry, meat, egg		3.80 ± 1.07
Daily (½ to 2 servings)	38 (30.6)	
Daily (> recommended serving)/ Daily (< recommended serving)	39 (31.5)	
2 to 6 times per week	37 (29.8)	
Once per week	5 (4.0)	
1 to 3 times per month	4 (3.2)	
Rarely/Never	1 (0.8)	
High fat protein foods		3.13 ± 1.45
Rarely/Never	25 (20.2)	
1 to 3 times per month	32 (25.8)	
Once per week	25 (20.2)	
2 to 6 times per week	25 (20.2)	
Once daily	10 (8.1)	
More than once daily	7 (5.6)	
Fat-rich foods		3.06 ± 1.25
Rarely/Never	16 (12.9)	
1 to 3 times per month	36 (29.0)	
Once per week	28 (22.6)	
2 to 6 times per week	29 (23.4)	
Once daily	14 (11.3)	
More than once daily	1 (0.8)	
Salt-rich foods		2.43 ± 1.40
Rarely/Never	11 (8.9)	
1 to 3 times per month	20 (16.1)	
Once per week	22 (17.7)	
2 to 6 times per week	39 (31.5)	
Once daily	22 (17.7)	
More than once daily	10 (8.1)	
Sugar-rich foods		2.79 ± 1.36
Rarely/Never	15 (12.1)	
1 to 3 times per month	24 (19.4)	
Once per week	32 (25.8)	
2 to 6 times per week	33 (26.6)	
Once daily	13 (10.5)	
More than once daily	7 (5.6)	
Total diet quality score		36.43 ± 5.77
At risk of poor diet quality	21 (16.9)	
At lower risk of poor diet quality	103 (83.1)	

Table 4.8 shows the difference between males and females on their diet quality score. Overall, there was no significant difference in the food groups within the diet quality index and also the total diet quality score by gender ($p > 0.05$). Such results indicated that there was no much difference in the quality as well as the food intake between the gender.

Table 4.8. Comparison of diet quality score within gender (*n* = 124)

Food groups	**Mean ± SD**		***t*-value**	***p*-value**
	Male (*n* = 34)	**Female (*n* = 90)**		
Cereals, cereal products and tubers	4.12 ± 0.84	3.81 ± 1.10	1.468	0.145
Wholegrain cereals	2.71 ± 1.75	2.31 ± 1.69	1.147	0.253
Fruits	3.21 ± 1.23	3.12 ± 1.22	0.341	0.734
Vegetables	3.97 ± 1.24	3.87 ± 0.94	0.501	0.617
Milk and dairy products	3.00 ± 1.67	2.60 ± 1.55	1.255	0.212
Legumes and their products	2.65 ± 1.39	2.38 ± 1.32	0.999	0.320
Fish	2.76 ± 1.21	2.68 ± 1.31	0.337	0.736
Poultry, meat, egg	3.74 ± 1.16	3.82 ± 1.04	-0.401	0.689
High fat protein foods	3.06 ± 1.56	3.16 ± 1.41	-0.331	0.741
Fat-rich foods	3.00 ± 1.41	3.09 ± 1.20	-0.351	0.726
Salt-rich foods	2.24 ± 1.26	2.50 ± 1.45	-0.940	0.349
Sugar-rich foods	2.59 ± 1.31	2.87 ± 1.38	-1.019	0.310
Total diet quality score	37.03 ± 6.35	36.20 ± 5.55	0.713	0.477

4.6 HABITUAL FOOD INTAKE

Table 4.9 shows the macronutrients distribution and daily energy intake of the respondents over the COVID-19 pandemic. It was found that the macronutrients distribution of the respondents was following the Acceptable Macronutrient Distribution Range (AMDR) for carbohydrate (50-65%) and fat (25-30%) but not protein (10-20%). The median of protein was slightly more than the AMDR with the median of 20.2 (7.8)%. The means for the carbohydrate and fat consumptions were 52.9 ± 11.8% and 24.6 ± 7.0%, respectively. At the same time, the respondents had a mean daily energy intake of 2144 ± 1282 kcal which was slightly higher than the recommended daily intake for the general Malaysian population (2000kcal). The mean energy intake of the current finding was similar to a study in Saudi Arabia which reported 2559.00 ± 1502.80 kcal per day among the young women (Al-Musharaf et al., 2021).

Table 4.9. Macronutrients distribution, intake and daily energy intake of the respondents (*n* = 111)

Habitual food intake	Mean ± SD	Median (IQR)
Macronutrients distribution (%)		
Carbohydrate	52.9 ± 11.8	
Protein		20.2 (7.8)
Fat	24.6 ± 7.0	
Macronutrients intake (g)		
Carbohydrate	282.31 ± 175.43	
Protein	117.49 ± 79.39	
Fat		52.28 (39.19)
Daily energy intake (kcal)	2144 ± 1282	

When comparing males and females, there was no statistically significant difference for their daily energy intake as well as their macronutrients intake and distribution. Even though females posed a higher mean rank for their protein intake percentage and males had a higher fat intake, the ranking was not significant ($p > 0.05$).

Hence, it can be here concluded that both males and females had similar food consumption during the COVID-19 pandemic.

4.7 DEPRESSION, ANXIETY, AND STRESS

Table 4.11 shows the depression, anxiety, and stress scores of the respondents by using the DASS-21. The respondents were mildly depressed and moderately anxious during the COVID-19 pandemic with the mean scores of 11.02 ± 9.90 and 10.40 ± 8.63 respectively.

Despite 50.8% of the respondents (*n* = 63) were not categorised as depressed during the pandemic, another 49.2% of the respondents (*n* = 61) were depressive at which 22.6% of them (*n* = 28) were even moderately depressed. It was also observed that more than half of the respondents (56.5%) had different degrees of anxiety, rating from mild to extremely severe. There were 20.2% of the respondents (*n* = 25) reported to be moderately anxious, followed by 16.1% of them (*n* = 20) in extremely severe anxiety state, 12.1% of them (*n* = 15) severely anxious, and lastly, 8.1% of them (*n* = 10) were mildly anxious. For the stress domain, more than half of the respondents (54.0%) had a normal stress level throughout the pandemic. Nevertheless, those who suffered from mild to severe degrees of stress could not be negligible as there were 13.7% (*n* = 17) of the respondents moderately and severely stressed out, respectively.

Table 4.10. Macronutrients distribution, intake and daily energy intake between males and females (n = 111)

Habitual food intake	Mean ± SD		*t-value*	*p*-value	Mean rank		Median (IQR)		*Z-value*	*p*-value
	Male (n = 31)	Female (n = 80)			Male (n = 31)	Female (n = 80)	Male (n = 31)	Female (n = 80)		
Macronutrients distribution (%)										
Carbohydrate	54.3 ± 10.5	52.4 ± 12.3	0.774[a]	0.441						
Protein					51.68	57.68	19.7 (7.8)	20.9 (7.72)	-0.881[b]	0.378
Fat	24.8 ± 7.8	24.6 ± 6.8	0.123[a]	0.903						
Macronutrients intake (g)										
Carbohydrate	343.86 ± 228.76	258.45 ± 144.62	1.934[a]	0.060						
Protein	121.46 ± 79.79	115.95 ± 79.69	0.326[a]	0.745						
Fat					58.84	54.90	52.28 (64.97)	52.57 (38.11)	-0.578[b]	0.563
Daily energy intake (kcal)	2473 ± 1625	2016 ± 1107	1.697[a]	0.093						

[a]Indenpendent-samples *t*-test
[b]Mann-Whitney U test

The mean scores for these three domains in the current study were higher than another study in Malaysia which reported a mean of 8.83 ± 0.49, 7.81 ± 0.41, and 9.54 ± 0.47 for depression, anxiety, and stress domains respectively (Wang et al., 2021). The possible reason behind these higher scores may be due to the lower income status of the respondents, which led to being emotionally more affected during this pandemic (Kola et al., 2021; Wong & Alias, 2021).

Table 4.11. DASS-21 scores for depression, anxiety, and stress of the respondents (n = 124)

DASS-21 Domains	n (%)	Mean ± SD
Depression		11.02 ± 9.90
Normal	63 (50.8)	
Mild	12 (9.7)	
Moderate	28 (22.6)	
Severe	14 (11.3)	
Extremely Severe	7 (5.6)	
Anxiety		10.40 ± 8.63
Normal	54 (43.5)	
Mild	10 (8.1)	
Moderate	25 (20.2)	
Severe	15 (12.1)	
Extremely Severe	20 (16.1)	
Stress		14.21 ± 9.77
Normal	67 (54.0)	
Mild	20 (16.1)	
Moderate	17 (13.7)	
Severe	17 (13.7)	
Extremely Severe	3 (2.4)	

Based on Table 4.12, it can be shown that no significant difference was observed between males and females in terms of their mean scores for the three domains in DASS-21. The male respondents showed a higher mean score in all the three domains compared to their female counterparts yet the difference was not significant, most probably due to the big gap between the number of male and female respondents.

Table 4.12. Mean differences of DASS-21 scores between gender (n = 124)

DASS-21 scores	Mean ± SD		*t*-value	*p*-value
	Male (n = 34)	Female (n = 90)		
Depression	11.41 ± 9.10	10.87 ± 10.23	0.272	0.786
Anxiety	12.00 ± 8.74	9.80 ± 8.55	1.270	0.206
Stress	15.06 ± 8.81	13.89 ± 10.14	0.593	0.554

4.8 ASSOCIATIONS BETWEEN SOCIODEMOGRAPHIC FACTORS AND BODY WEIGHT CHANGES DURING THE COVID-19 PANDEMIC

The present study found that there is significant correlation between age and body weight changes (r = -0.226, p = 0.007) during the COVID-19 pandemic among the respondents in Selangor. The finding is consistent with the study by López-Moreno et al. (2020) where they discovered that age was correlated with weight changes during the lockdown in Spain (ρ = 0.138, p < 0.01) at which those who aged younger than 30 years experienced weight loss while those who were 30 to 65 years gained weight. However, the current study found no significant correlation and association between age [$\chi^2(2)$ = 2.666, p = 0.264), weight gain (ρ = -0.148, p = 0.214) , and weight loss (r = -0.248, p = 0.093). Similarly, Kriaucioniene et al. (2020) found that there was no association between age and weight gain solely among the Lithuanians during the COVID-19 pandemic [Age group 36-50 years: OR = 1.14 (0.94 – 1.39), p = 0.173; Age group ≥ 50 years: OR = 1.08 (0.86 – 1.35), p = 0.483]. As age is not the solely biological factor affecting body weight changes, hence explaining the mixed findings between these studies which included different groups of populations from different races and living environments (*Factors Affecting Weight & Health*, 2018; Institute of Medicine (US) Subcommittee on Military Weight Management, 2004).

Table 4.13. Correlations between sociodemographic factors and body weight changes of the respondents (n = 141)

Variables	Body Weight Changes (%)					
	Overall (n = 141)		Weight gain (n = 72)		Weight loss (n = 47)	
	r / ρ	p-value	ρ	p-value	r / ρ	p-value
Age (years)	-0.226	0.007*	-0.148	0.214	-0.248	0.093
Income status (RM)						
Monthly household income	0.069	0.414	-0.034	0.780	-0.236	0.111
Monthly personal income	-0.147	0.083	-0.172	0.152	-0.265	0.072
Weekly food expenses (RM)	0.010	0.902	-0.024	0.841	-0.078	0.602
Household size	0.143	0.090	0.147	0.218	0.139	0.352

*Significant at $p < 0.05$

The present study portrayed no significant correlations between both monthly household income (r = 0.069, p = 0.414) and personal income (r = -0.147, p = 0.083) with body weight changes during the COVID-19 pandemic. Table 4.14 also shows that no significant association can be found between the income threshold within the B40 group and the body weight changes in the midst of this pandemic [$\chi^2(6) = 10.528$, p = 0.104]. Meanwhile, Reyes-Olavarría et al. (2020) found that the respondents from the middle-income level presented a significant association with weight gain during the COVID-19 confinement in Chile [OR = 1.48 (1.04 – 2.10), p = 0.027]. Hence, even though the COVID-19 hits the low-income earners hard, its impact did not reflect on the respondents' body weight changes, at least among this group of respondents. In addition, the majority of the respondents who participated in this survey were students whereby they might not have a fixed income, therefore contributing to the non-significant correlation.

Schröder et al. (2016) had demonstrated food expenses related to body weight changes at which increased food expenses were significantly related to a reduction in body

weight due to an improved diet quality ($p = 0.020$). Even though Mahmud & Riley (2021) found that the COVID-19 had led to a decrement in monthly household income which in turn led to the reduction of food expenses, the current study found that the correlation between food expenses and body weight changes during the COVID-19 pandemic was negligible and not significant ($\rho = 0.010$, $p = 0.902$).

The current study also discovered that household size was not significantly correlated to the body weight changes during the pandemic ($r = 0.143$, $p = 0.090$), neither the weight gain ($r = 0.147$, $p = 0.218$) nor weight loss ($r = 0.139$, $p = 0.352$). This indicated that household size did not affect how the body weight fluctuates even though during the pandemic of COVID-19.

Table 4.14. Associations between sociodemographic characteristics and body weight changes

Characteristics	**Body Weight Changes (%)**			χ^2	***p*-value**
	Weight gain *n* (%)	**No changes *n* (%)**	**Weight loss *n* (%)**		
Age (years) (*n* = 142)				2.666	0.264
< 25	34 (47.2)	9 (40.9)	28 (59.6)		
≥ 25	38 (52.8)	13 (59.1)	19 (40.4)		
Gender (*n* = 142)				11.000	0.004*
Male	29 (40.3)	5 (22.7)	6 (12.8)		
Female	43 (59.7)	17 (77.3)	41 (87.2)		
Ethnics (*n* = 142)				2.981	0.225
Chinese	47 (65.3)	15 (68.2)	24 (51.1)		
Non-Chinese	25 (34.7)	7 (31.8)	23 (48.9)		
Education level (*n* = 142)				1.425	0.490
Primary & secondary level (Primary school, Secondary school)	4 (8.5)	4 (18.2)	10 (13.9)		
Tertiary level (Diploma, Bachelor degree, Master degree, PhD degree)	43 (91.5)	18 (81.8)	62 (86.1)		

Table 4.14. Associations between sociodemographic characteristics and body weight changes *(cont')*

Characteristics	Body Weight Changes (%)			χ^2	*p*-value
	Weight gain ***n* (%)**	**No changes** ***n* (%)**	**Weight loss** ***n* (%)**		
Occupation (*n* = 141)				3.437	0.179
Employed	21 (44.7)	10 (45.5)	43 (60.6)		
Unemployed	26 (55.3)	12 (54.5)	28 (39.4)		
Income status (RM)					
Monthly household income threshold[#] (*n* = 142)				10.528	0.104
B1 (< RM2,500)	17 (23.6)	13 (59.1)	16 (34.0)		
B2 (RM2,501 – RM3,169)	11 (15.3)	2 (9.1)	7 (14.9)		
B3 (RM3,170 – RM3,969)	15 (20.8)	1 (4.5)	8 (17.0)		
B4 (RM3,970 – RM4,849)	29 (40.3)	6 (27.3)	16 (34.0)		
Weekly food expenses (RM) (*n* = 142)					
Household size (*n* = 141)				0.319	0.853
< 5	45 (62.5)	13 (59.1)	27 (57.4)		
≥ 5	27 (37.5)	9 (40.9)	20 (42.6)		

[#]Classification based on the Household Income & Basic Amenities Survey Report 2019
[*]Significant at $p < 0.05$

Table 4.14 shows the associations between respondents who gained weight, lost weight, and no weight changes during the COVID-19 pandemic with respect to their sociodemographic characteristics. It was found that there was a significant association between gender and body weight changes ($\chi 2 = 11.000$, $p = 0.004$) at which female respondents had a higher proportion in gaining (59.7%), losing (87.2%), or even maintaining (77.3%) their body weight compared to the male respondents.

In terms of education level and occupation, the current study found no significant associations related to body weight changes ($p > 0.05$). It was inconsistent with the

previous studies at which Pellegrini et al. (2020) reported a significant negative association between education level and weight gain during the lockdown (β = -1.15, 95% CI = -2.13, -0.17, p = 0.022). Similarly, Deschasaux-Tanguy et al.(2020) found that respondents with higher education levels were more likely to lose weight at which respondents who graduated from a high school were most likely to experience weight loss (OR = 1.24, 95% CI = 1.09, 1.41) as well as an undergraduate degree holder (OR = 1.13, 95% CI = 1.01, 1.26), if compared to those with an education level lower than high-school. However, Drywień et al. (2020) found no associations between education level with both weight gain nor weight loss which was similar to the current finding, showing that education level is not a contributing factor to weight changes during the pandemic.

Previous studies discovered that the change of working mode had led to weight changes but the results were contradicting to each other; Drywień et al. (2020) found a 2-fold odds of weight loss among those working from home while the respondents who changed their working mode from the study by Di Renzo et al. (2020) perceived themselves gained weight. The current study found no association between occupation status and body weight changes, yet, a limitation here would be the mode of working of the respondents did not investigate during the data collection. With such, it can only be said that occupation itself might not contribute to body weight changes but the change of working mode might be and it is yet to be figuring out.

Hence, the current study only found that age and gender were significantly correlated and associated with body weight changes but not the other sociodemographic factors. The inconsistency in the findings might be contributed by the different cultural backgrounds between the current study and the previous literature since that literature was

from foreign countries which were having a different biological trait from the Malaysian population.

4.9 ASSOCIATIONS BETWEEN LIFESTYLE FACTORS AND BODY WEIGHT CHANGES DURING THE COVID-19 PANDEMIC

As shown in Table 4.15, the relationship between physical activity level and body weight changes was not significantly correlated in this study (ρ = -0.037, p = 0.679). The current finding was inconsistent with the previously published studies at which the studies found that time of being physically active or physical activity level was negatively associated with body weight at p <.05 (He et al., 2020; Reyes-Olavarría et al., 2020; Zachary et al., 2020). However, Di Renzo et al. (2020) found that weight gain was observed despite the physical activity level posed a slight increment during the COVID-19 among the respondents. Such mixed findings could be explained by the theory of energy balance at which physical activity is not the only component in energy balance; food intake, thermogenesis, resting energy expenditure, and more. The interactions between the components of the energy balance will then lead to body weight changes in a prolonged period (Hall et al., 2012). Moreover, the current study used the GPAQ questionnaire as the instrument in determining the physical activity level of the respondents while the other studies used self-developed questions in assessing the physical activity level, hence, explaining the presence of mixed findings between the previous literature and current study.

Table 4.15. Correlations between physical activity level and body weight changes of the respondents (n = 127)

Variable	Body Weight Changes (%)					
	Overall (n = 127)		Weight gain (n = 62)		Weight loss (n = 43)	
	ρ	*p*-value	ρ	*p*-value	ρ	*p*-value
Physical activity level (METs-min/week)	-0.037	0.679	-0.124	0.336	-0.027	0.864

The present study also found that there was no significant association between total diet quality score and body weight changes in the midst of pandemic (r = -0.073, p = 0.422). Meanwhile, Drywień et al. (2020) also discovered that diet quality was not significantly accounted for body weight changes after conducting a linear regression analysis with both positive and negative lifestyle changes along with dietary changes. In contrast, the online study by Kaufman-Shriqui et al. (2021) revealed a significant negative association between diet quality score and body weight change that took place over six continents (ρ = -0.129, p < 0.0001). The previous literature also proved that a good diet quality managed to help in maintaining body weight or reducing weight gain (Fung et al., 2015; Vinke et al., 2020). From here, a conclusion can be drawn is diet quality score may not be associated with weight change but poor diet quality and the food itself yes (Aljadani et al., 2013).

Table 4.16. Correlations between diet quality score and body weight changes of the respondents (n = 124)

Diet quality	Body Weight Changes (%)					
	Overall (n = 124)		Weight gain (n = 59)		Weight loss (n = 43)	
	r	*p*-value	ρ	*p*-value	r	*p*-value
Total diet quality score	-0.073	0.422	-0.204	0.121	0.143	0.362
Cereals, cereal products and tubers	0.016	0.863	0.062	0.639	-0.096	0.540
Wholegrain cereals	-0.091	0.316	-0.070	0.598	-0.092	0.557
Fruits	-0.200	0.026*	-0.041	0.757	-0.183	0.241
Vegetables	-0.003	0.971	-0.113	0.395	-0.015	0.924
Milk and dairy products	-0.079	0.382	-0.134	0.313	0.016	0.917
Legumes and their products	0.102	0.262	-0.091	0.493	0.162	0.298
Fish	0.018	0.843	-0.109	0.413	-0.063	0.686
Poultry, meat, egg	-0.063	0.484	-0.168	0.203	0.037	0.813
High fat protein foods	-0.105	0.248	-0.056	0.673	0.029	0.853
Fat-rich foods	0.040	0.656	-0.100	0.449	0.166	0.288
Salt-rich foods	0.096	0.291	-0.014	0.915	0.283	0.066
Sugar-rich foods	-0.024	0.792	-0.084	0.529	0.317	0.038*

*Significant at $p < 0.05$

Interestingly, a significant correlation was found between the 'fruit' item from the diet quality score sheet and body weight changes among the respondents (r = -0.200, p = 0.026). However, there were no significant correlations between 'fruits' and weight gain or weight loss when further analysed. Instead, 'sugar-rich foods' was found to be significantly correlated with weight loss (r = 0.317, p = 0.038). Even though the strength of the association for these two correlations was small and moderate respectively, the intake of fruits and sugar-rich foods did impact the body weight of the respondents.

As the diet quality scoring was related to the consumption of each food group, hence, the negative correlation between 'fruits' and body weight changes implied that

increased fruit intake may lead to a lesser degree of body weight changes, or vice versa. According to Schwingshackl et al. (2015), higher consumption of fruits managed to lose weight at which a reduction of body weight by 13.68g per year for each increase intake of 100g fruits after pooling the studies conducted prior to the COVID-19 pandemic. As fruits are considered as low energy-dense food, therefore, it helps in maintaining fullness state longer which may help in reducing total energy intake if there is increased consumption of fruits (Fung et al., 2015). The present study confirmed again that fruit consumption does impact body weight and even during the pandemic.

On the other hand, the positive correlation established between 'sugar-rich foods' and weight loss showed that a lesser consumption of sugar-rich foods such as cakes, doughnuts, or any foods high in sugar content may help in lowering body weight since a higher score in 'sugar-rich foods' indicated the consumption is less. As those foods that are high in sugar are usually energy- or calories-dense, hence, cutting down such intakes can result in lesser calories consumed and therefore lowered body weight if the individual was in negative energy balance for a period of time. Studies by Kriaucioniene et al. (2020) and Pellegrini et al. (2020) found that increased consumption in sweet stuff during the pandemic posed a higher odds on gaining weight and such findings in line with the present study that increased sugar-rich foods consumption was correlated to weight gain and decreased consumption led to weight loss, though the correlation between 'sugar-rich foods' item and weight gain was not significant.

Table 4.17. Correlations between habitual food intake and body weight changes of the respondents (n = 141)

Habitual food intake	Body Weight Changes (%)					
	Overall (n = 111)		Weight gain (n = 50)		Weight loss (n = 39)	
	r / ρ	*p*-value	ρ	*p*-value	r / ρ	*p*-value
Daily energy intake (kcal)	0.101	0.289	0.060	0.680	-0.160	0.330
Macronutrients distribution (%)						
Carbohydrate	-0.077	0.424	0.083	0.568	-0.178	0.278
Protein	-0.039	0.687	-0.117	0.420	0.213	0.194
Fat	0.145	0.128	0.080	0.582	0.078	0.638
Macronutrients intake (g)						
Carbohydrate	0.079	0.411	0.139	0.336	-0.184	0.263
Protein	0.103	0.283	-0.040	0.782	-0.055	0.738
Fat	0.211	0.027*	0.112	0.440	-0.122	0.460

*Significant at $p < 0.05$

Daily energy intake was reported to have no significant relationship with body weight changes during the COVID-19 pandemic in the present study (r = 0.101, p = 0.289). There were also no significant correlations between macronutrients distribution and weight changes, neither the carbohydrate (r = -0.077, p = 0.424), protein (ρ = -0.039, p = 0.687), nor fat (r = 0.145, p = 0.128). The current finding was consistent with the study conducted by Mahmoud & Taha (2017). Even though the respondents consumed calorie-dense foods such as fast foods and fried foods, their eating habits were not significantly correlated with their BMI ($p > 0.05$) (Mahmoud & Taha, 2017).

Contrastingly, food intake was a significant factor in relation to weight gain (β = -0.39, p = 0.004) and weight loss (β = 0.62, p = 0.004) (Xia et al., 2020). Nonetheless, the current study found a significant correlation between mean fat intake and body weight changes (ρ = 0.211, p = 0.027), indicating that increases in fat intake might contribute to increased body weight changes. However, no significant correlations were found when

further analysed its correlation with weight gain (ρ = 0.112, p = 0.440) and weight loss (r = -0.122, p = 0.460). Such findings indicated that an increase in fat intake will lead to more weight gain while reduction in fat intake will lead to more weight loss even though the correlations were not significant. Studies also found that increase in high fat foods which were high in calories as well contributed to weight gain during the pandemic (Di Renzo et al., 2020; Kriaucioniene et al., 2020; Pellegrini et al., 2020; Reyes-Olavarría et al., 2020).

According to Benton & Young (2017), controlling calorie intake itself is not the only measure in determining body weight changes or regulation, hence, explaining the inconsistency between the present finding and previous findings.

4.10 ASSOCIATIONS BETWEEN EMOTIONAL FACTORS AND BODY WEIGHT CHANGES DURING THE COVID-19 PANDEMIC

As presented in Table 4.18, depression (r = 0.110, p = 0.222) and anxiety (r = 0.129, p = 0.153) were not significantly correlated with body weight changes among the respondents during this pandemic but stress did though the strength was weak.

In a previous study conducted by van Strien et al. (2016), no statistical significance was found in the total association between depression and change in BMI, or more specifically, weight gain, among the study participants when 3 mediators (emotional eating, external eating, and restrained eating) were included in the model. Van Strien et al. (2016) discovered that there was a positive association between depression and weight gain in both mothers (β = 0.31, p = 0.171) and fathers (β = 0.25, p = 0.068), yet the

association was not significant, which was similar to the present study. On the other hand, studies by Fernandez-Rio et al. (2020) and Xia et al. (2020) discovered that depressive symptom was related to body weight changes in Spain and China respectively, most probably due to the trigger of the symptom that led to overeating and/or restrictive eating, therefore, reflecting on weight changes.

Table 4.18. Correlations between emotional factors and body weight changes of the respondents (n = 124)

Variables	**Body Weight Changes (%)**					
	Overall (n = 124)		**Weight gain (n = 59)**		**Weight loss (n = 43)**	
	r	***p*-value**	**ρ**	***p*-value**	**r**	***p*-value**
Depression	0.110	0.222	-0.014	0.917	0.135	0.388
Anxiety	0.129	0.153	0.115	0.386	0.067	0.671
Stress	0.180	0.045*	0.096	0.471	0.150	0.338

*Significant at $p < 0.05$

The current finding on the correlation between anxiety and body weight changes was contrasting with what be presented in the studies by ALMughamis et al. (2020) and Pellegrini et al. (2020) which found that anxiety was correlated with weight gain during the COVID-19 pandemic. In the study by Pellegrini et al. (2020), anxiety or depression was the strongest predictor of weight gain in the study [β = 1.61 (0.53 - 2.69), p = 0.004]. The study by ALMughamis et al. (2020) further revealed that always in an anxious state contributed to a 2-fold possibility of weight gain [OR = 2.45 (1.11 - 5.41), p = 0.026].

Table 4.19. Correlations between emotional factors and 'sugar-rich foods' score (n = 124)

Variables	**'Sugar-rich foods' score**	
	r	***p*-value**
Depression	-0.218	0.015*
Anxiety	-0.230	0.010*
Stress	-0.209	0.020*

*Significant at $p < 0.05$

Despite the present study found a weak but significant correlation between anxiety and 'sugar-rich foods' score (r = -0.230, p = 0.010) as well as anxiety and daily energy intake (r = 0.282, p = 0.003), indicating that being anxious may increase the sugar-rich food consumption and/or dietary intake of the respondents, yet daily energy intake was not significantly correlated with the body weight changes. Prolonged duration of staying at home and the unstable mood or mood swings may lead people to seek comfort foods during this pandemic, hence, increasing snack and/or food intake was found in related to being anxious (Khan & Moverley Smith, 2020; Pellegrini et al., 2020).

On the other hand, the present study found that stress level was significantly correlated with body weight changes (r = 0.180, p = 0.045). Nevertheless, there were no significant correlations between stress and weight gain (r = 0.096, p = 0.471) or weight loss (r = 0.150, p = 0.338) in the later analyses. The non-significant results could be explained by the smaller sample size involved in the later analyses and therefore the effect of stress on those gaining or losing weight might not be that impactful.

Contrasting with the present study, a study by Dun et al. (2020) found that no significant association between stress and weight changes for those who suffered mild to a major degree of stress during the pandemic (p = 0.99). Nonetheless, previous literature discovered that stress level was related to body weight changes, specifically weight loss at which an increase in stress level may result in less extend of weight loss in weight management programme (Cox et al., 2013; Elder et al., 2012).

At the same time, Zachary et al. (2020) found that the respondents were moderately stressed on average, yet, the Perceived Stress Scale (PSS) score itself did not

significantly correlate with weight gain (p = 0.653), suggesting that weight gain could only be reflected if and only the respondents use food to cope with stress (Zachary et al., 2020). For such reason, the present study correlated stress with daily energy intake as well as 'sugar-rich foods' from the diet quality index. It showed that there was a weak correlation between stress level and daily energy intake despite the correlation was not significant (r = 0.185, p = 0.051). Meanwhile, a significant correlation was found between stress and 'sugar-rich foods' score (r = -0.209, p = 0.020), indicating that the respondents might opt for sweet stuff while under stress. Hence, it could be suggested that individuals who were stress might tend to eat high-sugar foods and therefore affect their body weight.

Table 4.20. Correlations between emotional factors and energy intake (n = 111)

Variables	**Daily energy intake (kcal)**	
	r	***p*-value**
Depression	0.183	0.055
Anxiety	0.282	0.003*
Stress	0.185	0.051

*Significant at $p < 0.05$

CHAPTER 5: CONCLUSION, LIMITATIONS, AND FUTURE RECOMMENDATIONS

5.1 CONCLUSIONS

The majority of the low-income adults who participated in this survey (84.4%) experienced a weight change during the COVID-19 pandemic, either weight gain (51.1%) or weight loss (33.3%). This provides a suggestion that health promotion on weight management among this group of people should not be halted even though in the midst of the pandemic. Similar to other areas in the world, weight gain was more prevalent than weight loss, therefore, the need for a weight control intervention program is urgent to prevent another health issue arise after the pandemic which will burden the public health system.

Based on the present study, it showed that age (r = -0.226, p = 0.007) and gender (χ^2 = 11.000, p = 0.004) were significantly correlated and associated with body weight changes during the COVID-19 pandemic, indicating that females who were at a younger age were more probably to experience weight changes during the pandemic. However, there was no significance correlation or association between income status (monthly household income: r = 0.069, p = 0.414; monthly personal income: r = -0.147, p = 0.083), weekly food expenses (ρ = 0.010, p = 0.902), household size (r = 0.143, p = 0.090), ethnicity (χ^2 = 2.981, p = 0.225), education level (χ^2 = 1.425, p = 0.490), and occupation (χ^2 = 3.437, p = 0.179), with the body weight changes. Thus, the first research hypothesis of there is a significant association between sociodemographic factors and body weight changes was not fully accepted.

At the same time, the current study found no significant relationship between the physical activity level and body weight changes whereby the correlation was negligible (ρ = -0.037, p = 0.679). The correlation between diet quality and body weight changes was weak and not significant in the current study (r = -0.073, p = 0.422). However, a negative correlation was found significantly between 'fruits' and body weight changes after analysing the items within the diet quality score (r = -0.200, p = 0.026). Such significance implied that reduced fruit consumption may lead to weight changes in the midst of this pandemic. Similarly, 'sugar-rich foods' was also found to be positively correlated with weight loss (r = 0.317, p = 0.038), indicating that a lesser intake of foods that are high in sugar content may help in reducing weight since the scoring for this item was inversely proportional to its consumption. On the other hand, daily energy intake (r = 0.101, p = 0.289) and macronutrients distribution (Carbohydrate: r = -0.077, p = 0.424; Protein: ρ = -0.039, p = 0.687; Fat: r = 0.145, p = 0.128) were not significantly correlated with body weight changes and the correlations were negligible to weak. However, the mean fat intake was found to be significantly correlated with body weight changes (ρ = 0.211, p = 0.027) but not the mean intakes of carbohydrate (r = 0.079, p = 0.411) and protein (r = 0.103, p = 0.283). As a result, the second research hypothesis cannot be fully rejected since there were significant associations between fruits and sugar-rich foods with weight changes and weight loss respectively.

Lastly, the emotional factors were tested with their associations with the body weight changes by using the DASS-21 questionnaire. Out of the three domains, only the stress domain was found to have significant correlation with the body weight changes (r = 0.180, p = 0.045). Both depression (r = 0.110, p = 0.222) and anxiety domains (r =

0.129, p = 0.153) were not significantly correlated with body weight changes of the respondents in the midst of this pandemic, even though there were positive correlations. Such findings implied that being stress may influence body weight. Hence, the hypothesis of there is a significant association between emotional factors and body weight changes could be accepted if involved only stress.

Even though there were only several factors found significantly associated with body weight changes during the COVID-19 pandemic in this study, such issues should not be neglected especially the cases that show no sign in lowering, both locally and globally. It should be handled and addressed to prevent further burden on the post-COVID-19 pandemic. New forms of strategies should be implemented in intervening since the COVID-19 pandemic had altered the lifestyle and brought in the new norms.

5.2 LIMITATIONS

The present study poses several limitations. Firstly, the data collection of the study was conducted online due to the rising cases of the COVID-19 in Malaysia, the questionnaire was too long to be filled in online, burdening the respondents, hence contributing to the incompleteness of data. Therefore, different sample sizes were used in the analysis.

Next, the study was a cross-sectional study at which the data was collected at one point of time, therefore, the temporal relationship between the variables is unable to be determined. Besides, the data may not be representative enough since the data collected only in Selangor. Moreover, the questionnaire was distributed mostly among the Chinese community, hence the distribution of the ethnicity is not even and the result of this study may not be generalised enough to represent the B40 population in Selangor.

As the questionnaire was distributed online, the respondents had to answer the questionnaire based on a self-reported basis, therefore, the anthropometry measurement may not be accurate since the respondents self-reported their body weight the last October and the recent one. In addition, over- and/or under-reporting on dietary intake may also exist as the respondents. For the food expenses, the question itself did not highlight whether it should be answered based on personal expenditure or overall household expenditure, confusing the respondents while answering.

5.3 FUTURE RECOMMENDATIONS

The present study found that there was a body weight change among the low-income adults in Selangor during the COVID-19 pandemic, especially the weight gain. Therefore, health promotion programs are needed to provide knowledge and educate this group of adults to control their body weight and maintain it within the normal range of BMI. For instance, an intervention program on weight management can be conducted virtually to provide the tips on maintaining healthy body weight in the midst of pandemic.

Besides, the present study included only the low-income adults from Selangor. It is suggested to include the low-income adults from other states in the future to provide an overview of the body weight changes and the associated factors during an emergency or a pandemic. It is because different states have different sociodemographic background such as living costs, which may contribute to different outcomes. It is also suggested to include questions on changes in income and/or occupation before and after the pandemic to provide a better overview of the impact of the pandemic and how these changes would then in turn reflecting on their body weight changes.

In addition, it is recommended to provide subsidisation or monetary help to this lower-income household especially in the midst of the COVID-19 pandemic to assist them in thriving through these difficult hours. Financial support is needed so that they can put more effort into their health without worrying too much about the financial problems.

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APPENDICES

APPENDIX A - APPROVAL LETTER FROM JKEUPM

Ref. no: UPM/TNCPI/RMC/JKEUPM/1.4.18.2 (JKEUPM)
Date: 3 February 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 **'Diet Quality and Other Factors Influencing Body Weight Changes during COVID-19 Pandemic among Low-Income Adults in Selangor, 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-2020-478

Thank you.

Yours faithfully,

Prof. Dr. Zamberi Sekawi

Chair
Ethics Committee for Research Involving Human Subjects
Universiti Putra Malaysia

APPENDIX B – APPROVAL LETTER FROM JKEUPM ON CHANGING IN SAMPLING DESIGN

From: NOR ELLIA BT ABD AJIS / RMC
Sent: Thursday, June 17, 2021 4:38 PM
To: ROSITA BINTI JAMALUDDIN / MEDIC
Cc: jiayingss@hotmail.com; Jawatankuasa Etika Universiti / UPM; JOHNSON A/L STANSLAS / MEDIC; ZAMBERI BIN SEKAWI / MEDIC; Abdul Hadi Abd Rashid
Subject: NOTIFIKASI KELULUSAN POST APPROVAL - (JKEUPM-2020-478)

Assalamualaikum,

Prof. Madya Dr. Rosita Jamaluddin,

Sukacita dimaklumkan permohonan pindaan protokol tuan/puan dengan no rujukan JKEUPM-2020-478 telah diluluskan berkuatkuasa pada 17 Mei 2021.

Sekian, terima kasih.

--
Nor Ellia Abd Ajis
Executive Officer
Office of the Deputy Vice Chancellor (Research & Innovation)
University Putra Malaysia
Tel: 03-97691244

APPENDIX C – RESPONDENT'S INFORMATION SHEET AND INFORMED CONSENT FORM (ENGLISH VERSION)

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 :
Diet Quality And Other Factors Influencing Body Weight Changes During COVID-19 Pandemic Among Low-Income Adults In Selangor, Malaysia

2. INTRODUCTION:
It is well known that lifestyle behaviours will affect body weight. The relationships between poor diet quality, physically inactive, and weight gain are established a long time ago. Implementation of the MCO, CMCO, EMCO, and RMCO since 2020 had altered the lifestyle which then in turn affecting the individual's physical health and mental health. This alteration brings effect to body weight whereby the individual may experience either weight loss or weight gain due to the restriction of movement and alteration of lifestyle. Therefore, this study is aimed to determine the factors influencing body weight changes during the COVID-19 pandemic among adults.

This study is a part of the requirements for the degree of Bachelor of Science (Nutrition and Community Health) from Faculty of Medicine and Health Sciences, Universiti Putra Malaysia which is estimated to take 1 year to be completed. A total of 188 adults in Selangor will be taking part in this study.

3. WHAT WILL YOU HAVE TO DO?
You are required to read and understand this study in the Respondent's Information Sheet and Informed Consent Form. If you agree to participate in this study, please sign the consent form on page 3. After that, you are requested to return the signed consent form to the investigator.

You are required to complete a self-administered questionnaire composed of 6 sections. The questionnaire will be collecting your sociodemographic background, body weight and height, physical activity level, diet quality, habitual food intake, and emotional status.

It takes about 30 minutes to complete this questionnaire. Your participation is voluntary. You have the right to withdraw from this study at any time without giving any excuses to the investigator. No penalty will be provided upon withdrawal.

4. WHO SHOULD NOT PARTICIPATE IN THE STUDY?
Non-Malaysians, individuals who are handicapped or with physical disability, cognitive disorder, self-reported to have chronic disease such as cardiovascular disease, hypertension, and diabetes, and pregnant women.

5. WHAT WILL BE THE BENEFITS OF THE STUDY:

(a) TO YOU AS THE SUBJECT?

You will be benefited to know about your diet quality and emotional status after the investigator has calculated the scoring. From there, you can seek advice to make improvements to it.

(b) TO THE INVESTIGATOR?

The investigator will be benefited to determine the factors influencing the body weight changes among low-income adults. Besides, the results of this study can help healthcare professionals to plan health promotion programs among low-income adults to solve body weight-related issues.

6. WHAT ARE THE POSSIBLE RISKS?

Minimum risks are available in this study as only self-administered questionnaire and self-reported body weight and height.

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

Yes, the information collected from this research will be kept confidential and for academic purposes only. The information will not be revealed to any parties. The respondents' identities will not be revealed in this research or any publication.

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

If you have any queries, please contact:

Researcher:

Tee Jia Ying,
Final Year Student,
BSc (Nutrition and Community Health),
Department of Nutrition,
Faculty of Medicine and Health Sciences,
Universiti Putra Malaysia.
mailto:jiayingss@hotmail.com
Tel. no.: 017-7681834

Supervisor:

Assoc. Prof. Dr. Rosita Jamaluddin,
Lecturer,
Department of Dietetics,
Faculty of Medicine and Health Sciences,
Universiti Putra Malaysia.
mailto:rositaj@upm.edu.my
Tel. no.: 03-97692467

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

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 ……..…… (Respondent)

Date :……..

Signature ……..…… (Witness)

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 – RESPONDENT'S INFORMATION SHEET AND INFORMED CONSENT FORM (MALAY VERSION)

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

BORANG 2.4: PENERANGAN DAN PERSETUJUAN RESPONDEN

Sila baca maklumat berikut dengan teliti. Sekiranya anda mempunyai sebarang pertanyaan, sila kemukakan kepada penyelidik.

1.TAJUK KAJIAN
Kualiti Diet Dan Faktor-Faktor Lain Yang Mempengaruhi Perubahan Berat Badan Semasa Pandemik COVID-19 dalam kalangan Orang Dewasa Yang Berpendapatan Rendah Di Selangor, Malaysia

2. PENGENALAN
Pengaruh tingkah laku gaya hidup terhadap berat badan telah lama diketahui. Hubungan antara kualiti diet yang buruk dan cara hidup yang tidak aktif dengan kenaikan berat badan sudah lama terjalin. Pelaksanaan PKP, PKPB, PKPD, dan PKPP sejak tahun 2020 telah mengubah gaya hidup yang biasa, seterusnya mempengaruhi kesihatan fizikal dan mental. Perubahan ini membawa kesan kepada berat badan di mana seseorang itu mungkin mengalami perubahan berat badan, sama ada kenaikan atau penurunan berat badan disebabkan sekatan pergerakan dan perubahan gaya hidup. Oleh itu, kajian ini bertujuan untuk mengetahui faktor-faktor yang mempengaruhi perubahan berat badan semasa pandemik COVID-19 dalam kalangan orang dewasa.

Kajian ini adalah sebahagian daripada keperluan untuk bergraduat bagi Ijazah Sarjana Muda Sains (Pemakanan dan Kesihatan Komuniti) dari Fakulti Perubatan dan Sains Kesihatan, Universiti Putra Malaysia yang dijangka siap dalam tempoh satu tahun pengajian. Seramai 188 orang dewasa di Selangor akan mengambil bahagian dalam kajian ini.

3. APAKAH YANG PERLU ANDA LAKUKAN?
Anda perlu membaca dan memahami tentang kajian ini dalam borang Penerangan dan Persetujuan Responden. Jika anda bersetuju untuk menyertai kajian ini, anda diminta untuk menandatangani borang persetujuan penyertaan di halaman 3. Setelah itu, anda diminta menyerahkan kembali borang tersebut kepada penyelidik.

Anda perlu melengkapkan satu set soal selidik yang mengandungi 6 bahagian. Soal selidik ini akan mengumpulkan latar belakang sosiodemografi, berat badan dan ketinggian, tahap aktiviti fizikal, kualiti diet, pengambilan makanan, dan status emosi anda.

Anda akan mengambil masa lebih kurang 30 minit untuk menyiapkan kajian ini. Penyertaan anda dalam kajian ini adalah secara sukarela. Anda berhak untuk menarik diri daripada kajian ini pada bila-bila masa tanpa memberi sebarang alasan kepada penyelidik. Tiada penalti akan dikenakan semasa penarikan diri anda.

4. SIAPA YANG TIDAK BOLEH MENYERTAI KAJIAN INI?
Individu yang bukan warganegara Malaysia, individu yang cacat, individu yang mempunyai masalah kognitif, individu yang mempunyai penyakit kronik seperti penyakit jantung, tekanan darah tinggi, dan kencing manis, dan wanita hamil.

5. APAKAH FAEDAH MENYERTAI KAJIAN INI?

a) KEPADA ANDA SEBAGAI PESERTA?
Anda akan mengetahui tentang kualiti diet dan staus emosi anda setelah penyelidik mengira skor bagi kedua-dua bahagian tersebut. Dengan itu, anda boleh mendapatkan nasihat daripada profesional kesihatan supaya menambahbaikkannya.

b) KEPADA PENYELIDIK?
Penyelidik akan mendapat manfaat untuk menentukan faktor-faktor yang mempengaruhi perubahan berat badan di kalangan dewasa yang berpendapatan rendah. Selain itu, hasil kajian ini dapat membantu profesional kesihatan untuk merancang program promosi kesihatan dalam kalangan orang dewasa berpendatan rendah bagi menyelesaikan masalah yang berkaitan dengan berat badan.

6. ADAKAH IA BERISIKO?
Kajian ini mempunyai risiko yang minimum kerana kajian ini hanya memerlukan responden untuk mengisi borang soal selidik dan melaporkan berat badan dan ketinggian.

7. ADAKAH MAKLUMAT DAN IDENTITI SAYA KEKAL RAHSIA?
Ya, semua maklumat yang diperolehi daripada kajian ini akan kekal sulit dan digunakan untuk tujuan penyelidikan sahaja. Maklumat anda tidak akan didedahkan kepada mana-mana pihak. Identiti setiap individu tidak akan disertakan di dalam kajian atau publisiti.

8. SIAPA YANG SAYA PERLU HUBUNGI SEKIRANYA SAYA MEMPUNYAI SOALAN TAMBAHAN SEMASA MENGIKUTI PENYELIDIKAN INI?
Sekiranya anda mempunyai sebarang pertanyaan, sila hubungi:

Penyelidik:

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Sila tandatangan di sini sekiranya anda telah membaca dan memahami kandungan halaman ini

9. PERSETUJUAN

Saya…… No Kad Pengenalan. …… beralamat…… ……..dengan ini bersetuju untuk mengambil bahagian secara sukarela dalam penyelidikan yang tersebut di atas *(kajian klinikal/percubaan ubat-ubatan/rakaman video/kumpulan sasaran/temuduga/ soal selidik).

Saya telah diberi penjelasan secara menyeluruh mengenai penyelidikan ini dari segi metodologi, risiko dan komplikasi (seperti tertulis pada Helaian Penerangan Responden). Saya memahami bahawa saya berhak menarik diri dari penyelidikan ini pada bila-bila masa tanpa memberi sebarang alasan.Saya juga memahami bahawa sebarang maklumat yang berkaitan identiti saya akan dirahsiakan.

Saya* berminat / tidak berminat untuk mengetahui keputusan kajian yang melibatkan saya.

Saya setuju/tidak bersetuju untuk imei/gambar/rakaman video/ rakaman suara digunakan dalam apa jua bentuk penerbitan atau pembentangan. (sekiranya berkaitan).

*potong yang tidak berkenaan

Tandatangan ……..…… Tandatangan ……..……
(*Responden*) (*Saksi*)

Tarikh :…….. Nama :……..

No. K/P: ……..

Saya mengesahkan bahawa saya telah menerangkan kepada responden ini sifat dan tujuan penyelidikan yang tersebut di atas.

Tarikh ……..…… Tandatangan ……..…….
(*Penyelidik*)

APPENDIX E - QUESTIONNAIRE

FACULTY OF MEDICINE AND HEALTH SCIENCES
FAKULTI PERUBATAN DAN SAINS KESIHATAN

DEPARTMENT OF NUTRITION
JABATAN PEMAKANAN

QUESTIONNAIRE
BORANG SOAL SELIDIK

RESEARCH TITLE:
TAJUK KAJIAN:

DIET QUALITY AND OTHER FACTORS INFLUENCING BODY WEIGHT CHANGES DURING COVID-19 PANDEMIC AMONG LOW-INCOME ADULTS IN SELANGOR, MALAYSIA

KUALITI DIET DAN FAKTOR-FAKTOR LAIN YANG MEMPENGARUHI PERUBAHAN BERAT BADAN SEMASA PANDEMIK COVID-19 DALAM KALANGAN ORANG DEWASA YANG BERPENDAPATAN RENDAH DI SELANGOR, MALAYSIA

RESEARCHER
PENYELIDIK : TEE JIA YING (194940)

SUPERVISOR
PENYEDIA PENYELIDIK : PROF. DR. ROSITA JAMALUDDIN

DATE
TARIKH :

Instruction: The questions within this questionnaire are only for academic purposes. All the information will not be revealed to any parties. Your involvement and cooperation are much appreciated.

Arahan: Soalan dalam borang soal selidik ini hanya untuk tujuan akademik sahaja. Semua maklumat tidak akan didedahkan ke mana-mana pihak. Penglibatan dan kerjasama anda amatlah dihargai.

SECTION A
BAHAGIAN A

Instruction: Please fill in the details or tick (√) at the space provided
Arahan: *Sila isikan makluman anda atau tandakan (√) di ruangan yang disediakan*

1.	Date of birth *Tarikh lahir*	_____ / _____ / _____ (dd/mm/yyyy)
2.	Age *Umur*	
3.	Gender *Jantina*	☐ Male *Lelaki* ☐ Female *Perempuan*
4.	Ethnicity *Kaum*	☐ Malay *Melayu* ☐ Chinese *Cina* ☐ Indian *India* ☐ Others: _____ *Lain-lain:* _____
5.	Educational level *Tahap pendidikan*	☐ No formal education *Pendidikan tidak formal* ☐ Primary school *Sekolah rendah* ☐ Secondary school *Sekolah menengah* ☐ Diploma *Diploma* ☐ Bachelor degree *Ijazah sarjana muda* ☐ Master degree *Ijazah sarjana* ☐ PhD degree *Ijazah PhD*

6.	Occupation *Pekerjaan*	
7.	Household size *Bilangan ahli keluarga*	
8.	Monthly household income *Pendapatan isi rumah bulanan*	
9.	Monthly personal income *Pendapatan peribadi bulanan*	
10.	Monthly household expenses *Pembelanjaan isi rumah bulanan*	

11. During the COVID-19 pandemic, how much did you spend on the following food items/groups on a weekly basis?
Semasa pandemik COVID-19, berapa anda belanja atas makanan/kumpulan makanan berikut dalam seminggu?

No.	**Food items/Food groups** ***Makanan/Kumpulan makanan***	**Quantity per purchase** ***Kuantiti setiap pembelian***	**Weekly cost (RM)** ***Kos seminggu (RM)***	**Remarks (eg. brand)** **Catatan (cth. jenama)**
1.	Rice *Beras*			
2.	Bread & other cereals *Roti & bijirin lain*			
3.	Meat *Daging*			
4.	Poultry & eggs *Ayam/itik & telur*			
5.	Fish & seafood *Ikan & makanan laut*			
6.	Milk & dairy products *Susu & product tenusu*			
7.	Fresh fruits & vegetables *Buah-buahan & sayur-sayuran yang segar*			
8.	Oils & fats *Minyak & lemak*			
9.	Sugar, jam, honey, chocolate & confectionery *Gula, jem, madu, coklat & manisan*			
10.	Coffee, tea, cocoa & non-alcoholic beverages *Kopi, teh, koko & minuman bukan alkohol*			
11.	Canned foods & processed foods (eg. Instant noodles) *Makanan dalam tin & makanan diprocess (cth. Mi segera)*			
12.	Fast food *Makanan segera*			

SECTION B

BAHAGIAN B

Instruction: Please fill in the following details as requested.
Arahan: *Sila isikan butiran berikut seperti yang diminta.*

Body weight measured at the **beginning of the October of the year 2020** (kg) *Berat badan yang diukur pada **awal bulan Oktober tahun 2020** (kg)*	
Body weight measured **recently** (kg) *Berat badan yang **diukur baru-baru ini** (kg)*	
Height (m) *Ketinggian (m)*	

SECTION C

BAHAGIAN C

Instruction: Please answer the following questions based on the situation during the CMCO started in October of 2020 and MCO started in January of 2021.
Arahan: *Sila jawab soalan berikut berdasarkan situasi semasa PKPB pada bulan Oktober 2020 dan PKP pada bulan Januari 2021.*

No.	Question *Soalan*	Response *Maklum balas*
Work-related ***Berkaitan dengan pekerjaan***		
1.	Does your work involve vigorous-intensity activity that causes large increases in breathing or heart rate like [carrying or lifting heavy loads, digging or construction work] for at least 10 minutes continuously? *Adakah pekerjaan anda melibatkan aktiviti kerja berat yang mengakibatkan peningkatan yang banyak dalam kadar pernafasan ataupun denyutan jantung seperti berlari, membawa atau mangangkat barang yang berat, menggali, mencangkul, menuai, berkebun, memburu atau melakukan kerja pembinaan sekurang-kurangnya 10 minit secara berterusan?*	☐ Yes Ya ☐ No Tidak If 'No', go to Q4 Jika 'Tidak', sila ke Q4
2.	In a typical week, on how many days do you do vigorous-intensity activities as part of your work? *Biasanya dalam seminggu, berapa harikah anda melakukan kerja-kerja berat dalam pekerjaan anda?*	Number of days *Jumlah hari* ☐
3.	How much time do you spend doing vigorous-intensity activities at work on a typical day? *Pada hari biasa yang anda lakukan kerja berat, berapa lamakah anda melakukannya?*	Hours : minutes *Jam : minit* ☐☐
4.	Does your work involve moderate-intensity activity, that causes small increases in breathing or heart rate such as brisk walking [or carrying light loads] for at least 10 minutes continuously? *Adakah pekerjaan anda melibatkan aktiviti kerja sederhana yang mengakibatkan peningkatan yang sedikit dalam kadar pernafasan ataupun denyutan jantung seperti berjalan pantas, membawa barang yang ringan, memancing, membuat kerja rumah, mencuci kereta atau mengecat rumah sekurang-kurangnya 10 minit secara berterusan?*	☐ Yes Ya ☐ No Tidak If 'No', go to Q7 Jika 'Tidak', sila ke Q7
5.	In a typical week, on how many days do you do moderate-intensity activities as part of your work? *Biasanya dalam seminggu, berapa harikah anda melakukan kerja-kerja sederhana dalam pekerjaan anda?*	Number of days *Jumlah hari* ☐
6.	How much time do you spend doing moderate-intensity activities at work on a typical day? *Pada hari biasa yang anda lakukan kerja sederhana, berapa lamakah anda melakukannya?*	Hours : minutes *Jam : minit* ☐☐

Travel to and from places ***Perjalanan***		
7.	Do you walk or use a bicycle (pedal cycle) for at least 10 minutes continuously to get to and from places? *Adakah anda berjalan atau berbasikal secara berterusan sekurang-kurangnya 10 minit untuk menuju ke, dan dari sesuatu tempat?*	☐ Yes Ya ☐ No Tidak If 'No', go to Q10 Jika 'Tidak', sila ke Q10
8.	In a typical week, on how many days do you walk or bicycle for at least 10 minutes continuously to get to and from places? *Dalam satu minggu yang biasa, berapa harikah anda berjalan atau berbasikal secara berterusan sekurang-kurangnya 10 minit untuk menuju ke, dan dari sesuatu tempat?*	Number of days *Jumlah hari* ☐
9.	How much time do you spend walking or bicycling for travel on a typical day? *Dalam satu hari yang biasa, berapa lamakah anda berjalan atau berbasikal untuk bergerak dari satu tempat ke tempat yang lain?*	Hours : minutes *Jam : minit* ☐☐
Recreational activities ***Aktiviti pada waktu lapang***		
10.	Do you do any vigorous-intensity sports, fitness or recreational (leisure) activities that cause large increases in breathing or heart rate like [running or football] for at least 10 minutes continuously? *Pada masa lapang, adakah anda melakukan aktiviti sukan, kecergasan atau riadah yang lasak yang mengakibatkan peningkatan yang banyak dalam kadar pernafasan ataupun denyutan jantung, seperti berlari, jogging, aerobik atau bermain bola sepak, sekurang-kurangnya 10 minit secara berterusan?*	☐ Yes Ya ☐ No Tidak If 'No', go to Q13 Jika 'Tidak', sila ke Q13
11.	In a typical week, on how many days do you do vigorous-intensity sports, fitness or recreational (leisure) activities? *Biasanya dalam seminggu pada waktu lapang, berapa harikah anda melakukan aktiviti-aktiviti sukan, kecergasan atau riadah yang lasak?*	Number of days *Jumlah hari* ☐
12.	How much time do you spend doing vigorous-intensity sports, fitness or recreational activities on a typical day? *Dalam satu hari yang biasa, berapa lamakah anda melakukan aktiviti-aktiviti sukan, kecergasan atau riadah yang lasak?*	Hours : minutes *Jam : minit* ☐☐

13.	Do you do any moderate-intensity sports, fitness or recreational (leisure) activities that cause a small increase in breathing or heart rate such as brisk walking, [cycling, swimming, volleyball] for at least 10 minutes continuously? *Pada masa lapang, adakah anda melakukan aktiviti sukan, kecergasan atau riadah yang sederhana yang mengakibatkan peningkatan yang sedikit dalam kadar pernafasan ataupun denyutan jantung, seperti berjalan pantas, berbasikal, berenang, menanam pokok bunga atau bermain bola tampar, sekurang-kurangnya 10 minit secara berterusan?*	☐ Yes Ya ☐ No Tidak If 'No', go to Q16 Jika 'Tidak', sila ke Q16
14.	In a typical week, on how many days do you do moderate-intensity sports, fitness or recreational (leisure) activities? *Biasanya dalam seminggu pada waktu lapang, berapa harikah anda melakukan aktiviti-aktiviti sukan, kecergasan atau riadah yang sederhana?*	Number of days *Jumlah hari* ☐
15.	How much time do you spend doing moderate-intensity sports, fitness or recreational (leisure) activities on a typical day? *Dalam satu hari yang biasa, berapa lamakah anda melakukan aktiviti-aktiviti sukan, kecergasan atau riadah yang sederhana?*	Hours : minutes *Jam : minit* ☐☐
Sedentary behaviour ***Tingkah laku sedentari/tidak aktif***		
16.	How much time do you usually spend sitting or reclining on a typical day? *Dalam satu hari yang biasa, berapakah jumlah masa yang anda gunakan untuk duduk atau baring/bersandar?*	Hours : minutes *Jam : minit* ☐☐

SECTION D

BAHAGIAN D

Instruction: Please tick (√) at the option that fulfilled the situation during the CMCO started in October of 2020 and MCO started in January of 2021.
Arahan: *Sila tandakan (√) pilihan yang menggambarkan situasi semasa PKPB pada bulan Oktober 2020 dan PKP pada bulan Januari 2021.*

Food groups ***Kumpulan makanan***	**Examples** ***Contoh***	**Frequency** ***Kekerapan***	(√)
Cereals, cereal products and tubers *Bijirin, produk bijirin, dan ubi-ubian*	Rice, rice porridge, noodles, Mihun, Kueh teow, laksa, laksam, pasta, sago, bread, capati, roti canai, Tosai, breakfast cereals, Instant cereal, pizza, corn, potatoes, tubers *Nasi, bubur, mi, mihun, kueh teow, laksa, laksam, pasta, sago, roti, capati, roti canai, tosai, bijirin sarapan pagi, bijirin segera, pizza, jagung, ubi kentang, ubi-ubian*	Daily (4 to 8 servings) *Setiap hari (4 hingga 8 hidangan)*	
		Daily (> recommended serving) *Setiap hari (> hidangan yang dicadangkan)*	
		Daily (< recommended serving) *Setiap hari (< hidangan yang dicadangkan)*	
		2 to 6 times per week *2 hingga 6 kali seminggu*	
		Once per week *Sekali seminggu*	
		1 to 3 times per month *1 hingga 3 kali sebulan*	
		Rarely/Never *Jarang/Tidak pernah*	
Wholegrain cereals *Bijirin penuh*	Capati, Atta flour, wholemeal bread, brown rice, oats, barley *Capati, tepung Atta, roti bijirin penuh, nasi perang, oats, barli*	Daily (≥½ of recommended serving) *Setiap hari (≥½ hidangan yang dicadangkan)*	
		Daily (<½ of recommended serving or exceeding recommended serving) *Setiap hari (< ½ hidangan yang dicadangkan atau lebih daripada hidangan yang dicadangkan*	
		2 to 6 times per week *2 hingga 6 kali seminggu*	
		Once per week *Sekali seminggu*	
		1 to 3 times per month *1 hingga 3 kali sebulan*	
		Rarely/Never *Jarang/Tidak pernah*	
Fruits *Buah-buahan*	Fresh fruits, canned fruits, dried fruits *Buah segar, buah dalam tin, buah kering*	Daily (≥2 servings) *Setiap hari (≥2 hidangan)*	
		Daily (< 2 servings) *Setiap hari (<2 hidangan)*	
		2 to 6 times per week *2 hingga 6 kali seminggu*	
		Once per week *Sekali seminggu*	
		1 to 3 times per month *1 hingga 3 kali sebulan*	

		Rarely/Never *Jarang/Tidak pernah*	
Vegetables *Sayur-sayuran*	Cooked vegetables, Ulam, salads, green leafy vegetables, bean vegetables, canned vegetables, frozen vegetables *Sayur yang dimasak, Ulam, salad, sayur yang berdaun hijau, sayur kacang, sayur kalengan, sayur beku*	Daily (≥3 servings) *Setiap hari (≥3 hidangan)*	
		Daily (< 3 servings) *Setiap hari (<3 hidangan)*	
		2 to 6 times per week *2 hingga 6 kali seminggu*	
		Once per week *Sekali seminggu*	
		1 to 3 times per month *1 hingga 3 kali sebulan*	
		Rarely/Never *Jarang/Tidak pernah*	
Milk and dairy products *Susu dan produk tenusu*	Unsweetened liquid or powdered cow's milk, cheese, yogurt, fermented milk beverages *Susu atau tepung susu lembu tanpa gula, keju, yogurt, minuman susu fermentasi*	Daily (1 to 3 servings) *Setiap hari (1 hingga 3 hidangan)*	
		Daily (> recommended serving) *Setiap hari (> hidangan yang dicadangkan)*	
		Daily (< recommended serving) *Setiap hari (< hidangan yang dicadangkan)*	
		2 to 6 times per week *2 hingga 6 kali seminggu*	
		Once per week *Sekali seminggu*	
		1 to 3 times per month *1 hingga 3 kali sebulan*	
		Rarely/Never *Jarang/Tidak pernah*	
Legumes and their products *Kekacang dan produknya*	Chickpeas, dhal, canned baked beans, tempe, tauhu, unsweetened plain soybean milk *Kacang kuda, dhal, kacang panggang dalam tin, tempe, tauhu, soya tanpa gula*	Daily (½ to 1 serving) *Setiap hari (½ hingga 1 hidangan)*	
		Daily (> recommended serving) *Setiap hari (> hidangan yang dicadangkan)*	
		Daily (< recommended serving) *Setiap hari (< hidangan yang dicadangkan)*	
		2 to 6 times per week *2 hingga 6 kali seminggu*	
		Once per week *Sekali seminggu*	
		1 to 3 times per month *1 hingga 3 kali sebulan*	
		Rarely/Never *Jarang/Tidak pernah*	
Fish *Ikan*	Fresh fish, frozen fish, dried fish, canned fish *Ikan segar, ikan beku, ikan kering, ikan dalam tin*	Daily (1 serving) *Setiap hari (1 hidangan)*	
		Daily (>1 serving) *Setiap hari (>1 hidangan)*	
		Daily (<1 serving) *Setiap hari (<1 hidangan)*	
		2 to 6 times per week *2 hingga 6 kali seminggu*	

		Once per week *Sekali seminggu*	
		1 to 3 times per month *1 hingga 3 kali sebulan*	
		Rarely/Never *Jarang/Tidak pernah*	
Poultry, meat, egg *Ayam, daging, telur*	Chicken, duck, beef, mutton, goat, chicken's egg, duck's egg, quail's egg *Ayam, itik, daging lembu, daging kambing, kambing, telur ayam, telur itik, telur puyuh*	Daily (½ to 2 servings) *Setiap hari (½ hingga 2 hidangan)*	
		Daily (> recommended serving) *Setiap hari (> hidangan yang dicadangkan)*	
		Daily (< recommended serving) *Setiap hari (< hidangan yang dicadangkan)*	
		2 to 6 times per week *2 hingga 6 kali seminggu*	
		Once per week *Sekali seminggu*	
		1 to 3 times per month *1 hingga 3 kali sebulan*	
		Rarely/Never *Jarang/Tidak pernah*	
High fat protein foods *Makanan protein yang berlemak tinggi*	Organ meats (liver, intestines, etc.), sausages, hotdogs, ready-made burgers *Daging organ (hati, usus, dll), sosej, hotdog, burger siap makan*	More than once daily *Lebih daripada sekali setiap hari*	
		Once daily *Sekali setiap hari*	
		2 to 6 times per week *2 hingga 6 kali seminggu*	
		Once per week *Sekali seminggu*	
		1 to 3 times per month *1 hingga 3 kali sebulan*	
		Rarely/Never *Jarang/Tidak pernah*	
Fat-rich foods *Makanan berlemak tinggi*	Butter, margarine, peanut butter, snacks, crackers, chips *Mentega, marjerin, mentega kacang tanah, makanan ringgan, keropok, kerepek*	More than once daily *Lebih daripada sekali setiap hari*	
		Once daily *Sekali setiap hari*	
		2 to 6 times per week *2 hingga 6 kali seminggu*	
		Once per week *Sekali seminggu*	
		1 to 3 times per month *1 hingga 3 kali sebulan*	
		Rarely/Never *Jarang/Tidak pernah*	
Salt-rich foods *Makanan bergaram tinggi*	Chilli sauce, tomato sauce, soy sauce, fish sauce, oyster sauce, shrimp paste, Sambal belacan, Budu, Cencaluk	More than once daily *Lebih daripada sekali setiap hari*	
		Once daily *Sekali setiap hari*	
		2 to 6 times per week *2 hingga 6 kali seminggu*	

	Sos cili, sos tomato, kicap, sos ikan, sos tiram, pes udang, sambal belacan, budu, cencaluk	Once per week *Sekali seminggu*	
		1 to 3 times per month *1 hingga 3 kali sebulan*	
		Rarely/Never *Jarang/Tidak pernah*	
Sugar-rich foods *Makanan bergula tinggi*	Sweets, candies, chocolate, cookies, cakes, ice cream, jam, Seri kaya, fizzy drinks, sweetened beverages *Gula-gula, coklat, biskut, kek, aiskrim, jem, seri kaya, minuman bersoda, minuman manis*	More than once daily *Lebih daripada sekali setiap hari*	
		Once daily *Sekali setiap hari*	
		2 to 6 times per week *2 hingga 6 kali seminggu*	
		Once per week *Sekali seminggu*	
		1 to 3 times per month *1 hingga 3 kali sebulan*	
		Rarely/Never *Jarang/Tidak pernah*	

SECTION E

BAHAGIAN E

Instruction: In this section, you will be asked questions on whether you have eaten or not the type of foods listed. Write down numbers in the column how many times were consumed whether Daily, Weekly, or Monthly during the CMCO started in October of 2020 and MCO started in January of 2021. Please fill in the serving size for each time consumption. For example, if you consume a slice of papaya twice a week, please fill in '2' in the 'Weekly' column and '1' at the 'Total servings (each time eaten)' column.

Arahan: *Dalam bahagian ini, anda akan ditanya sama ada pernah atau tidak makan makanan yang tersenarai. Tuliskan angka dalam kolum bilangan kali diambil sama ada dalam Per Hari atau Per Minggu atau Per Bulan semasa PKPB pada bulan Oktober 2020 dan PKP pada bulan Januari 2021. (Pastikan hanya satu kolum sahaja yang diisi) Sila isikan jumlah sajian setiap kali makan. Contohnya, anda makan sekeping betik dua hari seminggu. Sila tuliskan '2' dalam kolum 'Per Minggu' dan '1' dalam kolum sajian setiap kali makan.*

No. ***Bil.***	**Type of Food** ***Jenis Makanan***	**How frequent each food was taken (Fill in one of the columns only)** ***Berapa kali kekerapan pengambilan dalam (Isikan dalam salah satu kolum sahaja)***			**Total servings (each time eaten)** ***Jumlah sajian (setiap kali makan)***
		Daily ***Sehari***	**Weekly** ***Seminggu***	**Monthly** ***Sebulan***	
Cereals and cereals products / *Bijirin dan hasil bijirin*					
1.	White rice / *Nasi putih*				___ cup / *cawan*
2.	Brown rice / *Nari beras perang*				___ cup / *cawan*
3.	Flavoured rice / *Nasi berperisa (Nasi briyani, nasi goreng, dsb)*				___ cup / *cawan*
4.	Rice porridge / *Bubur nasi*				___ cup / *cawan*
5.	Glutinous rice / *Pulut*				___ cup / *cawan*
6.	Noodles / *Mee kuning/Mee siput/Mee segera*				___ cup / *cawan*
7.	Mihun / Kueh teow / laksa / laksam / loh shi fun				___ cup / *cawan*
8.	Pasta				___ cup / *cawan*
9.	*Sagu / ambuyat / linut*				___ cup / *cawan*
10.	Bread / *Roti*				___ slices / *keping*
11.	Wholemeal bread / *Roti bijirin penuh*				___ slices / *keping*
12.	Bread bun / *Roti bun*				___ pieces/ *biji*
13.	*Roti canai (termasuk roti telur, roti sardine, roti bawang, roti pisang, murtabak)*				___ slices / *keping*
14.	*Capati*				___ slices / *keping*
15.	*Tosai*				___ slices / *keping*
16.	Breakfast cereals / *Bijirin sarapan pagi (Cornflakes, Koko Crunch, Honey star, dsb)*				___ cup / *cawan*
17.	Cereal grains prepared with water / *Bijirin tersedia perlu dibancuh (Nestum, quaker oats dsb.)*				___ cup / *cawan*
18.	Corn / *Jagung*				___ *tongkol*

No. *Bil.*	Type of Food *Jenis Makanan*	How frequent each food was taken (Fill in one of the columns only) *Berapa kali kekerapan pengambilan dalam (Isikan dalam salah satu kolum sahaja)*			Total servings (each time eaten) *Jumlah sajian (setiap kali makan)*
		Daily *Sehari*	Weekly *Seminggu*	Monthly *Sebulan*	
Fast food / *Makanan segera*					
19.	Burger				___ pieces / *biji*
20.	Fried chicken / *Ayam goreng*				___ pieces / *ketul*
21.	Pizza				___ slices / *keping*
22.	French Fries / *Kentang goreng*				___ medium size / *hidang medium*
23.	Mashed potatoes / *Kentang Lenyek*				___ small container / *bekas kecil*
24.	Coleslaw				___ small container / *bekas kecil*
25.	Sausage / Hotdog / Frankfurter / *Sosej*				___ slices / *keping*
26.	Nugget				___ pieces / ketul
Meat and meat product / *Daging dan hasil daging*					
27.	Chicken / *Ayam*				___ pieces / *ketul*
28.	Quail / *Burung puyuh*				___ whole / *ekor*
29.	Duck / *Itik*				___ pieces / *ketul*
30.	Meat / *Lembu / kerbau*				___ matchbox size / *kotak mancis*
31.	Mutton / *Kambing*				___ matchbox size / *kotak mancis*
32.	Internal organs (liver, spleen, lungs) / *Organ Dalaman (Hati, Limpa, paru)*				___ matchbox size / *kotak mancis*
33.	Chicken/ meat ball / *Bebola ayam/daging*				___ pieces / *ketul*
Meat and meat product (For non-Muslim only) / *Daging dan hasil daging (Bagi peserta bukan Islam sahaja)*					
34.	Ham				___ slices / *keping*
35.	Bacon				___ slices / *keping*
36.	Luncheon meat				___ slices / *keping*
37.	Pork / B*abi*				___ matchbox size / *kotak mancis*
Fish and seafoods / *Ikan dan makanan laut*					
38.	Marine fish / *Ikan laut*				___ whole / *ekor*
39.	Freshwater fish / *Ikan air tawar*				___ whole / *ekor*
40.	Prawn / *Udang basah*				___ whole / *ekor*
41.	Squid / *Sotong basah*				___ whole / *ekor*
42.	Canned fish / *Ikan dalam tin*				___ whole / *ekor*
43.	Crab / *Ketam*				___ whole / *ekor*
44.	Anchovy / *Ikan bilis*				___ tablespoon / *sudu makan*
45.	Shellfish / *Kekerang (kerang, lala, remis, kupang, mentarang dsb.)*				___ tablespoon / *sudu makan*
46.	Snail / *Siput sedut (Belitung, siput buluh dsb.)*				___ tablespoon / *sudu makan*
47.	Pickled fish / *Ikan jeruk / pekasam*				___ pieces / *keping*
48.	Dried squid / *Sotong kering*				___ pieces / *keping*
49.	Fish/prawn/squid/crab crackers / *Keropok ikan/udang/sotong/ketam*				___ slices / *keping*
50.	Keropok lekor				___ slices / *keping*

No. *Bil.*	Type of Food *Jenis Makanan*	How frequent each food was taken (Fill in one of the columns only) *Berapa kali kekerapan pengambilan dalam (Isikan dalam salah satu kolum sahaja)*			Total servings (each time eaten) *Jumlah sajian (setiap kali makan)*
		Daily *Sehari*	Weekly *Seminggu*	Monthly *Sebulan*	
Fish and seafoods / *Ikan dan makanan laut*					
51.	Fish/prawn/squid/crab ball or cake / *Bebola/kek ikan/udang/sotong/ketam*				___ pieces / *ketul*
52.	Dried fish / *Ikan kering*				___ whole / *ekor*
Eggs / *Telur*					
53.	Hen eggs (bulls eye, omelette, boiled, with chilies or herbs) / *Telur ayam (mata kerbau, telur dadar, telur rebus, telur masak sambal, telur pindang)*				___ pieces / *biji*
54.	Duck eggs (cooked with coconut milk gravy, omelette) / *Telur itik (masak lemak/gulai, telur dadar)*				___ whole / *biji*
55.	Quail eggs (boiled, with chilies) / *Telur puyuh (rebus, masak sambal)*				___ pieces / *biji*
56.	Salted egg / *Telur masin*				___ pieces / *biji*
Legumes and legumes product / *Kekacang dan hasilnya*					
57.	Legumes / *Kekacang (kacang hijau, kacang parang, kacang kuda, kacang merah dsb.)*				___ tablespoon / *sudu makan*
58.	Groundnuts / *Kacang tanah*				___ tablespoon / *sudu makan*
59.	Taufufa				___ tablespoon / *sudu makan*
60.	Tauhu				___ slices / *keping*
61.	Fermented soy beans / *tempe*				___ slices / *keping*
Milk and milk products / *Susu dan hasil tenusu*					
62.	Fresh milk / *Susu segar (yang tidak diproses)*				___ cup / *cawan*
63.	Commercial milk / *Susu komersial*				___ cup / *cawan*
64.	Yogurt/lassi/curd				___ cup / *cawan*
65.	Powdered milk / *Susu tepung*				___ tablespoon / *sudu makan*
66.	Evaporated milk / *Susu sejat/cair*				___ tablespoon / *sudu makan*
67.	Cheese / *Keju*				___ slices / *keping*
Vegetables / *Sayur-sayuran*					
68.	Leaf green vegetables / *Sayuran berdaun hijau (bayam, kangkong, kailan dsb.)*				___ tablespoon / *sudu makan*
69.	Ladies finger / *Bendi*				___ tablespoon / *sudu makan*
70.	Other type of legumes / *Sayuran kekacang lain (kacang panjang, kacang buncis, kacang botol dsb.)*				___ tablespoon / *sudu makan*
71.	Bean sprout / *Taugeh*				___ tablespoon / *sudu makan*
72.	Tubers (potatoes, sweet potatoes, yam) / *Sayuran berubi (kentang, keladi, keledek)*				___ tablespoon / *sudu makan*
73.	Cabbages / *Sayuran kobis (kobis bulat, brokoli, kobis cina, bunga kobis)*				___ tablespoon / *sudu makan*
74.	Chilies / *Cili*				___ tablespoon / *sudu makan*
75.	Tomatoes / *Tomato*				___ tablespoon / *sudu makan*

No. *Bil.*	Type of Food *Jenis Makanan*	How frequent each food was taken (Fill in one of the columns only) *Berapa kali kekerapan pengambilan dalam (Isikan dalam salah satu kolum sahaja)*			Total servings (each time eaten) *Jumlah sajian (setiap kali makan)*
		Daily *Sehari*	Weekly *Seminggu*	Monthly *Sebulan*	
Vegetables / *Sayur-sayuran*					
76.	Brinjal / *Terung*				___ tablespoon / *sudu makan*
77.	Fruit vegetables (Luffa/pumpkin/cucumber/baby corn) / *Sayuran berbuah lain (Petola/labu/timun/putik jagung)*				___ tablespoon / *sudu makan*
78.	Salted or dried vegetables / *Sayuran masin/kering (pucuk soo hon dsb.)*				___ tablespoon / *sudu makan*
79.	Local fresh salads / *Ulam-ulaman*				___ tablespoon / *sudu makan*
80.	Mushrooms / *Cendawan basah*				___ tablespoon / *sudu makan*
81.	Dried mushrooms / *Cendawan kering*				___ tablespoon / *sudu makan*
Fruits / *Buah-buahan*					
82.	Papaya / *Betik*				___ slices / *potong*
83.	Mango / *Mangga*				___ slices / *potong*
84.	Pineapple / *Nanas*				___ slices / *potong*
85.	Watermelon / *Tembikai*				___ slices / *potong*
86.	Dragon fruit / *Buah naga*				___ slices / *potong*
87.	Honey dew / *Tembikai susu*				___ slices / *potong*
88.	Rock Melon				___ slices / *keping*
89.	Guava / *Jambu batu*				___ slices / *keping*
90.	Water apple / *Jambu air*				___ piece / *biji*
91.	Lime / *Limau*				___ piece / *biji*
92.	Banana / *Pisang (pisang segar, pisang goreng, pengat pisang, pisang salai dsb.)*				___ piece / *biji*
93.	Starfruit / *Belimbing*				___ piece / *biji*
94.	Apple / *Epal*				___ piece / *biji*
95.	Orange / *Oren/Mandarin*				___ piece / *biji*
96.	Pear / *Pir/Lai*				___ piece / *biji*
97.	Grape / *Anggur*				___ piece / *biji*
98.	Rambutan				___ piece / *biji*
99.	Longan / *Mata kucing segar*				___ piece / *biji*
100.	Lychee / *Laici segar*				___ piece / *biji*
101.	Mangosteen / *Manggis*				___ piece / *biji*
102.	Durian				___ piece / *ulas*
103.	Jackfruit / *Nangka/Cempedak*				___ piece / *ulas*
104.	Canned fruits / *Buahan dalam tin (laici, longan dsb.)*				___ tablespoon / *sudu makan*
105.	Dried fruits / *Buahan kering (kurma, prun, kismis dsb.)*				___ tablespoon / *sudu makan*
106.	Pickled fruits / *Buahan jeruk/acar*				___ tablespoon / *sudu makan*
107.	Young coconut / *Kelapa muda*				___ tablespoon / *sudu makan*

No. *Bil.*	Type of Food *Jenis Makanan*	How frequent each food was taken (Fill in one of the columns only) *Berapa kali kekerapan pengambilan dalam (Isikan dalam salah satu kolum sahaja)*			Total servings (each time eaten) *Jumlah sajian (setiap kali makan)*
		Daily *Sehari*	Weekly *Seminggu*	Monthly *Sebulan*	
Drinks / *Minuman*					
108.	Plain water / *Air kosong*				___ cup / *cawan*
109.	Tea / *Teh*				___ cup / *cawan*
110.	Coffee / *Kopi*				___ cup / *cawan*
111.	Chocolate drink / *Minuman bercoklat (van houten, cadbury dsb.)*				___ cup / *cawan*
112.	Malted drink / *Minuman bermalt (milo, horlick dsb.)*				___ cup / *cawan*
113.	Pre-mixed drinks / *Minuman Pra Campuran 2 in 1/3 in 1 dsb. (kecuali botani/herba)*				___ cup / *cawan*
114.	Ready-to-drink drinks / *Minuman Ready-to-drink seperti air tin/air kotak (kecuali botani/herba)*				___ cup / *cawan*
115.	Cordial syrup / *Sirap cordial*				___ cup / *cawan*
116.	Fruit juice / *Jus buah-buahan*				___ cup / *cawan*
117.	Carbonated drinks (includes isotonic) / *Minuman bergas (termasuk isotonik)*				___ cup / *cawan*
118.	Soy milk / *Air kacang soya*				___ cup / *cawan*
119.	Herbal/botanical drinks (pre-mixed) / *Minuman botani/herba 2 in 1/3 in 1 dsb. (pra campuran)*				___ cup / *cawan*
120.	Herbal/botanical drinks (ready-to-drink) / *Minuman botani/herba seperti dalam tin/kotak (ready-to-drink)*				___ cup / *cawan*
121.	Herbal/botanical brewed drinks / *Minuman air rebusan botani/herba*				___ cup / *cawan*
122.	Energy drinks / *Minuman bertenaga (Red Bull, Livita)*				___ cup / *cawan*
123.	Yoghurt drinks / *Minuman yogurt*				___ cup / *cawan*
Alcoholic drinks (For non-Muslim only) / *Minuman beralkohol (Untuk peserta bukan Islam sahaja)*					
124.	Shandy / *Syandi*				___ glass / *gelas*
125.	Beer/lager/ale/stout / *Bir*				___ glass / *gelas*
126.	Todi (Palm wine) / *Todi (tuak kelapa/bahar)*				___ glass / *gelas*
127.	Wine/cider/champagne/ peri				___ glass / *gelas*
128.	Rice wine/lihing / *Wain beras/tuak beras/lihing*				___ glass / *gelas*
129.	Brandi/rum/whiskey/ vodka/samsu/sam cheng/montoku/langkau				___ glass / *gelas*
Confectionaries / *Konfeksi*					
130.	Local kuih / *Kuih-muih*				___ pieces / *ketul*
131.	Sweets / *Gula-gula*				___ pieces / *ketul*
132.	Chocolate bar / *Coklat bar*				___ small size 40g / *bar kecil 40g*
133.	Cake / *Kek*				___ slices / *potong*
134.	Jelly/custard / *Agar-agar/kastard*				___ slices / *potong*
135.	Lolly ice / *Aiskrim (tanpa susu)*				___ slices / *potong*
136.	Ice cream / *Aiskrim (susu)*				___ slices / *potong*
137.	ABC/Ice blended / *ABC (Air batu campur)/ais*				___ cup / *cawan*

No. *Bil.*	Type of Food *Jenis Makanan*	How frequent each food was taken (Fill in one of the columns only) *Berapa kali kekerapan pengambilan dalam (Isikan dalam salah satu kolum sahaja)*			Total servings (each time eaten) *Jumlah sajian (setiap kali makan)*
		Daily *Sehari*	Weekly *Seminggu*	Monthly *Sebulan*	
Confectionaries / *Konfeksi*					
138.	Cream crackers / *Biskut tawar/krim kraker*				___ pieces / *keping*
139.	Flavoured/cream/ filled cookies / *Biskut berperisa/berkrim/berinti*				___ pieces / *keping*
140.	Pastry (Pie, croissant) / *Pastri (Pai, croissant)*				___ pieces / *keping*
141.	Snacks/crackers / *Snek/kerepek*				___ pieces / *keping*
Bread spread / *Sapuan roti*					
142.	Jam / *Jem*				___ teaspoon / *sudu teh*
143.	Kaya (coconut jam) / *Seri kaya*				___ teaspoon / *sudu teh*
144.	Butter / *Mentega*				___ teaspoon / *sudu teh*
145.	Margarine / *Marjerin*				___ teaspoon / *sudu teh*
146.	Peanut butter / *Mentega kacang*				___ teaspoon / *sudu teh*
147.	Cream cheese / *Krim keju*				___ teaspoon / *sudu teh*
148.	Chocolate spread / *Sapuan coklat*				___ teaspoon / *sudu teh*
149.	Garlic spread / *Sapuan bawang putih*				___ teaspoon / *sudu teh*
Flavours / *Perencah/Perasa*					
150.	Sugar (white, brown, Melaka) / *Gula (putih, perang, Melaka)*				___ teaspoon / *sudu teh*
151.	Honey / *Madu*				___ teaspoon / *sudu teh*
152.	Condensed milk (creamer) / *Susu Pekat Manis (Susu isian pekat manis/Krimer pekat manis)*				___ tablespoon / *sudu makan*
153.	Condiment / *Sambal (lada, belacan, tempoyak, bambangan)*				___ teaspoon / *sudu teh*
154.	Pickles / *Jeruk (bawang, tuhau)*				___ teaspoon / *sudu teh*
155.	Shrimp paste / *Belacan*				___ teaspoon / *sudu teh*
156.	Budu				___ teaspoon / *sudu teh*
157.	Cencalok				___ teaspoon / *sudu teh*
158.	Soy sauce / *Kicap*				___ teaspoon / *sudu teh*
159.	Chili sauce / *Sos cili*				___ teaspoon / *sudu teh*
160.	Tomato ketchup / *Sos tomato*				___ teaspoon / *sudu teh*
161.	Oyster sauce / *Sos tiram*				___ teaspoon / *sudu teh*
162.	Fish sauce / *Sos ikan*				___ teaspoon / *sudu teh*
163.	Petis/heko/otak udang				___ teaspoon / *sudu teh*
164.	Chili flakes / *Cili kering*				___ teaspoon / *sudu teh*
165.	Salad dressing				___ teaspoon / *sudu teh*

SECTION F

BAHAGIAN F

Instruction: Please read the following statement and choose the numbers 0, 1, 2, or 3 that best suit your situation during the CMCO started in October of 2020 and MCO started in January of 2021. There is no right and wrong for the answer. Please don't take too long time while answering.

Arahan: *Sila baca setiap kenyataan di bawah dan bulatkan pada nombor 0,1,2 atau 3 bagi menggambarkan keadaan anda semasa PKPB pada bulan Oktober 2020 dan PKP pada bulan Januari 2021. Tiada jawapan yang betul atau salah. Jangan mengambil masa yang terlalu lama untuk menjawab mana-mana kenyataan.*

Scale ***Skala***	**Statement** ***Kenyataan***
0	Did not apply to me **at all** ***Tidak langsung*** *menggambarkan keadaan saya*
1	Applied to me to **some degree**, or **some of the time** ***Sedikit atau jarang-jarang*** *menggambarkan keadaan saya.*
2	Applied to me to **a considerable degree**, or **a good part of time** ***Banyak atau kerapkali*** *menggambarkan keadaan saya.*
3	Applied to me **very much**, or **most of the time** ***Sangat banyak atau sangat kerap*** *menggambarkan keadaan saya*

No.	**Statement** ***Kenyataan***	**Scale** ***Skala***			
1.	I found it hard to wind down *Saya dapati diri saya sukar ditenteramkan*	0	1	2	3
2.	I was aware of dryness of my mouth *Saya sedar mulut saya terasa kering*	0	1	2	3
3.	I couldn't seem to experience any positive feeling at all *Saya tidak dapat mengalami perasaan positif sama sekali*	0	1	2	3
4.	I experienced breathing difficulty (eg, excessively rapid breathing, breathlessness in the absence of physical exertion) *Saya mengalami kesukaran bernafas (contohnya pernafasan yang laju, tercungap-cungap walaupun tidak melakukan senaman fizikal)*	0	1	2	3
5.	I found it difficult to work up the initiative to do things *Saya sukar untuk mendapatkan semangat bagi melakukan sesuatu perkara*	0	1	2	3
6.	I tended to over-react to situations *Saya cenderung untuk bertindak keterlaluan dalam sesuatu keadaan*	0	1	2	3
7.	I experienced trembling (eg, in the hands) *Saya rasa menggeletar (contohnya pada tangan)*	0	1	2	3
8.	I felt that I was using a lot of nervous energy *Saya rasa saya menggunakan banyak tenaga dalam keadaan cemas*	0	1	2	3

9.	I was worried about situations in which I might panic and make a fool of myself *Saya bimbang keadaan di mana saya mungkin menjadi panik dan melakukan perkara yang membodohkan diri sendiri*	0	1	2	3
10.	I felt that I had nothing to look forward to *Saya rasa saya tidak mempunyai apa-apa untuk diharapkan*	0	1	2	3
11.	I found myself getting agitated *Saya dapati diri saya semakin gelisah*	0	1	2	3
12.	I found it difficult to relax *Saya rasa sukar untuk relaks*	0	1	2	3
13.	I felt down-hearted and blue *Saya rasa sedih dan murung*	0	1	2	3
14.	I was intolerant of anything that kept me from getting on with what I was doing *Saya tidak dapat menahan sabar dengan perkara yang menghalang saya meneruskan apa yang saya lakukan*	0	1	2	3
15.	I felt I was close to panic *Saya rasa hampir-hampir menjadi panik/cemas*	0	1	2	3
16.	I was unable to become enthusiastic about anything *Saya tidak bersemangat dengan apa jua yang saya lakukan*	0	1	2	3
17.	I felt I wasn't worth much as a person *Saya tidak begitu berharga sebagai seorang individu*	0	1	2	3
18.	I felt that I was rather touchy *Saya rasa yang saya mudah tersentuh*	0	1	2	3
19.	I was aware of the action of my heart in the absence of physical exertion (eg, sense of heart rate increase, heart missing a beat) *Saya sedar tindakbalas jantung saya walaupun tidak melakukan aktiviti fizikal (contohnya kadar denyutan jantung bertambah, atau denyutan jantung berkurangan)*	0	1	2	3
20.	I felt scared without any good reason *Saya berasa takut tanpa sebab yang munasabah*	0	1	2	3
21.	I felt that life was meaningless *Saya rasa hidup ini tidak bermakna*	0	1	2	3

END OF THE QUESTIONNAIRE
THANK YOU FOR YOUR COOPERATION

BORANG SOAL SELIDIK TAMAT
TERIMA KASIH ATAS KERJASAMA ANDA

APPENDIX F – ORIGINALITY REPORT OF THESIS

194940_Thesis

ORIGINALITY REPORT

15%	8%	10%	5%
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PRIMARY SOURCES

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