UNIVERSITI PUTRA MALAYSIA

ASSESSMENT OF DIET DIVERSITY ACCORDING TO SOCIODEMOGRAPHIC, NUTRITION KNOWLEDGE AND FOOD SECURITY AMONG HOUSEHOLDS WHO RECEIVE THE LOST FOOD PROJECT IN LOW-COST PUBLIC HOUSES IN KLANG VALLEY

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BY

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

APPROVAL

This project entitled “Assessment of diet diversity according to sociodemographic, nutrition knowledge and food security among households who receive The Lost Food Project in low-cost public houses in Klang Valley” was prepared by Nur Syaqiera binti Mansor and submitted to the Faculty of Medicine and Health Sciences as a partial fulfilment of the requirement for the degree of Bachelor of Science (Nutrition and Community Health) from the Department of Nutrition, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia.

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ABSTRACT

ASSESSMENT OF DIET DIVERSITY ACCORDING TO SOCIODEMOGRAPHIC, NUTRITION KNOWLEDGE AND FOOD SECURITY AMONG HOUSEHOLDS WHO RECEIVE THE LOST FOOD PROJECT IN LOW-COST PUBLIC HOUSES IN KLANG VALLEY

Nur Syaqiera Mansor

Emergence of non-communicable diseases occurs due to transition of individual nutrition from traditional diets to high energy dense diet which mostly affects low-income which results in poor diet quality. There are several determinants that can be found to be linked with diet quality among individuals. It can be categorized into adequate diet diversity and not adequate diet diversity. Thus, this cross-sectional study aimed to compare diet diversity between sociodemographic characteristics, nutrition knowledge and food security among households who received The Lost Food Project food assistance. A total of 87 respondents aged between 17 to 69 years as a representative for each households who received the TLFP food assistance were selected from two areas of public houses in Klang Valley. A self-administered questionnaire consisted of sociodemographic characteristics, nutrition knowledge, food assistance, food security status and diet diversity were completed by the respondents. Diet diversity was assessed using Individual Diet Diversity Scores (IDDS) which focus on individual diet diversity. Nutrition knowledge was assessed using Knowledge, Attitude and Practice questionnaire by TWR-G, food security status was assessed using U.S. Food Security Survey Module 2012: Six-item short while food assistance and sociodemographic characteristics were accessed by using self-developed questionnaires. More than half of respondents (69.0%) were found to have more diverse diet and at moderate to good level of nutrition knowledge (65.5%) even though they were food insecure (58.6%). The level of satisfaction, usefulness and significance of the TLFP food assistance were assessed among respondents which are 72.4%, 88.6% and 86.2% respectively. Diet diversity scores were found to be significantly difference between household monthly food and drinks expenditure (t= -2.573, p=0.016). However, diet diversity score was not significantly difference between other sociodemographic characteristics, nutrition knowledge, food assistance and food security status (p>0.05). In conclusion, most respondents had diversified diet even though they experienced food insecurity. Moreover, nutrition knowledge of respondents was at moderate to good level. It is advisable for TLFP management to have systematic management starts from having a recorded list of recipients and distribution of goods together include TLFP logo or flyer when distributes goods to recipients. Future intervention study should focus on certain aspects of nutrition knowledge that had been pointed out in current study.

ABSTRAK

PENILAIAN KEPELBAGAIAN MAKANAN BERDASARKAN LATAR BELAKANG DEMOGRAFI, PENGETAHUAN PEMAKANAN DAN SEKURITI MAKANAN DALAM KALANGAN ISI RUMAH YANG MENERIMA BANTUAN MAKANAN DARIPADA 'THE LOST FOOD PROJECT' DI PERUMAHAN KOS RENDAH DI LEMBAH KLANG

Nur Syaqiera Mansor

Peningkatan kadar penyakit kronik berlaku disebabkan perubahan gaya pemakanan daripada makanan tradisional kepada makanan yang tinggi kandungan tenaga (kalori) iaitu dapat dilihat dalam golongan yang berpendapatan rendah (B40) menyebabkan kualiti diet yang rendah. Terdapat beberapa faktor yang berkaitan dengan kualiti diet individu. Ianya dikategorikan kepada kecukupan kepelbagaian makanan dan ketidakcukupan kepelbagaian makanan. Oleh yang demikian, kajian keratan rentas ini dijalankan untuk membuat perbandingan kepelbagaian makanan individu dengan latarbelakang demografi, pengetahuan pemakanan dan status sekuriti makanan. Seramai 87 responden berumur 17 hingga 69 tahun iaitu individu daripada ahli isi-rumah yang menerima bantuan makanan TLFP dipilih daripada dua kawasan perumahan kos-rendah di Lembah Klang yang terlibat dengan TLFP. Edaran borang soal selidik yang lengkap dengan mengandungi maklumat latar belakang demografi, pengetahuan pemakanan, bantuan makanan, status sekuriti makanan dan pengambilan diet 24 jam yang lepas. Kepelbagaian makanan dapat dinilai mengikut garis panduan "Individual Diet Diversity Scores" oleh Pertubuhan Makanan dan Pertanian. Tahap pengetahuan pemakanan di nilai menggunakan soal selidik berkaitan pengetahuan pemakanan yang disediakan oleh TWG-R, manakala status sekuriti makanan di nilai menggunakan "SF-6 items food security status" dan soalan bantuan makanan yang disediakan oleh penyelidik. Lebih separuh daripada responden (69.0%) didapati mempunyai kepelbagaian makanan yang lebih baik dan tahap pengetahuan tentang pemakanan menunjukkan tahap sederhana dan baik (65.5%) walaupun responden mengalami masalah sekuriti makanan (58.6%). Kebanyakkan responden bersetuju bahawa bantuan makanan TLFP di tahap yang memuaskan (72.4%), membantu mengurangkan beban makanan isi rumah (88.6%) dan bantuan yang diberikan sangat penting (86.2%). Kajian ini mendapati bahawa terdapat perbezaan yang signifikan antara kepelbagaian makanan dan perbelanjaan makanan dan minuman (bulanan) isi rumah ($t= -2.573$, $p=0.016$). Kajian juga mendapati tiada perbezaan yang signifikan antara kepelbagaian makanan dengan maklumat demografi yang lain, pengetahuan pemakanan, bantuan makanan dan status sekuriti makanan ($p>0.05$). Kesimpulannya, pengetahuan pemakanan responden berada di tahap yang memuaskan namun terdapat segelintir aspek pengetahuan pemakanan yang perlu dititikberatkan pada kajian akan datang. Bagi penambahbaikan, pengurusan TLFP perlu mempunyai sistem yang lebih sistematik dengan merekod senarai penerima bantuan. TLFP juga boleh mempromosikan organisasi mereka kepada penerima. Dengan cara mengedarkan risalah atau meletakkan lambang TLFP pada bantuan makanan.

TABLE OF CONTENTS

APPROVAL 2
ACKNOWLEDGEMENT 3
ABSTRACT 4
ABSTRAK 5
TABLE OF CONTENTS 6
LIST OF TABLES 8
LIST OF FIGURES 9
CHAPTER 1 10
INTRODUCTION 10
1.1 Background of study 10
1.2 Problem statement 11
1.3 Significance of the study 14
1.4 Objectives 14
1.4.1 General objectives 14
1.4.2 Specific objectives 15
1.5 Research hypothesis 16
1.6 Research framework 17
CHAPTER 2 19
LITERATURE REVIEW 19
2.1 Diet diversity 19
2.2 Determinants of diet diversity 21
2.1.1 Sociodemographic characteristics 21
2.1.2 Nutrition knowledge 22
2.1.3 Food assistance 23
2.1.4 Food security status 25
CHAPTER 3 27
METHODOLOGY 27
3.0 Introduction 27
3.1 Location of study 27
3.2 Study design 27
3.3 Target population 28
3.4 Sampling design 28

3.5 Sample size determination 30
3.6 Respondents 31
3.7 Measures 33
3.7.1 Sociodemographic characteristics 34
3.7.2 Food assistance 34
3.7.3 Nutrition knowledge 34
3.7.4 Diet diversity 35
3.7.5 Household food security 36
3.7.6 Alternatives due to covid-19 situation 38
3.8 Study approval 38
3.9 Pre-testing 39
3.10 Data collection 39
3.11 Data analysis 40
CHAPTER 4 41
RESULTS AND DISCUSSION 41
4.1 Sociodemographic characteristics of the respondents 41
4.2 Food assistance 45
4.3 Nutrition knowledge 47
4.4 Food security status 50
4.5 Diet diversity 51
4.6 Comparison in diet diversity score by sociodemographic characteristics 52
4.7 Comparison in mean of food assistance between diet diversity 58
4.8 Comparison between diet diversity score and nutrition knowledge 59
4.9 Comparison between diet diversity score and food security 60
CHAPTER 5 62
CONCLUSION & RECOMMENDATIONS 62
5.1 Limitations and recommendation of study 63
REFERENCES 64
APPENDICES 70

LIST OF TABLES

Table 1 Sample size calculation for each variable based on the previous studies on proportionate sampling 30
Table 2 Inclusion and exclusion criteria of the respondents 32
Table 3 Summarisation of the operational definition of instruments used in this study 33
Table 4 The classification of nutrition knowledge scores 35
Table 5 The classification of Individual Diet Diversity Scores (IDDS) 36
Table 6 The classification of food security level 38
Table 7 Sociodemographic characteristics of respondents (n=87) 43
Table 8: The level of satisfaction, usefulness and significance of TLFP food assistance towards the respondents (n=87) 45
Table 9: Types of food assistance and frequency received by respondents in 12 months (n=87) 47
Table 10 Mean of food items received within 12 months period (n=87) 47
Table 11 Nutrition knowledge of the respondents 48
Table 12 Level of nutrition knowledge among respondents (n=87) 50
Table 13 Prevalence of food security status (n=87) 50
Table 14 Food groups consumed by respondents in last 24 hours (n=87) 51
Table 15 Comparison between diet diversity scores and sociodemographic characteristics (n=87) 56
Table 16 Comparison in mean of food items received in 12 months between diet diversity 59
Table 17 Comparison between diet diversity score and nutrition knowledge 60
Table 18 Comparison between diet diversity score and food security status 61

LIST OF FIGURES

Figure 1 Research framework 18
Figure 2 Sampling design..... 29

CHAPTER 1

INTRODUCTION

1.1 Background of study

Diet diversity is a qualitative measure of food consumption that reflects household access to a variety of foods and is also a proxy for nutrients adequacy of an individuals' diet (FAO, 2010). Diet diversity is one of the important components to identify an individual nutritional status other than anthropometry assessment, biochemical assessment and clinical assessment. There are several determinants of diet diversity have been discussed in previous studies including culture and ethnicity (Chong et al., 2018; Drewnoski et al., 2020), education (Alkerwi et al., 2015), food assistance (Litvak et al., 2020; Ohly et al., 2019), food security status (Chong et al., 2018; Mohamadpour et al., 2012; Raj et al., 2020), incomes (Carlson & Frazao, 2012; Laraia et al., 2013; Mohamadpour et al., 2012; Raj et al., 2020), nutritional knowledge (Conrad, 2018; Norimah et al., 2008; Onyeneke, 2019) and sex (Alkerwi et al., 2015).

In Southwest China, less than 50.0% of adults had diverse diet which includes all food groups except grains and vegetables (Zhang et al., 2017). While in Malaysia, most adults had diverse diet within food groups but not vary within each food groups (Zainal Badari et al., 2012). Poor diet diversity may result in increasing risk of malnutrition and other diet-related non-communicable diseases (Anik et al., 2019; Global Nutrition Report, 2018). Anik et al. (2019) examined the prevalence rate and the risk factors of Double Burden of Malnutrition at Household Levels (DBMHL) along with the socioeconomic inequality in DBMHL among Bangladesh, Nepal, Pakistan and Myanmar. The highest prevalence of DBMHL was observed in Myanmar (5.54%) and the lowest prevalence was 1.54% in Nepal. The prevalence of

DBMHL in Bangladesh was 4.10% and Pakistan is 3.93%. Among all these four countries the prevalence was higher among urban areas than rural area (Myanmar= 5.54%, urban: 6.16%, rural: 5.33%; Bangladesh= 4.1%, urban= 5.57%, rural= 3.51, Pakistan= 3.93%, urban= 5.62%, rural=3.2%; Nepal= 1.54%, urban=1.63%, rural=1.42%). Meanwhile, Malaysia experiencing triple burden of malnutrition (TBM) which consist of undernutrition, micronutrient-related deficiency and overnutrition (Global Nutrition Report, 2018). The prevalence of overweight and anaemia are higher among women, which were 43.0% and 24.9%, respectively (Global Nutrition Report, 2018). Malaysian children under the age of 5 experience stunting problems (20.7%) (Global Nutrition Report, 2018).

Several studies have proved that food assistance could improves diet diversity and quality of an individuals and its households (Heim & Paksi, 2019; Ohly et al., 2019; Leroy et al, 2020; Litvak et al., 2020; Tirivayi & Groot, 2017; Zhou & Hendriks, 2017). The Lost Food Project (TLFP) is a non-governmental organization founded by Suzanne Mooney in 2016 aims to rescue and redistribute the quality of food surplus to people who need the most. Approximately up to 10 tonnes of edibles foods will be saved per week and those foods will be used to provide up to 1,948,224 meals to 48 charities and 7,510 families from low-cost public houses in Malaysia. There are several People's Housing Project (PPR) and '*Perumahan Awam'* that have been receiving TLFP since March 2020.

1.2 Problem statement

According to Food and Agricultural Organization (FAO, 2011), approximately 1.3 billion tons of food is lost and wasted annually and only one third of the food production is used for human consumption. The Food and Agricultural Organization (FAO) defined food loss as "the decrease in edible food mass throughout the part of the supply chain that specifically leads

to edible food for human consumption". Meanwhile, food waste can be defined as "the food losses occurring at the end of the food chain (retail and final consumption)" (Parfitt et al., 2010). To simplify, food loss is food that has been spoiled before reaching its final products or retail stage and food waste is food that is not consumed and being discarded by humans even though it is still in its good quality (Parfitt et al., 2010).

According to the Global Food Loss and Food Waste Report (FAO, 2011), Europe and North America experienced 280 to 300kg/year per capita of food loss compared to 120 to 170 kg/year in sub-Saharan Africa and South or Southeast Asia. However, Europe and North America's total per capita production of edible parts of food for human consumption have reached about 900 kg/year compared to sub-Saharan Africa and South or Southeast Asia was only about 460 kg/year. This has shown that more food is being wasted in medium and high-income countries; meanwhile, in low-income countries food is being lost at the early and middle stages of the food supply chain before reaching to the consumer level; besides, less food is being wasted after reaching the consumer. In Malaysia context, about 4,005 tons of edible food have been discarded in landfill daily and 44.5% of wastes are coming from food (SWCorp, 2017). With this 4,005 tons of avoidable food waste, it can feed almost 3 million people three times a day.

The economic and nutrition transition had profound impacts on the nutritional status of the worldwide population including Malaysia. As an increase in incomes, traditional diets which consist of conventional grain crops are substituted by more animal products, eggs and dairy, and more processed foods and fast foods among Malaysian (Drewnowski et al., 2020). In addition, higher intake of energy-dense foods and processed carbohydrate-rich foods coupled with sedentary lifestyle led to emergence of non-communicable diseases such as diabetes, hypertension, hypercholesterolemia and obesity (Noor, 2002). Lack of consumption of nutrient-

dense food may be due to nutrient-dense foods being way more expensive compared to high-energy dense foods (Carlson & Frazao, 2012). Approximately, more than 1.5 billion people around the world cannot afford a healthy diet to meet daily requirements and over 3 billion people cannot even afford the cheapest healthy diet (FAO, 2020). An individual with lower income might have difficulties to access a quality diet which results in poor nutritional status (Heim & Paksi, 2019; Hidru et al., 2020; Zhang et al., 2017). Other than that, mostly low-income households which experienced low food availability as well as experiencing hunger which results in food insecurity as well as poor diet quality (Ilhab et al., 2012; Mohamadpour et al., 2012).

Several studies had found the benefits of food assistance in order to improve diet quality among individuals (Heim & Paksi; 2019; Leroy et al., 2020; Tirivayi & Groot, 2017). Individuals who received food assistance are more likely to have a better diet compared to those who do not receive any food assistance. Furthermore, the current study does a collaboration with The Lost Food Project (TLFP) to identify the usefulness of TLFP food assistance towards an individual's diet quality among low-income households in low-cost public houses in Klang Valley. The Lost Food Project (TLFP) aims to rescue and redistribute the quality surplus food to people in need. Thus, the prevalence of food being waste or lost to landfill could be reduced by redistributing to needy people as well as improving their diet. In Malaysia, most study is focusing on food assistance or supplemental foods for maternal and child, children, adolescents and indigenous people (Chong et al., 2018; Drewnoski et al., 2020) but lack on low-income households. Moreover, there is a limited study in Malaysia focusing on food aid programs for PPR residents and, some focusing on indigenous people Therefore, the objectives of this study are to make a comparison in diet diversity based on socioeconomic, nutrition knowledge, food assistance and food security status among households who received TLFP food assistance in

low-cost public houses in Klang Valley. The important research question to be answered in the present study is:

1. Is there any difference in diet diversity scores according to sociodemographic characteristics, nutrition knowledge, food assistance and food security status among households who received TLFP food assistance in low-cost public houses in Klang Valley?

1.3 Significance of the study

Individuals who lived in PPR can be categorised as vulnerable groups which have poor access to nutrient-dense foods due to low-income which leads to food insecurity. In this present study will evaluate the effectiveness of TLFP in conjunction with diet diversity of the selected Malaysian population in Klang Valley's PPR. The outcomes of this study can be helpful for TLFP to understand the needs of TLFP recipients and improved their programs in order to achieve one of SDG goal: Zero hunger. Furthermore, the outcomes of this study can be used as reference for future food assistance programs. The researcher also can identify the level of nutrition knowledge among respondents specifically in low-cost public housing. Furthermore, an appropriate planning can be suggested in order to improve nutrition among women in low-cost public housing by looking at diet diversity.

1.4 Objectives

1.4.1 General objectives

To compare diet diversity between socioeconomic, nutrition knowledge and food security status among households who received TLFP food assistance.

1.4.2 Specific objectives

1. To identify the sociodemographic characteristics (age, sex, ethnicity and religion, marital status, education, employment status, household size, number of children, household with chronic disease or disabilities, household income and total food and drinks expenditure), nutrition knowledge, food assistance and food security status among respondents who received TLFP food assistance.
2. To assess the diet diversity among households who received TLFP food assistance.
3. To compare diet diversity scores between sociodemographic characteristics, nutrition knowledge and food security status among households who received TLFP food assistance.
4. To compare the mean score of food assistance between not adequate and adequate diet diversity among households who received TLFP food assistance.

1.5 Research hypothesis

1. There is a significant difference in diet diversity score between sociodemographic characteristics among households who received TLFP food assistance in low-cost public houses in Klang Valley.
2. There is a significant difference in diet diversity score between different nutrition knowledge groups among households who received TLFP food assistance in low-cost public houses in Klang Valley.
3. There is a significant difference in diet diversity score between food secured and food insecure households who received TLFP food assistance in low-cost public houses in Klang Valley.
4. There is a significant difference in mean score of food assistance between different diet diversity groups among households who received TLFP food assistance in low-cost public houses in Klang Valley.

1.6 Research framework

According to Figure 1, sociodemographic characteristics, nutrition knowledge, food assistance and food security status were compared among diet diversity groups which are adequate diet diversity and not adequate diet diversity. Several studies were found in comparing diet diversity between age (Alkerwi et al., 2015; Gómez et al., 2020), education (Alkerwi et al., 2015) and food security status (Mohamadpour et al., 2012). Limited study was focusing on comparing diet diversity between nutrition knowledge and food assistance merely previous study found an association with other determinants mentioned in Figure 1.

Previous study found that people with better education level had better diet quality compared to those with poor education level (Jones, Shrinivas & Bezner-Kerr, 2014; Morseth et al., 2017; Rydén & Hagfors, 2011). Furthermore, an individual with better education were found to had better nutrition knowledge (Norimah et al., 2008) which as well contribute to more diverse diet. On top of that, previous study did found association between those food secure group and food insecure group with diet diversity scores (Ilhab et al., 2012; Mohamadpour et al., 2012). Food secure women shows better consumption with diverse diet compared to food insecure women were more likely to consume less diverse diet (Ilhab et al., 2012; Mohamadpour et al., 2012).

Meanwhile, previous studies found association between food assistance and diet diversity among recipients (Leroy et al., 2020; Zhou & Hendriks, 2017). Different assistance contributes to different outcomes in an individual diet diversity. However, there was limited study in Malaysia that focusing on food assistance on low-income population as mostly food assistance or supplementation were focused on maternal and infants, children, indigenous people and adolescents.

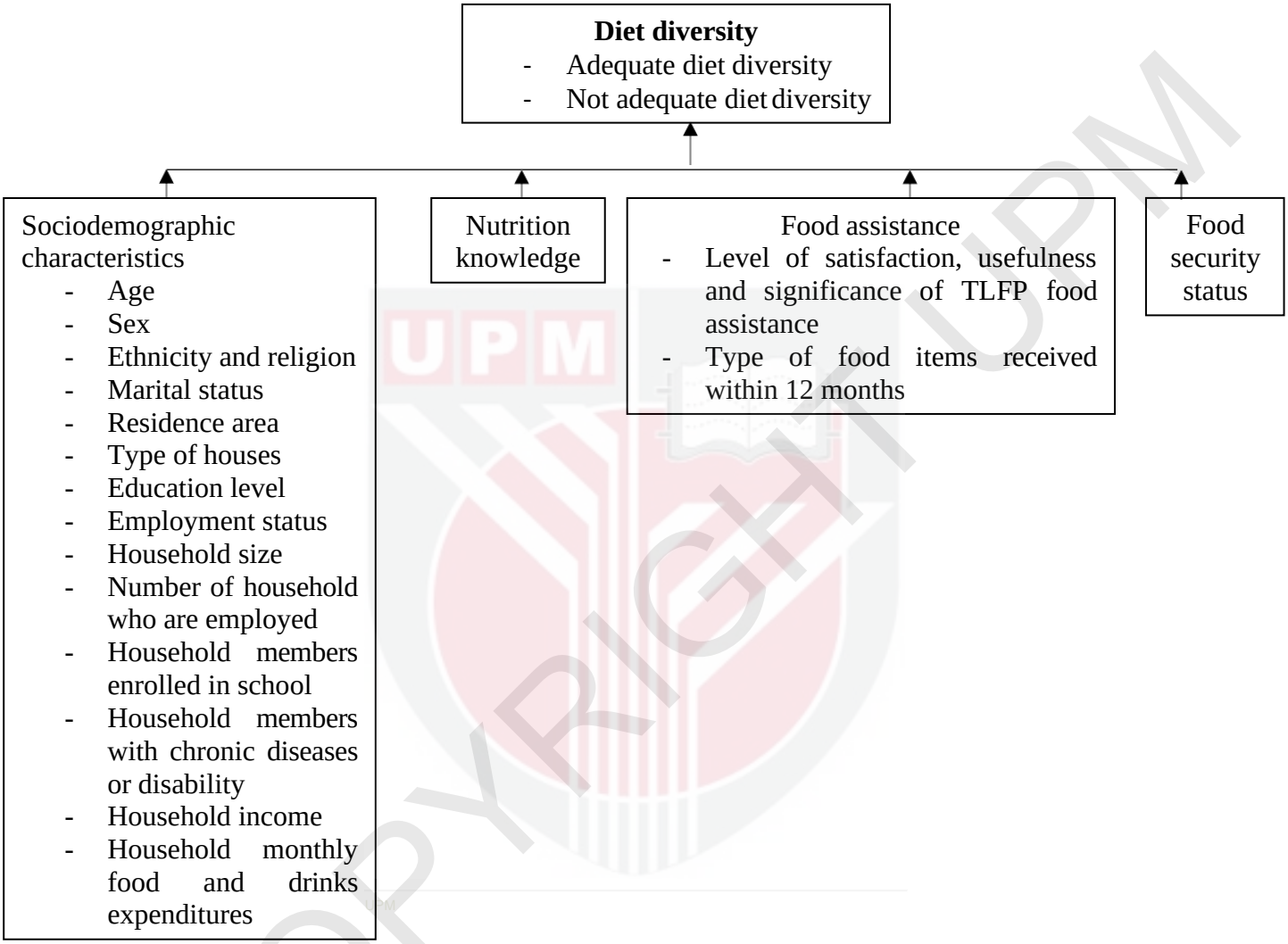

Figure 1 Research framework

CHAPTER 2

LITERATURE REVIEW

2.1 Diet diversity

Diet diversity is characterised as the number of food groups consumed over a certain period (FAO, 2011). A good source of macronutrients and micronutrients and better nutrient adequacy can be obtained from diversified foods (Arimond et al., 2011; Frison, Cherfas & Hodgkin, 2011). Furthermore, diet diversity is used as possible proxy indicators to measure diet quality (FAO, 2010; Ruel, 2003). Over the last decades, economic growth has led to shifts in food consumption habits in low- and middle-income countries (LMICs), where Western food that high in fat and sugar-rich foods appear to replace conventional grain and fibre-rich foods (Morseth et al., 2017).

Several indicators have been proposed in order to measure diet quality includes diet diversity scores (DDS), food variety scores (FVS), food frequency scores (FCS), food consumption scores (FCS), healthy eating index scores (HEI) and minimum diet diversity for Women (MDD-W). Diet diversity scores can be categorised into two level which are individual DDS or Household DDS. The HDDS would imply economic access of households to food and would include products requiring domestic resources such as condiments, sugar and sugary foods, and beverages. Meanwhile, WDDS represents women of reproductive age's likelihood of micronutrient adequacy while IDDS represents an individual diet diversity (FAO, 2010). Next, food variety scores (FVS) are known as the number of different food items in each food group rather than quantified number of nutritious food groups (Ruel, 2003).

The ELANS study reported the mean diet diversity score are below the cut-off points among eight Latin American countries, however; 57.7% participants in this study able to exceed

minimum cut-off point of diversified diet (MDD-W >5) (Gómez et al., 2020). Previous study among adults in Southwest China reported that 36.7% adults had higher diet diversity score (DDS) which includes all food groups excepts grains and vegetables. Approximately up to 50.0% meats and oils being consumed; as increase in DDS are associated with increase in fat consumption, they managed to not exceed the fat recommendation intake (Zhang et al., 2017).

Contrary to finding in Ethiopia, 53.0% of the pregnant women were found to be having inadequate diet diversity (Hidru et al., 2020). Similar finding among a San group in Nambia found that majority of the participants experienced extreme low diet diversity which exposed to severe nutritional inadequacy (Heim & Paksi, 2019). In Malaysia, majority of household reported had higher diet diversity score (DDS) but low food variety scores (FVS) (Zainal Badari et al., 2012). The acceptable explanation on this issues is higher DDS only indicates diverse diet but not indicates the variety of foods within the food groups (Zainal Badari et al., 2012).

All in all, there are no standard tools used to identify diet diversity either among an individual or households. In addition, DDS are useful to look up at food groups compared to FVS which only look at individual food groups (Zhao et al., 2017). Thus, DDS will be applied in current study as an indicator to measure quality of diet.

2.2 Determinants of diet diversity

2.1.1 Sociodemographic characteristics

The sociodemographic characteristics is defined as the sum of one's combined economic and social status and tends to be strongly correlated to healthier lifestyle (Baker, 2014). A nation-wide cross-sectional population-based study identified that sociodemographic characteristics has impacts on diet quality (Alkerwi et al., 2015). World Bank (2020) stated that Malaysia's economic situation is severely affected by the COVID-19 pandemic, especially in its vulnerable households. Since less than 1% of Malaysian's household live in poverty, the government shifts priority on resolving the well-being of the poorest 40.0% of the population (B40) who remain vulnerable to economic shocks, rising living expenses and responsibilities (World Bank, 2020).

A study carried out by Alkerwi et al. (2015) observed that sex have greater impacts on individual food choices which women are prone to consume healthier food choices than men; however, in terms of diet diversity, men consume more diversified diet compared to women. In this study, the author also emphasised that higher incomes enable greater buying power for healthier food quality, while limited income limits access to nutrient-dense foods (Alkerwi et al., 2015). Similar to previous study found that people with low sociodemographic characteristics prefer to buy staple foods such as routine foods instead of having diversified diets as it is cheaper and easier to get access to those foods (Raj et al., 2020).

Next, several studies found that insufficient household income as well can contribute to the inability to provide sufficient foods for household members (Carlson & Frazao, 2012; Mohamadpour et al., 2012; Laraia et al., 2013). Likewise, a population-based study among 5094 impoverished adults reported that food insecure adults consume highly processed food that is

rich in sodium and replace fruits and vegetables with refined carbohydrates (Seligman et al., 2011). In addition, ethnicity and culture plays a role on individual food choices and affect diet diversity among Malaysian (Drewnowski et al., 2020). Thus, an individual with low sociodemographic characteristics might have poor access to variety of food and healthier choices which results to buy cheaper foods that higher energy dense instead of nutrient dense foods.

2.1.2 Nutrition knowledge

Several studies found that improving nutrition knowledge is associated with diet diversity. A cross-sectional study was conducted to identify the role of nutrition education, farm production diversity and commercialization on household, women and children diet diversity in eight districts in Zimbabwe (Conrad et al., 2018). Conrad et al. stated that increase in household nutrition education is significantly associated with improving diet diversity among women which is 9.0% (IRR= 0.98, 95% CI= 0.94-1.03). Several studies accessed women's knowledge on diversified diets rich in vitamins A including sources and functions of nutrients towards health (Tischler et al., 1998; Okello et al., 2013). Most women specified access to nutrition knowledge through mass electronics such as radio and some gain the knowledge from health centers (Okello et al., 2013) as well from ancestor's nutrition knowledge (Weerasekara et al., 2020). However, Tischer et al. (1998) reported that misconception on source and importance of nutrients might contribute to poor diet diversity among women.

Previous study by Onyeneke et al. (2019) observed that low levels of nutrition knowledge of mothers on the importance of feeding children with animal-based diets may have led to low intake of beef, snail, egg and diverse types of food for Nigerian children under five years of age. Since parents are the one who will provide food to their children, the choices of

food made by their parents are important to ensure the availability of certain food at their home. Educating the community on the benefits of diet diversity for food security would increase demands for conventional foods such as grains and cereals and improve their quality of life (Happychuk et al., 2014).

2.1.3 Food assistance

The food assistance is about providing food and related assistance to combat hunger, either in emergency situations or to support broader, longer-term hunger alleviation and food security (Anup Shah, 2007). Mousseau has stated that three forms of food aid are food aid program, emergency food assistance and food aid project (cited in Anup Shah, 2007). The World Food Program (WFP) by United Nation is the leading humanitarian agency that saves lives and transforms lives, offers emergency food aid and partners with communities to promote nutrition and create resilience. For instance, types of food being provided to the community on food assistance programs majority consists of maize, canned foods, beans, cooking oil and flour (Tirivayi & Groot, 2017; Heim & Paksi, 2019). Several studies had identified various forms of assistance on diet diversity and diet quality such as food assistance (Tirivayi and Groot, 2017; Heim & Paksi, 2019; Leroy et al, 2020), cash (Zhou and Hendricks, 2017) and vouchers for grocery shopping (Litvak et al., 2020).

Food assistance receivers shown positive impacts on diet diversity and quality. Previous study in Burundi found that mother who participated in the food assistance programs had improved in diet diversity as well increase in fruits and vegetables consumption (Leroy et al., 2020). Finding of a study that investigates on the impacts of WFP cash and food assistance on diet diversity and quality indicates that food beneficiaries showed a greater diversification of diet than cash beneficiaries even though cash beneficiaries have higher consumption of

nutrients dense foods (Zhou & Hendriks, 2017). The best explanation of this outcomes is food beneficiaries received most staple foods which can be supplemented with dairy products. Meanwhile, cash beneficiaries might have limited cash to purchase diversified food and high possibility to spend money on non-food expenditure. However, people who are fully dependent on food assistance shown extremely low diet diversity which their main meals only come from food assistance itself (Heim & Paksi, 2019).

Litvak et al. (2020) studied on the association of grocery shopping on diet quality with food assistance among people who participated in different food assistance programs. The outcomes of this study shown people who participated in Supplemental Nutrition Assistance Program (SNAP) are poor in diet quality compared to those participated in Supplemental Nutritional Assistance Programme for Women, Infants and Children (WIC). Furthermore, different in nutrient supplementation between two groups affect their diet quality as WIC groups had been provided with fruits, vegetables, meat and dairy products compared to SNAP groups. In addition, grocery restrictions also contributed with the outcome of diet quality between those groups because WIC groups were restricted to buy only healthier food while for SNAP group there are no restriction on grocery shopping (Litvak et al., 2020). Similar to a study among pregnant women who received the food vouchers shown increase in diet diversity as well as diet quality where they get better access to fruits, vegetables and also milk products (Ohly et al., 2019).

Thus, proper assessment of which foods are particularly common in beneficiary households is suggested in order to avoid supplying food currently available (such as starchy staples), but instead to complement them with higher nutritional value foods that are not frequently consumed (Zhou & Hendriks, 2017). Furthermore, increased food demands on

production and consumption of conventional cereals and grains could expand and diversify types of foods assistance provided to the region which could support the society's economically, environmentally and socially through health improvements (Happychuk, 2014).

2.1.4 Food security status

Food insecurity can cause the dietary quality worse and thus increase the risk of various forms of malnutrition which can potentially lead to undernutrition and obesity (Food Security and Nutrition in the World, 2020). Low-income countries are more dependent than countries with high incomes on staple foods and fewer on fruits, vegetables and animal source foods. There are enough of fruits and vegetables for human consumption only in Asia and globally in upper-middle-income countries, in order to meet the FAO/WHO recommendation of consuming a minimum of 400 g/person/day (Food Security and Nutrition in the World, 2020).

Study found that food security and diet diversity were low among lactating mothers in the far-western mountain of Nepal (Raj et al., 2020). More than half of the respondents (54.0%) were food insecure and 53.0% of the mothers had a low diversified diet. This study also mentioned that socioeconomic is a confounding variable that is associated with food insecurity and deprivation of nutrients among respondents. Impoverished respondents prefer to buy staple foods such as routine foods instead of diversified diets as it is cheaper and easier to get access to those foods (Raj et al., 2020). Likewise, a population-based study among 5094 impoverished adults reported that food insecure adults consume highly processed food that is rich in sodium and replace fruits and vegetables with refined carbohydrates (Seligman et al., 2011).

In Malaysian context, a study by Chong et al. (2018) among 222 households of Mah Meri tribe in Kuala Langat, Selangor reported a significant association of food insecurity with diet diversity among individual and child levels of food insecurity groups. The food secure

group had significantly higher Malaysian Healthy Eating Index (HEI) scores for grains and cereals ($p<0.01$) as well as meat, poultry, and eggs ($p<0.001$) compared to food insecure group. This might be due to the location of the study are mainly nearby rivers enabling them to have a greater access to protein sources such as fish. Chong et al. (2018) study mentioned that the adjustment of dietary intake quality patterns may be another mechanism to resolve household food insecurity. Previous study also observed the respondents' food preferences are less expensive and high energy dense rather than nutrient dense in order to maintain the intake of food quantity (Chong et al., 2018). Another study among 169 Indian women in palm-plantation households in Negeri Sembilan also found that food secure women had significantly higher mean diet diversity scores than women experiencing food insecurity (Mohamadpour et al., 2012).

The inconsistent findings might be due to different mothers' perception on adequacy of food in the household (Mohamadpour et al., 2012). Furthermore, ethnicity also might interfere with the food preferences of the household according to food cultures. Next, geographical area also contributes to different food availability as for the Mah Meri population they live near the river where they have abundant access to protein sources (Chong et al., 2018).

In conclusion, the difference uses of tools also can be determinants of different findings from previous studies. Geographical area, socioeconomic background, ethnicity influence an individual food security status.

CHAPTER 3

METHODOLOGY

3.0 Introduction

In this chapter 3 contained several methodology aspects that had been proposed and carried out in current study. Details regarding location of study, study design, target population, sampling design, determination of sample size, inclusion and exclusion criteria in selecting respondents, measurements of instruments used, study approval, pre-test and data analysis can be looked out in this chapter.

3.1 Location of study

This study conducted in the selected low-cost public houses in Kuala Lumpur, Malaysia which includes several areas: Lembah Pantai, Pandan, Setiawangsa, Batu and Sentosa. In addition, PPR is a government program for the resettlement of squatters and residence requirements for low-income earners. This project is under the Ministry of Housing and Local Government and National Housing Department that implement the programs throughout Malaysia.

3.2 Study design

Due to time constraint and COVID-19 issues, current study chooses to do a cross-sectional study which aimed to compare in diet diversity scores between sociodemographic characteristics (age, marital status, ethnicity and religion, education, employment status, household size, number of children, household income, total expenditure), nutrition knowledge, food assistance and food security status among households who received TLFP food assistance.

3.3 Target population

A household representatives from each household from selected low-cost public houses including People's Housing Project (PPR), *Perumahan Awam* and low-cost flat in Klang Valley that involved in the TLFP.

3.4 Sampling design

As shown in figure 2, a sampling frame obtained from the office of selected PPR that is involved in the TLFP. Five selected areas in Klang Valley which participated in this project were included in this study. A convenience sampling method conducted in the first stage of sampling in which equal respondents selected from each PPR. The second stage of sampling is cluster sampling as respondents who meet the inclusion and exclusion were invited to participate in this study.

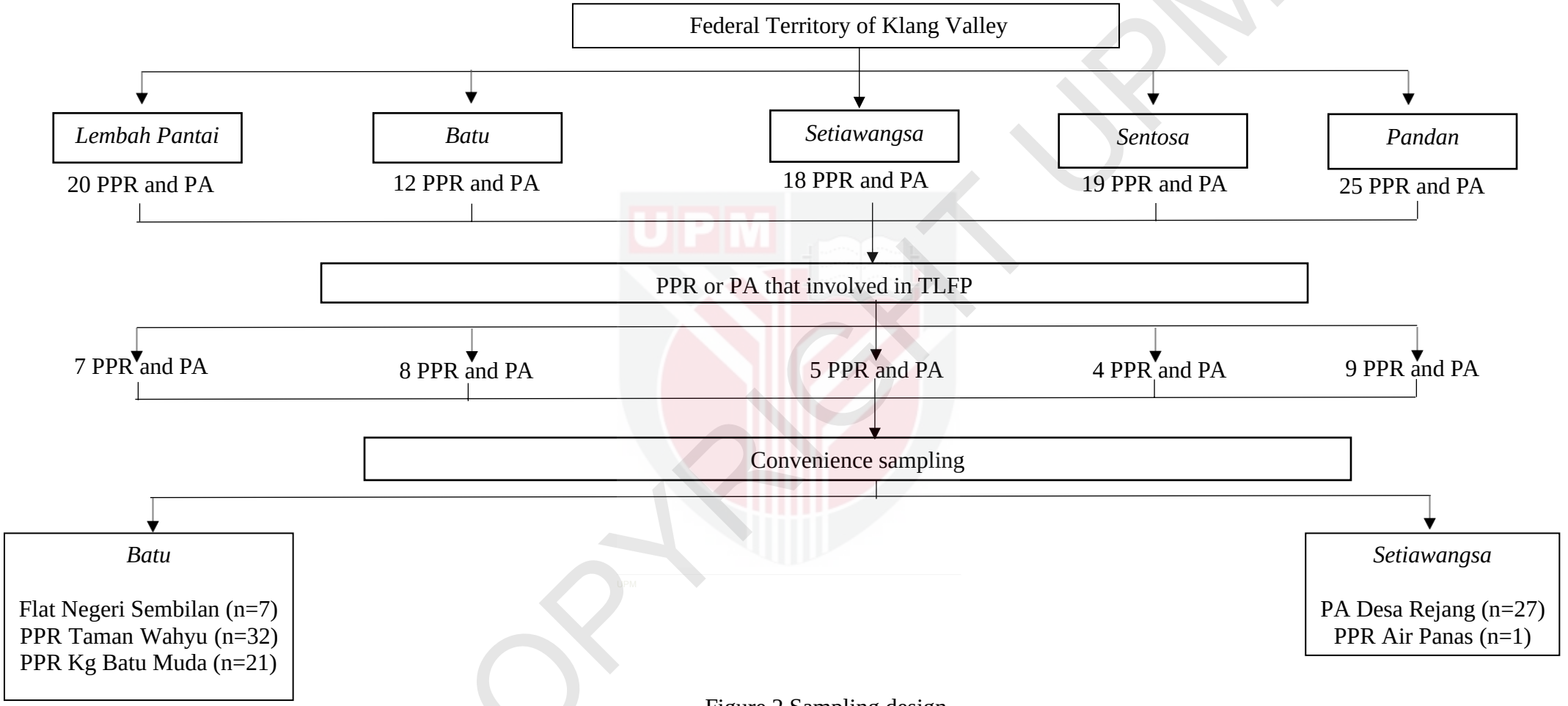

Figure 2 Sampling design

3.5 Sample size determination

As shown in Table 1, sample size calculation for proportionate sampling formula was used (Lemeshow, Hosmer, Klar & Lwanga, 1990) to calculate the population sample size of this study:

$$n = \frac{\{Z_{1-\alpha/2}\sqrt{2P(1-P)} + Z_{1-\beta}\sqrt{P_1(1-P_1)+P_2(1-P_2)}\}^2}{(P_1 - P_2)^2}$$

Where,
n= required sample size
P = (P1 + P2)/2
P1= estimated proportion for group 1
P2 = estimated proportion for group 2
Z(1-α/2) = 1.96 for 95% CI
Z(1-β) = power = 80% = 0.84

Table 1 Sample size calculation for each variable based on the previous studies on proportionate sampling

Parameters		Calculated sample size, n	Adjustment of design effect (2.0)	Expected response rate (80%)	Proportion of eligible (90%)
Gender (Esfandiari, Omidvar, Eini-Zinab, Doustmohammadian, & Amirhamidi, 2017)	P1: 0.717 (Male with food secure) P2 0.283 (Female with food secure)	20x2=40	40x2.0 = 80	80÷0.8 =100	100÷0.9= 111
	P1: 0.734 (Male with food insecure) P2: 0.266 (Female with food insecure)	17x2=34	34x2=68	68÷0.8= 85	85÷0.9=94
House ownership (Obayelu & Osho, 2019)	P1: 0.694 (House owners with very low diet diversity) P2: 0.306	25 x 2 = 50	50x2.0=100	100÷0.8 =125	125÷0.9= 139

	(Tenants with very low diet diversity) P1: 0.700 (House owners with low diet diversity) P2: 0.300 (Tenants with low diet diversity	23 x 2 = 46	46x2.0=92	92÷0.8= 115	115÷0.9= 128
Household income (Mamat et al., 2019)	P1: 0.228 (Food secure with income less than RM 2150) P2: 0.772 (Food secure with income more than or equal to RM 2150)	12x2 = 24	24x2.0=48	48÷0.8= 60	60÷0.9=67
	P1: 0.778 (Food insecure with income less than RM 2150) P2: 0.222 (Food insecure with income more than or equal to RM 2150)	11 x 2 = 22	22x2.0=44	44÷0.8= 55	55÷0.9=61

The highest number of sample size is selected as the final sample size of this study, which is 50 respondents based on Table 1. After consideration of design effect, response rate and expected proportion of eligibility, the final sample size required for this study is 139 respondents among a member in each household from selected PPR who participated in the TLFP.

3.6 Respondents

Table 2 represents inclusion and exclusion criteria of the respondents. A household representatives aged 18 to 69-year-old which received TLFP food assistance and residents staying or living in the PPR which participated TLFP. The selected areas which participated in the TLFP; *Lembah Pantai, Pandan, Setiawangsa, Batu and Sentosa.* According to Department

of Statistics Malaysia (2020), B40 or bottom 40% of the Malaysian household incomes which those total household income less than RM 4850.00 per month. For each household, a representative of the household who usually those who are responsible in managing all the expenses and food production in the households or knows about management of households were selected.

Table 2 Inclusion and exclusion criteria of the respondents

Respondents	Inclusion criteria	Exclusion criteria
The Lost Food Project (TLFP) recipients	- A household representative aged between 18 to 69 years old - Low-income households (B40) - TLFP recipients	- Respondent with Dementia

For the exclusion criteria, those with dementia will be excluded from this study. According to the World Health Organization (WHO) 2020, dementia can be defined as a syndrome in which there is deterioration in memory, thinking, behaviour and the ability to perform everyday activities. The reason to exclude those with dementia problems is to minimize any external factor that could interrupt the main outcomes of the study.

3.7 Measures

A set of questionnaires prepared for the respondents. The questionnaire consisted of five (5) sections; A: Demographic and sociodemographic characteristics; B: Food assistance; C: Nutrition knowledge D: Food Security Status and E: Diet diversity. All the questions was prepared in Malay. The summary of the operational definition of the instruments used in this study is shown in Table 3.

Table 3 Summarisation of the operational definition of instruments used in this study

Parameter	Instrument	Operational definition
A: Sociodemographic characteristics	Questionnaire	Include sociodemographic characteristics: - Respondent's personal information: age, marital status, education level and occupation - Family information: number of children, household size, household income, total household expenditure and food expenditure.
B: Food Assistance	Questionnaire, Food list	Consist of level of satisfaction, usefulness, significant of TLFP food assistance and food list received within 12-months
C: Nutrition knowledge	KAP Questionnaire by the Malaysian Technical Working Group on Research (TWR-G) (Norimah et al., 2008)	Comprises of 20 items that categorizes into five components: 1. Nutrient function 2. Nutrient insufficiency 3. Energy of food 4. Food selection 5. Supplies of nutrients. Scoring (Total score:20) 0-11 (≤ 50%) = Poor 11-14 (51-74%) = Moderate 15-20 (≥75%) = Good
D: Household food security	U.S. Food Security Survey Module 2012: Six-item short form	Consists of six items that assess the household food security status. Scoring (Total score:6) 0 – 1: High or marginal food secure 2 – 4: Low food secure 5 – 6: Very low food secure
E: Diet Diversity	FAO Diet diversity Questionnaire	Dietary data obtained from 24-hour dietary recall (FFQ). Using an WDDS consist of nine (9) food groups followed FAO (2010) guidelines

3.7.1 Sociodemographic characteristics

This section is divided into four parts; Part A: Respondent's background, Part B: Family's background, Part C: Household income and Part D: Household expenditure. Information such as age, ethnicity, religion, marital status, education level, type of residence, occupation for both respondent and husband, side job is required in Part A. Meanwhile, number of household either working or not, number of children staying together and children who attended school and any family's health background is needed in the Part B. Part C will be focusing on the monthly total household income information and Part D will be focusing on food and non-food related household expenditure such as housing rental, transportation, utility bills, medical expenses and others.

3.7.2 Food assistance

This section is consisting of four questions that focus on food assistance. The participants who involved or received the food assistance from TLFP will be asked about the type of food received specifically and its frequency within six months and up to 12 months. A list of foods will be attached to this section and respondent need to tick foods that they had been received. For examples, the food list includes dry groceries such as rice, cereals, mee, malt drinks, sugar, salt, fruits, cordial drinks, fruits and vegetables, and ready to eat foods.

3.7.3 Nutrition knowledge

A validated questionnaire developed by Malaysian Technical Working Group on Research (TWR-G) is adapted for this section (Norimah et al., 2008). The questionnaire was developed for each specific target group such as elderly (Norimah et al., 2008) and indigenous people (Chong et al., 2018). This section comprises 20 nutrition knowledge items that are

categorized into five (5) domains which are food selection, nutrient function, energy of food, nutrient insufficiency, and nutrient availability. Each question will be provided with five (5) choices of answer. One mark will be given to each correct answer and zero mark will be given to the wrong answer. The cumulative scores for this section are 20 while the lowest score is zero. It will then be converted into percentage. The classification of nutrition knowledge score and the categories is referred to the TWR-G, Ministry Of Health (Norimah et al., 2008) (Table 4). The reliability of instruments used in current study was tested with Cronbach's alpha 0.82 which highly reliable. Similar with local study among indigenous women in Selangor reported Cronbach's alpha was 0.88 (Chong et al., 2018).

Table 4 The classification of nutrition knowledge scores

Knowledge categories	Scores	%ages
Poor	0-10	≤ 50%
Moderate	11-14	51-74%
Good	15-20	≥75%

Source: Norimah et al. (2008)

3.7.4 Diet diversity

Face-to-face interview on 24-hour dietary recall will be conducted to determine the food intakes of the participants. The 24- hour dietary recall will be assessed for two (2) days which involved food intakes on weekday and weekend. The participants will be asked to recall all foods including snacks and drinks that they consumed in the last 24 hours. In order to obtain a more accurate serving size, household measures such as teaspoons, tablespoons, cups, bowls, and glass will be used together with Food Atlas: Size Portion and Exchange (Suzana et al., 2009) and Malaysia Food Album (MOH, 2014). Besides, the meal type and type, quantity taken,

methods of cooking will also be asked. Probing technique will also be used to direct the participants during the interview session.

From the information obtained, diet diversity score (DDS) will be calculated by total up the number of food groups consumed by the participants (Kennedy, Ballard, & Dop, 2010). Nine food groups will be created, and this is based on Individual Diet diversity Score comprises of starchy staples, dark green leafy vegetables, other vitamin A rich fruits and vegetables, other fruits and vegetables, organ meat, meat and fish, eggs, legumes, nuts and seeds, milk and milk products. Each food group will be received one point for each intake and will be counted once only regardless of different types of food from the same food group were consumed. The total score from Individual Diet diversity Scores is 9. This instrument will be categorized into several classification according to Food and Agriculture (FAO, 2010) recommendation (Table 7). In this study, a reliability test for Individual Diet Diversity Scores (IDDS) instrument was carried out and the Cronbach's alpha was 0.40. Compared to previous study among which test for maternal diet diversity in Ethiopia reported acceptable Cronbach's alpha (0.73) (Yeneabat et al., 2019). There is no local study used this instrument to measure individuals diet diversity.

Table 5 The classification of Individual Diet Diversity Scores (IDDS)

Diet diversity score	Scores
Not adequate	<5 food groups
Adequate	≥5 food groups

Source: FAO (2010)

3.7.5 Household food security

In this section, U.S. Household Food Security Survey Module: Six-Item Short Form Survey by National Center for Health Statistics will be used to assess financially based food

insecurity and hunger in surveys of households with or without children (Blumberg, MS, Hamilton, & Briefel, 1999). The Malay translated version of the instrument is used after being translated using forward and backward translation method. This instrument comprises 6 items. The questionnaire will be answered by the mother of the household. The first and second question are related to the household condition. There are four (4) choices of answer which are "often true", "sometimes true", "never true" and "refused to answer or don't know". Meanwhile the third question related to whether their households have experienced cutting their meals because of not enough money. For this question, there are three (3) choices of answer which are "Yes", "No" and "Don't know". If the participants choose "Yes", they need to answer the next question about the frequency of the situation happening in the household. The choices of the answers consisted of "almost every month", "some months but not every month", "only 1 or 2 months" and "don't know". The remaining 2 questions will be asked to the respondents regarding their feelings about food accessibility in their households and both questions are regarded with three choices of answers whether "Yes", "No" or "Don't know".

For the scoring and analysing the data, the responses of "often' or "sometimes true" in the first and second questions and "yes" on the third, fifth and six questions will be coded as "Yes". The fourth question will be coded as "Yes" if the response is either "almost every month" or "some months but not every month". From these, all the "Yes" coded will be added to get the total score on food security status in the household. The higher total score indicates a very low food security level. The classification of food security level will be referred to the classification proposed by USDA (2012) (Table 5). Current study test on the reliability of U.S. Household Food Security Survey Module: Six-Item Short Form Survey was reliable (Cronbach's alpha:0.72). Similarly, previous local study among urban elderly in Malaysia

tested reliability for this instrument which shown acceptable reliability and Cronbach's alpha was 0.75 (Mesbah et al., 2020).

Table 6 The classification of food security level

Food security status	Scores
High food security	0 – 1
Low food security	2 – 4
Very low food security	5 – 6

Source: USDA (2012)

3.7.6 Alternatives due to covid-19 situation

The face-to-face method in data collection will be conducted according to the Standard Operating Procedures (SOPs) provided by the Ministry of Health Malaysia (MOH) in order to obtain a reliable data. However, due to the COVID-19 situation in Malaysia, alternatives will be opted to collect the data from the participants. A digital questionnaire will be distributed to the participants through online platform. A telephone interview conversation will be conducted for respondents who cannot access to online platform questionnaire which take 30 minutes for each respondent to be interviewed by the researchers.

3.8 Study approval

Ethical approval was obtained from Ethics Committee for Research Involving Human Subjects Universiti Putra Malaysia with reference no. JKEUPM-2020-455 refer to appendix 2. Letter of collaboration between UPM and TLFP were obtained refer to appendix 3.

3.9 Pre-testing

A pre-testing will be conducted among 30 participants who are staying or living in PPR which participated in the TLFP. The amount of the participants for pretesting is determined according to Sheatsley (1983) and Sudman (1983) where at least 12 to 50 people are said to be enough for pre-testing in terms of cost-, energy- and time-efficient. This will able the researcher to estimate the time taken for the participants to answer the questions. Besides, it is crucial to do pre-testing in order to ensure whether the participants are able to understand the questions and instructions given or not. This will help to assess the reliability of the questionnaire before the questionnaire is being distributed to the targeted population. The participants who participate in pre-testing will not be included in the sample. Hence, pre-testing could give advantages in re-assessing the instruction and specific time allocates to complete the session for each of participants. During pre-test, only 16 out of 30 respondents answered the questionnaire through online platforms or phone interview. Due to covid-19 chaos, a few people do not want to participate in this study, and some are scared they might be scammed during a phone interview. Furthermore, most of the respondents are unable to use google form as they are not good in applying technology as most of them aged 41 years and above.

3.10 Data collection

Due to conditional movement control order (CMCO) restrictions, three methods of data collection are used such as face-to-face interview following SOP procedure, phone interview approximately 20-30 minutes for each respondent, and sharing google form link through whatsapp. Approximately, 87 of respondents completed the study with response rate achieved was 62.6%.

3.11 Data analysis

Data from the questionnaire will be analysed using IBM SPSS Version 25.0. Prior to analyses, exploratory data analysis (EDA) is explored to ensure all the data obtained are normally distributed. Univariate analysis will be used to analyse all the data obtained descriptively. Categorical variables will be presented as percentage while mean and standard deviations are applied to continuous variables. An independent-samples t-test and one-way ANOVA are used to compare diet diversity between sociodemographic characteristics, food assistance and nutrition knowledge among respondents. In addition, independent t-test was also used to compare mean of food assistance between not adequate and adequate diet diversity. A post-hoc test is used when there is significant value ($p<0.05$) and utilized to determine any significant difference in diet diversity according to sociodemographic characteristics, nutrition knowledge and food security status. The significant value of this study was stated when $p<0.05$.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Sociodemographic characteristics of the respondents

Sociodemographic characteristics of respondents are summarised in Table 7. A total of 87 respondents were involved in this study starting from 17 years old and above. Majority of respondents were aged above 41 years old (76.7%) followed by aged 20 to 40 years old (19.8%) and aged below 19 years old (3.5%). More than half female participated in this study compared to men (79.3% and 20.7% respectively). Seventy-five out of 78 respondents were Bumiputera and across religion majority were Islam (88.6%) followed by Hindu (9.2%) and Buddha (2.3%) respectively. Approximately 65.5% of respondents were married while 34.5% were single or divorced. Three quarters of the respondents (74.4%) completed secondary education, 12.8% completed primary education, 9.3% completed tertiary education and 3.5% reported having no education. Most of respondents' spouse's education were at secondary education (34.8%) followed by tertiary education (10.1%), primary education (10.1%), no education (1.4%) and irrelevant (43.5%).

Respondents mostly still rent their house (67.8%) and a few owned houses (32.2%). Majority respondents were unemployed (58.6%), and another 41.1% of respondents were employed. Contrary, previous study carried out among B40 households including all states in Malaysia identified that 87.8% respondents were employed and only 12.2% were unemployed (Ibrahim & Othman, 2020). In this study, 33.3% reported that their partners were employed and 21.8% were unemployed. Respondents reported that their household size was 3 to 5 members (54.7%) and 3.5% reported they have more than 9 members in their households. On the contrary, a national study found that most of their respondents (57.4%) have a household size

of 4 to 6 family members, followed by 31.4% with 1 to 3 members in a household and 11.1% had more than 7 family members (Ibrahim & Othman, 2020). Majority of the respondents (87.7%) reported below 2 persons in the households were working. Across the number of household members who enrolled in school, 65.9% were enrolled in school and 34.1% were not enrolled in school. The presence of chronic disease or disability were reported among most of respondents' households (69.4%).

According to the Department of Statistics Malaysia (2021), most of the households experienced a decline income as households from higher incomes shifted to lower income groups due to economic recession during COVID-19 pandemic. The income statistics among B40 groups were slightly decreased from 16.0% in 2019 to 15.9% in 2020 (DOSM, 2021). Furthermore, the number of poor households in Malaysia increased from 405,000 households in 2019 to 640,000 households in 2020 (DOSM, 2021). Previous national study found that 40.9% respondents monthly household incomes were ≤RM 2000 while 59.0% respondents have household incomes ≥RM 2001 (Ibrahim & Othman, 2020). However, current study reported that most respondents (76.5%) have monthly household income ≤RM 2000. The difference findings due to different location of study as current study focusing on TLFP recipients in Klang Valley while previous study included all states in Malaysia. Moreover, respondents spent money on food and drinks ranging from RM 500 to RM 1000 (45.3%). Table 7 showed that 55.3% of the respondents had reported current income was adequate to meet daily requirements and 32.9% reported current income was not enough to meet daily requirements. The small sample size in current study might influence the outcomes of this study.

Table 7 Sociodemographic characteristics of respondents (n=87)

Characteristics	n (%)
Age (years) (n=86)	
≤19	3 (3.5)
20 - 40	17 (19.8)
41+	66 (76.7)
Gender	
Male	18 (20.7)
Female	69 (79.3)
Ethnicity	
Bumiputera	75 (86.2)
Non Bumiputera	12 (13.8)
Religion	
Islam	77 (88.6)
Buddha	2 (2.3)
Hindu	8 (9.2)
Marital status	
Married	57 (65.5)
Single/Divorced	30 (34.5)
Respondent's education (n=86)	
No Formal Education	3 (3.5)
Primary Education	11 (12.8)
Secondary Education	64 (74.4)
Tertiary Education	8 (9.3)
Spouse's education (n=69)	
No Formal Education	1 (1.4)
Primary Education	7 (10.1)
Secondary Education	24 (34.8)
Tertiary Education	7 (10.1)
Irrelevant*	30 (43.5)
Type of houses	
Rent	59 (67.8)
Owned	28 (32.2)
Respondent's occupation	
Employed	36 (41.4)
Unemployed	51 (58.6)

Table 7 Sociodemographic characteristics of respondents (cont.)

Characteristics	n (%)
Spouse's occupation	
Employed	29 (33.3)
Unemployed	19 (21.8)
Irrelevant**	39 (44.8)
No. of household (n=86)	
≤ 2 persons	10 (11.6)
3-5 persons	47 (54.7)
6-8 persons	26 (30.2)
≥ 9 persons	3 (3.5)
No. of household who are employed (n=81)	
≤ 2 persons	71 (87.7)
3-5 persons	10 (12.3)
6-8 persons	0
≥ 9 persons	0
Household members enrolled in school (n=85)	
None	29 (34.1)
1-2 persons	37 (43.5)
3-4 persons	18 (21.2)
≥ 5 persons	1 (1.2)
Household members with chronic disease or disability (n=85)	
Yes	59 (69.4)
No	26 (30.6)
Household's income (n=85)	
≤ RM 2000	65 (76.5)
≥ RM 2001	20 (23.5)
Monthly foods and drinks expenditures (n=86)	
≤RM500	33 (38.4)
RM501-RM1000	39 (45.3)
≥RM1001	14 (16.3)
Level of adequacy on current income (n=85)	
Not enough to meet daily requirements	28 (32.9)
Enough to meet daily requirements only	47 (55.3)
Enough to buy anything desired	8 (9.4)
Enough to buy anything desired and enough for saving	2 (2.4)

*`Education level (partners): Irrelevant' is referred to those who single or divorced.
**Occupation (partners): Irrelevant' s referred to those who are single or divorced and unemployed.

4.2 Food assistance

Table 8 represents the level of satisfaction, usefulness and significance of food assistance received by respondents. For the level of satisfaction, most respondents reported to be satisfied (72.4%) with TLFP food assistance. Besides, approximately 69.0% reported the food assistance was helpful. Furthermore, majority agreed that TLFP food assistance was significant (86.2%).

Table 8: The level of satisfaction, usefulness and significance of TLFP food assistance towards the respondents (n=87)

Items	n	Percentage (%)
Level of satisfaction		
Dissatisfied	6	6.9
Average	18	20.7
Satisfied	63	72.4
Level of usefulness		
Helpful	77	88.6
Average	10	11.4
Level of significance		
Significant	75	86.2
Average	12	13.8

Table 9 represents types of food assistance and frequency received by respondents in the past 12 months. Approximately, 81.6% of the respondents received rice once or twice annually, while 10.3% received more than three times annually and 8.0% reported never receiving rice. Majority respondents (83.0%) received instant noodles about 1 to 2 times in a year. Mainly, 79.3% of the respondents received biscuits up to 2 times and 10.3% received more than 3 times in a year. The respondents who received sugar were 89.7% and 10.3% did not receive any sugar. Most of the respondents received frequent cooking oil 1 to 2 times, more than 3 times and a few reported never receiving it (79.3%, 10.3% and 10.3% respectively). Approximately 65.5% of the respondents received malt drinks once or twice annually, 3.4%

received the drinks more than three times every year, and the remaining 31.0% had never received malt drinks. Majority of respondents reported not receiving flour (64.4%), bread (72.4%), eggs (64.4%), powder milk (67.8%), condensed or evaporated milk (70.1%), formula milk (75.9%), vegetables (72.4%), fruits (93.1%), other types of drinks (88.5%), sauces (85.1%) and ready to eat foods (90.8%). Table 10 represents the mean of food items received within 12-months periods. The mean of food items received within 12 months was 7.83±3.472, which most of respondents received about 8 to 9 food items within 12 months.

Compared to previous study among household who received food assistance in Mozambique reported that respondents received basic staple foods such as cereal (45.0 kg), cowpeas (9.0 kg) and cooking oil (3/4 litre) in a month (Zhou & Hendriks, 2017). Meanwhile, study on food assistance among HIV/AIDS in Zambia found that the food received by respondents were maize, vegetable oil, peas and corn and soy blend flour (Tirivayi & Groot, 2017). Similarly, all studies received cereal products and cooking oil as this is major staple foods being consumed as well as the production of cereals were higher in both studies. Furthermore, previous studies did receive on legumes products such as cowpeas (Zhou & Hendriks, 2017) and peas (Tirivayi & Groot, 2017) compared to current study which respondents did not receive any legumes products. However, respondents in current study reported receiving fruits and vegetables within 12-months period.

Food items given by TLFP depends on the availability of foods itself. Before pandemic, respondents reported received vegetables, fruits and ready to eat foods. However, during pandemic the production of vegetables are quite slow and limited of employee to make ready to eat food results in limited production of this food. In addition, during pandemic most respondents received staple foods which are easier to get from donors such as rice, cereal, noodles, biscuits, sugar, cooking oil and malt drinks.

Table 9: Types of food assistance and frequency received by respondents in 12 months (n=87)

Food assistance	n (%)	
	Yes	No
Rice[a]	80 (92.0)	7 (8.0)
Noodles, maggi[a]	80 (92.0)	7 (8.0)
Flour	31 (35.6)	56 (64.4)
Bread	24 (27.6)	63 (72.4)
Biscuit[a]	77 (88.5)	10 (11.5)
Eggs	31 (35.6)	56 (64.4)
Sugar[a]	78 (89.7)	9 (10.3)
Powder milk	28 (32.2)	59 (67.8)
Condensed or evaporated milk	26 (29.9)	61 (70.1)
Formula milk	21 (24.1)	66 (75.9)
Cooking oil[a]	78 (89.7)	9 (10.3)
Vegetables	24 (27.5)	63 (72.4)
Fruits	6 (6.8)	81 (93.1)
Malt drinks[a]	60 (68.9)	27 (31.0)
Other drinks; cordial, coffee, tea	10 (11.4)	77 (88.5)
Sauces	13 (14.9)	74 (85.1)
Ready to eat foods	8 (9.1)	79 (90.8)

[a] Main food items received within 12 months-period.

Table 10 Mean of food items received within 12 months period (n=87)

Variable	Mean±SD	Min. value	Max. value
Mean of food item received within 12 months	7.83±3.47	1	17

4.3 Nutrition knowledge

Table 11 shows the nutrition knowledge of the respondents in this study. More than half of the respondents were able to answer correctly on the knowledge about balance diet (56.3%), food to be consumed less (56.3%), foods high in salt (54.0%), body-building nutrient (50.6%), carbohydrate-rich foods (52.9%), protein-rich foods (65.5%), foods rich in vitamins, minerals and fibre (47.1%), fibre-rich foods (54.0%), food labels (61.4%), importance of exercise (74.7%), body mass index (BMI) (53.6%), cooking method that increase fat content (87.4%), the effect of excessive calorie intake (90.8%), the risk of obesity (92.0%), how to prevent

obesity (71.3%) and the risk of excessive sugar intake (92.0%). While compared to previous study by Norimah et al. (2008) reported that only about a quarter to a third of elderly answered correctly on nutrient function and content questions. In addition, Norimah et al. (2008) found that most of respondents (65.0%) answered correctly on the knowledge on foods high in salt which is slightly higher from current study (54.0%). This may be due to age difference between both studies as current study includes wide age range while Norimah et al. (2008) only focusing on elderly.

Nonetheless, several items were answered incorrectly by respondents such as knowledge on how to get balanced nutrients (52.9%), food to be consumed in moderation (44.8%), nutrient with highest energy (kilocalories) (77.0%) and foods high in cholesterol (72.4%). There a few of respondents reported not knowing which are higher in knowledge on food to be consumed in moderation (28.7%), food to be consumed less (23.0%), and body mass index (BMI) (36.9%). However, previous study by Norimah et al. (2008) found that majority of respondents answered incorrectly to the questions on foods to be consumed most and to be consumed less (88.0% and 87.0% respectively).

Table 11 Nutrition knowledge of the respondents

Items	Statements	n (%)		
		Correct	Incorrect	Do not know
1	Knowledge about balance diet	49 (56.3)	27 (31.0)	11 (12.6)
2	Knowledge on how to get balanced nutrients	34 (39.1)	46 (52.9)	7 (8.0)
3	Knowledge on food to be consumed in moderation	23 (26.4)	39 (44.8)	25 (28.7)
4	Knowledge on food to be consumed least.	49 (56.3)	14 (16.1)	24 (27.6)
5	Knowledge on foods high in salt	47 (54.0)	20 (23.0)	20 (23.0)
6	Knowledge on nutrient with the highest energy (kilocalories)	10 (11.5)	67 (77.0)	10 (11.5)
7	Knowledge on body-building nutrient	44 (50.6)	32 (36.8)	11 (12.6)
8	Knowledge on carbohydrate-rich foods	46 (52.9)	25 (28.7)	16 (18.4)
9	Knowledge on protein-rich foods	57 (65.5)	16 (18.4)	14 (16.1)

Table 11 Nutrition knowledge of the respondents (cont.)

Items	Statements	n (%)		
		Correct	Incorrect	Do not know
10	Knowledge on foods rich in vitamins, minerals and fibre	41 (47.1)	35 (40.2)	11 (12.6)
11	Knowledge on fibre-rich foods	47 (54.0)	25 (28.7)	15 (17.2)
12	Knowledge on foods high in cholesterol	20 (23.0)	63 (72.4)	4 (4.6)
13	Knowledge on food label (n=83)	51 (61.4)	32 (38.6)	-
14	Knowledge on the importance of exercise	65 (74.7)	20 (23.0)	2 (2.3)
15	Knowledge on Body Mass Index (BMI) (n=84)	45 (53.6)	8 (9.5)	31 (36.9)
16	Knowledge on cooking method that increase fat content	76 (87.4)	9 (10.3)	2 (2.3)
17	Knowledge on the effect of excessive calorie intake	79 (90.8)	5 (5.7)	3 (3.4)
18	Knowledge on the risk of obesity	80 (92.0)	3 (3.4)	4 (4.6)
19	Knowledge on how to prevent obesity	62 (71.3)	14 (16.1)	11 (12.6)
20	Knowledge on the risk of excessive sugar intake	80 (92.0)	4 (4.6)	3 (3.4)

Table 12 represents the level of nutrition knowledge among respondents. Approximately, 57 out of 87 respondents (65.5%) had moderate to good nutrition knowledge. Similarly, Agbozo et al. (2018) found that 65.8% respondents had satisfactory nutrition knowledge while remaining were good nutrition knowledge (28.3%) and poor nutrition knowledge (5.8%). Meanwhile, Norimah et al. (2008) reported that the more than half (73.0%) of respondents classified as poor knowledge. In previous study found that female elderly had poor nutrition knowledge compared to male elderly (Norimah et al., 2008). However, the current study population includes a wide age-range from late adolescents until elderly while the previous study focused only on elderly (Agbozo et al., 2018; Norimah et al., 2008). In addition, most elderly in Malaysia reported did not receive any formal education and had illiteracy problems which results in poor nutrition knowledge (Norimah et al., 2008). Besides, the instruments used to assess level of nutrition knowledge between studies were different as current study and Norimah et al. (2008) used KAP models on knowledge parts. On the other hand, Agbozo et al.

(2018) used specifically designed questionnaire for their population which focused on issues tackled centered on nutrients, health benefits of food, the diet-disease relationship, fruits and vegetables, water and physical activity. In addition, differences in findings of nutrition knowledge among studies also might be due to respondents who did not receive any formal education and had illiteracy problems (Norimah et al., 2008).

Table 12 Level of nutrition knowledge among respondents (n=87)

Variables		n (%)	Mean±SD	Min. value	Max. value
Total scores			11.68±3.93	2	18
Poor	(0-10 scores)	30 (34.5)			
Moderate	(11-14 scores)	33 (37.9)			
Good	(15-20 scores)	24 (27.6)			

4.4 Food security status

The prevalence of food security status among respondents is presented in Table 13. Most respondents were food insecure (58.6%) and a few of respondents were food secure (41.4%). Consistent findings with previous studies, most respondents experienced food insecurity above 50.0% (Ilhab et al., 2012; Mamat et al., 2019; Mohamadpour et al., 2012; Rajikan et al., 2019; Shariff et al., 2014; Yong & Norhasmah, 2016). Thus, there is no change in the prevalence of food security among studies because the majority of studies focus on food security status among low-income populations.

Table 13 Prevalence of food security status (n=87)

Food Security Status		n	%age (%)
High food security	(0-1 scores)	36	41.4
Low food security	(2-4 scores)	35	40.2
Very low food security	(5-6 scores)	16	18.4

4.5 Diet diversity

Table 14 represents food groups consumed by respondents in the last 24 hours. Majority of the respondents (98.9%) consumed starchy staples. Most of the respondents consumed dark green leafy vegetables (66.3%), other vitamins A rich fruits and vegetables (59.8%), other fruits and vegetables (80.5%), meat and fish (85.1%) and eggs (62.1%). Meanwhile, several respondents reported not consuming organ meats (85.1%), legumes, nuts and seeds (66.7%) and milk and milk products (55.2%).

Table 14 Food groups consumed by respondents in last 24 hours (n=87)

Items	Food groups	n (%)	
		Yes	No
1	Starchy staples	86 (98.9)	1 (1.1)
2	Dark green leafy vegetables (n=86)	57 (66.3)	29 (33.7)
3	Other vitamin A rich fruits and vegetables	52 (59.8)	35 (40.2)
4	Other fruits and vegetables	70 (80.5)	17 (19.5)
5	Organ meats	13 (14.9)	74 (85.1)
6	Meat and fish	74 (85.1)	13 (14.9)
7	Eggs	54 (62.1)	33 (37.9)
8	Legumes, nuts and seeds	29 (33.3)	58 (66.7)
9	Milk and milk products	39 (44.8)	48 (55.2)

*Individual Diet Diversity Scores (IDDS) is used to assess individual diet diversity which consists of 9 food groups.

Table 15 represents the distributions of respondents by individual diet diversity scores (DDS). The mean of diet diversity was 5.45±1.61 which most of the respondents had an adequate diet (69.0%) with consumption of 5 to 6 food groups in their daily diet while 31.0 % had inadequate diet. Similarly, most participants (57.7%) in ELANS study were able to exceed the minimum cut-off point of a diversified diet (MDD-W ≥5) (Gomez et al., 2020). On the other hand, Tiew et al. (2014) reported 34.5 % respondents had scores up to 5 food groups with mean diet diversity scores were 4.12±0.79 among T2DM patients. The findings were different because of indicators used in the current study and Gomez et al. used MDD-W tools which

consist of 9 food groups whereas Tiew et al. (2014) used the Food Group Score (FGS) consisting of 5 food groups. Moreover, in the current study slightly more respondents had an adequate diet compared to previous studies because respondents in the current study did receive food assistance which might contribute to better diet quality.

Table 15 Distribution of respondents by individual diet diversity scores (IDDS) (n=87)

Variables		n (%)	Mean ± SD	Min. Value	Max. value
Total Scores			5.45±1.61	1	9
Not adequate	(<5 food groups)	27 (31.0)			
Adequate	(≥5 food groups)	60 (69.0)			

4.6 Comparison in diet diversity score by sociodemographic characteristics

Table 15 shows the comparison in diet diversity score by sociodemographic characteristics of the respondents in this study. There was a significant difference in diet diversity scores for household monthly foods and drinks expenditure below RM 1000 (Mean±SD= 5.28±1.646) and above RM 1001 (Mean±SD= 6.14±1.027, t= -2.573, p=0.016). Households who spend above RM1001 for foods and drinks have higher scores on diet diversity compared to households who spend below RM1000. Similarly, a previous study among households in Malawi reported a significant association (p<0.01) between food expenditures and diet diversity scores (Jones, Shrinivas & Bezner-Kerr, 2014). Food secure household have greater purchasing power results in more diverse diet compared to food insecure household (Ilhab et al., 2012). Furthermore, there were no significant differences in diet diversity between age, sex, ethnicity and religion, marital status, level of education, type of houses, employment status, household size, household members enrolled in school, household members with chronic disease or disability and household incomes as shown in Table 15.

On top of that, there was no significance difference in diet diversity between below 19 years old (Mean±SD= 6.67±1.53), 20-40 years old (Mean±SD= 5.24±1.99) and 41 years above

(Mean±SD= 5.41±1.48, F=1.039, p=0.358). Similarly, previous study among women childbearing aged reported insignificant difference in diet diversity scores between age groups; 15 to 19 years old (Mean±SD= 4.61±1.28), 20 to 34 years old ((Mean±SD= 4.73±1.34) and 35 to 49 years old (Mean±SD= 4.76±1.35, p<0.081) (Gómez et al., 2020). However, Alkerwi et al. (2015) study among healthy and non-institutionalised respondents found a significant differences in diet diversity scores between age groups in which respondents aged 30 to 49 years old had higher DDS compared to 18 to 29 years old and 50 to 69 years old (p<0.001). As a matter of fact, the age group ranges between three studies might interfere with findings as food preferences changes as increase in age (Adamska et al., 2012). Early adulthoods consume more on western diet while middle-aged consume more on diverse food groups (Abdullah et al., 2016; Ramadas et al., 2021). In addition, elderly might have difficulties swallowing food and their food preferences might change as they increase in age. Furthermore, there is an insignificant difference in diet diversity scores between male and female (Mean±SD= 5.78±1.555, 5.36±1.618; , t= 0.978, p=0.331 respectively). In contrast, Alkerwi et al. (2015) found that sex have greater impacts on individual food choices which women are prone to consume healthier food choices than men; however, in terms of diet diversity, men (Mean±SD= 16.1±0.10) consume more diversified diet compared to women (Mean±SD= 15.7±0.10) (p<0.05). Likewise, previous study found that men consumed more protein-based foods compared to women (Norimah et al., 2008). Food choices among sex might influence by cultural beliefs as consumption of protein-based foods were relates with masculinity while consumption of vegetables was related with femininity (Love & Sulikowski, 2018). Furthermore, study among Korean population found that environmental factors also associated with poor diet quality (Chae et al., 2018). Male and female who eats alone shows declined in

diet quality compared to those who eats with accompany (Alkerwi et al., 2015; Chase et al., 2018).

Next, there is no significant difference in diet diversity scores between bumiputra and non-bumiputra (Mean±SD= 5.49±1.597, 5.17±1.697, t=0.652, p=0.516). Nevertheless, a previous study found there is a significant difference in diet quality between ethnicity and culture among Malaysian (Drewnoski et al., 2020; Chong et al., 2018). A previous study among Indigenous women observed that most indigenous women preferred to consume high energy dense food (Chong et al., 2018). A previous study among Malaysian population found that different preference of animal-based protein food choices between ethnicities as Malay and Chinese more likely to consume beef compared to Indian due to its religious belief beef symbolised as motherly giving animal (Drewnoski et al., 2020). Current study found no significant difference in diet diversity scores between marital status among respondents ($p<0.05$). Contradictory with previous study among Indigenous women found positive association between marital status and diet quality ($p<0.05$) (Chong et al., 2018). Married women were reported with high diet quality compared to single women (Alkerwi et al., 2015; Chong et al., 2018) because married women can pool resources with spouses which enable them to have better diet quality (Oneyeneke et al., 2015). In addition, a single parenthood might have difficulties to provide an adequate diet for their family due to limited financial resources (Chong et al., 2018).

There is no significance difference in diet diversity scores between respondent's education, spouse's education and employment status (respondents, spouses and household members) ($p>0.05$). Likewise, Alkerwi et al. (2015) reported there is no significant difference in diet diversity scores between employment status among households ($p<0.05$). However, previous studies found that education level (Jones, Shrinivas & Bezner-Kerr, 2014) and

employment status (Rydén & Hagfors, 2011) were associated with diet diversity. Individuals with higher education levels consumed more diverse diet (Jones, Shrinivas & Bezner-Kerr, 2014) while an individual with lower education consumed a less diverse diet (Chong et al., 2018). Education is important in order to ensure a better rate of employment as individuals with proper education have proper jobs (Obayelu & Osho, 2020; Oneyeneke et al., 2015; Rydén & Hagfors, 2011) and are able to spend money on healthier food choices compared to lower education which focuses on staple foods (Raj et al., 2020).

Current study found an insignificant difference in diet diversity scores between household size ($p= 0.440$). However, study among low-income urban households in Nigeria found that an individual with larger household size shows declining on diet diversity (Obayelu & Osho, 2019) as mothers will compromise their nutrients needs for their household members (Ilhab et al., 2012). However, previous studies mentioned that people who live alone reported with low diverse diet (Alkerwi et al., 2015; Chae et al., 2018) might be due to poor cooking skills and lack of knowledge on healthy food choices. In current study, there is no significant difference in diet diversity scores between household with chronic disease or disability ($p=0.921$). Contrary, previous studies found relation between chronic diseases with diet quality ($p<0.05$) (Fanelli et al., 2020; Green et al., 2016; Tiew et al., 2014). Individuals which consumed more vegetables shows reduction of ischaemic heart diseases (IHD) mortality (Green et al., 2016). Previous study by Tiew et al. (2014) among type-2 diabetes mellitus in Hospital Serdang reported that diabetic patients had lower diet diversity as they focused on diabetic diet. Diabetic patients avoid consumption of fruits as they believe that fruits are high in sugar which might elevate blood glucose levels and dairy products acts as potential fattening foods (Tiew et al., 2014). In addition, individuals with multiple medical conditions also shown declining in diet quality as various consumption of medicine impair food intakes (Fanelli et al., 2020).

On top of that, there is no significance difference in diet diversity scores between household income ≤ RM 2000 (Mean±SD= 5.43±1.658) and ≥ RM 2001 (Mean±SD= 5.45±1.395) in current study (t= -0.047, p= 0.963). Similarly, Alkerwi et al. (2015) reported insignificant association between household incomes and diet diversity scores (p>0.05). Inconsistent with findings of several studies found that insufficient household income can contribute to the inability to provide sufficient foods for household members (Carlson & Frazao, 2012; Laraia et al., 2013; Mohamadpour et al., 2012). This is because certain food such as protein-based foods are expensive (Ilhab et al., 2012) and individual with low-income preferred less expensive foods in order to maintain food quantity instead of food quality (Chong et al., 2018).

Table 15 Comparison between diet diversity scores and sociodemographic characteristics (n=87)

Characteristics	Diet diversity			
	Mean ± SD	t	F	p
Age (years) (n=86)			1.039	0.358
≤19	6.67±1.528			
20 – 40	5.24±1.985			
+41	5.41±1.478			
Gender				
Male	5.78±1.555	0.978		0.331
Female	5.36±1.618			
Ethnicity				
Bumiputera	5.49±1.597	0.652		0.516
Non Bumiputera	5.17±1.697			
Religion				
Islam	5.45±1.602		0.176	0.839
Buddha	6.00±1.414			
Hindu	5.25±1.832			
Marital status				
Married	5.56±1.559	0.905		0.368
Single/Divorced	5.23±1.696			

Table 15 Comparison between diet diversity scores and sociodemographic characteristics (n=87) (cont.)

Characteristics	Diet diversity			
	Mean ± SD	t	F	p
Respondent's education (n=86)				
Never attend/Primary education	5.14±1.748		0.490	0.615
Secondary Education	5.53±1.573			
Tertiary Education	5.13±1.727			
Spouse's education (n=39)				
Never attend/ Primary education	4.63±1.923		1.070	0.354
Secondary Education	5.58±1.501			
Tertiary Education	5.14±1.773			
Type of houses				
Rent	5.61±1.520	1.373		0.173
Owned	5.11±1.750			
Respondent's occupation				
Employed	5.36±1.726	-0.424		0.673
Unemployed	5.51±1.528			
Partner's occupation (n=48)				
Employed	5.55±1.478	-0.637		0.527
Unemployed	5.84±1.642			
No. of household (n=86)				
≤ 5 persons	5.53±1.616	0.776		0.440
≥ 6 persons	5.24±1.596			
No. of household who are employed (n=81)				
≤ 2 persons	5.31±1.635	-0.351		0.727
3 persons and above	5.50±1.354			
Household members enrolled in school (n=85)				
Yes	5.39±1.659	0.151		0.881
No	5.45±1.502			
Household members with chronic diseases or disability (n=85)				
Yes	5.42±1.610	0.099		0.921
No	5.46±1.655			

Table 15 Comparison between diet diversity scores and sociodemographic characteristics (n=87) (cont.)

Characteristics	Diet diversity			
	Mean ± SD	t	F	p
Household's income (n=85)				
≤ RM 2000	5.43±1.658	-0.047		0.963
≥ RM 2001	5.45±1.395			
Monthly food and drinks expenditure (n=86)				
≤RM1000	5.28±1.646	-2.573		.016*
≥RM1001	6.14±1.027			

*significant level set when p<0.05

4.7 Comparison in mean of food assistance between diet diversity

Table 16 shown insignificant difference in mean of food items received in 12-months between not adequate diet (<5 food groups) (Mean±SD= 6.96±1.951) and adequate diet (≥5 food groups) (Mean±SD= 8.22±3.923, *t*= -1.988, *p*=0.050). Previous studies found that individuals who received food assistance had improvement in diet quality (Leroy et al., 2020; Zhou & Hendriks, 2017). Zhou and Hendriks (2017) compared the type of assistance received among three groups: food beneficiaries, cash beneficiaries and non-beneficiaries. Individuals who received food assistance are more likely to have a more diverse diet compared to those who receive cash assistance because a small sum of cash received by cash beneficiaries might not be enough to buy diverse food groups (Zhou & Hendriks, 2017). In addition, an individual who is fully dependent on food assistance shows low diet diversity (Heim & Paksi, 2019). Furthermore, some respondents in current study truly depends on food assistance provided by other agencies to ensure sufficient amounts of foods for their household members. Thus,

absence of food assistance might cause food assistance dependents to lose their food source (Heim & Paksi, 2019).

Table 16 Comparison in mean of food items received in 12 months between diet diversity

Diet diversity	Mean of food items received in 12 months		
	Mean ± SD	*t*	*p*
Not adequate (<5 food groups)	6.96±1.951	-1.988	.050
Adequate (≥5 food groups)	8.22±3.923		

4.8 Comparison between diet diversity score and nutrition knowledge

As shown in Table 17, there were no statistically significant difference in diet diversity scores between poor nutrition knowledge (Mean±SD= 5.23±2.06) and moderate to good nutrition knowledge (Mean±SD= 5.56±1.31) as determined by an independent t-test (t=-0.791, p=0.433). Contradicted with previous study by Melesse and Van den Berg (2021) found a significant association between nutrition knowledge and diet diversity scores among respondents living in Addis Ababa, Ethiopia (p<0.001). Likewise, study among Indigenous women in Malaysia found significant association between nutrition knowledge and diet quality (Chong et al., 2019). A caregiver with poor education level due to not receiving any formal education and had illiteracy problems affect nutrition knowledge of individuals as well results in poor diet quality (Norimah et al., 2008). In addition, it is advisable to include 'home economics' subject in order to reduce gap on nutrition knowledge between lower and higher education (Carbonneau et al., 2021). Moreover, shortage of time for preparing healthy meals as well as following food preferences of family members reflects their diet quality (Carbonneau et al., 2021). However, an individual's diet with higher DDS only indicates diverse diet but not indicates the variety of foods within the food groups (Zainal Badari et al., 2012).

In conclusion, an individual who receive education might have a good nutrition knowledge. However, lack of time to prepare for meals or having troubles to follow family members food preferences might as well impact their diet quality.

Table 17 Comparison between diet diversity score and nutrition knowledge

Nutrition Knowledge	Diet Diversity		
	Mean ± SD	*t*	*p*
Poor	5.23±2.06	-0.791	0.433
Moderate to good	5.56±1.31		

Independent t-test, with reported mean ± SD and t value.

4.9 Comparison between diet diversity score and food security

As shown in Table 18, an independent-samples t-test was used to do comparison between diet diversity scores and food security. Furthermore, there was no significant difference in diet diversity scores between food secure (Mean±SD= 5.58±1.402) and food insecure (Mean±SD= 5.35±1.742, t= 0.657, p= 0.513). Yet, Mohamadpour et al. (2012) found there was a significant difference in diet diversity score for food secure (Mean±SD= 11.60±4.13), household food insecurity (Mean±SD= 10.31±3.21), individual food insecurity (Mean±SD= 10.52±3.47) and child hunger (Mean±SD= 9.23±3.36) (p=.025) among Indian women in palm-plantation. Food secure women have higher consumption of a diverse diet compared to food insecure women (Ilhab et al., 2012; Mohamadpour et al., 2012). In addition, mother's perception on food adequacy also contributes to food insecure among households (Mohamadpour et al., 2012) as well mother might compromise own nutrients need for their children (Ilhab et al., 2012).

Several studies mentioned that food insecure adults consumed highly processed food and refined carbohydrates (Ilhab et al., 2012; Seligman et al., 2011) as they focused more on food quantity rather than food quality (Chong et al., 2018). Moreover, strategic geographical areas were important as reported in study among Indigenous women consuming high protein-based

foods as they lived nearest to the river which have better access to protein-based foods such as fishes (Chong et al., 2018). Thus, different geographical areas contribute to different availability of food consumed by individuals.

As a matter of fact, during this pandemic respondents mentioned that they were dependent on food assistance provided by the government and NGO. Majority reported were affected by Covid-19 as they experienced limited resources to support their family and depending on availability of part-time jobs, even though respondents with permanent jobs reported that basic pay was not enough to support costs living in urban areas. Hence, food assistance helps to increase food availability at homes at the same time reduce prevalence of food insecurity coupled with good diet quality.

Table 18 Comparison between diet diversity score and food security status

Food security status	Diet Diversity		
	Mean ± SD	*t*	*p*
Food secure	5.58±1.402	0.657	0.513
Food insecure	5.35±1.742		

CHAPTER 5

CONCLUSION & RECOMMENDATIONS

Diet diversity is a useful indicator to measure diet quality among individuals and an important component to identify an individual nutritional status (FAO, 2010; Ruel, 2003). Current study focusing on several determinants which influence an individual diet diversity among low-income household who received TLFP food assistance resides in low-cost public houses in Klang Valley.

In summary, the findings of this study identified more than half of TLFP recipients were adequate diet diversity even though more than half of respondents were food insecure. In addition, more than half of respondents had moderate to good nutrition knowledge followed by poor nutrition knowledge. Moreover, majority of respondents were satisfied with food assistances provided that consists of staple foods compared to before pandemic which respondents did received vegetables. Furthermore, current study found significant difference in diet diversity scores between household monthly food and drinks expenditures. The findings of this study observed that respondents with higher incomes have a greater purchasing power which enables them to greater access to various foods. On the other hand, current study found that no significance difference in diet diversity scores between others item in sociodemographic characteristics, nutrition knowledge, food assistance and food security status might be due to several limitations when carried out this study. Nutrition knowledge of respondents were good but there is still an intervention needed to ensure the community could improve their knowledge on nutrition.

5.1 Limitations and recommendation of study

Indeed, several limitations were found in current study that should be improved in future studies. First, different data collection methods were carried out during this pandemic due to Conditional Movement Control Order (CMCO) which might contributes to potential bias when collecting data. In particular, to assess an individual food security status through different methods is challenging because some might over-explain their situations or denying current situation. Furthermore, convenience sampling was used in this study might not be useful to represent the population; however, there is no choice left because it is quite challenging to approach respondents during this pandemic. Afterwards, TLFP managements does not record the list of their recipients which cause difficulty in tracking previous recipients. Also, the respondents were unable to differentiate between food assistance provided by TLFP or other agencies.

As for recommendations, several aspects of nutrition knowledge should be focus on future intervention studies to ensure better nutrition knowledge which leads to improvement in diet quality among low-income households. Furthermore, TLFP should have a systematic management starts from having a recorded list of recipients and distribution of food assistance. On top of that, TLFP could try to collaborate more with other donors that could provide fruits and vegetables to encourage Malaysian to include fruits and vegetables in their meals. In addition, TLFP can provide logo or leaflets together with food assistances when distributes to their recipients in order to promote their organization as well to ensure recipients acknowledge the food assistance provided TLFP. Furthermore, perhaps future intervention study could share healthier recipes using foods being provide by TLFP such oats to make an oat cookies which are healthier and tastier.

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APPENDIX 3: Research consent form for respondents

JAWATANKUASA ETIKA UNIVERSITI UNTUK PENYELIDIKAN MELIBATKAN MANUSIA (JKEUPM)
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2.4: PENERANGAN DAN PERSETUJUAN RESPONDEN

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

1.TAJUK KAJIAN

Perbandingan status jaminan kedapatan makanan, status pemakanan dan kualiti hidup berkaitan kesihatan dalam kalangan penduduk Program Perumahan Rakyat (PPR) yang menerima atau tidak menerima bantuan makanan daripada '*The Lost Food Project* (TLFP)' di Lembah Klang, Malaysia.

2. PENGENALAN

'*The Lost Food Project*' (TLFP) adalah organisasi bukan kerajaan yang ditubuhkan pada tahun 2016 untuk mengatasi masalah sisa makanan, kelestarian alam sekitar dan tiada jaminan kedapatan makanan di Malaysia. TLFP berusaha menguruskan lebihan makanan yang masih berkualiti dan berkhasiat dari pasar borong dengan mengagihkan semula makanan dan barangan keperluan lain kepada isirumah yang memerlukan di Projek Perumahan Rakyat (PPR) yang terpilih. Sekiranya lebihan makanan ini tidak diuruskan dengan sebaiknya, ia akan berakhir di tempat pembuangan sampah. Melalui pengagihan semula makanan ini, TLFP bertujuan untuk membantu isirumah berpendapatan rendah bagi mengalihkan sumber kewangan mereka yang sepatutnya digunakan untuk membeli makanan kepada keperluan lain seperti penjagaan kesihatan dan pendidikan.

Dalam kajian ini, penyelidik ingin mengkaji mengenai keberkesanan program TLFP terhadap status tiada jaminan kedapatan makanan, status pemakanan dan kualiti hidup berkaitan kesihatan. Selain itu, kajian ini juga ingin mengkaji perbezaan penerima dan bukan penerima bantuan makanan daripada TLFP dari segi latar belakang sosioekonomi, tahap pengetahuan pemakanan, status tiada jaminan kedapatan makanan, kepelbagaian makanan, ukuran antropometri dan kualiti hidup berkaitan kesihatan. Hasil kajian ini dapat membantu pihak yang melaksanakan program TLFP dalam menambah baik strategi pelaksaaan program disamping membantu menyelesaikan masalah tiada jaminan kedapatan makanan dan mengurangkan masalah pengurusan lebihan dan pembuangan sisa makanan di Malaysia.

Kajian ini juga telah diluluskan oleh Jawatankuasa Etika Universiti Untuk Penyelidikan Melibatkan Manusia, JKEUPM dengan nombor rujukan JKEUPM-2020-455.

3. APAKAH YANG PERLU ANDA LAKUKAN?

Kajian ini akan melibatkan dua perkara yang perlu dilakukan oleh responden iaitu **seorang wanita dewasa atau individu yang menguruskan dan menyediakan makanan dalam satu isi rumah**:

1. Responden perlu menjawab soalan-soalan di dalam borang soal-selidik yang diberikan. Borang soal selidik dibahagikan kepada 7 bahagian yang terdiri daripada latar belakang ekonomi dan demografi, bantuan makanan, pengetahuan pemakanan, status jaminan dapatan makanan, strategi daya tindak tiada jaminan kedapatan makanan, status kesejahteraan hidup, pengambilan diet 24 jam yang lepas dan ukuran antropometri.
2. Jangka masa untuk responden melengkapkan satu set borang soal-selidik adalah 20 minit.

Untuk beberapa bahagian dalam borang soal-selidik yang melibatkan bahagian status tiada jaminan kedapatan makanan dan strategi daya tindak terhadap tiada jaminan kedapatan makanan yang mungkin boleh menyebabkan responden kurang selesa untuk menjawab. Oleh itu, responden diberi pilihan untuk menjawab bahagian tersebut secara temuduga dalam talian atau menjawab secara sendiri dengan dipantau oleh penyelidik atau AJK pelaksana.

Sebelum menyertai kajian ini, responden perlu membaca segala maklumat pada Borang Penerangan dan Persetujuan Responden dan perlu menandatangani borang persetujuan untuk menyertai kajian ini. Penyertaan di dalam kajian ini adalah secara sukarela tanpa paksaan daripada mana-mana pihak dan responden boleh menarik diri sekiranya mereka mahu keluar atau berhenti menyertai kajian ini.

4. SIAPA YANG TIDAK BOLEH MENYERTAI KAJIAN INI?

Responden yang mempunyai masalah dementia.

5. APAKAH FAEDAH MENYERTAI KAJIAN INI?

a) KEPADA ANDA SEBAGAI RESPONDEN?

Penyelidikan yang dilakukan membolehkan responden mengetahui status kesihatan diri melibatkan status berat badan dan status pemakanan serta kualiti hidup berkaitan kesihatan supaya mereka dapat mengekalkan kesihatan diri di tahap yang optimum atau melakukan perubahan yang sepatutnya.

b) KEPADA PENYELIDIK?

Dengan memperolehi maklumat yang lengkap, penyelidik dapat mengkaji keberkesanan program TLFP terhadap status tiada jaminan kedapatan makanan, status pemakanan dan kualiti hidup berkaitan kesihatan. Selain itu, penyelidik juga dapat mengkaji perbezaan penerima dan bukan penerima bantuan makanan daripada TLFP dari segi latar belakang ekonomi dan demografi, bantuan kewangan dan makanan, pengetahuan pemakanan, status jaminan dapatan makanan, strategi mengatasi ketidakdapatan makanan, status kesejahteraan hidup, pengambilan diet 24 jam yang lepas dan ukuran anthropometri responden dalam populasi kajian ini. Ini dapat membantu penyelidik dan agensi yang menguruskan TLFP dapat merancang aktiviti berkaitan pengurusan lebihan makanan dan pembuangan sisa makanan di Malaysia.

6. ADAKAH IA BERISIKO?

Tiada sebarang risiko kepada responden yang menyertai kajian ini.

7. ADAKAH MAKLUMAT DAN IDENTITI SAYA KEKAL RAHSIA?

Segala maklumat yang diberikan adalah sulit dan keputusan yang diperolehi akan dimaklumkan secara keseluruhan.

8. SIAPA YANG SAYA PERLU HUBUNGI SEKIRANYA SAYA MEMPUNYAI SOALAN TAMBAHAN SEMASA MENGIKUTI PENYELIDIKAN INI?

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

_____

(Tandatangan responden)

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 imej/ 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 4: Questionnaire (Malay version)

NO. ID

JABATAN PEMAKANAN

FAKULTI PERUBATAN DAN SAINS KESIHATAN

BORANG SOAL-SELIDIK

TAJUK KAJIAN

PERBANDINGAN STATUS JAMINAN KEDAPATAN MAKANAN, STATUS PEMAKANAN DAN KUALITI HIDUP BERKAITAN KESIHATAN DALAM KALANGAN ISI RUMAH DI PROGRAM PERUMAHAN RAKYAT YANG MENERIMA ATAU TIDAK MENERIMA BANTUAN MAKANAN DARIPADA 'THE LOST FOOD PROJECT' DI LEMBAH KLANG MALAYSIA

PENYELIDIK

PROF. DR. NORHASMAH BINTI SULAIMAN

PROF. MADYA DR. GAN WAN YING

PEMBANTU PROJEK

NUR SYAQIERA BINTI MANSOR

NUR ARINA BINTI BAKERI

TAN SEOK KWAN

□ - □□ - □ - □□□□□

Zon Kawasan Blok No. rumah

TARIKH PENGUMPULAN DATA : ___ / ___ / ___

Borang soal-selidik ini mengandungi 7 bahagian secara keseluruhannya.

BAHAGIAN A: MAKLUMAT DEMOGRAFI DAN SOSIOEKONOMI

A. LATAR BELAKANG RESPONDEN

1. No. Telefon: _____

2. No. Kad pengenalan: _ _ _ _ _ _ - _ _ - _ _ _ _

3. Umur : [ ] Bawah 19 tahun [ ] 20-30 tahun [ ] 31-40 tahun
   [ ] 41-50 tahun [ ] 51-60 tahun [ ] 61 tahun dan keatas

4. Kaum : [ ] Melayu [ ] Cina [ ] India [ ] Lain-lain;_____

5. Jantina : [ ] Lelaki [ ] Perempuan

6. Tinggi : _____ cm

7. Berat : _____ kg

8. Alamat Rumah (lengkap) :

   _____

   _____

   _____

9. Kawasan perumahan:

[ ] PPR Seri Semarak	[ ]PPR Sungai Bonus	[ ] PPR Kerinchi	[ ] Apartment Bukit Tinggi 2
[ ] Apartment Palma Botanic	[ ] Apartment Pendamar Indah 1	[ ] Apartment Pendamar Indah 2	[ ] PPR Desa Rejang
[ ] Flat Negeri Sembilan	[ ] PPR Air Panas	[ ] Perumahan Awam Setapak Jaya	[ ] Flat Pandan Jaya
[ ] Flat Taman Bakti	[ ] Flat Taman Nirvana	[ ] Flat LC940	[ ] Flat Sri Suria
[ ] Flat Taman Muda	[ ] Flat LC700	[ ] Flat LC500	[ ] PPR Kg Limau

[ ]PPR Pantai Ria	[ ] PPR Seri Cempaka	[ ] PPR Seri Pantai	[ ] PPR Seri Anggerik
[ ] PPR Intan Baiduri	[ ] PPR Taman Wahyu	[ ] PPR Batu Muda	[ ]PPR Pekan Batu
[ ] PPR Beringin	[ ] PPR Sri Aman	[ ] PPR Sri Murni	
[ ] Lain-lain;_____			

10. Agama : [ ] Islam [ ] Buddha [ ] Hindu [ ] Kristian
[ ] Lain-lain;_____

11. Taraf perkahwinan: [ ] Berkahwin [ ] Bercerai/ Meninggal [ ] Belum berkahwin

12. Tahap pendidikan:

Responden (Isteri)	*Suami (Tidak perlu diisi sekiranya suami sudah meninggal atau bercerai)*
[ ] Tidak pernah bersekolah [ ] Sekolah Rendah [ ] Menengah Rendah (Tingkatan 3) [ ] Menengah Atas (Tingkatan 5) [ ] Matrik atau Tingkatan 6 (STPM) [ ] Kolej atau Universiti	[ ] Tidak pernah bersekolah [ ] Sekolah Rendah [ ] Menengah Rendah (Tingkatan 3) [ ] Menengah Atas (Tingkatan 5) [ ] Matrik atau Tingkatan 6 (STPM) [ ] Kolej atau Universiti [ ] Tidak berkenaan

13. Jenis rumah: [ ] Sewa beli [ ] Rumah sendiri [ ] Lain-lain;_____

14. Jenis pekerjaan utama:

i. Responden (isteri) : [ ] Bekerja sendiri [ ] Suri rumah [ ] Kerajaan
[ ] Swasta [ ] Pelajar [ ] Bersara

ii. Suami : [ ] Bekerja sendiri [ ] Suri rumah [ ] Kerajaan
[ ] Swasta [ ] Pelajar [ ] Bersara
[ ] Tidak berkenaan

B. MAKLUMAT KELUARGA

1. Bilangan ahli isi rumah : [ ] 2 orang dan kebawah [ ] 3-5 orang [ ] 6-8 orang
[ ] 9 orang dan keatas

2. Bilangan isi rumah yang bekerja: [ ] 2 orang dan kebawah [ ] 3-5 orang [ ] 6-8 orang
[ ] 9 orang dan keatas

3. Bilangan anak yang masih bersekolah:
[ ] Tiada [ ] 1-2 orang [ ] 3-4 orang [ ] 5 orang dan keatas

4. Bilangan ahli keluarga yang menghidap penyakit kronik/kurang upaya (tinggal bersama):
[ ] Tiada [ ] 1-2 orang [ ] 3-4 orang [ ] 5 orang dan keatas

5. Tandakan jenis penyakit kronik/ kurang upaya yang dihidapi
[ ] Kencing manis [ ] Darah tinggi [ ] Sakit jantung [ ] Sakit buah pinggang
[ ] Strok [ ] Asma [ ] Kanser [ ] Obesiti
[ ] Orang kurang upaya seperti kurang upaya pendengaran (DE), penglihatan (BL), pertuturan (SD), fizikal (PH) dan sebagainya
[ ] Lain-lain penyakit, nyatakan;_____

C. MAKLUMAT PENDAPATAN BULANAN

1. Jumlah pendapatan isi rumah (RM) dalam sebulan :

   [ ] RM 1000 dan kebawah

   [ ] RM 1001- RM 2000

   [ ] RM 2001- RM 3000

   [ ] RM 3001-RM 4000

   [ ] RM 4001- RM 4850

   [ ] RM 4851 dan keatas

2. Perbelanjaan makanan dan minuman di DALAM dan LUAR rumah setiap bulan (RM)

   [ ] RM 500 dan kebawah

   [ ] RM 501- RM 1000

   [ ] RM 1001- RM 1500

   [ ] RM 1501 dan keatas

3. Secara keseluruhan, apakah yang anda rasa terhadap kecukupan pendapatan anda sekarang?

   [ ] Mempunyai masalah kerana tidak cukup untuk memenuhi keperluan harian

   [ ] Hanya cukup untuk memenuhi keperluan harian sahaja

   [ ] Cukup untuk membeli semua yang diingini

   [ ] Cukup untuk membeli semua yang diingini dan cukup untuk penyimpanan

BAHAGIAN B: BANTUAN MAKANAN

1. Adakah anda berpuas hati dengan kualiti makanan yang diberikan oleh "The Lost Food Project"?

   [ ] Sangat tidak berpuas hati
   [ ] Tidak berpuas hari
   [ ] Sederhana
   [ ] Berpuas hati
   [ ] Sangat berpuas hati

2. Adakah bantuan makanan yang diterima daripada The Lost Food Project (TLFP) ini membantu anda dan isi rumah anda dari segi bekalan makanan di rumah?

   [ ] Sangat membantu
   [ ] Membantu
   [ ] Sederhana
   [ ] Tidak membantu
   [ ] Sangat tidak membantu

3. Bagaimanakah anda menilai tahap kepentingan bantuan makanan daripada The Lost Food Project (TLFP) terhadap anda dan isi rumah?

   [ ] Sangat penting
   [ ] Penting
   [ ] Sederhana
   [ ] Tidak penting
   [ ] Sangat tidak penting

4. Jika anda ada **menerima bantuan makanan daripada "The Lost Food Project"**, sila tandakan (/) untuk menunjukan kekerapan bagi makanan yang diterima dalam jangka masa 6 bulan.

Makanan yang diterima	Kekerapan Dalam jangka masa 6 bulan				
	Lebih daripada 7 kali	5-6 kali	3-4 kali	1-2 kali	Tiada
1. Beras					
2. Mi, bihun					
3. Tepung					
4. Roti					
5. Biskut					
6. Telur					
7. Gula					
8. Susu (tepung atau cecair)					
9. Susu pekat					
10. Susu formula bayi					
11. Minyak masak					
12. Sayur-sayuran (termasuk sayur daun, batang seperti saderi, akar seperti lobak, ubi seperti kentang, mentol seperti bawang, bunga seperti kobis, kekacang seperti kacang buncis dll) Nyatakan:					
13. Buah-buahan Nyatakan:					
14. Minuman bermalta (Contoh: Milo, Horlick, Oligo, Vico dll)					
15. Minuman berperisa (Contoh: kordial, kopi, teh dll)					
16. Sos (Contoh: Sos cili, sos tomato, kicap dll)					
17. Makanan tersedia (Contoh: Nasi lemak, nasi goreng, kuih-muih)					

BAHAGIAN C: PENGETAHUAN PEMAKANAN

*Arahan: Sila **tandakan** jawapan yang paling tepat pada ruang yang disediakan.*

1. **Diet yang seimbang** perlu mengandungi zat (nutrient) berikut:
   [ ] Karbohidrat dan protein
   [ ] Vitamin dan mineral
   [ ] Karbohidrat, lemak, protein, vitamin dan mineral
   [ ] Karbohidrat, lemak, protein dan mineral
   [ ] Tidak tahu

2. Anda boleh **mendapatkan semua zat (*nutrient*)** yang diperlukan dengan:
   [ ] Memakan banyak sayur-sayuran
   [ ] Memakan banyak makanan
   [ ] Memakan makanan yang mahal
   [ ] Memakan pelbagai jenis makanan
   [ ] Tidak tahu

Adakah anda tahu mengenai **piramid makanan (*food pyramid*)**?

[ ] Ya [ ] Tidak

Jika "Ya", jawab soalan 3&4, dan jika "Tidak" terus ke soalan 5

3. Mengikut piramid makanan (*food pyramid*), kumpulan makanan manakah yang anda boleh **makan secara sederhana**?
   [ ] Sayur-sayuran dan buah-buahan
   [ ] Lemak, minyak, gula, garam
   [ ] Nasi, mi, roti, bijirin, produk bijirin
   [ ] Ikan, ayam, daging dan legum
   [ ] Tidak tahu

4. Megikut piramid makanan (*food pyramid*), kumpulan makanan manakah yang anda dinasihatkan untuk **makan sedikit**:
   [ ] Lemak, minyak, garam, gula
   [ ] Ikan, ayam, daging, legum
   [ ] Susu dan produk tenusu
   [ ] Nasi, mi, bijirin, produk bijirin
   [ ] Tidak tahu

5. Makanan yang **tinggi kandungan garam** ialah:
   [ ] Daging kambing
   [ ] Kicap soya
   [ ] Minuman bergas dalam tin
   [ ] Kangkung
   [ ] Tidak tahu

6. Jenis zat (*nutrient*) yang memberi paling banyak **tenaga (kalori)** ialah:
   [ ] Vitamin dan mineral
   [ ] Lemak
   [ ] Karbohidrat
   [ ] Protein
   [ ] Tidak tahu

7. Jenis zat (*nutrient*) yang **membina badan** ialah:
   [ ] Lemak
   [ ] Vitamin dan mineral
   [ ] Karbohidrat
   [ ] Protein
   [ ] Tidak tahu

8. Antara berikut, makanan manakah yang mengandungi **paling banyak karbohidrat:**
   [ ] Ikan
   [ ] Sayur-sayuran
   [ ] Roti dan biskut
   [ ] Buah-buahan
   [ ] Tidak tahu

9. Di antara berikut, makanan manakah yang mengandungi **paling banyak protein**:
   [ ] Sayur-sayuran
   [ ] Ayam
   [ ] Roti dan biskut
   [ ] Buah-buahan
   [ ] Tidak tahu

10. Makanan yang **kaya dengan vitamin, mineral dan serat/gentian/serabut (fibre)** adalah:
   [ ] Ikan, ayam, daging dan legum
   [ ] Lemak, minyak, garam dan gula
   [ ] Sayur-sayuran dan buah-buahan
   [ ] Nasi, mi, roti, bijirin, produk bijirin
   [ ] Tidak tahu

11. Di antara yang disenaraikan di bawah, makanan **yang paling tinggi kandungan serat/gentian/serabut (fibre)** adalah:
    [ ] Ayam dan daging
    [ ] Susu dan produk tenusu
    [ ] Sayur-sayuran dan kekacang
    [ ] Ikan dan makanan laut
    [ ] Tidak tahu

12. Di antara yang disenaraikan di bawah, makanan yang **paling tinggi kandungan kolesterol** ialah:
    [ ] Daging kambing
    [ ] Santan kelapa
    [ ] Kunig telur
    [ ] Daging lembu
    [ ] Buah durian
    [ ] Tidak tahu

13. Berikut adalah maklumat yang penting dalam sesuatu label makanan **KECUALI:**
    [ ] Cara memasak
    [ ] Nama pengedar/pengeluar
    [ ] Berat atau isipadu produk
    [ ] Bahan-bahan yang digunakan
    [ ] Tarikh luput

14. Senam aerobik (seperti jogging, berbasikal, tarian aerobik, jalan pantas dan berenang) adalah penting untuk:
    [ ] Menguatkan tulang
    [ ] Kecantikan badan
    [ ] Pencernaan makanan
    [ ] Kesihatan jantung
    [ ] Tidak tahu

15. **Indeks Jisim Tubuh** (*Body Mass Index*) adalah satu petunjuk
[ ] Status tinggi badan
[ ] Status berat badan
[ ] Corak pengambilan makanan
[ ] Keadaan darah
[ ] Tidak tahu

16. Cara memasak yang boleh **meningkatkan kandungan lemak** adalah secara:
[ ] Panggang (*roost*)
[ ] Rebus (*boil*)
[ ] Kukus (*steam*)
[ ] Goreng (*fry*)
[ ] Tidak tahu

17. Pengambila **tenaga (kalori) yang berlebihan** akan mengakibatkan:
[ ] Penyakit denggi
[ ] Kegemukan
[ ] Penyakit batuk kering (TB)
[ ] Penyakit kulit
[ ] Tidak tahu

18. **Kegemukan** boleh meningkatkan risiko terhadap penyakit berikut:
[ ] Peyakit batuk kering (TB)
[ ] Penyakit malaria
[ ] Penyakit jantung
[ ] Penyakit denggi
[ ] Tidak tahu

19. Untuk mengelakkan kegemukan dan mengekalkan **berat badan yang unggul** (***desirable body weight***) kita perlu mengimbangkan pengambilan makanan dengan:
[ ] Pengetahuan kita
[ ] Jenis minuman
[ ] Aktiviti fizikal
[ ] Pendapatan kita
[ ] Tidak tahu

20. Risiko apabila **mengambil makanan yang berlebihan gula** ialah:
[ ] Peyakit kencing manis
[ ] Penyakit batuk kering (TB)
[ ] Penyakit darah tinggi
[ ] Penyakit malaria
[ ] Tidak tahu

BAHAGIAN D: STATUS JAMINAN KEDAPATAN PEMAKANAN

*Arahan: Sila **tandakan (/)** jawapan yang paling sesuai bagi setiap kenyataan yang berikut.*

1.	**"Makanan yang (saya/ kami) beli tidak mencukupi, dan (saya/kami) tidak mempunyai wang untuk mendapatkan lebih makanan."** Adakah keadaan ini selalu, kadang-kadang, atau tidak benar untuk (anda/isi rumah) untuk tempoh 12 bulan yang lepas? [ ] Selalu benar [ ] Kadang-kadang benar [ ] Tidak benar [ ] Tidak tahu atau Menolak
2.	**"(Saya/ kami) tidak mampu untuk makan makanan yang seimbang."** Adakah keadaan ini selalu, kadang-kadang, atau tidak benar untuk (anda/isi rumah) untuk tempoh 12 bulan yang lepas? [ ] Selalu benar [ ] Kadang-kadang benar [ ] Tidak benar [ ] Tidak tahu atau Menolak
3.	Sepanjang tempoh 12 bulan yang lepas, adakah (anda/isi rumah dewasa) mengurangkan saiz makanan atau tidak makan kerana tidak cukup wang untuk membeli makanan? [ ] Ya (Terus soalan 3a) [ ] Tidak (Terus soalan 4) [ ] Tidak tahu (Terus soalan 4)

3a.	Jika Ya, berapa kerap perkara seperti ini berlaku? [ ] Hampir setiap bulan [ ] Beberapa bulan tetapi bukan setiap bulan [ ] Hanya 1 atau 2 bulan [ ] Tidak tahu
4.	Sepanjang tempoh 12 bulan yang lepas, adakah anda makan kurang daripada apa yang anda rasa sepatutnya kerana tidak cukup wang untuk membeli makan? [ ] Ya [ ] Tidak [ ] Tidak tahu
5.	Sepanjang tempoh 12 bulan yang lepas, adakah anda pernah kelaparan tetapi tidak makan kerana tidak cukup wang untuk membeli makanan? [ ] Ya [ ] Tidak [ ] Tidak tahu

BAHAGIAN G: PENGAMBILAN DIET 24 JAM YANG LEPAS

Sila tandakan YA ataupun TIDAK di antara contoh makanan yang diambil **dalam tempoh 24 jam yang lepas?**

No	*Jenis makanan*	*Ya*	*Tidak*
1	Jagung, bubur, nasi, mi, roti, atau sebarang makanan yang berasaskan gandum		
2.	Ubi kentang, ubi kayu, ubi keladi atau sebarang makanan yang berasal daripada akar		
3.	Labu, lobak merah, ubi keledek		
4.	Bayam, sawi, kailan, kangkung (Sayuran/ tumbuhan hijau)		
5.	Terung, tomato, bawang, peria		
6.	Mangga, betik, oren, lemon, nenas, aprikot dan 100% jus yang diperbuat daripada buah-buahan ini		
7.	Epal, anggur, manggis, langsat, duku, dokong, durian, ciku		
8.	Hati, jantung, ginjal atau lain-lain organ atau makanan berasaskan darah		
9.	Daging lembu, daging babi, daging kambing, ayam, itik, burung puyuh		
10.	Telur ayam, telur itik, telur burung puyuh atau lain-lain telur		
11.	Ikan segar, ikan kering, kerang, siput, sotong, ketam atau sebarang makanan laut		
12.	Kacang tanah, kacang dhal, kacang hijau atau makanan yang berasaskan kacang (contoh: mentega kacang)		

No	*Jenis makanan*	*Ya*	*Tidak*
13.	Susu, yogurt, keju, dadih atau sebarang produk susu dan tenusu		
14.	Minyak, lemak, mentega atau makanan yang berasaskannya atau digunakan untuk memasak		
15.	Gula, madu, minuman jus bergula, coklat, gula-gula, pastri, kek, biskut		
16.	Rempah-ratus (lada sulah, garam), perasa (kicap, sos cili), kopi, teh, minuman beralkohol		

Adakah **anda** ada mengambil sebarang makanan (makanan berat atau ringan) DI LUAR rumah semalam?

[ ] Ya

[ ] Tidak

Adakah **isi rumah anda** ada mengambil sebarang makanan (makanan berat atau ringan) DI LUAR rumah semalam?

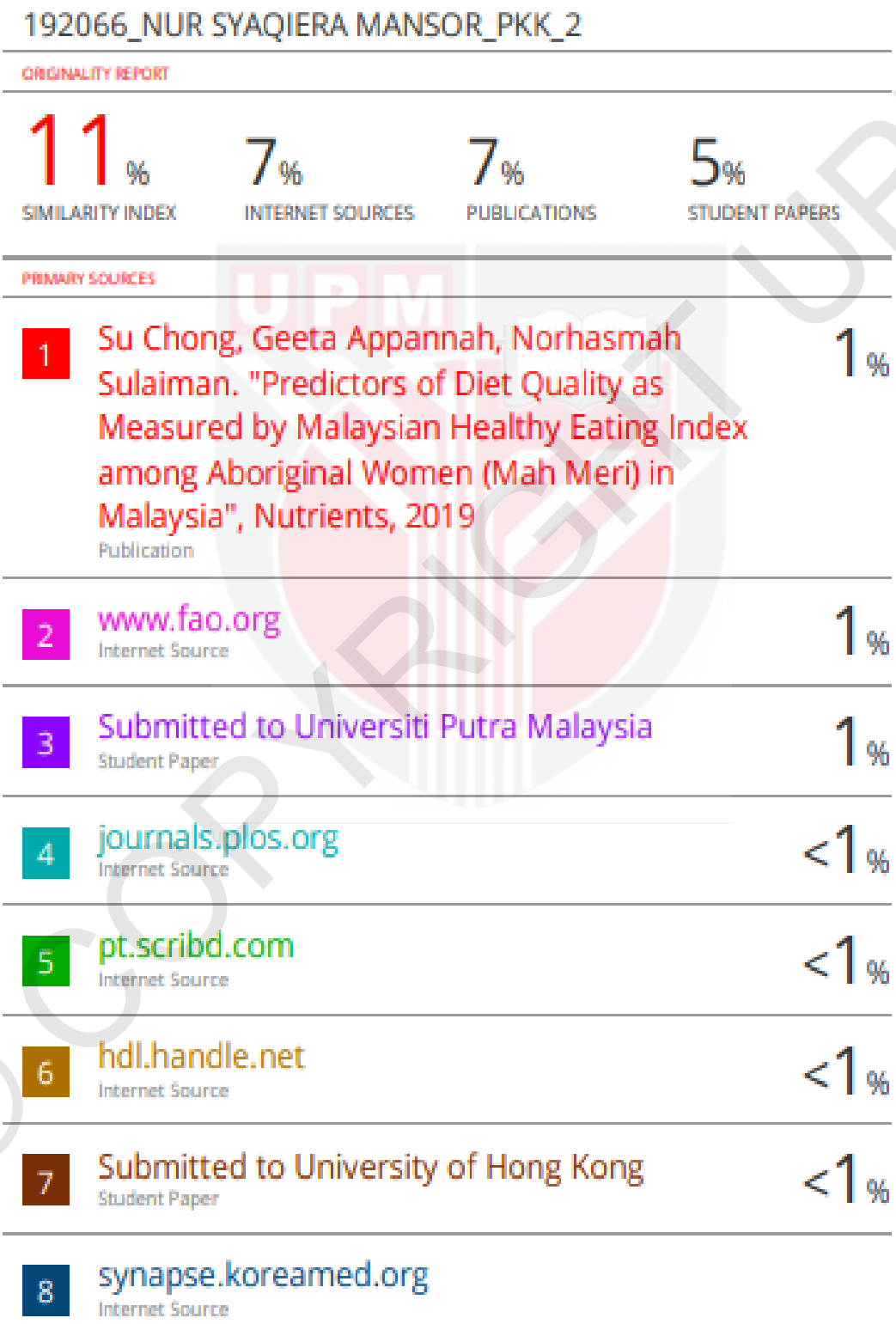
[ ] Ya

[ ] Tidak

SOALAN TAMAT

TERIMA KASIH ATAS KERJASAMA ANDA.

APPENDIX 5: TURNITIN SUMMARY REPORT



192066_NUR SYAQIERA MANSOR_PKK_2

ORIGINALITY REPORT

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1	Su Chong, Geeta Appannah, Norhasmah Sulaiman. "Predictors of Diet Quality as Measured by Malaysian Healthy Eating Index among Aboriginal Women (Mah Meri) in Malaysia", Nutrients, 2019 Publication	1%
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