UNIVERSITI PUTRA MALAYSIA

AWARENESS, KNOWLEDGE AND PRACTICE ON FOOD GUIDE PYRAMID AND PLATE METHOD AMONG DIETETICS AND NUTRITION STUDENTS

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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 Faculty of Medicine and Health Sciences, Universiti Putra Malaysia

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Abstract

AWARENESS, KNOWLEDGE AND PRACTICE ON FOOD GUIDE PYRAMID AND PLATE METHOD AMONG DIETETICS AND NUTRITION STUDENTS

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Food Guide Pyramid and plate method are both meal planning approaches than can be used by nutrition educators (dietitians and nutritionists). The competencies and practices of these tools among nutrition and dietetics students however still unknown. Awareness, knowledge and practice on these two meals planning among dietetics and nutrition students are poorly studied. The objective of this study was to determine the awareness, knowledge and practice on food guide pyramid and plate method among dietetics and nutrition students. A total of 158 dietetics and nutrition students aged 21-26 years, from 6 public universities (UPM, UIA, UKM, USM, UNISZA and UiTM Puncak Alam) were recruited. A self-administered questionnaire was used to obtain socio-demographic background data, awareness, knowledge and practice on food guide pyramid and plate method. The results showed that more than three-quarters of the respondents were aware on food guide pyramid while more than 60% of them were unaware on plate method. Majority (45%) of them had good knowledge on food guide pyramid as compared to knowledge on plate method. Furthermore, about 60% of the respondents able to illustrate correctly food groups on food guide pyramid, while more than 85% of the respondents failed to illustrate the actual proposed meal guide using plate method. Nevertheless, more than 70% of the respondents practice plate method in meal planning although they did not know much about actual proposed meal guide using plate method. There were significant correlations between practice and confidence in using both meal planning tools. As the respondents practice more on meal planning tools, they had more confidence to apply these tools either in nutrition counseling or personalized practice. There was significant correlation between knowledge and confidence in using food guide pyramid and plate method. In conclusion, academic curriculum should be reviewed to emphasize on plate method besides food guide pyramid, to allow the production of competence nutritionists and dietitians for the sake of patients, community and nation.

Abstrak

KESEDARAN, PENGETAHUAN DAN AMALAN PIRAMID MAKANAN DAN KAEDAH PINGGAN *(PLATE METHOD)* DALAM KALANGAN PELAJAR DIETETIK DAN PEMAKANAN

Nur Suhadah binti Rosli

Piramid makanan dan kaedah pinggan *(plate method)* kedua-duanya adalah pendekatan perancangan hidangan yang digunakan oleh pendidik pemakanan (dietetik dan pakar pemakanan). Kebolehan dan amalan penggunaaan kedua-dua jenis alat ini dalam kalangan pelajar dietetik dan pemakanan masih tidak diketahui. Kesedaran, pengetahuan dan amalan kedua-dua alat pendidikan ini kurang dikaji. Objektif kajian ini adalah untuk menentukan kesedaran, pengetahuan dan amalan piramid makanan dan kaedah pinggan *(plate method)* dalam kalangan pelajar dietetik dan pemakanan. Seramai 158 pelajar dietetik dan pemakanan yang berumur 21-26 tahun, dari 6 buah university awam (UPM, UIA, UKM, USM, UNISZA dan UiTM Puncak Alam) telah diambil. Soal selidik telah digunakan untuk mendapatkan latar belakang sosio-demografi, kesedaran, pengetahuan dan amalan piramid makanan dan kaedah pinggan *(plate method.* Hasil kajian menunjukkan bahawa lebih daripada tiga perempat daripada responden sedar mengenai piramid makanan; walaubagaimanapun, terdapat lebih daripada 60% daripada mereka tidak menyedari kaedah pinggan *(plate method).* Kebanyakan (45%) daripada mereka mempunyai pengetahuan yang baik dalam pengetahuan piramid makanan berbanding dengan pengetahuan mengenai kaedah pinggan *(plate method).* Tambahan itu, kira-kira 60% daripada responden dapat menggambarkan kumpulan makanan yang betul pada piramid makanan, manakala lebih daripada 85% daripada mereka gagal untuk berbuat demikian pada kaedah pinggan *(plate method).* Walaubagaimanapun, lebih daripada 70% daripada mereka mengamalkan kaedah pinggan *(plate method)* walaupun pengetahuan mengenai kaedah pinggan *(plate method)* kurang. Terdapat hubungan yang signifikan di antara amalan dan keyakinan menggunakan kedua-dua alat perancangan makanan ini. Sekiranya responden mengamalkan piramid makanan dan kaedah pinggan, mereka mempunyai keyakinan yang lebih baik dari segi kaunseling pemakanan atau amalan dalam kehidupan seharian. Terdapat hubungan yang signifikan antara pengetahuan dan keyakinan dalam menggunakan piramid makanan dan kaedah pinggan. Kesimpulannya, kurikulum dari segi akademik perlu diberi penekanan kepada kaedah pinggan selain piramid makanan, untuk menghasilkan pakar pemakanan dan dietetik yang berkebolehan demi kepentingan pesakit, masyarakat dan negara.

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

Food Guide Pyramid and dietary guidelines are common nutrition tools used to educate public about diet, nutrition and health (Lachance & Fisher, 2005). Despite its long-history of invention and wide coverage as one of the most recognized nutrition education tools globally, a major drawback of the pyramid is reflected, in calorie differences or nutrient densities of various foods within each grouping was not clearly distinguished. In addition, Food Guide Pyramid has been subjected to criticism as a culprit in obesity epidemic (Goldberg et al., 2004). As such, other meal planning tools including plate method has been suggested.

Plate method on the other hand is less recognized as compared to Food Guide Pyramid. It is however gaining more popularity when more countries including United States Department Agriculture (USDA) replaced their long-history icon, MyPyramid with MyPlate

in 2005.The key MyPlate characteristics are simplicity and practicality (United States Department of Agriculture, 2011b). It presented significant differences from previous food guides, such as the removal of a human being demonstrating physical activity and the pyramid shape (Haven et al., 2006).

MyPlate is inherently simpler than MyPyramid. It is a method of portioning the plate to include all the food groups in healthy proportions embedded colourful icon of a sectioned plate emphasizing proportions of fruits, vegetables, grain, protein and dairy food groups. It is believed that the use of MyPlate will prompt people to think about serving a more balanced and healthful plate at meals, with particular attention on vegetables and whole grains (Bachman et al., 2008; Casagrande et al., 2007; Post, Haven & Maniscalco, 2011 & Serdula et al., 2004). Although this method is simplistic and easy to understand, it is primarily based on the American food culture and may not be easy to use in other cultures (Kim, 2013). Hence, various countries have food guidance systems and plate method based on their food supply and cultural food preferences.

Other than Myplate, there is another healthy plate that can be applied, called Idaho Plate Method.The Idaho Plate Method (IPM) is a simple meal-planning instrument used to educate people with diabetes about meal planning (Kaiser et al., 2009). Diabetes educators have found that meal planning can be complicated for many individual with diabetes. In 1987, Swedish dieticians designed a visual way to teach diabetes meal planning and called it the Swedish Plate Method (University of Idaho Extension, 2009). In 1990s, a group of Idaho dietitians modified this method to meet the nutritional guidelines of the American Diabetes Association and the Academy of Nutrition and Dietetics, renaming it the Idaho Plate Method

(University of Idaho Extension, 2009). In addition, the IPM uses low literacy illustrations, colour-coding and basic numeracy to teach meal planning and portion control, and has been recommended for people who have diabetes with low health literacy (Idaho Plate Method, 2011).

All of these nutrition education tools still remain a viable and relevant nutrition education tool, especially when used by dietetics professionals and nutritionists in the context of individualized, comprehensive nutrition education and behaviours modification interventions. The key concepts by Food Guide Pyramid and plate method are important guidelines on which Malaysian people should base their diet and nutrition interventions based on overall dietary pattern were advocated. The competencies and practices of these tools among dietetics and nutrition students however remain unknown. Hence, it is essential to ascertain the awareness, knowledge and practice on food guide pyramid and plate method among the dietetics and nutrition students.

1.2 PROBLEM STATEMENT

The food pyramid remains as a useful tool in promoting healthy dietary pattern among Malaysians (Tee, 2011). Eating pattern and lifestyles had changed drastically over the last decades among Malaysians however, which may have corresponding to the increasing prevalence of diet-related chronic diseases and obesity (Tee, 2011), and prompt the need for an alternative meal planning approach, for example plate method. However, to the best of the researcher's knowledge, there is no data available delineating the acceptance level of food pyramid and plate method among Malaysian.

According to a study conducted by Norimah et al. (2010), although the first Malaysian Dietary Guidelines was published 10 years ago, it has unfortunately about 63% of the respondents from 773 adults (aged between 18 to 59 years) in Kuala Lumpur were not aware of its existence. The majority of the subjects had difficulty understanding the key words and key messages from the food pyramid (Norimah et al., 2010). Similar results were reported by studies in United States whereby two-thirds of Americans did not know the existence of their Dietary Guidelines (Derby & Levy, 1996; Keenan et al., 2002). According to Loughrey et al. (2001), to have a successful nutrition education strategy, for example, disseminating dietary messages, an abstract nutrition concept should be changed to a practical and doable action so that the messages can be easily identified by the community. In addition, key messages should be simple, short and food based to ensure getting across to the community effectively (Stuart &Achterberg, 1997; Abu Sabha, 1998).

Food Guide Pyramid and plate method both are sources of information on healthy eating that are used by nutrition educators. The competencies and preferences of these tools in counselling however were poorly studied. It was also timely to assess the awareness and knowledge among the future nutrition educators on the method used for dietary planning. According to United Kingdom Nutrition Society (2007), the roles of nutritionist are to elicit, integrate, disseminate and apply scientific knowledge drawn from the relevant sciences, to promote an understanding of the effects of nutrition and to enhance the impact of food on health and well-being of people. Meanwhile, dieticians are nutrition professionals to be statutorily regulated and governed by an ethical code to ensure that they always work to the highest standard (American Dietetic Association, 2002). Hence, it was essential to ascertain the awareness, knowledge and the use of Food Guide Pyramid and plate method in meal planning among the dietetics and nutrition students.

1.3 SIGNIFICANCE OF STUDY

The lifestyles of the population will continue to change and with this, the dietary habits and pattern will also change. All of these changes will also affect the profession of nutrition educators that need to change the focus, content and teaching expectations for lessons. Use of the food pyramid will also require changes in the way the concepts of good nutrition are related to different audiences or people. Therefore, from this study, the future nutrition educators (dietitians and nutritionists) will have a better understanding of the role of diet in the prevention and treatment of certain diseases. In addition, they will get a better

understanding in improving strategies for the community to reduce the burden of diseases in Malaysia.

In addition, the innovative nutrition intervention including education, counselling and behaviour modification are needed at the individual, family, community and public health levels (Goldberg, 2004). Thus, the future nutrition educators that will work in nutrition aspects, food service, research, education and communication can use and apply all of the information of food pyramid and plate method as nutrition tools in their effort to improve public health. Form this study; it is hope that the respondents could acknowledge their competencies on Food Guide Pyramid and plate method, which are important tools in dietary planning.

On the other hand, this study will also add to the existing body of knowledge regarding the awareness, knowledge and practice on food pyramid and plate method among dietetics and nutrition students. From that, it will be served as a baseline data for future research work towards in improving healthy meal planning.

1.4 RESEARCH QUESTIONS

1. What is the awareness on food guide pyramid and plate method among the respondents?
2. What is the knowledge on food guide pyramid and plate method among the respondents?
3. What is the confidence in using food guide pyramid and plate method in meal planning among the respondents?
4. What is the practice on food guide pyramid and plate method among the respondents?
5. What is the mean difference on knowledge score between food guide pyramid and plate method among the respondents?
6. What is comparison on confidence level in using food guide pyramid and plate method during diet counselling?
7. What is the relationship between socio-demographic background, awareness, knowledge, confidence in using food guide pyramid and plate method and practice on food guide pyramid and plate method among the respondents?
8. What is the relationship between self-perceived awareness and knowledge on food guide pyramid and plate method among the respondents?
9. What is the relationship between knowledge and confidence in using food guide pyramid and plate method among the respondents?

1.5 OBJECTIVES

General Objective:

- To determine the awareness, knowledge, and practice on Food Guide Pyramid and plate method among dietetics and nutrition students

Specific Objectives:

1. To determine the socio-demographic background (age, sex, ethnicity, university attended, program studied and academic year) of the respondents
2. To determine the awareness on food guide pyramid and plate method among the respondents
3. To determine the knowledge on food guide pyramid and plate method among the respondents
4. To determine the confidence in using food guide pyramid and plate method in meal planning among the respondents
5. To determine the practice on food guide pyramid and plate method among the respondents
6. To compare the knowledge score on food guide pyramid and plate method among the respondents
7. To compare the confidence level in using food guide pyramid and plate method during diet counselling among the respondents
8. To determine the relationship between
    a. socio-demographic background and practice on food guide pyramid or plate method among the respondents
    b. self-perceived awareness and practice on food guide pyramid or plate method among the respondents

c. knowledge and practice on food guide pyramid or plate method among the respondents

d. confidence in using food guide pyramid or plate method and practice on food guide pyramid or plate method among the respondents

e. self-perceived awareness and knowledge on food guide pyramid or plate method among the respondents

f. knowledge and confidence in using food guide pyramid or plate method among the respondents

1.6 HYPOTHESES

H_o 1: There is no significant mean difference in knowledge score between food guide pyramid or plate method among the respondents

H_o 2: There is no significantdifference in confidence level between food guide pyramid and plate method among the respondents .

H_o 3: There is no significant correlation between self-perceived awareness and practice on food guide pyramid or plate method among the respondents

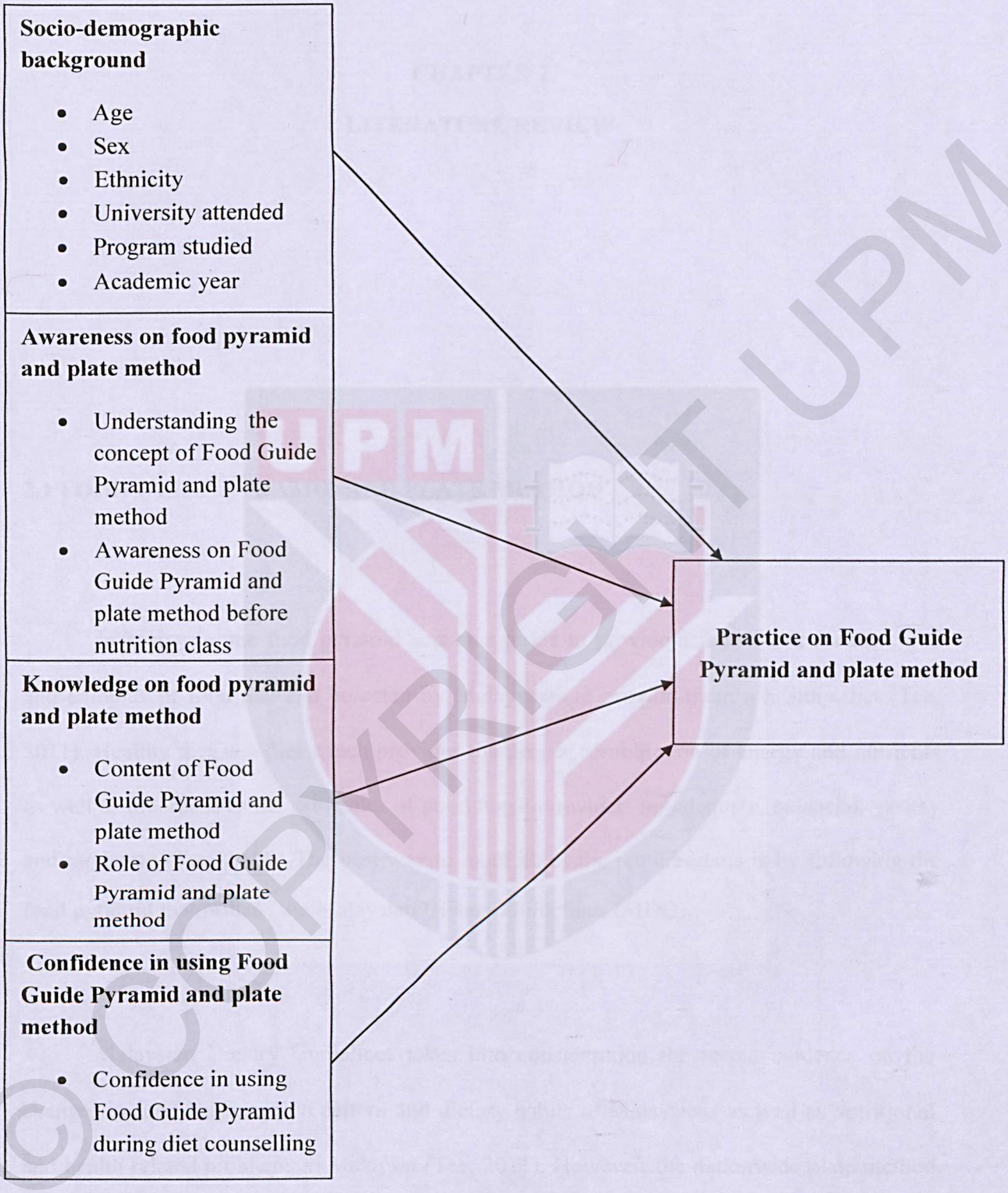
H_o 4: There is no significant correlation between knowledge and practice on food guide pyramid or plate method among the respondents

H_o 5: There is no significant correlation between confidence in using food guide pyramid or plate and practice on both tools among the respondents

H_o 6: There is no significant correlation between self-perceived awareness and knowledge on food guide pyramid or plate method among the respondents

H_o 7: There is no significant correlation between knowledge and confidence in using food guide pyramid or plate method among the respondents

1.7 CONCEPTUAL FRAMEWORK



CHAPTER 2

LITERATURE REVIEW

2.1 FOOD GUIDE PYRAMID AND PLATE METHOD

In Malaysia, the food pyramid acts as a guide to provide a framework for the types and amounts of food that can be eaten by Malaysians to provide them a healthy diet (Tee, 2011). Healthy diet is a diet which provides the proper combination of energy and nutrients as well as incorporates the principles of good nutrition which are adequate, balanced, variety and moderate (Tee, 2011). The best way to meet all of the requirements is by following the food pyramid that reflects the Malaysian Dietary Guidelines (MDG).

Malaysian Dietary Guidelines takes into consideration the recent evidence on the changes in food consumption pattern and dietary habits of Malaysians as well as nutritional and health related problems in Malaysia (Tee, 2011). However, the nationwide plate method approach in meal planning is not available. The My Healthy Plate, modified from Idaho Plate

Method, with its initial aim to assist individual with diabetes in meal planning was the first published material on the plate method concept.

2.2 AWARENESS ON FOOD GUIDE PYRAMID AND PLATE METHOD

Dourish and Bellotti (1992) stated that "awareness is an understanding of the activities of others, which provides a context for your own activity.Research showed that the availability of awareness support improves the effectiveness of how information was spread in communities (Loevstrand, 1991) and positively influenced social interactions taking place in those communities (Gross, Stary & Totter, 2005).

A study examining consumer's knowledge and understanding of the 1995 Dietary Guidelines for Americans found that 55% was not aware that there was a policy on nutrition (Keenan, AbuSabha & Robinson, 2002). It has reported that women, higher educated and younger adults were more likely to be aware of dietary guidelines compared to their counterparts (Food & Drug Administration, 2008). However, even if individuals were aware of dietary guidelines, studies showed that familiarity does not equal comprehension (Hendrie, Coveney & Coy, 2008; Tuttle, 2001) nor compliance (Söyler & El, 2009).

From Wright and Wang (2011), they reported that awareness of federal dietary guidance was an indicator of whether adoption of the recommended behaviours was likely. Awareness had suggested as a prerequisite to behaviour change (Contento et al., 1995), and

this was indicated by the reporting of a Chilean Internet study intervention, which implied that the provision of information improved awareness both of the 1997 FBDG or food guide and willingness to change diet (Albert, 2007). However, the reality of the relationship between awareness and behaviour change is complicated by many other factors such as liking and preference, which can be differentially affected by awareness. For example, in Baja Californian, focus group study reported that participants consciously stated that they were more familiar with the Pyramid food guide, yet they preferred the Apple food guide, stating that it was more attractive, colourful and clearer to identify foods and food group servings (Jime´nez, Bacardı´ & Jones, 1996).

In contrast, a United Kingdom (UK) study compared ten food guide versions during the development of the UK Balance of Good Health plate (1994) (Health Education Authority, 1994) and found that those who had previously seen food guide pyramid, (unconscious/conscious) were more likely to display a preference for the shape they were exposed to compared with the control group who had not seen any guides. It was hypothesised that preference, or familiarity, for a guide may affect an individual's ability to extract the guide's key information either by being more likely to notice and recall information or by familiarity, leading to loss of attention to the information (Hunt, Gatenby & Rayner, 1995). However, the measurement and definition of the concept awareness was not always clear, and the terms of familiarity, awareness and knowledge were used both interchangeably and differentially across studies (Brown et al., 2011).

The level of awareness on food guide pyramid and plate method varied widely across the countries. In the United States, about 80.6% awareness on USDA Food Pyramid was

reported using data from the National Health and Nutrition Examination Survey (NHANES 2005–2006) (Wright & Wang, 2011). Similarly, in Chile, more recent focus group data indicated that Chilean schoolchildren were aware of the Chilean Food Guide Pyramid (Chile FGP) (Albert, 2007).

On the other hand, studies from other countries reported a lower awareness of a national food guide. For example, among Japanese adults, awareness of two versions of the Japanese food guide was 56.0% in 2007 and 61.8% in 2009 (Takaizumi et al., 2012). In addition, in New Zealand, focus groups and key informant interviews in 1998 indicated that older people, parents, children and adolescents had limited awareness of the food-based dietary guidelines (FBDG) with only small proportion of participants appeared to have seen the official FBDG-related education booklets (Geiger, 2001; Trustin & McCracken, 1998). With only one third of Americans was aware on Food Guide Pyramid in 1994, this percentage had significantly increased to 43% in 1995 and approximately two-thirds in 1997 (American Dietetic Association (ADA), 1997; Kennedy, 1995).

Besides that, surveys with grocery shoppers in 2000 showed that 75% were 'somewhat/very familiar' with the Food Guide Pyrmaid (Davis, Britten & Myers, 2001). In a study by Uruakpa et al. (2013), about 50% of the participants in US reported they were aware that Myplate replaced MyPyramid, but they were unfamiliar with MyPlate guidelines. In Malaysia, a cross-sectional study conducted by Norimah et al. (2010) among Malaysian adults showed that they were more familiar with the food pyramid of Malaysia compared with the messages incorporated into the Malaysian Dietary Guidelines (MDG). However, there was no data available in terms of awareness among students in Malaysia and the

acceptance level of food pyramid and plate method among Malaysians was also not well studied.

2.3 KNOWLEDGE ON FOOD PYRAMID OR NUTRITION KNOWLEDGE

Adequate and correct knowledge about healthy diet was a prerequisite for individual to adopt a healthy dietary behaviour with subsequent dissemination of the acquired knowledge to their parents, relatives and friends (Al-Almaie, 2005). The knowledge of nutrition guidelines plays a vital role in improving food choices and subsequently better health status. Study by Sajwani et al. (2009) found that health sciences students had a superior level of knowledge on health issues regarding diet, lifestyles and exercise compared to non-health science students. Despite a higher knowledge score among the respondents from the health science program, there was no significant difference found between health sciences and non-health sciences students on effort to eat healthy foods (Fatima & Alshammary, 2013). Thus, nutrition knowledge may not translate or apply into practice.

In study by Kolodinsky et al. (2007), there was significant differences in nutrition knowledge score for the consumption of fruit, dairy products, protein and whole grain. Moreover, when asked about individual food choices, nutrition knowledge was related to making more healthful choices in every case. It appears that when posed with a question about a specific type of food, students were able to use their knowledge to make a healthful choice (Kolodinsky et al., 2007). Hence, nutrition education was part of a comprehensive

plan to help improve the dietary choices of people including college students, who eat away from home (Keystone Forum, 2006).

On the other hand, knowledge on food guide pyramid among non-nutrition students from UNIMAS, Sarawak was found low by Aung et al. (2012). They reported that only 33% of them knew the recommended daily serving size and food group which mention in food guide pyramid. This may be explained by the fact that they did not apply the knowledge in daily lives as knowledge alone was not sufficient to make healthy eating changes (Aung et al., 2012).

2.4 CONFIDENCE IN USING FOOD GUIDE PYRAMID AND PLATE METHOD

Confidence is the belief in one's own ability to succeed in one's efforts and achieve one's goals (Rosenberg & Kaplan, 1982). Self-confidence is the generalized trait of self-efficacy describing one's overall evaluation of ability rather than judgements regarding specific tasks. For example, a student who was self-confident believes she/he was competent to practice food guide pyramid or plate method since she/he already given the knowledge and training to do so.However, there was limited published data that measured confidence level in using food guide pyramid and plate method among people.

2.5 PRACTICES ON FOOD PYRAMID AND PLATE METHOD

The Food Guide Pyramid became widely distributed during the later 1990s as an educational tool. The effort to promote using Food Guide Pyramid was forceful and the Food Guide Pyramid could be found on posters, on food packaging, in classroom and in health clinics (Davis, Britten & Myers, 2001). In addition, the use of food pyramid or food guides was also became popular in other countries since this tool was needed to develop healthy diet among the populations. In United States, although it had reported that US Food Guide Pyramid was widely recognized and its concept of variety and moderation was understood, detailed information was less understood (Britten et al., 2006) and the majority of those who had heard of Food Guide Pyramid did not continue to use it (International Food Information Council, 2010).

Meanwhile, a quantitative Food Marketing Institute trends data survey reported that 27 % of US shoppers said they used Food Guide Pyramid information to make changes in their food purchase (Guthrie, Derby & Levy, 1999), and another survey reported that only 13 % of those sampled said they used the DGA (Campbell, 1996). From the limited information available in the papers reviewed on practice of food guides, it appears that Food Based Dietary Guidelines (FBDG) and food guides were minimally used by consumers (Brown et al., 2011). In addition, there was no data available of usability of plate method among Malaysian.

CHAPTER 3

METHODOLOGY

3.1 STUDY DESIGN

This was a cross-sectional study that aimed to determine the awareness, knowledge and practice on food guide pyramid and plate method among dietetics and nutrition students.

3.2 STUDY LOCATION

This study was conducted among interns studying nutrition or dietetics program at public universities in Malaysia. There were twenty public universities in Malaysia, but only six of them offered nutrition and dietetics courses which were Universiti Putra Malaysia (UPM), Serdang, Universiti Kebangsaan Malaysia (UKM), Kuala Lumpur, Universiti Sains Malaysia (USM), Kubang Kerian, Universiti Islam Antarabangsa (UIA), Gombak, Universiti Teknologi Mara (UiTM), Puncak Alam and Universiti Sultan Zainal Abidin (UniSZA),

Terengganu. Through simple random sampling, UPM, UKM, UIA, USM, UiTM and UniSZA were selected as the study location.

3.3 SAMPLING

As shown in Figure 1, multi-stage sampling was used in this study. Firstly, a list of public universities in Malaysia was obtained and all of the universities that offered nutrition and dietetics courses was identified.

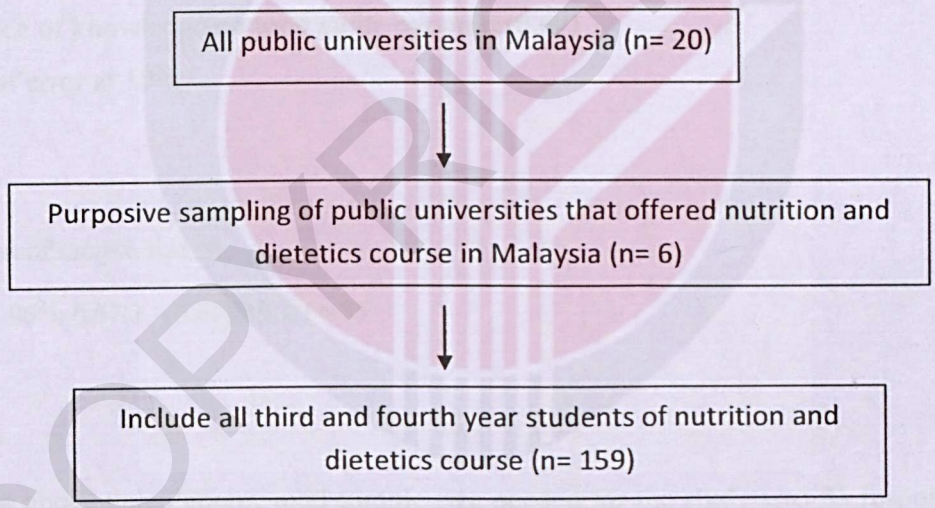


Figure 1: Flow chart of sampling design and selection of respondents

Purposive sampling was used to select six out of twenty public universities. This was because only these six universities offered courses of nutrition and dietetics that met the inclusion criteria of this study.

3.4 SAMPLE SIZE

According to Aung et al. (2012), about 67% of the students form UNIMAS, Sarawak not knew the recommended daily serving size that mention in Food Guide Pyramid.

The sample size calculation is shown below:

$$n = z^2_{(1-\alpha/2)} \times p(1-p)/d^2$$

(Cochran, 1977)

n = required sample size
z = confidence level at 95%
p = prevalence of knowledge on food guide pyramid (0.67)
d = margin of error at 10%

The estimation of sample size is:

$$n = 1.96^2 \times 0.67(1 - 0.67)/ (0.1^2) = 85$$

Based on the above calculations, total sample size needed for the study was 85 respondents. The sample size was added for the additional 30% to avoid any missing data or unwilling participation and 111 of nutrition and dietetics students were expected to be recruited. However, the study was able to get **158 of nutrition and dietetics students**.

3.5 SUBJECTS

A list of inclusion and exclusion criteria was used to identify subjects' eligibility as shown in **Table 1** below. Students who met the study criteria were invited to participate in the study.

Table 1: Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
• Male or female • Third and final year students of nutrition, dietetics or nutrition and dietetics (both courses)	• Other courses offered in university

3.6 STUDY APPROVAL

Ethical approval was obtained from the Research Ethics Committee of Faculty Medicine and Health Sciences, Universiti Putra Malaysia. Information sheet that explained about the study was given to students. Written informed consent was also obtained by all subjects.

3.7 MEASUREMENTS

3.7.1 Study Variables

Dependent Variables

Dependent variable for this study wasthe practice on food pyramid and plate method.

Independent Variables

Independent variables for this study was socio-demographic background, awareness on food pyramid and plate method, knowledge on food pyramid and plate method and confidence in using food guide pyramid and plate method among nutrition and dietetics students.

3.7.2 Study Instruments

Questionnaire

A set of pre-tested self-administered structure questionnaire was used to ascertain information on socio-demographic background, awareness on food guide pyramid and plate method, knowledge on good guide pyramid and plate method as well as practices on both nutrition education tools.

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(A) Socio-demographic background

There was seven items to be included in socio-demographic background. Respondents need to fill in his/her age, date of birth, sex, ethnicity, university attended, course and academic year.

(B) Awareness on Food Guide Pyramid and plate method

Several questions were self-developed to determine the awareness of subjects on food guide pyramid and plate method. These includes subjects' understanding of the concept on food guide pyramid and plate method, their awareness on food guide pyramid and plate method before nutrition class and sources of information regarding meal planning using food guide pyramid and plate method. In awareness part, respondents were given three choices of answer which were yes, no and unsure. For the positive answer, the respondents got 2 point, 1 point for negative answer and 0 point for unsure.

(C) Knowledge on food pyramid and plate method

A series of questions were adopted from Uruakpa et al. (2013) and Fatima and Alshammary (2013) and used to determine knowledge on food guide pyramid and plate method among the respondents; example, number of food groups comprised in Food Guide Pyramid, number of servings for fruits or starch or vegetables in Food Guide Pyramid, amount or quantities recommended for fruits or vegetables or starch or protein in plate method, complete the food pyramid given and so on. The questions

were constructed as score 2 for right answer, 1 for wrong answer and 0 for unsure answer.

(D) Confidence in using food guide pyramid and plate method

To address confidence in using food guide pyramid and plate method during diet counselling, respondents were requested to choose 5 point of likert scale; poor, fair, moderate, good and excellent. Each of the likert scale that the respondents choose was given marks.

(E) Practice on food guide pyramid and plate method

In terms of practice, respondents were requested to choose more that one of the statements that includes; "I take care of my diet by reducing high fat and high sugar foods, "I always use food pyramid when planning the meals" and so on. Besides that, respondents were also asked regarding their practices on food guide pyramid and plate method in meal planning and the frequency of using food guide pyramid and plate method in meal planning. Each of the questions that the respondents choose was given marks.

3.8 PRE-TESTING

A pre-test was carried out among 17 final year students of nutrition from UPM and they were randomly selected to test the questionnaire and the ability of the respondents to complete the questionnaire.However, all of these students were not be included in the sample of the study.

Some errors and ambiguity in the questionnaire was identified and the changes were being made before the data collection starts.

3.9 DATA COLLECTION PROCEDURES

This study was conducted from February to March 2015. It was facilitated by lecturers or course coordinator in each of the university. Sufficient copies of self-administered questionnaire, informed consent and information sheets were posted to the respective lecturers in order to be given to respondents. Subjects were received a token for their participation upon the completion of data collection.

4.0 DATA ANALYSIS

IBM SPSS Statistics version 20 was used for data analysis. Descriptive statistics was used to describe variables such as sex, ethnicity, courses, and awareness on food pyramid and plate method, knowledge on food pyramid and plate method, confidence in using food guide pyramid in meal planning and the practice on food guide pyramid and plate method. Pearson Product-Moment Correlation was used to determine the significant relationship between continuous variables and chi-square was used to determine the significant different between categorical variables. Besides, Independent T-test was also used to determine the differences of mean score for knowledge on food guide pyramid and plate method. A statistical level of $p < 0.05$ was considered as significant.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 SOCIO-DEMOGRAPHIC BACKGROUND

Out of the 158 respondents, 89.2% were female and 10.8% were male. About 70% of the respondents were Malay, 24% were Chinese, 2.5% were Indian and 1.3% of other ethnicities. Age ranged from 22 to 26 years with mean of 23 years old. The majority of the respondents were from Universiti Putra Malaysia (UPM) and Universiti Kebangsaan Malaysia, (UKM), Kuala Lumpur. There were approximately 20% of the respondents from Universiti Islam Antarabangsa (UIA), Kuantan, 17% from Universiti Zainal Abidin (UniSZA), Kuala Terengganu, 8% from Universiti Sains Malaysia (USM), Kubang Kerian and 2% from Universiti Teknologi Mara (UiTM), Puncak Alam, respectively.

All respondents were either from dietetics (79.7%),nutrition (18.4%), or both programs (1.99%). There was slightly higher proportion of third year students (56.3%) compared to fourth year students (43.8%). Socio-demographic background of respondents is presented in Table 2 below.

Table 2: Socio-demographic background

Variables	n	%	Mean ± SD
Sex			
Male	17	10.8	
Female	141	89.2	
Ethnicity			
Malay	114	72.2	
Chinese	38	24.1	
Indian	4	2.5	
Others	2	1.3	
Age (year)			22.96 ± 0.94
21 years	4	2.5	
22 years or older	154	97.5	
University Attended			
UPM, Serdang	44	27.8	
UKM, KL	42	26.6	
UIA, Kuantan	30	19.0	
UniSZA, Kuala Terengganu	27	17.1	
USM, Kubang Kerian	12	7.6	
UiTM, Puncak Alam	3	1.9	
Course			
Nutrition	29	18.4	
Dietetics	126	79.7	
Nutrition & dietetics	3	1.9	
Academic year			
Third year	89	56.3	
Fourth year	69	43.7	

4.2 AWARENESS ON FOOD GUIDE PYRAMID AND PLATE METHOD

The awareness on food guide pyramid and plate method among respondents is presented in Table 3. In terms of awareness, more than three quarters of the respondents were aware on food guide pyramid even before attending the introductory level of food guide pyramid in nutrition or dietetics course. This was encouraging when compared to approximately two-third of the respondents who were not aware on plate method before attending the introductory level of plate method in nutrition or dietetics course. Meanwhile, approximately one in five respondents were aware of plate method before attending nutrition class.

A current finding by Wright and Wang (2011) reported that about 80.6% of their respondents were aware on USDA Food Pyramid which was aligned with Uruakpa et al. (2013). On the other hand, 63% of Malaysian adults were reported not aware on the existence Malaysian Dietary Guidelines (MDG) (Norimah et al., 2010). The study also found that more than 80% of the respondents perceived themselves as having good understanding for both food guide pyramid and plate method. Despite self-perceived good awareness on food guide pyramid and plate method, only approximately 60% of the respondents aware that plate method had replaced food guide pyramid in the US. However, the proportion of respondents in this study who were aware that plate method had replaced food guide pyramid in the US was higher than the 50% as reported by Uruakpa et al. (2013).

Table 3: Awareness on Food Guide Pyramid and plate method among respondents

Variables	n	%
Aware on **food pyramid** before attending nutrition class		
Yes	121	76.6
No	19	12.0
Unsure	18	11.4
Self-perceived understanding on **food pyramid** in meal planning		
Fair	1	0.6
Moderate	18	11.4
Good	86	54.4
Excellent	44	27.8
Aware on **plate method** before attending nutrition class		
Yes	33	20.9
No	105	66.5
Unsure	20	12.7
Self-perceived understanding on **plate method** in meal planning		
Poor	2	1.3
Fair	3	1.9
Moderate	23	14.6
Good	87	55.1
Excellent	43	27.2
Aware that **plate method** had replaced food pyramid in US		
Yes	95	60.1
No	36	22.8
Unsure	27	17.1

4.3 KNOWLEDGE ON FOOD GUIDE PYRAMID AND PLATE METHOD

As presented in Table 4, only 13.3% of the respondents know that the first Malaysian food guide pyramid was develop in 1992 which almost all the respondents answered correctly that food guide pyramid aims to educate people on food groups that make up a healthy diet. More than 40% of the respondents failed to acknowledge the total number of food groups comprised in food guide pyramid. On the other hand, only 1.9% of the respondents had difficulty to answer that most of the food calories should come from carbohydrate group instead of protein group.

Out of 158 respondents, about 70.3% answered correctly on statement, "The maximum number of servings of vegetables that we should have is 5 servings per day". Meanwhile, for the next statement, "Legumes and beans are great sources of protein", more than 85% of the respondents answered it correctly. Despite the widespread coverage on the necessity to comprise of food items from the entire food group in our meal, there were still some 6% of respondents unable to tell the correct answer. In the study, the respondents were asked to complete the illustration of food guide pyramid with appropriate food groups and servings size where 60% of respondents was found to answered it correctly.

A total of 60% of the respondents were able to tell that protein and carbohydrate are the two food groups that balanced occupied on the plate according to plate method and approximately 80% of the respondents answered correctly that plate method is divided into

sections of 5 food groups. There were 30% of the respondents felt that the plate method can only be applied for lunch and dinner. A similar proportion of the respondents answer correctly on the sizes of plate method.

While 60% of the respondents able to illustrate correctly food groups on food guide pyramid, more than 85% of the respondents failed to illustrate the actual proposed meal guide using plate method. Hence, in general, despite respondents perceived plate method is more practical in meal planning, respondents' competence level in using plate method is still highly lacking.

Table 4: Distribution of respondents according to knowledge on food guide pyramid and plate method

Statements	Correct answers, n(%)
1) The first Malaysian food pyramid was developed in 1992. (Positive)	21 (13.3)
2) The food guide pyramid was aimed to educate people on food groups that make up a healthy diet. (Positive)	157 (99.4)
3) There are 6 food groups comprised in food guide pyramid. (Negative)	93 (58.9)
4) Most of your daily food calories should come from protein group. (Negative)	155 (98.1)
5) The maximum number of servings of vegetables that we should have is 5 servings per day. (Negative)	111 (70.3)
6) Legumes and beans are great sources of vegetables. (Negative)	138 (87.3)
7) Dry beans, eggs and nuts are in protein sources. (Positive)	149 (94.3)
8) According to Malaysian food guide pyramid, 1 servings of rice is equivalent to 2 scoop of rice.	84 (53.2)
9) Our daily meal should comprise of food items from all the food groups. (Positive)	149 (94.3)
10) Complete food pyramid illustration according to appropriate food groups and servings size.	95 (60.1)

11) The two food groups that balanced occupied on our plate according to plate method are protein and carbohydrates. (Positive)	95 (60.1)
12) Plate method is divided into sections of approximately 6 food groups. (Negative)	125 (79.1)
13) The plate method can be applied for lunch and dinner only. (Negative)	111 (70.3)
14) There should be specific plate method for different population, for example the plate method for elderly should be different from plate method for young adult. (Negative)	74 (46.8)
15) We can use any plate size in meal planning according to plate method. (Negative)	57 (36.1)
16) The specific plate size that should be use is approximately 9 inch	10 (6.3)
17) Complete plate method illustration according to meal planning.	23 (14.6)

Knowledge score of the respondents regarding to general aspects of food guide pyramid and plate method is presented in Table 5. Scores for knowledge on food guide pyramid and plate method were divided into tertiles. Approximately 45% of the respondents had achieved highest tertile for knowledge with a mean score achieved of 81.5 points. There were only 4 respondents (2.5%) who scored 20 points. Meanwhile, there were 2 respondents (1.3%) who scored 11 points which was the lowest score.

Meanwhile, for knowledge on plate method, majority (38%) of the respondents had achieved second tertile with a mean score achieved of 60.8 points. None of respondents had the full score of 14 points while there were only 2 (1.3%) respondents who scored 13 points. The study found that knowledge on plate method was lower than knowledge on food guide pyramid among the respondents. This findings was aligned with earlier section (Table 4), confirming that respondents had relatively poorer knowledge on plate method as compare to food guide pyramid.

Previous study reported that only 33% of non-nutrition students from UNIMAS, Sarawak knew the recommended daily serving size and food group mentioned in food guide pyramid. This may explained by the fact that they did not applied the knowledge in daily lives as knowledge alone was not sufficient to make healthy eating changes (Aung et al., 2012). Knowledge can however, influence health-related behaviours when mediated by attitudes, belief, self-efficacy and an effective call to action (Green et al., 1999; Kanz et al., 1984). There is limited published data that measured the knowledge on plate method in Malaysia, making comparison between not possible.

Table 5: Distribution of respondents according to knowledge score on food guide pyramid and plate method

Variables	n	%	Mean ± SD	Mean ± SD (100%)
Knowledge on food guide pyramid (Range: 0-20)			16.3 ± 1.6	81.5 ± 8.1
First tertile (11-15)	41	26.0		
Second tertile (16)	46	29.1		
Third tertile (17-20)	71	44.9		
Knowledge on plate method (Range: 0-14)			8.5± 2.2	60.8 ± 15.5
First tertile (2-7)	50	31.7		
Second tertile (8-9)	60	38.0		
Third tertile (10-13)	48	30.4		

4.4 Confidence in using food guide pyramid and plate method in meal planning

Confidence in using food guide pyramid and plate method in meal planning among the respondents is presented in Table 6.Majority (72.2%) of the respondents had good confidence (good and excellent) in using plate method in meal planning compared to food guide pyramid. On the other hand, there were less than 3% of the respondents who had poor confidence in using food guide pyramid while 0.6% respondents who had poor confidence in using plate method when planning the meal. In general, respondents had higher level of confidence to use plate method in meal planning.

Table 6: Distribution of respondents according to confidence level in meal planning using food guide pyramid or plate method

Variables	n	%
Confidence level in meal planning using food guide pyramid		
Poor	5	3.2
Fair	19	12.0
Moderate	64	40.5
Good	56	35.4
Excellent	14	8.9
Confidence level in meal planning using plate method		
Poor	1	0.6
Fair	3	1.9
Moderate	40	25.3
Good	78	49.4
Excellent	36	22.8

4.5 Practice on food guide pyramid and plate method

Practice on food guide pyramid and plate method in meal planning and eating habits which reflect food guide pyramid and plate method recommendations among the respondents are presented in Table 7and Table 8. In terms of eating habits, there were 50.6%, 39.2% and 39.9% of the respondents who take care of their diet by reducing high fat and high sugar foods, reducing high fat, high sugar and red meat foods, and low intake of high fat foods, respectively.

Majority (71.5%) of the respondents practice plate method in their meal planning while there were more than 60% of the respondents did not practice food guide pyramid in meal planning. Nevertheless, the proportion of respondents who practiced food guide pyramid in this study was higher as compare to the previous study by Guthrie, Derby & Levy (1999). In their study, a quantitative Food Marketing Institute trends data survey reported that only 27% of US shoppers said they used food guide pyramid information to make changes in their food purchase and another survey reported that only 13% of those sampled said they used the Dietary Guidelines of American (DGA) (Campbell, 1996). However, the sample population was contradictive with the previous study. In addition, there is limited published data that measured practice on food guide pyramid and plate method in Malaysia. More studies are deem necessary to provide a bigger and clearer picture on the practice on food guide pyramid or plate method in the local context.

Table 7: Eating habits that reflect food guide and plate method recommendations

Statements	n (%)	
	Yes	No
I take care of my diet by reducing high fat and high sugar foods	80 (50.6)	78 (49.4)
I take care of my diet by reducing high fat, high sugar and red meat foods	62 (39.2)	96 (60.8)
I take care of my diet by reducing high fat foods	63 (39.9)	95 (60.1)

Table 8: Practice on food guide pyramid and plate method

Variables	n	%
Practice on **food pyramid** in meal planning		
Yes	51	32.3
No	107	67.7
Practice on **plate method** in meal planning		
Yes	113	71.5
No	45	28.5

The frequency use of food guide pyramid and plate method among the respondents, and their perspectives on food guide pyramid and plate method with regards to food cultures are presented in Table 9. Only 7% of the respondents applied food guide pyramid and plate method for four to six days a week while 21.5% of them applied both of the tools in two to three days a week. There were less than 4% of the respondents use food guide pyramid and plate method in meal planning every day. There is no absolute different in the frequency use of the two meal planning tools among the respondents.

On the other hand, with regards to the practicality of meal planning, 67.7% of the respondents felt that plate method was either good or excellent. This proportion was almost doubled the respond on food guide pyramid, with only 34.1% of the respondents felt food guide pyramid is good or excellent in terms of practicality in meal planning. Majority of the respondents felt that practicality food guide pyramid was moderate in meal planning.

Table 9: Distribution of respondents according to frequency use of meal planning tools and perspectives on the practicality of food guide pyramid or plate method in meal planning

Questions	n	%
How often you use **food pyramid** in meal planning?		
Everyday	6	3.8
4-6 days a week	11	7.0
2-3 days a week	34	21.5
Considering the foods that are typical to the food's culture, how practical do you think **food pyramid** in meal planning?		
Poor	9	5.7
Fair	23	14.6
Moderate	72	45.6
Good	47	29.7
Excellent	7	4.4
How often you use **plate method** in meal planning?		
Everyday	6	3.8
4-6 days a week	11	7.0
2-3 days a week	34	21.5
Considering the foods that are typical to the food's culture, how practical do you think **plate method** in meal planning?		
Poor	2	1.3
Fair	6	3.8
Moderate	43	27.2
Good	83	52.5
Excellent	24	15.2

4.6 TEST HYPOTHESES

1. **Mean difference on knowledge score between food guide pyramid and plate method**

Mean difference on knowledge score between food guide pyramid and plate method among the respondents was determined using independent t-test. As shown in Table 10below, there was a significant mean difference on knowledge score between food guide pyramid and plate method among the respondents ($t = 14.8$, $p < 0.01$). The mean score of respondents' knowledge on food guide pyramid was significantly higher than the mean knowledge score of plate method. This may be attributed by respondents were more familiar with food guide pyramid compared to plate method, as the later is relatively a newer dietary meal planning approach.

Table 10: Mean difference on knowledge score between food guide pyramid and plate method

Variables	Mean ± SD	t	p-value
Knowledge score on food guide pyramid	81.5 ±8.1	14.8	0.000**
Knowledge score on plate method	60.8 ±15.5		

**Significant at p<0.001

2. Comparison between confidence level in using food guide pyramid and plate method

Confidence level of respondents in using food guide pyramid or plate method during diet counselling was compared using chi-square statistical test with the results display in Table 11 below. As shown in Table 11, there was significant difference in confidence level among the respondents in using the two meal planning approaches ($\chi^2 = 7.2$, $p < 0.01$). Despite the respondents generally had higher confidence with plate method, there were no significant difference in the proportion of respondents in terms of good or excellent confidence level across the two methods. There was however a significant higher proportion of respondents with moderate confidence level with food guide pyramid in meal planning.

Table 11: Comparison between confidence level in using food guide pyramid and plate method

	Food Guide Pyramid, n (%)	Plate method, n (%)	χ^2	p-value
Poor	5 (3.2)	1 (0.6)	7.2	0.007**
Fair	19 (12)	3 (1.9)		
Moderate*	64 (40.5)	40 (25.3)		
Good	56 (35.4)	78 (49.4)		
Excellent	14 (8.9)	36 22.8)		

3. Relationship between self-perceived awareness and practice on food guide pyramid or plate method

Pearson-correlation test was used to determine the relationship between self-perceived awareness and practiceon food guide pyramid or plate method among the respondents. As shown in Table 12, there was no significant correlation between self-perceived awareness and

practice on food guide pyramid ($r = 0.104$, $p > 0.05$) or plate method ($r = -0.06$, $p > 0.05$). Hence, practices on food guide pyramid and plate method among the respondents were not associated with higher awareness for both tools.

Table 12: Relationship between self-perceived awareness and practice on food guide pyramid and plate method

Variables	n	r	p-value
Awareness on Food Guide Pyramid Practice on Food Guide Pyramid	158	0.104	0.2
Awareness on plate method Practice on plate method	158	-0.06	0.5

4. Relationship between knowledge and practice on food guide pyramid or plate method

As reported earlier, respondents had relatively higher knowledge but lower practice on food guide pyramid, as compared to plate method (Table 7). Relationship between knowledge and practice on food guide pyramid or plate method among the respondents was determined using Pearson-correlation test. As shown in Table 13, it is interesting to note that there was no significant correlation between knowledge and practice on food guide pyramid or plate method among the respondents.

These findings were similar with study by Aung et al. (2012) which reported that even though the respondents in their study had sufficient knowledge regarding healthy food, they find it hard to practice or follow the recommendation. Earlier study by Croll et al.

(2001)reported similar findings. On the other hand, findings study by Sedek and Yih (2014) found that there was a significant positive relationship between dietary practice and nutrition knowledge among the athletes in Universiti Kebangsaan Malaysia (UKM). This showed that athletes with a good knowledge of nutrition were more likely to practice good habits. More studies are deemed necessary to delineate the relationship between knowledge and practice on meal planning tool.

Table 13: Relationship between knowledge and practice on food guide pyramid and plate method

Variables	n	r	p-value
Knowledge on Food Guide Pyramid	158	0.09	0.3
Practice on Food Guide Pyramid			
Knowledge on plate method		0.04	0.6
Practice on plate method			

5. Relationship between confidence in using food guide pyramid or plate method and practice on food guide pyramid or plate method

Pearson-correlation test was used to determine the relationship between practice and confidence in using both meal planning tools among the respondents. As shown in Table 14, there were significant correlations between practice and confidence in using food guide pyramid ($r = 0.37$, $p < 0.01$) or plate method ($r = 0.31$, $p < 0.01$). As the respondents practice more on meal planning tools, they had more confidence to apply or use these tools either in nutrition counseling or personalized practice.Hence, as the confidence in using food guide

pyramid and plate method was higher, the practice on these nutrition tools will also improved. Thus, keeping up the practice of meal planning tools (food guide pyramid and plate method) among the future dietetics and nutritionist are of utmost important. With higher confidence level on meal planning tools, more conducive nutrition education can be delivered to patients or community to foster healthy dietary behaviour.

Table 14: Relationship between confidence in using food guide pyramid and plate method andpractice on food guide pyramid and plate method

Variables	n	r	p-value
Confidence in using Food Guide Pyramid in meal planning	158	0.37	0.000**
Practice on Food Guide Pyramid			
Confidence in using plate method in meal planning		0.31	0.000**
Practice on plate method			

**Correlation is significant at p<0.01

6. Relationship between self-perceived awareness and knowledge on food guide pyramid or plate method

Relationship between self-perceived awareness and knowledge on food guide pyramid or plate method among the respondents were determined using Pearson-correlation test. As shown in Table 15, there was no significant correlation between self-perceived awareness and knowledge on food guide pyramid ($r = -0.006$, $p > 0.05$) or plate method ($r = -0.014$, $p > 0.05$). Awareness on food guides did not appear to translate automatically into understanding of knowledge on food guides, which aligned with earlier finding (Brown et al., 2011).

However, there was limited published data that measured awareness and knowledge on plate method among Malaysian.

Table 15: Relationship between self-perceived awareness and knowledge on food guide pyramid and plate method

Variables	n	r	p-value
Self-perceived awareness on Food Guide Pyramid Knowledge on Food Guide Pyramid	158	-0.006	0.94
Self-perceived awareness on plate method Knowledge on plate method	158	-0.014	0.87

7. **Relationship between knowledge and confidence in using food guide pyramid or plate method**

Relationship between knowledge and confidence in using food guide pyramid or plate method among the respondents were determined using Pearson-correlation test. As shown in Table 16, there were significant correlations between knowledge and confidence in using food guide pyramid ($r = 0.21$, $p < 0.01$) or plate method ($r = 0.25$, $p < 0.01$). Hence, higher knowledge on food guide pyramid and plate method were both associated with higher confidence level in meal planning.

Table 16: Relationship between knowledge and confidence in using food guide pyramid and plate method

Variables	n	r	p-value
Knowledge on Food Guide Pyramid	158	0.21	0.01*
Confidence in using Food Guide Pyramid in meal planning			
Knowledge on plate method	158	0.25	0.002**
Confidence in using plate method in meal planning			

**Correlation is significant at p<0.01

CHAPTER 5

CONCLUSION, LIMITATIONS & RECOMMENDATIONS

5.1 CONCLUSION

This was a cross-sectional study aimed to determine awareness, knowledge and practice on food guide pyramid and plate method among the dietetics and nutrition students. It was conducted among 158 of dietetics and nutrition students from Universiti Putra Malaysia (UPM), Serdang, Universiti Kebangsaan Malaysia (UKM), Kuala Lumpur, Universiti Sains Malaysia (USM), Kubang Kerian, Universiti Islam Antarabangsa (UIA), Kuantan, Universiti Teknologi Mara (UiTM), Puncak Alam and Universiti Sultan Zainal Abidin (UniSZA), Terengganu.

The self-administered questionnaire was used to ascertain the independent variables which were socio-demographic background (age, sex, ethnicity, university attended, program studied and academic year), awareness, knowledge on food guide pyramid and plate method and confidence in using food guide pyramid and plate method among the respondents

Meanwhile, practice on food guide pyramid and plate method was measured as dependent variable.

Finding showed that out of the 158 respondents, more than three quarters of them were aware on food guide pyramid even before attending the introductory level of nutrition or dietetics course. On the other hand, more than 60% of the respondents were unaware on plate method before attending the introductory level of nutrition or dietetics course. There were more than 80% of the respondents perceived themselves as having good understanding for both food guide pyramid and plate method in meal planning.

Besides that, the majority of the respondents had good and moderate knowledge on food guide pyramid and plate method, respectively. Approximately more than half of the respondents answered correctly on several questions regarding the content and role of food guide pyramid and plate method. Furthermore, about 60% of the respondents able to illustrate correctly food groups on food guide pyramid, while, more than 85% of the respondents failed to illustrate the actual proposed meal guide using plate method. In terms of confidence level in meal planning, majority of the respondents had good confidence in using plate method compared to food guide pyramid. Meanwhile, less than 3% and 1% of the respondents had poor confidence in using food guide pyramid and plate method, respectively.

There were more than 60% of the respondents did not practice food guide pyramid in meal planning even though they had good knowledge. This shows that higher knowledge on food guide pyramid was not associated with better practice on food guide pyramid. On the

other hand, more than 70% of the respondents did practice plate method in meal planning although they did not know much about actual proposed meal guide using plate method.

Besides that, there was a significant mean difference on knowledge score between food guide pyramid and plate method among the respondents. The respondents were more familiar with food guide pyramid compared to plate method, as the later is relatively a newer dietary meal planning approach. The study also found that there was no significant correlation between knowledge and practice on food guide pyramidamong the respondents even though the respondents had relatively higher knowledge on food guide pyramid, as compared to plate method. However, more studies are deemed necessary to delineate the relationship between knowledge and practice on meal planning tools. There were significant correlations between practice and confidence in using both meal planning tools. As the respondents practice more on meal planning tools, they had more confidence to apply or use these tools either in nutrition counseling or personalized practice. On the other hand, there was significant correlation between knowledge and confidence in using food guide pyramid and plate method. Hence, higher knowledge on food guide pyramid and plate method were associated with higher confidence level in meal planning tools.

Findings of the present study have critical importance. While a relatively higher proportion of respondents prefer and more confidence with plate method in meal planning, their knowledge on plate method seems to be inadequate. Taking all these together, relevant authorities should review the academic program carefully to ensure more coverage on plate method should be implemented, with the ultimate aim in producing competence dietitians and nutritionists for the seek of the patients, community and nation.

5.2 LIMITATIONS OF STUDY

Since this study was conducted among dietetics and nutrition students from public universities only, the sample population was not representing to all nutrition and dietetics students. In addition, there was insufficient number of nutrition students to allow comparison between both courses regarding awareness, knowledge and practice on food guide pyramid and plate method. The measurement used was self-reported by each individual only, which may have allowed for human errors, inaccuracies and bias. Furthermore, there was limited published data that measured awareness, knowledge and practice on food guide pyramid and plate method in Malaysia as well as other countries, making comparison of findings relatively difficult.

5.3 RECOMMENDATIONS

For future study, students from private universities that offered courses of nutrition or dietetics should be included. Ascertainment among adults and younger age people in Malaysia since there is limited study conducted among Malaysian regarding the awareness, knowledge and practice on food guide pyramid and plate method. Face-to-face interview with the respondents may be helpful for future study regarding the understanding of nutrition knowledge on food guide pyramid and plate method. In addition, it is recommended to recruit comparable number of interns from nutrition and dietetics to allow comparison between students from different program.

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APPENDICES

APPENDIX A
(Questionnaire)

Reference no.

UNIVERSITI PUTRA MALAYSIA

FACULTY OF MEDICINE AND HEALTH SCIENCES
DEPARTMENT OF NUTRITION AND DIETETICS

AWARENESS, KNOWLEDGE AND PRACTICE ON FOOD GUIDE PYRAMID AND PLATE METHOD AMONG DIETETICS AND NUTRITION STUDENTS

QUESTIONNAIRE (CONFIDENTIAL)

Name: Nur Suhadah bt Rosli

Matric no: 164759

Supervisor's name: Associate Prof Dr. Chan Yoke Mun

Note:

We wish to conduct a survey about the awareness, knowledge and practice on food guide pyramid or plate method among dietetics and nutrition students. Please answer ALL questions. All the data will be kept confidentially. Thank you for your cooperation. If there is any question about this study, please contact me (0145220759) or email to suhadahrosli2309@gmail.com. Your cooperation is much appreciated.

Reference no.

Section A: Socio-demographic background

Please answer and tick (√) on the appropriate answer.

1. Age : ____year
2. Date of Birth :_____ (dd/mm/yy)
3. Sex : ☐ Male ☐ Female
4. Ethnicity : ☐ Malay ☐ Chinese ☐ Indian

   ☐ Others: _____ (Please state)
5. University attended : _____
6. Course : ☐ Nutrition ☐ Dietetics
7. Academic year : _____

Section B (a): Awareness of food pyramid

The following questions are about your awareness on food pyramid. Please choose the most appropriate answer.

8. How would you rate your understanding on food pyramid in meal planning? (Circle one number)

1	2	3	4	5
Poor	Fair	Moderate	Good	Excellent

9. Before attending nutrition class, are you aware on food pyramid? (If the answer is no or unsure, please proceed to question number 11)

   ☐ Yes ☐ No ☐ Unsure

10. Please identify the sources of information on food pyramid?(You can tick more than one)

    ☐ Television ☐ Family members
    ☐ Internet ☐ Friends
    ☐ Newspaper ☐ Food labelling

Reference no.

☐ Others: _____ (Please state)

Section B (b): Awareness of plate method

The following questions are about your awareness on plate method. Please choose the most appropriate answer.

11. How would you rate your understanding on plate method in meal planning? (Circle one number)

1	2	3	4	5
Poor	Fair	Moderate	Good	Excellent

12. Before attending nutrition class, are you aware on plate method? ?(If the answer is no or unsure, please proceed to question number 14)

☐ Yes ☐ No ☐ Unsure

13. Please identify the sources of information regarding plate method. (You can tick more than one)

☐ Television ☐ Family members
☐ Internet ☐ Friends
☐ Newspaper ☐ Food labelling
☐ Others: _____ (Please state)

14. Do you aware that plate method has been used to replace food pyramid in the United States?

☐ Yes ☐ No ☐ Unsure

Section C (a): Knowledge on food pyramid

The following questions are about your knowledge on food pyramid. Please choose the most appropriate answer.

15. The first Malaysian food pyramid was developed in 1992.

☐ Yes ☐ No ☐ Unsure

16. The food pyramid was aimed to educate people on food groups that make up a healthy diet.

☐ Yes ☐ No ☐ Unsure

Reference no.

17. There are 6 food groups comprised in food pyramid.
☐ Yes ☐ No ☐ Unsure

18. Most of your daily food calories should come from protein group.
☐ Yes ☐ No ☐ Unsure

19. The maximum number of servings of vegetables that we should have is 5 servings per day.
☐ Yes ☐ No ☐ Unsure

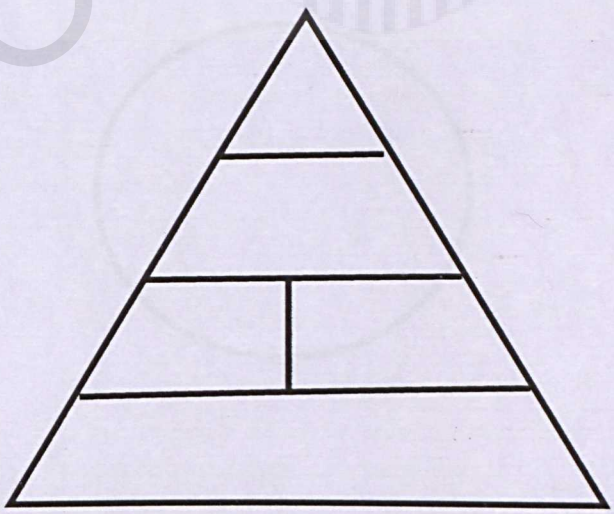
20. Legumes and beans are great sources of vegetables.
☐ Yes ☐ No ☐ Unsure

21. Dry beans, eggs and nuts are in protein sources.
☐ Yes ☐ No ☐ Unsure

22. According to Malaysian Food Guide Pyramid, 1 serving of rice is equivalent to
A. ½ scoop of rice
B. 1 scoop of rice
C. 1 ½ scoop of rice
D. 2 scoop of rice
E. Unsure

23. Our daily meal should comprise of food items from all the food groups.
☐ Yes ☐ No ☐ Unsure

24. Please complete the **food pyramid** below, indicate the appropriate **food groups** and **serving sizes** accordingly.



Reference no.

Section C (b): Knowledge on plate method

The following questions are about your knowledge on plate method. Please choose the most appropriate answer.

25. The two food groups that balanced occupied on our plate according to plate method are protein and carbohydrates.

☐ Yes ☐ No ☐ Unsure

26. Plate method is divided into sections of approximately 6 food groups.

☐ Yes ☐ No ☐ Unsure

27. The plate method can be applied for lunch and dinner only.

☐ Yes ☐ No ☐ Unsure

28. There should be specific plate methods for different population, for example the plate method for elderly should be different from plate method for young adult.

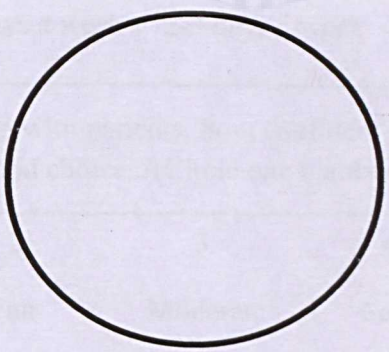
☐ Yes ☐ No ☐ Unsure

29. a) We can use any plate size in meal planning according to plate method.

☐ Yes ☐ No ☐ Unsure

b) If No, what is specific plate size that should be use? _____

30. Please complete the meal planning according to **plate method** in the diagram below.



Reference no.

Section D: Eating practices

The following questions are about your dietary practices. Please choose the most appropriate answer.

31. Which of the statements below clearly describe your dietary practice? (Please choose more than one)

☐ I take care of my diet by reducing high fat and high sugar foods.
☐ I take care of my diet by reducing high fat, high sugar and red meat foods (e.g. beef and mutton).
☐ I take care of my diet by reducing high fat foods.
☐ I always use food pyramid when planning my meal.
☐ I take care of my diet by using plate method.
☐ Others, please specify:

_____

Section E: Use of food pyramid and plate method

The following questions are about the use of food pyramid and plate method in your daily life. Please choose the most appropriate answer.

32. Do you use **food pyramid** in meal planning?

☐ Yes ☐ No (If No, please proceed to question 34)

33. If Yes, how often you use **food pyramid** in meal planning?(Circle one number)

1	2	3	4	5
Everyday	4-6 days a week	2-3 days a week	Once a week	Never

34. During diet counselling with patients, how confident are you to use **food pyramid** in making their healthy food choices?(Circle one number)

1	2	3	4	5
Poor	Fair	Moderate	Good	Excellent

35. Considering the foods that are typical to the food's culture, how practical do you think **food pyramid** in meal planning?(Circle one number)

1	2	3	4	5
Poor	Fair	Moderate	Good	Excellent

Reference no.

36. Do you use **plate method** in meal planning?

☐ Yes ☐ No (If No, please proceed to question 38)

37. If Yes, how often you use **plate method** in meal planning?(Circle one number)

1	2	3	4	5
Everyday	4-6 days a week	2-3 days a week	Once a week	Never

38. During diet counselling with patients, how confident are you to use **plate method** in making their healthy food choices?(Circle one number)

1	2	3	4	5
Poor	Fair	Moderate	Good	Excellent

39. Considering the foods that are typical to the food's culture, how practical do you think **plate method** in meal planning?(Circle one number)

1	2	3	4	5
Poor	Fair	Moderate	Good	Excellent

40. . Which tools do you prefer in meal planning?

☐ Food pyramid ☐ Plate method

-The end-

-Thank you for your cooperation-

APPENDIX B
(Information form & Consent form)

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

FORM B1: RESPONDENT'S INFORMATION SHEET AND CONSENT

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

1. STUDY TITLE :

Awareness, knowledge and practice on Food Guide Pyramid and plate method among dietetics and nutrition students

2. INTRODUCTION:

This study will examine the awareness, knowledge and practice on Food Guide Pyramid and plate method among dietetics and nutrition students.

3. WHAT WILL YOU HAVE TO DO?

You will be required to complete a set of questionnaire which includes information regarding to socio-demographic background, awareness , knowledge on Food Guide Pyramid and plate method and practice on Food Guide Pyramid and plate method. You also need to answer questions about your owns preference between Food Guide and plate method as meal planning approach.

4. WHO SHOULD NOT PARTICIPATE IN THE STUDY?

Students who are not taking nutrition or dietetics courses in university.

5. WHAT WILL BE THE BENEFITS OF THE STUDY:

(a) TO YOU AS THE SUBJECT?

You will know the awareness, knowledge and practice on Food Guide Pyramid and plate method among nutrition and dietetics students. You will also know confidence level in using food guide pyramid and plate method as meal planning approach.

(b) TO THE INVESTIGATOR?

All the information obtained can be used by researchers and healthcare professional to determine effective program to improve the quality of becoming nutrition educators (nutritionist and dietitian) in the future.

6. WHAT ARE THE POSSIBLE RISKS?

This study will not impose any risks as you just need to complete a set of questionnaire.

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

All the information gathered will be kept confidentially. No individual description will be made at any part of research or publication.

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

If you have any enquiry about this study, you can directly contact Ms Nur Suhadah bt Rosli, +6014-5220759 or email to suhadahrosli2309@gmail.com or the researcher's supervisor:

Associate Prof Dr. Chan Yoke Mun

Department of Nutrition and Dietetics

Faculty of Medicines and Health Sciences

Universiti Putra Malaysia,

43400 UPM Serdang,

Selangor Darul Ehsan.

Tel no: +608-9472752 (Office)

Email: cym@upm.edu.my

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

9. CONSENT

I …… Identity Card No. ……

address……..

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

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

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

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

* delete where necessary

Signature ……..…… Signature ……..……

(Respondent) (Witness)

Date :…….. Name :……..

I/C No. :……..

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

Date ……..…… Signature ……..……

(Researcher)

APPENDIX C
(Ethics letter)