



KEY MESSAGE 1

**Eat a variety of foods
within the recommended
servings**



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1.1 Terminology

<p>Adequate diet</p>	<p>foods that are similar in calories, carbohydrate, protein and fat contents.</p>
<p>An adequate diet provides enough energy, nutrients and fibre to maintain an individual's health. A diet that is adequate for an individual may not be adequate for another.</p>	<p>Healthy diet</p>
<p>Balanced diet</p>	<p>A healthy diet is a diet which provides a proper combination of energy and nutrients. The four characteristics of a healthy diet are varied, adequate, balanced and moderate.</p>
<p>A balanced diet is a diet that contains a combination of foods that provide a proper balance of nutrients. The body needs many types of foods in varying amounts to maintain health. The right balance of nutrients needed to maintain health can be achieved by eating proper balance of all healthy foods including fruit, vegetable, cereal, fish, meat, legume and milk.</p>	<p>Malaysian Food Pyramid 2020</p>
<p>Food groups</p> <p>A food group puts together foods of similar nutrient content and function. There are five food groups which are vegetables; fruits; rice, other</p>	<p>A food pyramid is a visual tool that is used as a guide to your DAILY food intake in achieving a healthy diet. It is developed to provide a guide for the types and amounts of food that can be eaten in combination to provide a balanced diet. A food pyramid consists of four levels that represent five food groups. The recommended number of servings per day for each food group is indicated next to it. From the bottom to the top of the food pyramid, the number of servings of each food group becomes smaller indicating that an</p>

cereals, whole grain cereal-based products and tubers; fish, poultry/ eggs/ meat, and legumes; milk and milk products. These food groups contain

individual should eat more of the foods at the base of the pyramid and less of the foods at the top of the pyramid.

Malaysian Healthy Plate

Malaysian Healthy Plate (MOH, 2016) is a visual guide to show the total food in each food group that needs to be consumed in a meal to achieve a healthy and balanced diet based on the principle of quarter, quarter, half. It is used to translate recommendations from the Malaysian Dietary Guidelines and Malaysian Food Pyramid to help Malaysian practise healthy eating habits by planning their daily meal.

Moderation

Moderation is a key to healthy diet. Moderation refers to eating the right amount of foods to maintain a healthy weight and to optimise the body's metabolic process.

Processed Foods

Edible parts of plants and animals after separation from nature or modified/preserved by minimal processes or modified with the addition of salt, sugar, oils or fats to preserve and enhance their sensory qualities. These include canned or bottled vegetables or legumes (pulses) preserved in brine; whole fruit preserved in syrup; tinned fish preserved in oil; some types of processed animal foods such as ham, nuggets, sausage, and smoked fish; most freshly baked breads; and simple cheeses to which salt is added (Monteiro *et al.*, 2019).

Recommended Nutrient Intakes (RNIs)

Recommended nutrient intakes are nutrient standards that used to plan and assess dietary nutrient intakes of healthy individual or population. Nutrient recommendations in RNI are differ with age, sex, and physical activity level. The range of intakes encompassed by the RNI should be considered sufficient to prevent deficiency, maintain optimal health while avoiding toxicity (NCCFN, 2017)

Serving size

In the Malaysian Food Pyramid, serving size is the recommended amount of foods consumed daily in household measures used for foods and drinks, for example cup, plate, bowl, tablespoon, teaspoon and glass. However, serving size defined in the Malaysian Food Pyramid may not be equal to a serving size defined in a food label.

Unprocessed and minimal processed foods

Unprocessed (or natural) foods are the edible parts of plants (such as fruit, leaves, stems, seeds, roots) or from animals (such as muscle, offal, eggs, milk), and also fungi, algae and water, after separation from nature. Whilst, minimally processed foods are natural foods altered by methods that include removal of inedible or unwanted parts, and also processes that include drying, crushing, grinding, powdering, fractioning, filtering, roasting, boiling, non-alcoholic fermentation, pasteurization, chilling, freezing, placing in containers, and vacuum packaging. Unprocessed and minimally processed foods vary in energy density and in their content and balance of fats, carbohydrates, proteins, and their fractions, and in vitamins, minerals and other bioactive compounds. (Monteiro *et al.*, 2019b; Lane *et al.*, 2020).

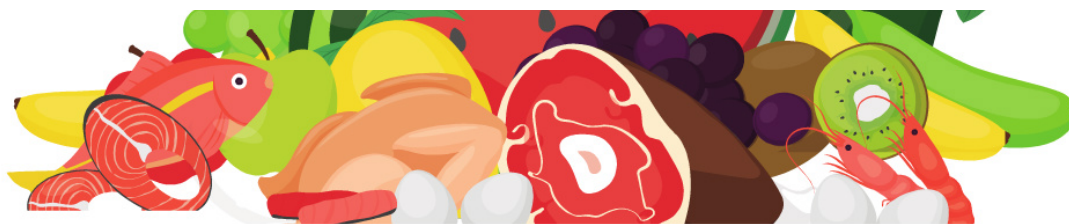
Ultra-Processed Foods (UPFs)

Ultra-processed foods are characterised by NOVA as industrial formulations generated through compounds extracted, derived or synthesized from food or food substrates. Ultra-processed foods also commonly contain artificial substances such as colours, sweeteners, flavours, preservatives, thickeners, emulsifiers and other additives used to promote aesthetics, enhance palatability and increase shelf life. Ready to eat food and beverage, spreads, packaged snacks and pastries, cakes, instant noodles, pre-prepared ready to heat products are some examples of ultra-processed foods high in sugar, salt, fat and artificial substances (Monteiro *et al.*, 2019b; Lane *et al.*, 2020).

Variety

Variety refers to eating many different types of foods each day and to ensure better selection of healthier foods. By selecting a variety of foods, the chances of consuming the multitude of nutrients the body needs are optimised.





1.2 Introduction

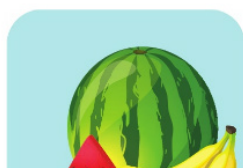
A healthy diet is important to supply nutrients, reduce risk and to manage certain diseases. Healthy and balanced eating habits provide energy and nutrients required by the body. The Malaysian Dietary Guidelines 2010, suggested three important considerations when planning healthy meals, specifically, (i) eating a balanced diet (ii) consume a wide variety of foods and (iii) consume foods in moderation (NCCFN, 2010). These recommendations have also been suggested by other dietary guideline from various countries such as USA (USDA, 2015), and Australia (NHMRC, 2013).

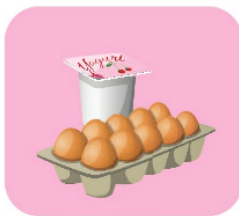
The accelerated phase of urbanisation and food industrialisation in recent decades has inevitably brought changes in the Malaysian dietary habits (NCCFN 2017). A major shift can be seen in the availability, accessibility, affordability of processed and convenient foods which influenced the consumer's food preferences and choices. The dietary changes towards affluent and convenient processed foods have been associated with the increasing prevalence of obesity irrespective of age, ethnic and social status. The adoption of Malaysian Food Pyramid 2020 recommendation in daily diet would benefit increasing consumption of freshly prepared dishes made from unprocessed or minimally processed foods and reducing consumption of processed foods especially ultra-processed foods and beverages. NOVA classification is one of the superlative techniques recognized by the Food and Agriculture Organization of the United Nations and the Pan American Health Organization as a valid tool to observe ultra-processed food (UPP) consumption (FAO (2019).

It is very important that an individual ensures getting appropriate foods and incorporates the principle of good nutrition such as variety, a balanced intake of nutrients and in moderation. To ensure varieties in the daily diet, an individual is required to eat different types of foods within each level of food pyramid. This will enhance and optimise the nutrient needs of the body. In addition, eating food within the recommended number of servings is crucial. Thus, the recommendations from the Malaysian

Food Pyramid are translated into practice using the Malaysian Healthy Plate which guides us to plan our main meals. The Malaysian Healthy Plate (MOH, 2016) incorporates the principles of quarter, quarter, half. To estimate food portion, a 10-inch (25 cm) plate is used. It is recommended that the first quarter of the plate is filled with either rice, noodles, breads, grains, cereal products or tubers. This is followed by filling the second quarter of the plate with either fish, poultry, meat or legumes. The other half of your plate should be filled with vegetables and fruits. It however does not reflect the daily calories intake and serving sizes for each food group. In addition, plain water or unsweetened beverages, milk or dairy products should be consumed with the meal. Water is essential for many body functions for example regulating body temperature and digestion.

The MDG 2010 is revised and updated taking into consideration the many studies reporting the changes in food consumption patterns and dietary habits of Malaysians as well as nutritional and health related problems in Malaysia (IPH, 2014; Ahmad Ali *et al.*, 2019a; Ahmad Ali *et al.*, 2019b; Balasubramanian *et al.*, 2020; IPH, 2020). The recent national prevalence of overweight and obesity as reported in the NHMS 2019 was 50.1% (IPH, 2020). The prevalence was the highest among women (54.7%), Indians (63.9%) and the 55-59 years old age group (60.9%). Similarly, abdominal obesity was present in 50% of adults, again highest among women (64.8%) and Indians (68.3%). It has been shown that the traditional diets have been replaced by diets higher in fats, salt and sugar-sweetened beverages; usually with lower intakes of fresh fruits and vegetables as well as higher weekly frequency of eating out (Balasubramanian *et al.*, 2020). In an earlier study, Fournier *et al.* (2016) reported about 64% of Malaysians had at least one meal per day outside of home, 23.4% had meals at home, and 12.5% will eat at home with outside food. Thus, it is very important that this revised MDG 2020 addresses these emerging dietary issues and diet-related health problems to guide Malaysian to eat a variety of foods within the recommended servings.





1.3 Scientific basis

1.3.1 Food groups

A healthy and balanced diet should include a variety of choices from each of the following five food groups, namely vegetables; fruits; rice, other cereals, whole grain cereal-based products and tubers; fish, poultry/ eggs/ meat, and legumes; milk and milk products. Each of these food groups provides an array of nutrients, and the amounts recommended that promote positive health outcomes. The WHO (2003) suggested the consumption of a variety of foods from different food groups, with emphasis on plant-based foods. Consuming foods from each group in the appropriate amount each day allows the individual to achieve the requirements for energy, carbohydrates, proteins, and fats as well as vitamins and minerals. In addition to the essential nutrients, different foods also provide fibre and phytochemicals (found in plants), many of which are protective against diseases. Some of these compounds act as antioxidants, which protect the body's cells from being damaged. Eating a variety of foods also keeps our meals interesting and full of flavour (McCrorry *et al.*, 2012; NHMRC, 2013). The following sections describe the food groups in general and highlight nutrients for which the food group is a key contributor.

In this revised MDG 2020, the food groups are still placed in the four levels of the Malaysian Food Pyramid. The Malaysian RNI (NCCFN, 2017) recommends that carbohydrate, protein and fat contribute to 50-65%, 10-20% and 25%-35% of the total caloric intake per day. This recommendation is used to calculate the number of servings to be consumed per day for each food group. The

be eaten either raw or cooked instead of as juices to optimise its health benefits. While it is best to cook certain vegetables to make them more palatable and increase the availability of the nutrients (Colle *et al.*, 2010), with minimal cooking process as well as minimal use of cooking oil or coconut milk (*santan*).

Together with vegetables, fruits are now placed at the base of the Malaysian Food Pyramid 2020. Fruits generally taste sweet, juicy and most of fruits are eaten fresh and raw. Fruits are excellent source of vitamins, minerals, fibers which rich in antioxidants including flavonoids, polyphenols and etc. Consumption of adequate fruits in a daily diet will improve immune system, prevent constipation and other chronic diseases. Most of fruits are low in fat, sodium, calorie and high in potassium. It is advised to eat fruits in the whole form, although it can be taken in the form of fruit juice (without added sugar) limit to once a day. Processing of fruits into juices lower fruit juice can be part of healthy eating patterns, processing of fruits into juices lower its dietary fibre content and can spikes blood glucose level. Fruit juice drink and fruit drink products sold in the market are considered to be sugar-sweetened beverages rather than fruit juice because they are primarily composed of water with added sugars. More information on vegetables and fruits can be found in Key Message 5.

Cereal especially rice is the staples for Malaysian. The Malaysian Food Pyramid 2020 is differs from the previous food pyramid, in which, vegetables and fruits groups form the base of the new pyramid replacing the carbohydrate food groups. Nevertheless, rice remain as staple food for

Malaysian Food Pyramid 2020 is reconstructed taking into consideration the number of servings contributed by vegetables and fruits which constitute the most as compared to other food groups.

There are many types of vegetable that are often classified based on their edible part mainly leaves, stems, roots, flowers and fruits vegetable. Vegetables are low in fat and carbohydrate but high in vitamins, minerals and fibers. Consumption of a variety of vegetables contributes an array of nutrients. For example, green leafy vegetables such as spinach (*bayam*), mustard green (*sawi*), and swamp cabbage (*kangkung*) are generally high in folate, vitamin K and potassium, while red and orange vegetables (i.e., carrots, tomatoes, pumpkins) provide the most vitamin A. Vegetables are a good source of dietary fibers and it can prevent constipation. Vegetable should

Malaysian. It is recommended to consume at least half from the total serving size of the cereal and cereal-based products in form of whole grains. Wholegrains (e.g., brown rice, oats, barley, quinoa) contain the entire kernel, including the endosperm, bran, and germ. Refined grains differ from wholegrains in that the bran and germ are removed, whereby essential components such as dietary fibre, iron, vitamin Bs and other nutrients are minimally retained. A higher intake of wholegrains are associated with lowered risk of non-communicable diseases (NCDs) (Reynolds *et al.* 2019). The intake of refined grains and products especially those high in saturated fats, sugars, and salt, such as cakes, crackers, and creme-filled biscuits and buns should be limited. More information on grains and cereal products can be found in Key Message 6.

Malaysian Dietary Guidelines 2020

5

Lean meats, fish, poultry, eggs and plant-based alternatives such as *tauhu*, legumes, nuts and seeds are protein foods. This is placed in the third level of the Malaysian Food Pyramid 2020. Besides protein, this food group provides a wide variety of other nutrients including iron, zinc, iodine, phosphorus, B vitamins (e.g., niacin, cobalamin, pyridoxine, and riboflavin), and essential fatty acids (omega 3 polyunsaturated fatty acids) among others. As in other food groups, each of the protein foods may provide different nutrients. For example, red meats are good sources of heme iron, which is more bioavailable than the non-heme iron found in plant sources. Fish and shellfish such as prawns provide more cobalamin and vitamin D, and essential fatty acids namely eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). Similar with previous recommendation of daily protein intake, fish should be consumed everyday. In addition, the Malaysian Food Pyramid 2020 also recommended a serving of legumes daily. Legumes include peas, beans, lentils, and peanuts are rich sources of plant protein which contained phytosterols and dietary fibre (Trinidad *et al.*, 2010).

Nuts and seeds are highly nutritious and are of prime importance for people in Asia and Africa (Carlsen, Halvorsen & Blomhoff, 2011). Most nuts and seeds contain substantial amount of fat (55-70%) and protein (10-30%). In effort to increase intake of unsaturated fatty acids, 1 serving of seeds is included in the calculation of total energy intake from fat. Besides fats, protein and vitamins, nuts and seeds are rich sources of phytochemicals including flavanoids (almonds, peanuts and pistachios), resveratrol (peanuts and pistachios), polyphenols and tocopherols (walnuts) (Carlsen, Halvorsen & Blomhoff, 2011), which may potentially reduce oxidative stress and risk of related diseases (Kim *et al.*, 2019, Moghtaderi *et al.*, 2020). More information on protein foods including nuts can be found in Key Message 7.

Milk and milk products, which are also placed in the third level of the Malaysian Food Pyramid 2020, provide a package of essential nutrients that is difficult to achieve in low-dairy or dairy-free diet (Rosenberg *et al.* 2016).

for energy and essential fatty acids (arachidonic acid and alpha-linolenic acid). Fats also have other important physiological functions including fat metabolism generates bioactive lipid molecules, which are fundamental mediators of multiple signaling pathways (Orsavova *et al.*, 2015). Nevertheless, in light of Malaysian generally being physically inactive (IPH, 2020), excessive fat intake (more than 35% of energy intake) may lead to overweight and obesity. More information on fat and oils, sugars and salt can be found in Key messages 9, 10 and 11 respectively.

Malaysians have betrothed extensive actions to alleviate the upsurge in obesity prevalence. One of the major challenges to curb obesity in Malaysia is due to abundant supplies of unhealthy foods and beverages products in the market. The over-reliance on processed foods, especially ultra-processed foods which high in energy, sugar, fat, salt and generally in combination with artificial substances such as flavour enhancers, colours, emulsifiers, and other additives to prolong shelf-life of the product (FAO, 2019). For instance, ready to eat food and beverages such as carbonated drinks, sweet or savoury snacks, chocolate, candies, ice-cream, mass-produced packaged breads and buns, spreads, cream filled biscuits, pastries, cakes including pre-prepared ready-to-heat products such as frozen currypuff, pasta and pizza dishes. It is gradually displacing home-prepared meals and the consumption of fresh fruit and vegetables in daily diets. Nowadays, ultra-processed foods are now often reformulated and advertised as if they are healthy, being labelled as for example 'light' or 'diet', or low in fat or sugar, or free from trans fats, or high in fibre or vitamins and minerals. These adjustments may improve the products which however remain ultra-processed and unhealthy (Monteiro *et al.*, 2019b). A systematic review and meta-analysis investigated the association between consumption of ultra-processed food and noncommunicable disease risk, morbidity and mortality demonstrated consumption of ultra-processed food was associated with increased risk of overweight, obesity, abdominal obesity, all-cause mortality, metabolic syndrome and depression in adults. In addition,

in low-daily or daily-free diet (Kozemberg *et al.*, 2010). Besides calcium, milk and milk products such as cheese and yoghurt have various health benefits and are a good source of many nutrients, including protein, vitamin A, vitamin D, riboflavin, cobalamin, zinc, phosphorus, vitamin K₁, vitamin K₂ and milk fat globule phospholipids (Dehghan *et al.*, 2018). Low fat or skimmed varieties of milk and milk products are recommended. Individuals who are lactose intolerant can choose low-lactose and lactose-free milk products. More information on milk and milk products can be found in Key Message 8.

Fats and oils, sugars and salt are placed at the top of the Malaysian Food Pyramid 2020 because these foods should be consumed sparingly. Fats and oils, sugars and salt are not considered as food groups, but they are often found in foods. Sugars and salt improve foods palatability, however it can be replaced or reduced by natural flavour enhancers such as spices and herbs. Fats and oils are good sources

of essential fatty acids and are important for brain health, cognitive function and depression in adults. In addition, consumption of ultra-processed food was associated with cardiometabolic diseases, frailty, irritable bowel syndrome, functional dyspepsia and cancer (breast and overall) in adults (Lane *et al.*, 2020).



1.3.2 Serving size

Based on the Recommended Nutrient Intakes for Malaysia (NCCFN, 2017) and the population's habitual intake (IPH, 2014), the number of servings calculated for the Malaysian Dietary Guidelines 2020 is based on 50-65% carbohydrate, 10-20% protein and 25-35% fat. The macronutrient contribution to the total energy intake (TEI) is then converted to exchange list to optimize the consumption of carbohydrate, protein and fat, subsequently converted to serving size (Shahar *et al.*, 2015). The number of servings for daily meal planning provide intakes of at least 90% of the Recommended Nutrient Intakes for Malaysian (RNI) for energy, carbohydrate, protein and fat. In MDG 2020, the number of servings recommended for the five food groups is based on 1500 kcal, 1800 kcal and 2000 kcal per day.

In the revised Malaysian Food Pyramid 2020, the five food groups are placed at four levels. Different from the previous MDG, vegetables and fruits group form the base of the new pyramid. It is reconstructed taking into consideration the number of servings contributed by fruits and vegetables which constitute the most as compared to other food groups. Such recommendation is also in line with the intention to consume more vegetables and fruits, considering the increasing prevalence of non-communicable diseases especially obesity and diabetes in Malaysia. The recommended number of servings is at least three servings or more of vegetables and two servings of fruits. One serving of vegetable is considered as zero calorie while one serving of fruit provides 15 g of carbohydrate and 60 kcal. In our main meal, the vegetables and fruits food groups should fill up half of the Malaysian Healthy Plate (MOH, 2016).

The second level is rice, other cereals, wholegrain cereal-based products and tubers group. The number of servings recommended for this group is three to five servings per day, based on the energy requirement. One serving of food in this food group contains 30 g of carbohydrate, 4 g of protein, 1 g of fat and 150 kcal. In our main meal, this food group should fill up only a quarter of Malaysian Healthy Plate.

The third level in the food pyramid 2020 consists of protein sources which are categorised into 3 groups namely i) fish, ii) poultry, meat and egg and iii) legumes. It is recommended to have one serving of fish daily, whereby one serving contains 14 g protein and 2 g of fat and 70 kcal. The recommendation for poultry/ meat/ eggs is one to two servings a day, of which one serving contains 14 g protein, 8 g of fat and 130 kcal. The cooked lean meat is limited to 500 g per week. Whilst, for protein from plant sources namely legumes are recommended one serving daily which contains 40 g protein, 8 g of fat and 130 kcal. Other than that, nuts and seeds are also protein sources but it contained high fat which contribute to high calorie, hence they can be consumed as snacks on a weekly basis. Both animal and plant based protein food should fill up only a quarter of Malaysian Healthy Plate.

In the Malaysian Food Pyramid 2020, the recommended number of servings for milk and milk products is 2 servings, in which one serving contains 12 g carbohydrate, 8 g protein, 5 g of fat and 125 kcal.



1.4 Current status

A number of nutritional surveys have been conducted to assess the dietary intake of Malaysians since 2010. The second Malaysian Adults Nutrition Survey (IPH, 2014) was a nationwide cross-sectional study of Malaysian adult population aged 18-59 years old ($N = 2,973$). This survey reported that the median energy intake of Malaysians (overall) was 1,466 kcal/day, with men reported to be consuming 1,489 kcal/day and women 1,445 kcal/day. The findings were comparable with previous MANS in 2003 (median overall 1,540 kcal/day; men 1,722 kcal/day; women 1,400 kcal/day) (Ahmad Ali *et al.*, 2019b). However, the MANS findings should be interpreted with caution as further analysis revealed that under-reporting of dietary intake has increased significantly from 53% in MANS 2003 to 61% in MANS 2014. The MANS in 2003 and 2014 showed that under-reporting of energy and nutrient intake still persisted. Dietary reanalysis after excluding of under-reporters showed that the revised mean energy intake was 2,097 kcal in MANS 2003 and 2,123 kcal for MANS 2014 (Ahmad Ali *et al.*, 2019b), respectively.

The Socio Cultural Research in Protein Transition (SCRiPT) study involving 1,604 Malaysian adults reported a mean energy intake of 1,776 kcal/day (men 1,869 kcal/day; women 1,699 kcal/day) (Drenowski *et al.*, 2020). In addition, the Malaysia Lipid Study which was conducted among Malaysian urban dwellers ($N = 577$) reported a mean energy intake of $1,825 \pm 413$ kcal/day (Karupaiah *et al.*, 2019).

The findings of the MANS 2014 demonstrated that the

were included. Both the review and meta-analysis results indicated that Malaysian adults generally met or exceeded recommendation for fat and protein but were inconsistent with respect to energy and carbohydrate. For example, the MANS 2003 and MANS 2014 studies showed inadequate energy intakes among Malaysian adults. However, the findings of the meta-analysis did not take into consideration the re-analysis of the MANS 2003 and 2014 data (Ahmad Ali *et al.*, 2019a).

The MANS 2014 evaluated the frequency of food consumption based on habitual intake of Malaysian adults aged 18 and 59 years during the last one year. The key findings of MANS 2014 revealed that the top ten foods consumed by Malaysians were rice (98.4%), hen egg (95.2%), green leafy vegetables (94.8%), chicken (94.5%), marine fish (93.5%), local kuih (79.9%), bread (78.3%), mee-hoon/ kuew-teow (77.5%), noodles (76.8%), and soy sauce (76.6%). In addition, white rice and sugar were the two top most foods consumed on daily basis as these were consumed by 89.8% and 55.9% of the Malaysian adults, respectively (IPH, 2014).

A recent review and meta-analysis on energy and macronutrient intake among adults (Shahar *et al.*, 2018) demonstrated that the major macronutrient sources in Malaysian adults' diet were animal products (poultry, meat, and fish) for protein, vegetable oils (palm oil and palm kernel oil) for fat, and white rice, vegetables, and sugar for carbohydrates. The most recent National Health and Morbidity Survey, NHMS 2019 (IPH, 2020) demonstrated that 94.9% (95% CI = 93.82-95.79) of the

The findings of the NHMS 2011 demonstrated that the median percentage of total energy contributed by macronutrients was 55% for carbohydrate, 16% for protein and 29% of fat. This was found to be similar in men and women (IPH, 2014). A more recent study reported a mean macronutrient distribution of approximately 54% carbohydrate, 14% protein, and 32% fat, respectively (Karupaiah *et al.*, 2019). Both nationwide and individual studies included in a review and meta-analysis consistently showed that Malaysian adults generally consumed adequate or higher protein (80% of RNI) and fat ($\leq 30\%$ of total energy intake) across different groups of respondents, regardless of the dietary assessments tool used (Shahar *et al.*, 2018). However, the findings were inconsistent with respect to carbohydrates with smaller studies reporting adequate intake (50-65% RNI) while a nation-wide survey (MANS 2014) reported a lower intake (Shahar *et al.*, 2018).

More recently, a literature review and meta-analysis was conducted to evaluate the best available evidence regarding energy and macronutrient intake among adults (aged 19 to 59 years) in Malaysia (Shahar *et al.*, 2018). Information regarding levels and status of intake in comparison to the Malaysian Recommended Nutrient Intake (NCCFN, 2017), and sources of macronutrients among the population, was collated from food balance sheets, national surveys, as well as individual studies. A total of 20 studies (five nationwide and 15 smaller studies)

demonstrated that 61.9% (60% of 51 = 30.92, 60.7% of 48 Malaysians did not consume adequate fruits (2 servings per day) and/ or vegetables (3 servings per day) as recommended by the World Health Organization (WHO, 2003) or MDG 2010. This prevalence is consistently showing an increasing trend from 92.5% in the NHMS 2011 and 94.0% in the NHMS 2015 (IPH, 2020).

Attributed to the rapid urbanisation, increased household incomes, and greater dependence on processed food or eating out, Malaysia is experiencing a change in dietary trends. This nutrition transition involves the change from a traditional or agro-based, to a more 'westernised' or global diet and lifestyle (Popkin, 2006). This was evidenced by the findings of a study on an urban-living cohort comprising of typical racial mix of Malaysia (Balasubramanian *et al.*, 2020). The findings revealed four dietary patterns: 'Home Meal' pattern which represented a high intake of white rice, sugar-sweetened beverages, and non-starchy vegetables; 'Chinese Traditional' pattern – high intake of noodle dishes, unsweetened plain coffee or tea; 'Plant Foods' pattern – a high intake of fruit and non-starchy vegetables and low eating out frequency; and 'Sugar-sweetened Beverages' pattern – a high intake of sugar-sweetened beverages such as tea or coffee added with sugar or sweetened condensed milk, cocoa and malted beverages, and cordial or carbonated beverages. Among these, the 'Sugar-sweetened Beverages' pattern which was more dominant with Malay

and Indian subjects, made up the largest proportion (35.1%). The study also found that men were least likely to practise the 'Plant Foods' pattern but most likely to have a diet that follows the 'Sugar-sweetened Beverages' pattern, whereas it was entirely reversed in women.

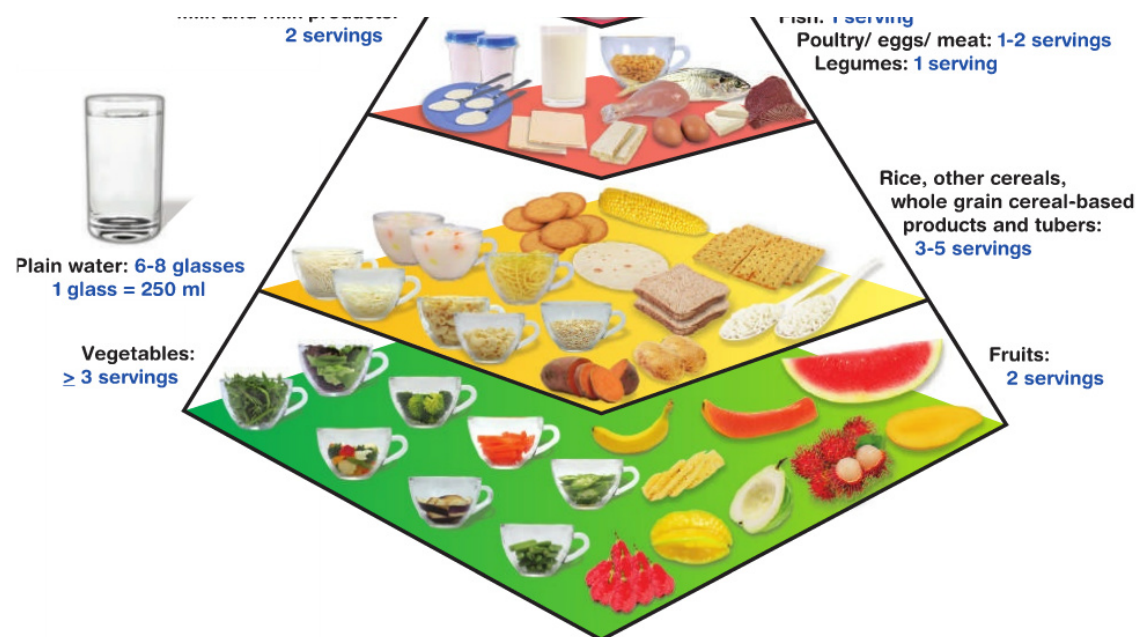
In a recent study, Drewnowski *et al.* (2020) reported energy intakes were 1,869 kcal/d for men and 1,699 kcal/d for women. Protein intakes were 78.5 g/d for men and 72.5 g/d for women. Higher energy and protein intakes were

associated with Chinese ethnicity, higher education and incomes. Frequency counts identified plant proteins in 50% of foods, followed by meat (19%), fish (12%), eggs (12%), and dairy (7%). Most frequent source of meat was chicken (16%) rather than pork or beef (1.5% each). In multivariate regressions, education, urbanization and ethnicity were associated with animal proteins; rural setting, age, ethnicity, and religion were associated with plant proteins. Protein choices involve socio-cultural as well as economic variables.

MALAYSIAN FOOD PYRAMID 2020

Guide to Your DAILY Food Intake





Notes:

- The number of servings is calculated based on 1500 to 2300 kcal.
- This pyramid is meant for children aged 7 years and older; for younger children, refer to the Malaysian Dietary Guidelines (MDG) for Children and Adolescents.
- For adolescents aged 13 to 15 years, the recommendation for fruits is 2-3 servings and for milk and milk products 2-3 servings.
- For adolescents aged 16 to < 18 years, the recommendation for fruits is 2-3 servings, milk and milk products 2-3 servings and for rice, other cereals, whole grain cereal-based products and tubers 3-6 servings.
- * This includes ultra-processed foods which contain artificial substances such as colours, sweeteners, flavours, preservatives, and other additives.

Figure 1.1. Malaysian Food Pyramid 2020

1.5 Key Recommendations

Key Recommendation 1

Choose your daily food intake based on recommended number of servings in the Malaysian Food Pyramid 2020.

How to Achieve

1. Choose a combination of all food groups in the Malaysian Food Pyramid 2020 (Figure 1.1) to ensure the body gets all the nutrients needed within the recommended amount.
2. Choose the recommended number of servings for each food group based on your caloric needs (Table 1.1 and Table 1.2). For food serving equivalent list, please refer Table 1.3 to Table 1.9.
3. Plan your daily menu based on your recommended number of servings for each food group (Refer to Table 1.10 to Table 1.13 for menu examples).
4. Limit intake of fats and oils as well as salt and sugars in your daily diet.
5. Limit intake of processed and ultra-processed foods.

Table 1.1: Recommended number of servings for each food group based on 1500 kcal, 1800 kcal and 2000 kcal per day

Food group	Recommended number of servings		
	1500 kcal*	1800 kcal*	2000 kcal*
Vegetable ¹	≥ 3	≥ 3	≥ 3
Fruit ²	2	2	2
Rice, other cereals, wholegrain cereal-based products and tubers ³	3	4	5
Poultry/ Meat/ Egg ⁴	1	1	2
Fish ⁵	1	1	1
Legumes (combine bean, lentil and soy) ⁶	1	1	1
Milk & milk products ⁷	2	2	2
Fats /oils (including 1 serving from nuts and seeds) ⁸	6	8	9
Sugar ⁹	1	1	2

Notes:

Tips to remember, the more physically active you are, the more calories are required per day. However, if you are very sedentary, less calories are needed per day.

¹ Calorie free

² Based on 15 g carbohydrate and 60 kcal per serving;

³ Based on 30 g carbohydrate, 4 g protein, 1 g fat and 150 kcal per serving;

⁴ Based on 14 g protein, 8 g fat and 130 kcal per serving;

⁵ Based on 14 g protein, 2 g fat and 70 kcal per serving;

⁶ Based on 40 g carbohydrate, 14 g protein, 0.5 g fat and 220 kcal per serving

⁷ Based on 15 g carbohydrate, 8 g protein, 1 g fat and 90 kcal per serving;

⁸ Based on 5 g fat and 45 kcal (including 1 serving of nuts & seeds = 5 g of fat and 65 kcal);

⁹ Based on 15 g CHO and 60 kcal. 1 serving of sugar = 3 teaspoons; 1 teaspoon = 5 g of carbohydrate and 20 kcal.

Sources: Suzana *et al.* (2015); *RNI (2017)

Table 1.2: Example of common foods (per serving) in household measurement for intake of 1800 kcal per day

Food group	Servings/ day	Serving size in household measurement
Vegetables	3	1/2 cup spinach, cooked 1 cup ulam 1/2 cup mixed vegetables, cooked (i.e., cabbage + carrot + baby corn + french bean)
Fruits	2	1 whole medium <i>pisang berangan</i> 1 whole medium apple
Rice, other cereals, wholegrain cereal-based products and tubers	4	2 slices wholemeal bread 2 scoops white rice, cooked 1 1/2 cups spaghetti, cooked 4 pieces wholegrain crackers
Poultry/ Meat/ Egg	1	1 medium chicken drumstick OR

		1 palm size lean beef OR 2 hen eggs
Fish	1	1 medium Indian Mackerel (<i>ikan kembung</i>)
Legumes	1	1½ square pieces tauhu
Milk & milk products	2	1 glass low fat milk 2 slices cheese
Fats/ oils	8	8 tsp
Sugar (including free sugar)	1	3 tsp

Note:

Please refer to Table 1.3 to Table 1.9 for list of foods in each food group with serving size.

Key Recommendation 2

Eat your main meals (breakfast, lunch and dinner) as recommended by the Malaysian Healthy Plate.



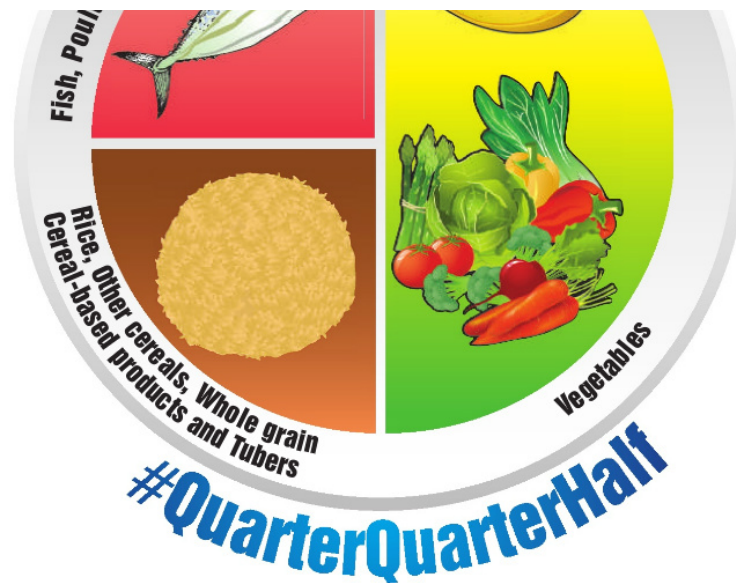


Figure 1.2: Malaysian Healthy Plate

How to Achieve

1. Use the Malaysian Healthy Plate for your daily main meals, which is based on the quarter-quarter-half concept (Figure 1.4).
 - a. Fill in the first quarter of your plate with rice/ other cereals (e.g: meehoon)/ wholegrain cereal-based products (e.g: wholegrain bread)/ tubers (e.g: sweet potato). It is recommended to fill in this first quarter with whole grains.
 - b. Fill in the second quarter of your plate with fish/ poultry/ meat/ egg/ legumes (e.g: dhall, tempeh, soy beancurd)/ dairy products.
 - c. Fill the other half of your plate with vegetables and fruits.
2. Drink plain water or unsweetened beverages with the meal.
3. Consume milk or milk products as recommended.
4. Add legumes as snacks if legumes are not included in your main meals.
5. Limit additional soy sauce, tomato sauce, chilli sauce and gravies high in salt, sugar and fat to your main meal.

Key Recommendation 3

Limit intake of processed and ultra-processed food.

How to achieve

1. Limit intake of ultra-processed foods such as soft drinks, sweetened breakfast cereals, salty fatty packaged snacks and instant noodles, which are nutritionally unbalanced.
2. Prepare or choose natural ingredients for cooking instead of using ingredients made from commercially prepared processed or ultra-processed foods such as fish ball, meat balls, salami, sausage and etc.

3. Reduce frequency of eating at fast food outlets and buying ready to eat frozen foods sold in convenient stores.
4. Be aware that advertising of ultra-processed products dominates commercial advertising of food; it often conveys incorrect or incomplete information about diet and health.
5. Shop mindfully. Limit purchasing of processed and ultra-processed products.



Additional recommendation: Nutrient supplements

Eating a variety of foods daily as guided by the Malaysian Food Pyramid should provide all the nutrients needed by the body. Therefore, supplements are not necessary for most individuals. Supplements of vitamins, minerals or fibre do not supply the nutrients and other essential components present in foods that are important to health. Nutrient supplements cannot be used as a substitute for proper food choices and supplements of some nutrients taken regularly in large amounts are harmful. However, supplements may be needed to meet specific nutrient requirements such as during convalescence, in pregnant and lactating women and for the elderly. Nutrient supplements should only be taken on the advice of nutritionists, dietitians and medical doctors.

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