REPUBLIC OF LEBANON
MINISTRY OF PUBLIC HEALTH

Dietary management of noncommunicable diseases

A reference guide for healthcare professionals




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Introduction

Consuming a healthy diet throughout the life-course helps prevent malnutrition in all its forms as well as several noncommunicable diseases (NCDs). NCDs, also referred to as chronic diseases, tend to be of long duration and are a result of a combination of genetics, physiology, ecology, and behavioral factors.

NCDs are the leading global cause of death, and they include cardiovascular diseases, cancer, diabetes, and chronic respiratory diseases. These NCDs share key modifiable behavioral risk factors like tobacco use, unhealthy diet, lack of physical activity, and the harmful use of alcohol, which in turn lead to overweight and obesity, raised blood pressure, raised cholesterol, and ultimately disease.[1] In Lebanon, 89% of deaths are from NCDs with a 20% probability of premature mortality from NCDs.[1]

Primary healthcare professionals have several roles to play in the prevention and management of behavioral risk factors and the provision of therapeutic education aiming to empower and involve patients in self-management.[2]

This guide addresses basic nutrition concepts (Chapter 1), evidence-based nutrition and lifestyle recommendations for a healthier lifestyle (Chapter 2), lifestyle guidance for cardiovascular diseases (Chapter 3), and lifestyle guidance for diabetes (Chapter 4). This guide aims to be a reference for healthcare professionals, including physicians, nurses, and dietitians, practicing in the context of Primary Health Care in Lebanon. Within each chapter, recommendations for each condition are described and a job aid is provided to support professionals in lifestyle therapeutic patient education.




Chapter 1:

Basic nutrition concepts

The human body is made of the same constituents that can be found in food. These constituents are referred to as nutrients. Nutrients are components that we find in food and that play an important role in health.[3]

A nutritious diet consists of a habitual way of choosing foods that aim to be adequate in nutrients, varied and balanced in food sources, and moderate in energy and other undesired dietary components (sugars, saturated fats, tans fats and salt).[3]

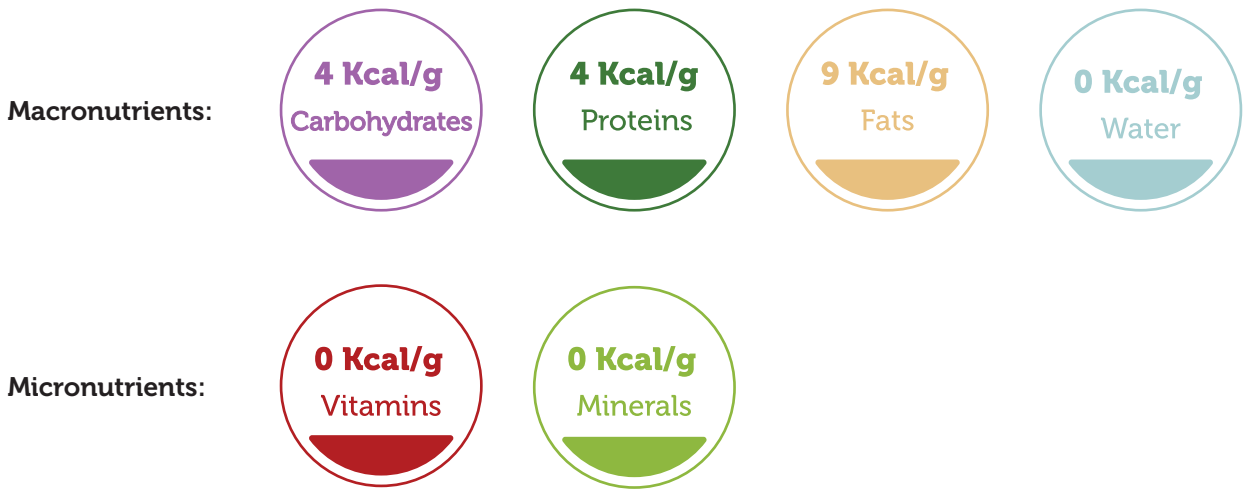
1. Nutrients

The human body requires six nutrients, and these include:

- Carbohydrates
- Proteins
- Fats
- Vitamins
- Minerals
- Water

These nutrients can also be classified into macronutrients and micronutrients. Figure 1 provides details on the types of nutrients and energy they yield.

Figure 1 | *Nutrients*



Different foods and beverages can provide sources of different nutrients. It is important for healthcare professionals to be familiar with food sources of nutrients to support and facilitate lifestyle changes of people living with noncommunicable diseases.

2. Carbohydrates

Carbohydrates are compounds composed of single or multiple sugars; carbohydrates are an important fuel for most body functions. The body uses carbohydrates for energy and other important bodily functions.[3]

Box 1 provides common food sources of carbohydrates.

Box 1 | *Common food sources of carbohydrates*

1. Whole grains
(whole grain bread, Tannour bread, bran bread, freekeh, burghul, whole grain pasta, etc.)*

2. Refined starches
(white breads, white pasta, white rice, etc.)

3. Starchy vegetables
(potatoes, corn, sweet potatoes, beets, etc.)*

4. Beans and legumes
(lentils, peas, chickpeas, beans, fava beans, etc.)*

5. Milk and yogurt
(full-fat or low-fat milk and yogurt)

6. Fruits and juices
(fresh fruits*, dried fruits*, and juices)

7. Sugar and desserts
(sugar, honey, molasses, desserts, sweetened beverages, etc.)

* *These food groups also provide sources of dietary fibers*

Consuming whole grains and other fiber-rich sources of carbohydrates (such as fruits, vegetables and legumes), has been associated with a decreased risk of cardiovascular diseases, overweight, abdominal obesity, hypercholesterolemia, and insulin resistance.[4]

Dietary fibers

Dietary fibers are a type of carbohydrates which mostly pass through the human body intact and do not provide energy (unlike other types of carbohydrates). Fibers are known for their ability to support healthier blood glucose levels, lower blood cholesterol, and promote the health of the digestive tract.[3] Foods rich in dietary fibers include fruits, vegetables, beans, peas, whole grains, nuts, and seeds. Box 1 above also marks foods rich in fibers with an asterisk (*).

3. Proteins

Proteins are nutrients composed of amino acids. Proteins are made up of 20 common amino acids, some of which are non-essential (can be produced by the body) while others are essential, meaning that they must be provided by the diet.[5]

Proteins are needed for the body to function properly. They are the basis of body structures, such as skin and hair, and of other substances such as enzymes and immune cells.[3]

Box 2 provides common food sources of proteins.

Box 2 **|** *Common food sources of proteins*

1. **Beans and legumes** (lentils, peas, chickpeas, beans, fava beans, etc.)*
2. **Dairy products** (full-fat or low-fat milk, yogurt, cheeses and labneh)
3. **Meat and poultry**
4. **Fish and seafood**
5. **Nuts and seeds***

* *These food groups also provide sources of dietary fibers*

Food rich in proteins can be from animal or plant sources; however, the quality of the proteins differs. While **animal sources are considered complete** because they provide enough of all the essential amino acids needed by the body, **plant sources of proteins need to be complemented**. This means that plant sources of proteins need to be complemented with other plant sources (or with animal sources) to become complete. The complementary proteins can be provided within a day (across multiple meals) and do not have to be eaten together at the same meal. Legumes/beans and vegetables can be complemented with grains or nuts to become complete[3] (vice versa is also applicable, nuts or grains can be complemented by vegetables or legumes/beans). For instance, a plate of rice (grain) is considered an example of incomplete protein, the same applies to a plate of beans. However, if they are consumed together, they complement each other, rendering a plate of beans and rice a complete source of protein.

Table 1 provides guidance on how to complement proteins together.

Table 1 | *How to complement proteins together*

	Isoleucine	Lysine	Methionine	Tryptophan
Grains (ex. Rice, bread)			●	●
Beans (ex. Hummus)	●	●		
Grain and beans (Bread and hummus)	●	●	●	●

Beans provide plenty of the essential amino acids isoleucine and lysine, but not enough methionine and tryptophan. Grains provide methionine and tryptophan, but not enough isoleucine and lysine, making them a complementary protein for beans.

4. Dietary fats

Fat is a nutrient that provides energy and acts as the body's chief storage form of energy. Fat also contributes to satiety and acts as a padding to protect internal organs. In the body, fats are needed for cells membranes, the production of some hormones and bile and other lipid-based compounds. Some types of fats called essential fatty acids, also known as omega-3 and omega-6 fatty acids, must be provided by the diet and cannot be produced by the body.[3]

Both the quality and quantity of fat impact human health and they play a critical role in the dietary management of cardiovascular disease.[6]

Box 3 provides common food sources of dietary fats.

Box 3 | *Common food sources of dietary fats*

Saturated fats

(usually solid at room temperature and found in animal sources of fats)

- Butter, oils, ghee
- Fat in meats and poultry
- Full-fat dairy products

Unsaturated fats

(usually liquid at room temperature and found in plant sources of fats)

- Nuts and seeds
- Vegetable oils (olive oil, corn oil, sunflower oil, etc.)
- Fat in fish and seafood (this is an exception of an animal source which provides unsaturated fats)

Chapter 2:
Nutrition and lifestyle recommendations for a healthier lifestyle

Human health is greatly influenced by nutritional and lifestyle habits across all stages of the lifespan. A large pool of evidence has shown that a healthy lifestyle and dietary patterns adopted by people can help achieve and maintain good health and reduce the risk of chronic diseases.[7]

Amongst adults, rates of overweight and obesity have been increasing over the past decade with about 38% of adults reported to be overweight and 27% obese as per the WHO STEPwise Approach to NCD risk factor surveillance (STEPS), published in 2018.[8] The 2023-2024 STEPwise survey (unpublished) shows increasing rates, with about 67% of adults reported to have overweight and 32.1% to have obesity.

Main behavioral risk factors for NCDs

a. Unhealthy diets

Consuming an unhealthy diet throughout a person's life increases the risk of diet-related NCDs and conditions. Unhealthy diets are characterized by high consumption of processed food, excess intakes of total fat, saturated and trans fats, added sugars and added salt/sodium, and not enough fiber-rich fruits, vegetables, and whole grains.[9,10]

Healthy diets focus on foods and beverages that are nutrient-dense and reflect personal preferences, cultural traditions, locally available foods and budgetary considerations.[7]

What is a healthy diet?

A healthy diet is important for the prevention and management of many NCDs including cardiovascular diseases, hypertension, diabetes, as well as obesity. Individuals have different energy and nutrients needs that depend on their age, sex, body size, life stage, level of physical activity, food access and other physical, economic, and socio-cultural determinants that may influence food choices. However, the basic components of healthy diet remain persistent. Figure 2 summarizes the basic elements of a healthy diet for adults.[11]

Figure 2 | *Basic elements of a healthy diet*[9]

☑☐☐☐☐

Eat more whole fruits, vegetables, beans, whole grains, and nuts (avoid processed foods). Red meat can be eaten **1-2 times per week** and poultry **2-3 times per week**

☐☑☐☐☐

Eat at least 5 portions of fruits and vegetables a day (at least 400g)

☐☐☑☐☐

Limit intake of added sugars to a maximum of 6-12 teaspoons per day (25-50g)

☐☐☐☑☐

Limit salt to **less than 5g per day** (1 teaspoon, equivalent to approximately 2g of sodium), and **use** iodized salt

☐☐☐☐☑

Unsaturated fats (fish, nuts, olive oil, avocados) are preferable to saturated fats (fatty meat, butter, palm oil, fatty cheeses, etc.)

Industrially produced fats (trans fats) found in fast food, fried food, ready-made cookies, and cakes should **NOT** be part of a healthy diet

b. Insufficient physical activity

Physical inactivity can have detrimental impacts on health. People who are insufficiently active are between 20% and 30% more likely to die prematurely; additionally, insufficient physical activity is a key risk factor for cardiovascular diseases, cancer, and diabetes.[11]

Regular physical activity has a multitude of health benefits that include improving blood lipid profile and blood circulation, bone health, cognitive health, and sleep. It also plays a role in enhancing weight loss, preventing some types of cancer, enhancing blood sugar control, and strengthening immunity, among other benefits.[6,12]

Generally, any amount of physical activity is considered important for health and better than none. Physical activity can be structured and part of sports, but it can also be simply incorporated into daily life as part of work, leisure, household chores or transportation (such as walking to work or to the market).[12]

For individuals who are generally inactive, physical activity can be initiated gradually and progressively with bouts of ten minutes until the recommendations are met.

Adults should aim for:[12]

at least **150 - 300 minutes** of moderate aerobic physical activity (mild increase in heart rate or breathing rate) throughout the week,

or

at least **75 minutes** of vigorous aerobic physical activity throughout the week,

or

an equivalent combination of moderate and vigorous activity throughout the week,

and

at least **2 days** a week of muscle-strengthening activities

Limit the amount of time spent being sedentary

(time spent sitting or lying with low energy expenditure while awake)

Table 2 | *Examples of physical activity*

Moderate physical activity	Vigorous physical activity	Muscle-strengthening activities
● Brisk walking	● Running	● Lifting weights
● Climbing stairs	● Fast cycling	● Push-ups, sit-ups and squats
● Dancing	● Fast swimming	● Climbing stairs
● Gardening	● Vigorous gardening	● Walking uphill
● Household chores	● Structured physical activity, such as playing a sport like football or basketball	




c. Tobacco use and harmful use of alcohol

Tobacco products are very harmful to health; the use of tobacco can damage every part of the body and is one of the main risk factors for cardiovascular diseases. Tobacco use causes an estimated 10% of all cardiovascular deaths, and about 3 million deaths per year are estimated to be due to tobacco.[13] Within one year of quitting, the risk of heart attack and angina is cut by half. Fifteen years after quitting, the risk of heart attack and angina becomes similar to that of a non-smoker.[11]

Harmful use of alcohol is also a risk factor for cardiovascular diseases and has many negative health and social consequences.[11] The risks related to alcohol are influenced by the individual's drinking patterns and amount of alcohol consumed. There is no clear definition for safe or non-harmful use of alcohol. However, individuals who drink no more than two units of alcohol per day (two drinks) and do not drink on at least two days of the week, are generally considered to be at lower risk for negative consequences of alcohol.[2]


Chapter 3:
Lifestyle guidance for cardiovascular diseases

Cardiovascular diseases are the leading cause of death, representing more than 30% of the total causes of global deaths. Most cardiovascular diseases can be prevented through behavioral change.[14] Poor diet, in particular, is associated with an increased risk of cardiovascular diseases.[15]

Box 4 provides evidence-based dietary guidelines to promote cardiovascular health.[4,15]

Box 4 **|** *Evidence-based dietary guidelines to promote cardiovascular health*

1. Enjoying and maintaining a healthy body weight through adequate energy intake

2. Consuming plenty and a variety of fruits and vegetables

3. Focusing on whole grains (such as whole grain breads, burghul, freekeh, etc.)

4. Choosing more heart-healthy sources of protein (based on legumes and beans, fish and seafood, low-fat dairy products, and less frequently lean and unprocessed meat or poultry)

5. Minimizing added sugars (especially sugar-sweetened beverages)

6. Choosing more heart-healthy sources of fats: using liquid plant oils such as olive, sunflower, corn, soy oils **instead of** tropical oils (palm oil), animal fats (butter, ghee) and hydrogenated (trans fats), fats (fried foods, packaged baked cakes, cookies and chips)

7. Limiting salt by minimizing salted and processed foods (ready-made soups and sauces, broth cubes, pickles and olives, smoked and processed meats) and limiting added table salt

8. Limiting or abstaining from alcohol

9. Being physically active

1. Enjoying and maintaining a healthy body weight

People at a healthy body weight should aim to maintain it, while those living with overweight or obesity may improve their health by gradually reducing their weight.

Overweight and obesity are classified based on Body Mass Index (BMI) which assesses body weight in relevance to height. Body mass index is calculated as weight (kg) / height (m^2). Appendix 2 provides anthropometric measurement techniques for estimating height and weight.

Table 3 details the classification based on BMI.

Table 3 | *BMI Classification*

BMI ranges (kg/m^2)[15]	Body weight classification
<18.5	Underweight
18.5-24.9	Healthy weight
25-29.9	Overweight
≥30	Obesity

A healthy dietary pattern along with a physically active lifestyle can support energy balance, meaning the calories consumed match the calories expended, which is essential for maintaining or adjusting weight effectively.[15]

Box 5 provides some tips to support weight management among individuals with overweight or obesity.

Box 5 | *Weight management tips*

- Aim for a weight loss of about **0.5kg per week**
- Focus on **portion control** (decreasing portion sizes is among the most efficient strategies to support weight loss)
- Increase **fiber-rich foods** (such as fruits, vegetables, legumes/beans and whole grains)
- **Limit added sugars** such as sweets and dessert and sweetened beverages (soda and juices)
- **Limit high energy foods** such as sweets and desserts, fried foods and fatty foods (such as butters, ghee, fatty meats, fast food)

2. Consuming plenty of fruits and vegetables

Fruits and vegetables have been shown to have a protective effect against cardiovascular disease.[15,16,17] These foods are rich in nutrients such as fiber, vitamins, and minerals, which help to lower blood pressure and cholesterol levels.[18] A diet rich in fruits and vegetables is associated with lower risk of stroke, cardiovascular mortality and overall mortality.[15,17,19]

It is recommended to consume 5 portions of fruits and vegetables per day (at least 400g) as part of a healthy diet.[11,17]

Table 4 provides examples of one portion of fruits and vegetables.

Table 4 | *Examples of 1 portion of fruits and vegetables*

Examples of 1 portion of fruits and vegetables	
Fruits (1 portion)	**Vegetables (1 portion)**
• **1** apple	• **1 cup** of raw vegetables (tomatoes, cucumbers, peppers, etc.)
• **1** banana	• **2 cups** of raw green leafy vegetables (mint, thyme, rocca, etc.)
• **1** orange	• **1 cup** of cooked vegetables (spinach, mouloukhye, okra, green beans, etc.)
• **1** peach	• **1 cup** of vegetable juice
• **1** handful of grapes, cherries	
• **2** plums or apricots	
• **1** cup of fresh fruit juice	
• **½ cup** of dried fruits (dates, prunes, raisins, figs, apricots, etc.)	

Box 6 provides tips to increase fruit and vegetable intake.

Box 6 **|** *Tips to increase fruit and vegetable intake*

- Add vegetables to meals such as pasta, pizza, rice, soups, sauces and casseroles
- Add vegetables to your sandwich
- Consume fresh fruits and vegetables as snacks
- Try vegetable sticks like carrots and cucumbers with a hummus dip
- Add fruits to yogurt or cereals
- Eat a variety of fresh fruits and vegetables that are in season

3. Focusing on whole grains

Whole grains have been linked to a reduced risk of heart disease due to their fiber, vitamins, minerals, and antioxidants content. Antioxidants are food components that protect cells from damage.

Individuals with higher whole grains intake have a lower risk of cardiovascular diseases, lower inflammation, blood pressure, blood lipids and insulin resistance.[20,21]

Examples of whole grains

- Whole wheat Arabic or Saj bread
- Tannour bread
- Whole wheat pasta
- Whole wheat toast
- Burghul
- Freekeh
- Whole wheat kernels
- Whole grain rice or oat

4. Choosing more heart-healthy sources of protein

Plant proteins have several advantages over animal proteins in terms of cardiovascular disease risk and thus they are considered more heart-healthy.[15] Higher plant protein intake has been linked to lower risk of cardiovascular disease related mortality.[22]

Box 7 provides heart-healthy sources protein.[9,15]

Box 7 | *Heart-healthy sources of protein*

Mostly consume plant sources of proteins, such as beans, lentils, chickpeas, fava beans, nuts and seeds.

Regularly consume fish and seafood.
When accessible and affordable, incorporate fresh or frozen fish on a regular basis.

Canned fish and seafood such as canned tuna and sardines are more affordable sources that can be suggested as an alternative. However, they are sources of salt and should be consumed with caution, especially among individuals with hypertension.

Washing canned food with drinking water can decrease salt content.

Select dairy products that are lower in fat.
Incorporate dairy products that are naturally lower in fat (such as labneh, double crème cheese, areesheh and shankleesh).

When accessible and affordable, replace full-fat milk, yogurt and cheeses with low-fat or fat-free products.

If desired, choose fresh or frozen lean cuts of meats and poultry.
Limit consumption of red meats to 1-2 times per week, skinless poultry to 2-3 times per week and avoid processed meats (mortadella, turkey, etc.).



5. Choosing more heart-healthy sources of fats

The quality of dietary fat plays an important role in cardiovascular health.

Unsaturated fats, mainly found in plant sources of foods such as vegetable oils, nuts and seeds have been shown to be beneficial to cardiovascular health. Replacing saturated (animal fats) with unsaturated (plant fats) has been associated with lower LDL ("bad") cholesterol levels in the blood, decreasing cardiovascular risk.[15] Unsaturated fats can either be polyunsaturated (such as corn, soy, sunflower oils, and seeds) or monounsaturated (such as olive, canola oil or peanuts and peanut butter); polyunsaturated fats have a stronger LDL ("bad") cholesterol effect as compared to monounsaturated fats.

Saturated fats, mainly found in animal fats, such as dairy products, processed cheese, red meats, poultry, butter and other animal products, have been linked to an increased risk of cardiovascular disease and mortality.[23] Saturated fats raise total and LDL ("bad") cholesterol levels in the blood, increasing the risk of heart disease and stroke.[24]

Trans fats, which are commonly found in processed foods, are usually created industrially to turn liquid oils into solid fats (examples include fried foods, fried sweets, packaged cakes, cookies and crackers, and any food with partially hydrogenated oils listed in the ingredients). Trans fats have been shown to raise LDL ("bad") cholesterol levels and lower HDL ("good") cholesterol levels, further increasing the risk of heart disease and mortality.[24,25]

Table 5 provides sources of dietary fats.

Table 5 | *Sources of dietary fats*

	Sources of dietary fats
Unsaturated fats	• Vegetable oils (olive oil, sunflower oil, corn oil, soy oil) • Seeds (tahini paste, sesame, sunflower seeds, pumpkin seeds) • Nuts (peanuts, almonds, cashews, walnuts) • Some vegetables (olives, avocados) • Fish and seafood
Saturated fats	• Red meats (especially fatty cuts of meat) • Poultry (poultry skin is particularly high in saturated fats) • Eggs • Dairy products (full-fat dairy products contain more saturated fats as compared to low-fat products) • Butter, ghee or cream • Tropical oils (palm or coconut oils)
Trans fats	• Fried foods (french fries, fried meats, fried vegetables, and fried sweets such as doughnuts, awamat, maakroun, mshabak, etc.) • Fast food (including common menu items at fast food outlets such as fried foods, burgers, etc.) • Ready-to eat packaged snacks (chips, ready-made cookies, cakes, and crackers) • Any food with "partially hydrogenated fat/oil" listed in the ingredients (these may include processed cheeses and margarine, non-dairy creamers, etc.)

It is advised to replace saturated fats with unsaturated fats when possible and to minimize the consumption of trans fats. **Saturated fat consumption should be limited to 10% of total energy intake,[11] meaning less than 20g of saturated fat per day**.

Box 8 illustrates an example on how to decrease saturated fat intake in a given day.

Box 8 **|** *Example strategies to decrease saturated fat intake in a given day*

Day 1:
High saturated fat (approx. 50g)

Breakfast
60g of full-fat cheese

Snack
1 cup of full-fat yogurt

Lunch
100g of beef steak

Dinner
2 tablespoons of labneh

Day 2:
Adequate saturated fat (<20g)

Breakfast
Zaatar with sesame and olive oil

Snack
1 cup of fat-free yogurt

Lunch
100g of skinless chicken breast

Dinner
2 tablespoons of labneh

The below are strategies that can be used to decrease saturated fat intake across the day:

Replace animal sources of food with plant sources (for example: cheese with zaatar or foul or balila for breakfast)

Replace full-fat dairy products with low-fat dairy products (for example: replace full-fat yogurt with low-fat yogurt)

Replace fatty meats with leaner cuts of meats (for example: beef steak with skinless chicken breast)

Consume smaller portions of foods high in saturated fats (for example: replace a steak of 150-200g with a stew that contains meat cubes providing an average of 2-4 pieces of meat which are around 40-50g)

6. Minimizing added sugars

Added sugars are used in cakes, cookies, sweets, sugar-sweetened beverages (juices, soft drinks, flavored milks, etc.), but they are also naturally found in honey, syrup, and fruit concentrates.[11] There is a strong association between consumption of foods and beverages with added sugar and decreased cardiovascular health; for example, intake of sweetened beverages has been shown to increase the risk of coronary heart disease, diabetes and obesity.[15,25,26]

It is recommended to limit sugar intake to 5-10% of total energy intake which is equivalent to a maximum of 12 teaspoons of sugar per day. For additional benefits, it is preferable to maintain sugar intake below 5% of energy intake meaning about 6 teaspoons per day.[11]

7. Limiting salt

There is a strong correlation between salt intake and elevated blood pressure both in individuals with or without hypertension.[15]

It is recommended to decrease salt intake to than 5g per day which is the equivalent of one teaspoon of salt. Salt is added to food either during cooking or directly to dishes. However, processed foods often contain high amounts of salt, which can go unnoticed and may not be accounted for in daily intake.[11]

Table 6 details the sources of salt in the diet. Box 9 provides strategies to decrease salt intake.

Table 6 | *Sources of salt in the diet*

Sources of salt in the diet	Common examples
Processed or ready-to-eat foods	• Ready-to-eat powdered soups, sauces and gravies • Stock cubes for cooking stews • Ready-to-eat snacks such as chips, some cereal bars, ready-made cookies, pretzels and crackers • Processed cheeses such as cheese spreads • Processed meats such as mortadella, turkey, etc. • Tomato paste • Frozen ready-to-eat meals or prepacked processed mixes of ready-to-eat dishes
Canned foods	• Canned vegetables (like peas and corn and carrots) • Canned beans (foul, hummus, lentils and beans) • Canned ready-to-eat meals • Canned tuna, sardines and other seafood • Canned processed meats
Pickled/cured or smoked foods	• Cucumber pickles • Makdous • Olives • Any other pickled food
Breads	• White Arabic bread if consumed in large amounts can contribute to salt intake • Some traditional breads like Markouk may also contain considerable amounts of salt
Other	• Zaatar (traditionally made zaatar can be produced with lower amounts of salt) • Keshek • Salted nuts • Soy sauce • Other table condiments such as mustard, gravies and ready-to-eat salad dressings

Box 9 **|** *Strategies to decrease salt intake*

- Use a variety of spices and dried herbs to flavor dishes
- Use lemon, vinegar, ginger and fresh herbs like mint, parsley and coriander leaves to add even more flavors to meals
- Limit the amount of salt added during preparation and cooking
- Limit salt added at the table
- Eliminate to the extent possible processed foods and replace them with fresh ingredients
- Eliminate to the extent possible foods, snacks and beverages with added salt
- Limit the amount of white Arabic bread, and other breads and rolls with salt and replace them with whole grain breads with no or little added salt

If all high salt items are eliminated as detailed in box 9, about ¼- ½ teaspoon of salt for the entire day can be included in a healthy diet and added to meals during cooking or at the table. For additional benefits, select salt that is iodized (has been fortified with iodine: a mineral needed for the health of the thyroid gland).

8. Limiting and abstaining alcohol

The relationship between alcohol consumption and cardiovascular health is complex. It is recommended to advise individuals who drink alcohol, to do so in moderation (not more than 1 drink per day). While it is recommended to advise individuals who do not drink not to start drinking.[15]

9. Being physically active

Adults with cardiovascular diseases should aim to perform physical activity based on the same guidelines for the general public. These include:[12]

at least 150 minutes of moderate intensity physical activity
(mild increase in heart rate or breathing rate)
or
at least 75 minutes of vigorous intensity physical activity
or
an equivalent combination of moderate and vigorous activity

and

at least 2 days a week of muscle-strengthening activities*

Limit the amount of time spent being sedentary
(time spent sitting or lying with low energy expenditure while awake)

* *Refer to table 2 of chapter 2 for more examples of physical activity based on different levels of intensity.*

Chapter 4:
Lifestyle guidance for diabetes

Diabetes is a noncommunicable disease in which the pancreas either does not produce enough insulin or the body cannot use the insulin it makes effectively. Insulin is a hormone that is produced by the pancreas responsible to control blood sugar levels.[27]

Adults suffering from diabetes face a heightened risk of heart attacks and strokes, reduced blood flow and nerve damage in the feet. Diabetes is also a major contributor to diabetic retinopathy, which may lead to blindness, it is also among the leading causes of kidney disease and people with diabetes tend to have worse outcomes for various infectious diseases, including COVID-19.[28]

Lifestyle habits to prevent and manage diabetes are similar to the guidelines for cardiovascular disease such as **maintaining a healthy body weight, consuming fruits and vegetables, focusing of whole grains, selecting lower fat sources of food, minimizing salt and being physically active**. More guidelines are listed in box 4 of chapter 3. However, individuals with diabetes are advised to follow additional meal planning strategies to help maintain blood sugar within the recommended glycemic targets.[28,29]

1. Dietary recommendations for diabetes

There is no perfect balance of nutrients for individuals with diabetes; their meal plans should be personalized to meet their nutrient needs, energy requirements, and metabolic objectives (such as their personal preferences, their blood pressure, lipid profiles, and their body weight among others).[28]

a. Carbohydrates

The breakdown of carbohydrates during digestion results in the creation of smaller sugar molecules known as glucose, which are then absorbed into the bloodstream and contribute to elevations in blood sugar levels. Accordingly, the amount of carbohydrates in a meal is the main determinant of blood sugar after the meal. There is strong evidence suggesting that reducing carbohydrates in the diet can improve blood sugar levels for people with diabetes. This can be achieved through different eating patterns that cater to individual preferences and needs.[29]

Carbohydrate intake should prioritize nutrient-rich sources that are high in fiber and minimally processed, including non-starchy vegetables, fruits, legumes, whole grains, dairy products (such as milk and yogurt) and foods with minimal added sugars.[29]

As listed in box 1 of chapter 1, carbohydrates are found in:

1. Whole grains
(whole grain bread, Tannour bread, bran bread, freekeh, burghul, whole grain pasta, etc.)*

2. Refined starches
(white breads, white pasta, white rice, etc.)

3. Starchy vegetables
(potatoes, corn, sweet potatoes, beets, etc.)*

4. Beans and legumes
(lentils, peas, chickpeas, beans, fava beans, etc.)*

5. Milk and yogurt
(full-fat or low-fat milk and yogurt)

6. Fruits and juices
(fresh fruits*, dried fruits*, and juices)

7. Sugar and desserts
(sugar, honey, molasses, desserts, sweetened beverages, etc.)

* *These food groups also provide sources of dietary fibers*

b. Dietary fibers

Individuals with diabetes are advised to consume about 14g of fibers for each 1,000 calories consumed per day or at least 25g of fibers per day.[29] The box below provides an example of one-day meal plan with 28g of fibers (the amount needed for an average consumption of 2,000 calories per day).

Box 10 below provides an example of a 2,000 calories meal plan with 28g of fibers/day (14g/1,000 calories).

Box 10 **|** *Example of a 2,000 calories meal plan with 28g of fibers/day (14g/1,000 calories)*

Breakfast (approx. 8g fibers):

½ loaf of whole wheat bread* with labneh and 1 cup of vegetables* (tomatoes, cucumbers and mint leaves) and one medium sized fruit* (1 apple or 1 banana or 1 orange)

Lunch (approx. 10g fibers):

2 cups of mjadara* (lentils and white rice) with 2 cups of mixed salad* (tomatoes, cucumbers, lettuce and cabbage)

Dinner (approx. 10g fibers):

½ loaf of whole wheat bread* with 2 tablespoons of hummus spread* with 1 cup of cucumber and carrot sticks and one medium sized fruit* (1 apple or 1 banana or 1 orange)

General tips to increase fiber content of meals include:

- Adding fresh vegetables or a salad to each meal
- Increasing plant sources of proteins such as beans, peas, lentils, nuts and seeds
- Consuming 2-3 fruits per day
- Replacing refined sources of carbohydrates such as white bread and white rice with whole grains such as whole wheat bread and burghul

* *These food groups provide sources of dietary fibers*

Consuming meals rich in dietary fibers also slows down the absorption of glucose from the meals into the blood and it is a good strategy to support blood sugar control and increase satiety.

c. Added sugars

People with diabetes are advised to avoid sugary drinks (including fruit juices) and opt for water or low-calorie/zero-calorie beverages to support blood sugar regulation. They should also limit their intake of foods with added sugar, as they can hinder the consumption of more nutritious options.[29]

To achieve optimal health benefits, it is suggested to keep sugar intake to no more than 5-10% of daily energy intake, or a maximum of 12 teaspoons per day. For even greater benefits, it is recommended to keep sugar intake below 5% of daily calories, or around 6 teaspoons a day.[11]

Box 11 provides sugar content of common foods and beverages.

Box 11 **|** *Sugar content of common foods and beverages*

1 can of soda
(~7 teaspoons of sugar)

1 small piece of plain vanilla cake
(~6 teaspoons of sugar)

1 cup of fruit juice
(~6 teaspoons of sugar)

1 cup of ice cream
(~6 teaspoons of sugar)

1 small bar of milk chocolate
(~5 teaspoons of sugar)

1 tablespoon of halawa or jam
(~3 teaspoons of sugar)

1 tablespoon of carob molasses
(~3 teaspoons of sugar)

d. Non-sugar sweeteners

Non-sugar sweeteners have been created as a substitute for sugars and are commonly utilized in both pre-made food and drinks and added directly to food and beverages by consumers. The outcomes of randomized controlled trials suggest that non-sugar sweeteners may have minimal effects on glucose metabolism and lead to lower body weight when combined with energy restriction in the short term. Effects of long-term use of non-sugar sweeteners showed no significant improvements in diabetes outcomes such as fasting glucose and HbA1c.[29]

Non-sugar sweeteners can be consumed by individuals with diabetes. For persons that often consume sugar containing foods and beverages, substituting sugar-sweetened items with non-nutritive sweeteners may decrease total calorie and carbohydrate intake.[29]

Examples of non-sugar sweeteners include Aspartame, Stevia, Sucralose, Maltitol and Xylitol, among many others.

e. Protein

In individuals with type 2 diabetes, consuming protein induces a boost in insulin response without raising blood glucose levels.[29] Thus, proteins play a supportive role in decreasing blood sugar, and adding proteins to carbohydrate containing meals can be a good strategy to help individuals achieve target blood sugar control. It is generally recommended to fill one quarter of the plate with lean protein sources such as skinless chicken breast or baked fish.

f. Dietary fats

A diet that focuses on unsaturated fats, which is rich in mono-unsaturated and polyunsaturated fats, can potentially support better blood glucose control and reduce the risk of cardiovascular disease.[29] Additionally, dietary fats delay gastric emptying, rendering the digestion and absorption slower; this in turn also delays absorption of glucose into the bloodstream. Accordingly, adding fats (preferably unsaturated fats) to carbohydrate-containing meals can be a good strategy to help individuals achieve target glycemic control.

g. Salt

It is recommended to decrease salt intake to less than 5g per day which is the equivalent of one teaspoon of salt. Salt can be added to food through cooking or during consumption; however, very often salt is found in high amounts in processed foods.[11] Table 6 of chapter 3 lists common sources of salt in the diet.

h. Alcohol

It is recommended to advise individuals who drink alcohol, to do so in moderation (not more than 1 drink per day). While it is recommended to advise individuals who do not drink not to start drinking.[15]

2. Meal planning approaches

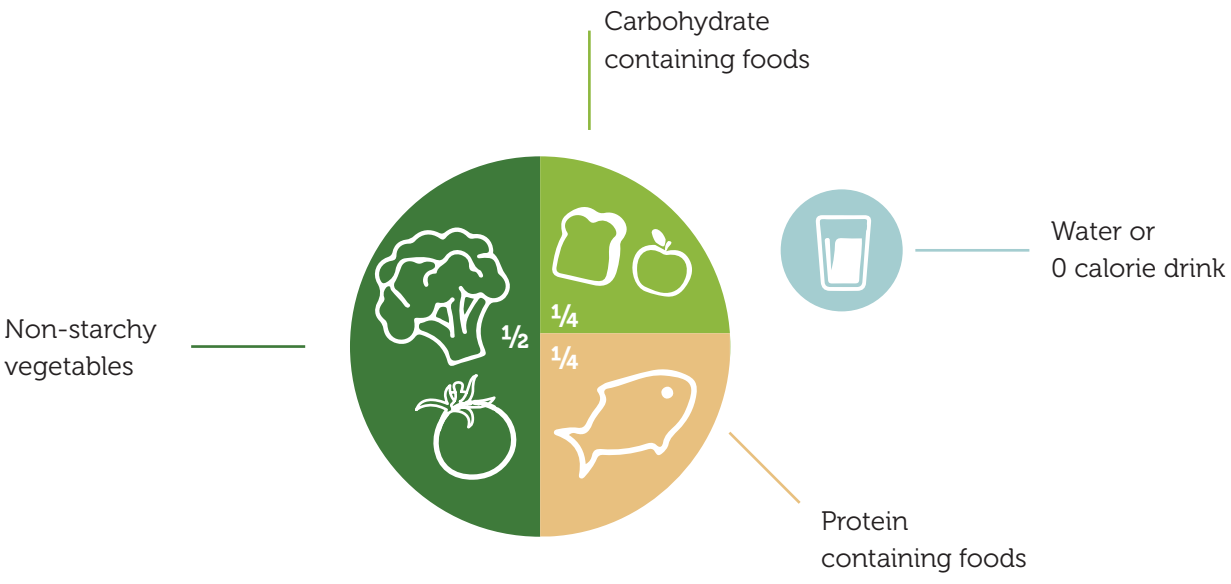
Meal planning approaches include tools that can be used to support individuals with diabetes in the management of their blood sugar through dietary interventions. The **diabetes plate method** and **carbohydrate counting method** are meal planning approaches that have been shown to be effective.[29]

a. Diabetes plate

The diabetes plate method is a widely used, easy-to-follow visual tool for meal planning. This method involves using the image of a plate to educate individuals with diabetes on the distribution of foods in appropriate portions, with half of the plate dedicated to non-starchy vegetables, a quarter for protein, and a quarter for carbohydrates.[29] In this plate, any food containing carbohydrates such as grains, starchy vegetables, fruits, milk and yogurt should be included in the carbohydrate foods, while protein foods include lean proteins, such as lean meats, poultry, fish, low-fat cheese, labneh, and eggs.

Figure 3 provides an illustration of the diabetes plate method.

Figure 3 | *Diabetes plate method*



b. Carbohydrate counting

Carbohydrate counting involves a more advanced technique for planning and monitoring the intake of carbohydrates in meals and snacks.[29] The main goal of this strategy is to maintain similar and consistent amounts of carbohydrates at each meal, supporting a steadier blood glucose release.

Carbohydrate counting can be performed by counting grams of carbohydrates or choices/portions with equivalent amounts of carbohydrates.

One carbohydrate choice or portion is equivalent to 15g of carbohydrates, meaning that 2 choices are equivalent to 30g, 3 choices to 45g and so on.

Figure 4 illustrates equivalents of 1 carbohydrate choice or 15g of carbohydrates, while figure 5 illustrates the equivalent of 3 carbohydrate choices (each with 45g of carbohydrates). Appendix 1 includes more carbohydrate equivalents listed in a table.

Figure 4 | *Each of the below images corresponds to **1 choice of carbohydrates** comprised of 15g of carbohydrates*

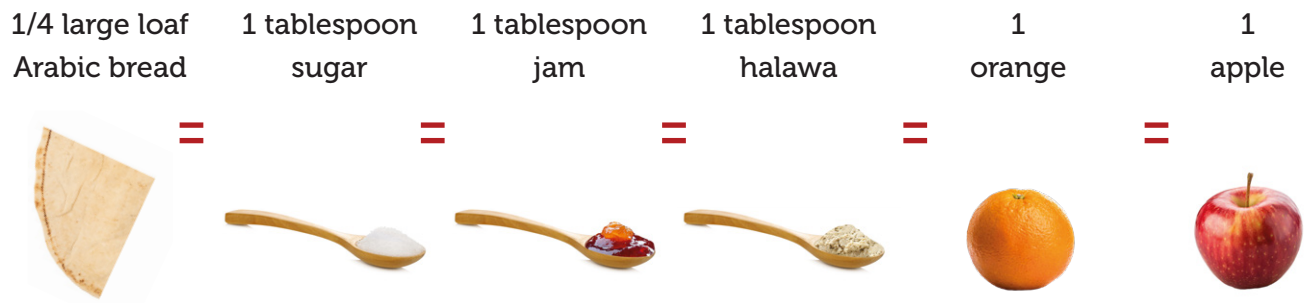


Figure 5 | *Each of the below images corresponds to **3 choices of carbohydrates** comprised of 45g of carbohydrates*

Note: The measurement of one cup can be resembled to the fist of hand for ease of visualization of the portion size.

Box 12 provides an application of carbohydrate counting.

Box 12 | *Application of carbohydrate counting*

On average, depending on the energy requirements and % carbohydrates from total calories,

a male would be advised to consume between 4-6 carbohydrate choices per meal,

while a female would be advised to consume between 3-4 carbohydrate choices per meal.

Example: Fahd is a 40-year-old male with type 2 diabetes and would like to have fasoulia stew and rice with a salad for lunch. Portion his lunch to 6 carbohydrate choices:

Lunch portioned to 6 carbohydrate choices (Total 90g of carbohydrates)

- **1 cup of fasoulia stew** (3 carbohydrate exchanges = 45g carbohydrates)
- **1 cup of rice** (3 carbohydrate exchanges = 45g carbohydrates)

If Fahd wants to consume some bread with his stew he can replace **2/3 cup of rice** *with* **1/2 loaf of bread** *keeping carbohydrate intake consistent at* **90g** *but with flexibility based on preference*

Lunch portioned to 6 carbohydrate choices (Total 90g of carbohydrates)

- **1 cup of fasoulia stew** (3 carbohydrate exchanges = 45g carbohydrates)
- **1/3 cup of rice** (1 carbohydrate exchange = 15g carbohydrates)
- **1/2 loaf of Arabic bread** (2 carbohydrate exchanges = 30g carbohydrates)

Box 13 provides a summary of suggested meal strategies that can support patients in slowing down and attenuating a fast blood sugar spike upon consumption of carbohydrate containing meals.

Box 13 | *Key meal strategies to support better blood sugar control*

1. Add fibers, proteins and fat to carbohydrate containing meals to slow down and attenuate a fast blood sugar rise
2. Replace refined carbohydrates (such as white rice and white bread) with whole grains to add more nutrients to the meal and increase fiber, which would attenuate a fast blood sugar rise
3. Avoid consuming meals that are merely composed of carbohydrates or sugars
4. Maintain consistency of carbohydrate amounts across meals
5. Decrease the total amount of carbohydrates in a meal through portion control (see suggestions based on the diabetes plate)

3. Management of hypoglycemia

For people with diabetes, hypoglycemia can be an acute complication resulting from taking too much insulin or some glucose-lowering medications. Meal timings that are not coordinated with the timing of insulin or medication action can also lead to hypoglycemia.

Hypoglycemia is characterized by low levels of blood sugar in the body. It is important to manage hypoglycemia properly to prevent serious health consequences.[29]

Figure 6 illustrates the hypoglycemia definition.

Figure 6 | *Hypoglycemia definition*

Symptoms of hypoglycemia include:

- Feeling shaky
- Feeling upset, nervous, or anxious
- Sweating and chills
- Lightheadedness and dizziness
- Feeling weak and without energy
- Headaches
- Feeling hungry or nauseous
- Blurred vision







Management of hypoglycemia mainly consists of providing exogenous glucose based on the 15:15 rule detailed below.

Box 14 provides an example of management of hypoglycemia.

Box 14 | *Management of hypoglycemia (rule of 15:15)*

If blood glucose level is:

< 70mg/dl:
Eat or drink **15g** of carbohydrates

< 50mg/dl:
Eat or drink **30g** of carbohydrates

Check blood glucose again after

If blood glucose is still < 70mg/dl:
Eat or drink another **15g** of carbohydrates

Remark: Do not treat with high-fiber, high-fat and/or high-protein foods as they would delay glucose absorption or increase insulin secretion.

Table 7 provides examples of the portions of carbohydrate containing foods with 15g of carbohydrates that are suitable for the treatment of hypoglycemia.

Table 7 | *Carbohydrate content of foods suitable for the management of hypoglycemia*

Food item	Portion size containing **15g** of carbohydrates
Jam or honey	1 tablespoon
Fruit juice	1/2 cup
Soft drink	1/2 cup
Sugar (diluted with water)	1 tablespoon (can be diluted in ½ cup of water)

4. Physical activity

Individuals with diabetes are advised to perform physical activity based on the same guidelines as people without diabetes. These include:[12]

at least 150 minutes of moderate intensity physical activity
(mild increase in heart rate or breathing rate)

or

at least 75 minutes of vigorous intensity physical activity

or

an equivalent combination of moderate and vigorous activity

and

at least 2 days a week of muscle-strengthening activities*

Limit the amount of time spent being sedentary
(time spent sitting or lying with low energy expenditure while awake)

* *Refer to table 2 of chapter 2 for more examples of physical activity based on different levels of intensity.*

Attention should be given to individuals with risk of hypoglycemia (using insulin or medications that may cause hypoglycemia), as physical activity may increase the risk of a hypoglycemic episode. It is advised that these individuals measure their blood sugar levels before exercise and that they consume a small carbohydrate containing snack (1-2 carbohydrate choices-the equivalent of 15-30g of carbohydrates) if blood glucose is below 90mg/dl.[30]

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Appendix 1:
Carbohydrate lists

Each of the portion sizes listed in this table contains about **15g of carbohydrates** which is the equivalent to **1 carbohydrate** choice

Food item	1 portion / 1 carbohydrate choice
Starchy foods	
Large Arabic bread (white or whole wheat)	¼ loaf
Medium sized Arabic bread (white or whole wheat)	1/3 loaf
Small sized Arabic bread (white or whole wheat)	½ loaf
Medium sized Tannour bread	½ loaf
Large sized Markouk bread	½ loaf
Soft toast (white or whole wheat)	1 slice
French bread (20cm) (white or whole wheat)	1/3 loaf
Small milk bread	1 loaf
Kaak sticks (large)	1 kaak
Kaak sticks (size of one finger)	3 kaak
Cooked rice (white or whole grain)	1/3 cup
Cooked pasta (white or whole grain)	1/3 cup
Cooked burghul	1/3 cup
Cooked wheat	½ cup
Cooked freekeh	½ cup
Raw oats	2 tablespoons
Wheat flour (white or whole grain)	2 tablespoons
Cooked lupines	1 cup
Breakfast cereals	½ cup
Kishik (powder)	1 tablespoon
Starchy vegetables	
Chestnuts	½ cup
Cooked corn	½ cup
Cooked green peas	½ cup
Cooked potato	½ cup (1/3 of large sized potato)
Beans and lentils	
Cooked chickpeas	½ cup
Cooked fava beans	½ cup
Cooked lentils	½ cup
Cooked red, white or black beans	½ cup

Fruits	
Apple (small)	1 piece
Apricots	2 pieces
Banana (medium)	1 piece
Berries (blueberries, raspberries or blackberries)	1 cup
Cherries	10-12 pieces
Custard apple	½ piece
Dates	2 pieces
Dried apricots	3 pieces
Dried cranberries	2 tablespoons
Dried figs	2 pieces
Dried prunes	2 pieces
Figs	2 pieces
Grapefruit	1 piece
Grapes	10-15 pieces (1 handful)
Guava	2 small pieces
Kiwi	1 piece
Loquat fruit	7 small pieces
Mandarins	2 pieces
Mango	½ piece
Melon	1/8 a melon (1 slice)
Orange (small)	1 piece
Peach	1 piece
Pear	1 piece
Pineapple	2 slices (circles)
Plums	2 pieces
Pomelo	1/3 piece
Pomegrenade	½ cup
Raisins	2 tablespoons
Strawberries	1 1/3 cup
Watermelon (cut into pieces)	1¼ cup
Milk and yogurt	
Fruit yogurt cup	1 pot (½ cup)
Milk, liquid	1 cup
Milk, powdered	3 tablespoons
Yogurt	¾ cup
Yogurt drink	1 cup

Appendix 2:
Anthropometric measurement techniques for estimating height and weight

I. Estimation of weight

If an individual cannot stand to be weighed, measurements of the Calf Circumference (CC) and Mid-Arm Circumference (MAC) can be taken to estimate body weight using the following formula:

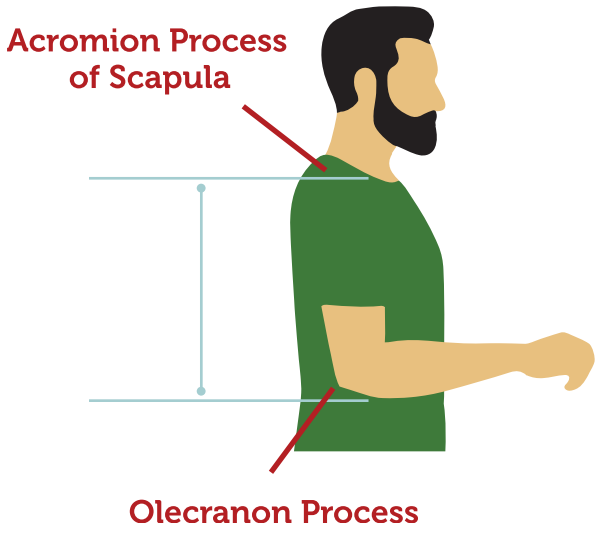
Females (Kg):
(MAC X 1.63) + (CC x 1.43) – 37.46 (± 4.96 SD)

Males (Kg):
(MAC x 2.31) + (CC X 1.50) – 50.10 (± 5.37 SD)

Body weight estimation equation should only be used when absolutely necessary.

Measurement of MAC and CC should be taken as illustrated in the below images:

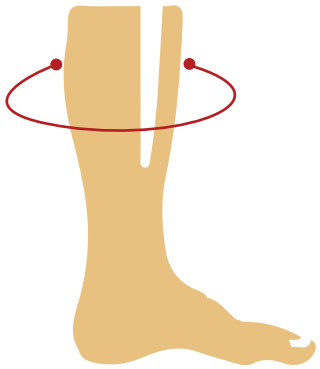
Measurement of MAC:



1. Measure the distance between the Acromion and the Olecranon
2. Measure MAC at the midpoint between the two

3. Measure CC at the largest circumference of the calf using the measurement tape:

Measurement of CC:



II. Corrected body weight for persons with amputations

When the weight of an amputated person can be measured it should be corrected for the amputation before being considered valid.

Corrected weight = Measured weight + Weight of amputated part

Table 8 | *Percent of total body weight contribution by individual body parts*

Body part	Contribution to body weight (%)
Entire arm	**6.5**
Upper arm	3.5
Forearm	2.3
Hand	0.8
Entire leg	**18.5**
Upper leg	11.6
Lower leg	5.3
Foot	1.8

Adapted from Brunnstorm S. 1983. Clinical Kinesiology, 4th ed. Philadelphia: Davis

For example:
If the measured weight is 50Kgs and one lower leg is amputated, then follow the below steps:

Step 1: Check the % contribution of body weight of the amputated part:
for example lower leg = 5.3% of total body weight

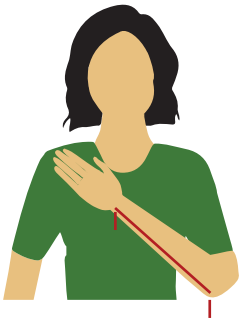
Step 2: Compute the weight of the amputated leg: if the lower leg contributes to 5.3% of total body weight, then the measured weight is 94.7% of the weight (100% - 5.3% = 94.7%).
So, the weight of the amputated part would be = (50Kgs x 5.3)/94.7 = 2.8Kgs

Step 3: Compute the corrected body weight (Measured weight + Weight of amputated part)
Corrected weight = 50Kgs + 2.8Kgs = 52.8Kgs

III. Estimation of height

If an individual cannot stand for height to be measured, measurements of the ulna can be taken to estimate height instead.

Step 1:
Measure the ulna



1. Ensure the person's left arm is bent, the palm is across the chest and the fingers are pointing to the opposite shoulder as in the image
2. Use a non-stretchable measuring tape to measure the distance between the two points (wrist bone and elbow)
3. Use the appropriate chart based on sex and age to estimate height

Step 2:
Estimate height using the conversion chart below

Height (m)	**Men** <65 yrs >65 yrs	1.94 1.87	1.93 1.86	1.91 1.84	1.89 1.82	1.87 1.81	1.85 1.79	1.84 1.78	1.82 1.76	1.80 1.75	1.78 1.73	1.76 1.71	1.75 1.70	1.73 1.68	1.71 1.67
Ulna length (cm)		**32.0**	**31.5**	**31.0**	**30.5**	**30.0**	**29.5**	**29.0**	**28.5**	**28.0**	**27.5**	**27.0**	**26.5**	**26.0**	**25.5**
Height (m)	**Women** <65 yrs >65 yrs	1.84 1.84	1.83 1.83	1.81 1.81	1.80 1.79	1.79 1.78	1.77 1.76	1.76 1.75	1.75 1.73	1.73 1.71	1.72 1.70	1.70 1.68	1.69 1.66	1.68 1.65	1.66 1.63
Height (m)	**Men** <65 yrs >65 yrs	1.69 1.65	1.67 1.63	1.66 1.62	1.64 1.60	1.62 1.59	1.60 1.57	1.58 1.56	1.57 1.54	1.55 1.52	1.53 1.51	1.51 1.49	1.49 1.48	1.48 1.46	1.46 1.45
Ulna length (cm)		**25.0**	**24.5**	**24.0**	**23.5**	**23.0**	**22.5**	**22.0**	**21.5**	**21.0**	**20.5**	**20.0**	**19.5**	**19.0**	**18.5**
Height (m)	**Women** <65 yrs >65 yrs	1.65 1.61	1.63 1.60	1.62 1.58	1.61 1.56	1.59 1.55	1.58 1.53	1.56 1.52	1.55 1.50	1.54 1.48	1.52 1.47	1.51 1.45	1.50 1.44	1.48 1.42	1.47 1.40

For example: If ulna length is measured to be 25.5cm in a woman over 65 years then her height is estimated to be 1.63m

Alternate height estimation:

When Ulna measurement is not feasible, knee height can be measured as an alternative using the below formula:

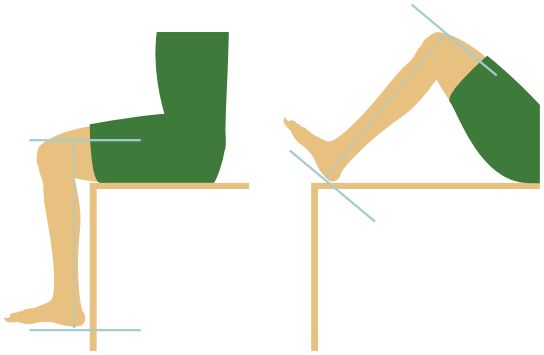
Females:

Estimated height (in cm) =
84.88 – (0.24 x age) + (1.83 x knee height)

Males (Kg):

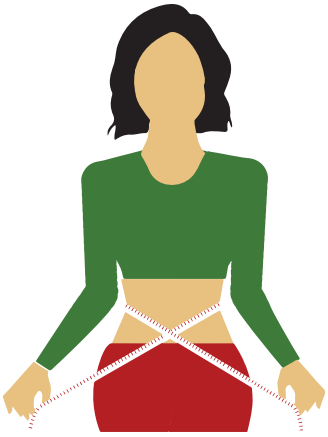
Estimated height (in cm) =
64.19 – (0.04 x age) + (2.02 x knee height)

Measuring knee height in cm:



1. Measure left leg if possible
2. The subject should have the knee at a right angle as per the image
3. Extend the tape straight down the side of the leg in line with the bony prominence at the ankle (lateral malleolus) to the base of the heel and measure to the nearest 0.5cm
4. Use the measurement in the formula provided (compute height in cm)

IV. Waist circumference



1. Clear the abdomen of clothing or accessories as needed
2. Ask the person to stand up tall but remain relaxed
3. Find the top of the hip bone and the lower edge of the last rib
4. Take the mid-point between the two points and place the non-stretchable tape to measure the circumference at the mid-point
5. Ask the person to breathe in and out
6. Measure waist circumference to the nearest 0.5cm

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