



Food & Dietary  
Guidelines  
for School - Aged Children  
in Bhutan

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Ministry of Education





SECRETARY

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Royal Government of Bhutan  
Ministry of Education

— *Rethinking Education* —



## FOREWORD

Nutrition is essential for growth and development of our children. Well-fed children are likely to achieve better educational results and income in adult life.

Bhutan now faces the double burden of under and over nutrition. Rates of stunting and wasting have decreased over the last decade. However, there are still concerns with hidden hunger from malnutrition and micronutrient deficiencies. Globally, low and middle-income countries are witnessing the fastest rise in overweight and obesity in young children.

Traditionally the Bhutanese diet has had limited variety and a high rice and salt intake, while the intake of fruits and vegetables tends to be low. This results in a diet which does not meet nutritional requirements and contributes to an increase of non-communicable diseases (NCDs).

Children with healthy dietary habits are more likely to maintain those habits throughout life. Nutrition education is an important tool to prevent malnutrition, address nutritional deficiencies and to promote behavioural and attitude changes, to reduce the risk of developing NCDs. The Ministry of Education, with support from the World Food Programme, has developed the Dietary Guidelines for School-Aged Children. We hope that you will find this tool useful to support nutrition education in our children.

(Karma Yeshey)

Secretary

Ministry of Education

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The *Bhutan Food and Dietary Guidelines for School-Aged Children*<sup>1</sup> provides clear, simple advice on the amount and kinds of foods school aged children need each day to achieve good health and nutrition. Different ages, gender, size, and physical activity all affect how much each child will need to meet their requirements. The amount of food needed for different age groups is set out in the servings and the type of food is set out in the food groups

A balanced diet and plenty of physical activity are just what children need for growth and health.

### Why do children need balanced diet?



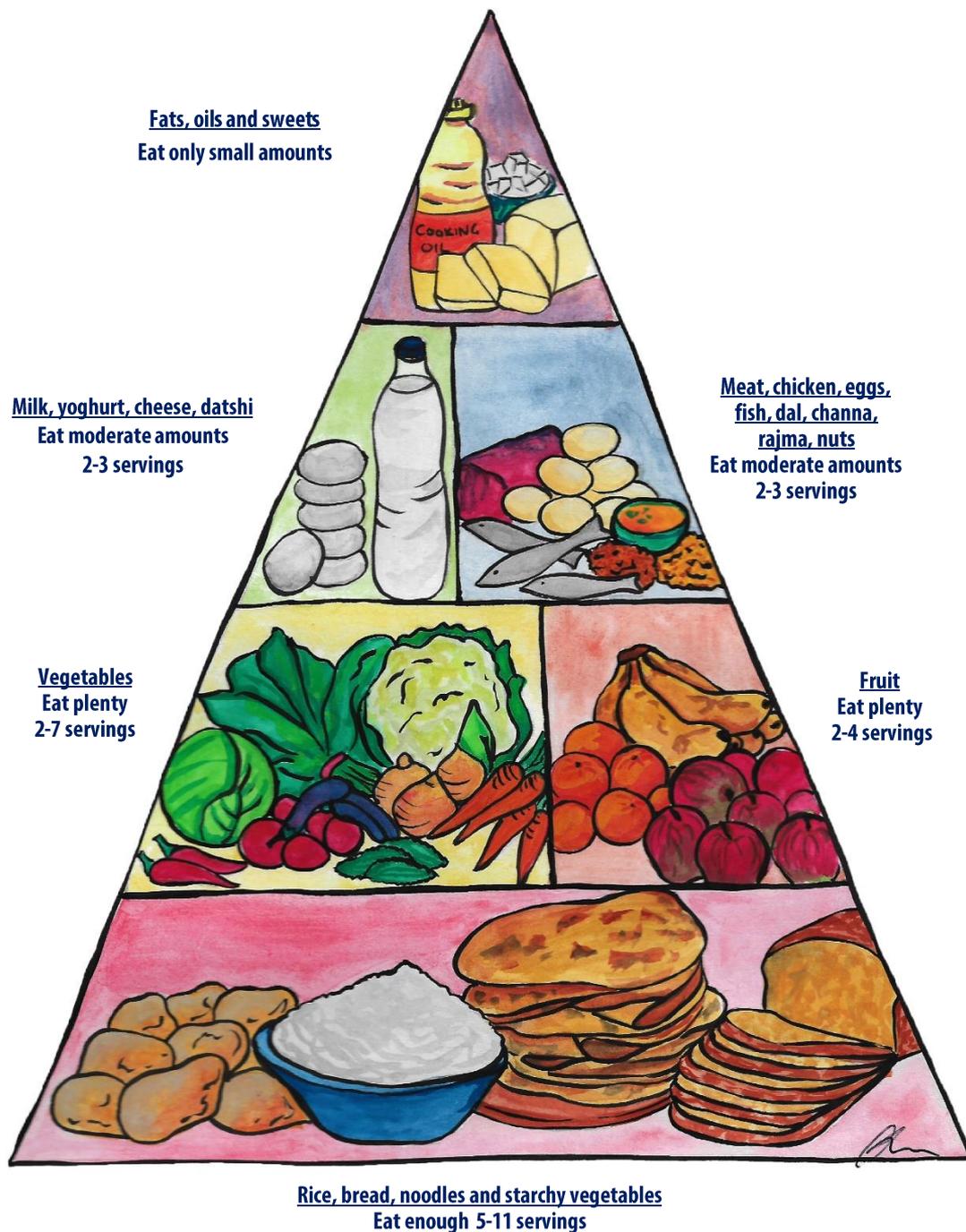
### But what is a balanced diet?

A balanced diet includes a good mix of all the food groups in the right amounts each day to meet the needs of growing children. The food groups are set out in the Good Food Guide Pyramid for Bhutanese Children.

<sup>1</sup> The guidelines are based on the Bhutan 2011: Food Based Dietary Guidelines, Ministry of Health and modified specifically for school aged children.

## Food & Dietary Guidelines for School-Aged Children in Bhutan

Good Food Guide Pyramid for Bhutanese Children is divided into 6 groups with the serve sizes needed by growing children each day



### Six food groups for Bhutan

Food Group	Examples of foods	Main Nutrients
<b>Rice, bread, Noodle and Starchy vegetables</b>	Rice, buckwheat, <i>Kharang</i> , <i>Kabche</i> , <i>Nabche</i> oats, cereal, potatoes, sweet potatoes, starchy root vegetables like yam and tapioca etc.	These foods supply most of the carbohydrates and energy to the diet. They also provide dietary fiber as well as a small quantity of protein, vitamins and minerals
<b>Vegetables</b>	All non-starchy vegetables amaranthus, asparagus, bean, bitter gourd, broccoli, cabbage, cauliflower, cucumber, carrot, capsicum, coriander leaves, drumstick, eggplant / brinjal, fern / <i>nakey</i> , green pea, okra / <i>lady finger</i> , lettuce, mushroom (fresh), mushroom (dried), lady's slipper / <i>olachoto</i> , onion, pumpkin, radish, spinach / <i>saag</i> , squash / <i>escoose</i> , tomato,	Fiber, Carotenes (a form of Vitamin A), folate (vitamin B9). Some contain minerals like iron and calcium. When eaten raw or slightly cooked, these vegetables also contribute vitamin C.
<b>Fruits</b>	Apple, banana grapes, guava, mango (Indian), mango (local), orange, peach, pear, plum, watermelon.	Fruits provide carbohydrate, vitamins, minerals, including Carotenes, vitamin C, and fibre. Fruit is best eaten raw or cooked without sugar. Dried fruit and fruit juice drink are not recommended for children as they can increase tooth decay and if eaten in excess can contribute to obesity.
<b>Meat and Plant protein group</b>	Beef, chicken, mutton, pork, fresh fish, eggs. Plant protein sources such as lentils / <i>dal</i> , dried kidney Beans / <i>rajma</i> , chickpeas / <i>channa</i> , soya bean (tofu / soya chunks), and nuts.	Protein, iron, zinc, fatty acids, vitamins A and D. Choose lean meat with little fat and chicken without the skin.
<b>Milk and dairy products</b>	Milk, yoghurt, curd, <i>datshi</i> , cheese, buttermilk / <i>dachu</i>	Provides protein, carbohydrate, calcium, vitamins, and minerals. It is also known as the body building group since it plays an essential role in maintaining the strength of bones, muscles and other parts of the body's structure. Calcium, protein, Riboflavin (B2), Niacin (B3).
<b>Oils, fats and sweets</b>	Vegetable oil - Soya bean oil, palm oil, mustard seed oil, olive oil. Butter, ghee, animal fat, fried snacks. Salad dressing, cream. Choose small amounts of unsaturated oils like soya bean oil, mustard seed oil or olive oil. Sugar, sweets, candy, cakes and chocolates.	Provides energy, fats and sugars. Palm oil, ghee, butter, animal fats and fried foods contain saturated fats and trans fats which increase cholesterol (fats in the blood) and the risk of stroke and heart disease. Fats and sweets have a lot of calories. Limiting these foods will help to lose weight and keep blood glucose and blood fats under control. Only a small amount of fat is needed to help absorb fat soluble vitamins A, D, E and K.

## Food & Dietary Guidelines for School-Aged Children in Bhutan

### What is a serving

A serving is a standard amount of food or drink that generally contains similar nutrients. A standard serving size of:

- ✓ *Rice, Bread, Noodles and Starchy vegetables*: ½ cup (125g) cooked rice or 1 small potato or 1 slice of bread or chapati (20 g)
- ✓ *Fruits and vegetables*: 1 medium fruit (± size of tennis ball) or ½ cup (125g) fruit or vegetables
- ✓ *Meat and plant protein* : 75 -100g cooked chicken or fish or meat (without bone); or 1 egg or one cup of cooked dry beans or lentils
- ✓ *Milk and dairy food products*: 1 cup (250g) milk or yoghurt; or 40-50 g cheese hard, 125g local cheese/*datshi*
- ✓ *Fats and oils*: 1 teaspoon (5 grams) oil or butter, 1 tablespoon (15 grams) salad dressing

Growing children need different amounts of different foods to meet their nutrient needs each day

	Servings per day			
	Rice, bread, noodles & starchy vegetables	Fruits & vegetables	Meat & Plant protein	Milk & dairy food
4-7 years	5-7	4-6	2	2
8-11 years	6-9	5-6	2	2
12-18 years	5-11	5-9	2-3	3

## GUIDELINES

### 1. ENJOY A WIDE VARIETY OF FOODS

#### What is a wide variety of foods?

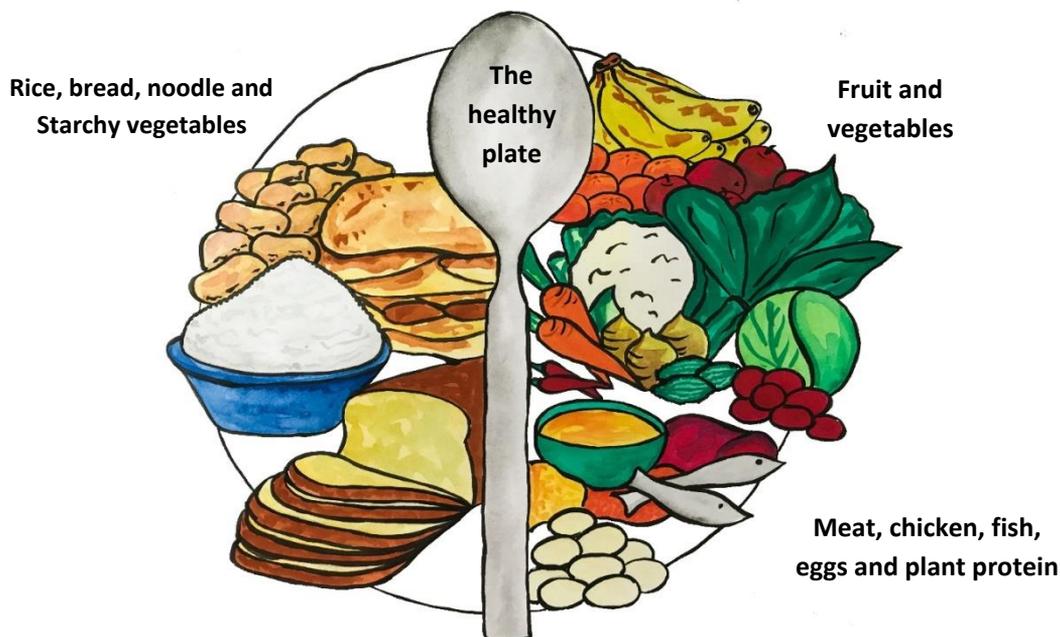
A wide variety of foods includes different types of food from the six food groups in the amounts needed.

#### Why are a wide variety of foods important?

A wide variety of foods is needed as no one food can meet all of the different macronutrients and micronutrients children need for normal growth, development, good health and nutrition. The amount of different foods that children need changes with age, weight and physical activity. The Servings of food provides a guide to how much children need to eat each day.

#### Recommendations

- ✓ Eat a wide variety of foods from the six food groups each day
- ✓ Eat the number of servings needed from each food group based on age and activity
- ✓ Eat at least three meals each day
- ✓ Eat at least 3-4 different colored vegetables each day
- ✓ Eat seasonal fruits each day



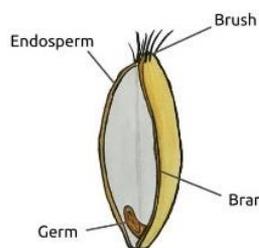
## 2. EAT WHOLE GRAIN RICE, BREAD, NOODLES AND OTHER CEREALS

### What are wholegrain foods?

Wholegrain foods include buckwheat, quinoa, oats, *Kharang*, brown/red rice and whole meal/whole wheat versions of noodles, bread and breakfast cereals. Grain products such as rice, wheat, buckwheat and maize are the most important sources of energy in the Bhutanese diet. Wholegrain food which contain both the bran (which is high in B-vitamins) and germ (which is rich in Vitamin E & other micronutrients). Refined grains only contain the endosperm (mostly starch - the bran and germ are removed during the milling process) and do not contain as many nutrients or fibre as wholegrain foods.

Other starchy vegetables such as potatoes and sweet potatoes, starchy root vegetables like yam, tapioca, taro are also important sources of energy in the Bhutanese diet.

### Why are starchy foods important?



Starchy foods provide energy, mainly carbohydrate and fibre and B Group vitamins.

Bhutan has had sporadic outbreaks of Peripheral Neuropathy (PN) in students of remote boarding schools for the past 15 years. The investigations indicate micronutrient deficiency, particularly thiamine (vitaminB1), as the probable cause. Eating whole grains, rice with added micronutrients can help improve the B vitamin status in school children. Animal proteins, fortified rice and green leafy vegetables are also rich source of B vitamins.

#### Recommendations:

- ✓ Eat more wholegrain starchy foods everyday. At least one serving of rice & starchy foods should come from whole grains
- ✓ Eat a serving of starchy foods in each meal every day
  - 4-7 years : 5-7 servings
  - 8-11 years : 6-9 servings
  - 12-18 years : 5-11 servings

1 serving = 1 slice of bread or *chapati* (20 g), ½ cup (125g) cooked rice, maize, porridge, *dengo*



### 3. EAT MORE FRUITS AND VEGETABLES

#### Why are fruits and vegetables important?

Only 4 out of 10 school children eat enough vegetables and only 3 out of 10 eat enough fruit<sup>2</sup>. Fruits and vegetables are high in vitamins and minerals, which help to strengthen the body's immune system to resist illnesses such as infections, diarrhoea, cough and cold and tuberculosis. All types of fruits and vegetables are good for health and should be washed and eaten as part of a healthy eating plan. They can be eaten as part of main meals and/or snacks. The skins on foods such as apples, potatoes, carrots provide extra nutrients.

Fruits and vegetables are high in fibre (roughage), which helps proper bowel functioning to prevent constipation. Fruits and vegetables also help to prevent certain types of cancer such as bowel cancer.

Most fresh fruits and vegetables (oranges, guavas, apples, broccoli, spinach, tomatoes) are rich in vitamin C. Vitamin C is essential for the formation and maintenance of body tissue. It promotes the absorption of iron and calcium as well as the healing of wounds and increases the body's resistance to infections.

Green leafy vegetables such as spinach/*saag*, broccoli, and cabbage and orange/yellow vegetables such as carrots and sweet potato are good sources of vitamin A. Vitamin A is essential for health and well-being. Vitamin A is especially important for good vision, protecting the body against infections and ensuring adequate growth and development.

Green leafy vegetables are also a good source of Vitamin K, Vitamin B9 (Folate), magnesium and other nutrients (such as antioxidants and phytonutrients) which can help protect the body from damage, associated with diseases of lifestyle such as obesity, heart disease and certain cancers. Green leafy vegetables also contain calcium for growing bones.

#### Recommendations:

- ✓ Eat at least 3-4 colored vegetables everyday
  - ✓ Eat at least 2 seasonal fruits
  - ✓ Eat a minimum of the following serving of fruits and vegetable everyday
    - 4-7 years : 4-6 servings
    - 8-11 years : 5-6 servings
    - 12-18 years : 5-9 servings
- One serving of vegetables is  $\frac{1}{2}$  cup cooked or 1 cup raw.
- One serving of fruit is about the size of a tennis ball or  $\frac{1}{2}$  cup cooked



<sup>2</sup>Bhutan Global School-Based Student Health Survey 2016 Royal Government of Bhutan, Ministry of Health 2017.

#### 4. EAT LEAN MEATS, CHICKEN, EGGS, FISH AND PLANT PROTEIN

##### What does this food group include?

Meat, chicken, fresh fish, eggs, plant protein sources such as: lentils/*dal*, dried beans/*rajma*, chickpeas /*channa*, soya chunk, tofu and nuts

##### Why is this food group important?

Lean meat, chicken, eggs, and fresh fish are good sources of animal protein. Protein is needed for growth, maintenance of and repair of muscles and body tissue. These foods are also good sources of iron, in a form that is well absorbed, as well as Vitamin B12 and zinc which help to prevent anaemia. Too little iron in the blood can cause anaemia which can lead to tiredness, reduced ability to work and lower resistance to infection. In Bhutan 31 percent of adolescent girls are anaemic<sup>3</sup>

For people who do not eat meat they need to eat enough vegetable protein, such as *dal*, *rajma*, *channa* or soy, for growth and maintaining the body. The iron in plant foods is not as well absorbed as the iron in meats. Eating fruit and vegetables with Vitamin C, like limes and oranges, with plant sources of protein helps the iron to be absorbed. Vegetables do not contain Vitamin B12.

##### Recommendations:

- ✓ Eat a minimum of the following serving of meats and plant protein everyday

- 4-7 years : 2 serving
- 8-11 years : 2 serving
- 12-18 years : 2-3 serving

One serving is 75-100g cooked chicken fish meat (without bone), 1 egg, 1 cup of cooked beans or legumes

- ✓ Vegetables and fruit with vitamin C will help absorption of iron, especially from plant sources.
- ✓ Tea and milk will inhibit the absorption of iron and should not be taken with meals.



<sup>4</sup> National Nutrition Survey, Nutrition Programme Department of Public Health, Ministry of Health Bhutan 2015

## 5. DRINK MILK AND EAT DAIRY FOODS

### What does this food group include?

Milk, processed cheese, *datshi* and yoghurt. Butter and cream are not included as part of this food group as they are classified as foods high in fat. Dairy whitener (often referred to as everyday milk powder) is made from milk powder, but has sugar added and is lower in protein and calcium than milk.

### Why are dairy foods important?

Dairy foods provide a major source of calcium for growing bone and protecting teeth. Foods from this group are a good source of energy, protein, calcium and vitamin A.

#### Recommendations:

Eat a minimum of the following servings of milk and dairy products everyday

- ✓ 4-7 years : 2 serving
- ✓ 8-11 years : 2 serving
- ✓ 12-18 years : 3 servings



### **6. LIMIT FOODS AND DRINKS WITH ADDED FAT, SALT AND SUGAR**

Junk food is an informal term given to foods high in fat, salt, sugar and calories with limited nutritional value. Fast foods, chips, fizzy drinks, chocolates, cakes and sweets can be included as junk food.

#### **What foods contain fat?**

Fats are found in vegetable oil like soya bean or *vansaparti*, butter, ghee, lard, margarine, in the skin on chicken and fat around meat, in processed foods like chips, biscuits, cakes and chocolate. Deep fried foods like foods like *puri*, *shel roti*, *mekhu*, *pokora* and *samosa* contain a lot of fat.

#### **Why is fat important?**

Fats contribute to texture, flavour and taste of the diet. Fats are essential for meeting some of the nutritional needs like essential fatty acids and absorption of fat-soluble vitamins and serve as rich sources of energy.

Fats are often described as 'saturated', and 'unsaturated'. Plant oils generally contain more unsaturated fats. Animal fats, palm oil, coconut oil and processed fats (sometimes labelled as 'hydrogenated'), contain a high percentage of saturated fats and trans-fat. Processed fats are found in *vansapati*, cakes, biscuits and deep-fried foods like *puri*, *shel roti*, *mekhu*, *pokora* and *samosa*. Foods that are deep fried are high in fat and if the oil is reused over and over the saturated and trans-fat content increases. Fat on meat and skin on chicken are also sources of saturated fat.

A high intake of saturated and trans fats has been linked to overweight/obesity, high cholesterol levels, heart disease, diabetes and some cancers. Fats and oils provide more than twice the amount of food energy as carbohydrates and proteins, leading to overweight/obesity more easily. Too much of the wrong kind of fat, especially from deep fried foods, raises blood cholesterol levels, which increases the risk of heart disease. Therefore, fats should be consumed in small amounts.

#### **What foods contain salt?**

Iodised salt is added to cooking and at the table. Chillies are often eaten with salt. Foods high in salt include: eazay, pickles, dried fish, chips, packaged products like instant noodles and packet soups.

#### **Why is salt important?**

Salt enhances taste and flavour. Salt has a long history of use as a preservative. All food contains sodium, but added salt is the major source of sodium in the diet.

Sodium helps balance the water in and around the cells in your body. It's important for proper muscle and nerve function, however only small amounts are needed. It also helps maintain

stable blood pressure levels. A high intake of salt increases blood pressure which increases the risk of heart disease, stroke and other diseases.

Only iodized salt should be used, as iodine is important for proper growth and development in the body. A lack of iodine in the diet causes iodine deficiency disorders (IDD) such as goitre and mental retardation. However only small amounts of iodised salt are needed.

*In Bhutan, all salt sold for human consumption should, by law, be iodized.*

### What foods contain sugar?

Sugars are carbohydrates. Sugars, honey syrup or concentrated fruit juice are widely added to processed foods and drinks to sweeten them. Sugars also play a role as a flavour enhancer and preservative.

### Why is sugar important?

Sugars provide a readily absorbed source of energy but, added sugars can increase the energy content of the diet and displace more nutritious foods.

Sugars are a factor in tooth decay and diets high in added sugars are also linked with many diseases like obesity, heart disease and diabetes.

### Why are foods high in fat, salt and sugar important?

Growing rates of obesity are associated with a significant rise in the consumption of junk foods in Bhutan and across the world. Other diseases like high blood pressure, insulin resistance (which leads to diabetes), high cholesterol, heart disease and certain cancers have been linked with consumption of junk foods. Snacking on junk foods contributes to excess calories or displaces more nutritious foods and contributes to obesity and tooth decay.

#### Recommendations:

- ✓ Diets of young children and adolescents should contain about 30-50 g/day fat.
- ✓ Choose fats that come from plant sources like soya bean or sunflower over fats that come from animal sources, palm oil or hydrogenated vegetable oils like *vansapati*
- ✓ Do not reuse cooking oils over and over
- ✓ Choose only iodised salt
- ✓ Use no more than 5 gm or one teaspoon of salt per person in a day
- ✓ Use lemon juice, herbs and spices to flavour food instead of salt
- ✓ Use less sugar in tea
- ✓ Junk foods should be limited as much as possible as they lead to obesity and many obesity related diseases

### 7. DRINK PLENTY OF WATER

#### Why is water recommended

Water is essential for life. It is needed not only for drinking, but also required for maintaining sanitation and hygiene such as for washing and cooking foods, for cleaning utensils and for washing hands etc. The quality of water and food is important for good nutrition and health. Unsafe and dirty water that comes from dams, open wells and rivers, and water that is not treated or boiled, is a major health risk.

Handling, preparation and storage of food in an unhygienic way can lead to serious health problems in infants, children and adults. Contaminated food and water are the main causes of diarrhoea in Bhutan. Dirty water can also lead to other food and water-borne diseases.

Children should drink safe boiled and/or filtered water to stay hydrated and replace water lost through normal body functions. More water is needed in hot weather or after physical activity.

*Fizzy drinks and fruit drinks are not recommended as they contain lots of added sugar, artificial flavour, colours and are acidic which increases tooth decay and obesity.*

*Children should not consume alcohol as it impacts children's brain development and health. In Bhutan, it is not legal for children to drink alcohol until the age of 18.*

*Tea is best if avoided or consumed between meals instead of during meal times. Tea reduces absorption of nutrients from foods, such as iron and Vitamin B1 (Thiamine). Tea and coffee also contain caffeine. Children are more sensitive to caffeine than adults. High levels of caffeine can cause stomach upset, difficulty concentrating and headaches.*

#### Recommendations

- ✓ Milk and water are the best drinks for children
- ✓ Drink at least six to eight glasses preferably boiled or filtered water (each of 100–150 ml) each day.
- ✓ Drink more boiled and/or filtered water in hot weather and after extra physical activity
- ✓ Avoid fizzy drinks
- ✓ Alcohol has negative impacts on children's health and brain development
- ✓ Limit or avoid tea, coffee, cola and other drinks or foods with added caffeine or other stimulants especially for younger children



## 8. ACHIEVE AND MAINTAIN A HEALTHY BODY WEIGHT

### What is a healthy body weight?

Healthy weight can be maintained by eating the right amounts of a variety of foods and by being physically active.

### Why is this important

A healthy body weight, appropriate for age, is important for good health, preventing diseases and for academic performance. Overweight and obesity can lead to a higher risk of non-communicable diseases like diabetes, high blood pressure, heart disease, stroke and cancers.

Being underweight causes problems including deficiency diseases like iron deficiency anaemia, Vitamin A deficiency (blindness), Thiamine deficiency (Peripheral Neuropathy) etc. An underweight person can also have weak immune system making them easy targets for other diseases. An underweight person could have reduced capacity for physical as well as mental work which might lead to poor performance in schools.

### Body Mass Index (BMI)

Body Mass Index (BMI) is a tool to measure if a person has a healthy body weight for height and age. BMI can be calculated by dividing weight in kilograms by height squared in meters.

$$BMI = \text{weight in kg} / (\text{Height in meters})^2$$

**For children below the age of 19 years use the BMI for age charts (next page) to determine their appropriate BMI.**

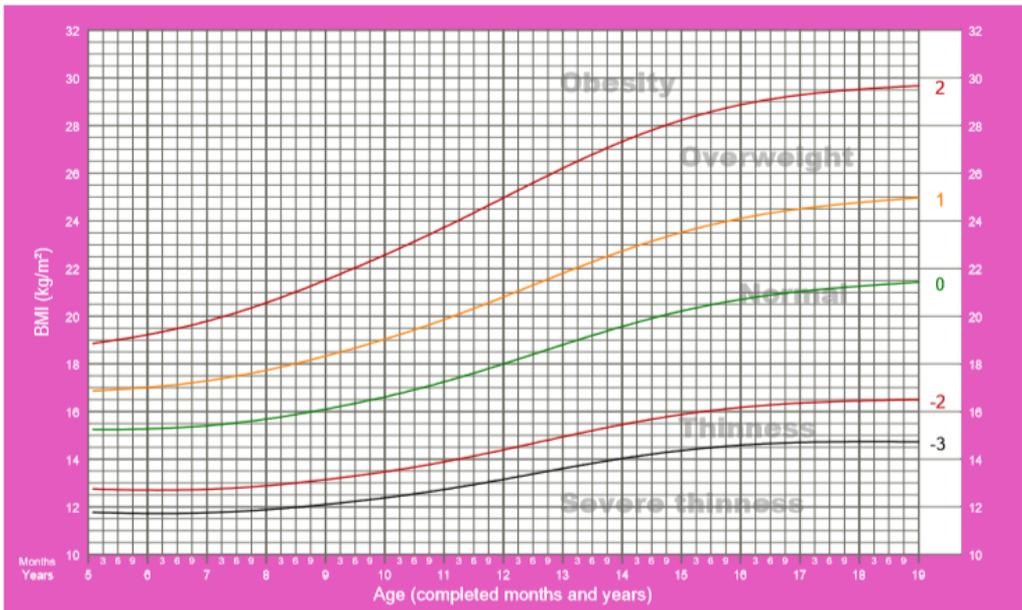
#### Recommendations

- ✓ Achieve and maintain a healthy body weight
- ✓ Monitor weight at least twice/year by using:
  - BMI for those above 19 years of age
  - Gender specific BMI for age for those below 19 years of age
- ✓ Get at least 60 minutes (1 hour) of moderate-to-vigorous physical activity everyday



## BMI-for-age GIRLS

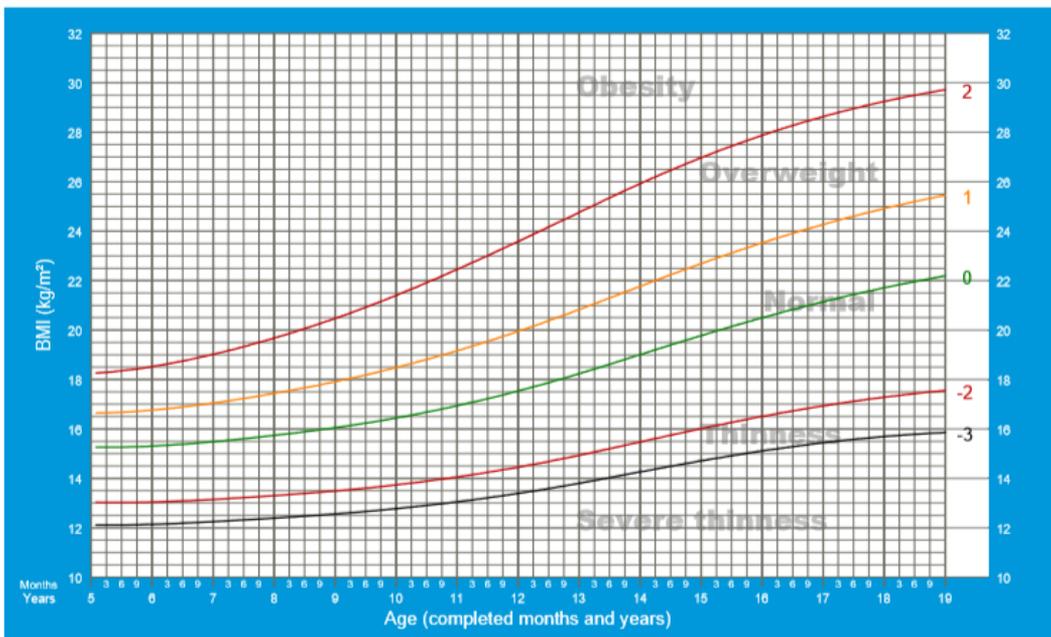
5 to 19 years (z-scores)



2007 WHO Reference

## BMI-for-age BOYS

5 to 19 years (z-scores)



2007 WHO Reference

## 9. FOOD SAFETY

Being *Food Safe* means there is no harm to children when food is prepared and/or eaten as intended. To avoid food poisoning follow five easy steps: **Clean, Separate, Cook, Keep food at safe temperatures and Use safe water and raw food.**

### Step 1 Clean:

- Wash hands with soap before handling food and often during food preparation
- Wash and sanitize all surfaces and equipment used for food preparation including the kitchen benches (use standard cleaning processes before, during and after food preparation)
- Keep food covered
- Protect kitchen areas and food from insects, pests and other animals



### Step 2 Separate: Don't cross-contaminate.

- Separate raw meat, poultry and seafood from other foods
- Use separate equipment and utensils such as knives and cutting boards for handling raw foods and ready to eat foods
- Store food in covered containers to avoid contact between raw and prepared foods

## Food Safety

Keep them separate!



When preparing food for cooking, keep vegetables and raw meat separate.  
This prevents cross-contamination and bacterial infection

## Food & Dietary Guidelines for School-Aged Children in Bhutan

### Step 3 Cook thoroughly: Cook food thoroughly, especially meat, poultry, eggs and seafood

- Cook to proper at temperatures (at least 85 degrees Celsius for chicken on the bone or 75 degrees Celsius for other meat).
- Use a thermometer to check food is cooked properly. If a thermometer is not available, cook meat until the juices are clear and the inside is no longer pink.

### Step 4 Keep Food at Safe Temperatures: Refrigerate promptly all cooked and perishable food (preferably below 5 degrees Celsius)

- Keep cooked food piping hot (more than 60 degree Celsius) prior to serving
- Do not thaw frozen food at room temperature
- Do not store food too long, even in the refrigerator
- Do not leave food at room temperature more than 2 hours

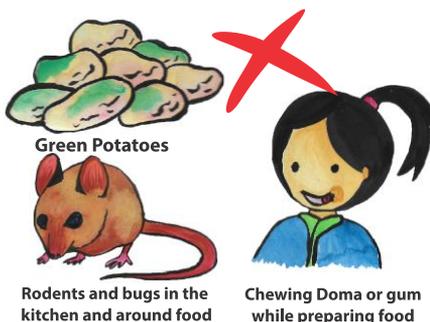
### Step 5 Use Safe water and raw materials

- Use safe water or treat it to make it safe (in the school, water may be boiled and filtered for drinking)
- Select fresh and wholesome foods
- Choose processed foods for safety, such as pasteurized milk, foods free from damage etc
- Do not use food past its expiry date/ best before



### What makes food unsafe?

- Chemicals like insecticides
- Natural poisons like green potatoes
- Not for eating like hair, dead insects, rat droppings, plastic
- Germs such as bacteria and viruses are the most common cause of food poisoning



## 10. PERSONAL HYGIENE IN THE KITCHEN:

### DOs

- Wash hands with water and soap before touching food and after toilet and blowing nose
- Keep hair tied back
- Wear neat and clean clothes
- Cover all wounds with water proof dressing
- Use mouth cover while preparing and serving food
- Keep nails clean and short
- Repair or replace torn clothes

### DO NOT

- Do not eat sweets/gum and doma (betel nut)
- Do not wear false nails/ nail varnish
- Do not smoke
- Do not touch mouth, lick fingers, pick nose
- Do not wear strong aftershave/ perfume

## 11. COOKING AND PREPARATION

- Steaming is the best way to reduce loss of nutrients from cooking food
- Boiling and baking are healthier cooking methods than deep frying
- When shallow frying use the minimum amount of oil and choose an unsaturated oil like soybean
- Cook for the minimum amount of time as possible; a high temperature for a short time is preferable
- Cover the pot with a lid to shorten cooking time
- Cook food as close to serving time as possible (keeping hot cooked food for long periods increases the risk of food poisoning (contamination) and increases nutrient loss)
- Cook food until it is steaming hot and serve as soon as possible
- Keep storage of raw foods to the minimum
- Use boiled/filtered water for washing salad vegetables and fruits that will not be cooked
- Wash fruit and vegetables well before cutting them
- Use the minimum amount of water for the preparation of vegetables.



steam cook



Boil cooking



cook with lid on



shallow fry

Shorten the cooking time

### Tips for cooking and preparing rice

- Choose fortified rice or parboiled rice with higher nutrient levels
- If necessary, rinse rice only once with cold water before cooking
- For best results, cook rice with twice the volume of water so there is no water to drain and nutrients are best retained in the rice (draining of cooking water removes vitamins and minerals from rice)
- If rice is cooked with excess water, scoop off and use rice cooking water to help thicken dal/curries (and conserve nutrients)

### Storage of food

- Cooked foods should not be stored together with fresh fruits and vegetables
- Food storage should have proper light and ventilation
- First-in First-out (FIFO) principle should be followed for both perishable and non-perishable food commodities
- Frequent and regular cleaning of the food storage areas is a must
- Pest control to ensure no pests can contaminate and add to nutrient loss of the food stored
- A food store should be only to store food commodities and no other things



**Annex 1 Recommended Dietary Allowances for school aged children**

Macro-nutrient RDA (National Institute of Nutrition, Hyderabad, India) (Indian Council Medical Research)

Age	Body Weight	Energy (kcal/day)	Protein (g/day)	Visible Fat(g/day)
Children 4-6	18	1350	20.1	25
Children 7-9	25.1	1690	29.5	30
Boys 10-12	34.3	2190	39.9	35
Girls 10-12	35	2010	40.4	35
Boys 13-15	47.6	2750	54.3	45
Girls 13-15	46.6	2330	51.9	40
Boys 16-17	55.4	3020	61.5	50
Girls 16-17	52.1	2440	55.5	35

Micro-nutrient RDA (National Institute of Nutrition, Hyderabad , India)(Indian Council Medical Research)

Age (years)	Vit. A Retinol (mcg/day)	Beta- carotene (mcg/day)	Vit. B1 (mg/day)	Vit. B2 (mg/day)	Vit. B3 (mg/day)	Vit. B6 (mg/day)	Vit. B12 (mg/day)	Vit. C (mg/day)	Zinc (mg/day)	Calcium (mg/day)	Iron (mg/day)	Magnesium (mg/day)
<b>Children 4-6</b>	400	3200	0.7	0.8	11	0.9	0.2-1.0	40	7	600	13	70
<b>Children 7-9</b>	600	4800	0.8	1.0	13	1.6	0.2-1.0	40	8	600	16	100
<b>Boys 10-12</b>	600	4800	1.1	1.3	15	1.6	0.2-1.0	40	9	800	21	120
<b>Girls 10-12</b>	600	4800	1.0	1.2	13	1.6	0.2-1.0	40	9	800	27	160
<b>Boys 13-15</b>	600	4800	1.4	1.6	16	2.0	0.2-1.0	40	11	800	32	165
<b>Girls 13-15</b>	600	4800	1.2	1.4	14	2.0	0.2-1.0	40	11	800	27	210
<b>Boys 16-17</b>	600	4800	1.5	1.8	17	2.0	0.2-1.0	40	12	800	28	195
<b>Girls 16-17</b>	600	4800	1.0	1.2	14	2.0	0.2-1.0	40	12	800	26	235

**Annex 2 Micronutrients and their food sources and functions**

Micro-nutrients	Good Source	Function
Vitamin A	Carrots, Pumpkin, Spinach, Chillies, Sweet Potato, Mangoes, Dairy, Liver	Helps form and maintain healthy teeth, skeletal and soft tissue and skin. Vitamin A promotes good vision, especially in low light.
Vitamin B1 [Thiamine]	Whole Grain Products, Sunflower Seeds, Oatmeal, Nuts, Lean Pork and other Meat forms, Wheat Germ	Helps the body's cells change carbohydrates into energy. It also plays a role in muscle contraction and conduction of nerve signals
Vitamin B2 [Riboflavin]	Eggs, Milk, Almonds	is needed for growth and overall good health. It helps the body break down carbohydrates, proteins and fats to produce energy, and it allows oxygen to be used by the body
Vitamin B3 [Niacin]	Beef, Chicken, Tuna, Liver, Peanut Butter, Barley, Rice Bran, Wheat Bran, Rice	It is important for the body because it helps to: Convert food into glucose, used to produce energy.
Vitamin B5 [Pantothenic acid]	Egg Yolk, Legumes, Brewer's Yeast, Whole Grains, Organ Meats	It's necessary for making blood cells, and it helps you convert the food you eat into energy. All B vitamins help you convert the protein, carbohydrates, and fats you eat into energy.
Vitamin B6 [Pyridoxine]	Bananas, Brewer's Yeast, Wheat Bran, Walnuts, Brown Rice, Sunflower Seeds, Liver, Meat	Vitamin B6 is also needed for proper brain development (in kids) and function (for people of all ages). It helps the body make the hormones serotonin (which regulates mood) and norepinephrine (which helps your body cope with stress)
Vitamin B12 [Cobalamin]	Oily Fish, Crab, Beef, Liver, Egg	It is important for protein metabolism. It helps in the formation of red blood cells and in the maintenance of the central nervous system.
Vitamin B 9 [Folate]	Lentils, Chickpeas, Kidney Beans, Green Leafy Vegetables, Nuts, Liver,	Helps to produce and maintain DNA and cells. Helps to make red blood cells and prevent anaemia.
Vitamin C	Citrus Fruits, Guava, Papaya, Kiwi, Green Leafy Vegetables, Broccoli, Capsicum, Red Chillies	It is necessary for the growth, development and repair of all body tissues. It's involved in many body functions, including formation of collagen, absorption of iron, the immune system, wound healing, and the maintenance of cartilage, bones, and teeth.
Vitamin D	Dairy products milk, cheese, Tuna, Fish Oils, Egg Yolk, Sunflower Seeds,	Among the vitamin's main functions, it helps the body: Absorb calcium. Vitamin

## Food & Dietary Guidelines for School-Aged Children in Bhutan

Micro-nutrients	Good Source	Function
	Sunlight	D, along with calcium, helps build bones and keep bones strong and healthy
Vitamin E	Safflower Oil, Peanut Oil, Peanut Butter, Sunflower Seed Oil, Sunflower Seeds, Almonds,	Vitamin E is an antioxidant. This means it protects body tissue from damage caused by substances called free radicals, which can harm cells, tissues, and organs. They are believed to play a role in certain conditions related to aging.
Vitamin K	Wheat Bran, Milk, Liver, Green Leafy Vegetables	It is probably best known for its role in the coagulation (clotting) of blood
Potassium	Legumes, vegetables potato skin, tomatoes, bananas, apples, apricots.	It helps the body regulate fluid, send nerve signals and regulate muscle contractions.
Chlorine	Table salt (sodium chloride) is the main dietary source.	Chlorides (chlorine compounds) play an essential role in the electrical neutrality and pressure of extracellular fluids and in the acid-base balance of the body.
Sodium	Table salt, Pickles, Ezay, Processed food such as chips, juma, waiwai.	Sodium is found mainly in body fluids. It plays a major role in maintaining blood volume and blood pressure by attracting and holding water. <b>High level of sodium increases blood pressure</b>
Calcium	Dairy products, canned fish with bones (salmon, sardines), green leafy vegetables, nuts and seeds.	It helps form and maintain healthy teeth, bones and clotting of blood. A proper level of calcium in the body over a lifetime can help prevent osteoporosis.
Magnesium	Dietary sources include nuts, soy beans, green vegetables.	Helps in blood glucose control, and blood pressure regulation.
Zinc	Meat, Beans, Nuts, Almonds, Whole grains, Pumpkin seeds, Sunflower seeds.	It is needed for the body's defensive (immune) system to properly work. It plays a role in cell division, cell growth, wound healing, and the breakdown of carbohydrates. Zinc is also needed for the senses of smell and taste
Iron	Red meat, Leafy green vegetables, Fish (tuna, salmon), Eggs, dried fruits, beans, whole grains, and enriched grains.	It is needed for the formation of haemoglobin, which carries oxygen from the lungs to the body cells.
Iodine	Found in sea foods and iodized salt	Iodine is needed for the cells to convert food into energy. Humans need iodine for normal thyroid function, and for the production of thyroid hormones

**Annex 3: Serving size of foods**

Starch group	One serving	Calories (Kcal approx)	Protein (gram)
Biscuit Plain	4-6 pieces (30 g)	147	2.1
Bread	1 slice (20 g)	48	1.9
Corn (maize)	½ cup (90 g)	96	2.3
Dry flour, wheat	3 Tbsp (45g)	160	4.9
Noodles, cooked	½ cup (75g)	112	3.2
Roti (wheat)	1 piece (30 g)	93	2.5
Popcorn	1 cup (11g)	52	1.1
Potato (small) cooked	1 (75 g)	50	1.3
Rice white, cooked	½ cup (100 g)	160	2.7
Sweet potato, (small) cooked	1 (75 g)	57	1.5
Zaw	½ cup (15g)	54	1.2
<b>Vegetable group</b>	<b>One serving 75 g</b>		
Cooked vegetables	½ cup	32	1.9
Green Leafy Vegetables (spinach, cabbage)	½ cup	14-25	1.3-2.4
Orange/yellow vegetable (pumpkin, carrot)	½ cup	23	0.7
Other Vegetables (beans, peas, cauliflower)	½ cup	15-47	0.7-3.8
Tomato	½ cup	12	0.7
<b>Fruit group</b>	<b>One serving 150g (about the size of a tennis ball)</b>		
Apple, banana, orange	1 (150g)	65 - 170	0.5 – 2.3
Apricot, peach, plum	1 (150g)	58-61	0.9 - 1.4
Canned fruit in syrup	1 cup (150g)	91	1
Water melon	1 cup (150g)	36	0.6
<b>Meat, poultry and vegetable protein group</b>	<b>One serving</b>		
Cooked lentils and legumes	1 cup (100 g)	85	6.8
Egg (hard boiled)	1 (60 g)	84	7.4
Fish(fresh)	75g	141	17.4
Meat, chicken	75-100 g	158-186	17.8-19.5
Peanuts (raw)	Handful (30 g)	170	7.4
Tofu (soft)	75 g	40	4
<b>Dairy group</b>	<b>One serving</b>		
Cheese (hard block)	40 g	125	8.4
Datshi	60 g	215	11
Milk (whole)	1 cup (250 ml)	139	8.8
Yogurt (plain)	½ cup (100 g) (5% fat)	105	5.7
<b>Fats, oil and sweet group</b>	<b>One serving</b>		
Biscuits plain, sweet	2 (20g)	87	1.2
Butter	1 tsp (5 g)	36	-
Chips (potato chips plain salted)	1 small packet (50 g)	258	3
Chocolate (milk)	1 small bar (50g)	264	3.8
Cupcake plain	1 small cake (60 g)	182	4.5
Ice cream	1/2 cup (30 g)	57	1.1
Jam	1 Tbsp (15 g)	38	-
Oil (soya bean)	1 tsp (5 g)	44	-
Sugar (granulated)	1 Tbsp (15g)	57	-

\*AUSNUT 2011-2013 Food Standards Australia New Zealand