**Supplementary material 5: “Nutrition for Children” Trainers Manual**

Singapore International Foundation
for a better world

# Nutrition for Children

## Trainers Manual

***Nutrition and Growth***
***Cooking a Healthy Meal***
***Selecting Nutrient-Rich Food***
***Healthy Hygiene Practices***
***Preparing and Storing Food***
***Heal Yourself Home Remedies***

***"...we all have an obligation as citizens of this earth to leave the world a healthier, cleaner and better place for our children and future generations."***

~ Blythe Danner

*Dedicated to the children and families of*
*Karnataka, India.*

# Table of Contents

# 1 Introduction

165 million children around the whole suffer from malnutrition and one in every three malnourished children in the world comes from India[1]. The number is higher than that of the Africa continent. 47% of India's children are undernourished because they do not get enough food or the food they consume lack the nutrients these young bodies require[2]. The consequences are dire. Half of all under-5 deaths in India are due to malnutrition, and half of all under-5 children are stunted.

Children who suffer from severe malnutrition are 9.5 times more likely to die from diarrhoea and 6.4 times more likely to die from pneumonia[3]. Malnutrition impairs physical and mental development and its impact lasts through one's lifetime. Stunted children often struggle to reach their potential in school and ultimately the workplace, diminishing economic productivity and development.

Four million people in India live on less than a US$1/day. With limited income and food, it becomes vital to educate families on the importance of a nutritious diet and how to achieve it with their limited resources through cost-effective tweaks to their diets. In many low-income families in Karnataka, diets primarily consist of starch, with some legumes cooked in heavy spices. A child's belly may be full but he still might not necessarily get the right balance of nutritious food and vitamins required for healthy development.

*The impact of malnutrition lasts through one's lifetime. Stunted children often struggle to reach their potential in school and ultimately the workplace, diminishing economic productivity and development.*
*Source: www.unicef.org*

[1] UN News Center (6 June 2013). *Leadership, commitment keys to winning battle against undernutrition, UN agency says.* http://www.un.org/apps/news/story.asp?NewsID=45103&Cr=nutrition&Cr1#.UnCyu6P2OYE

[2] Unicef India (2013). *Malnutrition is more common in India than in Sub-Saharan Africa. One in every three malnourished children in the world lives in India*. www.unicef.org/india/children_2356.htm

[3] World Hunger Education Service (2013). *2013 World Hunger and Poverty Facts and Statistics.* http://www.worldhunger.org/articles/Learn/world%20hunger%20facts%202002.htm

# 2 Learning Outcomes

Nutrition for Children (Bangalore) is tailored to meet the needs of the local community around Parikrma Humanity Foundation and the long-term goal for this project is for adults and children to understand the importance of proper nutrition and actively seek to improve their nutrition intake.

The project aims to effect changes in nutritional standards in Parikrma and the communities around Parikrma, through Teachers Training, Training of Mothers and the School Meal Programme.

The objective and learning outcomes of the Teachers Training are to equip teachers with:

- Knowledge in basic nutrition and incorporate enhanced nutrition in the schools health education curriculum.

- Skills to identify students suffering from nutrition-related health problems and provide advice to parents with regards to children's diets and related medical assistance, resulting in happier and healthier children.

- Knowledge in hygiene practices for food preparation, cooking and storage for greater retention of nutrients in food.

- Awareness of alternative food sources to ensure healthier diets for families with limited income.

- Knowledge to use home remedies to manage some common illnesses.

# Topic 1 | Nutrition and Growth

*"If we could give every individual the right amount of nourishment and exercise, not too little and not too much, we would have found the safest way to health."*

~ Hippocrates

# 3 Topic 1: Nutrition and Growth

## 3.1 Learning Objectives

At the end of this topic, students are expected to be able to:

- Understand the importance of good nutrition and a balanced diet.
- Have a basic grasp of the functions of protein, be able to identify of protein-rich foods and the consequences of insufficient protein.
- Be able to better track their own growth.

## 3.2 Methodology

- Lecture
- Quiz
- Activity Planning

## 3.3 Lecture Content

### 3.3.1 Feeding A Child's Future



Nutrition is extremely important in children, and will have far reaching consequences as they progress to their teenage years and finally to adulthood. Healthy eating habits will assist a child's development and growth, help them learn better and prevent illnesses arising from malnutrition of important nutrients.

### 3.3.2 Importance of Eating Right


The lack of protein and energy (calories) leads to malnutrition among young children in India and around the world.

Lack of key micronutrients like iron and calcium can also seriously hinder the physical and mental growth of children, and this impact can last through one's lifetime.

## 3.3.3 A Nutritionally Adequate Diet Should be Consumed Through a Wise Choice of a Variety of Foods

- Nutrition is a basic prerequisite to sustain life.
- Variety in food is not only the spice of life but also the essence of nutrition and health.
- A diet consisting of foods from several food groups provides all the required nutrients in proper amounts.
- Cereals, millets and pulses are major sources of most nutrients.
- Milk which provides good quality proteins and calcium must be an essential item of the diet, particularly for infants, children and women.
- Oils and nuts are calorie-rich foods, and are useful for increasing the energy density.
- Inclusion of eggs, flesh foods and fish enhances the quality of diet. However, vegetarians can derive almost all the nutrients from diets consisting of cereals, pulses, vegetables, fruits and milk-based diets.
- Vegetables and fruits provide protective substances such as vitamins/ minerals/ phytonutrients.
- Diversified diets with a judicious choice from a variety food groups provide the necessary nutrients.

**Why do we need nutritionally adequate food ?**

Nutrients that we obtain through food have vital effects on physical growth and development, maintenance of normal body function, physical activity and health. Nutritious food is, thus needed to sustain life and activity. Our diet must provide all essential nutrients in the required amounts. Requirements of essential nutrients vary with age, gender, physiological status and physical activity. Dietary intakes lower or higher than the body requirements can lead to under-nutrition (deficiency diseases) or over-nutrition (diseases of affluence) respectively. Eating too little food during the vulnerable periods of life such as infancy, childhood, adolescence, pregnancy and lactation and eating too much at any age can lead to harmful consequences. An adequate diet, providing all nutrients, is needed throughout our lives. The nutrients must be obtained through a judicious choice and combination of a variety of foodstuffs from different food groups (Figure 1).

Carbohydrates, fats and proteins are macronutrients, which are needed in large amounts. Vitamins and minerals constitute the micronutrients and are required in small amounts. These nutrients are necessary for physiological and biochemical processes by which the human body acquires, assimilates and utilizes food to maintain health and activity.

**Carbohydrates**

Carbohydrates are either simple or complex, and are major sources of energy in all human diets. They provide energy of 4 Kcal/g. The simple carbohydrates, glucose and fructose, are found in fruits, vegetables and honey, sucrose in sugar and lactose in milk, while the complex polysaccharides are starches in cereals, millets, pulses and root vegetables and glycogen in animal foods. The other complex carbohydrates which are resistant to digestion in the human digestive tract are cellulose in vegetables and whole grains, and gums and pectins in vegetables, fruits and cereals, which constitute the dietary fibre component. In India, 70-80% of total dietary calories are derived from carbohydrates present in plant foods such as cereals, millets and pulses.

Dietary fibre delays and retards absorption of carbohydrates and fats and increases the satiety value. Diets rich in fibre reduce glucose and lipids in blood and increase the bulk of the stools. Diets rich in complex carbohydrates are healthier than low-fibre diets based on refined and processed foods.

**Proteins**

Proteins are primary structural and functional components of every living cell. Almost half the protein in our body is in the form of muscle and the rest of it is in bone, cartilage and skin. Proteins are complex molecules composed of different amino acids. Certain amino acids which are termed “essential”, have to be obtained from proteins in the diet since they are not synthesized in the human body. Other non-essential amino acids can be synthesized in the body to build proteins. Proteins perform a wide range of functions and also provide energy (4 Kcal/g).

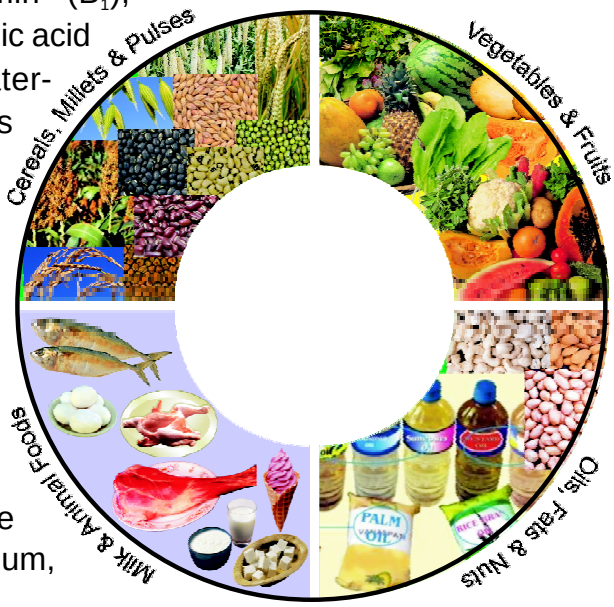
Protein requirements vary with age, physiological status and stress. More proteins are required by growing infants and children, pregnant women and individuals during infections and illness or stress. Animal foods like milk, meat, fish and eggs and plant foods such as pulses and legumes are rich sources of proteins. Animal proteins are of high quality as they provide all the essential amino acids in right proportions, while plant or vegetable proteins are not of the same quality because of their low content of some of the essential amino acids. However, a combination of cereals, millets and pulses provides most of the amino acids, which complement each other to provide better quality proteins.

## Fats

Oils and fats such as butter, ghee and vanaspathi constitute dietary visible fats. Fats are a concentrated source of energy providing 9 Kcal/g, and are made up of fatty acids in different proportions. Dietary fats are derived from two sources viz. the invisible fat present in plant and animal foods; and the visible or added fats and oils (cooking oil) (Refer chapter 7). Fats serve as a vehicle for fat-soluble vitamins like vitamins A, D, E and K and carotenes and promote their absorption. They are also sources of essential polyunsaturated fatty acids. It is necessary to have adequate and good quality fat in the diet with sufficient polyunsaturated fatty acids in proper proportions for meeting the requirements of essential fatty acids (Refer chapter 7). The type and quantity of fat in the daily diet influence the level of cholesterol and triglycerides in the blood. Diets should include adequate amounts of fat particularly in the case of infants and children, to provide concentrated energy since their energy needs per kg body weight are nearly twice those of adults. Adults need to be cautioned to restrict intake of saturated fat (butter, ghee and hydrogenated fats) and cholesterol (red meat, eggs, organ meat). Excess of these substances could lead to obesity, diabetes, cardiovascular disease and cancer.

## Vitamins and minerals

Vitamins are chemical compounds required by the body in small amounts. They must be present in the diet as they cannot be synthesized in the body. Vitamins are essential for numerous body processes and for maintenance of the structure of skin, bone, nerves, eye, brain, blood and mucous membrane. They are either water-soluble or fat-soluble. Vitamins A, D, E and K are fat-soluble, while vitamin C, and the B-complex vitamins such as thiamin ($B_1$), riboflavin ($B_2$), niacin, pyridoxine ($B_6$), folic acid and cyanocobalamin ($B_{12}$) are water-soluble. Pro-vitamin like beta-carotene is converted to vitamin A in the body. Fat-soluble vitamins can be stored in the body while water-soluble vitamins are not and get easily excreted in urine. Vitamins B-complex and C are heat labile vitamins and are easily destroyed by heat, air or during drying, cooking and food processing.




Minerals are inorganic elements found in body fluids and tissues. The important macro minerals are sodium,

potassium, calcium, phosphorus, magnesium and sulphur, while zinc, copper, selenium, molybdenum, fluorine, cobalt, chromium and iodine are microminerals. They are required for maintenance and integrity of skin, hair, nails, blood and soft tissues. They also govern nerve cell transmission, acid/base and fluid balance, enzyme and hormone activity as well as the blood- clotting processes. Approximate Calorific Value of Nuts, Salads and Fruits are given in annexure 1.

**What is a balanced diet ?**

A balanced diet is one which provides all the nutrients in required amounts and proper proportions. It can easily be achieved through a blend of the four basic food groups. The quantities of foods needed to meet the nutrient requirements vary with age, gender, physiological status and physical activity. A balanced diet should provide around 50-60% of total calories from carbohydrates, preferably from complex carbo-hydrates, about 10-15% from proteins and 20-30% from both visible and invisible fat.

In addition, a balanced diet should provide other non-nutrients such as dietary fibre, antioxidants and phytochemicals which bestow positive health benefits. Antioxidants such as vitamins C and E, beta-carotene, riboflavin and selenium protect the human body from free radical damage. Other phytochemicals such as polyphenols, flavones, etc., also afford protection against oxidant damage. Spices like turmeric, ginger, garlic, cumin and cloves are rich in antioxidants. Balanced Diet for Adults - Sedentary/Moderate/Heavy Activity is given in annexure 2.

**What are food groups ?**

Foods are conventionally grouped as :

1.Cereals, millets and pulses 2.Vegetables and fruits

3.Milk and milk products, egg, meat and fish 4.Oils & fats and nuts & oilseeds

However, foods may also be classified according to their functions (Table 4).

**What are nutrient requirements and recommended dietary allowances (RDA)?**

Requirements are the quantities of nutrients that healthy individuals must obtain from food to meet their physiological needs. The recommended dietary allowances (RDAs) are estimates of nutrients to be consumed daily to ensure the requirements of all individuals in a given population. The recommended level depends upon the bioavailability of nutrients from a given diet. The term bioavailability indicates what is absorbed and utilized by the body. In addition, RDA includes a margin of safety, to cover variation between individuals, dietary traditions and practices. The RDAs are suggested for physiological groups such as infants, pre-schoolers, children,

adolescents, pregnant women, lactating mothers, and adult men and women, taking into account their physical activity. In fact, RDAs are suggested averages/day. However, in practice, fluctuations in intake may occur depending on the food availability and demands of the body. But, the average requirements need to be satisfied over a period of time (Annexure-3).

The diet that one consumes must provide adequate calories, proteins and micronutrients to achieve maximum growth potential. There may be situations where adequate amounts of nutrients may not be available through diet alone. In such high risk situations where specific nutrients are lacking, foods fortified with the limiting nutrient(s), such as iodized salt, double fortified salt with iron and iodine are necessary.

**Table – 4 Classification of foods based on function**

| MAJOR NUTRIENTS | | OTHER NUTRIENTS |
|---|---|---|
| **ENERGY RICH FOODS** | **Carbohydrates & fats** | |
| | Whole grain cereals, millets | Protein, fibre, minerals, calcium, iron & B-complex vitamins |
| | Vegetable oils, ghee, butter | Fat soluble vitamins, essential fatty acids |
| | Nuts and oilseeds | Proteins, vitamins, minerals |
| | Sugars | Nil |
| **BODY BUILDING FOODS** | **Proteins** | |
| | Pulses, nuts and oilseeds | B-complex vitamins, invisible fat, fibre |
| | Milk and Milk products | Calcium, vitamin A, riboflavin, vitamin $B_{12}$ |
| | Meat, fish, poultry | B-complex vitamins, iron, iodine, fat |
| **PROTECTIVE FOODS** | **Vitamins and Minerals** | |
| | Green leafy vegetables | Antioxidants, fibre and other carotenoids |
| | Other vegetables and fruits | Fibre, sugar and antioxidants |
| | Eggs, milk and milk products and flesh foods | Protein and fat |

***Annexure - 11***

## PORTION SIZES AND MENU PLAN

### Portion Size of Foods (raw) and Nutrients

| | g/Portion | Energy (Kcal) | Protein (g) | Carbohydrate (g) | Fat (g) |
|---|---|---|---|---|---|
| Cereals & millets | 30 | 100 | 3.0 | 20 | 0.8 |
| Pulses | 30 | 100 | 6.0 | 15 | 0.7 |
| Egg | 50 | 85 | 7.0 | - | 7.0 |
| Meat/chicken/ fish | 50 | 100 | 9.0 | - | 7.0 |
| Milk (ml)[@] & milk products | 100 | 70 | 3.0 | 5 | 3.0 |
| Roots & Tubers | 100 | 80 | 1.3 | 18 | - |
| Green leafy vegetables | 100 | 46 | 3.6 | - | 0.4 |
| Other vegetables | 100 | 28 | 1.7 | - | 0.2 |
| Fruits | 100 | 40 | - | 10 | - |
| Sugar | 5 | 20 | - | 5 | - |
| Fat & Oils (visible) | 5 | 45 | - | - | 5.0 |

The balanced diets are given as multiples of these portion sizes

[@] Toned milk.

***Annexure - 4***

## Balanced Diet for Infants, Children and Adolescents (Number of Portions)

| Food groups | g/ portion | Infants 6-12 months | Years | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1 - 3 | 4 - 6 | 7 - 9 | 10 – 12 | | 13 – 15 | | 16 - 18 | |
| | | | | | | Girls | Boys | Girls | Boys | Girls | Boys |
| Cereals & millets | 30 | 0.5 | 2 | 4 | 6 | 8 | 10 | 11 | 14 | 11 | 15 |
| Pulses | 30 | 0.25 | 1 | 1.0 | 2 | 2 | 2 | 2 | 2.5 | 2.5 | 3 |
| Milk (ml) & milk products | 100 | 4a | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Roots & tubers | 100 | 0.5 | 0.5 | 1 | 1 | 1 | 1 | 1 | 1.5 | 2 | 2 |
| Green leafy vegetables | 100 | 0.25 | 0.5 | 0.5 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Other vegetables | 100 | 0.25 | 0.5 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 |
| Fruits | 100 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Sugar | 5 | 2 | 3 | 4 | 4 | 6 | 6 | 5 | 4 | 5 | 6 |
| Fat/ oil (visible) | 5 | 4 | 5 | 5 | 6 | 7 | 7 | 8 | 9 | 7 | 10 |

[a] Quantity indicates top milk. For breastfed infants, 200 ml top milk is required.

One portion of pulse may be exchanged with one portion (50 g) of egg/meat/chicken/fish.

For infants introduce egg/meat/chicken/fish around 9 months.

Specific recommendations as compared to a sedentary woman/man :

Children :

1-6 years- ½ to ¾ the amount of cereals, pulses and vegetables and extra cup of milk.

7-12 years- Extra cup of milk

Adolescent girls- Extra cup of milk

Adolescent boys- Diet of sedentary man with extra cup of milk

***Annexure - 5***

## Approximate Calorific Value of Nuts, Salads and Fruits

| | Portion | Calories |
|---|---|---|
| **Nuts** | | |
| Almonds | 10 Nos. | 85 |
| Cashewnuts | 10 Nos. | 95 |
| Coconut (fresh) | 100 g | 444 |
| Coconut (dry) | 100 g | 662 |
| Peanuts | 50 Nos. | 90 |
| **Fresh fruits** | | |
| Apple | 1 medium | 65 |
| Banana | 1 medium | 90 |
| Grapes | 30 Nos. | 70 |
| Guava | 1 medium | 50 |
| Jackfruit | 4 pieces | 90 |
| Mango | 1 medium | 180 |
| Mosambi/orange | 1 medium | 40 |
| Papaya | 1 piece | 80 |
| Pineapple | 1 piece | 50 |
| Sapota | 1 medium | 80 |
| Custard apple | 1 medium | 130 |
| Watermelon/muskmelon | 1 slice | 15 |
| **Salads** | | |
| Beetroot | 1 medium | 30 |
| Carrot | 1 medium | 70 |
| Cucumber | 1 medium | 12 |
| Onion | 1 medium | 25 |
| Radish | 1 medium | 10 |
| Tomato | 1 medium | 10 |

***Emphasis***

To highlight to students the need to eat from a wide variety of foods from each of the food groups in the proper amounts and proportion.

There is a crucial need for:

- Balance
- Variety
- Moderation


## 3.3.4 Functions of Energy

Energy is required for activities like:

| | |
|---|---|
|  |  |
| **Running** | **Thinking** |

| | |
|---|---|
|  |  |
| **Playing** | **Studying** |

### 3.3.5 Consequences of Insufficient Energy

It is important to explain to the students how insufficient energy leads to a chain of undesired consequences.

- Energy is needed to fuel the brain hence the lack of energy can lead to poor performance at school.


**Brain** **Poor Concentration** **Poor School Results**

- Malnourished children often have smaller hearts which have to work harder in order to pump the blood around the body, and as a result, these children are often fatigued.

**Heart** **Shrinks** **Pump Harder**

- Vital organs in our body include the heart, kidneys and liver. Toxins also build up in the kidneys and liver of malnourished children. When these organs are not able to function properly, they lead to more health problems.

**Liver** **Dangerous Toxins** **Liver Failure**

**Kidney** **Dangerous Toxins** **Kidney Failure**

***Annexure - 7***

**Vegetables and Fruits with High calorie value (≥ 100kcal)**

| Food Stuff | Kcal/100g |
|---|---|
| **Leafy vegetables** | |
| Chekkur manis | 103 |
| Colocasia leaves (dried) | 277 |
| Curry leaves | 108 |
| Fetid cassia (dried) (Chakunda) | 292 |
| Rape leaves (dried) | 297 |
| Tamarind leaves | 115 |
| **Roots & Tubers** | |
| Arrow root flour | 334 |
| Parsnip | 101 |
| Sweet potato | 120 |
| Tapioca | 157 |
| Yam ordinary | 111 |
| Yam wild | 110 |
| **Other vegetables** | |
| Beans, scarlet runner | 158 |
| Jack fruit, seeds | 133 |
| Karonda (dry) | 364 |
| Lotus stem (dry) | 234 |
| Sundakai (dry) | 269 |
| Water chestnut (fresh) | 115 |
| Water chestnut (dry) | 330 |
| **Fruits** | |
| Apricot (dry) | 306 |
| Avacado pear | 215 |
| Banana | 116 |
| Bael fruit | 116 |
| Currants, red | 316 |
| Dates (dried) | 317 |
| Dates fresh | 144 |
| Mahua (ripe) | 111 |
| Raisins | 308 |
| Seetaphal | 104 |
| Wood apple | 134 |

*Source:* Nutritive Value of Indian Foods, 2006

***Annexure - 6***

## Low calorie vegetables and fruits ( 20 kcal)

| Name of the vegetables | Kcal |
|---|---|
| **GLV** | |
| Amaranth (stem) | 19 |
| Ambat chukka | 15 |
| Celery stalk | 18 |
| Ipomoea stem | 19 |
| Spinach stalk | 20 |
| **Roots and tubers** | |
| Radish table | 16 |
| Radish white | 17 |
| **Other vegetables** | |
| Ash gourd | 10 |
| Bottle gourd | 12 |
| Cluster beans | 16 |
| Colocasia stem | 18 |
| Cucumber | 13 |
| Ghosala | 18 |
| Kovai | 18 |
| Parwal | 20 |
| Ridge guard | 17 |
| Snake guard | 18 |
| Vegetable marrow | 17 |
| **Fruits** | |
| Bilimbi | 19 |
| Jamb safed | 19 |
| Musk melon | 17 |
| Water melon | 16 |
| Orange juice | 9 |
| Tomato ripe | 20 |

*Source:* Nutritive Value of Indian Foods, 2006

*Annexure - 8*

## Approximate Calorific Value of Some Cooked Preparations

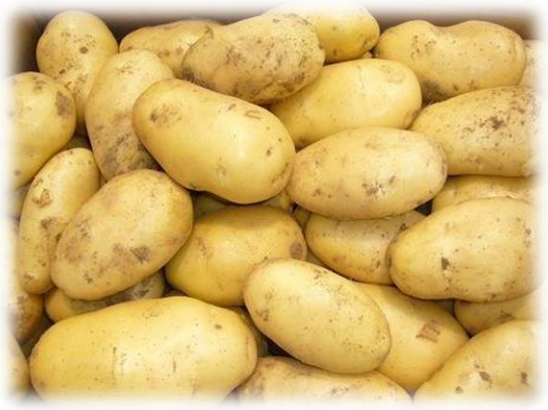
| Preparation | Quantity for one serving | Calories (Kcal) |
|---|---|---|
| **1. Cereal** | | |
| Rice | 1 cup | 170 |
| Phulka | 1 No. | 80 |
| Paratha | 1 No. | 150 |
| Puri | 1 No. | 80 |
| Bread | 2 slices | 170 |
| Poha | 1 cup | 270 |
| Upma | 1 cup | 270 |
| Idli | 2 Nos. | 150 |
| Dosa | 1 No. | 125 |
| Kichidi | 1 cup | 200 |
| Wheat porridge | 1 cup | 220 |
| Semolina porridge | 1 cup | 220 |
| Cereal flakes with milk (corn/wheat/rice) | 1 cup | 220 |
| **2. Pulse** | | |
| Plain dhal | ½ cup | 100 |
| Sambar | 1 cup | 110 |
| **3. Vegetable** | | |
| With gravy | 1 cup | 170 |
| Dry | 1 cup | 150 |
| **4. Non-Vegetarian** | | |
| Boiled egg | 1 No. | 90 |
| Ommelette | 1 No. | 160 |
| Fried egg | 1 No. | 160 |
| Mutton curry | ¾ cup | 260 |
| Chicken curry | ¾ cup | 240 |
| Fish fried | 2 big pieces | 190 |
| Fish cutlet | 2 Nos. | 190 |
| Prawn curry | ¾ cup | 220 |
| Keema kofta curry | ¾ cup (6 small koftas) | 240 |

| Preparation | Quantity for one serving | Calories (Kcal) |
|---|---|---|
| **5. Savoury snacks** | | |
| Bajji or pakora | 8 Nos. | 280 |
| Besan ka pura | 1 No. | 220 |
| Chat (Dahi-pakori) | 5 pieces | 220 |
| Cheese balls | 2 Nos. | 250 |
| Dahi vada | 2 Nos. | 180 |
| Vada | 2 Nos. | 140 |
| Masala vada | 2 Nos. | 150 |
| Masala dosa | 1 No. | 200 |
| Pea-kachori | 2 Nos. | 380 |
| Potato bonda | 2 Nos. | 200 |
| Sago vada | 2 Nos. | 210 |
| Samosa | 1 No. | 200 |
| Sandwiches (butter - 2tbsp) | 2 Nos. | 200 |
| Vegetable puff | 1 No. | 200 |
| Pizza (Cheese and tomato) | 1 slice | 200 |
| **6. Chutneys** | | |
| Coconut/groundnuts/til | 2 tbsp | 120 |
| Tomato | 1 tbsp | 10 |
| Tamarind (with jaggery) | 1 tbsp | 60 |
| **7. Sweets and Desserts** | | |
| Besan barfi | 2 small pieces | 400 |
| Chikki | 2 pieces | 290 |
| Fruit cake | 1 piece | 270 |
| Rice puttu | ½ cup | 280 |
| Sandesh | 2 Nos. | 140 |
| Double ka meetha | ½ cup | 280 |
| Halwa (kesari) | ½ cup | 320 |
| Jelly/Jam | 1 tbsp | 20 |
| Custard (caramel) | ½ cup | 160 |
| Srikhand | ½ cup | 380 |
| Milk chocolate | 25 g | 140 |
| Ice-cream | ½ cup | 200 |

| Preparation | | Quantity for one serving | Calories (Kcal) |
|---|---|---|---|
| **8. Beverages** | | | |
| Tea | (2 tsp sugar + 50 ml toned milk) | 1 cup | 75 |
| Coffee | (2 tsp sugar + 100 ml) | 1 cup | 110 |
| Cow's milk | (2 tsp sugar) | 1 cup | 180 |
| Buffalo's milk | (2 tsp sugar) | 1 cup | 320 |
| Lassi | (2 tsp sugar) | 1 cup/glass (200 ml) | 110 |
| Squash | | 1 cup/glass | 75 |
| Syrups (Sharabats) | | 1 cup/glass | 200 |
| Cold drinks | | 1 bottle (200 ml) | 150 |
| Fresh lime juice | | 1 glass | 60 |

### 3.3.6 Energy-Rich Foods

Displayed below are some food sources such as grains and potatoes that are high in energy.

| | |
|---|---|
|  |  |
| **Millet** | **Jowar** |
|  |  |
| **Rice** | **Potato** |
|  |  |
| **Bread (Chapatti)** | **Banana** |

### 3.3.7 Functions of Protein

Protein is essential for health:

| | |
|---|---|
|  **Growth** |  **Muscles** |
|  **Hair** |  **Skin** |
|  **Nails** | |

### 3.3.8 Consequences of Insufficient Protein

It is important to explain to the students how insufficient proteins lead to a chain of undesired consequences such as stunted growth and hair loss.

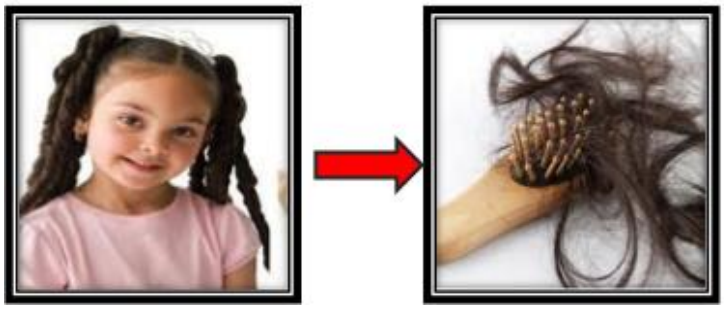
- Children with inadequate protein and calcium intake will have difficulty achieving their full potential in terms of their adult height.

**Bones** **Slower Growth Rat** **Stunted for Life**

**Muscles** **Slower Muscle Growth** **Muscle Wasting**

- Insufficient protein also leads to increased susceptibility to illnesses that can be very costly to treat medically.

**Skin** **Cracks** **Prone to Infections**



**Hair** **Hair Loss**

## 3.3.9 Protein-Rich Foods

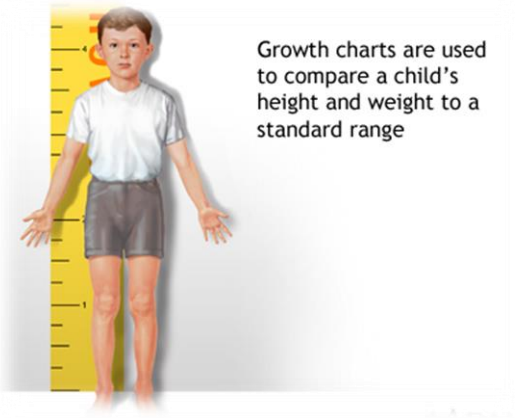
Some food sources that are high in protein:

- Meats
- Eggs
- Fish
- Beans/ Beancurd
- Soy
- Seed
- Milk

## 3.3.10 Types of Protein Foods

| | | |
|---|---|---|
|  **Curd** |  **Paneer** |  **Lentils** |
|  **Pinto Beans** |  **Lima Beans** |  **Black Gram** |
|  **Bengal Gram** |  **Green Gram** |  **Horse Gram** |
|  **Kidney Beans** |  **Black Beans** | |

## 3.3.11 Keeping Track of a Child's Growth

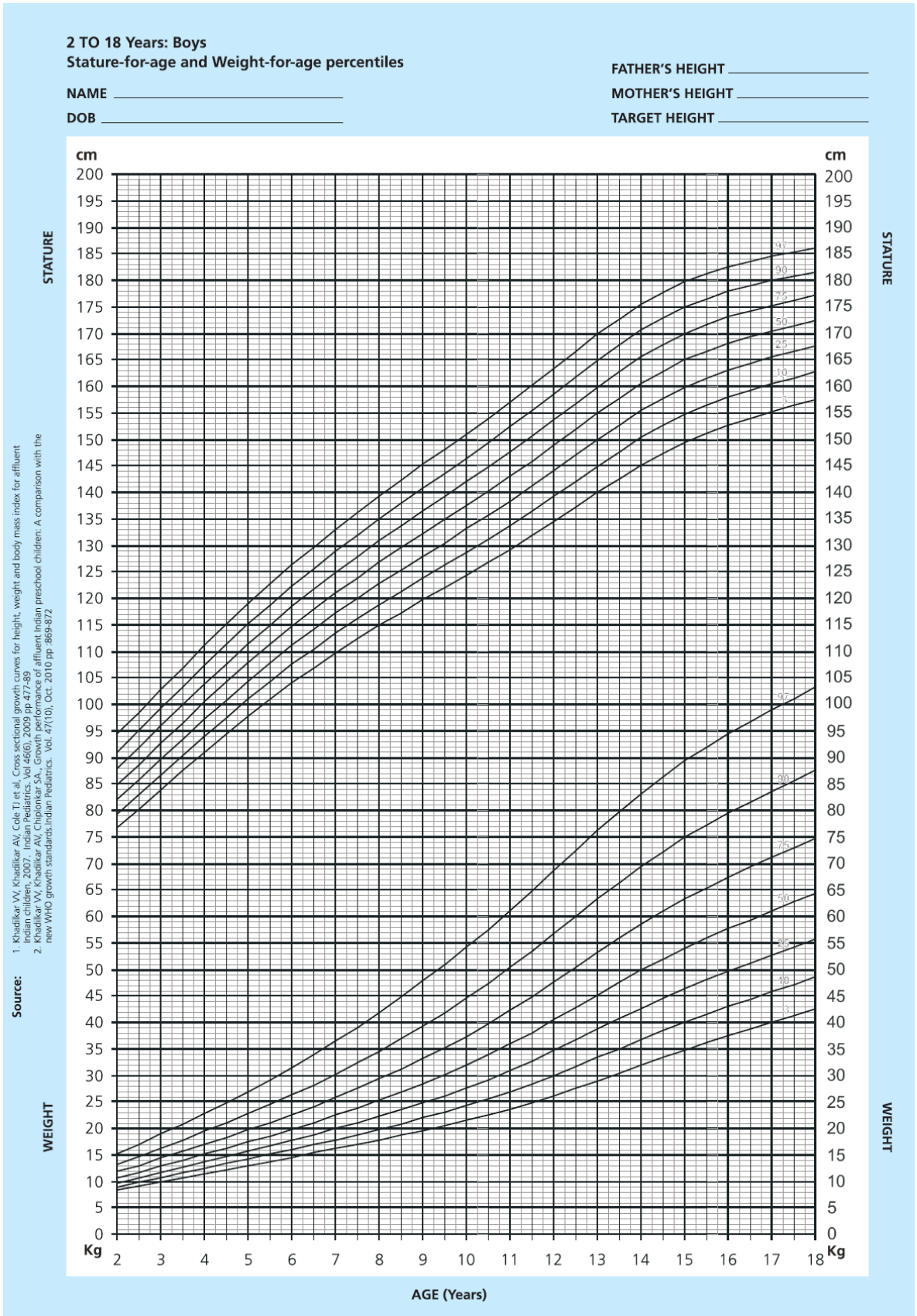



***Importance of keeping track of a child's growth***

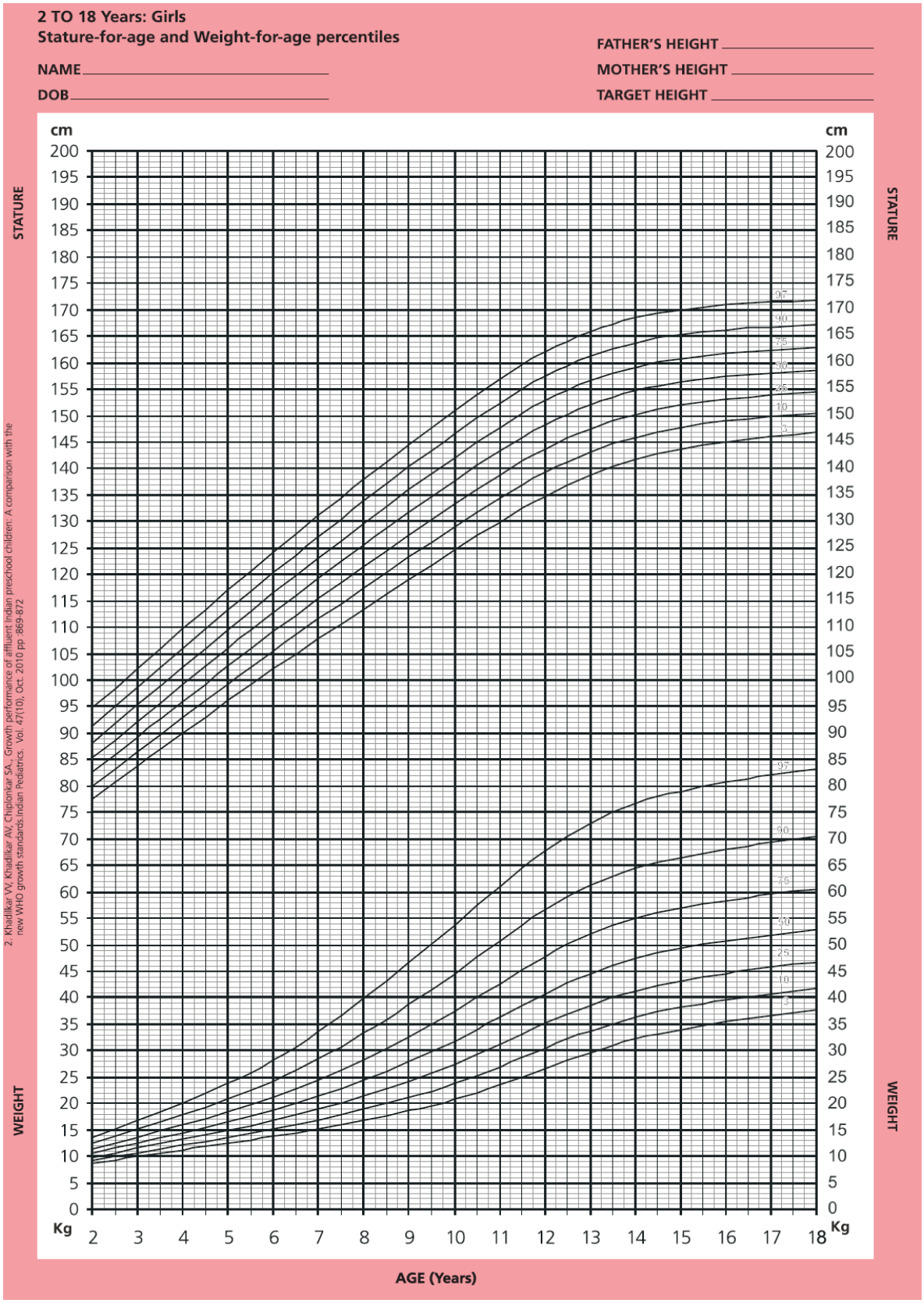
- Keeping track of a child's height and weight can help you to monitor if he or she is eating properly.
- A child's height can be influenced by the amount of protein and calcium consumed and the height of the child's parents.
- Weight is determined by how the amount of protein and calories consumed.

***How to Keep Track***

- Take height and weight once every 3 months.
- Use the appropriate growth chart for boys and girls.
- A reading below the 3rd and above the 97th percentile lines is considered as out of the normal range for weight and height. Refer to section 3.3.12.
- If there is a decline in the percentile value, the child's food intake needs to be reviewed.




**Boys' Growth Chart**




**Girls' Growth Chart**

# 3.3.12 Growth Charts: A Diagnostic Tool

**Vaman Khadilkar, Anuradha Khadilkar**

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A B S T R A C T

**Context:** Assessment of growth by objective anthropometric methods is crucial in child care. India is in a phase of nutrition transition and thus it is vital to update growth references regularly. **Objective:** To review growth standards and references for assessment of physical growth of Indian children for clinical use and research purposes. **Materials and Methods:** Basics of growth charts and importance of anthropometric measurements are described. A comparison between growth standards and references is provided. Further, Indian growth reference curves based on the data collected by Agarwal *et al.* and adopted by the Indian Academy of Pediatrics, World Health Organization growth standards for children under the age of 5 years (2006) and contemporary Indian growth references published on apparently healthy affluent Indian children (data collected in 2007-08) are discussed. The article also discusses the use of adult equivalent body mass index (BMI) cut-offs for screening for overweight and obesity in Indian children. **Results and Conclusions:** For the assessment of height, weight and BMI, WHO growth standards (for children < 5 years) and contemporary cross sectional reference percentile curves (for children from 5-18 years) are available for clinical use and for research purposes. BMI percentiles (adjusted for the Asian adult BMI equivalent cut-offs) for the assessment of physical growth of present day Indian children are also available. LMS values and Microsoft excel macro for calculating SD scores can be obtained from the author (email: vamankhadilkar@gmail.com). Contemporary growth charts can be obtained by sending a message to 08861201183 or email: gntd@novonordisk.com.

**Key words:** Children, growth, India, reference, standard

## Introduction

The assessment of growth by objective anthropometric methods of weight, length/height, and body mass index (BMI) is crucial in child care to assess the nutritional status and for the identification of growth failure. Reference data are central to growth monitoring and they help doctors, health care workers, and policymakers to diagnose under nutrition, overweight and obesity, and other growth-related and endocrine conditions.

The pattern of growth of children changes with time and hence it is recommended that references should be updated regularly.[1] India is in a phase of nutritional transition and thus it is vital to update growth references regularly.[2] The previously available growth reference curves in India were based on the data collected by Agarwal *et al.* in 1989 which were published in 1992 and 1994 and were then adopted by the Indian Academy of Pediatrics for growth monitoring in 2007.[3-5] World Health Organization (WHO) published new growth standards for children under the age of 5 years in 2006 which are being adopted in many countries including India as a global single standard of childhood growth for the under five children. It is therefore important to review the recent trends in growth monitoring and merits and demerits of the currently available growth references and standards.

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| | DOI: 10.4103/2230-8210.84854 |

### Basics of growth charts

Growth chart consists of an x axis which is usually age in years or months and a y axis that changes according to the reference e.g., it can be height in cm or inches, weight in kg or body mass index in kg/m$^2$. The x axis is usually divided into 12 equal parts (months) for each year, but some countries such as United Kingdom use decimal ages

where each year is divided into 10 parts. WHO, Centers for Disease Control and Prevention (CDC) and Indian charts use 12 (monthly) divisions for each year. Standard growth chart has 7 percentile lines and include 3rd, 10th, 25th, 50th, 75th, and 97th percentiles. These percentiles are standard for height and weight charts. Any individual who is below 3rd and above 97th percentile is considered out of normal range. For the BMI charts, however, there are 85th and 95th percentile lines which indicate overweight and obesity cut offs. Proportion charts use Z score lines instead of percentile lines and discrepancy of more than 2Z scores in the upper and lower segment is considered abnormal. On the growth velocity chart, 25th percentile is the cut off line for defining low height velocity. The correlation between Z scores and percentiles can be confusing and in the recent WHO Multicenter Growth Reference (MGRS) 2006 study, these correlations have been spelt out by the WHO and are given the Table 1 below for clarity of understanding.

Doctors and health care workers find it difficult to interpret various cut offs for diagnosis of underweight, overweight, stunting, wasting etc. which have also been clearly spelt out in the new WHO MGRS study and are given below [Table 2]. These make it easy for the practicing pediatrician and health care worker to follow as a guideline for management and referral.[6]

### Importance of anthropometry over tests

Anthropometry scores over all the available endocrine tests in the assessment of growth failure. Hence, it is of paramount importance that appropriate growth charts are used. Plotting a child's growth must always be the starting point in the investigations of growth failure. Longitudinal data plotted over a period of time is far more useful than a single record of height and weight. Observation of growth pattern usually over a period of minimum one year is necessary before a child is subjected to rigorous endocrine evaluation.

**Table 1: Correlation between percentiles and Z scores for World Health Organization charts**

| Z-Score | Exact percentile | Rounded percentile |
|---|---|---|
| 0 | 50 | 50 |
| -1 | 15.9 | 15 |
| -2 | 2.3 | 3 |
| -3 | 0.1 | 1 |
| 1 | 84.1 | 85 |
| 2 | 97.7 | 97 |
| 3 | 99.9 | 99 |

**Table 2: Growth parameters and their interpretation for the World Health Organization charts**

| Z Score (percentile) | Length/height for age | Weight for age | BMI for age |
|---|---|---|---|
| >3 (99) | May be abnormal | May be abnormal (Use BMI) | Obese |
| >2 (97) | Normal | Use BMI | Overweight |
| >1 (85) | Normal | Use BMI | Risk of overweight |
| 0 (50) | Normal | Use BMI | Normal |
| <-1 (15) | Normal | Normal | Normal |
| <-2 (3) | Stunted | Underweight | Wasted |
| <-3 (1) | Severely Stunted | Severely underweight | Severe wasted |

BMI: Body mass index

## Growth Standard Vs Reference

Growth charts mainly belong to two types: growth standards and growth references. Growth standards are prescriptive and define how a population of children should grow given the optimal nutrition and optimal health. Growth references on the other hand are descriptive and are prepared from a population which is thought to be growing in the best possible state of nutrition and health in a given community. These describe the growth of children at that time. They represent how children are growing rather than how they should be growing.

WHO 2006 growth charts for children under 5 years is an example of growth standards. They delineate how children of the world under the age of 5 years should grow if most of the controllable variables are kept optimal as opposed to this 1989 Agarwal *et al.*,[3] data and 2007 Indian growth charts by Khadilkar *et al.*,[7] for affluent children are an example of growth references which describe how children in India were growing at the given time.

### Strengths and shortcomings of both

Advantage of having a growth standard such as WHO 2006 charts is that children of all countries, races, ethnicity can be compared against a single standard thus assessment becomes more objective and easy to compare. The disadvantage of using charts such as these is that they are likely to over diagnose underweight and stunting in a large number of apparently normal children[8] in the developing countries such as India.

Advantage of a reference is that they are true representative of the existing growth pattern of children and allow us to study the secular trend in terms of height, weight, and obesity. The downside of reference curves is that they need to be updated at least once in a decade and in modern times as obesity is on the rise they are likely to define overweight children as normal.

## World Health Organization 2006 Growth Standards

In 2006, WHO produced growth standards for children

under the age of 5 years. The standards are derived from children who were raised in environments that minimized constraints to growth such as poor diets and infection. In addition, their mothers followed healthy practices such as breastfeeding, and not smoking during and after pregnancy. Because the standards depict physiological human growth under optimal environmental conditions, they provide an improved tool for assessing growth. These charts thus are prescriptive standards and not descriptive references.

These standards provide an opportunity to redefine and revitalize actions to promote optimal child growth, foster the adoption of "best practices", such as incorporating height and BMI to assess the dual burden of under- and over-nutrition (stunting and overweight); provide coherence between national and international infant feeding guidelines that recommend breastfeeding as the optimal source of nutrition during infancy and the charts are recommended for assessing the pattern of infant growth; and harmonize growth assessment systems within and between countries.[9]

WHO recommends using -2Z (3rd percentile) scores for diagnosis of stunting and underweight and -3Z (1st percentile) for the diagnosis of severe stunting and severe underweight.

### How India and other countries perform on these charts

Use of WHO 2006 growth charts are likely over diagnosed stunting or underweight or both in developing countries. In a recent multicentric study done on 1493 affluent preschool Indian children (selected from all zones of India) published by the author the Mean Z scores for height, weight, BMI, and weight for height (-0.75(1.1), -0.59(1.1), –0.19(1.22) and -0.26(1.18), respectively) were below the WHO 2006 standards. The overall incidence of stunting was 13.6% and underweight was 8.5% amongst affluent Indian children under the age of five years. This percentage is likely to be higher in rural areas and in under privileged urban areas although at the present time no such data is available from India.

Concerns regarding adoption of new WHO 2006 is also expressed by many authors from many parts of the world such as Indonesia, Czechoslovakia, Malawi etc. as these standards are likely to over diagnose stunting and underweight. Many authors have expressed caution regarding changing infant feeding policies based on WHO standards for the present time.

## New 2007 Affluent Indian Growth Charts [Figures 1-4]

### The need for new charts

The previously available growth reference curves in India were based on the data collected by Agarwal *et al.* in 1989 which were published in 1992 and 1994 and are almost two decades old. WHO recommends that each country should update its growth references every decade and hence new growth references were produced in 2009.

### Data collection

The Indian Academy of Pediatrics divides India into five zones, i.e., North, South, East, West, and Central. The nutritionally well off areas were identified based on per capita income of cities (from IAP zones). Data collection lasted from June 2007 to January 2008. Of the 19834 children measured, measurements for 18666 were analyzed (10496 boys and 8170 girls) where 5184 (3218 boys, 1966 girls) 3000 (1678 boys, 1322 girls), 698 (696 boys, 1002 girls) 6920 (3837 boys, 3083 girls), and 1864 (1067 boys, 797 girls) children were from the North, South, East, West, and Central zones, respectively. The differences between the zones were not significant. Standard percentiles were generated for height, weight, and BMI.

### Method used and its strength

The cleaned data were then analyzed using the LMS method, which constructs growth reference percentiles adjusted for skewness.[10] Each growth reference was summarized by 3 smooth curves plotted against age representing the median (M), the coefficient of variation (S) and the skewness (L) of the measurement distribution.[11] The models were checked for goodness of fit using the detrended Q-Q plot, Q Tests and worm plots. Least mean square (LMS) method is the universally accepted method for construction of growth charts as and it has certain advantage. The fitting procedure ensures that the values of LMS change smoothly with age so that they can be represented as smooth curves plotted against age, since these curves are smooth the resulting percentiles are also smooth, data is normalized using Box Cox transformation and any number of percentiles can be generated.

### Observations

#### *Secular trends in height*

The 50th percentile for boys' height was greater than that of the 1989 data at all ages. The 97th percentile at 18 years was 1.7 cm greater than the percentile in 1989. The 50th percentile for girls' height was greater than the percentile in 1989 at most ages, the greatest difference being 3.1 cm at 12 years. The median final height for girls was similar to 1989, but the 97th percentile was 2.4 cm greater, indicating increased variability.

#### *Alarming rise in obesity*

The 50th percentile for boys' weight was greater than the percentile in 1989 at all ages except five years, maximum

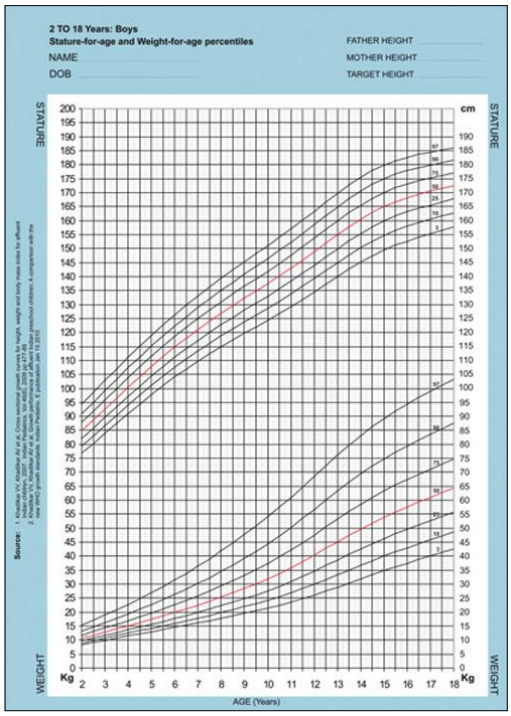


**Figure 1:** Growth chart for stature and weight for Indian boys

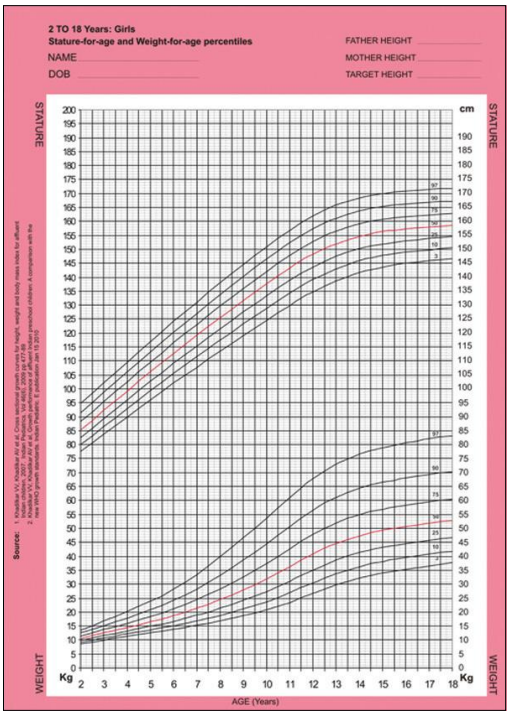


**Figure 2:** Growth chart for stature and weight for Indian girls

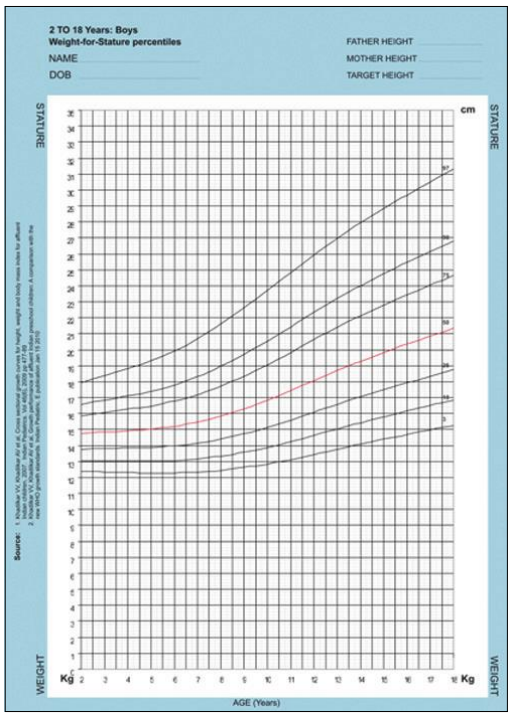


**Figure 3:** Body mass index charts for Indian boys

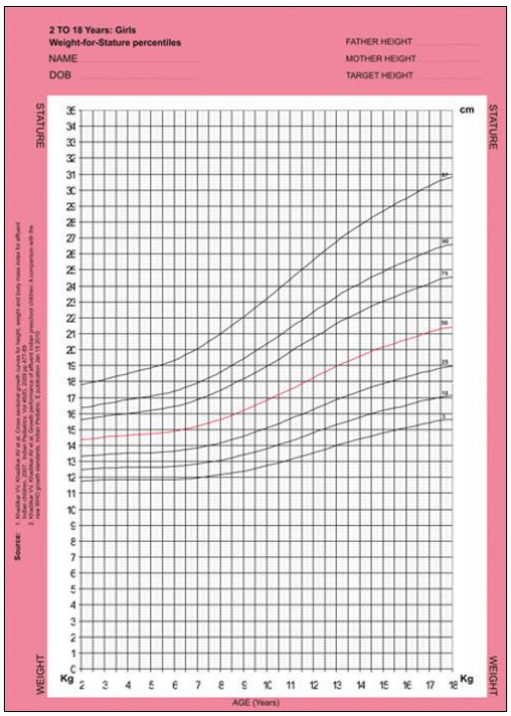


**Figure 4:** Body mass index charts for Indian girls

6.5 kg at 14 years reducing to 2.9 kg at 18 years. At 18 years, the 97$^{th}$ percentile was 14.7 kg higher than the percentile in 1989. The 50$^{th}$ percentile for girls' weight was lower than the 1989 up to the age of 6.5 years and higher afterwards, maximum 8.0 kg at 17 years. Unlike in boys, there was no reduction in difference in weight approaching adulthood. Compared with the 1989 data, average difference in the 97$^{th}$ percentile was similar to the 50$^{th}$ percentile (6.8 kg and 4.7 kg, respectively) in girls which was in stark contrast to the data on boys, where the difference was much greater (12.8 kg and 4.1 kg, respectively). In boys, the median BMI values were higher at almost all ages compared with the 1989 data. The difference in the 95$^{th}$ percentile in the two datasets was 2.3 at 18 years. In girls, the median BMI values were higher at almost all ages, the maximum difference being 1.1 kg/m$^2$ at 18 years.[7]

This dataset was examined for the prevalence of overweight and obesity by international standards. The overall prevalence of overweight and obesity was 18.2% by the IOTF classification and 23.9% by WHO standards. The prevalence of overweight and obesity was higher in boys than in girls. Mean BMI values were significantly higher than those reported in the 1989 data from 5 – 17 years at all ages and for both sexes. The rising trend of BMI in Indian children and adolescents observed in this multicentric study rings alarm bells in terms of associated adverse health consequences in adulthood.[12]

*Comparison with CDC and UK Charts*

On comparison with the US (NCHS 2000) and UK (1990) data, the height percentiles for both boys and girls are similar until the age of puberty but thereafter, Indian affluent children remain shorter and do not show the pronounced pubertal spurt. This is seen in both the sexes and may be related to genetic difference in the populations. On the BMI charts, the 75$^{th}$ percentile for the current data was very close to the US and UK 85$^{th}$ percentile on BMI charts, especially after seven years in boys and nine years in girls. Boys on the 75$^{th}$ percentile in our study had a mean BMI of 24.2 and girls had a mean BMI of 24 at 18 years, this value is just under the adult cut-off (25) for overweight.[13] Seventy-fifth percentile values on the current BMI curves may therefore be used as a cutoff for screening for overweight boys and girls.

*Body mass index charts*

As obesity in childhood is increasing around the world, using descriptive growth charts for weight may under-diagnose obesity in children as these charts tend to "normalize" obese children as the whole population from where the data is collected is on the higher side of the weight scale. It is therefore suggested that we use prescriptive growth standards for BMI in children. Such charts are made available by the WHO for children under the age of five years. For older children, IOTF has published BMI charts which are adjusted to adult equivalent cut offs of 25 and 30 BMI at 18 years of age. These charts are thus more appropriate for older children of the world.

WHO, however, recommends that for adult Asian Indians the BMI cut off value for overweight should be 23 and for obesity 28. It is thus important that based on the models such as IOTF, cut offs standards for BMI at 23 and 28 adult equivalent are produced to screen Indian children for overweight and obesity from five year onwards (below five years, WHO MGRS has defined the cut offs already). We, therefore, constructed BMI charts with adult 23 and 28 equivalent cutoffs for Indian boys and girls. These were validated against a total of 250 children from schools and a tertiary care pediatric clinic. The children were distributed over the whole range of BMI categories (adult equivalent BMI of <23, 23-25, 25-28, 28-30 and >30) (mean age 11.4±2.9 years). Forty three percent children in the adult equivalent BMI category of 23-25 had one or more than one risk factor for development of the metabolic syndrome (MS). Similarly, 73% children in the BMI category of adult equivalent of 28-30 had one or more than one risk factor for developing the MS and would be classified as overweight rather than obese if an adult equivalent cut-off of 30 were to be used. This validation suggests that Indian children above the adult 23 cut-off are already showing risk factors for the development of MS and hence it is appropriate to use these cut-offs for screening children who are at increased risk of later development of MS.[14]

Thus, with these three recent studies contemporary cross sectional reference percentile curves for height, weight, and BMI (adjusted for the Asian adult BMI equivalent cut-offs) for the assessment of physical growth of present day Indian children are thus made available for clinical use and for research purpose.

LMS values and Microsoft excel macro for calculating LMS values are produced for research purpose and can be obtained from the author by sending an email to vamankhadilkar@gmail.com. Similarly, 2007 growth charts can be obtained by sending a message or contacting Mr. Ganesh on 08861201183 or write to gntd@novonordisk.com.

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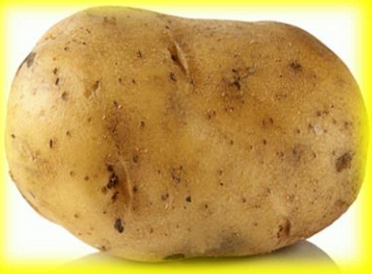
## 3.5 Quiz Content

### 3.5.1 Energy – Which will you Pick?

This is a game where 2 items are shown, and participants are expected to select the choice of food that contains more energy. The table below illustrates three examples (one example per row) and the correct answer is highlighted in yellow.

| | |
|---|---|
|  **Banana** |  **Carrot** |
|  **Chickdi Flat** |  **Potato** |
|  **Malted Drink** |  **Water** |

***Activity Planning***

Think of 2 other examples you can use in class.

**ACTIVITY TITLE:**

Objectives:

a) Learn how to measure height and plot on height curve

b) Learn how to measure weight and plot on weight curve

c) Learn how to interpret height and weight in terms of stunting/underweight

Summary of Activity:

Teachers will take the height and weight of at least one girl and one boy, plot it on the appropriate growth curves/charts and interpret the data accordingly. If the child is deemed to be stunted and/or underweight, he/she should be referred to an appropriate healthcare professional for follow-up

Materials required:

a. Enlarged growth charts for boys and girls

b. Cardboard marker/clipboard

c. Erasable whiteboard marker

d. Weighing machine

e. Height scale / Stadiometer

Conduct of Activity:

1. Take weight of child using weighing machine and record reading
2. Mark weight of child on weight curve on gender specific growth chart using whiteboard marker
3. Take height of child using height scale/stadiometer and cardboard marker/clipboard
4. Mark height of child on height curve on gender specific growth chart using whiteboard marker
5. Record the approximate percentile readings for both height and weight. If either or both markings are below the 3$^{rd}$ percentile, refer to appropriate healthcare professional for follow-up

**ACTIVITY TITLE:**

Objectives:

a)

b)

c)

Summary of Activity:

Materials required:

a.

b.

c.

d.

e.

Conduct of Activity:

**ACTIVITY TITLE:**

Objectives:

a)

b)

c)

Summary of Activity:

Materials required:

a.

b.

c.

d.

e.

Conduct of Activity:

## 3.5.2 Protein – Which will you Pick?

This is a similar game to 3.5.1 Energy – Which will you Pick?

The two examples are displayed in the table beneath.

| | |
|---|---|
|  **Curd** |  **Ice-Cream** |
|  **Candies** |  **Nuts** |

***Activity Planning***

Think of 2 other examples you can use in class.

**ACTIVITY TITLE:**

Objectives:

a)

b)

c)

Summary of Activity:

Materials required:

a.

b.

c.

d.

e.

Conduct of Activity:

**ACTIVITY TITLE:**

Objectives:

a)

b)

c)

Summary of Activity:

Materials required:

a.

b.

c.

d.

e.

Conduct of Activity:

# Topic 2 | Food Selection & Preparation

***"The awareness that health is dependent upon habits that we control makes us the first generation in history that to a large extent determine its own destiny."***

~ Jimmy Carter

# 4 Topic 2: Food Selection & Preparation

## 4.1 Learning Objectives

At the end of this topic, students are expected to be able to:

- Select food that make a well balanced meal in terms of nutritional content, done by choosing foods through the "5 Colour Magic" method.
- Understand the 3Rs to conserve the nutritional content of cooked foods.
- Understand the different cooking methods and be able to identify and avoid faulty cooking habits.

## 4.2 Training Aids

- Presentation slides

## 4.3 Methodology

- Lecture
- Quiz
- Activity Planning

## 4.4 Lecture Content

***Healthy Way of Cooking***

Indian food is loaded with a variety of vegetables and legumes, making it a great source of antioxidants and fibre – key ingredients in any disease-fighting diet.

Selecting the right food, preparing the ingredients and cooking the food are all important steps to serving a healthy and well balanced meal.

The way you prepare meals can affect the appearance and nutritional content of food. It is important to use good judgment about cooking times and preparation techniques to ensure healthy cooking. Make sure you cook your food the right way to avoid losing nutrients that your body needs to stay fit and healthy.

In this topic of food selection and preparation, students will learn about preparing a well-

balanced meal: information we hope they can share with their family and relatives.

***Overview of Lecture Content***

- Selecting Nutrient-Rich Food
- Conserving Nutrition
- Proper Methods of Cooking
- Faulty Cooking Habits

## 4.4.1 Selecting Nutrient-Rich Food

Consuming food that are rich in nutrients not only contributes to variety in meals but it also confers immense health benefits. In addition, sticking to a balanced diet is a very simple process, and involves the five basic food groups:

1. Grains
2. Fruits and vegetables
3. Dairy
4. Meat and Protein
5. Fats, oils and sweets

*Annexure - 15*

# SOME NUTRIENT-RICH FOODS

| Nutrients | Food Groups | Foods | Nutrient Content Unit/100 g edible portion |
|---|---|---|---|
| **Energy** | Cereals and Tubers | Rice, wheat and tapioca | 340 Kcal |
| | Nuts and Oilseeds | Almond, cashewnut, dry coconut and groundnut | 600 Kcal |
| | Vegetable oil, ghee and *Vanaspati* | | 900 Kcal |
| **Protein** | Pulses and Legumes | Bengalgram, blackgram, greengram, lentil and redgram | 22 g |
| | Nuts and Oilseeds | Groundnuts, cashewnuts and almond | 23 g |
| | Fish | | 20 g |
| | Meat and Poultry | Meat<br>Egg white | 22 g<br>11 g |
| | Milk products | Cheese, *khoa*, skimmed milk powder (cow) and whole milk powder (cow) | 30 g |
| **Beta-Carotene** | Leafy vegetables | *Ambat chukka*, coriander leaves, *ponnaganti,* spinach, leaves, mint, radish leaves | 2-6 mg |
| | | Some other leafy vegetables like agathi, amaranth, curry leaves, fenugreek leaves and *gogu* | 7-15 mg. |
| | Other vegetables | Pumpkin and green chillies<br>Carrot | 1 mg<br>6.5 mg |
| | Fruits | Ripe mango<br>Papaya | 2.0 mg<br>0.9 mg |
| **Folic Acid** | Green leafy vegetables | Amaranth, *ambat chukka*, mint and spinach | 120 µg |
| | Pulses | Bengalgram, blackgram, greengram and redgram | 120 µg |
| | Oilseeds | Gingelly and soyabean | 180 µg |

| Nutrients | Food Groups | Foods | Nutrient Content Unit/100 g edible portion |
|---|---|---|---|
| **Iron** | Green leafy vegetables | Amaranth, bengalgram leaves, cauliflower greens and radish leaves | 18-40 mg |
| **Calcium** | Cereals and Legumes | Ragi, bengalgram (whole), horsegram (whole), rajmah and soyabean | 200-340 mg |
| | Green leafy vegetables | Amaranth, cauliflower greens, curry leaves, knol-khol leaves | 500-800 mg |
| | | Agathi | 1130 mg |
| | | Colocasia leaves | 1540 mg |
| | Nuts and Oilseeds | Coconut dry, almond, mustard seeds and sunflower seeds | 130-490 mg |
| | | Gingelly seeds | 1450 mg |
| | | Cumin seeds | 1080 mg |
| | Fish | Bacha, katla, mrigal, pran and rohu | 320-650 mg |
| | Milk and Milk Products | Buffalo's milk, cow's milk, goat's milk, curds (cow's) | 120-210 mg |
| | | Cheese, *khoa*, skimmed milk powder and whole-milk powder | 790-1370 mg |
| **Vitamin C** | Green leafy vegetables | Agathi, cabbage, coriander leaves, drumstic leaves, knol-khol greens | 120-220 mg |
| | Other vegetables | Giant chillies *(capsicum)* | 137 mg |
| | | Green chillies | 117 mg |
| | Fruits | Amla | 600 mg |
| | | Guava | 212 mg |
| **Fibre** | Pulses and Legumes | Wheat, jowar, bajra, ragi, maize, legumes, dhals and fenugreek seeds | >10 g |

| Nutrients | Food Groups | Foods | Nutrient Content Unit/100 g edible portion |
|---|---|---|---|
| **Vitamin A** | Fats and edible oils | Butter, ghee (cow milk) and hydrogenated oil (fortified) | 700 g |
| **Riboflavin** | Cereal grains and products | Bajra, barley, ragi, wheat germs and wheat bread (brown) | 0.2 g |
| | Pulses and legumes | Bengalgram, blackgram, greengram, lentil, red-gram and soyabean | 0.2 mg |
| | Leafy vegetables | Amaranthus, carrot leaves, colacasia leaves, curry leaves, fenugreek leaves, gogu, mint, radish leaves and spinach | 0.25 mg |
| | Nuts and Oilseeds | Gingelly seeds, mustard seeds, niger seeds, sunflower seeds, almond and walnut | 0.3 mg |
| | Condiments and spices | Chillies dry, chillies green, coriander and cumin seeds | 0.35 mg |
| | Fruits | Apricot dried and papaya | 0.23 mg |
| | Meat and poultry | Egg (hen) | 0.26 mg |
| | | Sheep's liver | 1.7 mg |
| | Milk and milk products | Skimmed milk powder and whole milk powder (cow's milk) | 1.5 mg |

## 4.4.2 5 Colour Magic

Each colour of fruits and vegetables contains unique health components that are essential to our health.

By eating fruits and vegetables of a variety of different colours, one can get the optimal health benefits. This ensures proper maintenance of daily vitamins and minerals intake.

Optimal intake of vitamins and minerals helps to build a strong immune system, **prevent heart diseases**, stroke and diverticulitis, control **blood pressure**, prevent **some types of cancer**, and guard against cataract and macular degeneration (vision loss).

An easy and fun way to remember to eat your fruits and vegetables is by thinking of eating the different colours of the rainbow.

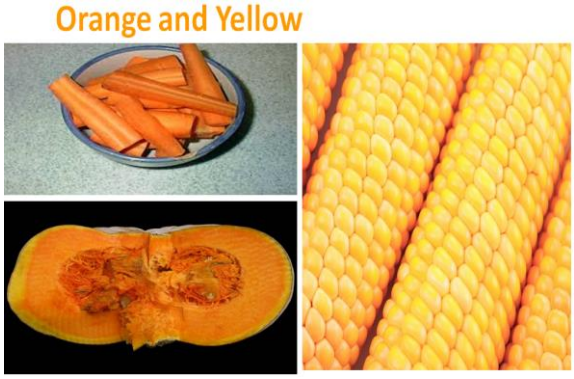
***Red***


- Lycopene and anthocyanins are both powerful antioxidants that give the red group of vegetables and fruits their colour. They reduce the risk of certain cancers, especially prostate cancer. They are also linked to heart health and the prevention of lung disease. They also help to maintain memory function, urinary tract health and the fighting of infections.

***Green***


- The green group of vegetables and fruits help prevent cataract and age-related macular degeneration. They also speed up the enzyme break-down of carcinogens and strengthen teeth and bones.

***Orange and Yellow***




- Phytochemicals found in the orange group of vegetables and fruits include carotenoids and bioflavonoids. These help maintain the immune system, slow aging, prevent heart disease, protect against cancer and improve vision.

***White***


- Allicin, found in the white group of vegetables, has anti-tumor effects and may decrease the risk of stomach cancer. It also may help lower cholesterol and blood pressure, and prevent heart disease.

***Blue and Purple***

## Blue and Purple

- Blues and purple group of vegetables and fruits reduce the risk of cancer, stroke and heart disease. In addition, they improve memory and promote healthy aging.

## 4.4.3 Green Leafy Vegetables, Other Vegetables and Fruits Should be Used in Plenty

- Normal diet, to be wholesome and tasty, should include fresh vegetables and fruits, which are store houses of micronutrients
- Vegetables/fruits are rich sources of micronutrients.
- Fruits and vegetables also provide phytonutrients and fibre which are of vital health significance
- They help in prevention of micronutrient malnutrition and certain chronic diseases such as cardiovascular diseases, cataract and cancer.
- Fresh fruits are nutritionally superior to fruit juices.

**Why should we eat vegetables/fruits ?**

Fresh Vegetables and fruits are rich sources of micronutrients and macronutrients (Annexure 2). The micronutrients present are minerals (like iron and calcium) and vitamins (like vitamin C, folic acid, B complex vitamins and carotenoids) whereas, the macronutrients present are complex carbohydrates/ fibre. They contain abundant amounts of iron, calcium, vitamin C, folic acid, carotenoids (precursors of vitamin A) and phytochemicals. Some vegetables and fruits provide very low calories (Annexure 6), whereas some others such as potato, sweet potato, tapioca and yam as well as fruits like banana are rich in starch which provide energy in good amount. Therefore, vegetables and fruits can be used to increase or decrease calories in our diet.

**What functions do these nutrients and special factors in vegetables/fruits perform in our body?**

***Iron***

Iron is an essential element necessary for the formation of haemoglobin, the red pigment present in the red cells of blood. Haemoglobin plays an important role in the transport of oxygen to the tissues. Reduction in haemoglobin in blood leads to anaemia, a condition characterised by paleness and easy fatigue and increased susceptibility to infections. Iron is available in plenty in green leafy vegetables. But the absorption of iron is limited. Vitamin C rich foods must be consumed daily to improve iron absorption.

### *Vitamin A*

This fat-soluble vitamin is necessary for clear vision in dim light, and for maintaining the integrity of epithelial tissues. In vitamin A deficiency, the white of the eye (conjunctiva) loses its lustre and becomes dry. In severe vitamin A deficiency, the black area of the eye (cornea) gets necrosed, leading to irreversible blindness in young children. Vitamin A also has a role in maintaining resistance of the body to common infections. Carotenoids are plentiful in fruits and vegetables that are green or deep yellow/orange in colour, such as green leafy vegetables, carrots, tomatoes, sweet potatoes, papaya, mango etc.

### *Vitamin C*

Vitamin C is an essential nutrient required for healthy bones and teeth. It also promotes iron absorption. Vitamin C deficiency is characterised by weakness, bleeding gums and defective bone growth. Vitamin C is abundantly available in fresh amla, citrus fruits, guava, banana and certain vegetables such as tomatoes. However, it is very susceptible to destruction by atmospheric oxidation. It is for this reason that when vegetables become dry and stale or cut and exposed to air most of the vitamin C originally present in destroyed.

### *Folic acid*

Folic acid is a haemopoietic vitamin essential for multiplication and maturation of red cells in our body. It's deficiency leads to megaloblastic anaemias. Folic acid intake during pregnancy protects the foetus from developing certain congenital defects. It also promotes the birth weight of infants. Folic acid deficiency increases homocysteine levels in blood, thereby increasing the risk for heart disease. Green leafy vegetables, legumes, nuts and liver are good sources of folates.

### *Calories*

Many of the vegetables and fruits have low calories (Annexure 7). Large intake of low calorie vegetables and fruits can help in reducing calories in diet and help in obesity management. On the other hand vegetables like colocasia, potato, tapioca, yam, sweet potato and fruits like banana, avocado pear (215 Kcal) and mahua (111 Kcal) have more than 100 kcal per 100gram (Annexure 7).

### Phytonutrients

Vegetables provide phytochemicals and considerable health significance to the human body. Among these, dietary fibre, antioxidants, and other bio-active constituents require special mention. These special factors are required for delaying

ageing and preventing the processes which lead to diseases such as cataract, cardio-vascular diseases, diabetes and cancer.

### *Dietary Fibre*

Dietary fibre delays the intestinal transit of the food consumed. Dietary fibre is important for proper bowel function, to reduce chronic constipation, diverticular disease, haemorrhoids coronary heart diseases, diabetes and obesity. They also reduce plasma cholesterol. The protective role of dietary fibre against colon cancer has long been recognised.

### *Antioxidants*

In the recent past, the role of vegetables and fruits as sources of antioxidants has been receiving considerable attention. Antioxidants restrict the damage that reactive oxygen free radicals can cause to the cell and cellular components. They are of primary biological value in giving protection from certain diseases. Some of the diseases that have their origin in deleterious free radical reactions are atherosclerosis, cancer, inflammatory joint diseases, asthma, diabetes etc. Raw and fresh vegetables like green leafy vegetables, carrots, fresh fruits including citrus and tomatoes have been identified as good sources of antioxidants (free radical-scavengers). The nutrients vitamin C and carotenoids that are present in these vegetables are also potential antioxidants. Different coloured vegetable provide different antioxidants like orange coloured provides -carotene, red provide lycopene, deep red provides betalines, blue and purple provide anthocynins.

### How much should we consume?

The Expert Committee of the Indian Council of Medical Research, taking into consideration the nutrient requirements, has recommended that every individual should consume at least 300 g of vegetables (GLV : 50 g; Other vegetables : 200 g; Roots & Tubers : 50 g) in a day. In addition, fresh fruits (100 g), should be consumed regularly. Since requirements of iron and folic acid are higher for pregnant women they should consume 100g of leafy vegetables daily. High calorie vegetables and fruits to be restricted for over weight/ obese subjects.

**Which vegetables and fruits should be consumed ?**

We should consume fresh, locally available and preferably seasonal vegetables and fruits. They have more micronutrients and are tasty. However, no single fruit or vegetable provides all the nutrients you need. The key lies in eating a variety of them and with different colours. Include commonly consumed leafy greens, tomatoes and other vegetables, apart from those which are yellow, orange, red, deep red, purple coloured citrus fruits, being vitamin C-rich enrich the diets significantly. Along with these, try selecting some new vegetables and fruits to your meals.

**How to prevent cooking losses** ?

Vitamins are lost during washing of cut vegetables and cooking of foodstuffs. However, proper methods of cooking can substantially reduce these losses (Annexure 8). Nutrient loss is high when the vegetables are washed after cutting or when they are cut into small pieces for cooking. Consumption of properly washed raw and fresh vegetables is always beneficial.

**How do we get these foods**?

Green leafy vegetables (GLVs), other vegetables and fruits are easily available. Most vegetables, particularly GLVs are inexpensive. In fact, these foods can be grown in the backyard with very little effort and cost. Even in lean seasons like summer, they can be grown using water and waste from kitchen.

**How to accommodate more servings of vegetables and fruits in a day?**

To get the maximum nutritional benefits from fruits and vegetables, it is important to find ways to eat more servings of vegetables and fruits per day. Few tips are given below to include more fruits and vegetables in the diets.

## 4.4.4 Benefits of Ingredients Used

***Hariyali Pulao***

<table>
<tr>
<td>  <br>Palak</td>
<td rowspan="3">Regular consumption of Green leafy vegetables in the diet helps prevent osteoporosis (weakness of bones), iron-deficiency anaemia. Besides, it is believed to protect the body from cardiovascular diseases and cancers of colon and prostate.<br><br>GLV eases constipation and protects the mucus lining of the stomach, so that you stay free of ulcers. It also flushes out toxins from the colon.<br><br>There’s a compound in GLV called oxalic acid, which blocks the absorption of calcium and iron. An easy way to solve this problem is to pair GLV with a food high in vitamin C. Another way to reduce the power of oxalic acid is to boil the leaves for at least two minutes.<br><br>Cooking GLV actually increases its health benefits. E.g. Just half a cup of cooked spinach will give you thrice as much nutrition as one cup of raw spinach. That’s because the body cannot completely break down the nutrients in raw spinach for its use.<br><br>Spinach: Another lesser known benefit of spinach is its role in skin care. The bounty of vitamins and minerals in spinach can bring you quick relief from dry, itchy skin and lavish you with a radiant complexion.<br><br>Methi: It stimulates the immune system and aids in removal of toxins from the body. Controls blood sugar homeostasis in</td>
</tr>
<tr>
<td>  <br>Fenugreek Leaves</td>
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<tr>
<td>  <br>Mint Leaves</td>
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| | |
|---|---|
| | individuals suffering from type-2 diabetes.<br><br>Mint Leaves**:** Mint help relieve fatigue and stress. It relaxes the stomach muscles and is useful to deal with digestive problems, including nausea, flatulence and hiccups. |
|  <br>**Brown Rice** | Brown rice is the "unrefined" version of white rice. White rice has been stripped of iron, vitamins, zinc, magnesium and other nutrients during the refining process. Brown rice, unlike white rice, still has the side hull and bran.<br><br>The side hulls and brans provide "natural wholeness" to the grain and are rich in proteins, thiamine, calcium, magnesium, fibre, and potassium. Wholes grains are proven to reduce the build-up of arterial plaque and reduce the risk of heart disease and high cholesterol. |
|  <br>**Black Channa** | There are complete and incomplete proteins, which are found in different food sources. An incomplete protein is any protein that lacks one or more essential amino acids in correct proportions. The amino acids that may be missing from one type of food can be compensated by adding a protein that contains that missing amino acid. When eaten in combination at the same meal, you are providing your body with all the essential amino acids it requires. E.g. Grains with Legumes as in this recipe. Besides this channa is a good source of fibre, iron, calcium and potassium.<br><br>Like channa it helps to make the protein complete and increase the protein content of the recipe. Serves as a source of calcium and has been associated with strengthening of the immune system. |
|  <br>**Curd** | |

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|  <br>**Oil** | Vegetable oils contain primarily polyunsaturated and monounsaturated fats. Coconut and other tropical oils, however, contain primarily saturated fat. As oil is a concentrated source of calories it should be used in moderation. Besides providing us with EFA it also serves as a source of vitamin E. |
|  <br>**Cumin Seeds (Jeera)** | Cumin seeds are an excellent source of iron, a very good source of manganese, and a good source of calcium and magnesium. Cumin seeds are also used as an antiseptic and as a digestion aid. |
|  <br>**Green Chilli** | Green chilies are low in calories, virtually fat-free and rich in nutrients that can enhance your health, including vitamins A, C and K and the phytonutrient capsaicin. |
|  <br>**Ginger (Adrak)** | It increases the motility of the gastrointestinal tract (anti-flatulent) and has anti-inflammatory, and antibacterial properties. Studies have shown that it may reduce nausea caused by motion sickness or pregnancy and may relieve migraine. The herb also contains a good amount of minerals like potassium, manganese, copper, and magnesium. |

| | |
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|  <br>**Garlic (Lehsun)** | Garlic is rich in a variety of powerful sulfur-containing compounds that has many health-promoting effects like Cardiovascular Benefits, Anti-Inflammatory Benefits, Antibacterial and Antiviral Benefits, Cancer Prevention. Garlic may help improve iron metabolism. It can help increase production of a protein called ferroportin. (Ferropotin is a protein that runs across the cell membrane, and it forms a passageway that allows stored iron to leave the cells and become available where it is needed.)<br><br>Too much heat for too long will reduce the activity of the health-promoting sulfur compounds, Therefore expose garlic to heat for as little time as possible |
|  <br>**Onions** | Onions help to prevent a large number of health conditions. The chromium in onions works to improve the cell's response to insulin. The combination of sulfuric compounds, chromium and vitamin B6 work together to lower blood pressure, prevent atherosclerosis and heart disease. Regular consumption of onions helps to greatly lower the risk of several common cancers. Vitamin C, Quercitin and other flavonoids also work together to kill bacteria. This is a good reason to add onions to stews and soups during flu and cold season. |
|  <br>**Tomatoes** | Lycopene, a flavonoid antioxidant, is the unique phytochemical present in the tomatoes. Together with carotenoids, it can protect cells and other structures in the body from harmful oxygen-free radicals. These pigment compounds are found to have antioxidant properties and take part in vision, maintain healthy mucus membranes and skin, and bone health. They are also good source of antioxidant vitamin C. Vitamin C helps the body develop resistance against infectious agents and scavenge harmful free radicals. It also facilitates better absorption of iron |

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| | from the food. |
|  <br>**Turmeric Powder (Haldi)** | Curcumin is a component in turmeric that helps in boosting immunity and has anti-inflammatory and anti-oxidant property**.** Turmeric is used as a natural painkiller and liver detoxifier. |
|  <br>**Chilli Powder** | Capsaicin, found in chilli peppers, has an anti-inflammatory effect, which may help ease arthritic swelling and pain. It can help to boost your metabolism. It also contains Vitamins A and C and is rich in Potassium, Phosphorus, Calcium, Iron, Zinc, Manganese and Selenium. |
|  <br>**Garam Masala** | Apart from enhancing the taste and flavour of food, spices have been widely believed to exert digestive stimulant action. It stimulates the liver and induces higher secretion of bile acids which play a vital role in fat digestion and absorption. It serves as antioxidant, helps to boost metabolism, flush out toxins from the body and improves blood circulation. It is anti-bacterial, anti-fungal and anti-carcinogenic. |
|  <br>**Salt** | Salt is essential in small amounts in our diet as it helps to maintain the right balance of fluids in our body. It helps transmit nerve impulses and is required for contraction and relaxation of muscles. However, we should remember diets too high in sodium can lead to high water retention and hypertension. Overall, salt is generally nontoxic to adults, provided it is excreted properly. Iodised salt consumption is the |

| | |
|---|---|
| | best and most cost effective method of for prevention of Iodine deficiency disorders. |

***Misal Pav***

| | |
|---|---|
|  <br>Sprouts | Nutrients in lentils and beans changes during the soaking and sprouting process, improving its nutritional value. As sprouting continues, carbohydrates are transformed by enzymes into simple sugars. Complex proteins are converted into simple amino acids, and fats change into fatty acids. All are easily digestible compounds, making sprouts an easy to digest food source.<br><br>Vitamin content increases dramatically like vitamins A, B-complex, C, and E. Lentils have such a miniscule amount of vitamin C when a dormant seed but once sprouted their vitamin C increases so much that they are considered to be a very good source.<br><br>Sprouts will also absorb minerals from the water you use to sprout them in and those minerals are chelated, meaning they are chemically bound to amino acids, making them more easily assimilated or used by the body. When you grow them yourself sprouts are cost effective as their volume doubles on sprouting. |
|  <br>Potato | Potatoes are one of the richest sources of starch, vitamins, minerals and dietary fibre. Fresh potato along with its skin is good source of antioxidant vitamin; vitamin C. They also contain adequate amounts of many essential minerals like Iron, manganese, magnesium, phosphorous, copper and potassium. |

| | |
|---|---|
|  <br>**Coriander Leaves** | It is rich in antioxidants, essential oils, vitamins like folic-acid, riboflavin, niacin, vitamin A, beta carotene, vitamin K, vitamin C that is essential for optimum health. The herb is a source of dietary fibre and minerals like potassium, calcium, manganese, iron, and magnesium. |
|  <br>**Farsan** | Mixed farsan refers to a mixture of roasted or fried ingredients like chiwda (rice flakes), papdi (salted fried gram flour cookies), cornflakes, peanuts, roasted moth beans, dried fruits, salt and spices. Mixed farsan is slightly rich in salt and fat content and should be used only in moderation. Roasted farsaan is better than the fried varieties. Peanuts are good source of monounsaturated fats. Rice flakes can help to make the protein complete. Dried fruits are rich in energy, vitamins and minerals. |

## 4.4.5 3 R's for Nutrient Preservation

The three R's for nutrient preservation are:

1. To reduce the amount of water used in cooking.
2. Reduce the surface area of the food that is exposed.
3. Reduce the cooking time.

### ***Reduce*** *the Surface Area of Food*

The following precautions need to be taken while cooking to minimise the loss of nutrients:

- Reduce soaking or washing time to minimise nutrient loss.
    - Reduce the surface area of food that is exposed.
    - Avoid repeated washing especially for grains to prevent the loss of water soluble vitamins like thiamin.
- Place the vegetables into a colander and rinse them well under room-temperature water before cooking to remove dirt and pesticide. Washing vegetables before cutting them prevents vitamin and mineral loss.

- Once a fruit or vegetable is removed from it source, it no longer receives water or nutrients but starts to lose water due to evaporation as it takes in oxygen from the surrounding air. Once they are cut the loss of water speeds up even more as does flavour and colour loss, decay, and an increased rate of vitamin loss. That means if cut in advanced will lose its vitamins. Vitamins A, C, E, K, and the B vitamins—are destroyed by exposure to air.
- Leaving a cut fruit or vegetable exposed to the air will hasten its natural ripening process and render it unfit for consumption in as little as a day, while some fruits and vegetables start to turn brown within a few minutes of being cut as the air starts to interact with enzymes in the fruit or vegetable. Hence it is advisable to cut just before cooking to conserve nutrients.

- Cut vegetables into big pieces so that exposure of vitamins to water is less during cooking and washing. Cut vegetables should not be soaked in water for long, as water-soluble minerals and vitamins get dissolved and lost in water.
- Do not remove the skins on your vegetables, if possible. If the skins need to be removed, peel them as thinly as possible, using a vegetable peeler instead of a paring knife. The most nutrient-rich part of a vegetable is often right underneath the skin.

## ***Reuse*** *the Water*

- Grains are good source of B vitamins. Reuse the water in which the grains are soaked to prevent nutrient loss.

- If you boil the vegetables do not throw away the liquid from them. Instead add the liquid to dal, curry, rasam, sambhar and to chapatti or roti flour.

## ***Reduce*** *the Cooking Time*


- Covering the vessel with a lid while cooking can help preserve the nutritional quality of our food. When a pot is covered, steam contact with the food is more consistent, allowing the cooking process to be completed in the least amount of time. In addition, light-sensitive nutrients - like vitamin B2 - will not be leeched out of the food so easily. As an added benefit, many water-soluble nutrients will pass out into the steam, and then drop back down into the food that is cooked and will be retained. This

means covering the vessel during cooking will save time, fuel and the most important nutrients.

- Pressure cooking method is advisable. It uses a lesser amount of water as the pressure cooker seals the water inside. This helps to retain the nutrients and is also a very fast way to cook.

## 4.4.6 Methods of Cooking

***Steaming***

Reduce steaming time and steam just enough to make vegetables crisp inside and tender outside. Steaming retains more nutrients in food compared to boiling because nutrients dissolve into the water during boiling.

***Boiling***

If you need to boil the vegetables, bring the water to boil before adding in the vegetables. This will help to reduce the cooking time and retain nutrients and colour of vegetables.

A compound in green leafy vegetables called oxalic acid blocks the absorption of calcium and iron in our bodies. An easy way to solve this problem is to pair green leafy vegetables with a food high in vitamin C. Another way to reduce the power of oxalic acid is to boil the leaves for at least two minutes.

***Stir-Frying***

When stir-frying vegetables and food, make sure not to overcook. Vegetables should still be crisp and other foods should not become dry. Stir-frying food too long removes more vitamins and minerals.

## 4.4.7 Faulty Cooking Habits

***High Temperature***

**Cooking at high temperature**s can lead to loss of nutrients and formation of harmful substances. Cooking at extremely high temperatures can produce advanced glycation end products (AGES) that contribute to aging and inflammation.

Glycation can be described as the binding of a protein molecule to a glucose molecule resulting in the formation of damaged protein structures. As these degraded proteins accumulate, they cause cells to emit signals that induce the production of inflammatory cytokines (destructive cell-signalling chemicals). Chronic inflammation is directly involved in diseases as diverse as cancer, atherosclerosis, diabetes, aortic valve stenosis, congestive heart failure, Alzheimer's disease and kidney impairment. It is possible to reduce exposure by changing the way food is prepared. Consider steaming, boiling, poaching, stewing, stir-frying or using a slow cooker.

***Prolonged Cooking***

**Cooking for prolonged time** will lead to loss of nutrients and flavour. The longer food is exposed to heat, the greater the nutrient loss.

***Repeated Heating of Oils***

To reduce the expenses, the oils tend to be used repeatedly for frying. When heated repeatedly, changes in physical appearance of the oil will occur such as increased viscosity and darkening in colour, which may alter the fatty acid composition of the oil. Heating causes the oil to undergo a series of chemical reactions like oxidation, hydrolysis and polymerization. During this process, many oxidative products such as free radicals and peroxide are produced, which can be absorbed into the fried food. Chronic consumption of repeatedly heated vegetable oils could be detrimental to health. Studies have shown that it increases the risk of cancer and cardiovascular diseases.

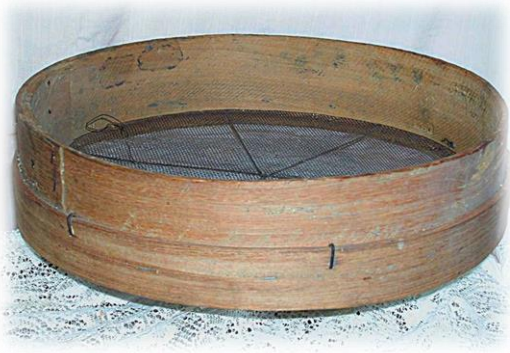
Hence this should be avoided by using just enough oil.

## 4.4.8 Improving Nutrition – (NOT to Dos)

### *Using Baking Soda*

Baking soda should never be added to green vegetables to retain colour during cooking or to dry peas and beans to decrease cooking time. Baking soda makes the cooking water alkaline, destroying vitamins like thiamin and vitamin C.

### *Sieving Wheat Flour*



Sieving wheat flour removes the fibre in flour. A diet high in fibre improves digestive health and helps prevent heart diseases, diabetes, weight gain and some cancers.

***Mixing Used Oil***

Oils which have been repeatedly heated should not be mixed with fresh oil but be used for other purposes such as seasoning.

## 4.4.9 Improving Nutrition – (To Dos)

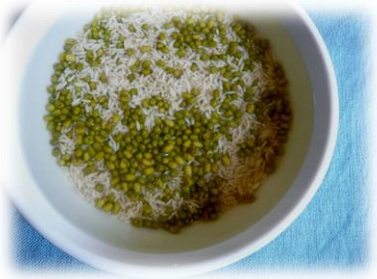
***Soaking, Sprouting and Fermentation***



Soaking, sprouting, and fermentation reduce phytates in legumes. Vitamins that were found in trace amounts previously are produced in larger amounts during sprouting, especially vitamin C and folic acid. Sprouts will also absorb minerals from the water you use to sprout them in and those minerals are chelated, meaning they are chemically bound to amino acids, making them more easily assimilated or used by the body. Sprouting also makes grains, seeds and beans more digestible.

***Soaking Complementary Protein***





Most grains, seeds, and legumes are high in protein but their protein is incomplete. Combining two or more foods as complementary proteins can provide adequate amounts of essential amino acids that the body requires to function and grow healthy.

**ACTIVITY TITLE:**

Objectives:

a)

b)

c)

Summary of Activity:

Materials required:

a.

b.

c.

d.

e.

Conduct of Activity:

**ACTIVITY TITLE:**

Objectives:

a)

b)

c)

Summary of Activity:

Materials required:

a.

b.

c.

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e.

Conduct of Activity:

**ACTIVITY TITLE:**

Objectives:

a)

b)

c)

Summary of Activity:

Materials required:

a.

b.

c.

d.

e.

Conduct of Activity:

# Topic 3 | Food Preparation & Storage

*"It is health that is real wealth*
*and not pieces of gold and silver."*

~ Mohandas K. Gandhi

# 5 Topic 3: Food Preparation & Storage

## 5.1 Learning Objectives

At the end of this topic, students are expected to be able to:

- Understand the importance of good hygiene when preparing food.
- Learn the proper handwashing techniques.
- Maintain good food preparation and storage habits.
- Create enzyme cleaner with fruit and vegetable waste.
- Create a home-made refrigerator.
- To be able to keep food longer.

## 5.2 Training Aids

- Presentation slides

## 5.3 Methodology

- Lecture
- Quiz
- Activity Planning

## 5.4 Lecture Content

### 5.4.1 Foods Consumed Should be Safe and Clean

- Safe and good-quality food is essential for maintaining good health
- Naturally-occurring toxins, environmental contaminants and adulterants in foods constitute a health hazard.
- Consumption of unsafe foods can lead to food-borne diseases.

**What makes food unsafe ?**

Microbes (bacteria and moulds) and their products are responsible for food spoilage. Natural enzymes present in food also lead to its deterioration. Besides, insects and rodents, adulterants, natural toxins and various chemical residues beyond permissible levels, make the food unwholesome. In addition to moisture and environmental conditions like temperature, storage time also influence the quality of the food.

**How do we select safe food?**

Selection of the right food is the first step to ensure safe and good quality diet. Food items purchased from reliable sources having a high turnover ensure their freshness. Some foods carry certification mark assuring good quality. For example AGMARK for honey and ghee; FPO (Fruit Products Order) for fruit and vegetable products (jams, squashes, etc); ISI (Bureau of Indian Standards) for food colours and essences.

Food grains purchased should be free from foreign matter and infestation (rodent excreta and insect remains). They should be of uniform size and should not be shrivelled, shrunken and mouldy. Foodstuffs should be free from artificial colours. There is a risk of adulteration when fats/oils are purchased loose from unsealed containers. Therefore, it is always safer to purchase reputed brand products in sealed sachets/containers. It is necessary to buy pasteurized milk in sachets from a reputed dairy or a reliable vendor to avoid the risk of adulteration and contamination. Milk products such as butter, ghee and *khoa* should also be purchased from reliable sources. Whole spices, uniform in colour, size and shape should be preferred. Since powdered spices are more likely to be adulterated, always buy certified products. Fruits and vegetables that show patches, mechanical damage and bruises, or are wilted and decayed with visible evidence of insects and moulds, should be avoided. Eggs should be fresh and free from cracks. Meat or poultry must be examined for characteristic colour, odour and texture, and should be purchased fresh or frozen.

Freshness of fresh-water fish is indicated by a stiff body, bright, clear and bulging eyes, reddish gills, tight scales and absence of stale odour or discolouration. Fresh fish will not show any pitting on finger pressure.

**What are the best practices of storage ?**

Agricultural commodities should be dried adequately and protected from moisture in a safe storage structure (eg. tin with a tight lid) to prevent damage from moulds. Microbes like bacteria and mould produce toxins (eg. aflatoxins). Rodent attacks, and the presence of insects and microbes, not only reduce the availability of nutrients but render the foods harmful. Frequent and careful disinfestation of the storage premises using pesticides like aluminium phosphide is essential. Some traditional household practices such as application of edible oils to grains, placing dried neem leaves in storage bins etc., are known to prevent infestations.

**Why do foodborne diseases occur?**

Foodborne infections and toxicities are common particularly with consumption of susceptible foods such as milk products like *khoa*, meat, poultry and even cooked foods like rice. Improper processing, handling and cooking, and keeping cooked foods in warm conditions for several hours before eating, promote bacterial growth and toxin production.

**How should perishable foods be handled ?**

Perishable foods like milk, meat, vegetables and cooked foods, are prone to spoilage due to microbes. These foods should be stored under refrigeration, preferably at a temperature of 10°C or less, which retards multiplication of microorganisms. However, even refrigerated foods, if stored for long, can get spoiled. Cross contamination can be avoided by keeping cooked and raw food separately.

In case food which is cooked has to be stored for some time, it should be kept either hot (more than 60°C) or be cooled quickly (below 10°C). Most micro-organisms multiply at temperatures between 10 and 60°C. Refrigerated cooked food should be heated before consumption. However, repeated heating may be avoided.

**What about personal hygiene ?**

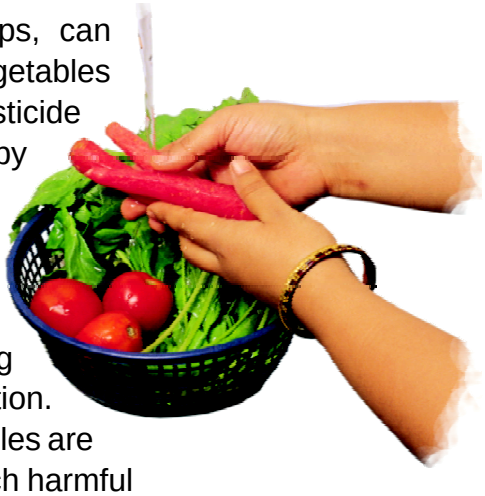
Food handlers should observe good personal hygiene to maintain food safety. They should be free from obvious signs of illness, wounds and sores. Traditionally in India, cooked food is touched by the hands while preparing, serving and eating. Use of spoons and ladles should be encouraged to avoid contamination. Hands should

be washed thoroughly before starting the preparation of food and after every interruption. Household pets like cats and dogs often harbour dangerous pathogens. They should be kept away from places where food is cooked, stored or served.

**What are the common adulterants ?**

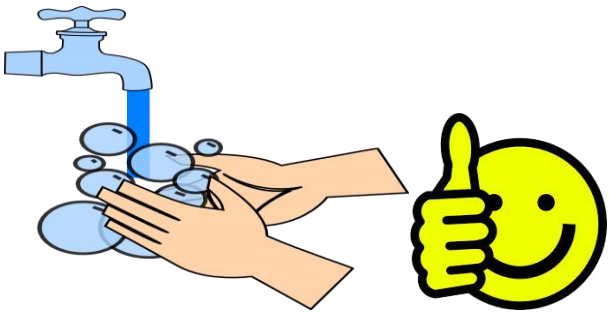
Foods may be adulterated with non-food material or inferior quality product. Spoilt, stale or poor quality food is made attractive and fresh by adding harmful colours or other chemicals. Frequently adulterated food items are milk and milk products, cereals, pulses and their products, edible oils and spices. The different classes of adulterants include non-permitted colours like metanil yellow; non-edible oils like castor oil; cheaper agricultural produce like various starches in milk powder; extraneous matter like husk, sand and sawdust; and metal contaminants like aluminum or iron filings. Consumption of adulterated foods could lead to disease outbreaks of epidemic proportions. Buying from a reliable and reputed source, careful checking of foods before purchase and insisting on certified brands will all minimize the risk of food adulteration.

**How to minimize effects of pesticide residues ?**



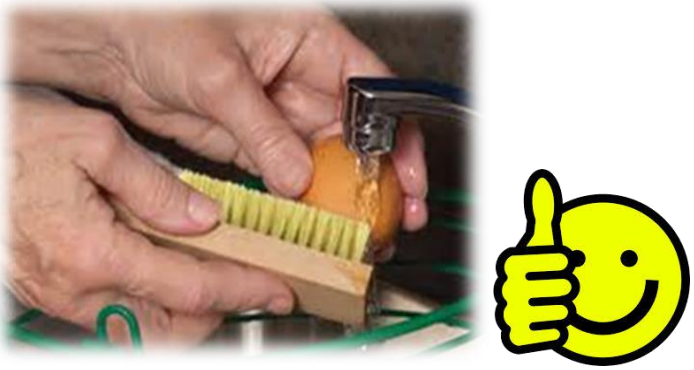
Pesticides, used during cultivation of crops, can remain as residues in foodstuffs, especially vegetables and fruits. Exposure of the population to pesticide residues may be harmful and can be minimized by washing the foodstuffs thoroughly in running water or by peeling. Cooking and other processes can also reduce such residues (Annexure 12). Insect control operations such as disinfestation in the kitchen by spraying pesticides is another source of contamination. Utmost care should be taken to ensure that eatables are well covered and protected from exposure to such harmful agents.

## 5.4.2 Food Preparation



- Keep fingernails short and clean.
- Wash your hands thoroughly with soap.
- Prevents illnesses like diarrhoea, vomiting and food poisoning.

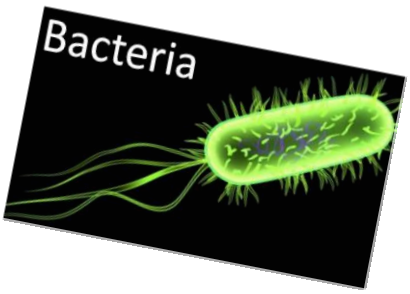
***Proper Handwashing***

- Rinse food properly before cooking.
- Clean dirty shells under water or with a wet cloth.

## 5.4.3 Food Contamination

***When does it Occur?***



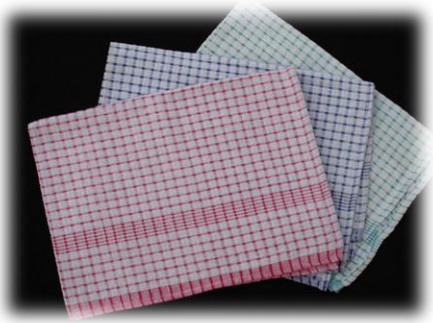

- Caused by unwashed cutting boards or countertops, as well as uncleaned knives, kitchen tools and dirty hands.
- Hands touching raw food followed by cooked or ready-to-eat foods.
- Raw or contaminated foods that touch or drip fluids on cooked or ready-to-eat foods.

Bacteria from one food item can transfer between raw and cooked foods.

The risk of cross contamination is highest where bacteria from a food item that needs to be cooked contaminates a food item that does not need to be cooked. Cross contamination can in turn lead to food poisoning.

For instance, when a cook cuts raw chicken on a cutting board and then later slices fresh tomatoes on the same board without first washing it.

***Ways to Prevent Food Contamination***

- Use clean water to wash your hands and food.
- Wash kitchen towels regularly.

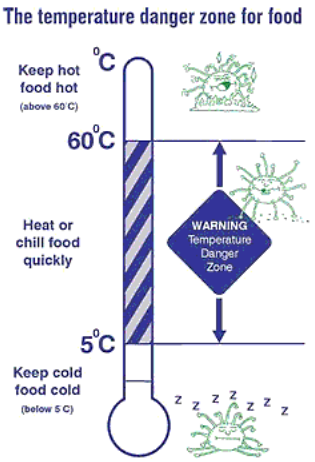

- Wash and dry plates and utensils.
- Store clean and dry utensils in drawers.
- Use clean towels and utensils.
- Keep kitchen and table top clean.

## 5.4.4 Food Safety

***Importance of Food Safety***


- Serving food safe for consumption is important for health.
- Food safety directly affects you and your child.
- Although serving safe food takes some extra time and effort, it is part of everyone's responsibility.

***Foodborne Illnesses***


If food safety is not adhered to, it may lead to the rise of foodborne illnesses. Foodborne illnesses are:

- Diseases that are carried or transmitted to human beings by food.
- Caused by micro-organisms (tiny, single-celled organisms, such as bacteria).
- More frequent where the proper conditions exist for bacteria growth. Bacteria will divide and multiply quickly to make people sick. Causing food contamination.
- More frequent at optimal temperatures. Allowing food to remain in the temperature danger zone, 40 °F - 140 °F (4.4 °C to 60 °C) for 4 hours or more provides conditions favorable for growth of bacteria and cause illness.

***Types of Foodborne Illnesses***

***Salmonella***

- Symptoms: Abdominal pain, headache, nausea, vomiting, fever and diarrhoea.
- Sources: Domestic and wild animals, and human beings.
- Food involved: Poultry and poultry salads, meat and meat products, milk, shell eggs, and other protein foods.

***Shigella***

- Symptoms: Fever, chills, diarrhoea and dehydration.
- Sources: Human beings (intestinal tract) and flies.
- Food involved: Potatoes, tuna, shrimp, turkey, macaroni salad and lettuce.

***Staphylococcus***

- Symptoms: Nausea, vomiting and dehydration.
- Sources: Human beings (skin, nose, throat, infected sores) and animals.

***E.Coli Infection***

- Symptoms: Diarrhoea, severe abdominal pain, nausea, vomiting and occasional fever.
- Sources: Animals, particularly cattle and human beings (intestinal tract).
- Food involved: Raw and undercooked red meats, imported cheese and unpasteurised milk.


***Hepatitis A***

- A contagious viral disease that causes inflammation of the liver.
- Microorganisms contaminate food through poor personal hygiene of food handlers, contaminated water supplies, or shellfish taken from sewage-contaminated water.

***Prevention of Foodborne Illnesses***

***Good Personal Hygiene***

Always wash your hands after:

- Using the restroom.
- Handling raw foods.
- Touching your hair, face, or body.
- Eating or drinking.
- Sneezing or coughing.
- Cleaning.
- Taking out the garbage.
- Touching anything that may contaminate your hands.

In addition:

- Keep nails short and clean.
- Cover all cuts and sores with bandages and plastic gloves.
- Wash your hands before putting on gloves and changing gloves.
- Wash your hair and bathe daily.
- Work clothes should be worn only on the job, not for personal use.

***Food Safety Activity Printouts***

**Question 1:**

How long can perishable foods be left out at room temperature?

A. one hour
B. **two hours**
C. three hours
D. four hours

**Question 2:**

When should you wash your hands when preparing food?

A. After handling raw meats.
B. After handling raw eggs.
C. Before preparing ingredients for a salad.
D. **All of the above.**

**Question 3:**

True or false: Cooking foods that have been out of refrigeration for hours will destroy any harmful material and the food will be safe to eat.

A. True
B. **False**

**Question 4:**

What is the safe final internal temperature for cooked ground beef?

A. 140 degrees F
B. 130 degrees F
C. 150 degrees F
D. **160 degrees F**

**Question 5:**

What is cross-contamination?

A. How bacteria are spread when raw meat is ground.
B. **Foods eaten raw coming into contact with foods which must be cooked.**
C. Placing salad ingredients near main dish ingredients.
D. Pantry foods invaded by pests.

**Question 6:**

At what temperature should your refrigerator be set?

A. 45 degrees F
B. 42 degrees F
C. **39 degrees F**
D. 32 degrees F

**Question 7:**

True or false: A cooler filled with ice can cool down hot foods and keep them safe for hours.

A. True
B. **False**

**Question 8:**

If the ambient temperature is higher than 80 degrees F, how long can perishable foods be out of refrigeration?

A. 2 hours
B. 3 hours
C. **1 hour**
D. 30 minutes

**Question 9:**

What temperature should leftovers be reheated to before serving?

A. 150 degrees F

B. **165 degrees F**

C. 180 degrees F

D. 140 degrees F

**Question 10:**

True or false: freezing food kills bacteria that cause food poisoning.

A. True

B. **False**

***Activity***

# Spread of Infection

## Food Hygiene

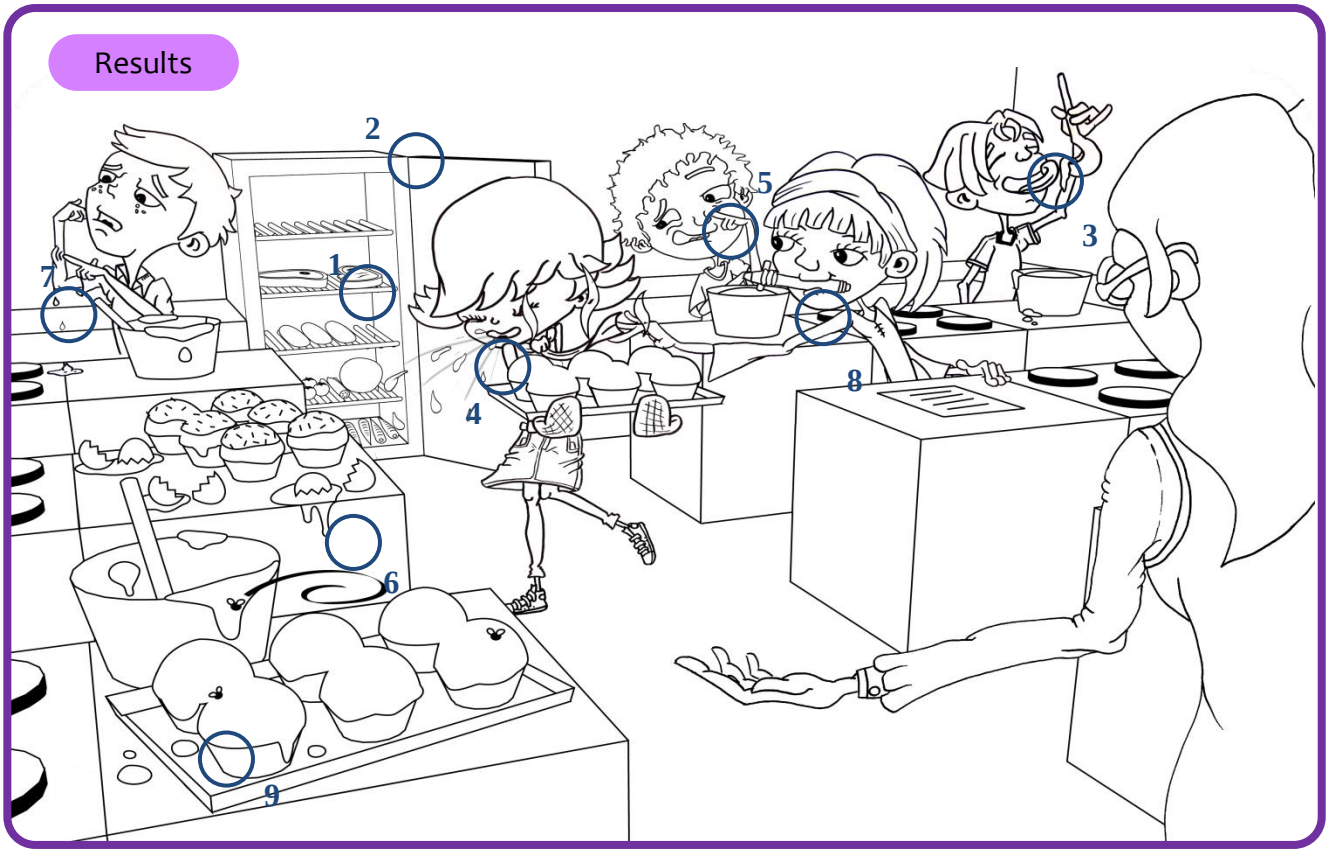
Find 9 errors than can be seen here.

***Activity Answers with Explanation***

# Spread of Infection

## Food Hygiene

Results



## Explanation of Results

1. Raw meat should be kept on the bottom shelf of the fridge or on a plate to prevent the blood and harmful microbes dripping onto and contaminating the other items in the fridge.
2. Normal fridge temperatures (2–5$^{o}$C) stop microbes from growing and multiplying. Leaving the fridge door open heats up the fridge and allows the microbes to grow and multiply until there are enough to become dangerous.
3. Licking the spoon can spread any harmful microbes from the mouth into the food mixture or alternatively, any unwanted microbes in the raw mixture into the mouth.
4. Using a tissue to cover your mouth when coughing or sneezing helps prevent the spread of infection.
5. Hair and mucus on the inside of the nose trap any unwanted microbes we may breathe in. The 'snot' picked from the nose may contain many harmful microbes which can be spread onto our food or other people by our hands.
6. Raw eggs have been known to harbour harmful bacteria such as *Salmonella*, which could lead to a gut infection if ingested.
7. All cuts and spots should be covered when cooking, to stop microbes spreading from blood to food.
8. The pencil may have come into contact with harmful microbes around the room and putting it in the mouth can spread these microbes to the mouth or gut.
9. Flies are known to carry potentially harmful microbes from source to source.

   Insects can spread infection onto our food. If a fly's last meal was from the waste bin, the bad microbes can stick to the fly's mouth and transfer onto our food when they land there!


- BACTERIA
- CLEAN
- COOK
- DEFROST
- FREEZE
- MICROWAVE
- REFRIGERATE
- SEPARATE
- SOAP
- THERMOMETER
- WASH
- WATER

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Q | C | E | C | L | E | A | N | L | D | N | Z | E | Y | N |
| M | N | W | A | S | H | N | S | L | X | T | S | A | P | P |
| B | J | Q | H | G | P | Y | L | Z | V | E | H | K | K | O |
| M | O | V | O | Y | V | P | Q | G | G | Q | W | C | M | H |
| D | E | F | R | O | S | T | P | J | W | O | H | C | I | A |
| X | E | F | T | N | P | B | U | Z | R | T | O | Z | C | H |
| D | Z | T | H | E | R | M | O | M | E | T | E | R | R | Q |
| O | E | I | T | H | O | P | N | U | G | S | K | K | O | S |
| V | E | L | U | K | E | H | H | W | U | K | F | A | W | E |
| U | R | D | L | L | O | S | O | A | P | Y | R | R | A | P |
| C | F | C | R | E | R | R | J | T | X | C | J | E | V | A |
| L | N | O | S | W | V | O | D | E | A | X | N | O | E | R |
| J | B | O | E | V | W | L | E | R | T | Q | S | S | J | A |
| J | G | K | A | B | A | C | T | E | R | I | A | P | H | T |
| R | E | F | R | I | G | E | R | A | T | E | Z | N | P | E |

# Hand Washing Maze

START

It's dinner time! Mike and Lily have been playing outside and are hungry. Help them get to dinner by washing their hands first!

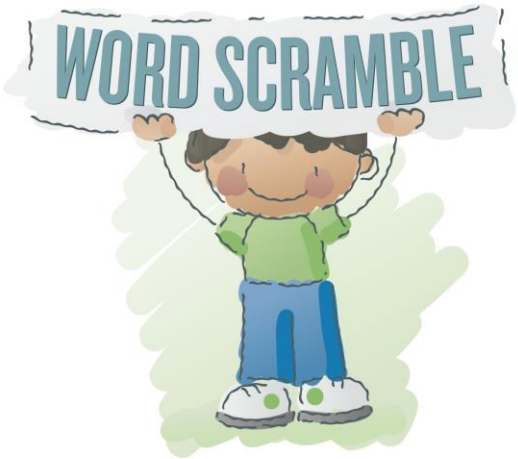
**Step #1**
Wet your hands with warm water, then add soap.

**Step #2**
Rub your hands together for 20 seconds, the length of two choruses of the Happy Birthday song!

**Step #3**
Rinse your hands clean with warm water.

**Step #4**
Dry with a clean towel. Now you're ready to eat!

FINISH



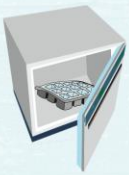

Unscramble the word that matches the picture and description.

**siwhang snadh**

This is something you should do before and after you eat. This will help you stay healthy, and doesn't take very long—just the length of two choruses of the happy birthday song.

**nlcuh xbo**

This is handy for carrying your lunch. Make sure it's packed with an ice pack and cleaned regularly.



**erefrze**

This is a place to keep your food very cold and safe to eat. How cold? It should be kept at 0 degrees F° and will freeze water!

**dofo rhmetreomet**

This measures the temperature of your food. Cooking foods to the correct temperature keeps it safe.

**vocemawir**

This is a fast and easy way to cook your favorite foods. Remember to always ask an adult for help.

**gfeirrroater**

This cold place keeps food safe and fresh. How cold? It should be below 40 degrees F.

## 5.4.5 Enzyme Cleaner

***What is an Enzyme Cleaner?***

An enzyme cleaner is a biodegradable, non-toxic cleaning agent. It is safe to use on a variety of things. It is even safe to use on skin.

Uses:

- Clean dishes and table top.
- Laundry stains.
- Wash fruits and vegetables.
- Wash hands.
- Insect repellent (ants and cockroaches).

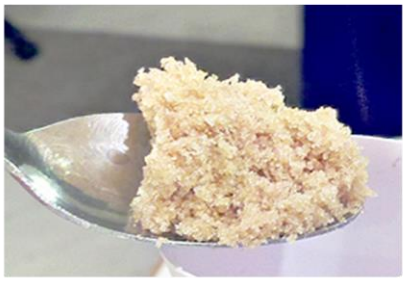
***How do Enzyme Cleaners Work?***

Enzymatic action is similar to digestive juices in the stomach, which break down food in preparation for digestion in the intestines.

Similarly, enzyme cleaners react with and break up stains that are made of proteins (eg. blood, meat gravy, milk, eggs and grass) into simpler forms so that it is easier to clean.

***How to Make an Enzyme Cleaner?***

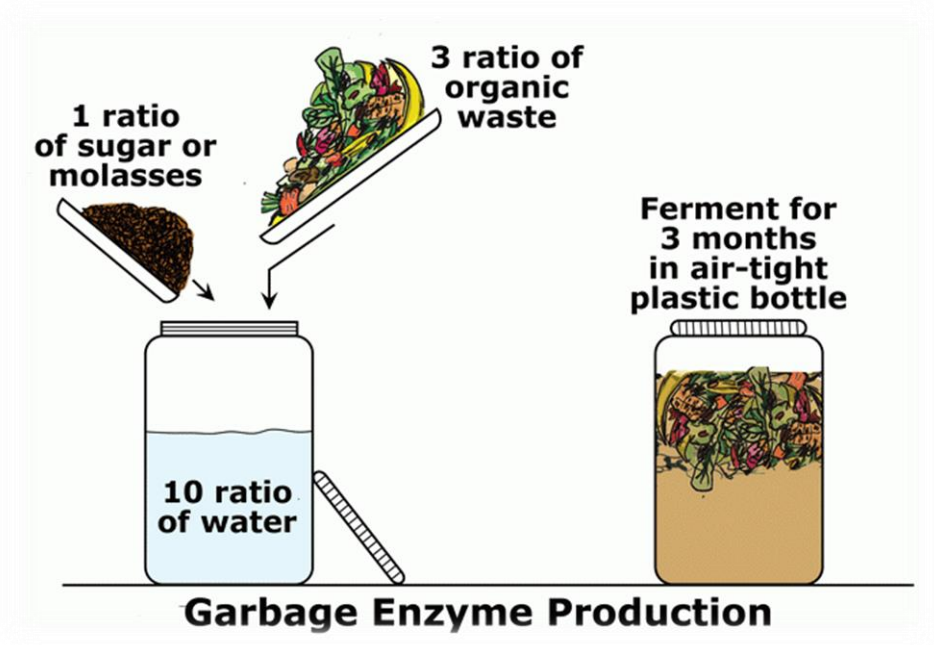
- Ingredients: 1 ratio sugar + 3 ratio vegetables/ fruits + 10 ratio water



Sugar

Water

Fruit/ vegetable dregs



***What are Garbage Enzymes (GE)?***

Also known as Enzyme Cleaners, GE is nothing but a vinegar or alcohol derived from fermenting fresh kitchen waste such as vegetables and fruit dregs (peels, cuttings and bits), sugar (brown sugar, jaggery or molasses sugar) and water.

The enzyme is derived after one filter and removes the residue after 3 months. The key ingredient is molasses, which the bacteria and microorganisms present in the waste metabolise into alcohol. This is reduced in its final form to acetic acid or vinegar. Vinegar with its acidic properties is well known as an all-round non-toxic cleaner.

Garbage enzyme has a pungent vinegary smell, but the smell varies and it can smell really nice depending on the fruit waste that goes into the fermentation. Sometimes it could be citrus and sourish, and sometimes bitter. There is no need to worry about the smell as it will dissipate after a while.

Garbage enzyme (not really an enzyme but a colloquial term) is actually vinegar or acetic acid derived from fermenting uncooked fruit and vegetable scraps, brown sugar and water. The vinegar with its acidic properties can be used as a non-toxic cleaner.

The sugar will be gone at the end of the 3 months because the yeast and microbes will eat it all away. It works to both detour and kill insects because an enzyme digests stuff. So it will digest stuff on the surfaces you are cleaning helping to keep then away because they don't sense the food they want to digest. Any insects that do show up just spray a little enzyme on then and it will start to digest their shell and then their inners.

After 3 months, you can filter the residue to get a clear, dark brown liquid that has a fresh, sour smell like vinegar. You can use the garbage enzyme to clean your toilet bowl, or dilute it with water to clean your floor.

***DOs when Making or Using GE***

Use an **airtight plastic container**, and not metal or glass ones which cannot expand as gases

build up within the container, and may explode. Even with the plastic container, it's important to open the lid once a week or once every few days during the first month and stir. Store the container in a dry and cool area away from direct sunlight. Keep the GE at room temperature and do not store inside a refrigerator.

Use any combination of **fresh veggie or fruit peels or dregs.** Do not use cooked food, meat or fish, or other non-food items like paper, metal, glass, plastic and so on.

Don't worry about the white, black or brown substance that forms as a layer on top of the enzyme. The white layer is yeast that is rich in vitamin B complex and vitamin C and can actually be used for making bread or roti.

If you see worms, add an extra ratio sugar and cover air tight. They will disappear by themselves.

You may filter out the residue after 3 months using a sieve, cotton cloth or t-shirt. If you can wait for 6 months, it is even better. There is no expiry date for the GEs once filtered.

Reuse the residue, as a fertiliser in the garden by drying and mixing with the soil, or combining it with fresh vegetable or fruit dregs as a starter for a new GE batch.

Dilute the GE with water for most uses. This increases its effectiveness. Dilution is especially important when using as fertilisers or pesticides for plants, where high concentrations can prove too acidic for them.

Making GEs will keep tons of kitchen waste from landfills and incinerators, including the plastic bags that are needed to bag them. Think of how much $CO_2$ emitting fossil fuels can be avoided that would otherwise be used in making, packaging and transporting toxic cleaners, fertilisers, insecticides and pesticides.

***Steps in Making Enzyme Cleaner***

**Step 1:**

- Use only air-tight plastic containers.

**Step 2:**

- Put sugar and vegetables or fruits into container with water.
- Open container 30 minutes daily for 30 days.
- Solution should be dark brown.


**Step 3:**

- Three months later, use an old cloth to filter the residue.
- After the filtration process, add water to dilute the residue to obtain your enzyme cleaner.

- Residues can be used to make a new batch of enzymes or as fertilizers and will never expire.

***Overview of Process in the Creation of an Enzyme Cleaner***


| | |
|---|---|
| Left: | 1 teaspoon of yeast was added |
| Middle: | 2 teaspoons of yeast was added |
| Right: | Sludge from another matured enzyme was added (about ½ cup) |

The reason it takes so long to ferment is that you are relying on the tiny amount of natural yeast that lives on the citrus peels to reproduce and eat all that sugar. Since there is not much yeast at the beginning, it takes a long time to get the fermentation going.

You can speed it up considerably by adding a spoonful of yeast at the beginning. It should take less than two weeks if there is enough yeast. Another way to speed it up is to save the liquid or sludge at the bottom and use it in your next batch, it will speed things up a lot. Try using a balloon instead of a lid; it will stop the bottles exploding.

If you look at the picture above, you will notice that the bottle with the enzyme sludge added has a more "mature" look in the colour of the enzyme. This shows that enzyme sludge is more effective in speeding up the fermentation process of the cleaning enzyme.

When yeast is added to speed up the fermentation process, the amount of gas build up is multiplied as well, and you will need to check your bottles for tension more often.

Here are some tips to stay safe and not have to clean up a big mess:

1. To test the extent of the gas build-up in the bottle, give the bottle a slight squeeze (if the bottle is not made from hard material) – the degree of tension or flexibility of the squeeze will tell you whether an explosion if likely or not.

2. Invert a plastic bag over the bottle before opening it – in the event of an explosion, the mess is contained within the plastic bag and the cap will not hurt you.

3. To prevent an explosion – remember to check the bottles frequently by opening the caps daily (even a few times a day if time permits).

4. Do not make the bottles airtight but keep the cap closed partially with just a couple of twists.

**5.4.6 Food Storage**


- Avoid exposing food to light and high temperature as they cause the breakdown of colour pigments, fats, proteins and vitamin C.




- Cover food before serving to prevent insect contamination.

***High Moisture Foods Spoil Quickly***



Moist, high protein foods on which bacteria can grow most easily are classified as Potentially Hazardous Foods. The four categories of potentially hazardous foods are:

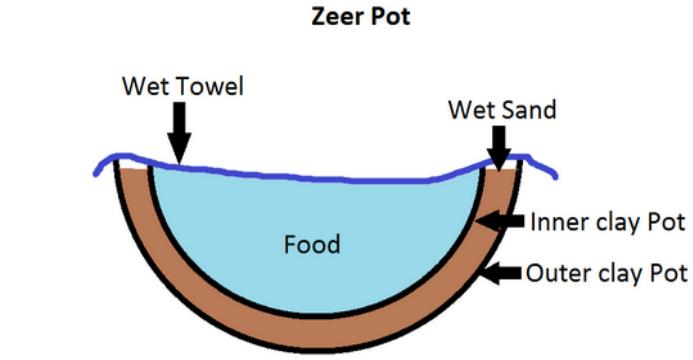
- Fresh meat
- Poultry, such as chicken or turkey
- Seafood or fish
- Dairy products, such as milk and cheese

As these types of food have a relatively short storage life, perishable meats should be refrigerated, frozen, **dried** promptly or **cured**.

- **Drying** is a method of food preservation that works by removing water from the food, which inhibits the growth of bacteria and has been practiced worldwide since ancient times to preserve food.
- **Curing**: food preservation and flavouring processes, especially of **meat** or fish, by the addition of a combination of salt, nitrates, nitrite or sugar.

## 5.4.7 Home-Made Refrigerator

***What is a Home-Made Refrigerator?***




A lid for the inner pot could be used instead of a towel

Applying science and technology to suit the needs of rural areas, a Pot-in-pot refrigerator method can be done at home, and is an evaporative cooling refrigeration device.

***History***

- Pot-in-pot refrigerator method known also as *'zeer'*.
- Was used as early as the Old Kingdom of Egypt, around 2500 B.C.
- Slaves were seen fanning water jars, which would increase air flow around the porous jars and aid evaporation, cooling the contents.
- Many of this earthenware pots were discovered in Indues Valley Civilization around 3000 BC which were probably used for storing as well as cooling water similar to present day's *ghara or matki* used in India and Pakistan.

***How is it constructed?***

- It is constructed by placing a clay pot within a larger clay pot with wet sand in between the pots and a wet cloth on top.

- The device cools as the water evaporates, allowing refrigeration in hot, dry climate.

- It must be placed in a dry, ventilated space for the water to evaporate effectively towards the outside.

- Evaporative coolers tend to perform poorly or not at all in climates with high ambient humidity, since the water is not able to evaporate well under these conditions.

***Alternative Methods***

If there is an impermeable separation layer between the food and the porous pots, undrinkable water such as seawater can be used to drive the cooling process, without contaminating the food.

This is useful in arid locations where drinkable water is a limited commodity, and can be accomplished by using a pot that has waterproof glaze applied to the inner wall where the food is stored.

Extended operation is possible if the pots are able to draw water from a storage container, such as an inverted airtight jar, or if the pots are placed in a shallow pool of water. A strap can be used to tie the inner pot down instead of using sand to prevent it from floating.

***Positive Impact of Using Home-Made Refrigerators***

- Store food at lower temperatures so that they are able to last longer.
- Storing food longer allows for less wastage and allows for bulk buying (larger quantities at lower unit price).
- Keeps food fresh for longer periods of time and decrease instances of food-related disease.
- Increased profits from food sales: As there is no rush to sell food to avoid spoilage, farmers are able to sell their produce on demand and can command higher prices.
- Increased opportunities for women: Women can sell food directly from their homes, decreasing their dependence on their husbands as sole providers.
- Also, because girls traditionally take food to market to sell, and because food in the *zeer* stays fresh long enough that they can go to market once a week rather than once a day, there is more time for them to attend school.
- Rural employment opportunities: Farmers are able to support themselves with their increased profits at market, slowing the move into cities.
- Increased diet variety because food is available for longer into the year.
- The ability to store vaccines and medicines that would otherwise be unavailable in areas without refrigeration facilities.

Overall, it increases the storage life not only for fresh foods, but also for medicines. Furthermore, it generates job opportunities for women to sell fresh vegetables from home.

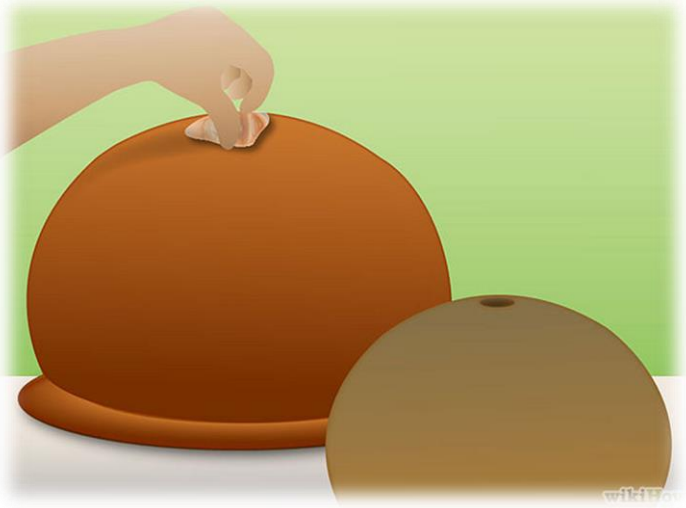
### 5.4.8 Making a Home-Made Refrigerator

| | | |
|---|---|---|
|  |  |  |
| **Unglazed Clay Pots (2 Sets)** | **Sand** | **Water** |

Things we need:

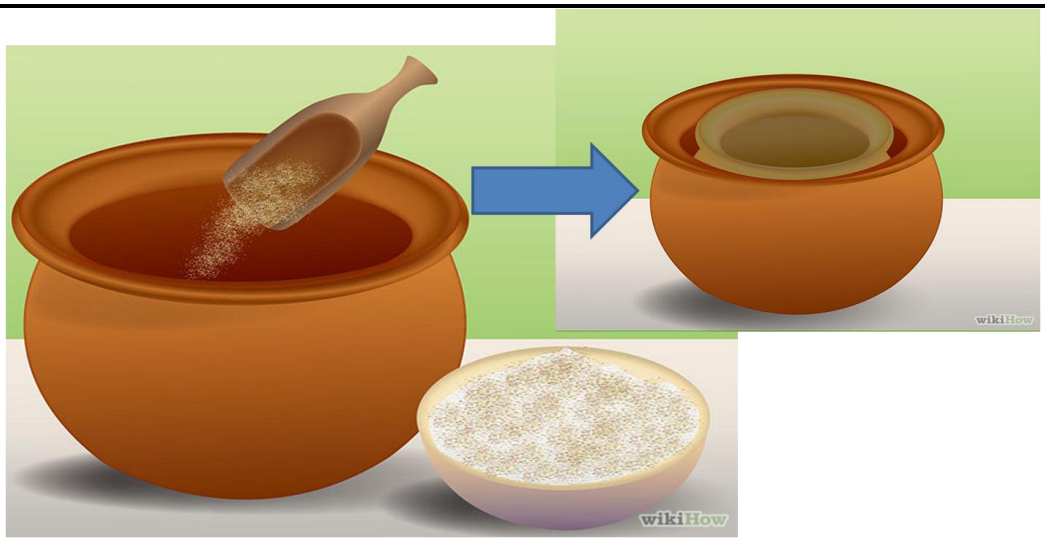
- 2 sets of unglazed clay pots.
- One pot must be smaller than the other so that the smaller pot fits inside the larger with some space around it.

***Step 1***



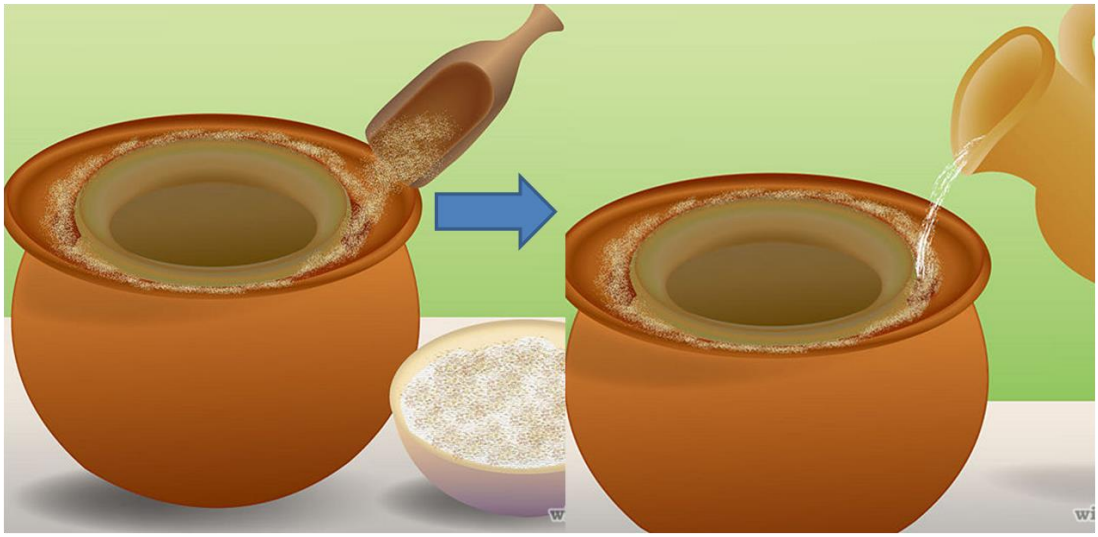
- Fill in any holes at the base of the pots using clay, large pebbles, cork, home-made paste to prevent water from entering the inner pot and running out of the larger pot.

***Step 2***




- Fill the base of the larger pot with sand to a height that will ensure the smaller pot sits equal in height with the larger pot.

***Step 3***



- Fill the area between pots with sand and pour cold water into the area until it is fully filled.

***Step 4***

- Store items within the inner pot with lid.
- Ensure that the sand within the pot is always damp.

***Step 5***

- Take a clean cloth and dip it into water. Place it over the top of the inner pot so that it covers it completely and let the inner pot to cool down. Keep the pot in a dry and ventilated space.

## 5.4.9 Natural Ways to Purify Water at Home

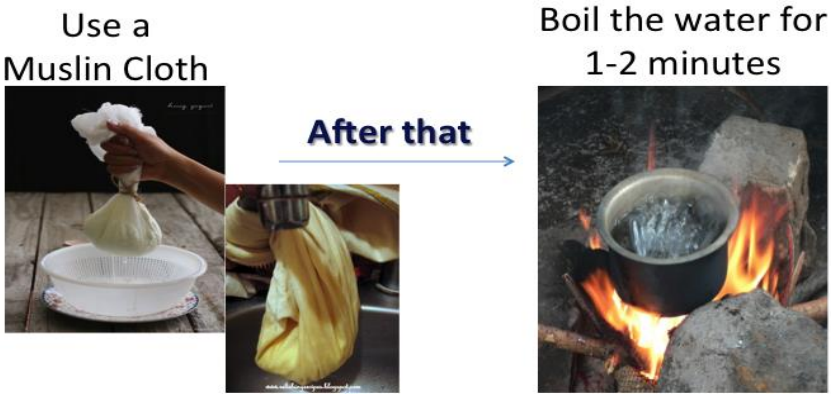

Water is susceptible to contaminant exposure at almost every stage of its journey. During and prior to collection, surface water, or water found in rivers and lakes, is vulnerable to interaction with acid rain, stormwater runoff, pesticide runoff and industrial waste.

Groundwater, or water found in wells and other public water supplies, is susceptible to disease-producing pathogen contamination. Additionally, contact with leachate from landfills and septic systems, runoff from careless disposal of hazardous household products, leaking underground chemical storage tanks and contamination from fracking pose potential risks.

***What are the other benefits of filtration?***

Safe drinking water can be consistently and reliably available to you provided you have the right tools — high quality filtration components can also help reduce your costs at nearly every level of use. At the consumer level, for example, water bottle filters offer a great low-cost alternative to disposable water bottles for portable, filtered water. Brand-name bottled water often costs upwards of five cents per ounce, nearly 500 times more than most municipal water sources. A portable filter serves as a small upfront cost that can offset bottled water mark-ups quite quickly.

***Method 1: Muslin Cloth and Boil***




Passing water through a muslin cloth makes it safe for drinking and removes some impurities from it. However; this still does not make it completely safe for drinking. There could still be bacteria, viruses and other toxic substances present in the water.

To make sure the water is fit for drinking, boil the water after filtering it through the cloth. Once the water starts boiling, keep it boiling for about 1-2 minutes and then leave it to cool. This kills germs present in the water and makes it safe for drinking.

Keep your water covered and store it in a container.

***Method 2: Leave in the Sun* (*Solar Water Disinfection Method)***

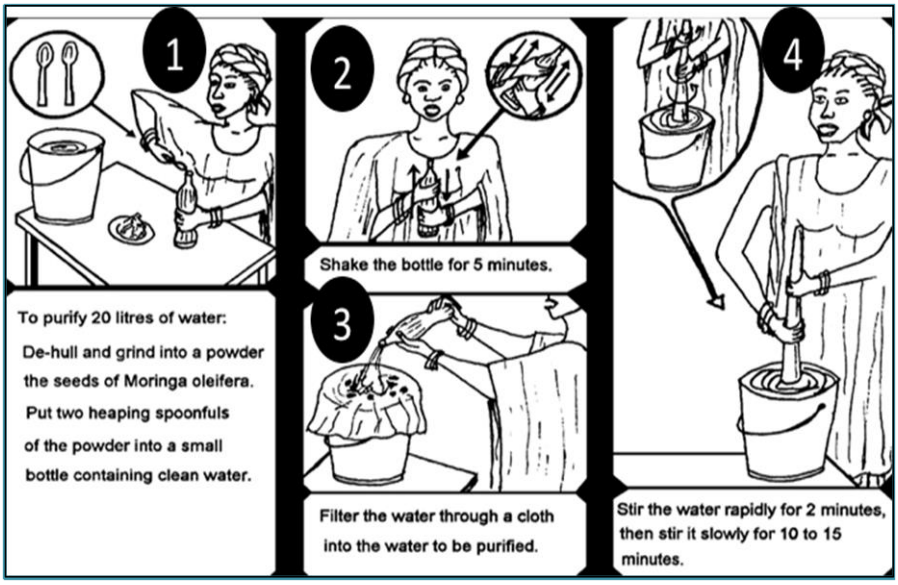

Solar energy is found to be beneficial in purifying the water and disinfecting it. For this, you need to pour water into clear plastic bottles and expose it to direct sunlight, for at least 6 hours. Do not use any plastic bottles as it can release toxic chemicals into the water, thus advice to use glass bottle.

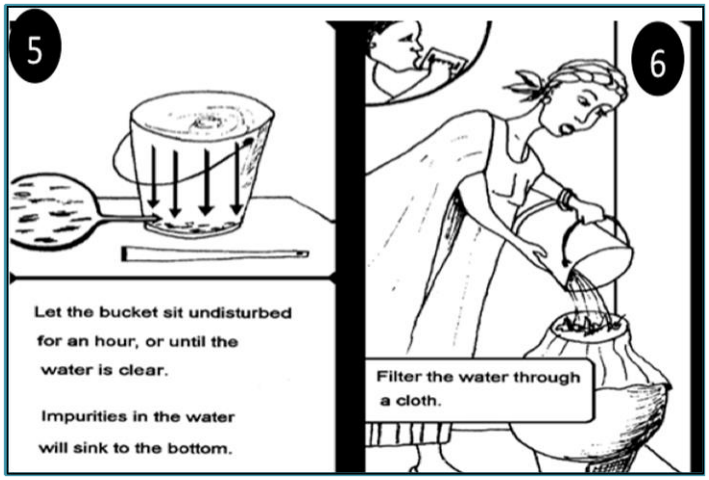
***Method 3: Moringa Tree***

Moringa seeds are dried and then ground into a powder

The Moringa tree (Moringa Oleifera) has been dubbed "The Miracle Tree" by many. Every part of the Moringa tree, from the roots to the leaves has beneficial properties that can serve humanity.

***How is this done?***




In order to make an effective water purification system, the Moringa seeds are dried and then ground into a powder.

Unlike other particles in the water such as clay, bacteria, and other toxic materials which are negatively charged, the protein in the Moringa seed powder is positively charged. Thus, it attracts the negatively charged particles like a magnet.

The flocs formed by the floculation process can then be easily removed by allowing the water to settle, or removed by filtration. This process was found to not only clarify turbid water significantly, but also remove 90-99% of bacteria contained in the water.

Not only can the Moringa provide highly nutritional food to the people who need it the most, but it can also clean their drinking water.

***Theory***

Moringa oleifera seeds treat water on two levels, acting both as a coagulant and an antimicrobial agent. It is generally accepted that Moringa works as a coagulant due to positively charged, water-soluble proteins, which bind with negatively charged particles (silt, clay, bacteria, toxins, etc) allowing the resulting "flocs" to settle to the bottom or be removed by filtration.

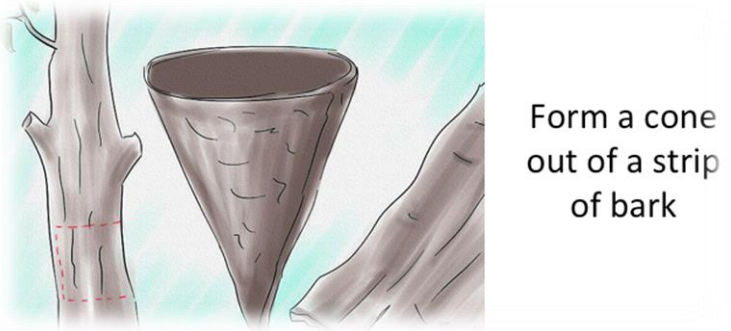
***Dangers***

**Secondary Infection:** The process of shaking and stirring must be followed closely to activate the coagulant properties; if the flocculation process takes too long, there is a risk of secondary bacteria growth during flocculation.

**Recontamination:** The process of settling is important. The sediment at the bottom contains the impurities so care must be taken to use only the clear water off the top and not allow the sediment to re-contaminate the cleared water.
**Additional contaminants:** Moringa treatment does not remove 100% of water pathogens.

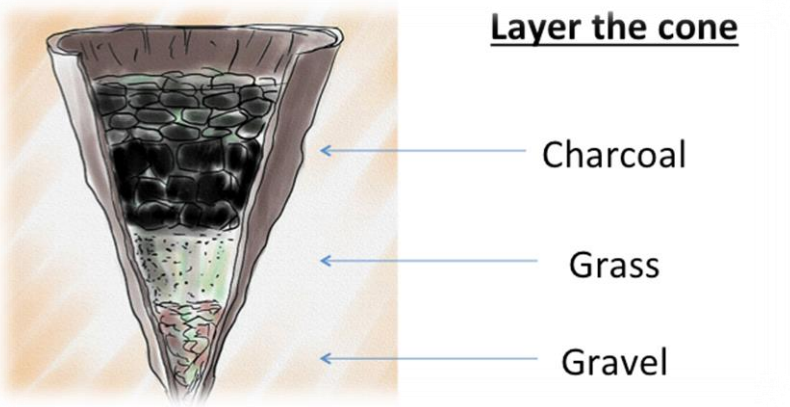
***Method 4: Form a Cone***

***Step 1: Form a Cone Out of a Strip of Bark***



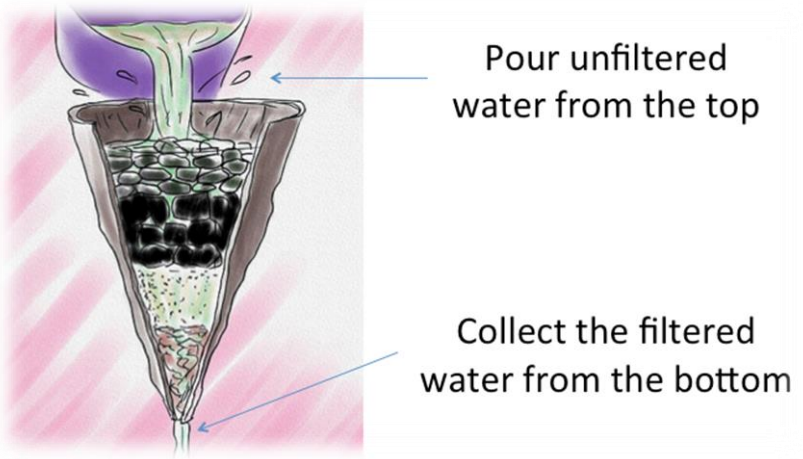

- Birch bark, or a bark similar to it, is best for creating this filtering system because it is flexible but will keep its shape.
- Keep in mind that this method will not fully purify the water, but it will reduce the amount of microbes in the water.
- This method should only be used in extreme emergencies.
- If you are having a hard time keeping your bark in the shape of a cone, you could try tying a piece of rope or a durable type of grass around it to keep its shape.

***Step 2: Layer the cone.***




- Layer the cone with sand, charcoal, grass, and gravel (or small rocks).
- Charcoal is especially good for removing bacteria.
- If you have had a fire, crush up some of the burnt pieces of wood.

***Step 3: Pour Unfiltered Water from the Top***




- Collect the filtered water from the bottom

**ACTIVITY TITLE:**

## 5.5 Quiz Content

### 5.5.1 Food Preparation, Food Contamination and Food Safety

***True or False Questions***

| |
|---|
| **Question 1:**<br>Foodborne illness is a disease that is carried or transmitted to human beings by food.<br><br>***Ans:*** |
| **Question 2:**<br>Clean and sanitary mean the same thing.<br><br>***Ans:*** |
| **Question 3:**<br>Raw food should never be mixed with food that has already been cooked.<br><br>***Ans:*** |
| **Question 4:**<br>You do have to wash your hands before putting on a pair of gloves.<br><br>***Ans:*** |
| **Question 5:**<br>The temperature danger zone for potentially hazardous foods is 40 degrees F-120 degrees F.<br><br>***Ans:*** |

***Multiple Choice Questions***

**Question 6:**

Sanitary means:

C. Free of visible soil
D. Coated with disinfectant
E. Washed by a chemical solution
F. Free of harmful levels of contamination

**Question 7:**

Personal hygiene is:

E. The spread of bacteria
F. Reporting an illness to your supervisor
G. The way a person maintains their health, appearance, and cleanliness
H. Using a hand sanitizer

**Question 8:**

When a person washes their hands they should also wash their:

E. Gloves
F. Elbows
G. Face
H. Lower arms up to the elbows

## 5.5.2 Enzyme Cleaner and Food Storage

***True or False Questions***

**Question 1:**

It is important to clean chopping boards/utensils after using them for raw meat.

***Ans:***

**Question 2:**

You only need to clean hands and kitchen surfaces when they look dirty.

***Ans:***

***Multiple Choice Question***

**Question 3:**

Why is it important to dry your hands after washing them?

A. So that they don't drip
B. So that your hands don't get cold
C. Germs spread more easily from wet hands

Objectives:

a)

b)

c)

Summary of Activity:

Materials required:

a.

b.

c.

d.

e.

Conduct of Activity:

**ACTIVITY TITLE:**

Objectives:

a)

b)

c)

Summary of Activity:

Materials required:

a.

b.

c.

d.

e.

Conduct of Activity:

# Topic 4 | Heal Yourself Home Remedies

***"The human body heals itself and nutrition provides the resources to accomplish the task."***

~ Roger Williams Ph.D. (1971)

# 6 Topic 4: Heal Yourself Home Remedies

## 6.1 Learning Objectives

At the end of this topic, students are expected to be able to:

- Know what destroys the immune system and things to avoid in the diet as such.
- Recognise that foods are able to aid in building up of the immune system.
- Understand and be capable of using remedies pertaining to common illnesses like sore throat, cough, common cold, common fever, diarrhoea and skin infections.
- Recognise the symptoms of vitamin deficiency and take measures to remedy and alleviate the symptoms.
- Identify the healthier and more nutritious choice when presented with various food and ingredients.

## 6.2 Training Aids

- Presentation slides

## 6.3 Methodology

- Lecture
- Quiz
- Activity Planning

## 6.4 Lecture Content

### 6.4.1 Lesson 1: The Immune System

Slide 3

I have good news for everyone! Do you know our body is miraculous? It has the ability to heal itself. For example, when you have a cut, the bleeding will stop after a while. The wound will heal and close up and scars will eventually fade.

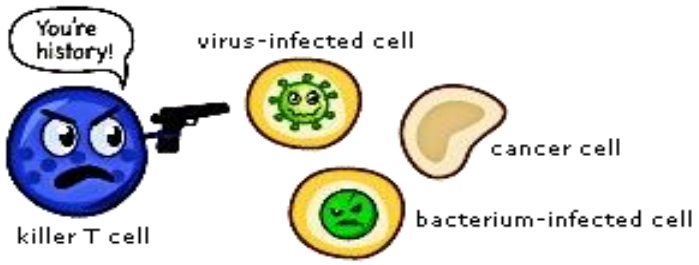
***Alternative Medicine***

Slide 4

We are going to learn how to use natural foods around you instead of medicine to help your body become stronger so that the healing can take place faster. This can help save you a lot of money. Such a method is called Alternative Medicine.

***Understanding the Immune System***

Slide 5




The killer T cells terminate cancer cells and cells infected by a virus or bacterium.

The key to prevention and treatment of diseases is a healthy immune system.

- When you have a cut, the wound heals because of your immune system.
- When you have a cough or fever, it goes away after a while because your immune system, like soldiers, throws out the enemies (i.e. virus). If you take longer to recover from a minor illness or if you fall sick often, it means your immune system is weak.
- You need to understand how to strengthen your immune system and what can cause your immune system to weaken.
- It is cheaper to maintain good health than to treat diseases.

Slide 6

A healthy immune system will mean that when someone coughs or sneezes, you will not be the first to catch the virus and fall sick.

It also means that even if you fall sick, the recovery will nevertheless be fast.

Look at the 2 girls, which one would you rather be? Do you want to be a sick or healthy child?

Why is it better to be healthy?

Ans: **Examples include better academic and non-academic performance in school now,**

**and better performance at work in the future. In addition, this reduces the burden on the family if you fall sick less often.**

Let us learn how your immune system works. Watch the video I am going to play for you carefully. I will ask you questions after that.

**Note to teachers**

For the older children, you can distribute the worksheets so that they take notes and answer the questions as they watch the cartoon video on the immune system. For younger children, you could just pick a few questions for children to answer at the end of the video.

### 6.4.2 Immune System Video and Quiz

Slide 7

This is a 6 minutes video.

Hand out quiz worksheets to older children and if time permits, they can watch the video twice to gather the answers. Quiz worksheets can be located in section 6.4.3.

***Teacher's Notes***

***Autoimmune Diseases***

Your body's immune system protects you from disease and infection. But if you have an autoimmune disease, your immune system attacks healthy cells in your body by mistake. Autoimmune diseases can affect many parts of the body.

No one is sure what causes autoimmune diseases. They do tend to run in families. Women - particularly African-American, Hispanic-American, and Native-American women - have a higher risk for some autoimmune diseases.

There are more than 80 types of autoimmune diseases, and some have similar symptoms. This makes it hard for your health care provider to know if you really have one of these diseases, and if so, which one. Getting a diagnosis can be frustrating and stressful. Often, the first symptoms are fatigue, muscle aches and a low fever. The classic sign of an autoimmune disease is inflammation, which can cause redness, heat, pain and swelling.

The diseases may also have flare-ups when they get worse, and remissions even when symptoms get better or disappear. Treatment depends on the disease, but in most cases one important goal is the reduction of inflammation. Sometimes doctors prescribe corticosteroids or other drugs that reduce your immune response.

***Suppressed Immune System***

Normal and Poor Immune System.

The immune system comprises of immune cells, like white blood cells, antibodies and other substances that fight against microbes and thus defend us against infections.

We may suspect that our immune system is low (poor, weak, deficient) when we suffer from frequent infections (like having influenza several times a year), when infections heal slowly (like common cold lasting a month), when they affect unusual sites (like Candida albicans yeast appearing in the mouth) or through infections that usually do not affect people with normal immunity (like Pneumocystis carinii fungus is harmless for healthy people but can cause pneumonia in AIDS patients).

People with chronic diseases, like diabetes or cancer, or those exhausted from long lasting hard work, starvation or psychological stress may also have lowered immunity and therefore frequent infections. Because of stress or disease, an old herpetic infection may re-activate and appear as oral herpes (itchy blisters around the mouth), genital herpes (on genital mucosa) or shingles (rash in a band-like distribution, affecting one side of the trunk, limbs or face).

When we know the exact substance, such as chemotherapy drugs or steroids, that causes low immunity, we say that immune system is suppressed or compromised. The term immune deficiency is usually reserved for a severely weakened immunity, which may be temporary, like most of acquired immune deficiencies, or permanent, like most of hereditary immune deficiencies and AIDS.

**Diagnosis of Low Immunity**

When low immunity is suspected, amount of immune cells (leukocytes and their subtypes: neutrofils, eosinophils and lymphocytes), antibodies (immunoglobulins, especially IgG and IgM) and complement (special proteins contributing in immunity) in the blood have to be checked.

Treatment of the cause, if possible and successful, usually results in normal immunity. If chemotherapy drugs or steroids severely affect immunity, they should be discontinued but only with doctor's approval. In AIDS, which cannot be treated for now, avoidance of infections is extremely important. In certain hereditary immune deficiencies, components of immune system, like immunoglobulins, can be injected intravenously, or transplantation of bone marrow, from which immune cells may grow, can be done.

## 6.4.3 The Immune System Quiz for Trainers

***Open Ended Questions***

**Question 1:**

Name the 3 important areas of the Immune Systems.

**Ans:**

1.
2.
3.

**Question 2:**

Name the 2 kinds of cells in your Immune System.

**Ans:**

1.
2.

**Question 3:**

What causes the production of Immune Cells to stop?

**Ans:**

**Question 4:**

Where is the Thymus Gland?

**Ans:**

**Question 5:**

When the Immune Cells pass the test, where are they sent to?

**Ans:**

**Question 6:**

Where are our Lymph Glands?

**Ans:**

**Question 7:**

What is the role of the Helper Cells?

**Ans:**

**Question 8:**

Who kills the Germs/Infections?

**Ans:**

**Question 9:**

When do you recover from Infection?

**Ans:**

**Question 10:**

What can you do to help flush out the Infection?

**Ans:**

**Question 11:**

What is Autoimmune Diseases?

**Ans:**

**Question 12:**

What is Suppressed Immune System?

**Ans:**

1.
2.
3.

**Question 13:**

Name one thing you can do to help make your Immune System stronger.

**Ans:**

## 6.4.4 Lesson 2: Destroyers and Builders of Immune System

***Introduction***

Slide 13

We learnt about how the immune system works. Let us take a look at what destroys the immune system and how we can help make the immune system strong.

Can someone tell me what the number 1 food is that weakens our immune system?

Ans: **Sugar**

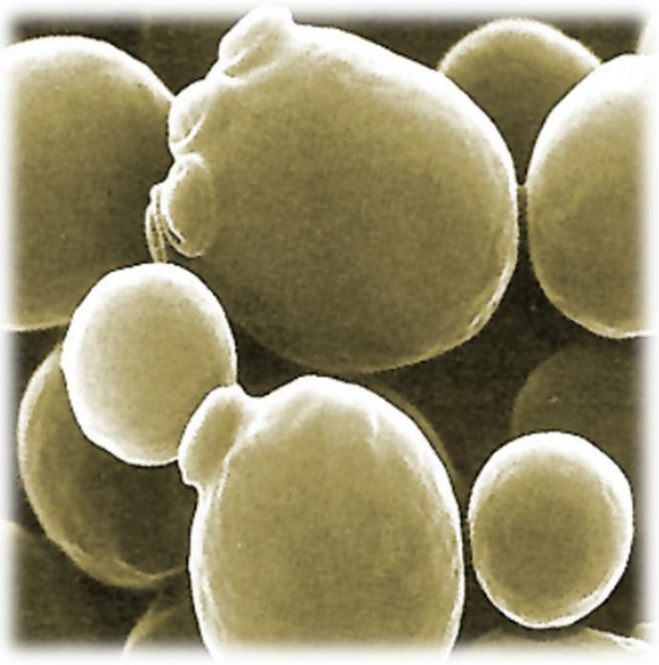
***Sugar***

Slide 14

Sugar causes the production of immune cells to shut down and also creates mucus that feeds cancer cells. This causes diabetes and makes the infection grow.

Let us do an experiment to see how sugar can cause a fungal infection to grow.

***Teacher's Notes***



*Picture yourself living in ancient Egypt and imagine that it is your job to rise before the sun each day to bake crackers for your family. Mixing up ground wheat and honey one afternoon, you are distracted. (Maybe you are watching a pyramid being built just across the Nile.) You forget to cover up the cracker dough. It sits all night in an open window, caressed by a warm breeze carrying tiny life forms that are too small to see. When you wake the next morning, you find the dough puffed up and overflowing its bowl. Everyone will be awake and hungry soon and you don't want to get in trouble, so you go ahead and bake it. The crackers are not hard and flat like usual, but emerge from the hearth light, puffy and delicious. You have just baked the first bread in human history.*

No one really knows how the ancient Egyptians discovered yeast, but we have learned from their writings and artwork that they have been making bread for over 4,000 years. How bread rose was a mystery though, until a famous scientist named Louis Pasteur proved that tiny living organisms called yeast were responsible for making bread dough puff up.

**Bread yeast is a type of fungus and is related to mushrooms.** If you look at yeast cells under a microscope, you will see that they are shaped like balloons and footballs. The single-celled organisms reproduce themselves by making tiny buds that will become new yeast cells. The kind of yeast used to make bread is called *Saccharomyces cerevisiae* (sack-a-roe-MY-seas sair-a-VIS-e-ey). *Saccharomyces* means "sugar fungus" and the word *cerevisiae* comes from the name of Ceres, who was a goddess of farming in Roman mythology. Here's what they look like under the microscope.

The **following experiment** shows students how adding sugar to fungus (yeast) will make it grow rapidly.

**This shows that when we are suffering from an infection, we must not consume sugar.**

We must not feed the infection with food. It will swell.

Do note that cakes, cookies and deserts all contain huge amounts of sugars.

# Yeast Experiment: It's Alive!


Shake a little from the package onto your dry hand, and you'll find that yeast just looks like sand. But add some lukewarm water, and it's something else entirely. It's alive! Get your child excited about science and teach her about a fascinating and extremely beneficial little organism that does so much for us. Your child's favorite peanut butter and jelly sandwich would not be same without yeast. This yeast experiment is especially good for kindergarteners, who are fascinated with that timeless question: "Is it alive?"

**What You Need:**

- 3 little pouches, or 3 teaspoons, of dry yeast
- 1 magnifying glass
- 3 Ziploc bags
- 1/4 cup of lukewarm water
- 2 teaspoons sugar

**What You Do:**

1. Lay a sheet of plain dark paper onto a clean, well-lit table surface. Then pour out the contents of one yeast pouch, dry, and invite your child to take a good look with a magnifying glass. What does she see? Note together how the yeast doesn't move or seem to breathe—indeed, it doesn't seem alive, does it? When you're done, carefully sweep the yeast into one of the plastic Ziploc bags and put it aside.
2. Now tell your child it's time for some experimenting. Pour out the contents of another yeast packet onto the dark paper, and mix it with one teaspoon of dry sugar. One way we can tell if things are alive is if they move together, or even absorb one another. Grab the magnifying glass and take a look again. See anything alive? (Probably not!) When you and your child are done taking a look, pour the dry sugar and yeast into the second Ziploc bag.
3. Take the last packet and pour it straight into the last Ziploc bag. Add the second teaspoon of sugar, and then (after making sure your bag has no holes), pour in the lukewarm water. Zip the bag securely shut.
4. Put all three bags in sunny window for approximately 20 minutes, and then check them out: the first two bags will show no change in the yeast, but that third bag will be…well, transformed. The bag should be puffy, and the yeast will have mostly dissolved. Try pouring a little of the solution into a clear bowl placed over the dark sheet paper or another dark surface, and have a look with the magnifying glass.

Well, yeast really is in fact alive. It's a one-celled member of the fungus family, and when you add water to it and give it a little sugar for food, the organism "burps" and releases carbon dioxide—the gas that makes the bag puff out and makes sodas fizzy and bread fluffy.

In fact, if you want to make the most of this experiment, pour the rest of dry yeast into the wet yeast mixture, let it sit just a few minutes longer, and then mix the whole thing into a nice big batch of bread dough. Bake it up and enjoy—if there was ever any doubt before, this is an activity that will remind your child that science is simply delicious!

***Alcohol***

Slide 15

Damages liver and can cause death.

Some students may have lost their fathers to alcohol addiction. It is sad. Do ask them to share their experiences to bring home the point if it is appropriate.

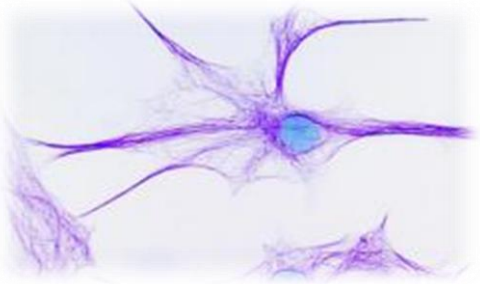
***Teacher's Notes***

**Alcohol Kills Brain Cells**

Just one observation of a drunken person is enough to convince you that alcohol directly affects the brain. People who drink enough to get drunk often end up with slurred speech and impaired motor skills and judgment, among other side effects. Many of them suffer from headaches, nausea and other unpleasant side effects afterward -- in other words, a hangover. But are a few drinks on the weekend, or even the occasional long drinking session, enough to kill brain cells? What about binge drinking or the frequent, sustained drinking of alcoholics?

Not so much. Even in alcoholics, alcohol use doesn't actually result in the death of brain cells. It can, however, damage the ends of neurons, which are called dendrites. This results in problems conveying messages between the neurons. The cell itself isn't damaged, but the way that it communicates with others is altered. According to researchers such as Roberta J. Pentney, professor of anatomy and cell biology at the University at Buffalo, this damage is mostly reversible.

Alcoholics can develop a neurological disorder called Wernicke-Korsakoff syndrome, which can result in a loss of neurons in some parts of the brain. This syndrome also causes memory problems, confusion, paralysis of the eyes, lack of muscle coordination and amnesia. It can lead to death. However, the disorder is not caused by the alcohol itself. It is the result of a deficiency of thiamin, an essential vitamin B. Not only are severe alcoholics often malnourished, extreme alcohol consumption can interfere with the body's absorption of thiamin.



**Dendrites**

***Antibiotics***

Slide 16

Lower the immune system. Immune cells are not given a chance to learn to fight.

***Teacher's Notes***

**How antibiotics destroy your immune system**

Monday, July 16, 2012 by: Craig Stellpflug
(NaturalNews)

Your immune system is constantly on a seek-and-destroy mission status - on the lookout for foreign invaders, naturally occurring cell defects and mutant cells. The immune system has a vast capacity to remember bad guys and deploy tactics that worked in the past to annihilate the enemy. Some of the fastest growing cells in the human body are immune cells.

Over 80 percent of the body's immunity is built in the intestinal tract by the friendly bacteria balance that resides there. The intestinal flora starts building in an infant while in the womb but doesn't really take off until after eight days of age. Starting with the colostrum milk, the gut begins to populate with more bacteria while the infant's immune system starts an inventory of good and bad cells in the body. This inventory is a life-long process and the immune system never forgets an invader.

**Where the problem begins**

The absolute worst thing to do to any infant is to give them an antibiotic. Antibiotics indiscriminately kill bacteria, both good and bad. One round of antibiotics will permanently change the baby's immune system, and because a majority of neuro-chemicals are also made in the gut, the baby's neurology is also altered. The antibiotics that have been touted as the saviour of mankind from disease are costing us in cancer and degenerative, chronic diseases.

Once the very first antibiotic is administered to the infant or child, the bacteria in the gut is wiped out and the immune system is permanently altered in its ability to manufacture appropriate immune cells. Fungus in the gut is now unopposed and begins to proliferate unchecked by the friendly bacteria. After fungus sets up strongholds then parasites move in to share the bounty of food and minerals meant to feed the body. This is the first step for chronic disease and cancer.

The same process happens when an adult takes even one round of antibiotics. Everything changes permanently and takes years of targeted nutrition and probiotic therapies to recover a semblance of normalcy in the body systems.

**Learn more:**
http://www.naturalnews.com/036479_antibiotics_immune_system_destruction.html#ixzz2pMKUohLA

***Smoking***

Slide 17

Smoking has toxic effects on the body which in turn damages the lungs, leading to a higher risk of cancer.

**6.4.5 Build Up your Immune System**

Slide 18



Choose **rainbow coloured** fruits and vegetables every day. **Different coloured fruits and vegetables have different nutrients**. You will need as much nutrients as you can get to stay strong and healthy. Do not overcook as this will destroy the nutrients.

***Whole Grains***

Slide 19

Eat as much whole grains as possible daily. Building up your immune system will prevent diseases and keep your family healthy. Whole grains and beans are also rich in protein.

Signs of Protein deficiency

- Wasting of the muscles
- Weakness
- Fatigue
- Falling hair

Name something served in school that contains whole grains.

Ans: **Malt Drink**

***Friendly Bacteria***

Slide 20

Our gut is lined with both good bacteria and bad bacteria.

Probiotics (friendly bacteria) in idli and curd help to make our gut healthy. This will build up the immune system.

***Conclusion***

Slide 21

*"Let food be your medicine and medicine be your food."*

~ Hippocrates, 400BC (i.e. 2400 years ago!)

Discuss the quote above with students. Get their thoughts on this historical wisdom.

Also do a summary of the lesson by asking them to name the destroyers and builders of the immune system.

## 6.4.6 Lesson 3: Indian Home Remedies (Part 1)

***Recap***

Slide 22

Remember in the last lesson, we learnt about how immunity can be lowered.

Can someone name me the different ways immunity can be destroyed?
Ans: **Smoking, drinking, antibiotics and excess consumption of sugar.**

We also learnt how to build up our immunity. Can someone tell me how we can build up our immunity?
Ans: **Consume rainbow coloured fruits and vegetables so that our body will have a broad spectrum of nutrients. Similarly, taking whole grains for protein and fibre and taking idli and curd to keep our gut healthy.**

We are using natural food as our medicine. This helps us save money and is a safer alternative.

Slide 23

Here are some home remedies used for thousands of years in India before the invention of modern medicine. These help build up your immune system so that the body can recover fast. Remember that with home remedies, it still takes time to recover. The key is to apply home remedies at the very **onset** of illness. I am sure that you are practicing this in some way at home today.

Get students to name some examples (e.g. drinking lime juice when they have a sore throat, applying herbs to wounds).

***Sore Throat***

Slide 24

Let us take a look at some home remedies for sore throats.

Slide 25

- Gargle lukewarm water with some salt a few times daily.
    - Get someone who has a sore throat to volunteer. Let him or her gargle some warm solution of salt water.
    - Ask how he/she feels thereafter. Let him/her know that this should be done a few times daily till he/she feels better.

Slide 26

- Have half a lime or lemon 3 times a day.
    - Let a child with a sore throat suck on a lime wedge. Ask if he/she feels that the sore throat is better.
    - Let the child take some lime wedges home in a plastic bag to complete treatment.
    - Follow up the next few days with child to see if the student has recovered.

Slide 27

- Boil basil leaves with some water. Drink or gargle after it cools.
    - This can be used if lime wedges are not in season.

Slide 28

- Drink 16 glasses of warm water daily till you get well, or 12 glasses at the least.
- If the condition persists and you do not feel that you are getting better, or if you feel worse even with lots of rest, water and natural remedies, see a doctor!

***Cough***

Slide 29

- Coughing is a means by which the body throws out or gets rid of substances that are irritating the air passage way.
- Frequent coughing is usually caused by the presence of disease caused in turn by bacteria or viruses. Coughing shows a well-functioning immune system. However, coughing caused by bacteria or virus is contagious and can spread to others.

Slide 30

- Chew 4 basil leaves and black pepper.
    - Ask if any student has a cough at the moment.
    - Get the child to try this remedy.
    - Ask how he/she feels after chewing on the basil leaves with black pepper.

Slide 31

- Add some grounded pepper in 1 tsp of jaggery. Take this 3 times daily for 5 days.
    - An alternative to treat cough.

Slide 32

- Increase consumption of garlic.
    - Use more garlic in cooking.
    - Or slice them thinly and take them raw; it is even more effective.

Slide 33

- Prepare a tea using half a tsp of fenugreek seeds.
    - Show students a sample of fenugreek seeds.
- If the condition persists and you do not feel that you are getting better, or if you feel worse even with lots of rest, water and natural remedies, see a doctor!

***Common Cold***

Slide 34

- An inflammation in the upper respiratory tract due to a viral infection is called the common cold. Also known as acute coryza, common cold is not a one-time disease and may appear and re-appear several times a year.
- Common cold lasts for about 3 to 10 days and mainly affects the nose. Sometimes there is blockage in ears as well. Bronchial tubes and sinus can also be affected.
- The symptoms of common cold are soreness of throat, congestion of nasal passage, running nose, sneezing, headache, chill and body ache. Common cold is not a serious disease and can be treated by adapting to some home remedies. Know more about how to cure a person suffering from the common cold.

Slide 35

- Take a glass of lukewarm water and dilute lime juice in it.
    - The most effective cold remedy.

Slide 36

- Increase consumption of garlic as its antiseptic properties make it one of the most effective ingredients for cold.
    - Use more garlic in cooking.
    - Or slice them thinly and take them raw; it is more effective.

Slide 37

- Boil small pieces of ginger with water. Mix the hot liquid with half a tsp of jaggary.
    - Prepare this mixture in front of students if possible.
    - It may be easier to squeeze juice from pre-grated ginger.
    - Add hot water to some jaggary and stir.
    - Get a student suffering from a runny nose to drink the mixture.

Slide 38



- Make a paste of 200 grams of coriander seeds and jaggary with water. Boil mixture and inhale vapour 4 times daily.
    - Show students samples of coriander seeds. This remedy aids in clearing the nasal passage and stuffy nose.
    - If the condition persists and you do not feel that you are getting better, or if you feel worse even with lots of rest, water and natural remedies, see a doctor!

***Common Fever***

Slide 39

- Fever shows that the immune system is fighting the infection. Heat is generated during the process.

Slide 40

- Boil 12 grams of basil leaves in half a litre of water. Drink this once a day.

Slide 41

- Mix turmeric powder with cold water. Have this to eliminate infection and fever.
    - Show students a sample of turmeric powder.
    - Prepare the mixture and get a student who feels that he/she might be coming down with fever to taste mixture.

Slide 41

- Increase consumption of limes and lemons. This helps to build resistance.

Slide 43

- Lots of sleep! **Rest and water is always the best medicine.**
- If the condition persists, and fever does not subside after 2 days and you do not feel that you are getting better, or if you feel worse even with lots of rest, water and natural remedies, see a doctor!

***Teacher's Notes***

Comprehensive Home remedies resource guide:
http://www.iloveindia.com/home-remedies/

## 6.4.7 Lesson 4: Indian Home Remedies (Part 2)

***Recap***

Slide 44


Revise what they have learnt from the previous lesson.

- What are the home remedies for sore throat, common cold, fever and cough? Did they get to try applying these natural remedies at home? Are there any results?
- What is the concept of 'heal yourself' and 'letting food be your medicine'? It is using natural food and remedies in place of medicine.

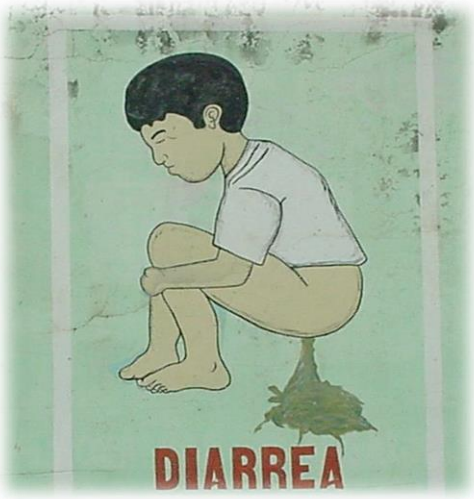
It is important to note that with natural remedies, it must be applied at the onset of symptoms (full blown sickness is very hard to treat with natural remedies as it will take time). It is also important to take lots of water (to flush out the virus) and having lots of rest or sleep is crucial for recovery.

See a doctor if you do not think you are getting any better even with application of natural remedies 3 times daily. Be sensitive to what your body is telling you. No one understands your condition as much as you. You are the 'best doctor' for your own health.

Now let us take a look at home remedies for 2 other common ailments.

***Diarrhoea***

Slide 45




- Commonly known as loose motion, diarrhoea is the frequent passage of unformed watery loose stools. Diarrhoea can be a mild one, acute or chronic. People of any age can be struck with diarrhoea. It is a condition where the water is either not absorbed properly or there is excess of water secreted by the organs. The most common symptoms for diarrhoea are loose stools, vomiting, stomach pain, thirst, fever, nausea and dehydration.
- If diarrhoea occurs for a longer period it can result in general weakness due to loss of various vitamins from the body. Overeating, incomplete digestion of the food, viral or bacterial infection, bowel disorder and food allergies are some of the causes of diarrhoea.
- Prevent diarrhoea by eating clean food.
    - Ask students to share some instances when the food they ate were not clean and what they went through. How did they manage to stop the diarrhoea in the end?

Slide 46

- Take banana with curd.
    - Simple and effective remedy. The reason for this remedy is the friendly bacteria (probiotics) that is present in the curd.
    - This will help fight the bad bacteria in the gut that is causing the diarrhoea.
    - Take this 3 times daily or more.

Slide 47

- Mix 1 tsp of ginger juice with half a cup of boiling water. Drink this mixture hot once every hour. Drink at least 12 glasses of water.
    - **Replenishing fluid is crucial in the treatment of diarrhoea. Can someone tell me why?**
    - You lose a lot of water during diarrhoea. 80% of your body is made up of water. Water is crucial for health. No one can survive without water.
    - So it is very important to drink lots of water when suffering from diarrhoea.

Slide 48

- Roast fennel and white cumin seeds in equal amounts and take 3 grams of mixture with water. Take this every three hours.
    - Show samples of fennel and cumin seeds. Pass it around the class.
- If the condition persists, and you do not feel that you are getting better, or if you feel worse even with lots of rest, water and natural remedies, see a doctor!

***Skin Infection***

Slide 49

- Your skin protects you from germs, but sometimes it can get infected. Some common types of skin infections are:
    - Bacterial: Cellulitis and impetigo. Staphylococcal infections can also affect the skin.
    - Viral: Shingles, warts and herpes simplex.
    - Fungal: Athlete's foot and yeast infection.
    - Parasitic: Body lice, head lice and scabies.
- Some skin infections like ring worms, warts and head lice are infectious. Putting a bandage over the infected area or wearing socks or long sleeves or pants can help prevent the spread of the infection to other parts on the skins and body.

Slide 50

- Wash the infected area with salt water a few times a day. Keep it clean.
    - Get a child with a skin infection to rub some salt gently onto the infected area. Do not rub salt on an open wound or broken skin. It will hurt and sting badly.
    - Rinse off with water. Do this a few times a day until the infection clears up.

Slide 51

- Apply Aloe Vera gel to the affected area a few times daily.
    - Show the class a sample of Aloe Vera plant.
    - A pharmacy in a plant: Aloe has been shown to reduce the healing time of fire burns by at least half, and heal ulcers, dermatitis and skin diseases caused by parasites.
    - Aloe successfully heals cuts, blisters, sores and acne. It greatly improves skin texture and helps eliminates dryness, itching, eczema, psoriasis and other skin diseases. Studies have shown that aloe regenerates skin cells, eliminates scarring and promotes regeneration of natural skin colour.
    - Encourage students to grow this amazing plant at home in a pot.
    - Demonstrate how to apply aloe gel on students who has a skin infection or

burn.

***Teacher's Notes***

Aloe Vera – Healing Plant

**Aloe Vera – Aloe Barbadensis Miller**

The word Aloe in Sanskrit means Goddess.

Known by such names as healing plant, miracle plant, burn plant, first aid plant, lily of the desert, jelly leek, plant of life and plant of immortality, Aloe Vera and related species are well loved and widely used around the world.

Originally a native of South and East Africa, this remarkable healing plant flourishes in warm, dry climates such as the Mediterranean.

A member of the Liliacea family, Aloe Vera is a succulent perennial, grows in a clump and has long, spiky, grey-green leaves. The yellow-orange tubular flowers bloom at the top of tall spikes that emerge from the center of the plant. There are approximately 400 species of Aloe, but it is the Aloe Barbadensis Miller, or "true aloe," referred to as Aloe Vera, that possesses the most remarkable healing properties.
History - Aloes have a history of use going back for at least 5,000 years. In Ayurvedic medicine, Aloe Vera gel is considered to possess estrogenic properties, and this may be one of the reasons the plant was so highly esteemed by Indian, Arab, Egyptian and Mediterranean women. Aloe was known and widely used in Asia, and is found in the folklore of the Japanese, Filipinos and Hawaiians. Its name is derived from the Arabic word alloeh, meaning bitter, most likely due to the bitter liquid found in the leaves.

A Sumerian clay tablet found in the city of Nippur, written around 2,200 B.C., documents the first recorded use of Aloe Vera as a laxative. A detailed account of Aloe's medicinal value is found in the Egyptian Papyrus Ebers, dated about 1,550 B.C. This document records twelve

formulas combining Aloe with other substances for the treatment of both internal and external ills.

The master of Roman pharmacology, Dioscorides, 41 A.D.-68 A.D., expanded his herbal knowledge and skill as he travelled throughout the lands with the Roman army. He observed that the whole Aloe Vera leaf, when pulverised, would stop the bleeding of wounds and attributed to its juices “the power of binding, of inducing sleep.” Dioscorides further noted that it “loosens the belly, cleansing the stomach” and was used to treat boils, ease haemorrhoids, heal bruises and dry, itchy skin conditions, was good for the tonsils, gums and mouth irritations, and that it was an effective medicine for the eyes. By the year 200 A.D. Aloe had become an essential and vital part of Roman medicine.

The plant was brought to the New World by the Spanish in the 1600s. It was planted in gardens and used extensively by the missionaries as well as by the indigenous people as a universal healing agent. Aloe was officially listed as both a purgative and a skin protector by the United States pharmacopoeia in 1820.

**Medicinal Uses** - During the 20th century, countless studies were conducted around the world demonstrating Aloe Vera to be therapeutic as well as curative for a wide range of ills. Among them, Aloe has been shown to heal as well as to prevent radiation burns, cut the healing time of fire burns by at least half, and heal ulcers, dermatitis and skin diseases caused by parasites.

Aloe successfully heals cuts, blisters, sores and acne. It greatly improves skin texture and helps eliminate dryness, itching, eczema, psoriasis and other skin diseases. Studies have shown that aloe regenerates skin cells, eliminates scarring and promotes regeneration of natural skin colour.

It has effectively been used as a treatment for peptic ulcers, lung disorders, chronic leg ulcers, periodontal disease, seborrhoea and hair loss. Aloe is effective against ringworm and other fungal infections, abscess, inflamed cysts and hot spots.

Studies performed in the 1960s and repeated in the 1980s confirmed findings that Aloe is highly effective against Staphylococcus aureus, Streptococcus viridaus, Candida albicans, Corynebacterium xerosis, and the five strains of Streptococcus Mutant, and that it is nontoxic. Furthermore, Aloe quickly relieves pain, eliminates soreness, irritation and swelling, and is a very effective treatment for herpes and shingles. Researchers concluded that Aloe is a powerful anti-inflammatory and antimicrobial agent and is effective against a broad spectrum of micro-organisms.

Studies conducted at the Chicago Burn Center demonstrated the ability of Aloe Vera to heal third degree burns and frost bite up to six times faster than accepted modern medical treatment. Dr. Heggars, M.D., who directed the study, concluded that these healing effects were due, at least in part, to the steroidal compounds and salicylic acid present in the whole leaf. He found that Aloe eliminated scarring; normal skin colour returned, and the hair follicles were completely regenerated, allowing for re-growth of hair in burned areas of the skin and scalp. Aloe was found to be more effective in preventing and controlling infections than Silver Sulfadiazine.

Researchers at the Linus Pauling Institute concluded that drinking Aloe Vera juice helps improve protein digestion, promotes balance of digestive bacteria, relieves indigestion and reduces acid stomach. They also found that it helps normalise bowel movements, controls yeast infections, can be a benefit to those dealing with irritable bowel syndrome and colitis, and that it has no toxic effects.
Researchers from Okinawa, Japan, reported in the Japanese Journal of Cancer Research that Aloe contained at least three anti-tumour agents, emodin, mannose and lectin. When Dr. James Duke, the well-known and much beloved herbal educator, was with the United States Department of Agriculture, he approved the use of Aloe mannose as a treatment of soft tissue cancer in animals and of feline leukaemia.

In Traditional Chinese Medicine Aloe Vera is considered a cool, moistening, Yin tonic and used to allay irritation, inflammation and infection and also to relieve congestion.

**A Pharmacy in a Plant** – Aloe contains at least 140 individual substances – no less than 70 essential nutrients, including a wealth of vitamins, minerals, enzymes, protein, phytosterols and amino acids.

Aloe Vera juice offers vitamins A (beta-carotene and retinol), B1 (thiamin), B2 (riboflavin), B3 (niacin), B6 (pyridoxine), B12 (cyanocobalamin), choline, vitamin C (ascorbic acid), E (tocopherol) and folic acid; plus the minerals calcium, chlorine, copper, germanium, iron, magnesium, manganese, potassium, silicon, sodium, sulfur and zinc.

The plant also contains the organic acids chrysophanic, salicylic, succinic and uric and all-important polysaccharides, long chain sugar molecules such as acemannen, which act as immune stimulators and anti-inflammatory agents, as well as enzymes such as glutathione peroxidase and resins.
Phytosterols such as B-sitosterol, a powerful anti-inflammatory and anti-cholestromatic, which helps to lower cholesterol levels, and lupeol, a potent pain reliever and antimicrobial agent, are also present.

Among Aloe's ingredients are at least six potent antiseptic agents: lupeol, salicylic acid, urea nitrogen, cinnamonic acid, phenols and sulphur. All of these substances kill or control mould, bacteria, fungus, and viruses which helps explain Aloe's ability to eliminate many internal and external infections.
Aloe also contains at least 23 polypeptides, or immune stimulators, and so is active against a wide range of immune system diseases. These polypeptides, together with the anti-tumor agents Aloe emodin and Aloe lectin, make Aloe an effective ally for the prevention and treatment of cancer.

Acemannan, a constituent of aloe gel shown in laboratory tests to have strong immune-stimulating and potent anti-viral activity, is thought to mimic the function of AZT, and is currently being tested as a promising adjunct to AIDS therapy. When 20 ounces of Aloe Vera juice was orally administered to 69 AIDS patients per day, symptoms eventually disappeared in 81% of these patients.

**Directions for Use** – Aloe Vera is simple to use to treat external conditions, such as burns, wounds and skin afflictions. The clear gel inside the leaf has an immediate soothing effect and places a protective coat over the affected area, speeding the rate of healing and reducing the risk of infection. This action is due in part to the presence of aloectin B, another immune stimulating constituent present in the gel. To obtain the gel, cut a leaf in half along its length and apply the inner pulp to the affected area.

The yellow sap that oozes from the base of the leaf when it is cut is called bitter aloes. This bitter sap contains anthraquinones which are a useful digestive stimulant and act as a strong laxative. Anthraquinones also bind to calcium in the urinary tract and significantly reduce urinary calcium crystals. Aloe can be used to prevent stone formation and reduce the size of kidney stones.

Aloe juice, made from both the skin and gel of the plant, may be a useful therapy for those with diabetes type II, as laboratory studies show that it can stimulate insulin release from the pancreas and reduce blood sugar and triglyceride levels in the blood. Throughout history Aloe juice has been mixed with water, milk, wine, honey and many other substances to make it easier to use and more palatable, with no loss of effectiveness.

Remember that it is the synergistic relationship between all parts of the plant that make Aloe Vera such an amazing healer. Most authorities agree that there is no single agent responsible for Aloe Vera's ability to heal, and therefore using the whole leaf is most effective. In antiquity the whole plant was used, rather than one or another of its parts. The leaves were often ground up and cooked to preserve their medicinal value when traded across long distances. Successful modern studies have used either a combination of the sap and gel, or the whole leaf.

**Household benefits** – Aloe plants improve air quality, and when grown in pots inside the house, help remove toxins from the atmosphere. The plant has a strong reputation in the magical realms; because its leaves emerge from the base of the plant in groups of three, it has been associated with the sacred Trinity since the most ancient times. Additionally, Aloe Vera is believed to protect the home and its inhabitants from the evil eye and when kept in the

kitchen, helps prevent culinary mishaps.

**Caution:** People with heart disease, kidney disease, or electrolyte abnormalities should not take aloe internally. Topical use of Aloe is entirely safe during pregnancy and breastfeeding but oral use is not recommended.

Excerpt from *Through the Wild Heart of Mary; Teachings of the 20 Mysteries of the Rosary and the Herbs and Foods Associated with Them*, by Gail Faith Edwards, Bertha Canterbury/Rosina Publishers, 2009

Slide 52

- Cut small thin pieces of garlic, wrap them in a cheesecloth and place the bundle over the affected area.
    - Try this natural remedy at home and give feedback.
    - If the condition persists, and you do not feel that you are getting better, or if you feel worse even with lots of rest, water and natural remedies, see a doctor!

Slide 53

- Eliminate sugar till infection clears.
    - Ask students if they can remember the sugar experiment and why sugar is bad for fungus. It feeds the fungus infection and makes it grow.
    - So it is important to eliminate sugar till skin infection is healed.
    - If the condition persists, and you do not feel that you are getting better, or if you feel worse even with lots of rest, water and natural remedies, see a doctor!

***Teacher's Notes***

Comprehensive Home remedies resource guide:
http://www.iloveindia.com/home-remedies/

## 6.4.8 Lesson 5: Vitamin Deficiencies Self-Test Food Choices

***Vitamin A***

Slide 55

An early warning sign of vitamin A deficiency is the inability to see well in the dark, a condition called **night blindness**. If the deficiency is not corrected, the outer layers of the eyes become dry, thickened, and cloudy, and eventually leads to blindness if left untreated.

Slide 56

Vitamin A deficiency also causes dry and rough skin, making it take on a kind of "goose flesh" appearance. In addition, one can become more susceptible to infectious diseases. That is because a lack of vitamin A damages the lining of the gastrointestinal and respiratory tracts, so they cannot act as effective barriers against **bacteria**.

Vitamin C deficiency has the same symptoms.

Slide 57

Peeling or splitting of nails is also a sign of vitamin A deficiency.

Slide 58

Dry brittle hair is another sign of vitamin A deficiency.

**Food rich in vitamin A are reddish in colour**. For example, carrots, chilli, bright orange sweet potatoes and dark orange squash.

***Vitamin B6***

Slide 59

If you feel more irritable, it can be due to sores in your mouth. Look for cracks around the edges of your mouth and inside your mouth, and for sores under the tongue; these are signs of vitamin B6 deficiency.

Other signs

- Fatigue or malaise
- Anaemia
- Skin disorders including eczema and seborrheic dermatitis
- Convulsions or seizures

Excellent sources of vitamin B6 include bell peppers, summer squash, turnip greens, shiitake mushrooms, spinach, Chicken, banana, potatoes, spinach, sunflower seeds and avocados.

***Vitamin B12***

Slide 60

The Standing Balance test is a test for vitamin B12 deficiency. Stand up straight with your eyes closed and your feet together. Lift the right foot off the floor and hold it in the air for three seconds.

If this is hard for you to keep balance, it is likely you are **vitamin B12** deficient. This is a key vitamin for the body's neurological system and is critical for your immunity.

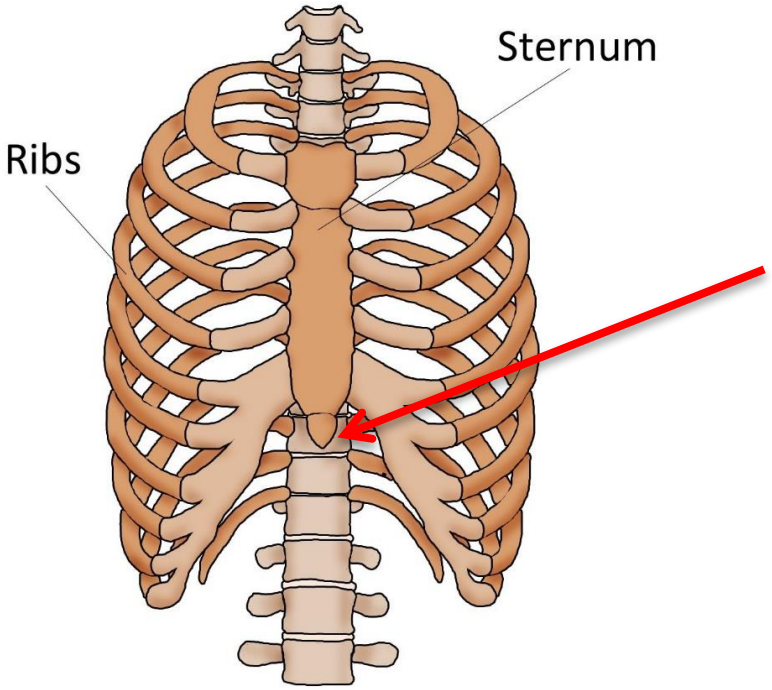
Vitamin B12 helps maintain nerve cells and red blood cells and is also essential in making the DNA found in all cells. It is brain food. Because the nutrient is found in meat, fish and dairy, vegans and vegetarians are more susceptible to vitamin B12 deficiency.

Meat sources of B12 - Chicken, Fish

Vegetarian sources - Whole grains, Cereals

***Vitamin D***

Slide 61




Are you getting enough vitamin D? You can test this at home by putting your thumb in the center of your chest, on the sternum. If you feel any pain or this is uncomfortable, that is a sign that you are vitamin D deficient.

Your body needs vitamin D to help it absorb calcium. Vitamin D helps to keep your bones growing and strong. Getting adequate amounts of vitamin D helps to prevent rickets in children and osteoporosis and osteomalacia in adults. This vitamin is also involved in the proper functioning of the nervous and immune system.

The main source of vitamin D is from natural sunlight.

Listen to your body. No one knows or understands your condition as much as you! Neither the doctor, nor the nutritionist. **You** are your best doctor because you understand yourself best!

Help yourself and your loved ones. Heal yourself!

## 6.5 Quiz Content

### 6.5.1 Food Choices Quiz - Nutrient - Which will you pick?

This is a game where 2 items are shown, and participants are expected to select the choice of food that is more nutritious. The table below illustrates three examples (one example per row) and the correct answer is highlighted in yellow.

<table>
<tr><td>Slide 63<br>  <br>Cabbage</td><td>  <br>Spinach</td></tr>
<tr><td colspan="2">Vegetable are good for you. Both the cabbage and spinach are vegetables but which vegetable has more nutrients?<br><br>Answer: Spinach. Remember to always pick fruits and vegetables that has a deeper colour. They have more nutrients. Write scores for each group of students on board.</td></tr>
<tr><td>Slide 64<br>  <br>Tomato</td><td>  <br>Tomato without Skin</td></tr>
<tr><td colspan="2">Both are tomatoes. Which tomato has more nutrient? Tomato with skin our without?<br><br>Answer: With Skin. The skin of vegetables and some fruits contain nutrients. Always try to</td></tr>
</table>

eat the skin so that your body can get as much nutrients as possible. I noticed that many of the students pick out the skin and pick out the vegetables from the breakfast and lunch rice with sambar. Do not waste the nutrients.

Slide 65

**Candies**

**Nuts**

Which is a better snack?

Answer: **Nuts.** It has nutrients and protein. The main ingredient in candies is **sugar**. What does sugar do to your immune system? It lowers it!

## 6.5.2 Food Choices Quiz – Which is Healthier?

This is a similar game to 6.5.1 Food Choices Quiz - Nutrient - Which will you pick? The three examples are displayed in the table beneath.

| | |
|---|---|
| Slide 66 | |
|  |  |
| **Fried Fish** | **Fish Curry** |
| Hmmm… delicious fish! A rare treat! Which cooking method is healthier? Deep frying or boiling?<br><br>Answer: **Boiling.** Deep frying kills all nutrients and is cancer causing. Make sure your vegetables are not overcooked. Look at the vegetables in the fish curry. It still has good colour i.e. lots of nutrients. Do not overcook your food. It destroys nutrients. | |
| Slide 67 | |
|  |  |
| **French Fries** | **Potato Chaat Masala** |
| Which potato dish is healthier?<br><br>Answer: **Potato Chaat Masala.** Plus point: spices and herbs contain loads of nutrients. | |

Slide 68

**Stir-fried Beans**

**Stir-fried Mixed Vegetables**

Both vegetables dishes are stir-fried. Which has more nutrients?

Answer: **Mixed vegetables.** Always remember to eat vegetables of as many different colours as possible so that you can get a broad spectrum of nutrients.

Slide 69

**Red Cargo Rice**

**White Rice**

Which rice is healthier?

Answer: **Red cargo rice.** It has vitamin B and fibre. It can help generate the iron your body needs. Always choose wholegrains over white as much as possible.

Total the score for each team. Give the winning team a big round of applause! Encourage the other teams as well.

**ACTIVITY TITLE: CARING FOR THE SICK**

Objectives:

a) To gain a better understanding of the symptoms of common ailments.

b) To gain a better appreciation for the need to build up their immunity system.

c) To identify remedies to treat common ailments.

Summary of Activity:

| |
|---|
| Using role playing, students will be asked to identify the appropriate remedy for the common ailment that is being acted out by the fellow student. |

Materials required:

a. Salt
b. Lemon or Lime
c. Basil leaves
d. Black Pepper
e. Garlic
f. Fenugreek seeds
g. Turmeric powder
h. Banana
i. Curd
j. Ginger
k. Fennel
l. White cumin seeds
m. Aloe vera

Conduct of Activity:

**1. Introduction (10 mins):**

Teacher to introduce the importance of remedies and how these simple cost-saving methods can make someone who is sick feel better.

**2. Identifying common ailments & applying the appropriate treatment (30 mins):**

a. Sore throat
b. Cough
c. Cold
d. Fever
e. Diarrhea
f. Skin Infection

Teacher is to have a volunteer to role play the symptoms of a common ailment and with help of the class, apply the appropriate remedy. **Note: The method of application is just as important as the item used, please ensure the student understands the appropriate method of application.**

**3. Conclusion (10 mins):**

Teacher is to re-emphasize the importance of remedies and recap on the appropriate remedies. However, in times of doubt or when the person does not get better, it is important to refer the person to a certified doctor.

**ACTIVITY TITLE:**

Objectives:

a)

b)

c)

Summary of Activity:

Materials required:

a.

b.

c.

d.

e.

Conduct of Activity:

*Notes*

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