Edible School Garden in India

To educate Students about proper nutrition intake by growing vegetables in a school garden

Tag Words: edible school garden; India; nutrition; education

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Summary:

Malnutrition is the condition, which occurs when your body does not get enough nutrients. Nutrition is the supply of material food which is necessary for organisms to stay alive. Malnutrition occurs in people who are either undernourished or overnourished. India is second after Bangladesh where children suffering from the malnutrition. There are 90% undernourished children are living in the developing country and the India is one of them. For normal growth and development vitamins and minerals are important. To overcome from this problem, Malnutrition may develop from even lacking of a single vitamin in diet. Eating well and balanced diet is vital for healthy life but in the developing countries people do not eat healthy due to lack of education regarding nutrition. To provide education on nutrition, school is the best place to start. The edible garden in the school, provide education and nutrition to children who suffer in India.

http://www.youtube.com/watch?v=ILgyofR-gjA

Malnutrition:

Malnutrition is the condition, which occurs when your body does not get enough nutrients. Underweight among the children is amongst the highest in the world. Undernutrition is found in rural areas and is concentrated relatively in small number of districts and villages of all underweight children. Nutrition is the supply of material food necessary for organisms to stay alive. Individuals are suffer from undernutrition on their diet will not have adequate protein and calories however which is necessary for growth. For normal growth and development vitamins and minerals are important. Intake of vitamins and minerals from the food consume every day.

Malnutrition continues to be a significant problem all over the world, especially in the developing countries’ children. According to World Bank, India is second developing country after Bangladesh where children suffering from the malnutrition. Malnutrition may develop from even lacking of a single vitamin in the diet. Eating well and balanced diet is
vital for healthy life but in the developing countries people do not eat healthy due to lack of education regarding nutrition. The proper education helps to prevent most forms of malnutrition. People are not aware of what to eat for healthy life. For example, what kinds of vitamins are necessary for body on daily basis? What are the sources to get enough vitamins? What will be the cause of insufficient vitamins? Some time resources are there but lack of awareness or education people from developing countries are suffering of malnutrition. Nutrition education is a key for developing the skills and motivation needed to eat healthy.

**Vitamins**

Vitamins play major role for optimal growth. Body requires certain amount of each vitamin every day to process all metabolic activates in body. To supply sufficient vitamins a balanced diet is required. Vitamin A, B, C, D, E, and K play important role in daily life diet. The lacking of essential vitamin interrupts growth of organs and tissue.

**Vitamin A:**

There are three forms of vitamins A are retinol and beta-carotene and carotenoids. Retinol is required for the photoreceptor pigment in the retina. Vitamin A is also helps to maintain the epithelial tissue. Vitamin A is the fat soluble vitamins so liver store about 80 to 90 % of the vitamin A.

**Deficiency of Vitamin A:**

Vitamin A deficiency is a public health problem in more than half of all countries. The Africa and south East Asia are facing this problem in the young children. The absence of vitamin A cause high risk of disease and death. Vitamin A deficiency can result from inadequate intake and liver disorders.

The blindness in developing countries is due to vitamin A deficiency. Deficiency of vitamin A impairs immunity and causes skin rashes. The primary vitamin A deficiency caused by dietary deprivation. The primary deficiency leads to blindness among young children in the developing countries. The secondary vitamin A deficiency is due to carotenoids or unable to store, transport or absorption. Unable to absorption or storage of vitamin A is likely in sprue, cystic fibrosis, pancreatic insufficiency, duodenal bypass, chronic diarrhea, bile duct obstruction, giardiasis, and cirrhosis. The vitamin A deficiency also causes childhood infections as diarrheal disease and measles.

**Prevention of vitamin A:**

Retinol is the naturally found in animal products and Beta-carotene is found in bright color fruit and vegetables, such as carrots. The vitamin A deficiency people should intake vitamin A rich food.
The vitamin A rich foods are sweet potatoes, carrots, mango, spinach, cantaloupe, dried apricot, milk, egg yolks and cheese, red pepper, dark leafy green vegetables, butternut squash, dried herbs, and lettuce.

http://www.merckmanuals.com/professional/nutritional_disorders/vitamin_deficiency_dependency_and_toxicity/vitamin_a.html

Vitamin B:

Vitamin B1 also known as thiamine or thio-vitamin is water-soluble. If Vitamin B1 is not present in the diet it has neurological effects. It is also involved in many cellular processes. Almost all the living organism uses Vitamin B1 in their body, although it is only synthesized in bacteria, plants and fungi. All the animals should obtain it from their daily diet. If the intake of the Vitamin B1 is insufficient it results in a disease called beriberi affecting cardiovascular system and peripheral nervous system, and the outcome can be fatal if not cured. If the deficiency is less severe, this is result into confusion, irritability and weight loss. Vitamin B1 is found in some of the foods such as potatoes, oranges, and mango, watermelon, cauliflower and sunflower seeds.

Vitamin B2 also known as Riboflavin is also water-soluble. Vitamin B2 works as an antioxidant by fighting against the particles in body known as free radicals. Vitamin B2 is required for our body to change Vitamin B6 into forms it can use. Vitamin B2 plays an important role for body growth and red blood cells production. Along with other nutrients Vitamin B2 is very important for normal vision. Vitamin B2 prevents the damage to the eye lens, which can lead to cloudy vision. Vitamin B2 deficiency includes digestive problems, slowed growth, eye fatigue, swollen and sore throat, and increase sensitivity to sunlight. Vitamin B2 food sources are broccoli, Spinach, Soybeans, almonds, and whole grains.

Vitamin B3 also known as niacin, and it has two forms niacinamide and inositol hexanicotinate. Vitamin B3 helps body to make various hormones in adrenal glands and other body parts, which are related to sex and stress. Vitamin B3 also maintains the blood circulation. Niacin is also used to keep the lower elevated cholesterol and triglyceride levels in the blood. Vitamin B3 need for body could be meet through daily diet. Vitamin B3 deficiency is very rare in developed countries. The main reason for deficiency in these countries is due to alcoholism. Deficiency of Vitamin B3 includes vomiting, indigestion, and depression, burning in the mouth, scaly skin, diarrhea, and fatigue. At a very high dose of Vitamin B3 can be toxic for the body. The food sources for Vitamin B3 are beets, peanuts, sunflower seeds, potatoes, corn, mango, dates, and lychee.

http://www.umm.edu/altmed/articles/vitamin-b1-000333.htm
http://www.umm.edu/altmed/articles/vitamin-b2-000334.htm
http://www.umm.edu/altmed/articles/vitamin-b3-000335.htm
Vitamin B5 is also known as pantothenic acid. Vitamin B5 plays an important role in maintaining a healthy digestive tract and helps the body to consume other vitamins specially Vitamin B2. Vitamin B5 is sometime known as anti-stress vitamin, but there is no firm evidence for helping the body to overcome the stress. Human body needs Vitamin B5 to synthesize cholesterol. Pantethine a derivative of pantothenic acid is in studies to see if it may lower cholesterol levels in human body. Deficiency of Vitamin B5 is very rare, but deficiency of Vitamin B5 includes depression, vomiting, stomach pains and respiratory infection. Vitamin B5 food sources are corn, broccoli, cauliflower, avocado, split peas, soybean, tomatoes, and sweet potatoes.

Vitamin B6 is also known as pyridoxine. Vitamin B6 is very important to keep the nervous system function properly. Vitamin B6 forms several neurotransmitters and chemicals, which carry signals from one nerve cell to another. Vitamin B6 is very important for brain growth and function. It also forms hormones serotonin and norepinephrine, which influence mood. The body clock is regulated by melatonin hormone, which is also formed by help of Vitamin B6. Vitamin B6 along with vitamins B12 and B9 controls levels of homocysteine in blood. Human body requires Vitamin B6 to absorb Vitamin B12 and to form red blood cells and cells of the immune system. Significant deficiency of Vitamin B6 is rare, but some deficiency can be found in children and elderly people. Serious deficiency includes nervousness, depression, short-term memory loss, muscle weakness and depression. Vitamin B6 food sources are Broccoli, Corn, Green Pepper, Beans, Potatoes, Mango, Grapes, and Watermelon.

Vitamin B9 also know as folic acid, which plays very important role in nervous system functions. Vitamin B9 is found in fortified food and supplements. Vitamin B9 is very crucial for brain function and plays an important role in mental and emotional health. Vitamin B9 is important in production of DNA and RNA, which is body’s genetic material. Vitamin B9 helps in growing the cells and tissues very rapidly, such as in pregnancy, infancy, and adolescence. Folic acid along with Vitamin B12 helps make red blood cells and make iron in our body work properly. It is very common to have low level of Vitamin B9 in the body. Deficiency of Vitamin B9 includes loss of appetite, poor growth, and shortness of breath, forgetfulness, and mental sluggishness. Vitamin B9 food sources are spinach, root vegetables, beans, orange, avocado, and whole grains.

http://www.umm.edu/altmed/articles/vitamin-b5-000336.htm
http://ods.od.nih.gov/factsheets/vitaminb6
http://www.umm.edu/altmed/articles/vitamin-b6-000337.htm
http://www.umm.edu/altmed/articles/vitamin-b9-000338.htm
http://www.lifeclinic.com/focus/nutrition/folic-acid.asp

Vitamin C

Vitamin C also known as ascorbic acid is very necessary for growth and development, and it is water-soluble. Vitamin C is needed to repair tissues in all parts of body. Important protein is formed out of Vitamin C, which is used to make ligament, skin, and blood vessels. It is also one of many antioxidants, which help to block some of the damage caused by free radicals. Radicals are made when food breaks down in our body or when body is exposed to radiation or
tobacco smoke. These free radicals are building up over time and are responsible for aging. Also free radicals are responsible in cancer, arthritis and for heart disease.

Human body cannot generate Vitamin C on its own neither it can store vitamin c. Therefore it is very important to include food containing plenty of Vitamin C in your daily diet. For very long time Vitamin C is remedy for common cold, but some researches shows Vitamin C rich food or Vitamin supplements cannot reduce the risk of getting cold. By taking Vitamin C in enough quantity might help to get milder symptoms of common cold.

Vitamin C deficiency is very uncommon and which is primarily seen in malnourished adults. Extreme deficiency can lead to scurvy. High quantity of Vitamin C has very rare side effects, because it cannot be stored in body. Amount greater than 2000 mg/day is not recommended because such high quantity can cause stomach upset and diarrhea. The foods richest in vitamin C are citrus fruits, tomatoes, green peppers, potatoes, strawberries, broccoli, sweet potatoes, mango, dark leafy greens, cantaloupe, papaya, cauliflower, Brussels sprouts, red peppers, blueberries, raspberries, winter squash, watermelon, cabbage and pineapples.

http://www.webmd.com/diet/guide/the-benefits-of-vitamin-c

Vitamin E:

Vitamin E is a fat-soluble antioxidant vitamin that helps the body to defense the cell against free radicals damage within cell and organelles. Vitamin E is synthesized by plant and has eight different isoforms. Vitamin E reduces the cellular aging, inhibit the potentially damaging peroxynitrite radical, and inhibit the skin cancer melanoma’s cell growth. Vitamin E also prevents the abnormal blood clotting, protects nervous system, lungs, retina, and immune function. It reduces the risk of cancer and Alzheimer disease and lover the risk of ischemic and coronary heart disease.

Vitamin E is used with other medicines by some people for curing nervous system diseases including Alzheimer’s, night cramps, Parkinson’s disease. Vitamin E used by women for preventing complication in pregnancy due to high blood pressure, also use Vitamin E for preventing painful periods, breast cancer and menopausal syndrome.

Vitamin E is also used to reduce the harmful effect from medical treatments such as radiation and dialysis. It also reduces the side effects of the drugs such as doxorubicine and amiodarone. Vitamin E helps improving physical strength and reduces muscle damage after exercise. Vitamin E contained lotions provide benefit of treating and preventing sunburns. Excessive Vitamin E intake can cause hemorrhage and interrupt blood coagulation. The daily dose of Vitamin E should not exceed 15mg, which is likely safe for most people.

Dietary sources:
tomato, sweet potatoes, Sweet Red Peppers, spinach, avocado, carrots, apricots, blackberries, asparagus, turnip greens, dandelion Greens, peaches, raspberries, collards contain vitamin E.
Seeds, nuts and oils:
Roasted sunflower seeds are extremely high in vitamin E and almonds, brazil nuts, peanuts, peanut butter and wheat bran contain vitamin E.

Vitamin E is naturally found in dark leafy greens, eggs, fish, bright orange, nuts, vegetables, seeds, and grains. The herring, margarine, vegetable oil, canola oil crustaceans, sardines, and corn oil contain vitamin E.

Fruits and vegetables:
Green and orange fruits and vegetables are particularly high in vitamin E. The mangos, papaya, oranges or orange juice are also in the vitamin E rich.

Nutrition facts in India:
There are 90 % undernourished children are living in the developing country and the India is one of them. Undernutrition declines the survival, growth and development rate of children. The 20 % of the children, under the age five suffer from the wasting because of the undernutrition live in the India. The underweight children are higher in the India than any other 40 countries and twice as high then African countries. The 43 % of the children, under age five are underweight and 48 % children are stunted because of the undernutrition.

Undernutrition is significantly higher in rural than in urban areas. In the rural area, 54% children are living with stunted than urban area, 57 % children are living with underweight than urban area and 18 % children are living with wasting. According to these results of nutritional status, the lack of proper nutrition in India is a serious problem in rural areas. In other words, half of young children are stunted, almost half are underweight, and one out of five children is wasted in rural areas. The level of malnutrition in India is very high therefore more than 54 % of all deaths before age five due to malnutrition in the India.

Causes of undernutrition in India
First of all, parents are undernourished and lack the education regarding nutrition. In the result, their Childs also lack the nutrition and they are underweight. The low economic status and development also cause the undernutrition.

Lack of education:
The children who are severely underweight are almost 5 times higher whose mothers have no education about nutrition. Thirty-six percent of women and 34 percent of men are undernourished meaning parents lack the education about nutrition. In result, low birth weight
babies per year at an estimated 7.4 million suffer highest in the India. Parents do not have any background about nutrition meaning what to eat and what not to eat for good health. In the rural area, students do not gain the education regarding nutrition at all. The children who lack the education on nutrition under age five suffer from the stunted, underweight and Wasted. The 57% children are stunted, 23% children are wasted and 52% children are underweight who lacks the education on nutrition.

Undernutrition is often an unseen problem so prevent undernutrition by taking care of the nutrition of children in the rural area especially in the developing countries like India. In order to reach optimal growth, development and best chance to survive education regarding nutrition plays important role. The lack of children’s survival, health, growth and development will interrupt the nation future.

Child Nutrition in India, National Family Health Survey Subject Reports by Vinod K. Mishra, Subrata Lahiri, and Norman Y. Luther.
http://www.unicef.org/india/nutrition.html
Nutrition in India, Ministry of Health and Family Welfare Government of India

The most of the vitamin such as A, B, C, D, E, and K found the in the vegetables and fruits. Intake of the vitamin rich fruits and vegetable prevents the malnutrition in the children who are suffering.

Fruits growth in India:

After China India is the second largest producer of fruits with a production of approximately 44.04 million tons. Very large number of fruits can be grown in India, which includes mango, grapes, pineapple, apple, banana, guava, and citrus these are the major fruits growing in India. Other fruits like pomegranate, papaya, peach, jackfruit, and strawberry, which are grown in different parts of India, depend on the temperature. Fruits are grown throughout the country, but the major states for fruit production are Gujarat, Maharashtra, Karnataka, Bihar, Tamil Nadu, Uttar Pradesh, and Andhra Pradesh.
One of the most important fruit grown in India is Mango, which covers 35% of area and accounting of 22% total production of total fruits in the country. It is also the highest in the world with share of approximately 54%. Banana is the second, which covers about 13% of the total area of the land used to grow fruits. So these fruits can be easily grown in India, because the atmosphere is very suitable to grow these fruits.

**Vegetable growth in India**

In India more than forty kinds of vegetables can be grown. Vegetables are grown in three different categories, which are underground vegetables, fruit vegetables, and herbage vegetable. Underground vegetables are the vegetables, which grow below ground such as beetroot, carrot, potato, sweet potato, and onion. Herbage vegetables are the vegetables, which are also considered as leafy vegetables such as spinach, cabbage, cauliflower, lettuce, beans and broccoli. Fruit vegetables are the vegetables which are juicy that is why they are considered as fruit vegetables, some of the vegetables are tomato, eggplant, peppers, chili, and okra. All these vegetables can be grown in India, because weather is suitable to grow them easily.

Out of all these vegetables potato, tomato, eggplant and cabbage are the vegetables widely grown in different parts of the country. These four vegetables has different kind of varieties depends on where it is grown. The other important vegetables grown in the country are onion, peas, beans, cauliflower, pumpkin, cucumber, carrot and radish.

http://agricoop.nic.in/hort/hortrevo5.htm
http://www1.ximb.ac.in/users/fac/Niraj/niraj.nsf/23e5e39594c064ee852564ae004fa010/f781dced795fl75c6525711a001e3ae0/$FILE/Vegetable%20Growing.pdf
Climate of Gujarat

The climate of Gujarat state varies from seasons to seasons. In the southern region of the state the climate is moist and in the northern region. The temperature reduces because of Arabian Sea and the Gulf of Cambay, which makes the climate more pleasant and healthy. The year is divided into four seasons: from November to February is winter season with the average temperature variance from 14°C to 29°C, from March to May is summer with the average temperature variance from 27°C to 42°C, from June to September is monsoon season with about average rainfall of 28 inches, and the month of October is considered autumn also known as fall. The tropic of cancer passes through the northern border of the state, which affects the state to have an intensely hot or cold climate. The Arabian Sea and Gulf of Cambay in the west and the forest-covered hills in the east keeps the climate in control.

In the Gujarat, the vegetables such as tomato, eggplant, cabbage, onion, potato, peas, beans, cauliflower, cucumber, carrot, radish, okra and lettuce can grow.

http://www.webindia123.com/GUJARAT/LAND/climate.htm
http://www.whereincity.com/india/gujrat/weather.php

Letter to the Editor:

Send to Home News Tribune

To whom it may concern,

I am student of Rutgers University. I am working on one project; edible garden in the India. There are 90 % undernourished children are living in the developing country and the India is one of them. Undernutrition declines the survival, growth and development rate of children. In rural areas, half of young children are stunted, almost half are underweight, and one out of five children is wasted. Children in India lack the education regarding nutrition and Poverty is also one of the factors for the poor nutrition. Individuals are suffer from undernutrition on their diet will not have adequate protein and calories however which is necessary for growth. For normal growth and development vitamins and minerals are important; which can consume from food every day they eat.

The children who are severely underweight are almost five times higher whose mothers have no education about nutrition. Thirty-six percent of women and 34 percent of men are undernourished meaning parents lack the education about nutrition. Therefore parents are uneducated, which results in to lack of education in their children. That is why I would like to provide those children some proper education regarding nutrition.

I will be sending some useful resources such as seeds of vegetables, fruits and with proper guidance to plant them. By doing this project I will be able to educate those children and they will spread it out further.
Service Project:

The service project is focusing on the nutrition education in the developing country which is India. India is one of the highest percentages of undernourished children lived in the world so I chose this developing country to spared awareness or education regarding malnutrition. First I wrote the letter to the primary school principal that I would like to do edible garden in the school. I ask the permission to do the garden. I also mention that, doing garden in the school is very beneficial for children because children will learn how to grow plant. When the vegetables or fruits are ready then they can take home and their whole family can eat fruits or cook the vegetable. Intake of the vegetables and fruits will provide the malnutrition what they lack in their diet. The school professor agreed with my little project. In the school, they have 6 X 16 plots available to do garden. Then I start searching the seed to send India. I went to couples of the nursery to get the seed. The nursery in the Middlesex, they gave me seed on half price. I really appreciate for that. I bought the tomato, eggplant, cabbage, onion, peas, beans, cauliflower, cucumber, carrot, radish, okra and lettuce. I have sent these seeds and small manual on how to grow the seed in garden.

Cover letter:

Prathmik vidhyalaya
Rampara, unjha 384170
Gujarat, India

To Principle Mulchand Bhai Patel,

I am student of Rutgers University USA. I am doing little project of edible school garden in the India. Malnutrition continues to be a significant problem all over the world, especially in the developing countries’ children. India is second developing country after Bangladesh where children suffering from the malnutrition. There are 90 % undernourished children are living in the developing country and the India is one of them. Undernutrition declines the survival, growth and development rate of children. The children who lack the education on nutrition under age five suffer from the stunted, underweight and Wasted. The 57 % children are stunted, 23 % children are wasted and 52% children are underweight who lacks the education on nutrition. I would like to help these children to improve their diet. I am sending the seeds which can be grown in the school garden by the help of the children. When it is time to watering the plant, children can do after the school. As I know, school in the India does not have the extra curriculum activity or any club. So you can also start the environmental and health club, where student also watering, and maintain the plant. When the vegetable are ready children can harvest it and take it home and give their mother to cook. From this your community will be beneficial. Most of the essential vitamin can be provided by eating the vegetable and fruit. I hope this project work out and beneficial to the children and their family. The following direction will help to grow the seeds.

To grow the seeds, soil need to be porous. First dig soil up to two inches in the area for gardening. Then let the soil sit for two days under the sun. This will make soil oxygenated and accelerates naturally growing bacteria and fungi to grow, which will help plants to grow faster. Digging soil will soften the soil so plants route can be easily spread in the soil.
Okra: Sow seeds after frost have passed. Plant seeds 2" apart and ½" deep. Okra only grows in the hot weather because it cannot tolerate the cold.

Onion: first sow seeds in small container indoor 4 weeks before planning outdoor. Plant ¼" deep. Onion grows in the spring.

Beans: Sow seeds after frost have passed. Beans flourish in hot temperatures. Plant seeds 1" deep in soil. It takes 7-18 days to germinate.

Lettuce: Sow seeds in the spring, and best grown in cooler or sunny weather. Plant lettuce seeds ¼" deep. This Seed takes 7-14 days to germinate.

Eggplant: First sow seeds indoors 8 weeks before in the small container. Then grow outdoor in the full sun. Plant ¼" deep. Eggplant Seeds will germinate in 14 days.

Cucumbers: First sow seeds indoors 3-4 weeks before in the small container. Then grow out door in the full sun. Plants seeds 1" deep. Best grow in the full sun. This plant needs support.

Cauliflower: First sow seeds indoors 4-6 weeks before in the small container. Plant ¼" deep. These Seeds will germinate in 4-9 days after plant. Cauliflower can grow in full sun, cool temperatures. It need more water.

Cabbage: First sow seeds indoors 4-6 weeks before in the small container. Need to Plant ¼" deep in soil. It takes 7 to 12 days to germinate. Then plant out door and preferred the full sun and lots of water.

Peppers: First sow seeds indoors 8 weeks before in the small container. Sow seeds ¼" deep. It takes 12 to 14 days to germinate. Peppers can be growing in full sun.

Radish: This seed best grow in the spring. Plant seeds ½" deep.

Tomato: First sow seeds indoors 6 weeks before in the small container. It takes 7 days to germinate. Plant ¼" deep. This seed best grow in the full sun.

School gardening will need an involvement of faculty member and a small group of students. The seeds that I am sending you will grow to provide students vitamin rich vegetables. This will help your school students to have real experience with planting and importance of healthy nutrition. Gardening has been shown to increase students’ Self-esteem, help students develop a sense of ownership and responsibility, and how to choose healthy diet. Gardening will help students learn about planting vegetables and students tend to learn more and better when they are actively involved in an activity.

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