Flipbook

FORTIFICATION OF THE MID-DAY MEAL PROJECT

A resource book initiated by the combined efforts of United Nations World Food Programme and Department of School & Mass Education, Government of Odisha for the teachers, School Management Committee Members students, administrators, all associates of Mid Day Meal Program and the general public.

Our mission to prevent mal-nutrition and anemia in Dhenkanal Dist.

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Mid Day Meal Scheme

WFP
World Food Programme
wfp.org

Flipbook

INSTRUCTIONS

Instructions to teachers on the use of the flip book how and when?

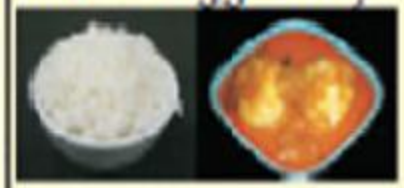
HOW?

- Please go through the module (provided at the school point) before explaining the contents of the flip book.
- The chapters contained in the flip book is in a sequence. The pictorial pages should be directed towards the children and the subsequent content page towards the person explaining the topic.
- After the use the flip book should be displayed at the TLM (Teaching Learning Materials) corner of the school.
- The chapters contained in the flip book are self - explanatory and the figures/pictures provided need to be displayed and explained to the students.
- It is best to move through the chapters as designed and instructed. Any abrupt beginning of the chapters in-between will confuse the students and make it difficult to understand.
- Allow students to ask questions and clarify any misunderstanding wrong information or concerns.
- You may also ask the students to summarize the messages to make sure that the message were understood correctly.

WHEN?

- The flip book is to be used during the NHED(Nutrition ,Health & Education) sessions and undertaking similar classes for the students of class 1 to 8.
- During Science exhibition, World Food day and similar occasions observed at the school.

MDM MENU

Sl.	Days	Menu	Primary		Upper Primary	
			Energy (K.Cal)	Protein (in gms)	Energy (K.Cal)	Protein (in gms)
1.	Monday & Thursday	Rice & Dalma 	503.8	13.9	745.5	18.2
2.	Tuesday & Friday	Rice & Soya Curry 	470.8	14.09	719.5	25.12
3.	Wednesday & Saturday	Rice & Egg Curry 	506.3	14.29	721.0	18.3

Fortification of the Mid-Day-Meal Project

Fortification of Mid-Day-Meals

To boost enrolment in schools, and simultaneously address the problem of malnutrition among school children, the Government of India launched the National Programme of Nutritional Support to Primary Education, popularly known as Mid-Day Meal Programme (MDM). Currently, the program provides for a cooked meal with a minimum of 450 and 700 calories, to be given to all primary and upper primary stage children respectively in government, local body and government aided schools, and alternative education centers.

Odisha is a nutritionally vulnerable State with high levels of micronutrient malnutrition. Government is therefore strengthening implementation of its Midday Meal (MDM) Programme, to address the nutrition and health problems of school children aged 6-14 years.

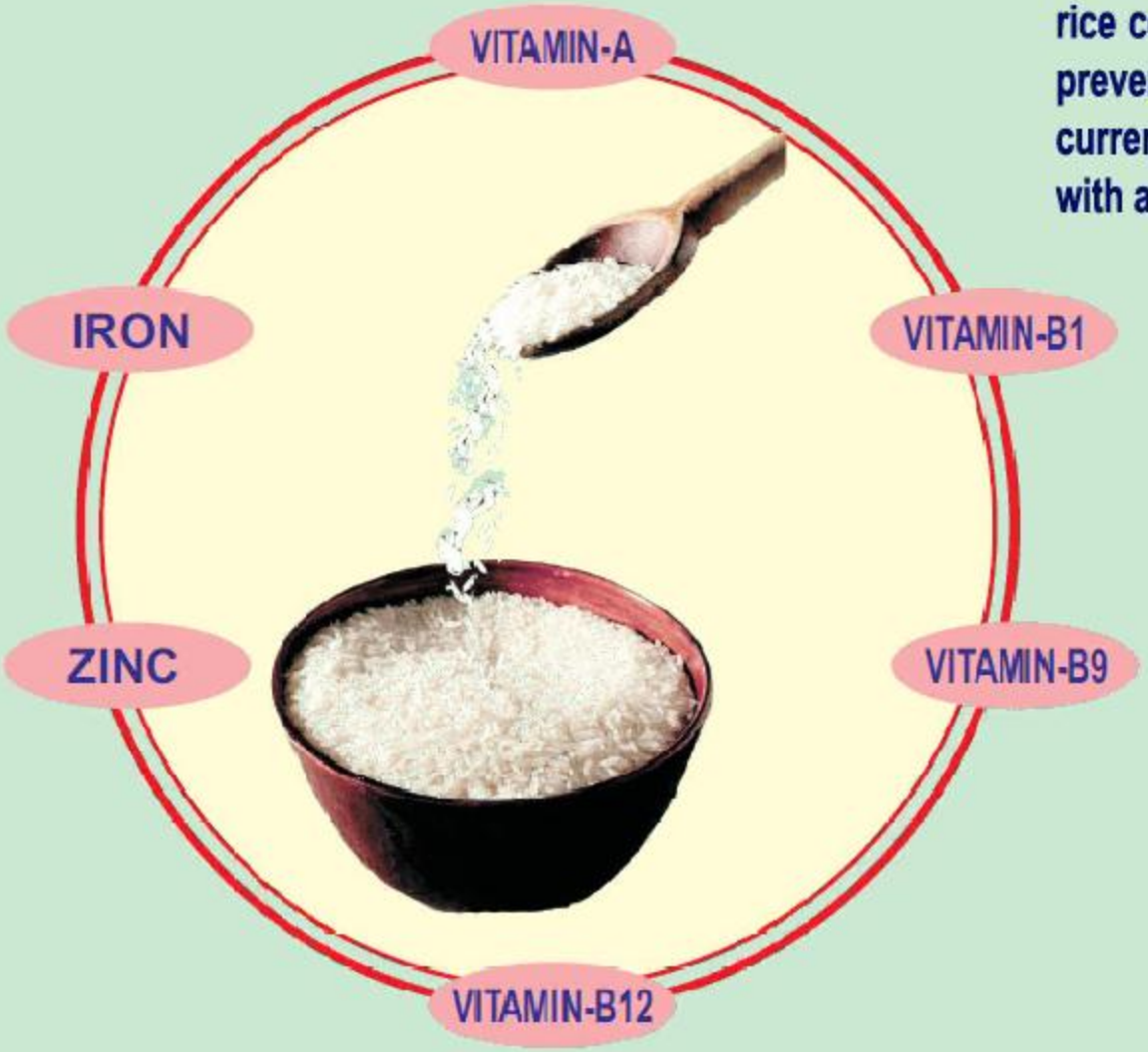
United Nations World Food Programme (WFP), as part of its effort for eradicating hunger worldwide, has been supporting the Department of School & Mass Education, Government of Odisha (GoO) to address specific gaps in the nutritional status of school going children through enhancement of nutritional value of the food served in MDM.

WFP in partnership with Government of Odisha implemented a pilot project for the fortification of rice used in the MDM in Gajapati district, Odisha. After successful implementationand with significant outcome of the project over a period of 3years, WFP handed over it to Government of Odisha on 31stOctober 2015. Government of Odisha has been sustaining the project at their own resources.

This year GoO and WFP has entered into a partnership for implementation of the fortification of MDM in Dhenkanal district by using multi-micronutrient fortificant. Fortification of school meals is the most efficient and effective route in alleviating micronutrient deficiencies in school children. Two major alternatives adopted are fortification of rice and introduction of Micro-Nutrient Powder in the Mid-Day-Meal Programme.

Fortification of the Mid-Day-Meal Project

Fortification of Mid-Day-Meals



Rice fortification is simpler and easier process where fortified rice kernel (FRK) can be blended with regular rice centrally and serve to the school going children to prevent themselves from anemia and malnutrition. In current project FRK will be blended with normal FCI rice with a proportion of 1: 100 respectively.

The National Institute of Nutrition (NIN) is a part of Technical Advisory Group (TAG) for the project. The NIN approved micronutrient composition for the project is as follow:

Nutrient	Fortified rice served to children between 11-14 years of age (Upper primary school children)	Fortified rice served to children between 06-10 years of age (Primary school children)
Iron	18 mg	12 mg
Zinc	8 mg	5.33 mg
Vitamin A	300 µg	200 µg
Vitamin B12	0.5 µg	0.33 µg
Folic Acid	75 µg	50 µg
Thiamine	0.7 mg	0.46 mg

Balance diet promotes sound health and psycho social wellbeing

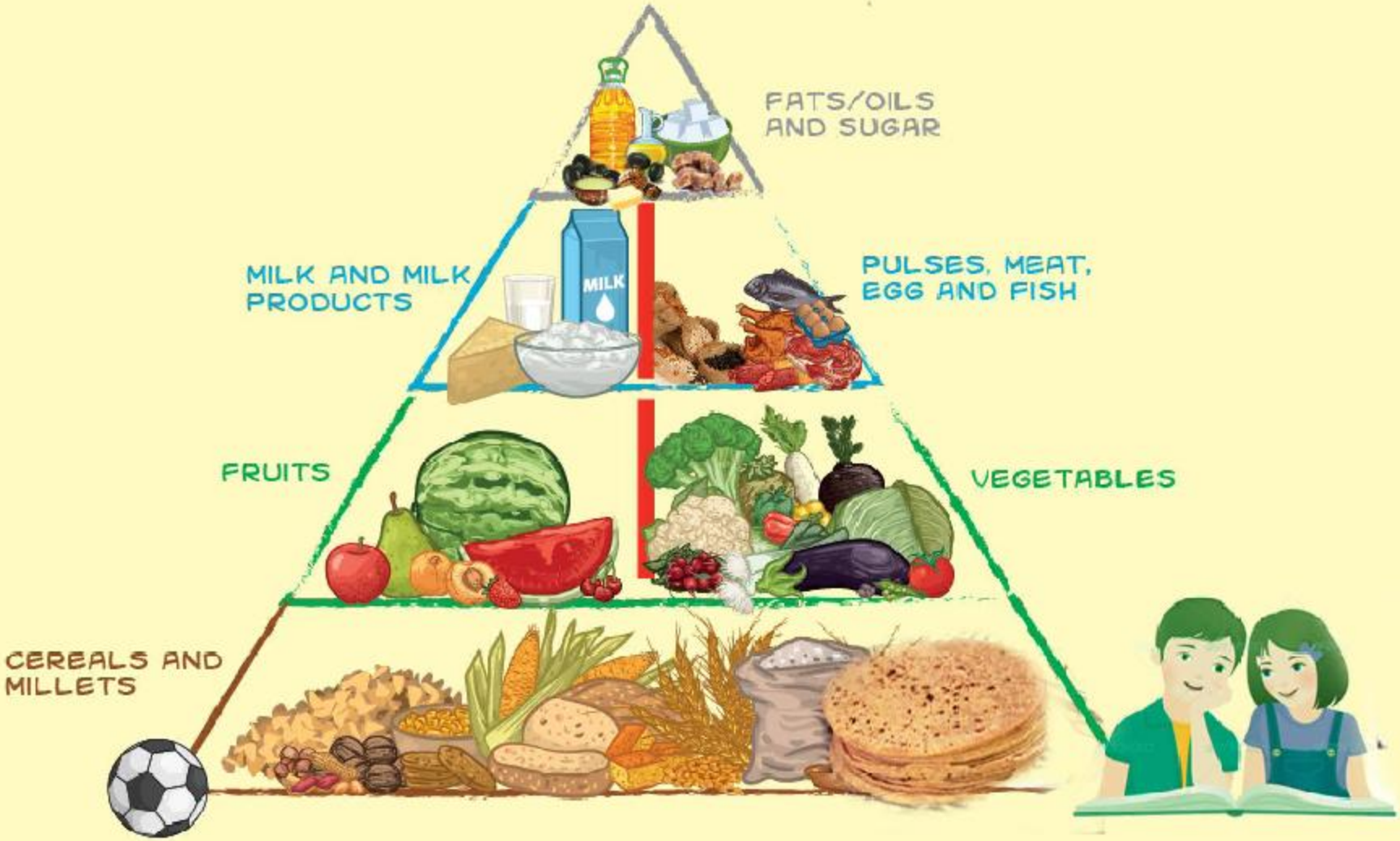
NUTRITION & NUTRIENTS

Nutrition is the intake of food, considered in relation to the body's dietary needs (WHO). The essential nutrients for life include carbohydrates, proteins, fats, as well as fibre, vitamins, minerals, and water. Good nutrition means getting the right amount of nutrients from healthy foods in the right combinations. Having proper nutrition knowledge can help us achieve optimum health. Nutrition is key to developing and maintaining good health. Nutrition is the science or practice of consuming and utilizing foods. It is our source for energy.

It is particularly concerned with identifying those nutrients and substances in foods that foster the development of a strong body and promote good health. It is mainly needed for the proper growth, maintenance and development of our body. Our body is made of cores of cells, the adequate nourishment of these cells is of immense importance to lead a healthy and productive life.

The school going children as they go through rapid growth process need adequate amount of nutrients in right combinations. Good health is defined as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity (WHO).

Fortification of the Mid-Day-Meal Project



CLASSES OF NUTRIENTS

Macro-nutrients

These nutrient classes can be categorized as under: (i) Macronutrients (needed in relatively large amounts): These are proteins, fats and carbohydrates which are often "proximate principles" because they form the main bulk of food.

Types	Source	Role
Carbohydrates	Rice, Roti/ Chapati, Potato, Sugar, etc.	The role of carbohydrates is to provide energy, as they are the body's main source of fuel, needed for physical activity, brain function and operation of the organs. All the cells and tissues in your body need carbohydrates, and they are also important for intestinal health and waste elimination
Proteins	Dal, Fish, Meat, Egg, milk, etc.	Proteins are used for growth and repair of tissues. They are needed for formation of Enzymes which act as catalyst for many processes in the body. Proteins also form hormones, which transport chemical messages between tissues and organs. Proteins are also important building blocks of bone, cartilage, muscle, skin, and blood
Fat	Nuts and seeds, plant oils like Coconut, Mustard, butter, ghee, Til, Groundnut, etc.	Fats act as a backup source of energy when carbohydrates are not available. Fat is an essential part of the diet. It provides energy, absorbs certain nutrients and maintains core body temperature

CLASSES OF NUTRIENTS

Chapati

Rice

Patato

Carbohydrates

Pulses

Soya

Meat, Fish, Egg

Proteins

OIL

Ghee

Cheese

Fat

Fortification of the Mid-Day-Meal Project

Micronutrients

Micronutrients (needed in smaller quantities): These are vitamins and minerals. They are called micronutrients because they are required in small quantity which may vary from a fraction of a milligram to several grams but they are equally most important for the body growth and development.

Sl. No	Name of the Micronutrient	Natural Source	Deficiency Disease caused by their absence
1	Calcium	Milk, Yogurt and cheese	Osteoporosis
2.	Iron	Heme Sources- meat, fish and poultry Non-heme sources- Green leafy vegetables, beans, peas and lentils	Iron deficiency Anemia
3.	Zinc	Oysters, red meat and poultry, beans, nuts	Growth retardation, loss of appetite and impaired immune function, delayed sexual maturation, importance.
4.	Vitamin A	Pumpkin, Carrots, Papaya	Night blindness, Xeropthaimia.
5.	Thiamine	Whole grains, nuts, meat, fruit and vegetable	Beri-Beri, weight loss and anorexia, confusion, short term memory loss.
6.	Riboflavin	Milk, egg, rice, fortified breakfast cereals, liver, legumes, mushrooms and green vegetable.	Ariboflavinosis, cracks or sores on the outsides of the lips (cheliosis) and at the corners of the mouth (angular stomatities), inflammation and redness of the tongue (magenta tongue)
7.	Niacin	Yeast, meat, poultry, red fish (e.g. tuna, salmon), Legumes and seeds, milk, green leafy vegetable, coffee	Three D's: dermatitis, diarrhea, and dementia.
8.	Vitamin B6	Fish, liver, fruit (other than citrus)	Dermatitis- like eruption, atrophic glossitis with ulceration, angular cheilitis, conjunctivtis, intertrigo and neurologic symptoms of somnolence, confusion and neuropathy.
9.	Vitamin C	Amla, Citrus fruits, Lemon	Scurvy : gingivitis, petechiae, rash, internal bleeding, impaired wound healing
10	Folic Acid	Dark green vegetables such as broccoli, spinach, okra, citrus and juice	Spina Bifida, Neural tube Defects, Megaloblastic Anemia, insomnia, depression and forgetfulness.
11.	Vitamin B12	Non-Vegetarian food like meat, fish, dairy and eggs, vegans are more susceptible to B12 deficiency	Pernicious anemia : nerve and brain damage, which may eventually become irreversible.
12.	Vitamin D	Mushrooms, Cheese, Fish, EGG, Soya Milk, Sunlight	Vitamin D is required to maintain normal blood levels of calcium and phosphate, that are in turn needed for the normal mineralization of bone, muscle contraction, nerve conduction. Deficiency Disease' Rickets
13.	Vitamin E	nuts such as almonds, peanuts and hazelnuts, and vegetable oils such as sunflower, wheat germ, safflower, corn and soybean oils	Vitamin E deficiency causes nerve problems due to poor conduction of electrical impulses along nerves due to changes in nerve membrane structure and function
14.	Vitamin K	Green leaves, and dark green leafy vegetables such as romaine lettuce, kale and spinach	Vitamin K1 deficiency can result in coagulopathy, a bleeding disorder. Symptoms of K1 deficiency include anemia, bruising, and bleeding of the gums or nose in both sexes, and heavy menstrual bleeding in women

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Vitamins and Minerals

Zinc: Bean

Vitamin A: Papaya

Vitamin C: Lemon

Iron: Drumstick

Vitamin D: Mushrooms

Calcium: Cheese

Vitamin E : Almond

Vitamin B12 : Meat

Vitamin K: Cabbage

Folic Acid: Spinach

Thiamine: Nuts

Vitamin B6: fish

Niacin:Legumes and seeds

Riboflavin: Egg

MALNUTRITION

The term malnutrition refers to both under nutrition and over nutrition. It Malnutrition literally means 'bad nutrition' and is a defined as the immediate outcome of insufficient food intake (hunger) and repeated infectious diseases' (UNICEF). Malnutrition is an indication of poor nutritional status. It can take a variety of forms and badly tell upon our overall health.

Malnutrition is of the following types:
Undernutrition- this can be either underweight, stunting or wasting.
Overnutrition- obesity/overweight
Micronutrient deficiency disorders

- **Underweight -** Moderate and severe - below minus two standard deviations from median weight for age of reference population; severe - below minus three standard deviations from median weight for age of reference population
- **Wasting -** Moderate and severe - below minus two standard deviations from median weight for height of reference population
- **Stunting -** Moderate and severe - below minus two standard deviations from median height for age of reference population (Source: UNICEF)

The following groups are at high risk than others

- Children aged 0–24 months
- Elderly, disabled and people with chronic diseases
- Pregnant and lactating women
- People living with HIV and AIDS

The above category of people is at high risk because of their increased nutritional requirement.

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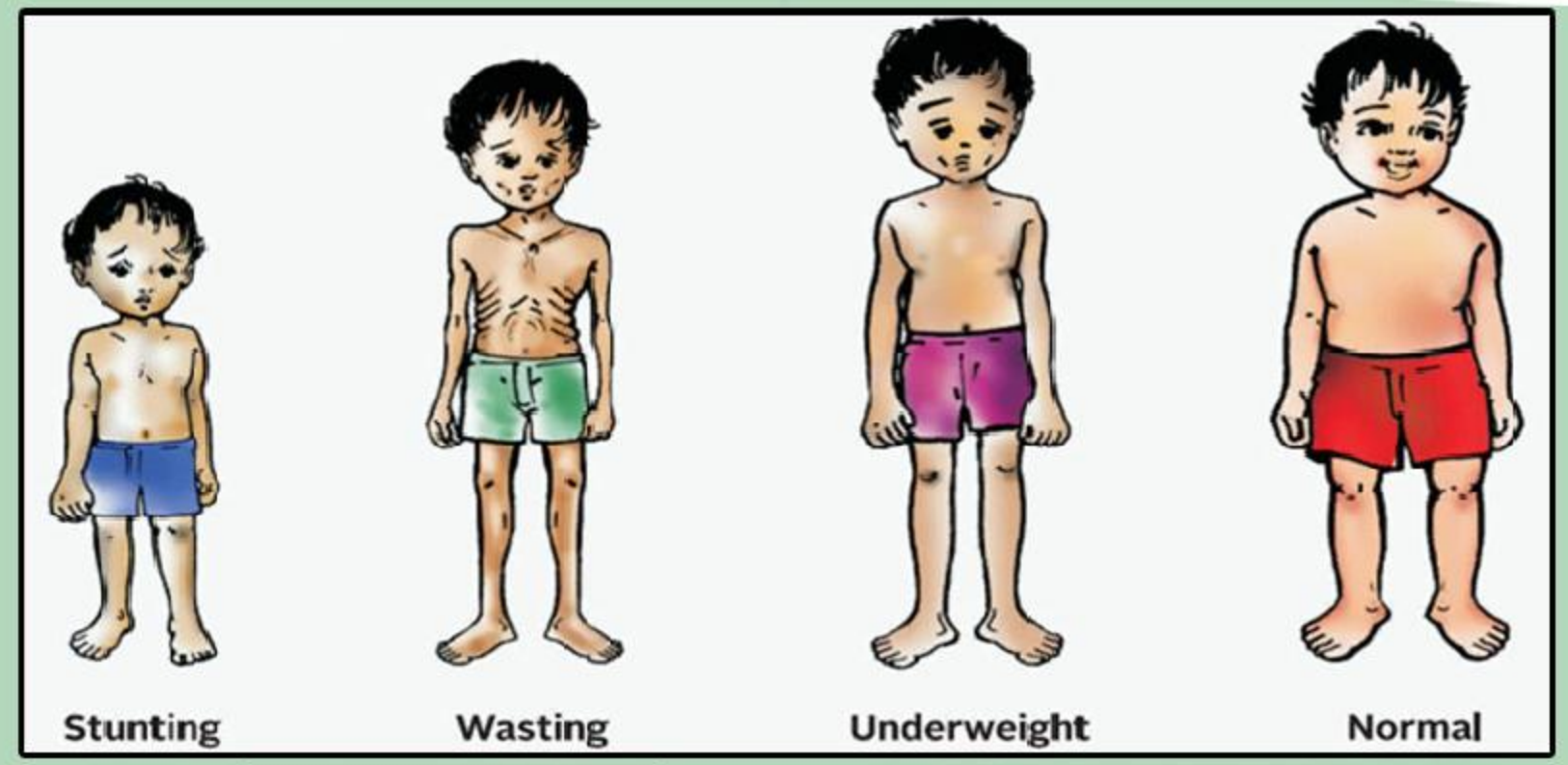

Healthy Child

Malnourished Child

Impact of Malnutrition

- **As per RSOC data, 38.7% of children in India are stunted, which means 4 out of 10 children do not get proper nutrition. Malnutrition engulfs children and lead to their death. Of all the deaths, 45% of children deaths are due to under-nutrition.**
- Lack of proper food make a child more prone to certain diseases like diarrhea, malaria, pneumonia and measles that ultimately cause the death of a child, though all these diseases are curable.
- Malnourished children experience developmental delays, weight-loss and illness as a result of inadequate intake of protein, calories and other nutrients.
- Malnourishment can greatly compromise a child's immune system, making them more susceptible to infectious diseases. In particular, zinc, iron and vitamin A are commonly associated with weakened immune function.
- Malnutrition negatively effects brain development causing delays in motor and cognitive development, such as:

Attention deficit disorder

- Impaired school performance
- Decreased IQ scores
- Memory deficiency
- Learning disabilities
- Reduced social skills
- Reduced language development
- Reduced problem-solving abilities

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Effects of Hidden Hunger Across the Life Cycle

NEWBORNS
- Low birth weight
- High Mortality
- Reduced mental development
- Often ill

CHILDREN
- Stunting
- Often ill
- Small stature
- High mortality
- Lower resilience
- Adolescents
- Stunted

ADOLESCENTS
- Stunted
- Reduced mental and physical performance
- Often ill

Increased requiremtns due to growth spurt/ menstruation.

ADULTS
- Malnourished
- Limited Productivity

PREGNANT
- High mortality
- Frequent prenatal complications
- Lower performance

Reduced mental and physical performance
Often ill

Micronutrient deficiency Disorder

Micronutrients are vitamins and minerals or chemical elements such as zinc, iron etc. These are also called micro-elements or trace elements. Dietary deficiencies of these micro nutrients represents an enormous problem of "hidden hunger." In general vitamins are needed to regulate the maintenance and growth of the body, and to control metabolic reactions in cells. Most vitamins are provided to the body through the diet, however, the body can make vitamin D, vitamin K and niacin.

The 'hidden hunger' due to micronutrient deficiency does not produce hunger as we know it. You might not feel it in the belly, but it strikes at the core of your health and vitality

Impact of Micronutrient deficiencies

Micronutrients are absolutely essential to good health. Billions of people around the world suffer from micronutrient malnutrition. People living in rural areas do not get enough micronutrients required to lead a healthy and productive lives from the foods that they eat. Micronutrient malnutrition is a serious public health concern. The micronutrient deficiencies which are of greatest public health significance include iron deficiency, vitamin A deficiency and iodine deficiency disorder. Micronutrient mal-nutrition has many adverse effects on human health. It can affect all age groups, but young children and women of reproductive age are more likely to suffer from micronutrient deficiencies. It affect a variety of health and disease outcomes: Child growth and development, maternal health, malnutrition and vulnerability to infectious diseases.

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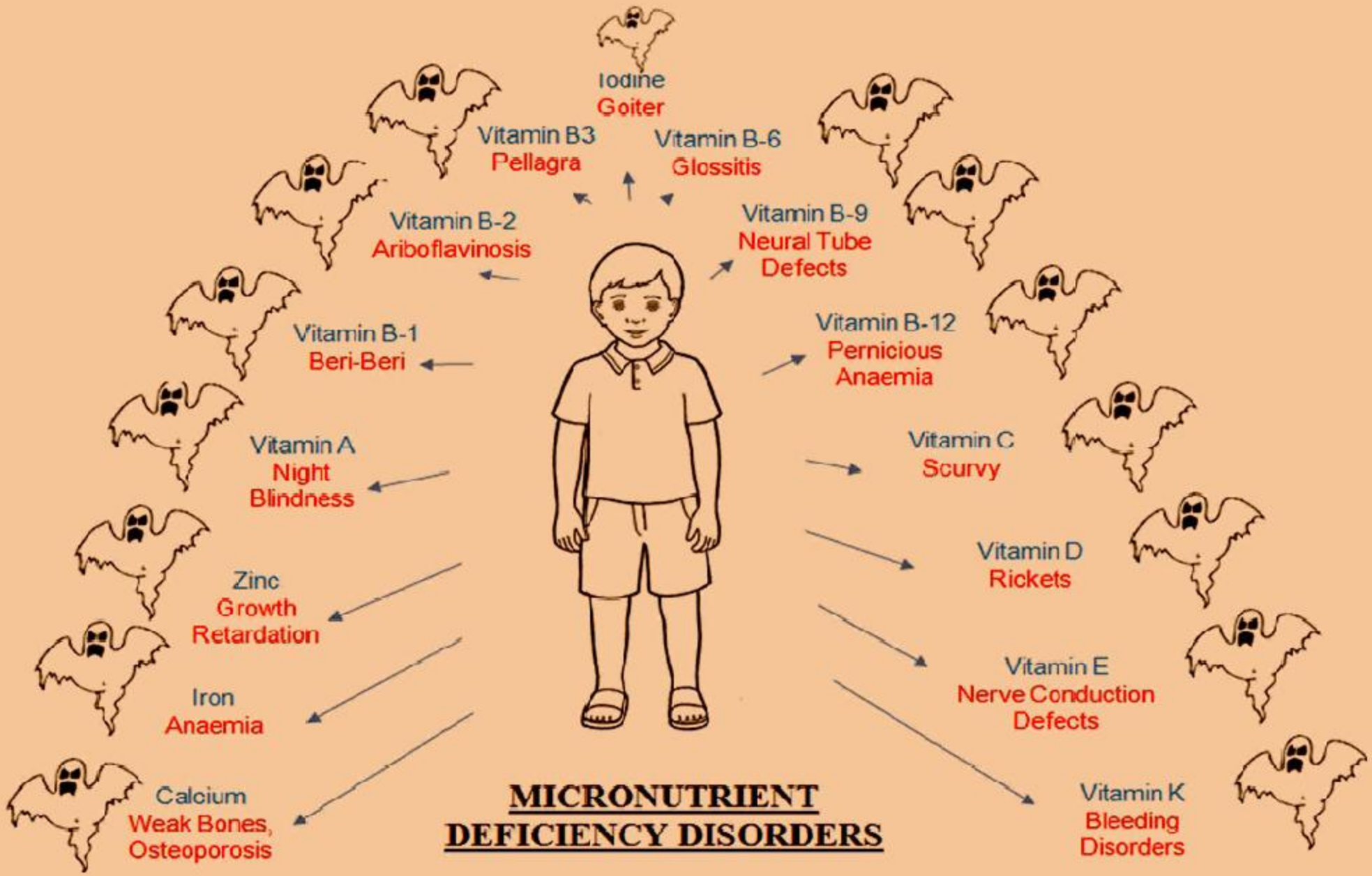

Fortification of the Mid-Day-Meal Project

Iron - Iron Deficiency Anaemia

Manifestation of deficiencies

1. Weakness and fatigue
2. Reduced work performance
3. Pale skin, nail beds and conjunctivae
4. Brittle nails
5. Shortness of breath
6. Poor pregnancy outcomes (pre-term, low birth weight, increased maternal and prenatal mortality
7. Impaired cognitive function (in children)
8. Impaired immune function
9. Heart failure (in severe cases)

Vitamin A - Night Blindness (Retinol, Carotene)

Manifestation of deficiencies

1. Deficiency leads to poor vision in dim light or night blindness. Severe deficiency can lead to total blindness.
2. For children, lack of vitamin A causes severe visual impairment and blindness, and significantly increases the risk of severe illness
3. For pregnant women in high-risk areas, vitamin A deficiency occurs especially during the last trimester when demand by both the unborn child and the mother is highest.

Vitamin C - Scurvy (Ascorbic Acid)

Manifestation of deficiencies

1. Scurvy can result from lack of ascorbic acid. It tends to occur in infants and the older adults. Scurvy leads to spots on the skin, bleeding gums and loose or loss of teeth.

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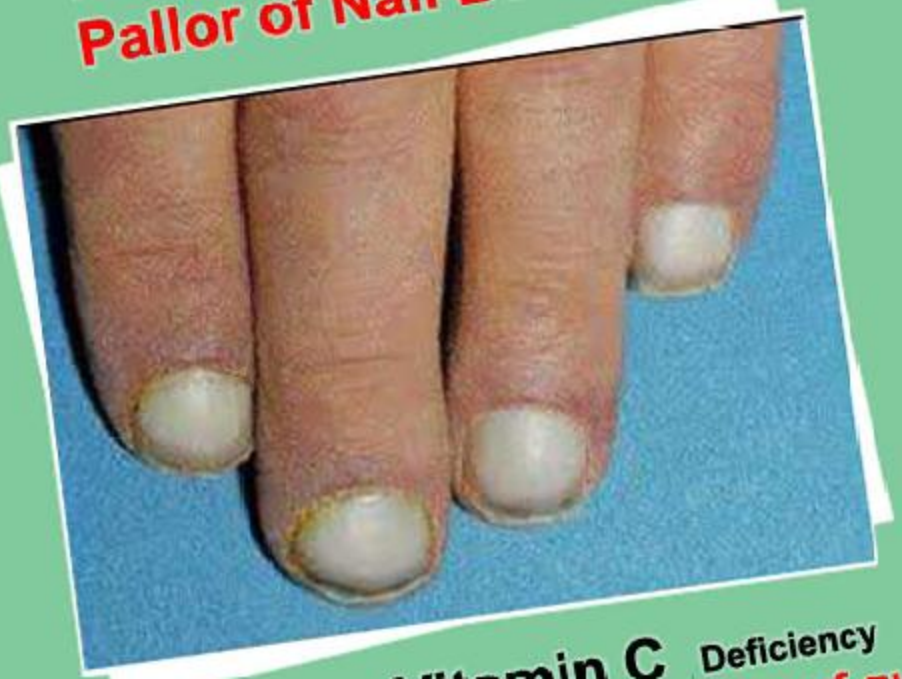
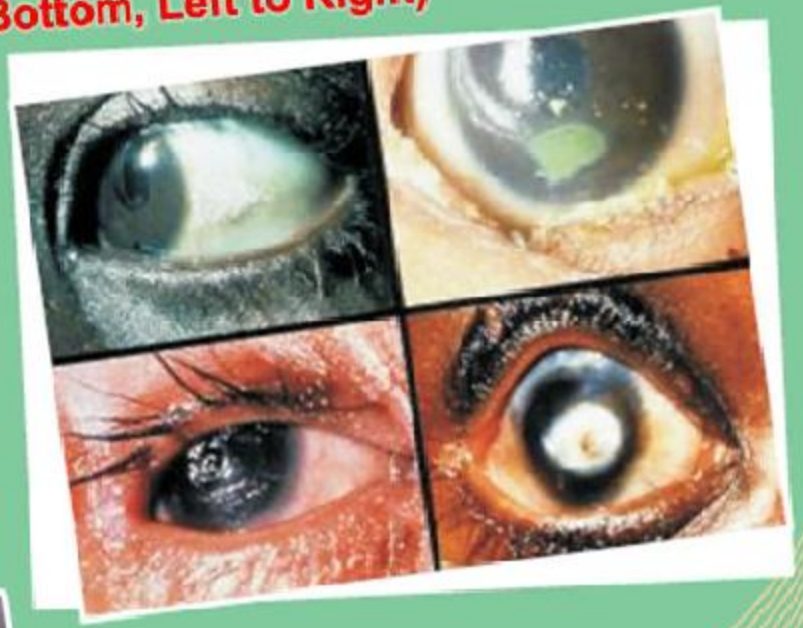
IRON Deficiency

Pallor of Nail Bed



Vitamin A Deficiency

Bitots Spots, Corneal Inflamation and Corneal Uceration (from Top to Bottom, Left to Right)



Vitamin C Deficiency

Scurvy: Bleeding of gums

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Vitamin B-1: Beriberi (Thiamine)

Manifestation of deficiencies

1. In its early stage, thiamin deficiency can cause weight loss and anorexia, confusion, short-term memory loss, and other mental signs and symptoms; muscle weakness; and cardiovascular symptoms (such as an enlarged heart)

Vitamin B-2: Ariboflavinosis (Riboflavin)

Manifestation of deficiencies

1. Ariboflavinosis is the medical name for clinical riboflavin deficiency. Riboflavin deficiency occurs frequently in combination with deficiencies of other water-soluble vitamins.
2. Symptoms of riboflavin deficiency include, sore throat, redness and swelling of the lining of the mouth and throat, cracks or sores on the outsides of the lips (cheliosis) and at the corners of the mouth (angular stomatitis), inflammation and redness of the tongue (magenta tongue), and a moist, scaly skin inflammation (seborrheic dermatitis) symptoms may involve the formation of blood vessels in the clear covering of the eye (vascularization of the cornea) and decreased red blood cell count.
3. Other in which the existing red blood cells contain normal levels of hemoglobin and are of normal size (normochromic normocytic anemia)

Vitamin B-9: Megaloblastic Anaemia / Neural Tube defects (Folic Acid)

Manifestation of deficiencies

1. Deficiency of folate can lead to megaloblastic anaemia. Symptoms can include insomnia, depression and forgetfulness.
2. Folic acid deficiency is most serious in the developmental stages of life (embryo, fetus, infant and child)

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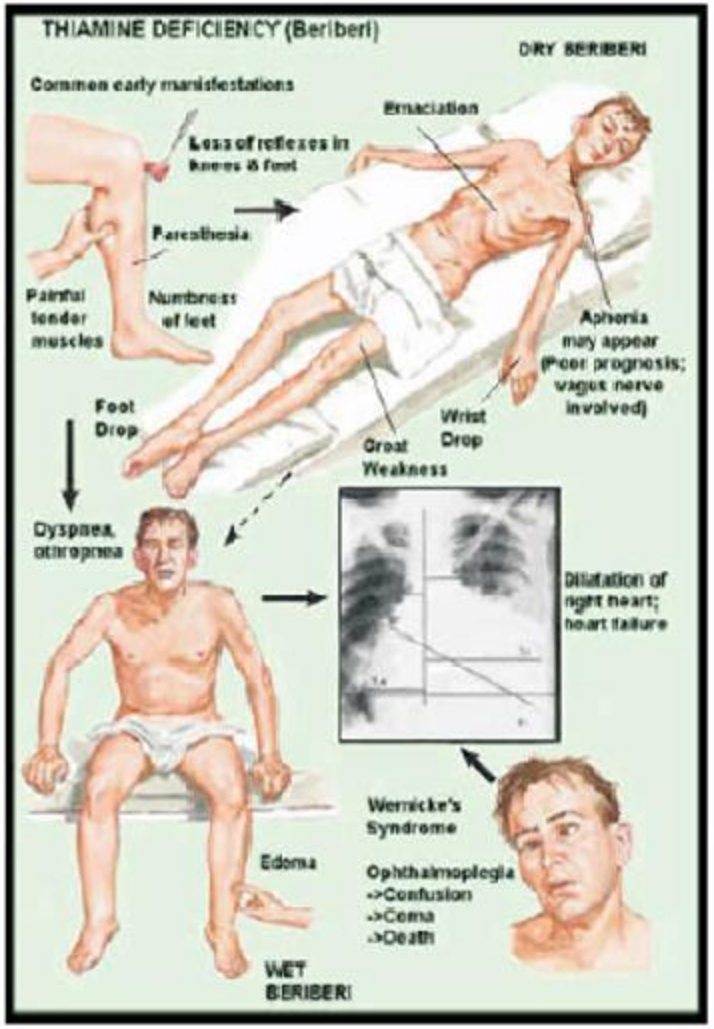
Vitamin B-1 Deficiency

Beri Beri, Either Dry Beri Beri or Wet Beri Beri: leading to either paralysis, Weakness of muscles or Swelling of feet, arms etc (wet beri beri)

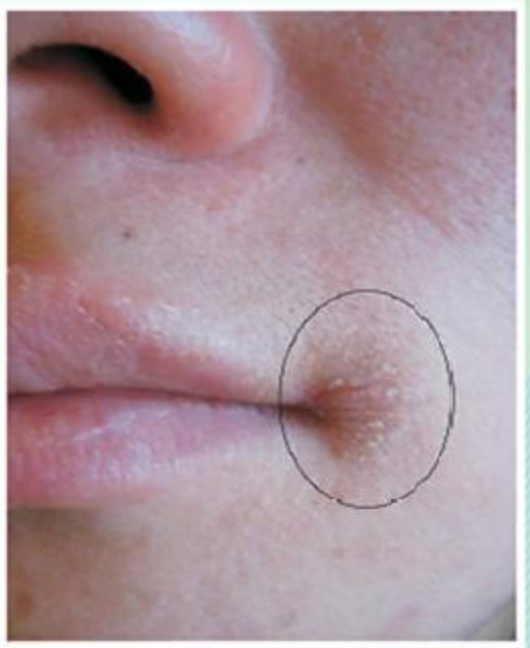


Vitamin B-9 Deficiency

Spina Bifida or Neural Tube Defect

Vitamin B-2 Deficiency

Angular Stomatitits - Cracks and Sores on Corners of mouth



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Vitamin B-12: Pernicious Anaemia (Cyanocobalamine)

Manifestation of deficiencies

1. Fatigue
2. Depression
3. Mood changes
4. Numbness in limbs
5. Myocardial infarction
6. Sore red tongue
7. Loss of balance
8. Dementia
9. Paralysis*
10. Stroke

*occurs in 10% of deficiency cases

Zinc

Manifestation of deficiencies

- Skin lesions
- Impaired wound healing
- Loss of taste and appetite
- Anaemia

Iodine: Goitre

Manifestation of deficiencies

- Goiter
- Cretinism
- Spontaneous Abortion, Still Birth, Birth Defects
- Defects of speech & hearing, squint
- Loss of IQ points, leading causes of mental handicap

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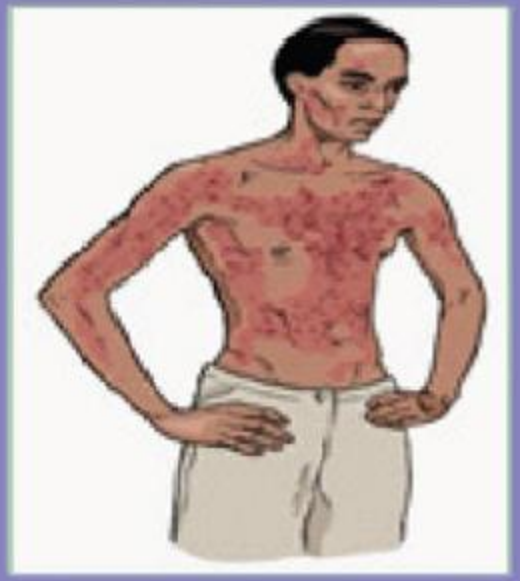
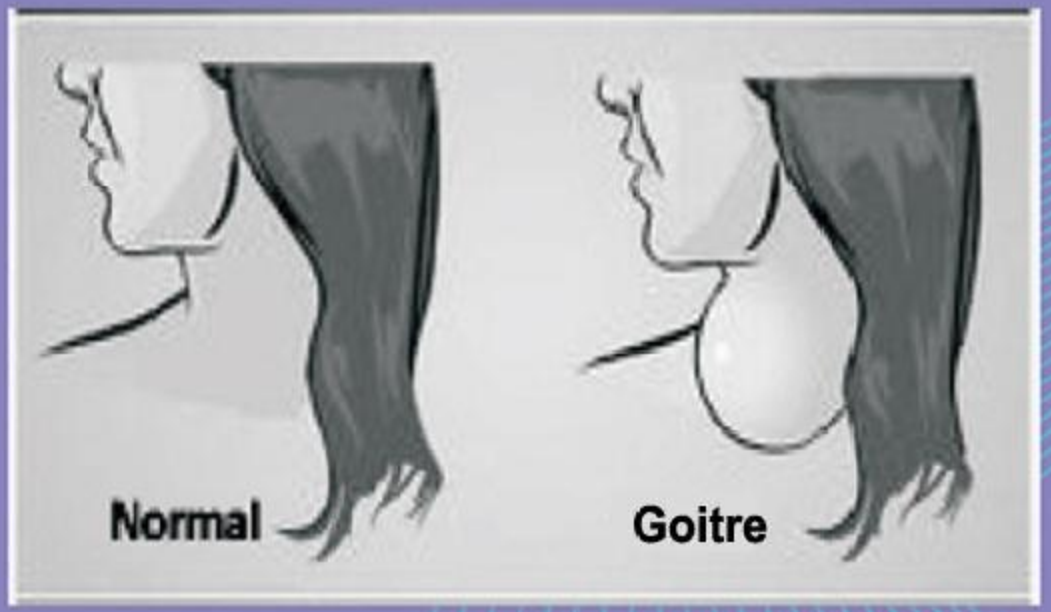
Vitamin B-12 Deficiency
Sore Red Tongue

Zinc Deficiency
Skin Lesions



Iodine Deficiency
Goitre



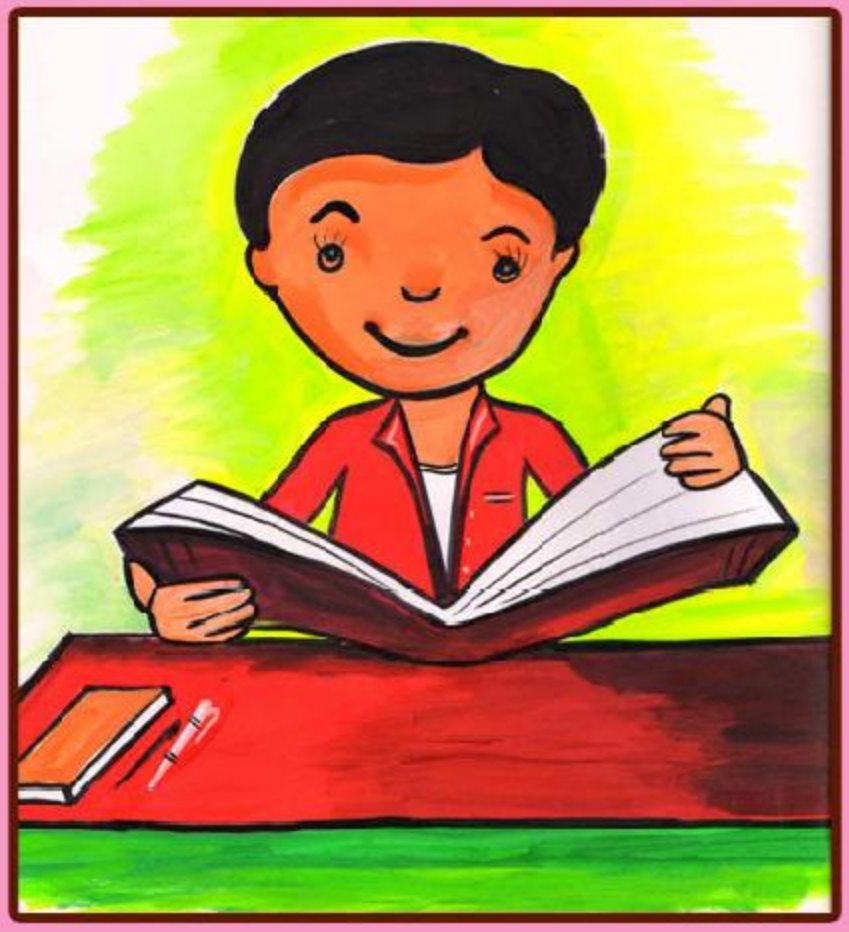
ANAEMIA

Anemia is multi-factorial in etiology with both infection as well as nutritional deficiency being causal factors. Iron deficiency anaemia is the most common cause of anemia. It is major health problem for adults as well as children. Insufficient absorbable iron in the diet is the most common cause of iron deficiency. The body needs iron to make haemoglobin, a protein on RBCs that carries the oxygen from the lungs to the rest of the body. Haemoglobin also gives blood its red colour. Anemia is a condition where the number of healthy red blood cells (RBCs) in the blood is lower than normal. Iron-deficiency anemia is the most common type of anemia. It commonly affects children and women of all ages - especially women who are menstruating. Anemia is the most common disorder of the blood.

Anaemia

Tired and breathless child and not able to focus in studies

VS



Healthy child, playful and well focussed in studies

Strategies to address Anaemia:

Iron deficiency and Anaemia should be tackled simultaneously using a multi-factorial and multi-sectoral approach

Dietary Diversification	**It represent the most desirable and sustainable method of preventing micronutrient malnutrition. Such approaches are designed to increase micronutrient intake through the diet. Acquiring all micronutrients from one or two food groups is not plausible and requires regular intake of several foods and foodgroups in sufficient quantity and variety to satisfy the nutritional needs. Dietary diversification strategies help community access a range of nutrient-rich foods. They involve educating caregivers on appropriate infant and young child feeding practices and improving the use of locally available foods.**

Dietary Diversification

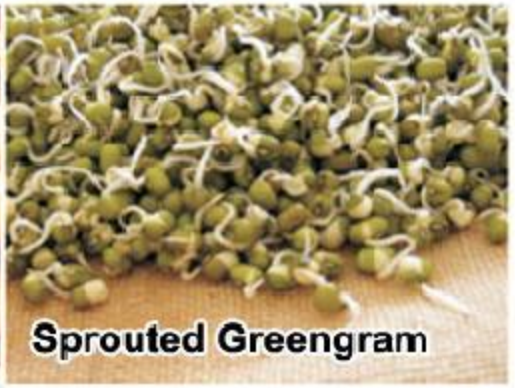

Amla


Millet


Palak


Pigeon-Pea


Soya


Sprouted Greengram


Fish, Meat, Egg


Jaggery


Lemon

Strategies to address Anaemia :

2. Food fortification	➲ Fortification is a cost effective and sustainable means of achieving prevention of anaemia and other micronutrient deficiency disorders. Food fortification can lead to relatively rapid improvements in the micronutrient status of a population at a very reasonable cost, especially if advantage can be taken of existing technology and local distribution networks. Further it does not require any behavior change on the part of the consumer. ➲ Fortification is the practice of deliberately increasing the content of an essential micronutrient, i.e. vitamins and minerals (including trace elements) in a food, so as to improve the nutritional quality of the food supply and provide a public health benefit with minimal risk to health.
3. Nutrition and Health Education	➲ mproving health and nutrition practices through education and awareness like washing hand in soap before and after taking food, drinking safe and clean water, using toilet, consuming green and leafy vegetables in daily diet, practicing healthy and hygienic habits at home etc.
4. Supplementation	➲ **National Iron Plus Initiative programme (NIPI) is evidence based programmatic response to the prevailing anaemia situation amongst adolescent girls and boys through supervised weekly ingestion of IFA supplementation and biannual helminthic control. The long term goal is to break the intergenerational cycle of anaemia, the short term benefits is of a nutritionally improved human capital. The programme, implemented across the country both in rural and urban areas.** ➲ Benefits of Iron supplementation ➲ Improved concentration in school, and school performance ➲ Feeling stronger and less tired, ➲ Increased energy levels and output in day to day work, ➲ Increased appetite, ➲ Improved overall capacity to work and earn ➲ Better sleep ➲ Improved skin appearance, ➲ Regularization of menstruation ➲ Building pre-pregnancy health

Fortification of the Mid-Day-Meal Project

FOOD FORTIFICATION

Rice fortification

MNP fortification

NUTRITION & HEALTH EDUCATION

SUPPLEMENTATION

Strategies to address Anaemia:

5. Public health measures

Malaria prophylaxis, hookworm control, immunization, Counseling on Nutrition and Health Education, Hand Washing before meals, Consumption of Iron tablets on a weekly basis, Use of clean boiled water for drinking, Use of toilet, Habit of wearing shoes/chappals regularly, environmental health, control of micronutrient malnutrition and community based PHC

Public Health Measures

Hand Washing before meals

Cut nails and keep them clean.

Use Mosquito net for prevention of Malaria

Use Toilet

Strategies to address Anaemia:

6. Cooking and eating practice

Cooking Practices

- ☐ Cooking in iron vessels
- ☐ Sorting of cereals and pulses . Leafy Vegetable to be washed properly before preparation.
- ☐ Must use Iodized salt
- ☐ For chopping vegetables a clean chopping board should be used.
- ☐ Wooden chopping boards to be avoided.
- ☐ Cooking temperature should be above 75 Degree C for cooked food.
- ☐ Service temperature should be maintained at 65°C.
- ☐ Water use for cooking should be potable.
- ☐ Cooking must be done with the lid on to avoid loss of nutrients and contamination
- ☐ Utensils must be thoroughly washed, cleaned & dried after use.

Eating Practices

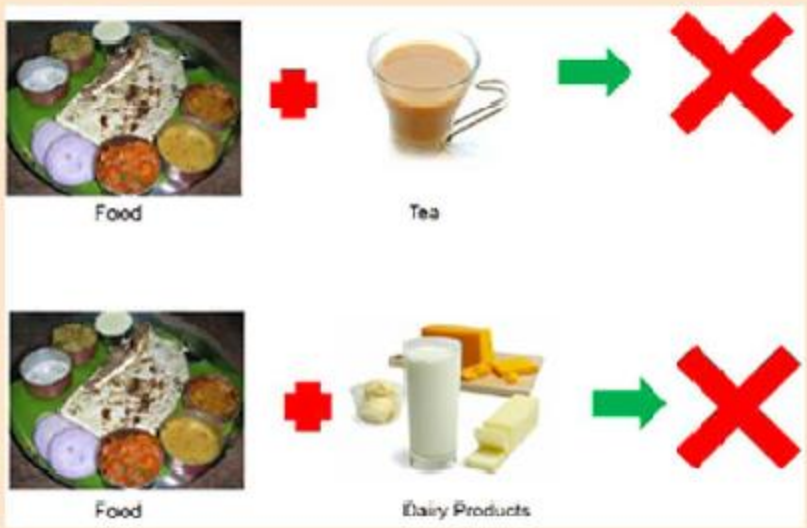
- ☐ Regular consumption of iron rich foods such as green leafy vegetables, cereals such as wheat, ragi, jowar and bajra; pulses (especially sprouted pulses); legumes, nuts, oilseeds, dried fruits and jaggery.
- ☐ In addition, wherever culturally and economically feasible, consumption of iron flesh foods such as meat, liver, poultry, fish etc must be encouraged.
- ☐ Including vitamin C rich foods in the meal for e.g. cauliflower, cabbage, carrot, guava
- ☐ Consuming milk, cheese, and other dairy products as a between meal snack, rather than at mealtime
- ☐ Avoiding consumption of tea along with meals.
- ☐ Consuming IFA Tablet once in a week.

Fortification of the Mid-Day-Meal Project

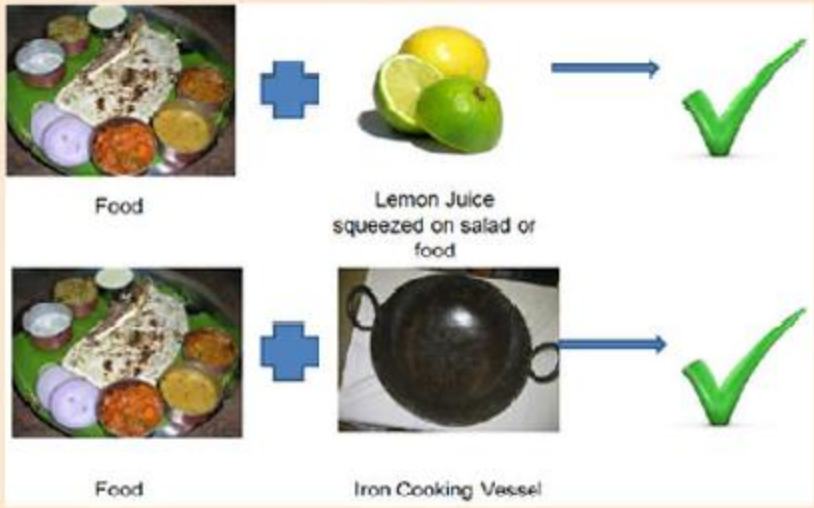
Cooking and Eating Practice

Maintain personal hygiene, wear aprons

The service area should be cleaned everyday before & after the service.



Food based approach – Incorrect Practices



Food Based Approach – Correct Practices

Fortification of the Mid-Day-Meal Project

Supported by

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