

Technical Handbook on Anaemia in Adolescents

**WEEKLY IRON AND FOLIC ACID
SUPPLEMENTATION PROGRAMME**

I. IRON AND ANAEMIA

Anaemia is a critical public health problem in India that affects women and children throughout the lifecycle. Anaemia in boys and girls limits their development, learning ability, reduces concentration in daily tasks, increases their vulnerability to infection, increases school dropout rates, reduces physical fitness and work productivity. Anaemia in girls during pregnancy is associated with premature births, low birth weight, and peri-natal and maternal mortality.

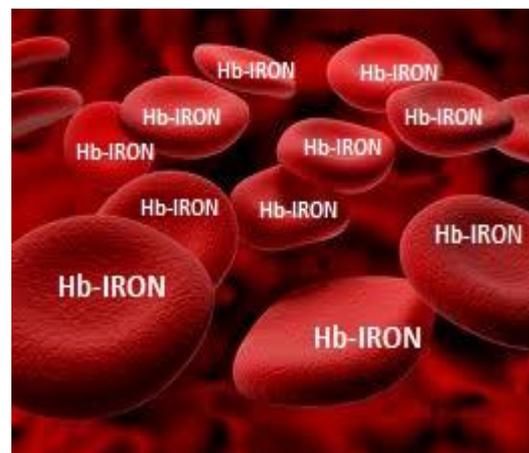
Adolescence is an opportune time for interventions to address anaemia, as it is an important time of growth and development. Missing out on nutrition education and IFA supplementation at this time may push young boys and girls further into the cycle of iron deficiency and anaemia. In adolescent girls, apart from meeting growth needs, sufficient iron intake is also essential before and during pregnancy.

What is Iron?

Iron is one of the essential nutrient required by our body , as it cannot madeby our body on its own. Iron is so important to your body that is has been referred to as the body's gold. Most of the iron in your body is found as part of proteins called hemoglobin, which is found in red blood cells of blood. Hemoglobin in blood carries the oxygen you breathe into your lungs to all tissues throughout the body

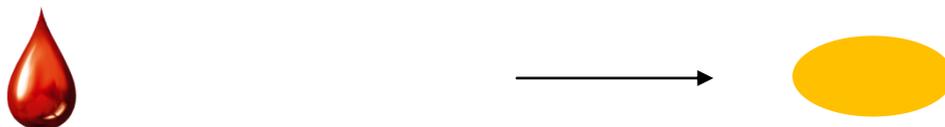


CLOSER LOOK



What is anaemia?

Human blood contains a red pigment called haemoglobin, which is rich in iron. It carries oxygen to different parts of body. Deficiency of iron in diet leads to decreased amount of haemoglobin, making the blood thin and less red in colour which leads to less supply of oxygen to different parts of the body; this state is known as anaemia.



Cut off levels of hemoglobin for diagnosis of Anemia

Age/Sex	Hb Gram/dl
Children 6 months to 6 years	11
Children 6 to 14 years	12
Adolescents 15-19 years	12
Adult male	13
Adult female	12
Adult female pregnant	11

If the level falls below those above, then the person is diagnosed as having anaemia.

Classification of anaemia according to WHO

Mild anaemia	11.9 gm to 10 gmHb /100 ml blood
Moderate anaemia	9.9 gm to 7gm Hb /100 ml blood
Severe anaemia	< 7 gmHb/100 ml blood
Anaemia in non-pregnant woman	<12 gmHb/100 ml blood (above 15 years of age)
Anaemia in pregnant women	<11 gmHb/100 ml blood

II. CAUSES AND EFFECTS OF ANAEMIA

a) Common causes of anaemia

There are many different types of anaemia. They could be nutritional or non-nutritional causes (heavy/chronic bleeding, infections, genetic disorders or cancers). Nutritional anaemia, particularly, is the most widely prevalent form of anaemia in the country.

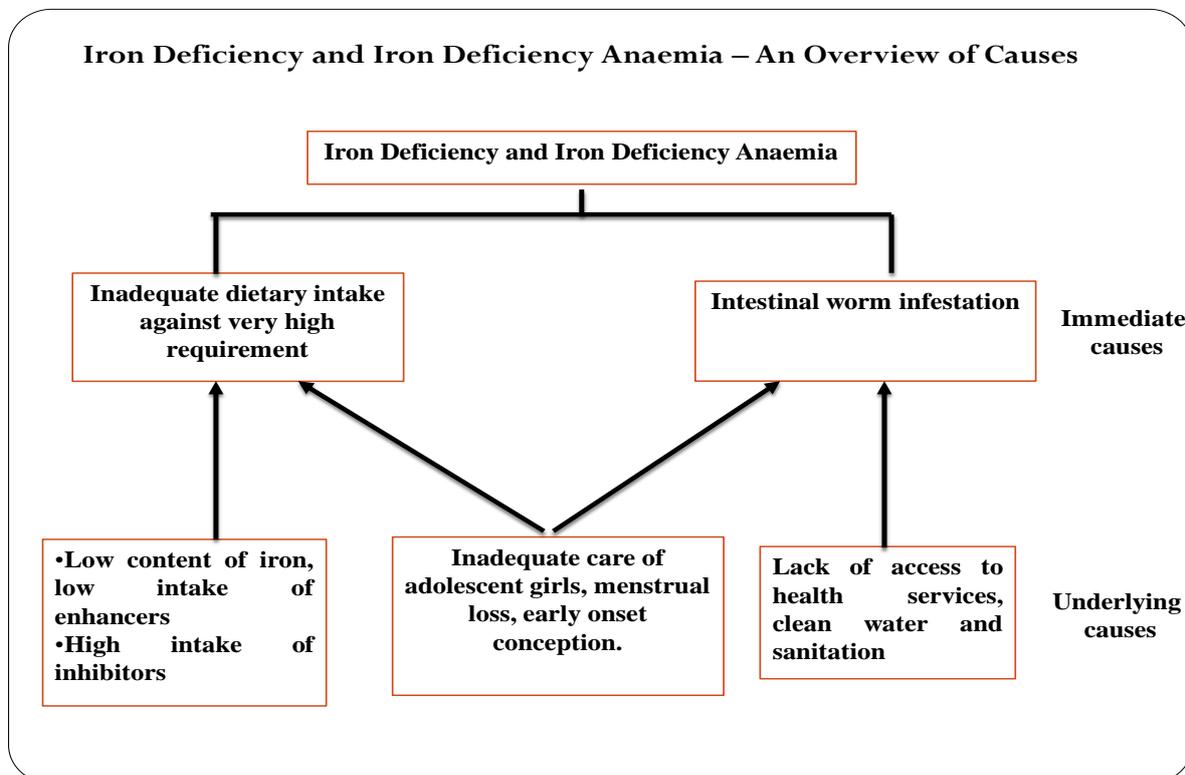
Causes of **Iron Deficiency Anemia** and nutritional anaemia are:

- Poor Dietary intake of iron resulting in deficiency of iron in the body and thus Iron deficiency anaemia (less intake of iron rich foods; Gender discrimination in food allocation in a family aggravates the situation)

- Low bio-availability of iron- Habitual intake of cereal based diet high in phytate and poor consumption of iron absorption enhancers such as vitamin C result in low availability of iron
- Dietary deficiency of vitamins such as Folic Acid, Vitamin C, Vitamin B₁₂

Non nutritional causes of anaemia:

- Accelerated increase in requirement for iron during adolescent period
- Hookworm infestation
- Infections such as Malaria
- Loss of blood in case of heavy menstrual bleeding.
- Teenage marriage and early pregnancy – Teenage pregnancy places double burden on the physically and physiologically immature body of girls and results in increasing the likelihood of anaemia, maternal mortality, pregnancy complications and birth of low birth weight babies.



Iron deficiency anaemia develops after normal stores of iron have been depleted in the body. Thus the signs of anaemia may not be clinically visible until the anaemia is severe (Hb less than 7-8 gms/dl).¹ However, adverse impact on health occurs even before this stage is reached.

b) Who is affected?

The high risk groups for anaemia include-

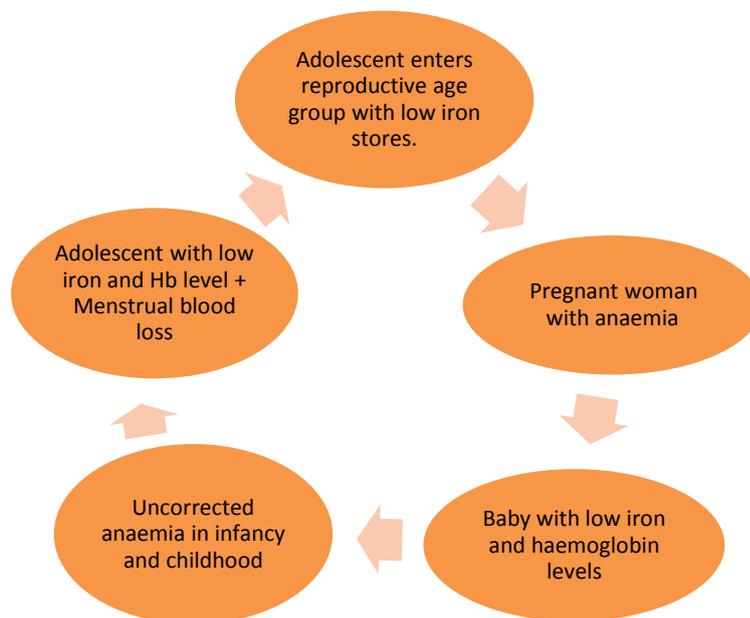
- Women of child bearing age who have blood loss through menstruation

¹Nelson Textbook of Pediatrics; Volume 1 Chapter Anemia Treatment and Causes

- Pregnant and lactating women who have an increased requirement of iron
- Adolescents and children who have rapid growth phases
- People with poor dietary intake of iron through a deficient diet.

Intergenerational cycle of Anemia - An adolescent girl who enters the reproductive age with low iron stores and becomes pregnant during adolescence or later is at greater risk of giving birth to a low birth weight and preterm baby. The baby is also born with low iron stores and due to poor infant feeding practices is more likely than ever to enter adolescence with low iron stores in the body. Thus this vicious cycle of iron deficiency anemia continues.

Intergenerational cycle of Anemia

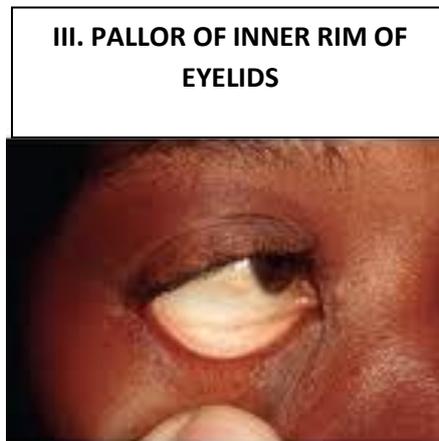
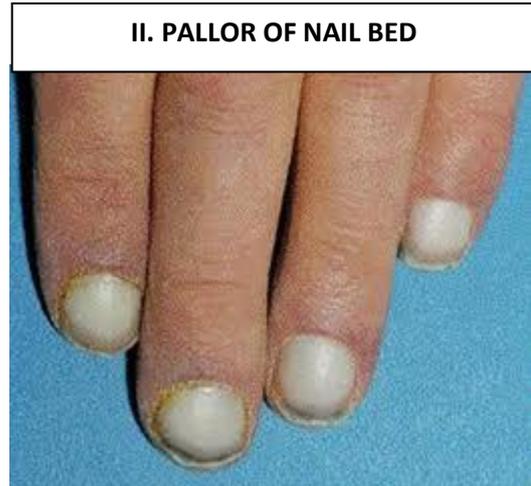
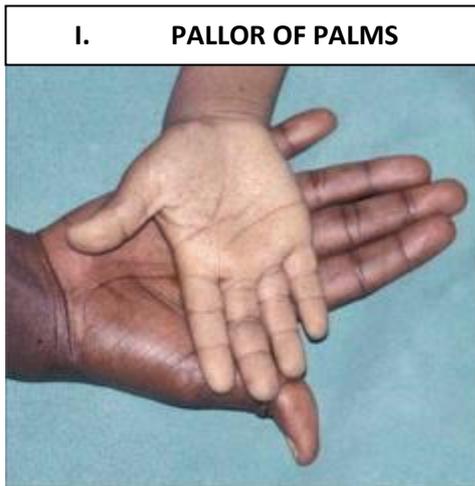


Women in general are more prone to anaemia than men because of smaller stores of iron and the onset of menstruation imposes additional requirement of Iron to compensate for menstrual blood loss. In Indian girls, the highest prevalence of anaemia is reported between the ages of 12-13 years which also coincides with the average age of menarche. In girls, the lower total food intake or energy intake by compared to boys, combined with menstrual losses cause adolescent girls to be at greater risk of Iron deficiency and IDA

c) Signs and Symptoms of anaemia:

Definitive diagnosis of anaemia can only be made by a blood test that measures Haemoglobin(Hb) levels in the blood. The test for Hb is carried out in health centres. However there are some signs that may assist in identifying anaemia. They include:

- Whiteness or pallor in the inner rims of the eyelid, tongue, overall skin, nails, palms of the hand.



- Soreness of the mouth, with cracks at the corners.
- Dizziness, tiredness, fatigue and low energy
- Unusually rapid heartbeat, particularly with exercise
- Shortness of breath and frequent headaches, particularly with exercise
- Lack of interest in play and studies
- Difficulty/ inability to concentrate
- Leg cramps
- Lowered resistance to infections

Iron deficiency anemia develops after normal stores of iron have been depleted in the body. Thus the signs of anemia may not be clinically visible until the anemia is severe (Hb less than 7-8 gms/dl).² However, adverse impact on health occurs even before this stage is reached.

²Nelson Textbook of Pediatrics; Volume 1 Chapter Anemia Treatment and Causes

d) How to identify anemia:

Pallor is unusual paleness of the skin. It is a sign of anaemia.

1. Palmar pallor- To see if the child has palmar pallor, look at the skin of the palm. Hold the child's palm open by grasping it gently from the side. Do not stretch the fingers backwards. This may cause pallor by blocking the blood supply. Compare the colour of the child's palm with your own palm and with the palms of other children. If the skin of the palm is pale, the child has some palmar pallor. If the skin of the palm is very pale or so pale that it looks white, the child has severe palmar pallor. Refer to Image I
2. Nail bed pallor- Look for pallor of the flesh underneath the nails. Pallor of tongue, nail, conjunctiva (lower eyelids) of eyes, fatigue, weakness, dizziness, drowsiness, loss of appetite and swelling (odema) of feet. refer to Image II
 - Pallor of inner side of lower eyelid- pull the lower eyelid downwards and outwards and look for pallor or whiteness of inner side of lower eyelid
 - Pallor of tongue- asks the child to protrude his/her tongue out and look for paleness of surface of tongue. Refer to Image III
 - If an adolescent looks pale, fatigued or listless and anemia is suspected, refer her/him to the nearest PHC.
 - ask for symptoms of weakness, dizziness, drowsiness, loss of appetite, craving for mud/clay, passage of worms in stool, loss of concentration.

Moderate to severe anemia is present if there is:

- Yellowness of tongue, nail, palm and conjunctiva of eye
- Fatigue and loss of appetite
- Breathlessness
- Swelling (oedema) of feet
-

III Prevention and Control of Anaemia in Adolescents

Primary prevention of anaemia is achieved through well- balanced diet rich in iron and other vitamins and minerals involved in iron absorption or in the production of RBCs/Haemoglobin.

a) *Balanced diet rich in Iron*

Adolescence is a significant period for physical growth and sexual maturation. Adolescents need to eat a balanced diet i.e. a diet that provides all nutrients (carbohydrates, proteins, fats, vitamins and minerals) in required amounts and proportions for maintaining health and general well-being.

Eating a balanced diet means consuming different types of food items like pulses, chapatti or rice, green vegetables, locally available fruits and milk every day.

Functions of various food components and why it is important for adolescents:

- Proteins are required for body building and help in repair and maintenance of body tissues. Egg, milk, pulses, fish, meat, ground nut are some examples of body building foods.
- Fats are high-energy foods and provide fat-soluble vitamins. Oil, ghee, butter, cheese, egg, fat of meat, fish, ground nut oil, and mustard oil are some examples of fat.
- Carbohydrates form the major component of most diets and are the main source of energy. Rice, potato, sugar, banana, jaggery, sugarcane, honey are the examples.
- Vitamins and minerals are required in small quantities. They play an important role in growth, repair and regulation of vital body functions. Fruits and vegetables are the examples of protective food.
- Calcium needs during adolescence is greater in adolescence because of rapid increase in lean body mass and skeletal growth. Milk and milk products are rich source of calcium.

Foods rich in iron are

- (i) Green vegetables and fruits
- (ii) Grains-wheat, jowar, bajra, sprouted pulses, ground nut, sesame, jaggery, dried fruits
- (iii) Liver, egg, fish,meat
- (iv) Vitamin C rich foods help in absorption of iron. Citrus fruits (oranges, lemon), Indian gooseberry (Amla), apple, pear are rich in vitamin C.

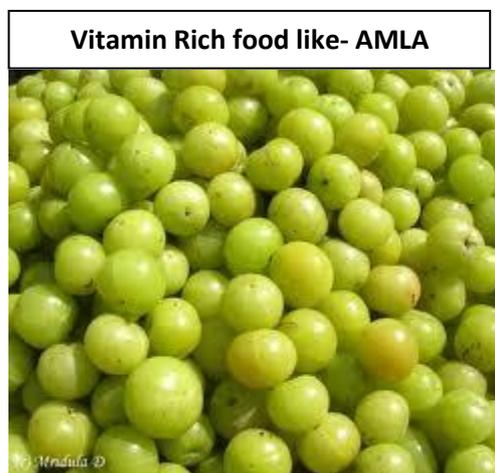
IRON RICH COMMON FOODS



However given that many of these sources of iron are often not available on a regular basis to most people in our country, eating green vegetables should be emphasized. This is more likely to be widely available even among families with low incomes. It should certainly be part of the meals served in schools and at the Anganwadi Centers.

In our Indian diets, the absorption of iron from the diet is poor because of the presence of certain chemical substances. For example tannin in tea can hamper the absorption of iron. On the other hand vitamin C and vitamin C rich foods like amla

(Indian gooseberry, lime juice, oranges, and sprouts) improve iron absorption. Thus tea, coffee or soda containing drinks should not be consumed immediately before or at least two hours after a meal. Adding Vitamin C rich foods to the meal should be encouraged.



b) Iron Supplementation:

In India, the poor absorption of iron and a predominantly vegetarian diet means that despite the consumption of a balanced diet, iron supplementation is required to prevent and control anaemia. Anaemia among adolescents can be prevented by regular consumption of iron and folic acid tablets once a week, ideally 52 tablets in a year. This is the basis of the WIFS programme launched by the Ministry of Health and Family Welfare- Government of India has the Weekly Iron and Folic Acid Supplementation (WIFS). This programme addresses nutritional anaemia among adolescents (age group of 10-19 years). This programme will be implemented pan India both rural and urban areas. It will focus on:

School Based (Boys and Girls)

- A. School going adolescent girls and boys in government/government aided/municipal schools from Classes 6th -12th

Community Based through the Anganwadi Center(Girls only)

- B. Out of school adolescent girls

The WIFS programme will also cover married adolescent girls. Pregnant and lactating adolescent girls will be given IFA supplements, according to current guidelines for antenatal and postnatal care through the existing health system of NRHM.

Under the WIFS programme for adolescents, IFA supplements are to be distributed free on a weekly basis to the target groups in Categories A and B. In addition to IFA supplements, Albendazole tablets for de-worming are to be administered twice a year, to the same target groups.

- **Administration of weekly iron-folic acid supplements (WIFS).** One IFA tablet containing 100mg elemental iron and 500 microgram Folic acid administered on a fixed day through supervised consumption for 52 weeks in a year.

- **Screening of target groups for moderate/severe anaemia and referring these cases** to an appropriate health facility.
- **Biannual Albendazole (400mg) for de-worming** given six months apart, for control of worm infestation.
- **Information and counseling** for improving dietary intake and for taking actions for prevention of intestinal worm infestation.

c) ***Prevention and treatment of hookworm infestation:*** Deworming reduces worm load and blood loss and prevents anemia.

To prevent hookworm infestation one should maintain personal hygiene and environmental cleanliness. One should use latrine and avoid open air defecation. Regular consumption of Albendazole 400mg tablet, six months apart, for control of helminthes infestation should be undertaken.

- Personal hygiene and sanitation, food hygiene
- Use of clean drinking water can help protect from various infections and diseases.
- Washing hands with soap water before cooking, consuming food, after defecation and after discarding faecal matter of a child is essential to prevent entry of germs into our abdomen
- Keeping personal hygiene
- Preparing and consuming hygienically treated or prepared food

d) **Additional Interventions**

- i. Fortification of food with iron (salt, flour, rice, biscuits etc.)***
- ii. Prevention of malaria: Clean surroundings, use of insecticide treated mosquito net while sleeping helps keep malaria mosquitoes away from people and greatly reduces malaria***
- iii. Early Identification and Referral-*** Early identification and referral of suspected cases of anaemia constitutes an important measure of secondary prevention of anaemia.

If anaemia is suspected it is important to refer the adolescent girl/boy to the nearest health facility for further management.

COMMON IRON RICH FOODS

CHANA SAG



SPINACH



**KANTEWALI
CHAULAI**



**ONION
STALKS**



**MUSTARD
LEAVES**



**FENUGREEK
LEAVES
(METHI)**

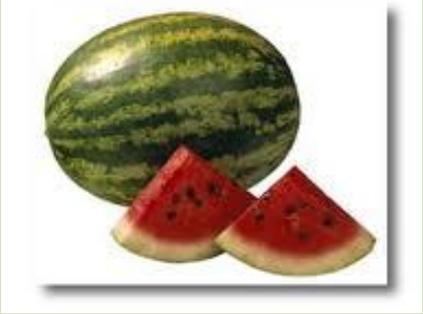


MINT



**ARVI KA
SAG**

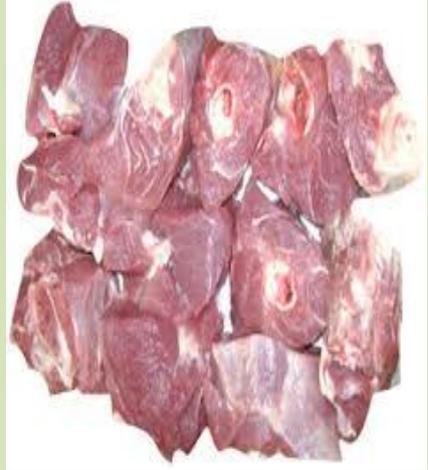


<p>LENTIL</p>		<p>BENGAL GRAM, WHOLE</p>	
<p>SOYABEAN</p>		<p>GINGELLY SEEDS (TIL)</p>	
<p>RED GRAM DHAL (ARHAR)</p>		<p>PLANTAIN GREEN (UNRIPE KELA)</p>	
<p>BLACK GRAM ,DHAL (URD DAL OR KASKALAY)</p>		<p>MELON, WATER</p>	

SEETHAPHAL



MUTTON



COMMON VITAMIN C RICH FOODS

CABBAGE



DRUMSTICK LEAVES



CORIANDER LEAVES



AMLA



SAMPLE ADOLESCENT BALANCED DIET

10 – 12 years Adolescents Boys

Early morning : 1 glass milk (200 ml) + 1 – 2 tsp sugar

Breakfast: 2 vegetable stuffed parantha (any) /2 -3 dosas stuffed with potato vegetable / 2 bread slices with butter / 4 idlis with coconut chutney/ 1 cup vegetable upma + 1 cup tea (with 1 – 2 tsp sugar)

Mid-morning : 1 fruit like banana, apple, guava etc or 1 glass lemon juice (with 1 – 2 tsp sugar)

Lunch : 4 rotis or 2 katori cooked rice or 2 rotis and 1 katori rice
+ 1 katori green leafy vegetables (cooked in 1 tsp oil) + 1 katori cooked dal or sprouts (cooked in 1 tsp oil) + 1 katori dahi (200 ml) like aloo raita or carrot raita etc

Tea : 1 cup tea (with 1 – 2 tsp sugar) + 1 rusk or 1 biscuit or aloo chaat

Dinner: 4 rotis or 2 katori rice or 2 roti and 1 katori rice
+ 1 katori cooked dal/pulses vegetables (cooked in 1 tsp oil) + 1 katori any vegetable (cooked in 1 tsp oil)

10 – 12 years Adolescent girl

Menu

Early morning : 1 glass milk (200 ml) + 1 – 2 tsp sugar

Breakfast: 2 vegetable stuffed parantha (any) /2 -3 dosas stuffed with potato vegetable / 2 bread slices with butter / 4 idlis with coconut chutney/ 1 cup vegetable upma + 1 cup tea (with 1 – 2 tsp sugar)

Mid-morning : 1 fruit like banana, apple, guava etc

Lunch : 3 rotis or 1 ½ katori cooked rice or 2 roti and ½ katori rice
+ 1 katori any green leafy vegetables (cooked in 1 tsp oil) + 1 katori any cooked dal or sprouts (cooked in 1 tsp oil) + 1 katori dahi (200 ml) like aloo raita or carrot raita etc

Tea : 1 cup tea (with 1 – 2 tsp sugar) + 1 rusk or 1 biscuit or aloo chat

Dinner: 3 rotis or 1 ½ katori rice or 1 roti and ½ katori rice
+ 1 katori any cooked dal/pulses vegetables (cooked in 1 tsp oil) + 1 katori any vegetable (cooked in 1 tsp oil)

13 – 18 years Adolescent girl

Early morning : 1 glass milk (200 ml) + 1 – 2 tsp sugar

Breakfast: Breakfast: 2 vegetable stuffed parantha (any) /2 -3 dosas stuffed with potato vegetable / 2 bread slices with butter / 4 idlis with coconut chutney/ 1 cup vegetable upma + 1 cup tea (with 1 – 2 tsp sugar)

Mid-morning : 1 fruit like banana, apple, guava etc

Lunch : 3 rotis or 1 ½ katori cooked rice or 2 rotis and ½ katori rice + 1 katori green leafy vegetables (cooked in 1 tsp oil) + 1 katori cooked dal or sprouts (cooked in 1 tsp oil) + 1 katori dahi (200 ml) like aloo raita or carrot raita etc or 1 katori paneer sabji

Tea : 1 cup tea with 1 – 2 tsp sugar) + 2 rusk or 2 biscuit or ½ katori aloo chaat

Dinner: 3 rotis or 1 ½ katori rice or 2 roti and ½ katori rice + 1 katori cooked dal/pulses vegetables (cooked in 1 tsp oil) + 1 katori any vegetable (cooked in 1 tsp oil)

13 – 18 years Adolescent Boys

Early morning : 1 glass milk (200 ml) + 1 – 2 tsp sugar

Breakfast: 3 aloo ka parantha/ vegetable stuffed parantha (any) /3 rotis + 1 katori paneer sabji or aloo sabji/ 4 bread slices with butter /3-4 dosas stuffed with potato vegetable / 5-6 idlis with coconut chutney/ 2 cup vegetable upma + 1 cup tea (with 1 – 2 tsp sugar)

Mid-morning : 1 fruit like banana, apple, guava etc

Lunch : 4 rotis or 1 ½ katori cooked rice or 2 rotis and ½ katori rice + 1 katori green leafy vegetables (cooked in 1 tsp oil) + 1 katori cooked dal or sprouts (cooked in 1 tsp oil) + 1 katori dahi (200 ml) like aloo raita or carrot raita etc or 1 katori paneer sabji

Tea : 1 cup tea with 1 – 2 tsp sugar) + 2 rusk or 2 biscuit or 1 katori aloo chaat

Dinner: 4 rotis or 1 ½ katori rice or 2 roti and ½ katori rice + 1 katori cooked dal/pulses vegetables (cooked in 1 tsp oil) + 1 katori any vegetable (cooked in 1 tsp oil)

