CHAPTER 12

INSTRUCTIONS
FOR
COMMUNITY HEALTH WORKER

CHW-C1

Mental Health

12.1 Recognize signs and symptoms of mental illness and refer these cases to the Health Worker(Male/Female)

Though you are not expected to treat nervous and mental diseases you must know how to recognize these conditions and refer them to the Health Worker. Early recognition leads to early treatment and early recovery.

Report to the Healt Worker any person who behaves as follows:

(i) Says things which cannot be understood
(ii) Is violent without reason
(iii) Is behaving strangely in a socially unacceptable manner
(iv) Suffers from fits and/or loss of consciousness
(v) Has become very quiet and does not talk to people
(vi) Claims to hear voices or see things which others do not hear or see
(vii) Claims to get possessed by bhutas and spirits
(viii) Has become unusually cheerful and brags that he is a big man, when he is not really so
(ix) Has become very sad lately and cries without reason
(x) Threatens to commit suicide
(xi) Has attempted suicide
(xii) Has lost his memory or is losing his memory
(xiii) Drinks too much

1.2.2. Give immediate assistance in emergencies associated with mental illness

It may happen that a patient is in need of urgent help but the Primary Health Centre is too far away and the Health Worker is not available. Under these circumstances, you as a Community Health Worker must offer immediate assistance to the extent possible. The following are the circumstances in which you are required to offer your help:

1. Very excited patient: Usually such a patient is brought 'tied up' due to a fear of the relatives that he may become violent. Violent behaviour by a patient is the result of his fear that others may harm him. Trying him up only increases this fear. When you see a patient in this state, proceed as follows:

(i) Untie the patient
(ii) Talk to him soothingly and tell him that you will see to it that nobody beats him or harms him
(iii) Give him food and fluids because excited patients may not have eaten or taken any fluids

2. Very dull patient : A patient may be brought to you with the history that he has become very quiet and lethargic. Such a patient might stop all activities including going to the toilet and might be soiling his clothes. When you see a patient in this state, proceed as follows:

(i) Talk to the patient
(ii) Gently coax him to eat and drink
(iii) Clean him up and take him to the Primary Health Centre as soon as you can

3. Suicidal patient : Whenever a patient threatens that he might kill himself take him seriously. When you see a patient in this state, proceed as follows:

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(i) See that someone is always with the patient until he is taken to a doctor
(ii) Remove all sharp instruments and poisons from within his reach

4. Person who has had too much alcohol: People may get irritable and even violent after drinking. The best way to deal with a drunken person is to let the patient sleep.

5. Fits: When you see a patient with fits, proceed as follows:

(i) Take the patient to a safe place and see that he does not get hurt by hitting himself against a hard object
(ii) Put a rolled-up piece of cloth in the mouth so that the patient does not bite his tongue
(iii) Do not give him anything to drink during or soon after the fit. It might choke him.

6. Without wasting any time take the patient to the doctor if mental symptoms have appeared immediately or soon after:

(i) Child birth
(ii) High fever
(iii) Head injury
(iv) Fits
(v) Dog bite

12.3 Educate the community about mental illness

You must make the people under your care aware of the following facts:

1. Mental illness is like any other illness and is not due to bhutas, spirits or witchcraft
2. There is no shame in having a case of mental illness in the family, just as there is no shame in having a person with fever
3. Mental illness can be cured. The recovery is quick and may be complete if the patient is seen in the early stages
4. The treatment of mental illness is prolonged and must be continued according to the advice of the doctor even after the patient becomes apparently normal
5. Marriage is not a cure for mental illness. The stress of married life will only increase the problem
6. A mentally disturbed patient on treatment must be kept occupied in whatever job he can do. Keeping the patien unoccupied makes him more disturbed.
7. One must not make fun of patients with mental illness. It makes them worse and induces them to excitement.

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PROGRAMME

TOPIC: "Organising Nutrition Rehabilitation in a village set up".

9.30 - 10.00 a.m.	Introduction of the participants.
10.00 - 11.00 a.m.	'Concept of Nutrition Rehabilitation in a village set up'.
11.00 - 11.15 a.m.	Break
11.15 - 12.15 a.m.	Group Discussion
12.15 - 1.00 p.m.	Presentation of the groups
1.00 - 2.00 p.m.	Lunch
2.30 - 4.00 p.m.	Field trip to the Bangalore Baptist Hospital
	Slides; use of health education material
	Use of simple anthropometric equipments.

GROUPS

1. What are the different Nutritional problems seen in the community what are its causes, effects and the cure sought?
2. What are the problems inter-related to Malnutrition? Social? economic? Cultural?
3. What are the factors to be considered in teaching nutrition to members? What are the methods to be adopted? The media for rural education. Evaluation techniques in education
4. How will you integrate the other services with Nutrition Rehabilitation or surveillance in the community?

Concept of Nutritional Rehabilitation and Nutritional Surveillance:

Vanaja Ramprasad,
Bangalore Baptist Hospital.

The economic liability of malnutrition in the growing population is the concern of many nations all over the world. It is a modest estimate that in India about 30% of the vulnerable group of population is malnourished or undernourished.

The most desirable and lasting solution depends upon long term measures aimed at social and economic development. This calls for motivation of so many people and large capital investments and sustained efforts for long periods, before any change can be noticed.

Meanwhile, the situation calls for immediate and specific attention. The idea that the malnourished child requires hospitalization is still very widespread. While it is obvious that extremely severe cases should be hospitalized, it is now realised that a large proportion of advanced cases require simply a proper diet. Hospitalized children when treated successfully have a relapse because treatment a cone fails to correct the underlying cause of illness which is in his home. Effective education based on their understanding, their educational background and their food and financial resources is a must for a lasting impact on the mothers.

It is here that the Nutrition Rehabilitation has its genesis. The concept of Nutrition Rehabilitation centres was initiated way back in the year 1955, by Dr. Jose M. Bengoa, Since then a number of countries including Algeria, Brazil, Haiti, Nigeria, Philippines and now India have set up Nutritional Rehabilitation Centres.

It is an established factor that the rehabilitation centres should be a part of a more comprehensive child health programme.

Objectives of N.R.C.

1. The primary aim of an NRC is education.
2. Rehabilitation of the malnourished child with well balanced diet of local goods.
3. To include in the education not only practical nutrition but the elements of personal hygiene and good sanitary practices.
4. To have the centre, house and operate it in a way that is as close as possible to the conditions prevailing in the community.
5. To study the knowledge, attitude, and practice of the people prior to exposing them to health education.
6. To study pertinent information about people, their problems regarding health, their understanding and misconceptions about certain aspects of life situations, their customs and beliefs.

7. To identify those who will perform health services in the operational phase of the programme.

NUTRITIONAL EDUCATION:

Since the mother determines completely the food the child eats, her nutritional knowledge needs to improve. Past efforts at educating peasant mothers have been largely frustrating. Effective education of peasant women requires that several basic facts of the problem be given serious attention. The process of learning should be very non-formal since for most part these mothers are illiterates. What these women need to learn in terms of nutrition and general child care is simple. Everything that is taught must be usuable within the framework of an extremely limited family income. Knowledge of the art of combining locally available food in a way that will meet the food needs of the young child should be imparted to them.

Education process starts with an active desire for such a centre, from the village. Usually this requires a series of meeting with community leaders, convincing them of their local needs and determining the extent to which the community is able and willing to support the centre.

A thorough knowledge of the people to be educated is very essential, apart from the thorough investigation that is needed to study the nutritional problems of children under five. With this basic information the message should be directed at the problems. The lessons conducted should be relevant and appropriate, apart from being clear and easily understood.

Use of demonstrations is an effective method of teaching because seeing is believing . Use of flash cards, flip charts or flannel graphs should be relevant to the local situations. Use of the weight card in educating the mother is extremely valuable. The long term results of a rehabilitation centre can be explained with due credit to the education programme.

NUTRITIONAL RECUPERATION:

Although Kwashiorkor has been known and treated for more than three decades there are many variations in its therapy through the world. Various aspects of Protein Calorie Malnutrition; have to be understood before treatment can be undertaken, especially in their own homes. Literature suggests two clinical types of Protein Calorie Malnutrition; i.e. Kwashiorkor and Marasums sometimes seen in the same community children exposed to the same dietary environment. This is the result of adaptation or non-adaptation to dietary habits or other stress in which the functional status of the adrental cortex and adrentel hypophyseal axis plays an active role. As a result of continuous protein-calorie deficiency, loss of subcutaneous tissue occurs and muscle protein may break down resulting in severe wasting as seen in clinical cases of marasums. It is possible that some children may be

biochemically adapted if on the other hand, the child fails to adapt to the dietary restriction and is not protected by muscle wasting, it may develop signs of Kwashiorkor in wich the biochemical integrity is not maintained. Several studies show that the biochemical integrity is better maintained in marasums then in Kwashiorkor. Plasma proteins and alcumin serum enzymes like lipase, amylase and esterase and blood urea are found to be normal in marasmic children while these values were markedly lowered in children suffering from Kwashiorkor. Livers of children suffering from Kwashiorkor have invariably been found to be heavily infiltrated with fat while livers of marasmic children are free from fatty infiltration. With this background let us discuss about the appropriate treatment at different stages.

TREATMENT:

As long as severe diarrhoea persists, the child needs hospitalization and under medical care is kept on NPO. The traditional and safe method of introducing food to the child is half strength milk with sugar. As the child is able to accept the milk, the dilution is decreased gradually to full strength milk. The next stage is when solid foods are given to provide 4 gms of protein and 150-200 calories per kg of body weight.

The treatment of Kwashiorkor consists of providing protein food of biological value in an easily assimilable form Considering the severe shortage of milk, it cannot be the practical answer. While we resort to the use of protein rich foods of vegetables origin, there are certain disadvantages. 1. They contain indigestible carbohydrate which may swell and interfere in the digestion and absorption of proteins. 2. Many of them contain odiferous and bitter principles which effect their palatibility.

The criteria of selection of the vegetable food recommended are: 1. It should be rich in protein. 2. Locally available and reasonably cheap. 3. Commonly acceptable and 4. Suitable for use in the daily diet in various forms. Literature provides evidence of ample experiments conducted with peanut proteins and roasted Bengalgram dhal powder. The following alternate suggestions could be introduced: 1. Defatted peanut protein powder and milk in the ration of 3:1, reconstituted to provide 4 gms of protein and 150 to two hundred calories per kg. body weight arrived at, from the average of actual and expected body weight. The second alternative is with dehusked roasted bengal gram powder in the form of a toffee.

The third alternative is plain yoghurt.

So much for tackling cases of Kwashiorkor with severe oedma. But whenever there is a child over 2 years falling the third degree malnutrition or as per the arm circumference in the 'Red' area, neither severe marasmus nor Kwashiorkor, the following recommendation is made based on the finding from the children fed at the NRC.

The blend made of the locally available material consists of ragi, gg dhal, D.G.N. flour and jaggery. The following details give the nutritive value of the blend.

		Cal	Prot	Calcium	Fe (mgm)	Vit A (i.u)	Cost
Ragi	30 gms	98.4	2.19	103.2	1.92	12.6	
gg dhal	20 gms	66.8	4.40	15.0	1.7	4.8	
D.G.N. flour	10 gms	38.0	4.0	20.0	-	-	
Jaggery	25 gms	95.5	0.1	20.0	2.8	43.00	
Total	85 gms	302.75	11.19	138.2	6.4	60.4	
		9.8	.17	79.00	3.3	461.0	
Add methi	20 gms	312.55	11.26	217.2	9.7	589.8	

Requirement of child

1 - 3 years	1200	17/18/20	4 to 5	15 - 20 mg	1000
4 - 6 years	1500	22	4 to 5	15 - 20 mg	1200
Pregnant women	3300	55 gms	1 gm 40 mg		3000
Lactating women	3700	65 gms	1 gm 30 mg		4600

(Education for Preparation in their homes)

Considering the requirement, 85 gms of the blend gives the above quantities of the requirement. When used as a supplement it fills up the existing gap of calories, proteins and vitamin A especially in children and iron in pregnant and lactating women, who are anaemic.

Whenever advise needs to be given regarding preparation of the mix at home the following approximate measures have been arrived at

· Ragi	30 x 100	3 kg /3	= 1 kg
· gg dhal	20 x 100	2 kg /3	= 3/4kg (little less)
· g.n. flour	10 x 100	1 kg /3	= ¼ kg
· Jaggery	25 x 100	2½ kg /3	= 3/4kg (little less)

Alternate ingredients should be suggested.

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Composition, Nutritive Value and Cost of the Ready to Consume formulations

Ingredients	Amount gm.	Calories	Protein gm.	Cost Rs.ps.
Jowar-Bengal Gram Formulation				
Roasted Jowar flour	37.5	131	3.9	0.04
Roasted Bengal gram dhal flour	25.0	92	5.6	0.06
Roasted groundnuts	12.5	71	3.3	0.05
Jaggery	25.0	96	0.1	0.04
	100.0	390	12.9	0.19
Jowar green gram formulation				
Roasted jowar flour	37.5	131	3.9	0.04
Roasted green gram dhal flour	25.0	87	6.1	0.05
Roasted groundnuts	12.5	71	3.3	0.05
Jaggery	25.0	96	0.1	0.04
	100.0	385	13.4	0.18
Maize-bengal gram formulation				
Roasted maize flour	37.5	128	4.1	0.04
Roasted bengal gram dhal flour	25.0	92	5.6	0.06
Roasted ground nuts	12.5	71	5.6	0.05
Jaggery	25.0	96	0.1	0.04
	100.0	387	13.1	0.19
Maize-green gram formulation				
Roasted maize flour	37.5	128	4.1	0.04
Roasted green gram dhal flour	25.0	87	6.1	0.05
Roasted ground nuts	12.5	71	3.3	0.05
Jaggery	25.0	96	0.1	0.04
	100.0	382	13.6	0.18
Ragi-bengal gram formulation				
Roasted ragi flour	37.5	123	2.7	0.04
Roasted bengal gram dhal flour	25.0	92	5.6	0.06
Roasted groundnuts	12.5	71	3.3	0.05
Jaggery	25.0	96	0.1	0.04
	100.0	382	11.7	0.19
Ragi-green gram formulation				
Roasted ragi flour	37.5	123	2.7	0.04
Roasted green gram dhal flour	25.0	87	6.1	0.05
Roasted groundnuts	12.5	71	3.3	0.05
Jaggery	25.0	96	0.1	0.04
	100.0	377	12.0	0.18

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NUTRITIONAL SURVEILLANCE:

Malnutrition amongst the agricultural population is hidden beneath the surface in apparently normal children and is not obvious to the naked eye. The majority of the children with mild to moderate malnutrition and even some suffering from severe malnutrition remain undetected. Between extreme manifestations of malnutrition and full health there is a wide "grey area" in which the body mechanisms are not working fully efficiently. Hence it is crucial to detect malnutrition in its early stages. (Refer the training manual chapter 8) here in the early signs and symptoms of malnutrition are described, and where the 'at risk factors are discussed.

Some of the points to be noted while advising simple changes in food habits are also mentioned.

Meaningful education must start with recognition of the situation in which the people find themselves, their attitudes and the resources actually or potentially available to them.

Family welfare through education of in family planning which is of direct relevance to improving nutrition, since malnutrition is frequently more common in large families and especially in those families where children are closely spaced, must also be promoted by the health workers.

For sustained benefit to be derived, the active cooperation of the community has to be enlisted. Local people can be trained to maintain hand pumps or to administer simple drugs in conjuction with supplementary feeding and nutrition therapy.

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ASSESMENT OF NUTRITIONAL STATUS OF A COMMUNITY

The nutritional status of a community is the sum of the nutritional status of the individuals who form that community.

Types of Survey : (1) Longitudanal (2) Cross Sectional

Elements of Nutritional Assesment:

I Clinical Examination
II Anthropometiic Examination
III Biochemical Examination
IV Laboratory Examination
V Dietary Examination
VI Study of Vital Statistics
VII Assessment of Ecological Factors

I Clinical Examination

(1) General appearance : Normal built/Thin built/sickly
(2) Hair : Normal/dull and dry/dyspigmented/thin and sparse/easily pluckable flag sign
(3) Face : Diffuse depigmentation/naso-labial dyssebacea/moon face
(4) Eyes : Conjunctiva-normal/dry on exposure for ½ min/dry and wrinkled/bitot's spots/brown pigmentation/angular conjunctivitis/pale conjunctiva Cornea-normal/dryness/hazy or opaque
(5) Lips : Normal/angular/stomatitis/cheilosis
(6) Tongue: Normal/pale and flabby/red and raw/fissured/geographic
(7) Teeth : Mottled enamel/caries/attrition
(8) Gums : Normal/bleeding
(9) Glands : Thyroid enlargement/parotid enlargement
(10) Skin : Normal/dry and scaly/follicular hyperkeratosis
(11) Nails : Koilonychia
(12) Oedema : in dependent parts
(13) Rachitic changes : Knock-knees or bow legs/epiphyseal enlargement/beading of the ribs/pigeon chest
(14) Internal Systems : Motor weakness/Hepatomegaly/Psychomotor change/mental confusion/sensory loss/loss of position sense/loss of vibration sense/loss of ankle and knee jerks/calf tenderness/cardiac enlargement/tachycardia.

II Anthropometric Examination :

(1) Weight (kg)
(2) Height (cm)
(3) Mid-upper-arm circumference (cm)
(4) Head circumference (cm)
(5) Chest circumference (cm)
(6) Skin fold- Triceps, subscapular, paraumbilical
(7) Calf circumference

Composite indices. (1) $\frac{Wt}{(Ht)^2} \times 100$ (2) $\frac{\text{Arm Circumference}}{\text{Head circumference}}$ (3) $\frac{\text{Calf circumference}}{\text{Height}}$

III Biochemical Examination :

(1) Protein :- Total serum-protein, Serum albumin, Urinary urea
(2) Vitamin A :- Serum vitamin A, Serum carotene
(3) Vitamin C :- Serum ascorbic acid, Urinary ascorbic acid
(4) Vitamin D :- Serum alkaline phosphatase in young children
(5) Thiamine :- Urinary thiamine, Blood pyruvate
(6) Riboflavine :- Urinary riboflavine
(7) Niacin :- Urinary N-methyl nicotinamide
(8) Iron :- Haemoglobin, Serum iron
(9) Iodine :- Urinary iodine, Tests for thyroid function

IV Laboratory Examinations :

(1) Haemoglobin : (specify method)
(2) Stool : negative/ascariasis/ancylostomiasis/giardiasis/amoebiasis/strongyloidiasis/others (state) :
(3) Blood smear : negative/M.F./B.T./Filaria

V Dietary Examinations : (see attached Diet Survey Schedule)

(1) Weighment of raw foods
(2) Weighment of cooked foods
(3) Oral questionnaire method
(4) Checking of stock inventory

VI Study of Vital Statistics

(1) Infant mortality rate
(2) Neonatal mortality rate
(3) Still Birth rate
(4) Perinatal mortality rate
(5) mortality for (1-4) years group
(6) Life expectancy
(7) Hospital statistics

VII Assessment of Ecological Factors

(1) Conditioning influences
(2) Cultural influences
(3) Food production
(4) Socio-economic factors
(5) Health and educational services

II. BALANCED DIETS IN TERMS OF STANDARD CUPS AND SPOONS

The balanced diets for different categories of people are given in terms of standard cups and spoons in the following table:

Table-1: Balanced Diet for Adult Man(Moderate worker)

Food Stuff	Qty (g)	Approximate volume in std. cup and std. spoon.	Number
I. CEREALS			
1. Rice	335	1-3/5	
2. Wheat flour	140	1	
II. PULSES			
1. Redgram dhal	50	1/5	
2. Blackgram dhal	30	6 std. sp.	
III. GREEN LEAFY VEGETABLE			
1. Amaranthus	125	1-4/5	3 bundles
IV. Roots and Tubers			
Photato	100	3/5	2 medium sized ones
V. OTHER VEGETABLES			
Beans	75	1/2	12-15 or a handful
VI. FRUIT			
Orange	30	-	3 segments.
VII. Milk	200	4/5	-
VIII. Fats and oils	40	2/5	-
IX. Sugar & Jaggery	40	1/5	-

Table-II: Balanced Diet for an Adult Women (Moderate Worker)

(1)	(2)	(3)	(4)
I. CEREAL			
1. Rice	230	1	
2. Wheat	120	-4/5	
II. PULSES			
1. Redgram dhal	45	-1/5	
2. Blackgram dhal	25	5 std. sp.	-
III. GREEN LEAFY VEGETABLE			
Amaranth	125	1-4/5	3 bundles.
IV. ROOTS AND TUBERS			
Potato	75	1/2	1
V. OTHER VEGETABLES - Beans	75	1/2	12-15 or a handful.
VI. FRUITS - Orange	30	-	3 segments or a quarter fruit.
VII. Milk	200	4/5	-
VIII. Fats and Oils	35	1/5	-
IX. Sugar and Jaggery	30	6 Std. sp.	-

Table-III: Additional Allowance for Pregnancy and Lactation

Food Stuff	Pregnancy			Lactation		
	Qty (g)	Appx.Vol. in std.cup.	No.	Qty (g)	Appx.Vol. in std.cup	No.
I. CEREALS:						
Rice	50	1/5	-	40	1/5	-
Wheat				60	2/5	-
II. PULSES:						
Redgram dhal				20	2 std.sp.	-
III. GREEN LEAFY VEGETABLE	25	2/5	3/4 bundles	25	2/5	3/4bundles
VI. Milk	125	½	-	125	1/2	-
V. Fats & Oils				15	4 std.sp.	
VI. Sugar & Je-						

Table - IV: Balanced Diet for a Child between the Age 3-6 years (Ref. - 6 years old child)

Food Stuff	Qty (g)	Appx. Vol. in std. cup	No.
(1)	(2)	(3)	(4)
I. CEREALS			
1. Rice	140	3/5	-
2. Wheat flour	60	2/5	-
II. PULSES			
1. Redgram dhal	30	6 std. sp.	
2. Blackgram dhal	15	3 "	
3. Other grams	15	3 "	
III. GREEN LEAFY VEGETABLE:			
Amaranth	75	1-1/5 std.cup	1-½ bundles
IV. ROOTS AND TUBERS			
Potato	50	2/5 "	1 medium size
V. OTHER VEGETABLES			
Beans	50	2/5 std.sp.	8-10 in no.
VI. FRUITS			
Orange	50	2/5 std.cup.	5 segments.
VII. Milk	250	1 "	
VIII. Fats and Oils	25	7 std.sp.	
IX. Sugar and Jaggery	40	8 std. sp.	

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Table - V : Balanced Diet for a Child Between the Age 1-3 years
(Ref : 3 year old child)

(1)	(2)	(3)	(4)
I. CEREALS			
1. Rice	90	2/5	-
2. Wheat	60	2/5	-
II. PULSES			
1. Redgram dhal	25	5 std.sp.	-
2. Blackgram dhal	10	2 std.sp.	-
3. Greengram dhal	15	3 std.sp.	-
III. GREEN LEAFY VEGETABLES:			
Amaranth	50	4/5 cup	1 bundle
IV. ROOTS AND TUBERS			
Potato	30	2/5 cup	1 small
V. OTHER VEGETABLES			
Beans -	30	2/5 cup	5-7 in no.
VI. FRUITS - Orange	50		5 segments
VII. Milk	300	1-1/5	-
VIII. Fats and Oils	20	6 std.sp.	
IX. Sugar and Jaggery	30	6 std. sp.	

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II. BALANCED DIETS IN TERMS OF STANDARD CUPS AND SPOONS

The balanced diets for different categories of people are given in terms of standard cups and spoons in the following table:

Table-1: Balanced Diet for Adult Man(Moderate worker)

Food Stuff	Qty (g)	Approximate volume in std. cup and std. spoon.	Number
I. CEREALS			
1. Rice	335	1-3/5	
2. Wheat flour	140	1	
II. PULSES			
1. Redoram dhal	50	1/5	
2. Blackgram dhal	30	6 std. sp.	
III. GREEN LEAFY VEGETABLE			
1. Amaranthus	125	1-4/5	3 bundles
IV. Roots and Tubers			
Photato	100	3/5	2 medium sized ones
V. OTHER VEGETABLES			
Beans	75	1/2	12-15 or a handful
VI. FRUIT			
Orange	30	-	3 segments.
VII. Milk	200	4/5	-
VIII. Fats and oils	40	2/5	-
IX. Sugar & Jaggery	40	1/5	-

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Table-II: Balanced Diet for an Adult Women (Moderate Worker)

(1)	(2)	(3)	(4)
I. CEREAL			
1. Rice	230	1	
2. Wheat	120	-4/5	
II. PULSES			
1. Redgram dhal	45	-1/5	
2. Blackgram dhal	25	5 std. sp.	-
III. GREEN LEAFY VEGETABLE			
Amaranth	125	1-4/5	3 bundles.
IV. ROOTS AND TUBERS			
Potato	75	1/2	1
V. OTHER VEGETABLES - Beans	75	1/2	12-15 or a handful.
VI. FRUITS - Orange	30	-	3 segments or a quarter fruit.
VII. Milk	200	4/5	-
VIII. Fats and Oils	35	1/5	-
IX. Sugar and Jaggery	30	6 Std. sp.	-

Table-III: Additional Allowance for Pregnancy and Lactation

Food Stuff	Pregnancy			Lactation		
	Qty (g)	Appx.Vol. in std.cup.	No.	Qty (g)	Appx.Vol. in std.cup	No.
I. CEREALS:						
Rice	50	1/5	-	40	1/5	-
Wheat				60	2/5	-
II. PULSES:						
Redgram dhal				20	2 std.sp.	-
III. GREEN LEAFY VEGETABLE	25	2/5	3/4 bundles	25	2/5	3/4bundles
VI. Milk	125	½	-	125	1/2	-
V. Fats & Oils				15	4 std.sp.	
VI. Sugar & Jaggery						

Table - IV: Balanced Diet for a Child between the Age 3-6 years (Ref. - 6 years old child)

Food Stuff	Qty (g)	Appx. Vol. in std. cup	No.
(1)	(2)	(3)	(4)
I. CEREALS			
1. Rice	140	3/5	-
2. Wheat flour	60	2/5	-
II. PULSES			
1. Redgram dhal	30	6 std. sp.	
2. Blackgram dhal	15	3 "	
3. Other grams	15	3 "	
III. GREEN LEAFY VEGETABLE:			
Amaranth	75	1-1/5 std.cup	1-½ bundles
IV. ROOTS AND TUBERS			
Potato	50	2/5 "	1 medium size
V. OTHER VEGETABLES			
Beans	50	2/5 std.sp.	8-10 in no.
VI. FRUITS			
Orange	50	2/5 std.cup.	5 segments.
VII. Milk	250	1 "	
VIII. Fats and Oils	25	7 std.sp.	
IX. Sugar and Jaggery	40	8 std. sp.	

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Table - V : Balanced Diet for a Child Between the Age 1-3 years
(Ref: 3 year old child)

(1)	(2)	(3)	(4)
I. CEREALS			
1. Rice	90	2/5	-
2. Wheat	60	2/5	-
II. PULSES			
1. Redgram dhal	25	5 std.sp.	-
2. Blackgram dhal	10	2 std.sp.	-
3. Greengram dhal	15	3 std.sp.	-
III. GREEN LEAFY VEGETABLES:			
Amaranth	50	4/5 cup	1 bundle
IV. ROOTS AND TUBERS			
Potato	30	2/5 cup	1 small
V. OTHER VEGETABLES			
Beans -	30	2/5 cup	5-7 in no.
VI. FRUITS - Orange	50		5 segments
VII. Milk	300	1-1/5	-
VIII. Fats and Oils	20	6 std.sp.	
IX. Sugar and Jaggery	30	6 std. sp.	

* * * * * *

ms/18578/*

II. BALANCED DIETS IN TERMS OF STANDARD CUPS AND SPOONS

The balanced diets for different categories of people are given in terms of standard cups and spoons in the following table:

Table-1: Balanced Diet for Adult Man(Moderate worker)

Food Stuff	Qty (g)	Approximate volume in std. cup and std. spoon.	Number
I. CEREALS			
1. Rice	335	1-3/5	
2. Wheat flour	140	1	
II. PULSES			
1. Redgram dhal	50	1/5	
2. Blackgram dhal	30	6 std. sp.	
III. GREEN LEAFY VEGETABLE			
1. Amaranthus	125	1-4/5	3 bundles
IV. Roots and Tubers			
Photato	100	3/5	2 medium s sized ones
V. OTHER VEGETABLES			
Beans	75	1/2	12-15 or a handful
VI. FRUIT			
Orange	30	-	3 segments.
VII. Milk	200	4/5	-
VIII. Fats and oils	40	2/5	-
IX. Sugar & Jaggery	40	1/5	-

Table-II: Balanced Diet for an Adult Women (Moderate Worker)

(1)	(2)	(3)	(4)
I. CERFAL			
1. Rice	230	1	
2. Wheat	120	-4/5	
II. PULSES			
1. Redgram dhal	45	-1/5	
2. Blackgram dhal	25	5 std. sp.	-
III. GREEN LEAFY VEGETABLE			
Amaranth	125	1-4/5	3 bundles.
IV. ROOTS AND TUBERS			
Potato	75	1/2	1
V. OTHER VEGETABLES - Beans	75	1/2	12-15 or a handful.
VI. FRUITS - Orange	30	-	3 segments or a quarter fruit.
VII. Milk	200	4/5	-
VIII. Fats and Oils	35	1/5	-
IX. Sugar and Jaggery	30	6 Std. sp.	-

Table-III: Additional Allowance for Pregnancy and Lactation

Food Stuff	Pregnancy			Lactation		
	Qty (g)	Appx.Vol. in std.cup.	No.	Qty (g)	Appx.Vol. in std.cup	No.
I. CERFALS:						
Rice	50	1/5	-	40	1/5	-
Wheat				60	2/5	-
II. PULSES:						
Redgram dhal				20	2 std.sp.	-
III. GREEN LEAFY VEGETABLE	25	2/5	3/4 bundles	25	2/5	3/4bundles
VI. Milk	125	½	-	125	1/2	-
V. Fats & Oils						

Table - IV: Balanced Diet for a Child between the Age 3-6 years (Ref. - 6 years old child)

Food Stuff	Qty (g)	Appx. Vol. in std. cup	No.
(1)	(2)	(3)	(4)
I. CEREALS			
1. Rice	140	3/5	-
2. Wheat flour	60	2/5	-
II. PULSES			
1. Redgram dhal	30	6 std. sp.	
2. Blackgram dhal	15	3 "	
3. Other grams	15	3 "	
III. GREEN LEAFY VEGITTABLE:			
Amaranth	75	1-1/5 std.cup	1-½ bundles
IV. ROOTS AND TUBERS			
Potato	50	2/5 "	1 medium size
V. OTHER VEGETABLES			
Beans	50	2/5 std.sp.	8-10 in no.
VI. FRUITS			
Orange	50	2/5 std.cup.	5 segments.
VII. Milk	250	1 "	
VIII. Fats and Oils	25	7 std.sp.	
IX. Sugar and Jaggery	40	8 std. sp.	

... 4

Table - V : Balanced Diet for a Child Between the Age 1-3 years
(Ref: 3 year old child)

(1)	(2)	(3)	(4)
I. CEREALS			
1. Rice	90	2/5	-
2. Wheat	60	2/5	-
II. PULSES			
1. Redgram dhal	25	5 std.sp.	-
2. Blackgram dhal	10	2 std.sp.	-
3. Greengram dhal	15	3 std.sp.	-
III. GREEN LEAFY VEGETABLES:			
Amaranth	50	4/5 cup	1 bundle
IV. ROOTS AND TUBERS			
Potato	30	2/5 cup	1 small
V. OTHER VEGETABLES			
Beans -	30	2/5 cup	5-7 in no.
VI. FRUITS - Orange	50		5 segments
VII. Milk	300	1-1/5	-
VIII. Fats and Oils	20	6 std.sp.	
IX. Sugar and Jaggery	30	6 std. sp.	

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II. BALANCED DIETS IN TERMS OF STANDARD CUPS AND SPOONS

The balanced diets for different categories of people are given in terms of standard cups and spoons in the following table:

Table-1: Balanced Diet for Adult Man (Moderate worker)

Food stuff	Qty (g)	Approximate volume in the std.cup and std.spoon.	Number
I. CEREALS			
1. Rice	335	1-3/5	
2. Wheat flour	140	1	
II. PULSES			
1. Redgram dhal	50	1/5	
2. Blackgram dhal	30	6 std.sp.	
III. GREEN LEAFY VEGETABLE			
1. Amaranthus	125	1-4/5	3 bundles
IV. ROOTS AND TUBERS			
Potato	100	3/5	2 medium sized ones
V. OTHER VEGETABLES			
Beans	75	1/2	12-15 or a hand ful
VI. FRUIT			
Orange	30	-	3 segments.
VII. Milk	200	4/5	-
VIII. Fats and oils	40	2/5	-
IX. Sugar & Jaggery	40	1/5	-

Table - II: Balanced Diet for an Adult Woman (Moderate Worker)

I. CEREAL			
1. Rice	230	1	
2. Wheat	120	-4/5	
II. PULSES			
1. Redgram dhal	45	-1/5	
2. Blackgramdhal	25	5 std.sp.	-
III. GREEN LEAFY VEGETABLE			
Amaranth	125	1-4/5	3 bundles.
IV. ROOTS AND TUBERS			
Potato	75	1/2	1

V. OTHER VEGETABLES - Beans	75	1/2	12-15 or a handful.
VI. FRUITS - Orange	30	-	3 segments or a quarter fruit.
VII. Milk	200	4/5	-
VIII. Fats and Oils	35	1/5	-
IX. Sugar and Jaggery	30	6 std.sp.	-

Table - III: Additional Allowance for Pregnancy and Lactation

Foodstuff	Pregnancy Qty (g)	Appx.Vol. in std.cup	No.	Lactation Qty. (g)	Appx.vol. in std.cup	No.
I. CEREALS:						
Rice	50	1/5	-	40	1/5	-
Wheat				60	2/5	-
II. PULSES:						
Redgram dhal				20	2 std.sp.	-
III. GREEN LEAFY VEGETABLE	25	2/5	3/4 burdles	25	2/5	3/4 burdl
IV. Milk	125	½	-	125	1/2	-
V. Fats & oils				15	4 std.sp.	
VI. Sugar & Jaggery	10	2 std.sp.	-	20	4 std.sp.	

Table - IV: Balanced Diet for a Child between the Age 3-6 Years
(Ref. - 6 years old child)

Foodstuff	Qty (g)	Appx.vol.in std.cup	No.
1	2	3	4
I. CEREALS			
1.Rice	140	3/5	-
2.Wheat flour	60	2/5	-
II. PULSES			
1.Redgramdhal	30	6 std.sp.	
2.Blackgram dhal	15	3 "	
3.Other grams	15	3 "	
III. GREEN LEAFY VEGETABLE:			
Amaranth	75	1-1/5 std.cup	1-½ burdles
IV. Roots and Tubers			
Potato	50	2/5 "	1 Medium size

1	2	3	4
V. OTHER VEGETABLES			
Beans	50	2/5 std.sp.	8-10 in no.
VI. FRUITS			
Orange	50	2/5 std.cup	5 segments.
VII. Milk	250	1 "	
VIII. Fats and Oils	25	7 std.sp.	
IX. Sugar and Jaggery	40	8 std.sp.	

Table-V: Balanced Diet for a Child Between the Age 1-3 Years
(Ref: 3 year old child)

1	2	3	4
I. CEREALS			
1. Rice	90	2/5	-
2. Wheat	60	2/5	-
II. PULSES			
1. Redgram dhal	25	5 std.sp.	-
2. Blackgram dhal	10	2 std.sp.	-
3. Greengram dhal	15	3 std.sp.	-
III. GREEN LEAFY VEGETABLES:			
Amaranth	50	4/5 cup	1 bundle
IV. ROOTS AND TUBERS			
Potato	30	2/5 cup	1 small
V. OTHER VEGETABLES - Beans	30	2/5 cup	5-7 in no.
VI. FRUITS - Orange	50	2/5 std.cup	5 segments.
VII. Milk	200	1 "	-
VIII. Fats and Oils	20	6 std.sp.	
IX. Sugar and Jaggery	30	6 std.sp.	

4/4/75.

Nature.

NUT 6.6

VITAMIN AND MINERALS
Daily Requirement for an adult

		Deficiency
Vitamin A	3000 I.U.	1. Xeroptalmia. Blindness 2. Decrease Resistance to URTI 3. Inner Ear Deafness 4. Acne & hyperkeratinosis.
Vitamin D	400 I.U.	1. Rickets in children 2. Osteomalacia in adults
Thiamine	1.5 mgms	1. Beri Beri 2. Neuritis
Riboflavine	1.5 mgms	. Angular Stomatitis . Photophobia Glossitis
Nicotinic Acid	15 mgms	Pellegara
Cyanocobalamine	1 mcg.	Anaemia
Pathothemic Acid	3 mgms	1. Chick Pellagara 2. Hair growth
Choline - Parent substance acetylcholine and a constituent of Lecithin	2 gms	Deposition of fat in liver and Haemorrhagic degeneration of liver and kidney
Ascorbic acid	50 gms	1. Scurvy 2. Decrease resistance to infection
Folic acid	1.5 mgms.	Anaemia
Vitamin E & K	Not known	1. Vitamin E - sterility in male 2. Vitamin K - Hypoprothrombinaemia
Ca.	1 gm.	1. Bone defects 2. Hair 3. Blood disease
Iron	15 mgms.	Anaemia
Fluoride, Ion in water	1 - 2 ppm	Dental caries

Essential Fatty acids nutritionally important and necessary for growth. They are Linoleic, Linolenic and Arachidonic acids. They cannot be synthesised in the body and have to be supplied in the diet. Linoleic and Linoenic acid are of vegitable origin and present in cotton seed, groundnut and linsee oils while Arachidonic acid is of fish and animal origin. E.F.A. regulate cholesterol metabolism.

DAILY BALANCED DIET FOR AN ADULT

	Average Indian Diet	Gms	Cals
Cereals (rice chiefly milled)	400 gm	300	(340x3) 1020
Dhal (red gram)	85 "	100	355
Green vegetable (cabbage)	115 "	100	2[illegible]
Potatoes - roots & tubers	85 "	100	9[illegible]
Cauliflower - other veg.	85 "	100	3[illegible]
Banana - fruits	85 "	150	15[illegible]
Oils & fats	85 "	50	45[illegible]
Sugar (in tea, coffee & sweets)	115 "	100	40[illegible]
Milk (cow)	284 "	100	6[illegible]
Mutton	85 "	200	(194x2) 38[illegible]
Egg		50	6[illegible]
Agathi		50	15
			3014

NVT 6-7

DEPARTMENT OF PREVENTIVE & SOCIAL MEDICINE

ST. JOHN'S MEDICAL COLLEGE, BANGALORE 560034

EXERCISES IN NUTRITION AND DIETETICS

Q - I. A family consists of the following members:

a) Old lady of 60 years (40 kg.)
b) An adult male going to office (55 kg.)
c) An adult female (45 kg)
d) Two sons and two daughters of 15, 13, 11 and 7 years of age.

Give a schedule of balanced diet for this family in terms of Rice, Pulses, Greenleafy vegetables, Root vegetables, other vegetables, milk, sugar, fish, meat, egg and oil.

ANSWER: Coefficient value of the family:

a) Old lady	..	0.9
b) Adult male	..	1.0
c) Adult female	..	0.9
d) Son, 15 years	..	1.0
e) Son, 13 years	..	1.0
f) Daughter, 11 years	..	0.8
g) Daughter, 7 years	..	0.7
Total		6.3

Requirement of Balanced Diet for the family =

		gms				Oz.		
1.	Rice	400 x 6.3	=	2520	gms	14	..	88.2 Oz.
2.	Pulses	85 x 6.3	=	535.5	gms	3	..	18.9 oz.
3.	G.L. Vegetables	114 x 6.3	=	718.2	gms	4	..	25.2 oz.
4.	Root vegetables	85 x 6.3	=	535.5	gms	3	..	18.9 oz.
5.	Other vegetables	85 x 6.3	=	535.5	gms	3	..	18.9 oz.
6.	Fruits	85 x 6.3	=	535.5	gms	3	..	18.9 oz.
7.	Milk	284 x 6.3	=	1789.2	gms	10	..	63.0 oz.
8.	Sugar	57 x 6.3	=	359.1	gms	2	..	12.6 oz.
9.	Fish & meat	85 x 6.3	=	535.5	gms	3	..	18.9 oz.
10.	Eggs	7 eggs				1	..	7 eggs
11.	Oil	57 x 6.3	=	359.1	gms	2	..	12.6 oz.

We require for the above family 2400 x 6.3 = 15,120 calories. The above diet yields approximately 3000 x 6.3 calories. Henco, it is sufficient for the family.

Q - II. A family consists of an adult male (55 kg.), and adult female (45 kg.) and a child of 5 years weighing 15 kgs. On a diet survey of this family, it was observed that the consumption per day in terms of the proximate principles and nutrients was as follows:-

4 x Proteins	..	150 gms.	Vit. A.	1000 I.U.
4 x CHO	..	2000 gms.	Vit. B.	10 mgm.
4 x Fats	..	100 gms.	Vit. C.	150 mgm.

a) Comment on the quantityt and quality of the diet.

b) Suggest improvements confining your attention to the above nutrients only.

carbo – 2000 cal.
1g = 4 cal.

ANSWER:-

Requirements	Male		Female		Child		
1. Proteins	55 gm.	+	45 gms.	+	52.5 gms.	=	152.5 gms.
2. CHO	450 gm.	+	450 gms.	+	180.0 gms.	=	1080.0 gms.
3. Fats	60 gm.	+	40 gms.	+	40.0 gms.	=	160.0 gms.
4. Vit. 'A'	3500 IU	+	3500 IU	+	3500.0 IU	=	10,500.00 IU

1g/kg. 50-60 food
15-25% cal.

In terms of Retinol and daily requirement will be 750 micrograms for the adult and for the child of 5 years 300 micrograms. It comes to 750 + 750 + 300 = 1800 micrograms. One I.U. of Vit. 'A' = 0.3 mg. So, 10,500 I.U. will be 3,150 micrograms.

5. Vit. 'B' (Thiamine) .. 2 + 2 + 1 = 5 gms.

6. Vit. 'C' .. .. 50 + 50 + 40 = 140 mgm

i. COMMENTS: Quantity: Calories requirement 1 + 0.9 + 0.5 = 2.4 coefficient
= 5,760 calories.

The above diet will provide Proteins 150 x 4 = 600 calories
CHO 2000 x 4 = 8000 -do-
Fats 100 x 9 = 900 -do-

Total = 9400 calories

It is more than ample.

ii. QUALITY :- Proteins : Just short: CHO - more than ample
Fats : Short : Vit. A - very much short
Vit. B : Sufficient: Vit. C — sufficient.

iii. IMPROVEMENT: Cut out CHO (Cereals) and increase the pulses, milk or include egg. Fat requirement can be met by increasing oil or ghee (60 gms). Vit.A or Retinol is very much short of requirements and leafy vegetables like amaranath, drum stick leaves and other vegetables like carrot; fruits like papaya should be included in the diet. Vit. B & C are sufficient.

Q - III. A mother with an infant of 6 months old wants to start her child with artificial feeding with buffalo's milk. What is the quantity of the buffalo's milk and the number of feeds per day that you would advise? What other advise you would like to give to the mother about the feeding with the buffalo's milk? Considering the deficiencies in the milk, what supplements would you advise?

ANSWER: Buffalo milk yields 118 calories/100 gms. A child of 6 months (normal), weighing 6.7 kg. will require 600 calories. The child therefore, requires 600/118 = 5 or 500 gms. of milk or 16 to 17 oz. of milk. This milk must be diluted with water to reduce the fact concent and sugar must be added to increase the CHO content.

Composition: Buffalo milk = Fat 8.8 sugar 5.1
Human milk = Fat 3.4 sugar 7.4

i.e. the milk must be humanised.

Thus, 16 to 17 ozs. of diluted milk must be given in 4 feeds (8 hrs. once) during day and one feed before going to bed. Milk is deficient in Iron and Vit. C. Hence, fruit juices and green leafy vegetables mashed should be given as supplements.

Dilute the milk – tabl., frac. of feeds.

To prescribe a diet – nutrition carbo prob. fat all of convert to foodstuff.

PROBLEMS ON NUTRITION

NUTRITION:

1. A family consists of an adult male (55 kg) and an adult female (45 kg) and a child of 5 years weighting 15 kg. On a diet survey of this family it was observed that the consumption per day in terms of the proximate principles and nutrients are as follows:

Protein	150 gms.
Carbohydrates	2000 Caloris
Fats	100 gms.
Vit A	1000 I.U.
Vit B	10 mgm
Vit C	150 mgm

Suggest improvements confiming your attention to the above nutrients only.

2. On analysis, it was found that diet of an adult male doing moderate work contained following nutrients:

a) CHO	250 g	e) Thiamine	0.5 mg
b) Fat	30 gs	f) Vit C	25 mg
c) Protein	25 g	g) Calcium	0.5 mgm
d) Vit A -	4000 I.U.	h) Iron	10 mg

a) Comment on the quantity and quality of the diet?

3. A mother with an infant of 6 months old, wants to start her child with artificial feeding with bufallo's milk. Calculate the quantity of the buffalo's milk and its strength and the number of feeds per day that you would advise? Considering the deficiencies in the milk, enumerate the supplments to be advised for this child from your knowledge of commonly available food stuffs.

4. As a medical officer of a PHC what would you do if you come across Vit A deficiency conditions among many members of a family?

5. Put up a balanced diet for a family consisting of a father, a lactating mother and a boy aged 12 years.

6. In your practice as a family physician you encounter nutritional deficiency cases in a family. What investigations would you conduct to determine that it is due to lack of proper diet? Give the composition with quantity, of a balanced diet in a family consisting of father 40 years, mother 35 years, one son 15 years, two daughters of 10 years and 6 years respectively.

7. Describe how you would conduct a diet and nutrition survey in a boarding hostel having 100 students in the Primary school age group and suggest measures to improve the nutritional status of these students.

8. A family consists of the following members:

a) Old lady of 60 years (40 kg);
b) An adult male going to office (55 kg);
c) An adult female (45 kg);
d) Two sons and two daughters of 15, 13, 11 and 17 years of age.

Give a schedule of balanced diet for this family in terms of Rice, Pulses, Greenleafy vegetables, Root Vegetables, other vegetables, milk, sugar, fish meat, eggs, and oil.

..2

9. Prescribe a diet for a family of 4 whose monthly income is Rs.400/- of father, mother, sons and daughter.

10. Comment on the following daily diet:

i)	Raw rice polished	- 16 oz.	480 gms.
ii)	Pulses	- 1 oz.	30 gms.
iii)	Greenleafy vegetables	- ½ oz.	15
iv)	Brinjals	- ½ oz.	15 gms.
v)	Butter milk	- 4 oz.	120 gms.
vi)	Sugar	- ½ oz.	15 gms.

11. Suggest improvements <u>without increasing</u> the cost of the diet <u>very much?</u>

12. Comment on the following:-

a) Pasteurised milk is positive for phosphotase test.

b) Infant should be started on solid diet after 6 months of age.

c) Mixed cereals is desirable than a single cereal in our diet.

©©©©

Date :

Marking

PEM (10)

1. Different Syndroms - K & M

2. Appearance - Face
Wasting
Odema
Skin
Hair
Organomegaly
Assoc. V.I Deff signs
Assoc Infections

Wt/Ht changes & Skds

Mental Changes
Delayed Miles Stones

3. Tabulated differences

Nutr Blindness/Prevention (5)

1. Causes - 2
2. Manifn - 2
3. Req.
4. Sources
5. Prev Measures - I
Large Scale
National

Comments

Date : 19/9/81

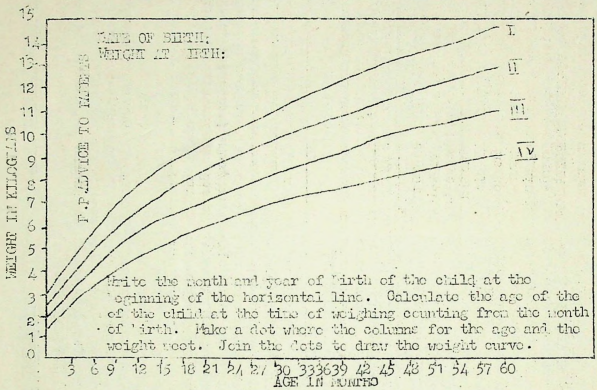
1. Age groups affected by PCM.
2. Clinical Symptom

Non pitting oedema
deformed bones
Unproportionate limbs.
Bouts of gidderness
Schizophrenic
Kelikis
Angular dermatitis
Mental retardation - diff

3. Anore Vit Deficiencies - A etc -
4. Mineral oil - rewards absorption ?
5. Biochemical Pathways - not necessary
6. Reversion of PEM not asked for
7. Temperature chart / Body wt

PARENTS SHOULD BE ENCOURAGED TO TAKE THEIR CHILDREN REGULARLY TO THE CLINIC AT THE SUBCENTRE FOR A HEALTH EXAMINATION, WEIGHING AND MEASURING.

WEIGHT CURVE FROM BIRTH TO 5 YEARS OF AGE



Weights of average well-fed healthy children should be above the uppermost line I.
Children whose weight falls between lines I and III are under-nourished and require supplementary feeding at home.
Children whose weight falls below line III are severely malnourished. Consult the doctor and follow his advice.
Children whose weight falls below line IV will have to be hospitalized for treatment.

Fig. 11.3: Weight curve chart

2. Measuring Mid-arm Circumference: The identification of children who are malnourished can also be done by measuring the distance around the mid-arm. This should be done by having the arm hang loose at the side of the body and placing the arm circumference scale at the mid-point as shown in fig. 11.4a & b. Any child between the ages of one and five years is considered to be malnourished if this measurement is less than 12.6 cm.*

.....Contd/65-

IMMUNIZATION SCHEDULE

SMALLPOX

Primary: at birth or as soon after as possible — Date*
Examination of Scar — Date
REVACCINATION at one year — Date
and every three years, thereafter — Date

TUBERCULOSIS (B.C.G)

Primary: at birth or as soon after as possible — Date
Examination of Scar — Date

DIPHTHERIA-WHOOPING COUGH-TETANUS)

(Triple Vaccination)
Primary: from 4th month — Date
Two injections at interval of 8-12 weeks — Date
BOOSTER: 1-1/2 - 2 years — Date
5 years

POLIOMYELITIS (Oral trivalent Vaccine)

Primary: from 4th month — Date
three doses by mouth 4-6 weeks interval — Date

TYPHOID-PARATYPHOID

Primary: at 1-1/2 years or latter — Date
Two doses at 7-10 days interval — Date
BOOSTER: Two doses at 7-10 days interval every year — Date

DIPHTHERIA - TETANUS

Primary: when triple vaccine not given during infancy — Date
Two injections at 8-12 weeks weeks interval — Date
BOOSTER: One injection at 5 years — Date

*The doctor/nurse will record the date of giving the injection and tell you when to bring the child for the next one.

GUIDE TO NUTRITION

BIRTH TO ONE YEAR: Breast Feed

Breast milk is not enough for the baby after six months. He needs additional nourishment. Continue breast feeding as long as possible and introduce the following solids gradually.

FOURTH MONTH

Introduce fresh cow, buffalo, goat or tinned powder milk if breast milk is insufficient. Rice, Suji, Ragi (Dhalia) etc., well cooked to a soft consistency and sweetened. Vegetables like potato, carrot, cooked and mashed. Mashed ripe banana-sweetened, orange/ sweet lime/tomato juice.

SIXTH MONTH

In addition to solid foods already given introduce the following:
Bread, biscuits, dhals like Bengal gram, lentil, red gram - well - cooked, Fish-Boiled, Meat - well- cooked and tender, Eggs-half boiled, Curd, butter-milk-Channa (Casein), vegetables like cauliflower, cabbage, cucumber, etc. All fruits.

ONE YEAR

Child can share the family food, except hot and spiced foods.
Do not wait for the baby to cut his teeth to give solid foods. He will digest well cooked vegetables, rice, suji, etc., even if he has no teeth to chew them.
Wash your hands before preparing food, cooking or feeding.
All food for the baby should be freshly prepared, no left-over be given.
All utensils like cups, spoons, bottles etc. should be washed in boiled water and kept covered.

M.C.H. CARD II

Child' Card
(To be kept with the mother)

FHC/S.C/I.C.D. Centre
Registration No. — Vill
Name: — M/
Date first seen:
Date of birth : — Cri
No. of brothers: — bir
Religion: — Sik
Diet: Vegetarian/Non
Mother's name:
Occupation:
Father's name :
Occupation :
Address :

Medical notes:
Blood Group :
Allergies:
Other information:
Family Planning status of p

Have your child weighed regu
Weight will be marked on thi
Bring your child to the cent
month till his second birthd
every three months till his 5
birthday and any time he does
appear well. Protect your ch
from diseases by giving him i
zations shown on this card.
services are given without la

Ministry of Health and Famil
planning, Nirman Bhavan, New

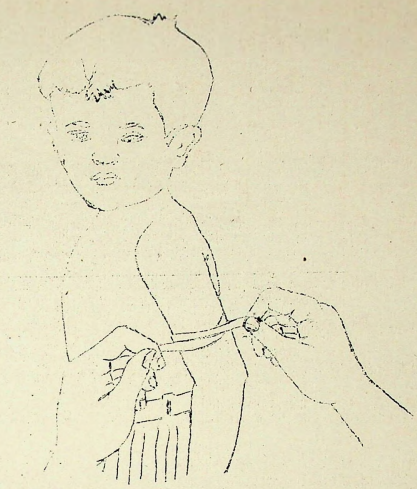
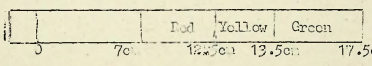


Fig. 11.4a: Measuring mid-arm circumference



ARM CIRCUMFERENCE SCALE

Colour Code	
Red	under 12.5cm Malnourished
Yellow	12.5-13-5cm Possible malnutrition
Green	over 13.5cm Normal

(adapted from Adnan Shakir & David Morley-1 The Lancet.P 758-759, April 20, 1974

Mal-nourished

Possible Mal-nutrition

Normal

Fig: 11./b: Arm circumference tape

3. Characteristics of Children who are likely to Develop Malnutrition:

The systematic search for malnourished children in the community can be very fruitful when your effort s are concentrated among those who have certain social characteristics which are as follows:

i. The child is one of twins.
ii. The child has no living parents or has a stepmother.
iii. The child is cared for during the day by an older sister or brother while the mother works.
iv. The child has a younger sister or brother and the difference in age is less than one year.
v. There are four or more children in the family.
vi. The child belongs to a migrant family.
vii. The child is obviously thinner and smaller than others of his age.

4. Signs and Symptoms of Nutritional Deficiency: You should be familiar with the nutritional deficiency diseases which are encountered frequently and which can cause significant health problems. Some of these diseases occur in infants and young children, whereas others are seen in persons of all ages. A few can be fatal or can be the underlying cause of death, while others may lead to serious disability. These diseases are as follows:

a. Kwashiorkor (Protein Deficiency) is a serious disease which develops in young children, usually between one and three years, who are fed diets which lack sufficient amounts of protein and calories to meet body requirements (see fig.11.5). It can also develop in previously malnourished children following diseases such as measles, whooping cough and malaria. If adequate treatment is not provided, children with kwashiorkor can die (see section 11.8.3).

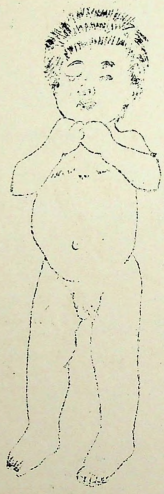


Fig: 11.5: Kwashiorkor

Fig.11.6: Marasmus

b. Marasmus (see fig.11.6) is the technical term for the severely wasted, undernourished child or adult. It is a serious disease which can occur at any age when a person does not eat or get enough food which is required by his body. In young children the condition often develops during the second year when breast feeding stops and provision is not made for giving them sufficient amounts of milk and other foods to meet the daily requirements, e.g., small supplementary feedings until the child is able to consume sufficient foods during the regular family meals (see section 11.8.3).

KWASHIORKOR AND MARASMUS ARE DISEASES WITH SERIOUS CONSEQUENCES WHICH CAN BE [illegible]

c. Anaemia (see section 11.8.4)
d. Vitamin deficiencies -

i. Vitamin A: Dryness of the eyes occurs due to the lack of vitamin A in the diet of young children (see section 11.8.5).
ii. Vitamin B: Signs of symptoms of vitamin B deficiency include: A sore mouth and tongue, cracks and sores at the angles of the mouth, pain, numbness and reduced sensation in the limbs.
iii. Vitamin C: Persons who do not consume sufficient amounts of fresh fruits and vegetables containing vitamin C develop spongy, bleeding gums, loosening of the teeth, and haemorrhages under the skin.
iv. Vitamin D: Rickets is a disease caused by a deficiency of vitamin D in the diet, or lack of exposure of the skin to sunlight. It can result in permanent deformities in the bones (see fig.11.7). Signs and symptoms include soreness and tenderness of the body, delayed eruption of teeth, bulging of the bones of of the head in young children, bow legs, beading of the ribs and deformities of the pelvic bones and spine.

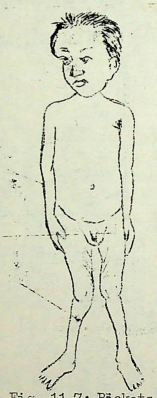


Fig. 11.7: Rickets

Fig. 11.8: Goitre

e. Mineral deficiencies:

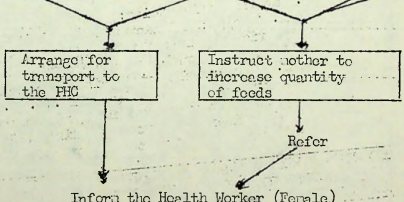
i. Calcium: A deficiency of calcium in the diet can result in rickets, interference with the clotting of blood, deformities of bones such as knock-knees and poor teeth.
ii. Iodine: Goitre is a disease characterized by swelling in the front of the neck (see fig.11.8). It occurs most frequently in areas where the food and water are deficine in iodine. The increasing use of iodized salt by persons living in such areas has decreased the number of people affected by goitre.

ANY PERSON WHO HAS SIGNS OR SYMPTOMS OF MALNUTRITION SHOULD BE FURTHER SCREENED SINCE HE WILL OFTEN HAVE MORE THAN ONE NUTRITIONAL DEFICIENCY.

11.8.3 KWASHIORKOR AND MARASMUS

If an infant or pre-school child (under five years) is found to have any of the following signs and symptoms, proceed as follows:

	Kwashiorkor	Marasmus
General appearance	Miserable and apathetic	Alert to people and surroundings
Oedema of feet and legs*	Yes	No
Appearance of face	Fat or "moon" face	Thin or "old man's" face
Hair colour and texture	Lighter than in others or reddish and brittle	Normal colour and Springy
Weight	Below normal	Very much below normal
Muscles	Thin and flabby	Very thin, bones showing
Skin	Stretched and taut, also has flaking of skin	Shrivelled and wrinkled
Appetite	Refuses food	Accepts food offered



*To check for oedema, see section 21.4

Both of the above children have severe malnutrition and must be referred to the Primary Health Centre for further treatment. Unless prompt referral is made, such children may die.

11.8.4 ANAEMIA

Anaemia is a condition which is commonly found in pregnant and nursing women and in children.

(For causes, signs and symptoms of anaemia see section 21.5).

ONE OF YOUR IMPORTANT TASKS AS A HEALTH WORKER IS TO IDENTIFY ANAEMIC WOMEN AND CHILDREN IN THE COMMUNITY AS EARLY AS POSSIBLE SO THAT THEY CAN BE TREATED PROMPTLY AND BE TAUGHT HOW TO PREVENT THE RECURRENCE OF THIS CONDITION.

1. Facts that you should know about anaemia and health

   i. Children who are anaemic suffer from minor illnesses more often than those who are healthy, and the illness is often more severe than in normal children.

   ii. The incidence of anaemia and its effect on health is highest among pregnant and nursing women and pre-school children.

   iii. Pregnant women who are anaemic often have serious complications, e.g., haemorrhage during childbirth, and produce babies who are also anaemic at birth.

   iv. Anaemic invididuals generally take a longer time to recover from infections.

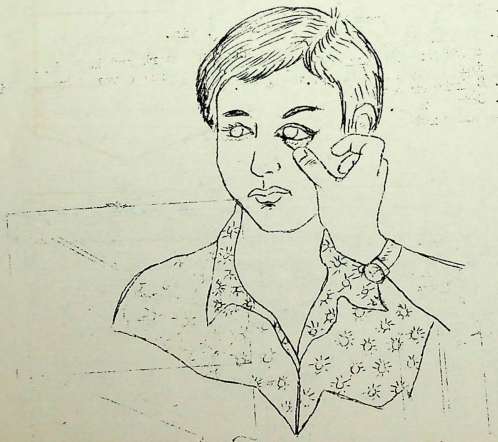


Fig. 11.9: Examining the ye fer anaemia

2. Method for identifying those are are anaemic: There are several ways that can be used to find those who are anaemic as you make your house-to-house visits. Look for mothers and children whose skin is pale and those who tire easily and have little energy since these are the signs that are commonly associated with anaemia. Such persons should further be examined as follows:

   i. Pull down the lower eyelid to look at the colour of the conjunctive (see fig.11.9).

REMEMBER TO WASH YOUR HANDS BEFORE DOING THIS AND BE CAREFUL NOT TO [illegible] COMMUNITY [illegible]

- If the conjunctiva is pale pink or colourless, the person is anaemic. A bright pink conjunctiva usually means that there is no anaemia.

ii. Pull down the lown the lower lip to look at the colour of the mucosa lining the mouth. If it is very pale pink or colourless the person is anaemic. A bright pink mucosa usually means that there is no anaemia.

iii. Find out the percentage of haemoglobin using a Tallquist colour scale.

Procedure for determining anaemia using the Tallquist method.

Remember that before doing any procedure, especially one that is connected with losing blood, you must get the cooperation of the individual by explaining;

i. why it is needed;
ii. how it will be done;
iii. whether there will be any pain or discomfort associated with it.

Proceed as follows:

1. Collect and assemble the equipment, viz.

i. Sterile Hagedorn needle embedded in a cork and kept in a container of spirit so that the tip remains covered by the disinfectant (see fig.11.10a & b).
ii. Spirit or Savlon.
iii. Cotton wool.
iv. Tallquist papers and colour scale.

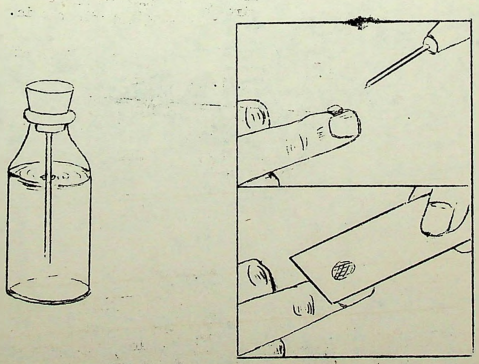


Fig.11.10:-Hagedorn needle

2. Carry out the technique: Any procedure that breaks the skin may lead to infection so it is important to take certain precautions on pricking the skin.

i. wash your hands and allow them to dry by shaking in the air.
ii. Hold the individual's finger, usually the left ring finger, or left big toe tightly for about 10 seconds to collect a good supply of blood.
iii. Wipe the area to be pricked, i.e. the side of the finger tip or big toe with cotton wool moistened with spirit or Savlon and allow to dry.
iv. Remove the needle from its container, shake off any excess spirit, and prick the finger or toe with a quick jabbing motion.
v. Squeeze the finger until a large drop of blood appears and blot it into a piece of the Tallquist paper (see fig.11.10b).
vi. Take a piece of cotton wool moistened with spirit on the finger and ask the person to press it with his thumb until bleeding stops.
vii. Compare the colour of the blood on the paper with the colour on the Tallquist scale to determine the haemoglobin level.
viii. Record the haemoglobin level on the individual's health card.
ix. Explain the test result to the individual.

3. Administration of iron and folic acid as prophylaxis against nutritional anaemia in mothers and children

Eligibility for iron and folic acid: The following criteria are to be used to determine who are eligible to be given iron and folic acid and who should be referred to the Primary Health Centre:

i. All pregnant and nursing women who have 10 gms (70 per cent) haemoglobin or less according to the Tallquist scale should be referred to the Primary Health Centre for treatment. If the haemoglobin level is between 10 to 12 gms (70 to 80 per cent) given iron and folic acid tablets.
ii. All family planning acceptors who have 10 gms haemoglobin or less, according to the Tallquist scale should be referred to the Primary Health Centre for treatment. If the haemoglobin level is 10 to 12 grams, give iron and folic acid tablets.
iii. All infants and pre-school children (under five years) who have 8 grams haemoglobin or less according to the Tallquist scale, should be referred to the Primary Health Centre for treatment. If the haemoglobin level is 8 to 12 grams give iron anf folic acid.

Dosage of iron and folic acid:

Category	Form of drug	Dosage of folic acid	Dosage of ferrous sulphate
Pregnant and nursing women and family planning acceptors	Tablets	0.5 mg daily	180 mg daily
Children under 5 years	Tablets or liquid	0.1 mg daily	60 mg daily

Give the treatment for three months. Dispense a two to four week supply of the drugs.

Health teaching related to treatment: Individuals who are anaemic and are being given iron and folic acid tablets need to have the following information:

i. Iron and folic acid are special drugs that are needed by the body for raising the haemoglobin content in the blood.
ii. To be effective, both drugs must be taken daily in the prescribed dosage together with foods rich in iron.
iii. Foods rich in iron such as leafy vegetables that are available locally should be included in the daily diet.
iv. Because the drugs can irritate the stomach they should always be taken with some food or at mealtime.
v. The tablets will make the faeces black, but this is an expected action or iron and should not cause alarm or worry.
vi. If the person has symptoms such as diarrhoea or indigestion, she should inform you about this since the dosage or frequency of the drugs may have to be changed.
vii. After three months of treatment the blood test will be repeated to find out the haemoglobin level.
viii. To avoid accidental ingestion of the drugs by small children, the medicines should be kept out of their reach.
ix. A fresh supply of drugs can be obtained either at the subcentre or from the health worker.

Making follow-up contacts: Follow-up activities can be carried out when the individual comes to the subcentre, or during home visits. Points to remember include the following:

i. If the individual does not come to the subcentre within two to four weeks after the drugs are dispensed, make a home visit to assess tolerance to the drugs, side-effects if any, regularity in taking the tablets, and whether foods rich in iron have been added to the diet.
ii. Listen to complaints related to taking drugs and reassure the individual.
iii. Dispense a two to four week supply of the drugs if needed by the individual, but urge her to obtain them from the subcentre on a regular basis.
iv. Plan to repeat the Tallquist test after the individual has been taking the drugs for three months.

Records and reports: You are required to maintain the following records and reports pertaining to the iron and folic acid tablets that you have dispensed to eligible persons in the community (see Annexure 11.6 Forms A, B and C in the Supplement to the Manual).

a. Individual recipient's health record: The individual card of the pregnant or nursing woman, child, or family planning accepter should include:

i. the date of the blood test and the haemoglobin level;
ii. the date of commencing the prophylactic treatment, dosage of the drug, and the number of tablets dispensed;
iii. the date of the repeat blood test and the haemoglobin level;
iv. the date when the drug was stopped and the reasons for stopping it.

b. Register of beneficiaries: Enter the card number, date of enrolment, name, age and category of each beneficiary and date of stopping the treatment (see Form A).
c. Stock register: The number of tablets received, issued and in balance on each date are recorded in the stock register (see Form B).
d. Monthly report to the Primary Health Centre: This is a consolidation of the information in Nos. 2 and 3 above (see Form C).

11.8.5 VITAMIN A DEFICIENCY

Vitamin A deficiency in the diet is a very serious health problem in India. A large number of pre-school children have eye symptoms as a result of their deficiency in vitamin A.

specific dates for coverage of eligible children.

iii. Select the most easily accessible location in the village to facilitate attendance and make arrangements for its use.

iv. Decide on the content and methods to be used for pre-programme publicity and health education of village leaders and parents.

v. Estimate the amount of drug needed and procure the supply and calibrated spoons or droppers from the Primary Health Centre. Store the drug in a cool, dry place.

vi. Select simple tasks to be done by volunteers and train the community members to assist with the programme.

Co-ordinating activities with the Health Worker (Female): Your task is to administer vitamin A to as many children aged one to five years as possible in each village. In order to achieve a high coverage of such children and to avoid duplication of administration, you will need to work closely with the Health Worker (Female) since you will both be making visits to the same families at different intervals for delivery of specific health services.

Procedure for administering vitamin A solution:

1. Use a 2 ml. spoon (supplied with the vitamin A solution) or a medicine dropper which is calibrated to measure the 2 lakh unit dose (2 ml) which is prescribed (see fig.11.11).
2. Instruct the mother to hold the baby in her lap with the head raised so that the solution can be placed in the side of the mouth or on the tongue.
3. Administer the drug slowly to avoid the risk of choking.
4. If the child spits out the initial dose, repeat the procedure.

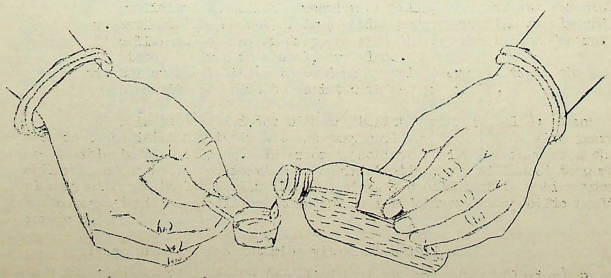


Fig:11.11: Plastic spoon for dispensing vitamin A solution

Health teaching related to vitamin A: Teach the people, especially parents, elders in the family and leaders, about the value of adding foods rich in vitamin A to the daily diet.

Records and reports: (see Annexure 11.7, Forms A, B and C in the Supplement to the Manual).

1. Individual recipient's health record: Record the details of vitamin A administration in the individual child's health record that is kept at the subcentre.
2. Register of beneficiaries: Note the date of enrolment, name, address and age of each beneficiary and date of administration of vitamin A solution (see Form A).
3. Stock register: Enter the receipt, issue and balance of vitamin A solution on each date (see Form B).
4. Monthly report to the Primary Health Centre: This is a consolidation of the information in Nos.2 and 3 above (see Form C).

PROTEIN FOOD SOURCES

PROTEIN FOODS	RATING
Vegetable sources	
Bengal gram dal	XX
Black gram dal	XX
Cow pea	XX
Green gram dal	XX
Horse gram	XX
Lentils	XX
Peas (dry)	XX
Red gram dal	XX
Soya bean	XXXX
Groundnut	XXX
Bajra	X
Cholam (Jowar)	X
Ragi	X
Rice	X
Wheat	X
Animal sources	
Cheese	XX
Panir (Cottage cheese)	XX
Milk	XX
Eggs	X
Curds	XX
Fish (fresh)	XX
Fish (dried powder)	XXXX*
Meat (goat or mutton)	XX

Legend:

X = 5 to 15 grams protein per 100 grams edible portion.
XX = 15 to 25 grams protein per 100 grams edible portion.
XXX = 25 to 35 grams protein per 100 grams edible portion.
XXXX = 35 to 45 grams protein per 100 grams edible portion.

*powdered fish contains more than 45 grams of protein per 100 grams edible portion.

NOTE: Food values in annexures 11.1, 11.2, 11.3 and 11.4 are based on tables included in 'Nutritive Value of Indian Foods' by C. Gopalan, B.V. Rama Sastri and S.C. Balasubramanian, NIN Publication, 1976.

VITAMIN A FOOD SOURCES

FOOD CONTAINING VITAMIN A	RATING
Vegetable sources	
Amaranth leaves (chaulai)	XX
Amaranth Stems	*
Bathua leaves	X
Bent greens (tops)	XX
Betel leaves	XXX
Carrot (leaves)	X
Colocasia (arvi)	XX
Fenugreek leaves (methi)	XXXX
Mango (ripe)	X
Mint leaves	X
Mustard (leaves)	X
Papaya (ripe)	X
Pumpkin	X
Radish (tops)	XX
Spinach	XXX
Turnip (tops)	XXXX
Yam	*
Animal sources	
Butter	X
Cheese	*
Fish liver oils	XXXX**
Ghee	X
Milk (fresh)	*
Sheep liver	XXXX**
Vanaspati	X
Whole powdered milk	X

Legend:

X = 1,000 to 5,000 units vitamin A per 100 grams edible portion.
XX = 5,000 to 10,000 units vitamin A per 100 grams edible portion.
XXX = 10,000 to 15,000 units vitamin A per 100 grams edible portion.
XXXX = 15,000 to 20,000 units vitamin A per 100 grams edible portion.

* Less than 1,000 units of vitamin A per 100 gms. edible portion.

** More than 20,000 units of vitamin A per 100 gms. edible portion.

.....Contd/78-

IRON FOOD SOURCES

FOODS CONTAINING IRON	RATING
Vegetable sources	
Bajra	X
Barley	*
Cholam	X
Ragi	XX
Rice (flakes)	XXXX
(hand pounded)	*
(milled)	*
Wheat (whole)	XX
Bengal gram	XX
Black gram	X
Cow pea	X
Green gram (Moong)	X
Lentils	*
Red gram dal	X
Soya bean	XX
Amaranth (tender)	XXXX**
Beet greens	XXX
Carrot leaves	X
Cauliflower greens	XXXX**
Colocasia (black leaves)	X
(green leaves)	XXX
Coriander leaves	X
Drumstick leaves	XX
Knol-khol greens	XXX
Mustard leaves	XXXX**
Neem leaves (tender)	XXX
Radish leaves	XXXX**
Turnip greens	XXXX
Vella keerai	
Animal sources	
Mutton or goat meat	*
Eggs (hen)	*
Fish meal (dry powder)	XXXX
Liver (sheep)	X
Khoa (buffalo milk whole)	X

Legend:

X = 5 to 10 mg. iron per 100 grams edible portion.
XX = 10 to 15 mg. iron per 100 grams edible portion.
XXX = 15 to 20 mg. iron per 100 grams edible portion.
XXXX = 20 to 25 mg. iron per 100 grams edible portion.

* Less than 5 mg. iron per 100 grams edible portion.

** More than 25 mg. iron per 100 grams edible portion.

.....79-

CALCIUM FOOD SOURCES

FOODS CONTAINING CALCIUM		RATING
Vegetable sources		
Ragi		XXX**
Bengal gram dal		X
Balck gram dal		XXX
Cow pea		X
Green gram (Moong) dal		X
Lentils		X
Red gram		X
Soya bean		XXXX
Animal sources		
Cheese		XXXX**
Curds		XX
Fish (dried)	7	XXXX**
Kheer		XXXX**
Khoa (Buffalo)		XXXX**
(Cow)		XXXX**
Milk (Buffalo)		XXXX
(Cow)		XX

Legend:

X = 50 to 100 mg. calcium per 100 grams edible portion.
XX = 100 to 150 mg. calcium per 100 grams edible portion.
XXX = 150 to 200 mg. calcium per 100 grams edible portion.
XXXX = 200 to 250 mg. calcium per 100 grams edible portion.

**More than 250 mg. calcium per 100 grams edible portion.

NUTRITIOUS RECIPES FOR VULNERABLE GROUPS (REGIONWISE)

NORTH

1. Wheat Besan Ladoo

Ingredients	Quantity
Wheat flour	6 teaspoons
Bengal gram flour (besan)	6 teaspoons
Groundnut	10 kernels
Jaggery (gur)	4 teaspoons

Method

1. Roast wheat flour and bengal gram flour.
2. Roast groundnut, remove the skin and crush coarsely.
3. Make jaggery syrup and add the flour mixture and groundnut to it.
4. Mix well and make into balls.

.....Contd/80-

Nutritive value: 339 calories
12.5 gm protein
Suitable for: Infants, pre-school children and school children.

NOTE: Wheat flour can be substituted by any other cereal flour. Bengal gram flour can be substituted by any other pulse flour.

2. Bajara Khichdi

Ingredients	Quantity
Bajara (millet)	6 teaspoons
Green gram dal	6 teaspoons
Rice	2 teaspoons
Leafy vegetables	4 teaspoons
Salt to taste	
Water	

Method

1. Pick bajara and grind it coarsely, sprinkling a little water on it.
2. Remove the husk of the bajara by washing it.
3. Soak it overnight in a little water.
4. Soak dal and rice for an hour after washing it.
5. Put dal and rice, bajara, and leafy vegetables chopped coarsely in a degchi.
6. Add salt and water.
7. Cook for 20 minutes or so.

Nutritive value: 250 calories
11.4 gm protein

Suitable for: Pre-school children, school children, pregnant and nursing women.

3. Paushtik Roti

Ingredients	Quantity
Wheat flour	7 teaspoons
Bengal gram flour	5 teaspoons
Green leafy vegetable, e.g., palak	2 teaspoons

1 teaspoon = 5 gms.

Vanaspati (margarine)	2 teaspoons
salt to taste	
Water as required	

Method

1. Sift together besan and wheat flour.
2. Wash green leafy vegetables, chop finely and mix with the flour.
3. Add salt and water and knead to a stiff dough.
4. Roll out chapati and place on heated tawa.
5. Turn when slightly done.
6. Pour a teaspoon of fat into the tawa and fry the chapati on both sides.

Nutritive value: 307 calories
9.8 gm protein

suitable for: school children and pregnant and nursing women.

4. Sprouted Horse Gram/Green Gram Savoury

Ingredients	Quantity
Horse gram/Green gram	6 teaspoons
Onion	2 teaspoons
Potatoes	10 teaspoons
Mango powder (amchur)	1 teaspoon
Salt and spices to taste	
Fat	1 teaspoon

Method

1. Soak gram in warm water overnight.
2. Drain water and put gram in wet cloth and hang in a warm place. Keep sprinkling water. Sprouts will appear 2 days.
3. Wash sprouted gram.
4. Chop onion and potato finely.
5. Fry onion and potato in fat and cook until potato is done.
6. Add sprouted gram and cook for 5 minutes.
7. Add salt, spices and mango powder.

Nutritive value: 217 calories
7.3 gm protein

Suitable for: school children and pregnant and nursing women.

SOUTH

5. Wheat Upma

Ingredients	Quantity
Broken wheat	6 teaspoons
Onion	2 teaspoons
Oil	2 teaspoons
Black gram dal (udath)	2 teaspoons
Drumstick leaves	1 bunch
Dried chillies	a few
Mustard seeds	a few
Curry leaves	a few
Salt to taste	
Water as required	

Method

1. Fry mustard seeds, chillies, curry leaves and dal in oil until brown.
2. Add broken wheat and fry until brown.
3. Add chopped onions and chopped drumstick leaves.
4. Add water and salt and cook over low fire until done.

Nutritive value: 237 calories
5.9 gm protein

Suitalbe for: Infants, pre-school and school children, and pregnant and nursing women.

6. Tapioca Porridge

Ingredients	Quantity
Tapioca (maravalli)	6 teaspoons
Milk	half cup
Jaggery	2 teaspoons
Grated coconut	2 teaspoons
Water as required	

NUT 6.10

H A R V A R D 50th P E R C E N T I L E

AGES	WEIGHT BOYS	WEIGHT GIRLS	MEAN WEIGHT	60% of 50 th PERCENTILE
3 MONTHS	5.72	5.62	5.67	3.40
6 "	7.58	7.26	7.42	4.45
9 "	9.07	8.71	8.89	5.33
1 YEAR	10.07	9.75	9.91	5.95
1½ "	11.43	11.11	11.27	6.76
2 "	12.57	12.29	12.43	7.46
2½ "	13.61	13.43	13.52	8.11
3 "	14.61	14.42	14.51	8.71
4 "	16.51	16.42	16.46	9.88
5 "	18.37	18.37	18.37	11.02

BALANCED DIETS FOR CHILDREN

	Pre-school Children				School children			
	1-3 years		4-6 years		7-9 years		10-12 years	
	Vegetarian (gm)	Non-vegetarian (gm)	Vegetarian (gm)	Non-vegetarian (gm)	Vegetarian (gm)	Non-vegetarian (gm)	Vegetarian (gm)	Non-vegetarian (gm)
Cereals	150	150	200	200	250	250	320	320
Pulses	50	40	60	50	70	60	70	60
Green leafy vegetables	50	50	75	75	75	75	100	100
Other vegetables Roots and tubers	30	30	50	50	50	50	75	75
Fruits	50	50	50	50	50	50	50	50
Milk	300	200	250	200	250	200	250	200
Fats and oils	20	20	25	25	30	30	35	35
Meat and fish Eggs	-	30	-	30	-	30	-	30
Sugar and jaggery	30	30	40	40	50	50	50	50

BALANCED DIETS FOR ADOLESCENT BOYS AND GIRLS

	BOYS				GIRLS	
	13-15 years		16-18 years		13-18 years	
	Vegetarian (gm)	Non-vegetarian (gm)	Vegetarian (gm)	Nonvegetarian (gm)	Vegetarian (gm)	Nonvegetarian (gm)
Cereals	430	430	450	350	350	350
Pulses	70	50	70	50	70	50
Green leafy vegetables	100	100	100	100	150	150
Other vegetables	75	75	75	75	75	75
Roots and tubers	75	75	100	100	75	75
Fruits	30	30	30	30	30	30
Milk	250	150	250	150	250	150
Fats and oils	35	40	45	50	35	40
Meat and fish	-	30	-	30	-	30
Eggs	-	30	-	30	-	30
Sugar and jaggery	30	30	40	40	30	30
Groundnuts	-	-	50*	50*	-	-

*An additional 30 gm of fats and oils can be included in the diet in place of groundnuts.

BALANCED DIETS FOR ADOLESCENT BOYS AND GIRLS

	BOYS				GIRLS	
	13-15 years		16-18 years		13-18 years	
	Vegetarian (gm)	Non-vegetarian (gm)	Vegetarian (gm)	Nonvegetarian (gm)	Vegetarian (gm)	Nonvegetarian (gm)
Cereals	430	430	450	350	350	350
Pulses	70	50	70	50	70	50
Green leafy vegetables	100	100	100	100	150	150
Other vegetables	75	75	75	75	75	75
Roots and tubers	75	75	100	100	75	75
Fruits	30	30	30	30	30	30
Milk	250	150	250	150	250	150
Fats and oils	35	40	45	50	35	40
Meat and fish	-	30	-	30	-	30
Eggs	-	30	-	30	-	30
Sugar and jaggery	30	30	40	40	30	30
Groundnuts	-	-	50*	50*	-	-

*An additional 30 gm of fats and oils can be included in the diet in place of groundnuts.

BALANCED DIETS FOR CHILDREN

	Pre-school Children				School children			
	1-3 years		4-6 years		7-9 years		10-12 years	
	Vegetarian (gm)	Non-vegetarian (gm)	Vegetarian (gm)	Non-vegetarian (gm)	Vegetarian (gm)	Non-vegetarian (gm)	Vegetarian (gm)	Non-vegetarian (gm)
Cereals	150	150	200	200	250	250	320	320
Pulses	50	40	80	50	70	60	70	60
Green leafy vegetables	50	50	75	75	75	75	100	100
Other vegetables / Roots and tubers	30	30	50	50	50	50	75	75
Fruits	50	50	50	50	50	50	50	50
Milk	300	200	250	200	250	200	250	200
Fats and oils	20	20	25	25	30	30	35	35
Meat and fish / Eggs	-	30	-	30	-	30	-	30
Sugar and jaggery	30	30	40	40	50	50	50	50

BALANCED DIETS FOR ADULT WOMEN

	Sedentary work		Moderate work		Heavy work		Additional allowances during	
	Vegetarian (gm)	Non-vegetarian (gm)	Vegetarian (gm)	Non-vegetarian (gm)	Vegetarian (gm)	Non-vegetarian (gm)	Pregnancy (gm)	Lactation (gm)
Cereals	300	300	350	350	475	475	50	100
Pulses	60	45	70	55	70	55	-	10
Green leafy vegetables	125	125	125	125	125	125	25	25
Other vegetables	75	75	75	75	100	100	-	-
Roots and tubers	50	50	75	75	100	100	-	-
Fruits	30	30	30	30	30	30	-	-
Milk	200	100	200	100	200	100	125	125
Fats and oils	30	35	35	40	40	45	-	15
Sugar and jaggery	30	30	30	30	40	40	10	20
Meat and fish	-	30	-	30	-	30	-	-
Eggs	-	30	-	30	-	30	-	-
Ground nuts	-	-	-	-	40*	40*	-	-

*An additional 25 gm. of fats and oils can be included in the diet in place of groundnuts

BALANCED DIETS FOR ADULT MAN

	Sedondary work		Moderate work		Heavy work	
	Vegetarian (gm)	Nonvegetarian (gm)	Vegetarian (gm)	Nonvegetarian (gm)	Vegetarian (gm)	Nonvegetarian (gm)
Cereals	400	400	475	475	650	650
Pulses	70	55	80	65	80	65
Green leafy vegetables	100	100	125	125	125	125
Other vegetables	75	75	75	75	100	100
Roots and tubers	75	75	100	100	100	100
Fruits	30	30	30	30	30	30
Milk	200	100	200	100	200	100
Fats and oils	35	40	40	40	50	50
Meat and fish	-	30	-	30	-	30
Egg	-	30	-	30	-	30
Sugar and jaggery	30	30	40	40	55	55
Groundnuts	-	-	-	-	50*	50*

*An additional 30 gm. of fats and oils can be included in the diet in place of groundnuts.

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BALANCED DIETS FOR ADULT WOMEN

	Sedendary work		Moderate work		Heavy work		Additional allowances during	
	Vegetarian (gm)	Non-vegetarian (gm)	Vegetarian (gm)	Non-vegetarian (gm)	Vegetarian (gm)	Non-vegetarian (gm)	Pregnancy (gm)	Lactation (gm)
Cereals	300	300	350	350	475	475	50	100
Pulses	60	45	70	55	70	55	-	10
Green leafy vegetables	125	125	125	125	125	125	25	25
Other vegetables	75	75	75	75	100	100	-	-
Roots and tubers	50	50	75	75	100	100	-	-
Fruits	30	30	30	30	30	30	-	-
Milk	200	100	200	100	200	100	125	125
Fats and oils	30	35	35	40	40	45	-	15
Sugar and jaggery	30	30	30	30	40	40	10	20
Meat and fish	-	30	-	30	-	30	-	-
Eggs	-	30	-	30	-	30	-	-
Ground nuts	-	-	-	-	40*	40*	-	-

*An additional 25 gm. of fats and oils can be included in the diet in place of groundnuts

BALANCED DIETS FOR ADULT MAN

	Sedentary work		Moderate work		Heavy work	
	Vegetarian (gm)	Nonvegetarian (gm)	Vegetarian (gm)	Nonvegetarian (gm)	Vegetarian (gm)	Nonvegetarian (gm)
Cereals	400	400	475	475	650	650
Pulses	70	55	80	65	80	65
Green leafy vegetables	100	100	125	125	125	125
Other vegetables	75	75	75	75	100	100
Roots and tubers	75	75	100	100	100	100
Fruits	30	30	30	30	30	30
Milk	200	100	200	100	200	100
Fats and oils	35	40	40	40	50	50
Meat and fish	-	30	-	30	-	30
Egg	-	30	-	30	-	30
Sugar and jaggery	30	30	40	40	55	55
Groundnuts	-	-	-	-	50*	50*

*An additional 30 gm. of fats and oils can be included in the diet in place of groundnuts.

KG1661976

PROTEIN-ENERGY MALNUTRITION

PEM can be defined as a range of pathological conditions arising from a deficiency of protein and energy, and is commonly associated with infections. It occurs more frequently in infants and young children but is also observed in adolescents and adults, mostly lactating women, especially during periods of famine or other emergencies.

PEM covers a wide spectrum of pathological conditions, the extremes being nutritional marasmus and kwashiorkor (4, 5). In practice, a large proportion of PEM cases occupy an intermediate position and are referred to as "marasmic kwashiorkor". The definitions of nutritional marasmus and kwashiorkor are as follows:

Nutritional marasmus: a condition characterized by very low body weight for age, loss of subcutaneous fat, gross muscle wasting, and absence of oedema. It is observed more frequently in infants and very young children.

Kwashiorkor: a condition characterized by oedema and low body weight for age. The following signs may be also present but are by no means universal or very marked: muscle wasting, dermatosis, hepatomegaly, hair changes, diarrhoea, and mental changes. The serum albumin level is low. The syndrome is most frequently observed in children aged 1-3 years and is precipitated by an infection or more commonly by a series of infections occurring successively or concurrently.

The manifestations of severe PEM vary widely according to the nature of the causative factors, the time for which they operate, and the age of the patient. Moreover, a child with nutritional marasmus may develop marasmic kwashiorkor and a child with marasmic kwashiorkor may present a picture of nutritional marasmus after the oedema subsides. From the public health point of view, it is often more convenient not to emphasize the distinctions but to use the more general term "protein-energy malnutrition". There has been a tendency in the past to understimate marasmus and to focus attention on kwashiorkor. It is now recognized that the proportion of marasmic children in the world is increasing steadily, especially in urban and periurban areas.

Besides the children suffering from the most severe forms of protein-energy malnutrition-namely, kwashiorkor, marasmic kwashiorkor, and marasmus a much greater number display a moderate or mild form of this type of malnutrition. The main characteristics of these children is that their weight for-age and weight-for height ratios are low in comparison with those of well-nourished children.

Finally, some children may have a low weight-for-age ratio while their weight-for height is normal. Although these children are small for their age, there is no apparent sign of actual malnutrition because of the more or less proportionate decrease in body dimensions. The term "nutritional dwarfism" has been used to describe this condition.

Protein-energy malnutrition results from the interaction of several factors, among which two are more or less directly responsible for the disease and act synergistically. They are (1) a quantitatively insufficient and qualitatively inadequate dietary intake, and (2) infectious processes such as gastrointestinal and respiratory infections and infectious diseases of childhood (11, 12).

PRINCIPAL FEATURES OF PROTEIN-ENERGY MALNUTRITION

Features	Marasmus	Kwashiorkor
Essential features		
(1) Oedema	None	Lower legs, sometimes face, or generalized
(2) Wasting	Gross loss of subcutaneous fat, "all skin and bone"	Less obvious; sometimes fat, blubbery
(3) Muscle wasting	Severe	Sometimes
(4) Growth retardation in terms of body weight	Severe	Less than in marasmus
(5) Mental changes	Usually none	Usually present
Variable features		
(1) Appetite	Usually good	Usually poor
(2) Diarrhoea	Often (past or present)	Often (past or present)
(3) Skin changes	Usually none	Often, diffuse depigmentation; occasional, "flaky-paint" or "enamel" dermatosis
(4) Hair changes	Texture may be modified but usually no dyspigmentation	Often sparse-straight and silky; dyspigmentation-greyish or reddish
(5) Moon face	None	Often
(6) Hepatic enlargement	None	Frequent, although it is not observed in some areas
Biochemistry/pathology		
(1) Serum albumin	Normal or slightly decreased	Low
(2) Urinary urea per g of creatinine	Normal or decreased	Low
(3) Urinary hydroxyproline index	Low	Low
(4) Serum free amino acid ratio	Normal	Elevated
(5) Anaemia	May be observed	Common; iron or folate deficiency may be associated
(6) Liver biopsy	Normal or atrophic	Fatty infiltration

VITAMINS

A

Oh fine and fat was Ralph the Rat,
And his eye was cold, clear grey
How mournful that he ate less fat
As day succeeded day.
Till he found each cornea daily hornier,
Lacking its Vitamin A.
'I missed my Vitamin A my dear,'
The Rat was heard to say.
'And you'll find your eyes will keratinize
If you miss your Vitamin A.'

B

Now polished rice is extremely nice
At a high suburban tea
But Arbuthnot Lane remarked with pain,
That it lacks all Vitamin B.
'And Beri-Beri is very very
Hard on the nerves' says he,
'Oh take your Vitamin B my dears,'
I heard that surgeon say.
'If I hadn't been fed on standard bread
I wouldn't be here today.'

C

The scurvy flew through the schooner's screw,
As they sailed the Arctic Sea.
They were far from land and their food was canned
So they got no Vitamin C
For 'Devils the use of orange juice'
The skipper had said, said he.
They were victualled with pickled pork,
my dears,
Those mariners bold and free.
Yet life's but brief on the best corned beef
If you don't get Vitamin C.

D

The epiphyses of Jemima's knees
Were a truly appalling sight
For the Rickets strikes where it jolly well likes,
If the Vitamin D's not right
Though its plots we foil with cod-liver oil
Or some Ultra-Violet light
So swallow your cod-liver oil, my dears,
And bonny big babes you'll be
Though it makes you sick, its a cure for rickets,
And teeming with Vitamin D.

E

Now Vitamin D, A, B, and C,
Will ensure that you're happy and strong.
But that's no use you must reproduce
Or the race won't last for long.
So Vitamin E is the stuff for me
And its praises end my son
We'll double the birth-rate yes my dear
If we all eat Vitamin E
We can blast the hopes of Marie Stopes
By taking it with our tea.

MALNUTRITION

Malnutrition has been defined as "a Pathological state resulting from a relative or absolute deficiency or excess of one or more essential nutrients, this state being clinically manifested or detected only by biochemical, anthropometric or physiological tests".

Four forms of malnutrition have been distinguished. (1) Undernutrition : This is the condition which results when insufficient food is eaten over an extended period of time. In extreme cases, it is called starvation. (2) Overnutrition : This is the pathological state resulting from the consumption of excessive quantity of food over an extended period of time. The high incidence of obesity, atheroma and diabetes in western societies is attributed to overnutrition. (3) Imbalance : It is the pathological state resulting from a disproportion among essential nutrientswith or without the absolute deficiency of any nutrient. (4) Specific deficiency : It is the pathological state resulting from a relative or absolute lack of an individual nutrient.

Classification of Nutritional Diseases :

The WHO Expert Committees on Nutrition (1962, 1971) proposed the following classification of nutritional diseases :

Nutritional Diseases :
HYPOALIMENTATION :

1. Protein-calorie Malnutrition (PCM)
   - (a) Kwashiorkor
   - (b) Nutritional marasmus
   - (c) Severe PCM, unqualified
   - (d) Moderate PCM, unspecified
   - (e) Other PCM
   - (f) Malnutrition, unspecified
   - (g) Nutritional dwarfism

2. Mineral deficiency
   - (a) Iodine
   - (b) Fluorine
   - (c) Selenium
   - (d) Calcium
   - (e) Others

3. Vitamin deficiency
   - (a) Vitamin A deficiency
   - (b) Thiamine deficiency
   - (c) Niacin deficiency
   - (d) Ariboflavinosis
   - (e) Deficiency of other B complex vitamins
   - (f) Ascorbic acid deficiency
   - (g) Vitamin D deficiency
   - (h) Sprue
   - (i) Vitamin K deficiency
   - (j) Vitamin E deficiency

4. Other Nutritional deficiencies
   - (a) Essential fatty acid deficiency
   - (b) Individual amino acid deficiency
   - (c) Other states and unspecified

HYPERALIMENTATION :

- (a) Obesity
- (b) Hypervitaminosis A
- (c) Carotenaemia
- (d) Hypervitaminosis D
- (e) Fluorosis
- (f) Other

FOOD TOXICANTS :

- (a) Lathyrism
- (b) Epidemic dropsy
- (c) Aflatoxicosis

p. t. o.

Diseases of the Blood and Blood Organs :

PERNICIOUS ANAEMIA :

(a) Subacute combined degeneration

NUTRITIONAL DEFICIENCY ANAEMIA :

(a) Iron deficiency anaemias
(b) Other deficiency anaemias (folic acid, vitamin B_{12}, vitamin B_6, protein)

INDICATORS OF MALNUTRITION :

It will be useful to bear in mind the following "indicators of mal-Nutrition" while assessing the nutritional status as well as evaluation of nutritional programmes in a community.

(1) Statistical:

(a) the mortality in the age-group under one year (especially 6-12 months).

(b) the mortality in the age group 1-4 years.

(c) the ratio of deaths of children less than 5 years of age to total deaths.

(2) Anthropometric :

(a) the weight of the newborn.
(b) the percentage of newborn weighing less than 2,500 grams
(c) the height and weight of children aged up to 5 years
(d) the average weight of 7-year old children entering school.
(e) The index weight/height is regarded as a simple and reliable indicator of the nutritional status of preschool children in a community. An index of 0.15 has been used as a dividing line between well-nourished and mal-nourished children.

(3) Clinical:

(a) the number of cases of mal-nutrition admitted annually in hospitals and health centres.
(b) diagnosis of individual nutritional deficiency diseases.
(c) the proportion of pregnant women with less than 10 g of haemoglobin per 100 ml of blood in the last trimester of pregnancy.

(4) Dietary Examination:

(a) Intake of calories, proteins and other nutrients :
(b) Studies of dietary habits.

Degrees of Malnutrition:

While studying malnutrition ininfancy and childhood with special reference to kwashiorkor, Gomez(1955) was able to draw up the following classification by assessing the percentage of underweight in relation to average

(1) First Degree Malnutrition:

Weight between 85 and 75 per cent of the theoretical average for the age

(2) Second Degree Malnutrition:

Weight between 75 and 60 per cent of the theoretical average for the age

(3) Third Degree Malnutrition:

Weight below 60 per cent of the theoretical average for the age.

NUTRITION

Milk: It is an ideal food for infants and children and a good supplementary food for adults. It is nearly a complete food existing in nature. It contains all the nutrients.

Composition:

	Gms. per 100 gms		
	Cow's milk	Buffalo's milk	Human milk
Protein	3.2	4.3	1.1
Fat	4.1	8.8	3.4
Lactose	4.4	5.0	7.4
Calories	67	117	68

Rich: in calcium

Deficient: It is deficient in iron and vitamin C

Daily requirement: Adults 10 oz or 284 gms (non-vegetarian requirement - 20 oz or 568 gms)

Children 20 oz

Expectant mothers 40 oz

Milk borne infections: from the animal - Bovine tuberculosis, (Brucellosis) anthrax, echinococcosis, Q. Fever

from the human handler & environment - typhoid, paratyphoid, dysentries, cholera, diphtheria, infective hepatitis.

Prevention: Pasteurization - if effectively done - phosphatase test will be negative

Boiling

Rice: Main cereal consumed in south India, cheapest source of energy and contributes 70-80% of calories. Main source of thiamine and nicotinic acid. By virtue of its quantity it provides nearly 50% of protein requirements. Proteins of rice is of better quality than wheat although the protein content of wheat is more.

Composition:

	Gms. per 100 gms				
	Protein	CHO	Fat	mgm Thiamine	mgm Nicotinic
Raw rice(mld)	6.8	78.2	0.5	0.06	1.9
Parboiled rice (mld)	6.4	79.0	0.4	0.21	3.8

Parboiled rice is superior in nutritive value to raw rice as regards the thiamine and nicotinic acid are concerned.

Daily requirements: 14 ozs or 400 gms. If milled raw rice is being consumed, it can be partially substituted by wheat, jowar or ragi. This improves the nutritive value of the diet (N.B. 100 gms or rice contains more proteins than in 100 gms of milk).

Wheat: Next to rice, wheat is the most important cereal

Daily requirements: 14 oz or 400 gms

Composition: (whole wheat)

	Per 100 gms
Protein	11.8 gms
Fat	1.5 gms
CHO	71.2 gms
Thiamine	0.45mgms
Niacin	5.60mgms

Though it has protein to the extent of 11.8% it lacks in lysine. It is a good source of thiamine and niacin.

Millets: Jowar and Ragi : - Jowar is deficient in lysine and has an excess of leucine. The consumption of jowar is occasionally found to be associated with pellagra.

Ragi is a popular millet in South India. It is very rich in calcium, and is a fair source of iron, phosphorous and thiamine.

Daily requirements: In combination with cereals daily requirement is 14 oz or 400 gms.

Composition:

	Gms. per 100 gms		
	Protein gm	CHO gm	Calcium gm
Jowar	10.4	72.6	25.0
Ragi	7.3	72.0	344.0

Pulses: Pulses are next in importance to cereals as an article of diet in India. The common pulses used are red gram, green gram, black gram dhal, Bengal gram, dry beans, and dried peas.

Pulses are rich in protein containing about 20-25 g of protein per 100 gms. In vegetarian diets, pulses are the main source of protein. Pulses are good sources of B group vitamins, especially thiamine and riboflavine. Sprouted pulses are good sources of vitamin C.

Daily requirements: 3 oz or 85 gms

	Mgm per 100 gms			
	Proteins %	mgm Thiamine	mgm Niacin	mgm Riboflavine	mgm Iron
Bengal gram	17.1	0.3	2.9	0.15	10.2
Black gram	24.0	0.42	2.0	0.37	9.1
Red gram	22.3	0.45	2.9	0.19	5.8
Green gram	24.0	0.47	2.1	0.39	7.3

Groundnuts: Groundnuts or Peanuts are extensively grown in India. It is rich in fat, protein is equal to pulses. It is also rich in nicotinic acid, thiamine and riboflavine.

Composition:

	Per 100 gms	
Protein	25.3%	Groundnuts after extraction of fat is a cheap and rich source of proteins
Fat	40.1%	
CHO	26.1%	
Thiamine	0.9 mgm	
Riboflavine	0.15 mgm	
Nicotinic acid	19.9 mgm	

Daily requirements: In combination with pulses 3 oz

Green leafy vegetables: Eg. spinach, amaranth, fenu greek, cabbage are cheapest protective foods. These are excellent source of carotene and vitamin C. They are also good sources of calcium, iron, riboflavine and folic acid. They provide cellulose which acts as roughage. It plays an important role in persons who go on diet to cut down calories.

Daily requirements: 4 oz or 114 gms.

Oils: Eg. groundnut oil, gingelly oil etc. vegetable fat. It is 100% fat, yields 900 calories per 100 gms. Contains no vitamin, contains more of polyunsaturated fatty acids. Lowers the serum cholestrol.

Daily requirements: 2 oz or 57 gms

Ghee: Animal. Except for little moisture it nearly cent per cent fat. Yields between 820 to 895 calories. Good source of vitamin A (200 i.u./100 gms) contains more of saturated fatty acid and hence tries to raise serum cholestrol.

Daily requirements: In combination with other fat like oil 2 oz (N.B. vegetable fats usually do not contain vitamin A)

Vanaspathi: Popular cooking media in our country. It is manufactured by hydrogenation of vegetable oils. On hydrogenation saturated fatty acid content increases. Gives about 700 i.u. of A and 150 i.u. of 'D' per 100 gms. It is 100% fat and yields 900 calories.

Daily requirement: In combination with other fats 2 oz.

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* These are added by manufacturers according to government regulations.

NUTRITION

Milk: It is an ideal food for infants and children and a good supplementary food for adults. It is nearly a complete food existing in nature. It contains all the nutrients.

Composition:

	Gms. per 100 gms		
	Cow's milk	Buffalo's milk	Human milk
Protein	3.2	4.3	1.1
Fat	4.1	8.8	3.4
Lactose	4.4	5.0	7.4
Calories	67	117	65

Rich: in calcium

Deficient: It is deficient in iron and vitamin C

Daily requirement:

Adults	10 oz or 284 gms (non-vegetarian) (vegetarian requirement - 20 oz or 568 gms)
Children	20 oz
Expectant mothers	40 oz

Milk borne infections: from the animal - Bovine tuberculosis, (Brucellosis) anthrax, achinomycosis, Q. Fever
from the human handler & environment - typhoid, paratyphoid, dysentries, cholera, diphtheria, infective hepatitis.

Prevention: Pasteurization - if effectively done - phosphatase test will be negative
Boiling

Rice: Main cereal consumed in south India, cheapest source of energy and contributes 70-80% of calories. Main source of thiamine and nicotinic acid. By virtue of its quantity it provides nearly 50% of protein requirements. Proteins of rice is of better quality than wheat although the protein content of wheat is more.

Composition:

	Gms. per 100 gms			mgm	mgm
	Protein	CHO	Fat	Thiamine	Nicotinic
Raw rice (mld)	6.8	78.2	0.5	0.06	1.9
Parboiled rice (mld)	6.4	79.0	0.4	0.21	3.8

Parboiled rice is superior in nutritive value to raw rice as regards the thiamine and nicotinic acid are concerned.

Daily requirements: 14 ozs or 400 gms. If milled raw rice is being consumed, it can be partially substituted by wheat, jowar or ragi. This improves the nutritive value of the diet (N.B. 100 gms or rice contains more protein than in 100 gms of milk).

Wheat: Next to rice, wheat is the most important cereal

Daily requirements: 14 oz or 400 gms

Composition: (whole wheat)

	Per 100 gms
Protein	11.8 gms
Fat	1.5 gms
CHO	71.2 gms
Thiamine	0.45mgms
Niacin	5.60mgms

Though it has protein to the extent of 11.8% it lacks in lysine. It is a good source of thiamine and niacin.

Millets: Jowar and Ragi : - Jowar is deficient in lysine and has an excess of leucine. The consumption of jowar is occasionally found to be associated with pellagra.

Ragi is a popular millet in South India. It is very rich in [illegible]

Daily requirements: In combination with cereals daily requirement is 14 oz or 400 gms.

Composition:

	Gms. per 100 gms		
	Protein gm	CHO gm	Calcium gm
Jowar	10.4	72.6	25.0
Ragi	7.3	72.0	344.0

Pulses: Pulses are next in importance to cereals as an article of diet in India. The common pulses used are red gram, green gram, black gram dhal, Bengal gram, dry beans, and dried peas.

Pulses are rich in protein containing about 20-25 g of protein per 100 gms. In vegetarian diets, pulses are the main source of protein. Pulses are good sources of B group vitamins, especially thiamine and riboflavine. Sprouted pulses are good sources of vitamin C.

Daily requirements: 3 oz or 85 gms

	Mgm per 100 gms			
	Proteins %	mgm Thiamine	mgm Niacin	mgm Riboflavine	mgm Iron
Bengal gram	17.1	0.3	2.9	0.15	10.2
Black gram	24.0	0.42	2.0	0.37	9.1
Red gram	22.3	0.45	2.9	0.19	5.8
Green gram	24.0	0.47	2.1	0.39	7.3

Groundnuts: Groundnuts or Peanuts are extensively grown in India. It is rich in fat, protein is equal to pulses. It is also rich in nicotinic acid, thiamine and riboflavine.

Composition:

	Per 100 gms	
Protein	25.3%	Groundnuts after extraction of fat is a cheap and rich source of proteins
Fat	40.1%	
CHO	26.1%	
Thiamine	0.9 mgm	
Riboflavine	0.15 mgm	
Nicotinic acid	19.9 mgm	

Daily requirements: In combination with pulses 3 oz

Green leafy vegetables: Eg. spinach, amaranth, fenu greek, calbage are cheapest protective foods. These are excellent source of carotene and vitamin C. They are also good sources of calcium, iron, riboflavine and folic acid. They provide cellulose which acts as roughage. It plays an important role in persons who go on diet to cut down calories.

Daily requirements: 4 oz or 114 gms.

Oil: Eg. groundnut oil, gingelly oil etc. vegetable fat. It is 100% fat, yields 900 calories per 100 gms. Contains no vitamin, contains more of polyunsaturated fatty acids. Lowers the serum cholestrol.

Daily requirements: 2 oz or 57 gms

Ghee: Animal. Except for little moisture it nearly cent per cent fat. Yields between 820 to 895 calories. Good source of vitamin A (200 i.u./100 gms) contains more of saturated fatty acid and hence tries to raise serum cholestrol.

Daily requirements: In combination with other fat like oil 2 oz (N.B. vegetable fats usually do not contain vitamin A)

Vanaspathi: Popular cooking media in our country. It is manufactured by hydrogenation of vegetable oils. On hydrogenation saturatol fatty acid content increases. Gives about 700 i.u. of A and 150 i.u. of 'D' per 100 gms. It is 100% fat and yields 900 calories.

Daily requirement: In combination with other fats 2 oz.

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[illegible]ded by manufacturers according to government regulations

Sugar & Jaggery: These are carbohydrate foods. Sugar is a pure carbohydrate food and contains no proteins, fats or minerals. 400 cal./100 gm.

Jaggery: Is used in place of sugar. 383 cal./100 gms. It is also rich source of iron 11.4 mgm/100 g.

Daily requirement: Sugar and/or jaggery - 2 oz or 57 gms.

Egg: It is an important source of animal protein. It contains also the nutrients except CHO. It contains protein, fat, calcium, all the vitamins except C. It is a complete protein containing all essential amino acids.

Composition:

Protein	13.3%
Fat	10.3%
Minerals	1%
K Cals	1+3

Daily requirement: 1 egg (1½ oz)

Root and tubers: Generally used as vegetables.

Potatoes, tapioca, carrot, onion, raddish. These especially potatoes are rich in CHO. Poor source of fat and protein. Good source of calcium and phosphorous.

Carrot rich in carotene
Potatoes rich in vitamin C

Daily requirement: 3 ozs or 85 gms.

RAVI NARAYAN

9. LANGFORD ROAD. BANGALORE-25, INDIA.

Proteins

Item	Qty	Protein/gms
1. Cows Milk.	1 qt (4 cups)	32
2. Buttermilk	1 cup	9
3. Curds	1 cup	8
4. Milk pudding	1 cup	9
5. Procesed cheese	1 oz	7
6. Eggs.- boiled, poached or raw	2	12
7. Banana	1 medium	1
8. Dates (dried)	1 cup	4
9. Orange juice	1 glass	2
10. Whole wheat bread	1 slice	2
11. Cornflakes	1 cup	2
12 Biscuit = 2½"	1	3
13. Polished Rice	½ cup	6

Calcium - 800 mg.

Iron = 10 mg.

Vit A - 5000 units

B_1 = 1 mg. 2 mg

B_2 = 1.6 mg 3 mg.

Niacin = 17 mg. 34 mg.

B_{12} = 1.5 µcg.

Vit C = 70 mg

Pantothenic acid = 100 - 200 mg

9/8/79 NUTRITION IInd MB IIIrd Sem.

Nutrients — rqmts / sources

Nutrient	Rqmt	Source
① Protein	= Vary ~ age, sex, physio cond eg preg/lact", inf", warm wfeat"; stress emotional disturbances = Also depends on the foll i) Digestibility coeff (DC) ii) Biological value (BV) iii) Net prot. utilization (NPU) iv) Prot. efficiency ratio (PER) = Adult 1gm/kg body wt/day pregnancy " +10 g lact" " +20g infants(0-3) 2·3 g/kg/day. 3-9 mths 1·8 " 9-12 1·5 " children 1·9-1·4 "	i) Animal - egg, milk, meat, fish 2) Plant - pulses, cereal nuts, beans, oilseed cake 3) MF, Bajra, soya milk, fish prot conc, leaf prot conc (i) mutual supplement of prot - for biologically incomplete plant prot eg cereals def in lysine & threonine + pulses in methionine - limiting a.a. ∴ comb (ii) AA imbalance - Xs of leucine in jowar/maize cause in conversion of tryptophan to niacin ∴ pellagra)
② Fat	EFA (less F.A) - 5g/day. or visible fat - 15g/day upper limit 30% of energy intake (Sat. fat shd not be >10% of total energy intake).	(i) Animal - ghee, butter, lard, fish oils - poor in EFA, but contain Vit A+D. (2) Veg - edible oils eg groundnut, mustard, gingelly, cottonseed, safflower, coconut, cereal - coconut (copra) others rich in EFA Invisible fats in milk, egg, fish, meat, cereals, pulses.
③ Carbohydrate	- 50-70% of total energy intake/day. (adult resource is only 500 g) Indians consume Xs - abt 90%.	① Starch - cereals & millets, - roots + tubers ② Sugars - ③ Cellulose - fibrous bulky of fruits / veg / cereals - roughage

9/8/79 NUTRITION IInd MB IIIrd Sem.

Nutrients — rqmts / sources

Nutrient	Rqmt	Source
① Protein	= Vary ~ age, sex, physio cond eg preg/lact, inf, worm infest, stress emotional disturbances = Also depends on the foll i) Digestibility coeff. (DC) ii) Biological value (BV) iii) Net prot. utilization (NPU) iv) Prot. efficiency ratio (PER) = Adult 1gm/kg body wt/day pregnancy " +10g lact " +20g infants(0-3) 2.3g/kg/day 3-9 mths 1.8 " 9-12 1.5 " children 1.9-1.4 "	i) Animal - egg, milk, meat, fish 2) Plant - pulses, cereal nuts, beans, oilseed cake 3) MF, Balahar, soya milk, fish prot conc, leaf prot conc (i) mutual supplement of prot - for biologically incomplete plant prot eg of cereals def in lysine & threonine + pulses in methionine - limiting a.a. comb (ii) A.A. imbalance - Xs of leucine in jowar/maize cause in conversion of tryptophan's niacin ∴ pellagra
② Fat	EFA (less F.A) - 5g/day or visible fat - 15g/day upper limit 30% of energy intake (Sat. fat should not be >10% of total energy intake).	(i) Animal - ghee, butter, lard, fish oils - poor in EFA, but contain Vit A+D. (2) Veg - edible oils eg groundnut, mustard, gingelly, cottonseed, safflower, coconut, except coconut (sat) others rich in EFA Invisible fats in milk, egg, fish, meat, cereals, pulses.
③ Carbohydrate	- 50-70% of total energy intake/day. (adult reserve is only 500g) Indians consume Xs - abt 90%,	① Starch - cereals + millets - roots + tubers ② Sugars - ③ Cellulose - fibrous bulk of fruits / veg / cereals - envelope

Nutrient	Remk		Source
(4) Vit A	Retinol	Beta Tene	(1) animal – liver, egg yolk, butter, cheese, milk, fish, ghee
	adults/preg – 750	3000 ug/day	
	lact" 750+400	3000+1600.	(2) plant – fresh GLV, yellow veg + fruit – carrot, pumpkin, papaya, mango.
	infants 400 → 300		
	children 250 – 600		(3) fish liver oil.
			(4) fortified foods – dalda
(5) Vit D	adult – 2.5 ugm/day (100 IU)		(1) Sunlight on 7-dehydrocholesterol
	infants + children – 10 " (400 IU)		(2) foods – ONLY OF ANIMAL ORIGIN liver, eggs, butter, milk, fish liver oils.
	preg + lact" – 10 " (400 IU).		(3) fortified foods – dalda
(6) Vit K	unknown		(1) GLV + fruits
			(2) Synth by bact in intestines
(7) Thiamine B1	0.40 mg/1000 Kcal		cereals, pulses, nuts, oilseeds (meat, fish, eggs, relatively poor)
(8) Riboflavin	0.60 mg/1000 kcal	(effect of milling)	1) G.L.V, liver meat, milk eggs
			2) cereals pulses – not v. rich source
(9) Niacin	6.6 mg/1000 Kcal		1) cereals, pulses, g nut.
			2) liver, meat, fish.
(10) Pyridoxine	1.25 mg/100 g prot.		whole cereals, legumes liver, meat, fish.
(11) Pantothenic acid	10 mg/day		widely distributed
(12) Folates	adult – 200 ugm		widely distributed esp in
	preg – 400 "		1) GLV
	lact" – 300 "		2) liver/eggs.
	children – 50-100 "		

Nutrient	Rqmt	Source
(13) Vit C	adult — 50 mg/day	1) Fruits — Amla, guava
	preg — 50 "	2) Veg esp grn, also roots + tubers esp potato.
	lact — 50+30 "	3) germinated pulses
	infants + children — 30 to 50 "	4) animal sources contain vit C.
(14) Calcium	adult — 400-500 mg/day	1) Milk + milk prod
	preg + lact — 1000 mg/day	2) Veg - grn
	infants - 500-600	2) Fish
	children - 500-700	3) Fruit — straphof, dried raisins, apricot, dates
		4) Cereals esp ragi
		5) Betel leaf & lime
		6) water.
(15) Iron	adult ♂ & ♀ - 20 mg/day	a) Animal - liver, meat, fish, eggs
	menstr ♀ — 30 "	1) Veg - cereals, pulses, veg esp grn, nuts, oilseeds, jaggery, dried fruit.
	preg — 40 "	
	lact — 30	
	children — 15-20	
	infants — 1 mg/kg	
		11) cook in iron vessels

— x —

The foods we eat have been classified on the basis of their nutritive value into the following groups.

1) cereals & millets - 345 kcal/100g, 7-14% prot, vit B.
2) legumes/pulses
3) Nuts & oilseeds
4) Veg — a - leafy, b - roots & tubers, c - others
5) fruits
6) Milk & milk prod
7) Meat fish eggs
8) fats & oils
9) sugars jaggery
10) condiments & spices.
11) Misc - beverages

Keeping the Body Healthy (Part 1)

Diet

Exercise + Rest

Mental Health.

Social/Spiritual Health.

Holistic Health

NUTRITION

Nutrition is the study of foods and their actions or effects on the body. Good nutirtion means that the body is getting the required food and is able to make use of it. Nutrients are substances with special functions which are found in food and which are necessary for growth and development of the body, repair of the body tissues, and protection of the body against disease. They are of six types, viz., proteins, carbohydrates, fats vitamins, minerals and water.

People generally eat or drink when they are hungry or thirsty and, on auspicious occasions, they may eat or drink special foods, the foods that people eat every day are usually not selected on the basis of their nutritive value, but because of family habit, religion, or social custom. It has been found that many such dietary practices, especially those that are related to feeding infants, young children and pregnant women are not based on body requirements.

SOME TRADITIONAL FOOD HABITS AND CUSTOMS ARE HARFUL TO HEALTH.

Because of eating an unbalanced diet, many young children in India are frequently ill due to infections, are retarded in their physical growth, and their mental development is negatively affected. Unless good nutritional guidance is given, accepted and practised by their parents, such children will become adults who have chronic ill health and are unable to make their full contribution as productive members of the community.

In addition, infants may be born weak and malnourished because their mothers had poor diets during pregnancy. Because many women do not eat the amount and kind of food that their bodies require during pregnancy and afterwards, they become weak, have little energy to care for their babies and are unable to produce breast milk in the amounts needed by growing infants.

NOT EATING CERTAIN FOODS EVERY DAY CAN CAUSE:

i. WEAK INFANTS OF LOW BIRTH WEIGHT.
ii. INSUFFICIENT PRODUCTION OF BREAST MILK.
iii. RETARDED PHYSICAL AND MENTAL GROWTH.
iv. ILLNESS AND DEATH ESPECIALLY AMONG INFANTS AND PRE-SCHOOL CHILDREN.

11.1 PRINCIPLES OF NUTRITION

In order to be able to assist individuals and families to learn about and be able to practise good nutrition, you must know the principles of nutrition.

1. Food is necessary for keeping the cells and tissues of the body alive and for maintaining normal body functions.
2. An adequate daily fluid intake is necessary for maintaining the fluid balanced diet includes.
3. A balanced diet includes:

   i. a sufficient number of calories;
   ii. adequate amounts of proteins, fats and carbohydrates;
   iii. adequate amounts of vitamins;
   iv. adequate amounts of minerals.

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10.12.3 INFORMING COUPLES ABOUT WHAT CAN BE DONE

Points for emphasis should include the following facts:

i. Infertility can be overcome in many cases by treatmen or advice.
ii. Treatment will require more than one visit to the doctor.
iii. There is a need for both the husband and the wife to undergo physical examination and special tests to determine the cause to infertility.
iv. Learning new sex techniques may be part of the treatment.
v. Advice and treatment for infertility are available from the male and female doctors and may given at the subcentre at the time of their weekly visits, or at the PHC, or at the District hospital if specialized treatment or investigations are required.

10.12.4 REFERRING COUPLES FOR SERVICES

In making referrals, make sure that the couple:

i. know where and when to go for advice;
ii. know what to expect at the clinic;
iii. know that both of them will have to undergo investigation and treatment;
iv. have a referral chit, which gives their name, address, and the nature of their problem, and which is signed by yourself and gives the name of your subcentre. In this way, should specific follow-up be needed, such instructions can be noted by the doctor and returned to you by the couple.

10.12.5 FOLLOW-UP VISITS

You should schedule a visit to the home within two weeks after the initial referral is made to find out if the couple had been to the clinic and whether they are in need of any assistance in following the prescribed treatment. You may often find that it takes more than one visit and discussion in the home to convince infertile couples that something can be done for them. Another problem that may be encountered in that although the man may be willing for his wife to submit to an examination tests, he may refuse to do the same himself. In such a situation, he may be willing to listen to some other man in the village who has benefited from such procedures.

10.12.6 RECORDS AND REPORTS

You are expected to record the usual details of referrals made in the health card of the couples and to submit the required reports.

REMEMBER

i. PREGNANCY CAN BE PLANNED TO PROTECT THE HEATH OF THE MOTHER AND CHILD.
ii. PREGNANCY CAN BE PREVENTED TO CONTROL FAMILY SIZE.
iii. PREGNANCY CAN BE TERMINATED IF IT IS UNWANTED.
iv. INFERTILE COUPLES CAN BE HEALPED TO HAVE A CHILD.

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PROTEINS	Approx. cost	Seasonal availability	Rating
Vegetable Sources			
Horse gram	Rs.3 per Kg.	March to October	XXX
Bengal gram	Rs.2/25 per Kg.	Throughout year	XX
Moong dal	Rs.2/25 per Kg.	Throughout year	XX
Wheat	Rs.1.29 per Kg.	Throughout year	X
Animal Sources			
Buffalo Milk	Rs.2/- per Kg.	Throughout year	XX
Eggs	Rs.4/- to 5/- per dozen	Throughout year	X
Fish	Rs.8/- to Rs.12/- per Kg.	January to April September to December	XX

Annexure 11.1 contains a list of protein food sources available in India. Refer to this list of prepare your own list of protein sources available in your area.

Similar kinds of food source lists can also be made for other nutrients such as vitamin A, iron, or calcium which are also often deficient in the diets of infants and young children (see annexures 11.2, 11.3 and 11.4).

11.3.1 PROTEIN OR BODY-BUILDING FOODS

Foods that contain proteins are needs by the body daily for repairing and replacing cells. Adequate amounts of this nutrient are especially important in the diets of pregnant and nursing women, infants and young children because they have extra needs in addition to normal requirements. Pregnant women need extra protein foods to take care of the needs of the growing foetus. A nursing mother needs more body-building foods to replace what she gives to her baby through breast feeding. Infants and young children are growing at a very rapid rate and require proteins for healthy growth and development.

11.3.2 CARBOHYDRATES OR ENERGY-GIVING FOODS

In order to run, play or work, we need foods that give us energy Carbohydrates in certain foods provide the body with energy. The amount required by a person depends on the kind of activity he carries out and the time for which it is done. A man who is breaking stones all day will need more energy-giving foods than a man who sits in his shop. Children, especially pre-school children, are often not fed frequently enough during the day so that they do not receive an adequate amount of carbohydrates. When this happens, children become less active and tire easily.

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Foods rich in carbohydrates include the following:

i. Sugar, jaggery and honey.
ii. Cereals such as wheat, rice, millet, suji, maize.
iii. Vegetalbes such as potato, sweet potato, tapioca, yams.
iv. Fruit suchaas bananas, jackfruit, chikku, mango.

11.3.3. FATS OR CONCENTRATED-ENERGY FOODS

Foods that contain fats are needed by the body because they supply concentrated energy, prevent dry, scaly skin, help in the absorption of vitamin D, and improve the flavour of food. Because they are a concentrated source of energy, fats supply twice as much energy as the same amount of proteins or carbohydrates. This means that smaller amounts of fats are needed in the daily diet to meet the body requirements.

Foods rich in fats include the following:

Vegetable sources:

i. Cooking oils such as coccanut, mustard, sesame (til) or groundnut oil

Animal sources:

i. Butter and ghee
ii. Milk, curds and cheese
iii. Fish and fatty meat

11.3.4 VITAMINS OR PROTECTIVE FOODS

Vitamins are substances which are found in small quantities in several kinds of food. They are needed by the body for normal growth and maintenance of cells. The body requires vitamins in small amounts. Since the body cannot produce these substances, food sources are very important.

There are several kinds of vitamins. Some are needed for good vision and healthy eyes (Vitamin A), others for blood formation (Vitamin B), others are needed in the diet for strong teeth and bones (Vitamin D), and others for increasing resistance to infections and early healing of wounds (Vitamin C).

1. Vitamin A: In order to prevent nutritional blindness in younng children due to vitamin A deficiency in the diet, people must be informed about the kinds of foods that contain this important substance and must be encouraged to include it in their daily diet. In order to prevent night blindness and dryness of the eyes all children from one to five years are being given vitamin A solutiin twice a year. Foos rich in vitamin A include the following:

Vegetable sources:

i. Green leafy vegetables and yellow fruit like mango and papaya and vegetables like yellow punpkins and carrots.

Animal Sources:

i. Eggs and liver
ii. Milk and curds

TEACHING FAMILIES HOW TO PREVENT NIGHT BLINDNESS IN YOUNG CHILDREN IS A VERY IMPORTANT HEALTH EDUCATION ACTIVITY FOR ALL HEALTH WORKERS.

2. Vitamin B: Vitamin B is a complex vitamin consisting of several components which have various special functions.

4. Different types of food provide different kinds and quantities of nutrients.
5. The age, activity, state of health and rate of growth decide the amount and kinds of nutrients that are required by the body for healthy growth and for the maintenance of good health.

11.2 FUNCTIONS AND VALUES OF NUTRIENTS IN FOOD

All foods contain nutrients in varying amounts. Some foods are made up of only one type of nutrient whereas others may include more than one nutrient, e.g., cooking oil consists entirely of fat, while rice consists mostly of carbohydrates but also contains some protein. Because of this characteristic, foods can be classified according to the amount of the various nutrients that they contain. It is very useful to know which foods contain a large amount of a given nutrient so that these can be selected to meet the requirements of the body.

REMEMBER THAT A GOOD DIET IS A MIXED DIET CONSISTING OF DIFFERENT KINDS OF FOODS WHICH CONTAIN THE NUTRIENTS NECESSARY FOR GOOD HEALTH.

Each of the six nutrients that are found in food has its own special functions to perform in the body. These functions are as follows:

i. Proteins are necessary for growth. They help in repairing worn-out body cells and in the formation of blood and antibodies which are needed for building up resistance to infection.
ii. Fats and carbohydrates provide the body with energy or fuel to carry out its various daily activities.
iii. Vitamins and minerals are necessary for the development of the blood cells, help to maintain good vision and strong teeth and bones, and help to promote normal growth.
iv. Water comprises more than half the weight of the body and is essential for the proper functioning of body cells and for maintaining the fluid balance of the body.

11.3 FOOD SOURCES OF NUTRIENTS

When a food contains a very high amount of a given nutrient, it is called a food source, e.g., pulses and dals and very good food sources for protein, while potatoes and bananas are good food sources for carbohydrates, but are a poor source of protein.

Protein is the nutrient that is the most important for infant and child nutrition, but it is the one that is most often missing in their diet. It is, therefore, necessary to have information about protein sources so that this can be conveyed at every opportunity to parents and others who care for children. Because the different geographical areas in the country produce varied kinds of vegetables which contain these nutrients and the dishes that are prepared differ according to locality, it is not possible to list all of them here. More accurate and realistic information which is based on local conditions can be compiled by you with the assistance of the Health Worker (Female) by developing a list of protein food sources for the villages within the subcentre. A sample form is given below:

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These include the following:

i. They assist in the breakdown and absorption of food.
ii. They are necessary for keeping the skin and mucous members healthy.
iii. They are necessary for the proper development and functioning of the nervous system.
iv. They are necessary for the formation of the blood cells.

Foods rich in vitamin B complex include the following:

Vegetable sources:

i. Parboiled rice and unpolished rice
ii. Cereals and millet
iii. Groundnuts
iv. Pulses
v. Legumes

Animal sources:

i. Milk and milk products
ii. Eggs
iii. Meat, liver and fish.

3. Vitamin C: This vitamin is necessary to keep the body tissues intact and to help in repair of the tissues. It also helps to protect the body against infection.

Vitamin C is very easily destroyed and hence foods containing this vitamin should not be exposed to air and heat.

Foods rich in vitamin C include the following:

i. Citrus fruits such as oranges and lemons.
ii. Guava, tomato and amla.

4. Vitamin D: Vitamin D is necessary for the absorption and utilization of calcium and phosphorus and hence lack of this vitamin causes unhealthy teeth and skeletal deformities such as are seen in rickets.

Sources of vitamin D are as follows;

i. Exposure to sunlight is the cheapest way to obtain this vitamin.
ii. Fish liver oils have a very high content of vitamin D.
iii. Butter, ghee, groundnut oil and eggs also contain vitamin D.

REMEMBER THAT EXPOSURE TO SUNLIGHT ALONE IS NOT ENOUGH IF THE DIET IS DEFICIENT IN FAT.

11.3.5 MINERALS OR PROTECTIVE FOODS

Minerals are needed by the body for the formation of blood. The development of strong teeth and bones, and for regulating certain body processes such as blood clotting. There are a number of minerals that are required in minute quantities by the body. However, calcium and iron are two of the important minerals which are needed by everyone, especially by pregnant and nursing women and children who are growing.

Foods rich in calcium include the following:

Vegetable sources:

i. Ragi
ii. Green leafy vegetables.

Animal Sources:

i. Milk, cheese.

Foods rich in iron include the following:

Vegetable sources:

i. Bajra and ragi
ii. Green leafy vegetables.

Animal sources:
i. Red meat, lever and eggs.

Iodine is another mineral which is essential for normal growth and development including the rate at which food is used by the body. The deficiency of this mineral in the daily diet is the cause of goitre.

Foods rich in iodine include the following:

i. Fish of all types
ii. Vegetables which are grown in areas close to the sea.

Salt which is fortified with iodine is used in areas where goitre is prevalent.

11.3.6 WATER OR FLUIDS

An adequate daily fluid intake is important for healthy functioning of the body. Abnormal losses from vomiting, diarrhoea and high fevers can cause dehydration (drying up of body fluids), which is a serious condition, especially among infants and young children. Fluids in the form of milk juices, other beverages and fruits and vegetables which are pulpy can be used to supply the daily needs of the body.

TO PREVENT DEATH FROM DEHYDRATION CAUSED BY EXCESSIVE FLUID LOSS, PROMPT FLUID REPLACEMENT IS NECESSARY ESPECIALLY IN INFANTS AND YOUNG CHILDREN.

11.4 A BALANCED DIET

Nutrition experts have been able to find out what combination of foods is needed in the daily diet for healthy growth and development. However, this information has not yet reached many who live in the villages so that they continue to eat only those foods that have been eaten by their families for generations and as a result often suffer from various kinds of malnutrition. Often they are unaware that pregnant women, mothers who are nursing their babies, and rapidly growing young children need more of certain foods to prevent their becoming ill-nourished.

A BALANCED DIET IS ONE WHICH IS MADE UP OF FOODS THAT CONTAIN ALL THE NECESSARY NUTRIENTS IN THE REQUIRED AMOUNTS AND PROPORTIONS TO MAINTAIN HEALTH (SEE FIG. 11.1).

A balanced diet is necessary for good health. It is especially important that pregnant and nursing women, infants and young children have a balanced diet because these groups are most likely to develop malnutrition.

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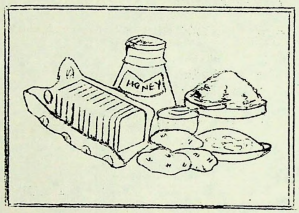
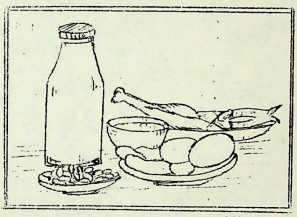
People need to know how a balanced diet will improve their health, what foods should be included, how much it will cost, where to obtain the required foods and even how to prepare food properly so that nutrients are not discarded or lost due to improper cooking.

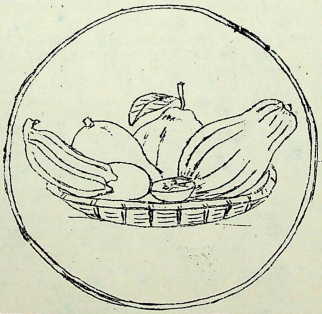
Since you will be the only health worker making regular house-to-house visits in the twilight area, you should know about balanced diets for pregnant and nursing women, and children, and proper feeding methods for infants.

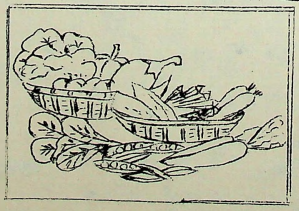
11.4.1 DAILY BALANCED DIET FOR A PREGNANT OR NURSING WOMAN

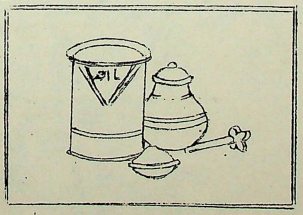
i. Milk, curds or lassi - 2 tumblers











Select one or more foods from each of these five groups:

Group A: Carbohydrate foods such as Bread, Rice, Wheat, Potato, Sugar,

Group B: Protein foods such as Meat, Fish, Eggs, Milk, Groundnut, Dal, Beans
Group C: Fruits such as Orange, Banana, Nimbu(Lime), Papaya, Mango
Group D: Vegetables such as Peas, Capsicum, Carrots, Bhindi (Ladies' fingers), Brinjal, Tomato, Karela (bitter gourd), Cawliflower, Palak (spinach), and Methi (fenugreek)
Group E: Fatty foods such as Ghee, Oil, Butter

Fig: 11.1: A balanced diet

ii. Pulses, e.g., beans or dal	-	twice
iii. Cereals e.g., rice or wheat	-	3 times
iv. Green leafy vegetables	-	at least once
v. Eggs	-	One every day or every other day
vi. Fruit (seasonal)	-	1 portion daily

Nursing mothers need more fluids including an extra glass of milk each day and extra servings of yellow and green leafy vegetables and cereals.

If the pregnant or nursing woman is vegetarian and does not eat eggs, or cannot afford to get milk, she should be encouraged:

i. to eat a handful of groundnuts each day;
ii. to increase the pulses to 3 times a day.

Anaemia is commonly found in pregnancy and causes the woman to feel weak and become easily tired. This can usually be prevented by including a serving of a green leafy vegetable in the daily diet, and by taking the iron and folic acid tablets which are distributed at the subcentre or on the home visits by the health worker.

In some communities women eat less during pregnancy because they believe that they will then have a smaller baby and an easier delivery. People need to know that this is a harmful practice which can lead to malnutrition in the mother and low birth weight of the infant who is also malnourished.

REMEMBER THAT A SMALL BABY AT BIRTH HAS LESS CHANCE OF SURVIVAL AND IS MORE LIKELY TO GET SICK BECAUSE OF LOW RESISTANCE TO INFECTION.

11.4.2 BALANCED DIET FOR INFANTS (ZERO TO 12 MONTHS)

The major points to remember about the diet for and feeding of infants are as follows:

1. Breast milk is the best food for infants up to the age of six months because:
   i. it is clean and safe;
   ii. it contains all the necessary nutrients;
   iii. no cost is involved.
2. After four months, all infants need to be given solid food since breast milk does not supply all the nutrients that a rapidly growing baby requires.
3. During weaning the 'first' foods should be semisolid in consistency e.g., mashed rice, millet, banana or potatoes. Gradually solid foods from vegetable and animal sources containing protein must be added so that the infant receives a balanced diet.

4. Remove the infant's portion of food before spices are added for the rest of the family otherwise the baby will develop [illegible] diarrhoea.
5. Give the baby a spoonful of food at first and gradually increase the amount given over a period of weeks.
6. The addition of foods other than milk to the infant's diet should be done gradually over a period of time rather than all at once.
7. Clean hands and utensils and fresh food are necessary for preventing infections. Food must be kept covered so that flies do not sit on it. Water should be obtained from a safe source of supply or boiled if possible. Never feed an infant with left-over foods because they are very likely to be spoiled and will cause illness.
8. If the mother does not produce enough breast milk, do not suggest the use of a bottle and nipple; use of a cup and spoon is safer since they are easier to keep clean.
9. Breast feeding should be continued throughout the first year so that the infant continues to receive valuable protein from this source.

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REMEMBER THAT THE MAJOR CAUSES OF MALNUTRITION IN INFANTS AND YOUNG CHILDREN ARE:

i. DELAY IN ADDING SOLID FOODS TO THEIR DIET.
ii. NOT FEEDING THEM FREQUENTLY ENOUGH.
iii. THE LACK OF BODY-BUILDING PROTEIN FOODS.
iv. INSUFFICIENT FOODS CONTAINING VITAMIN A.

11.4.3 BALANCED DIET FOR THE PRE-SCHOOL CHILD (ONE TO FIVE YEARS)

Children between the ages of one and five years are often neglected and underfed by their mothers. This happens because mothers do not know that these children need proportionately more food for their size than is needed by adults. Because they are growing at a fast rate and the growth is continuous, they need extra amounts of body-building protein food and energy-giving foods.

In many poor families, young children are breast-fed until they are two or three years old and are not given any other foods eaten by the rest of the family. This practice results in a high incidence of kwashiorkor and marasmus, the former of which is caused by a deficiency of protein and calories in the diet, while the latter is due to deficiency of calories.

AFTER FOUR MONTHS OF AGE, A DIET CONSISTING OF ONLY BREAST MILK IS INADEQUATE.

A daily diet for children one to five years should include the following:

1. Milk	- 1 tumbler
2. Cooked cereal - pulse mixture (khichiri, dalia, idli or groundnuts)	- 8 to 12 level spoons
3. Green leafy vegetables (Palak, chawli) and yellow vegetable or fruit (carrot pumpkin, papaya, mango)	- 4 to 8 level spoons
4. Cooked cereal or millet (rice, wheat, ragi)	- 4 to 16 level spoons or 1 to 2 chappatis

5. Egg	-	One
or dal	-	4 to 8 level spoons
or fish/meat	-	4 to 8 level spoons
6. Fresh fruit (banana, guava or Tomato)	-	one portion

The feeds for the child under two years should be small in amount and should be given at shorter intervals than for the rest of the family.

The following foods should be avoidéd in the diet of young children:

i. Highly spiced dishes and curries.
ii. Foods made with large amounts of sugar.
iii. Very greasy foods.
iv. Poorly cleaned, insufficiently cooked, or improperly mashed foods.

Dietary instructions are easier to follow for most individuals when they understand the amounts to be eaten in terms of commonly used measures (see fig. 11.2). When utensils are not available in the home, you will have to give instructions regarding the quantity to be consumed in terms of a 'a handful of dal', or 'one banana', etc.

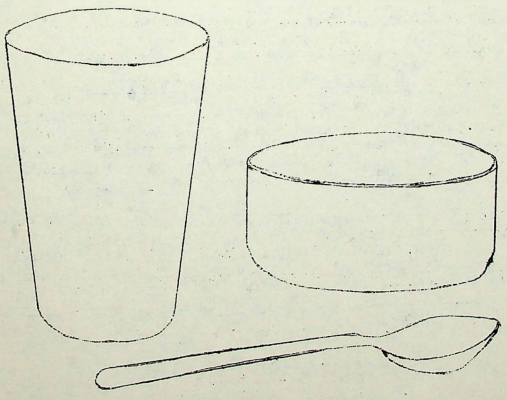

Fig. 11.2: Common household measures

The amount of food which a child can eat at one meal depends on his health, body size and physical activity.

Nutrition

Good nutrition means that the body is getting the required food and is able to make use of it. Malnutrition occurs when a person does not get the proper kinds of food in the amounts that are needed for keeping healthy.

8.1 Identify cases with signs and symptoms of malnutrition among pre-school children (one to five years) and refer them to the Health Worker (Male/Female)

It is important for you to identify malnourished children under five years of age as early as possible because they develop serious ill effects when they are improperly fed. Within this age group the children between six months and three years are most liable to develop malnutrition and, therefore, you should concentrate on looking for malnutrition in this age group.

Whenever you find a malnourished child in the community, you should refer the child to the Health Worker (Male/Female)

The early signs and symptoms of malnutrition which you should look for are the following:

1. The child is often sick because of low resistance to infection
2. It has a dry, scaly or rough skin
3. It has dry eyes and tends to stumble after dark
4. It fails to gain weight regularly or loses weight
5. It has cracks at the corners of the mouth (see slide Nut-1)
6. It has a sore mouth and tongue
7. It has bleeding from the gums
8. It has soreness and tenderness of the body
9. It tires easily and has little energy
10. It has a pale pink or colourless lower eyelid or lower lip

The later signs and symptoms of malnutrition which you should look for are the following:

1. The child is smaller in size and considerably thinner than other children of the same age
2. It may become easily breathless when playing
3. It may look miserable and show no interest in people or surroundings
4. It has hair which is lighter coloured than in others or which is reddish and brittle
5. It has swelling of the feet and legs and peeling of the skin (see slide Nut-2)
6. It is very thin with bones showing and wrinkled skin (see slide Nut-3)
7. It has eyes which no longer shine and the surface of which is rough and dull
8. It has sores on the surface of the eyes
9. It has bumps on the front portion of the head (see slide Nut-4)
10. It has bowing of the legs (see slide Nut-4)
11. It has bead-shaped lumps along the ribs on either side of the breastbone (see slide Nut-4)

You should also be especially alert to the possibility of finding a malnourished child when the conditions in his family are as follows:

1. The child is one of twins
2. The child was much smaller than usual at birth
3. Breast feeding was stopped before the child was three months old
4. The child has no living parents
5. The child belongs to a migrant family

6. The mother has low intelligence
7. There are four or more children in the family
8. The family belongs to the poorest group in the community
9. The child's brother or sister is less than one year younger
10. The child is cared for during the day by an older brother or sister without parental supervision

8.2 Identify cases with signs and symptoms of anaemia in pregnant and nursing women and childrens and refer them to the Health Worker(Male/Female) for treatment

Anaemia is a condition of the blood resulting from an insufficient amount of iron in the body. In India the most common causes of anaemia are malnutrition, malaria and hookworm infestation. However, in women additional causes of anaemia are frequent pregnancies, repeated abortion and severe bleeding before, during or after delivery. You can identify those who are anaemic in the community in the following ways :

1. Look for mothers and children who have a pale skin and nails and who tire easily
2. Pull down the lower eyelid and note whether the lining is pale (see slide Nut-5)
3. Pull down the lower lip and note whether the lining is pale (see slide Nut-6)

Whenever you find pregnant or nursing women or young children who have any combination of these signs and symptoms, you should refer them to the Health Worker(Male/Female) for treatment. If iron and folic acid are prescribed, assist the Health Worker in distributing the drug.

8.3 Assist the Health Worker(Male/Female) in administering vitamin A solution as prescribed to children from one to five years of age

You should assist the Health Worker(Male/Female) in the following ways:

1. Find out from the leaders of the village suitable dates six months apart for administering vitamin A solution, and inform the Health Worker
2. Suggest to the Health Worker a central, shady place for holding the clinic so that it is easily accessible to all
3. Get the community to provide the following:

   (a) A table for equipment
   (b) Mats or charpoys for seating
   (c) Adequate supply of drinking water
   (d) Facilities for washing hands and spoons

4. Prepare a list of children between the ages of one and five for your village according to the instructions given by the Health Worker
5. Visit the homes on the day before the date scheduled for the administration of vitamin A solution to remind families where and when to assemble
6. Greet those who come for vitamin A solution and see that they are administered the drug according to their turn
7. Ask the adult accompanying a child who is to be given the vitamin A solution to hold the child in her/his lap with the head raised so that the solution can be placed in the side of the mouth or on the tongue(see slide Nut-7)
8. Assist the Health Worker as required during administration of vitamin A solution
9. Inform adults accompanying children to the clinic approximately when the next dose of the drug will be administered in the village and tell them that regular six monthly doses are necessary for preventing vitamin A deficiency in children until they are 5 years of age.

8.4 Teach families about the importance of breast feeding and the introduction of supplementary weaning foods

The major factors which are responsible for malnutrition in infants and young children are poverty, incorrect family food habits and parental ignorance regarding proper feeding and diet for this age group. You should talk about the following whenever you teach a family about how they can improve the diet for infants and young children:

1. Breast milk is the best food for infants up to the age of six months because it is clean and safe, it contains all the necessary nutrients and there is no cost
2. Breast feeding should continue throughout the first year
3. It is dangerous to use a bottle and nipple for feeding babies when the family do not have the necessary facilities for boiling the articles and keeping them clean. Whenever breast feeding is not possible a cup and spoon should be used
4. After a baby is four months old, he needs to be give supplementary weaning food since breast milk does not supply all the nutrients that a rapidly growing baby requires
5. The first solid foods which are given to the baby should be soft, without roughage or spices and semi-solid in consistency, e.g., ripe banana, well-cooked mashed rice, millet or potatoes. Remove the infant's portion of the family food before spices are added as otherwise the baby will develop diarrhoea
6. Give the baby a spoonful of new food at first and gradually increase the amount given over a period of weeks
7. Supplementary weaning foods should be added gradually over a period of time rather than all at once
8. Clean hands and utensils and freshly prepared food are necessary for preventing infections
9. By six months of age the baby should be given dal, green leafy vegetables, egg yolk, chapati, roti or bread and fish or meat
10. By the time the child is one year old, it should be eating all the foods(without spices) eaten by the family daily

8.5 Educate the community about nutritious diets for mothers and children

It is important to educate the community about proper diets for mothers and children. The major points which you should stress about improving diets for mothers and children are the following:

1. If a pregnant woman does not eat sufficient amounts of the right kinds of food every day. She is likely to have a weak, low-birth-weight infant and insufficient breast milk.
2. Contrary to some common beliefs, pregnant women need more rather than less food throughout pregnancy
3. Pregnant and nursing women should eat larger quantities of the regular family meals especially dal, leafy green vegetables and cereals, i.e. rice, chapati and roti, and milk whenever available
4. If the pregnant or nursing woman does not eat eggs or cannot afford to have milk, she should eat ahandful of groundnuts each day, and have two servings of dal or have a serving of ragi daily
5. If children under five years do not receive the right amount and type of food every day, physcial and mental growth are retarded and illness and even death may result
6. Children over one year of age should be given all well-cooked foods in the family diet instead of diluted foods such as gruel or conjee. Hot spices for young children should be avoided
7. The child under three years must be fed two or more snacks or small meals between the family meals so that he will get the amount of food his rapidly growing body requires.
8. A nutritious diet is one that consists of a variety of foods selected from each of the five groups needed to meet the requirements of the body(see slide Nut-8)

../-

9. A family meal can be improved and made more nutritious by making simple changes as follows:

(a) Add a handful of groundnuts or any dal to rice or wheat to be prepared for the meal. Whenever possible add egg, fish or meat to the meal
(b) Include green leafy vegetables in the meal daily
(c) Use a combination of cereal and millet or cereal-millet-pulse preparation instead of a single cereal
(d) Serve well-washed vegetables such as carrot, cabbage or tomato raw instead of cooked
(e) Serve unpolished, hand-pounded or parboiled rice instead of milled rice
(f) Use the water in which rice or vegetables are cooked for making soups or adding to the curry
(g) Serve sprouted channa or moong either raw or lightly cooked as often as possible

10. Cheap and locally available nutritious foods should be used for family meals.

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NUT 6.20

1st August 1972. Nutrition Seminar M.V.Ravi.

Subject: Indian diet - Nutrition eduction.
i) Average Indian Diet.
ii) Suggestions for improving the diet.

References: a) Health eduction pamphlets.
b) Economics of diets by Lt. Col. Amirchand.

Introduction - Normal diet: Anormal balanced diet designed to meet our energy xxx requirements, to build and rebuild tissues and furnish vitamins and minerals Salts to maintain good health, is one which contains the basic of foodstuffs in sufficient quantities. There are a) cereals, b) pulses c) milk and milk products d) Fresh fo ds e) fruits f) leafy vegetables and g) Roots and tubers.

Indian diet: Mainly there are two types - a) urban and b) Rural. In the rural area, the main foodstuffs consumed are cereals like ragi, jowar and rice and pulies such as redgram, horsegram, field beans etc. the staple diet being ragi among the poorer class and wheat and rice among the middle class. Many families do not use vegetables daily and fruits are only occasionally used. The menu pattern as found by our work in Sangangiram nagar is as ollows:

Break fast - 2 iddly or dosai or uppama.

Lunch and Dinner	Ragi balls or chapathi	150 grms.	CHO - 50%
	Tur dhal rasam	50 gms.	fat - 30%
	Butter milk 1 glass	100 gms.	prot -20%
	Vegetables leafy	100 gms.	

Food value

	Amount	CHO gms.	Prot gms.	Fat gms.	Calories Kcals
Ragi flour	150 gms.	105	11	2	500
Dhal	50 gms.	30	11	1	180
Butter milk	100 gms.	5	5	0	120
G.L.Vegetables	100 gms.	6	4	1	40
		156	31	13	840

Then taking breakfast as equal to half a meal, and adult has 2½ meals a day and his consumption per day is - CHO - 390 grms.
Prot - 50 grms.
fats - 30 grms.

Calorific value - 2100 K cals.

This diet lacks in proteins and in fat. The energy requirement for a moderate worker per day is about 3000 k als and we see that about 30% of the total energy requirement is not met in this diet.

So there is a great difference between the diet most satisfactory and the diet now available to the greater part of our population. The least we can do is to reduce this difference between the actual and optimimum standards by using what is available most economically and wisely. This is economics of diets.

A factor of great importance in relation to this is the prevention of food wastage. Poverty is one of the causes but not the greatest cause of malnutrition. The best food is often the cheapest. The biggest single cause is ignorance.

contd....2/-

In many cases the most nutricious part of the food being prepared is either boiled or thrown away.

The following are some of the examples.

1. Cereals: In the case of wheat and ricewhich are the commonest Cereals consumed, the outer skin is discarded in the processes of milking. This part conta ns proteins, mineral salts and vitamin B in higher proportions.

Whole wheat - 7% gluten. finer grain flover.
white flour - finest 8% gluten.
(maida)

Similarly hand pounded rice is more nutricious than mill polished rice. Some people are in the habi of washing the rice several times before cooking and throwing it away after each washing. The water soluble mineral salts and vitamins are discarded in this manner. The rice should be cooked. so that there is no surplus water left after cooking.

II Pulses - There are extremely rich in proteins and the outer skin contains vitamins B in greater abandance than cereals. There should be consumed in this whole state instead of soaking them in water and discarding the outer skin.

III Vegetables are extremely rich sources of mineral salts and vitamins. Wastage in this case occurs in several ways. A point of importance is the selection of the proper edible portion of the vegetables.

a) The outer green leaves of cabbage are about 10 times as rich in vitamins as the pale inner ones, and should not be removed and discarded in preparation. About 15 grms of the green top of turnips and radish, can meet the daily requirement of vitamins A and C and ½ the daily need of calcium and 1/3 rd that of iron.

b) Sometimes the water in which the vegetable is boiled is thrownaway. This water contains the soluble mineral salts and vitamins C and A to a considerable degree.

d) Some of the vegetables can be eaten without being cooked for eg. carrots, beetroot, tomatoes, bottuce etc. and this preserves the heat semifive vitamins.

Cooking - To reduce loss in cooking, the vegetables should be cut into as large a piece as possi le, and should not be cut or pieced long before cooking. They should be cooked in a minimum quantity of water and the vessel should be covered. The vegetables should be added after the water begins to boil, as this prevents oxidation of vitamins first by destruction ofthe oxidising enzymes and secondly by removing the dissolved carbon-di-oxide. The food should be served while hot and re-heating should be avoided. Roots and tubers should be steamed and not boiled with their skin.

Some suggestions for improving the diet: With locally available foods and within the economic means of the people.

contd....2/-

a) Encourage a mixed cereal diet - instead of eating rice, ragi or wheat exclusively so that the nutriants lacking in one is made rup in the other.

b) Comparatively in expensive pulses, dhals and meats co bined and properly used would provide almost the same nutrients as milk and meat. for eg. 100 grms of ground nut contains 27 grms of protein, 40 grms of fat, 20 grms of CHO and provides about 550 cals of energy.

c) Increased use of sprented pulses, leafy tops of vegetables like cauliflower, Knol-khal and Raddish, and proper methods of cooking to prevent loss of nutrients and wastage can significantly e[illegible] the nutrifice value of the diet witout increasing the cost.

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Guidelines for Practicals

NUTRITION

(1) Dietary Constituents of Food - P, F, CHO, Vit, Min,

(2) Classification of Food by predominant function

i) Energy Yielding - rich in CHO & Fat
ii) Body Building - rich in Protein
iii) Protective - rich in Protein, vit and min

(3) Proteins Functions: Growth and development
Repair and Maintenance
Synthesis - enzymes, antibodies, hormone

Sources: Animal - milk, eggs, meat, fish liver
Plant - Pulses, nuts, cereals.
Non conventional - oil seed cakes, seaweed, leaf protein petroleum

Ref (Table of Protein content / 100 gm

Nutritive Value = Amino acid composition / Digestibility

Amino acid deficient in a protein is called first limiting amino acid eg Cereals - lysine
Pulses - methionine

Supplementary Action = Foods from two different sources supplement each others deficiencies and provide well balanced amino-acid composition

Protein Requirement

Varies i) individual to individual
ii) age
iii) Stress
blood loss, burns, surgery, parasitism
iv) emotional disturbance
v) infection. — Protein metabolism ↑
vi) Calorie intake - if inadequate protein used up for prodn of calories

Recommended Allowance

Indian Adult M/F 1gm/Kgm. b.wt.
Pregnancy - +10gm/day in IInd half of pregnancy
Lactation +20gm/day during lactation.
Infants, Children — Ref Table

(4) FATS – C H O – Fatty acids – Saturated (Solid at room temp)
– unsaturated

Functions i) Energy 9 calories/gm.
ii) Carry vitamins (Fat soluble)
polyunsaturated iii) Essential fatty acids → reqd for growth and maintenance of skin
iv) Support for organs
v) insulation against cold

Sources i) Animal – ghee, butter, lard, fish oil ← Saturated Vit A & D +
ii) vegetable – groundnut, gingelly, mustard, Safflower] – unsaturated
iii) Processed – Vanaspati – Hydrogenated vegetable oil (groundnut oil / cottonseed)
Adv – Keeping quality + Fortified c Vit A & D
Disadv – Saturated fatty acid.

Invisible fats – fats in milk, eggs, meat, nuts.

Indian Diet – 13-14 gm (visible) 15-16gm (invisible)

E.F.A – names in vegetable oils.
necessary for dermal integrity.

Fats and Atherosclerosis

Requirement
15gm of visible fat/day.
(Not more than 30% of dietary calories)

(5) CHO
– cheapest sources of energy
– excessive amounts in Indian Diet. (90% calories in some cases)
– Balanced diet – 50-60% of calories

Sources: Starches – cereals, roots, tubers, plant stems
Sugar – jaggery
Cellulose – fibrous lining of cereals, fruits vegetables
↓
Burkitt's theory

Guidelines for Practicals

NUTRITION

(1) Dietary Constituents of Food – P, F, CHO, V, Min

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Synthesis – enzymes, antibodies, hormones

Sources Animal – milk, eggs, meat, fish, liver
Plant – Pulses, nuts, cereals
Non conventional – oil seed cakes, seaweed, leaf protein, petroleum

Ref (Table of Protein content / 100 gm

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Amino acid deficient in a protein is called first limiting amino acid eg Cereals – lysine
Pulses – methionine

Supplementary Action – Foods from two different sources supplement each others deficiency and provide well balanced amino-acid composition

Protein Requirement

Varies i) individual to individual
ii) age
iii) Stress – blood loss, surgery, burns, pregnancy
iv) emotional disturbance
v) infection – Protein metabolism ↑
vi) Calorie intake – if inadequate protein used up for prod of calories

Recommended Allowance

Indian Adult M/F – 1gm/kgm body wt
Pregnancy – + 10gm/day in IInd half of pregnancy
Lactation – + 20gm/day during lactation
Infants, Children – Ref Table

(4) FATS – C H O – Fatty acids ← Saturated (Solid at room temp.)
← unsaturated

Functions i) Energy 9 calories/gm
ii) Carry vitamins (Fat soluble)
iii) Essential fatty acids → reqd for growth and maintenance of skin
iv) Support for organs
v) Insulation against cold

Polyunsaturated

Sources i) Animal – ghee, butter, lard, fish oil ← Saturated Vit A & D +
ii) vegetable – groundnut, gingelli, mustard, safflower] – unsaturated
iii) Processed Vanaspati – Hydrogenated vegetable (groundnut oil) refined

Adv – keeping quality + Fat soluble Vit A & D
Disadv – Saturated fatty acid

Invisible fats – fats in milk, eggs meat, nuts

Indian Diet – 13-14 gm (visible) 15-16 gm (invisible)

E.F.A – names in vegetable oils
necessary for dermal integrity

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Requirement
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(Not more than 30% of dietary calories)

(5) CHO
- cheapest sources of energy
- excessive amounts in Indian Diet (90% calories in some cases)
- Balanced diet – 50-60% of calories

Sources Starches – cereals, roots, tubers, plant stem
Sugar – + jaggery
Cellulose – fibrous lining of cereals fruits vegetables
↓
Burkitt's theory

Vitamins

Intro. – complex chem sub.
– rq. in v. small amts for normal metabolism
– catalysts in various body processes ^
(do not yield energy).
– cannot be manuf. by body in sufficient quantity ∴ diet daily supply rqd.
– each vitamin performs a specific func. + def. of a part. vit leads to specific deficiency disease
– The 13 vitamins rqd are widely distributed in foods + a well balanced diet supplies the vitamin needs of the body.
– 2 grps of vit < Fat soluble – ADEK.
Water " – B grp + C.

~~Vit B~~

~~– occurs in 2 forms~~

– Deficiencies of only 10 have clinical effects in man – A, D, K, C, Thiamine, Nicotinic acid, Riboflavine, pyridoxine, cyanocobalamin, folic acid
(others – E, pantothenic acid, biotin etc)
– Factors influencing the utilizⁿ of vitamins
i) availability in absorbable form
eg) Nicotinic acid in maize is bound in an unabsorbable form.
ii) fat sol. vit – digⁿ + absⁿ of fat should be normal

ii) Provitamins.
carotene → retinol
tryptophan → nicotinic acid

iii) Biosynthesis in gut: - by normal bacterial flora
eg vit K, nicotinic acid, riboflavine, B12, folic acid.

Vit A

- occurs in 2 forms — Retinol or A,
carotene or A2 - precursor

β carotene is converted into retinol largely in the walls of the small intestine ∴ considerable losses.
Its biological activity in rats is only 30% that of retinol

- The abs^n of both is facilitated by fats + bile salts.
- Func^n (i) for normal vision - present in visual purple or rhodopsin for night vision or dark adaptation
(ii) for the health of epi. cells ie skin + mucous
(iii) skeletal growth. - metab of all humans
(iv) anti-infective.

- Dietary sources. < animal, veg (yellow)
i) animal - butter, butter, cheese, egg yolk, fatty fish, liver
- fish liver oils - supplements rather than food. eg cod, shark, halibut

Retinol occurs only in foods of animal origin

*) Veg + fruits
- carotene occurs in ass^n c chlorophyll in (3) green leafy veg. — spinach, amaranth, cabbage, lettuce
- yellow + red fruits + veg. - carrots, mangoes, papaya.

6 µg of beta carotene = 1 µg of retinol.

a daily intake of 100 gm of green L.V. meets the daily requirements.

- The only veg. oil c Vit A is red palm oil — in Africa, Brazil etc.
- In Britain etc Vit A is added to Margarine here — to sunflower oil.
(Stable to cooking but not to sun drying)

Repn or RDA (I.U. given up — now µg IU = 0.3 µg R / 0.6 µg C)

adult man/women/pregnancy — 750 µg Retinol
+ adolescent, 3000 µg Beta
lactation — 750 µg + 400.
children — 400 ↓ 250 → 600 µg.

- Deficiency — A major health problem + an imp cause of preventable blindness in many developing countries incl. India
15.8 million blind or 9 million economically blind in India — 60-80% preventable
- pathology — epi. cells undergo squamous metaplasia i.e flattened + heaped up.
Sebaceous glands, hair follicles + tear glands of eye are blocked c horny plugs of keratin ∴ Hair loss + dryness

∴ xerophthalmia + phrynoderma

- Def. may be d/t inadequate intake or defective absorption.

- i) Night Blindness (Hemeralopia)
  one of the earliest & most characteristic symptoms of V.A deficiency
  - impairment of dark adaptation (rhodopsin)
  - usually in dim light
  - earliest symp.

ii) Xerosis conjunctivae.
  dry, thickened, pigmented (sandy/muddy) (crumbled) bulbar conjunctiva.
  when exposed for ½ min or so.

iii) Bitot's spots. rough, raised, glistening white plaques of desquamated epithelium, usually triangular on bulbar conjunctiva.

iv) xerophthalmia - when dryness spreads to cornea → dull, hazy, lackluster
  (exposure to dust & glare may cause similar changes)

v) Keratomalacia. - softening of the entire thickness of part or whole of the cornea → necrosis → ulceration → prolapse of iris etc.
  - usually in preschool children
  - often assoc. PCM.

vi) Phrynoderma or follicular Keratosis
  (also d/d/g. of assoc. E.A.)
  skin rough & dry — esp over back of upper arms, front of thigh.

Public. Health Imp

- Blindness - in India over 1 million cases (5)
  d/t to Vit A def.
- A serious prob in Kerala, TN, Karnataka, A.P, Bihar + W Bengal. — ? rice eating.

Pub. Hlth measures

i) Health ed ⁴ to consume more g.l.v.

ii) Massive dose prophylaxis.
66,000 IU of retinyl palmitate in oil every 6 mths.

iii) National prog. for prev. of blindness
Children bet 1-5 yrs given an oral dose of 200,000 I.U. Vit A every 6 mths since 1970.

(Rx of deficiency & water sol. prep.)

Toxicity. — stored in the body - in the liver mainly.
- reserves may last 6-9 mths.
- Sy - headache, irritability, nausea,
- Sy - vomiting, anorexia
- Skin but not conjunctiva yellow carotenemia

Vit D.

- Many forms — Many sterols.
  - Cholecalciferol. D_3. simp one natural form in egg yolk, milk + fish liver oils.
    Also formed in the skin from 7 dehydrocholesterol on exposure to the UV rays of the sun.
  - ergocalciferol D_2 manuf. by exposing ergosterol in fungi + yeasts to UV light.

(b) – Rqs bile + probably F.A. for dipep abs from gut.

– Func 1) rqd for form: of bones + teeth – probably a dued effect on mineralisation, mechanism uncertain.

2) promotes absorption of Ca + P.
(Ca + inorg. P → cal. phosphate → used by osteoblasts to make new bone)

– Sources 1) Sunlight – oil bath a good substitute
Air pollution – a filtering effect
glass " " "
pigment in skin – " " "

ii) All fat containing animal products.
eg liver, eggs, butter,
fish liver oil.
milk a poor source
Fortify: + margarine / vanaspati.

iii) Plant origin food do not contain Vit D

– Requirements – in dep not I.U.
adults – 2.5 µg.
infants + children – 10 µg.
preg + lact " – 10 µg.

– Deficiency.
* Rickets in children
– esp in large towns / cities / slums – Housing
– infants only on milk / cereals – faulty diet
– poor exposure to sunlight.
– diet ⇒ Ca poor.

- ↓ inhibitory effect of phytic acid in cereals on abs. of calcium may be a cause of rickets.
- Cl. f. may appear well nourished but is flabby
  - toneless muscles, restless, fretful.
  - xs. sweating of head
  - abd distended
  - GI upsets.
- dev. delayed
- widening of epiphyses - esp. radius, wrist
- craniotabes - unossified areas in skull
- rickety rosary of ribs
- bossing of frontal + parietal bones
- delayed closure of ant. fontanelle.
- pigeon chest
- Harrison's sulcus
- hypotonia. late loading
- enlarg. of bones and of femur/tibia/fibula.
- bow legs, knock knees, bowlegs.
- pelvic deformities.

(shin walks)

Xray - blurred/hazy outline of j/l.
- broadened epiphyses
- decalcif. of metaphy. = concave saucer deformity

raised serum alk. phosphatase

* osteomalacia in adults - Muslim Sindah
  - rpted pregnancies
  - skeletal pain.
  - bony tenderness
  - muscular weakness
  - waddling gait
  - spontaneous fractures/pseudo/ochiro
  - tetany.

- Both conditions are frequently reported in India (B)

Preventive measures -

1) educ. of mothers to adequately expose children to sunlight.
2) Vit D supplement :- to infants after 4th week
3) prophylaxis of Vit D during 1st 2 years of life.

Hypervitaminosis D (Toxicity)

- anorexia, nausea, vomiting, thirst, polyuria, drowsiness
  calcium & P levels may be raised & Ca may be deposited in tissues.

Vit E - Tocopherol.

- No known ill effects in man ∴ No RDA
- Animals - abn. muscular dystrophy, myocardial degen - veterinary science.

Vit K

Func - rqd for prothrombin form in liver.

Source - G.L.V.
  fruit.
  synth by intestinal bacteria.

Rqmt - for adults unknown
  average diet + intest. prod - adequate

Deficiency - bleeding tendency - quite common in infants esp prem. fall. complicated labour, mother - anticoag. Rx.
∴ 0.5 - 1 mg Vit K parenteral
or 1 - 2 mg oral

Vit C — Ascorbic Acid.

- rapidly destroyed by oxid: + high temp in cooking, drying. (a reducing agent)

Func — 1) Enzymatic role in metab of conn. tissue particularly collagen.

- Sources — 1) Fruit - amla, guava, lime, orange, tomato
  2) Veg — G L V,
  potatoes — root & tubers
  sprouted pulses
  3) animal foods — ✓ small amt

- Requirement — adult — 50 mg.
  preg — 50 "
  lact — 50 + 30.
  Infants + children — 30 - 50 mg.

- Deficiency pathology — defective form: ↓ collagen
  " intercellular cement
  " dentine
  " osteoid tissue
  capillary tumour
  delayed wound healing
  Anemia.

Scurvy — gingivitis — Scurvy buds — bleeding
- follicular keratosis
- perifollicular cutaneous bleeding
- feeble + listless — weakness
- Anemia.

Infants — painful limbs
- subperiosteal hemor: frog's leg

B group

unrelated chemically but grouped together because found together in same kinds of food. These foods are rich in cellular material with an active metabolism eg yeast, liver. They are essential parts of body systems on. e cellular metabolism depends.

Since Thiamine, riboflavine + nicotinic acid play roles in energy expenditure their RDA is expressed in terms of energy expenditure ie mg/1000 Kcal.

T - 0.4 mg
R - 0.55 "
N - 6.6

Thiamine B1

- water sol.
- rel. stable to heat in dry form
- Thiamine liable to oxid.
- rapidly destroyed in neutral/alk sol.

- Func - 1) in carbo. metn. — in def. there is accum of pyruvic + lactic acid in tissues & body fluids
  2) in brain metn. - causes neural + mental disturb
  3) ess. for good appetite + normal digest.
- Sources - widely distri in all food
  unmilled cereals - 60-85% in husk
  milk - infants + young children
  pulses
  nuts.
- Lost during - washing
  cooking
  milling
  prolonged storage in funds

- Requit - 0.40 mg/1000 kcal.
- Deficiency - Beri beri + wernicke's encephalopathy
  i) Beri Beri - cardiac, neuritic, wet (oedema) + infantile.
  less common now
  ii) Moderate def - absence of ankle/knee jerk early tenderness
  iii) Wernicke's encephalopathy - ac. def. ophthalmoplegia, polyneuritis, ataxia, mental deterioration

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Riboflavine B2

- Func - i) coenzyme in tissue oxid & resp.
  ii) involved in carbo, pro & fat metabolism
- Sources - widely distri.
  Yeast & rich source
  Whole cereal grains
  Germinating pulses
  Dairy
  Liver
  Kidney
  Meat eggs fish
  Beer.
- Requit - 0.55 mg/1000 kcal
- Deficiency - angular stomatitis, cheilosis glossitis, nasolabial scaliness Redness & burning of eyes, scrotal dermatitis

PTO

Nicotinic Acid. - Niacin

- Func - utiliz of carbo + tissue resp
  - rapidly converted to nicotinamide
  (tryptophan converted to nicotinic acid (60 mg → 1 mg)
- Sources - Widely distr.
  Whole cereals
  germ and pulses, ground.
  Fruits
  liver, meat.
  Africa - maize - bound unabsorbable form - niacytin
  India - jowar (sorghum) lacunae intafeed in corneus
- Rqmt. 6.6 mg/1000 kcal.
- Deficiency - pellagra
  Dermatitis, diarr, dementia
  glossitis + stomatitis

PYRIDOXINE B_6. - pyridoxine, pyridoxal, pyridoxamine

- Func - Helps in prot. fat + carbo
  - Biosynth of GABA in the brain
- Rqmt - 1.25 mg/100gm prot.
- Sources - whole cereals
  pulses
  liver, meat, fish
- Def - - Infants - convulsions
  - Adults - Def. diet + Antagonist
    skin lesions, cheilosis, glossitis, weakness, dizziness, vomiting.
  - & metabolic antibodies -
    INH & Hydrallazine & D.C

FOLATES - FOLIC ACID (Leaf).

- Func - synth of DNA.
- Source - widely distrib.
  - GLV.
  - liver, eggs
- Rqmt -
  - Adult - 200 µg.
  - Preg - 400 µg.
  - Lact - 300 µg
  - Children - 50-100 µg.
- Def -
  - megaloblastic Anemia
  - glossitis, GI disturb.
  - infertility / sterility.
  - fetal / placental abn.
  - Haemochromatosis - liver/pan/heart.

Public Health. - quite common in pregnancy.
+ infants fed on milk powder.

Prev - folic acid prescribed routinely to all preg. women.

CYANOCOBALAMIN - B_{12}.

- Func
  - Synth of DNA.
  - carbc // fat + prot. meta.
- Source
  - NOT present in foods of veg. origin.
  - liver, fish, eggs, milk.
- Rqmt
  - adult - 2 µg.
  - Preg - 3 µg.
  - Lact - 2.5 µg.
- Def
  - Megaloblastic Anemia (Pernicious An.)
  - Demyelinating neurological lesions.
  - infert./ sterility.

MINERALS

Func :) Form: of bones & teeth — Ca, P, Mg
2) Osmotic pres of body fluids — Na, K, Cl.
3) Specific func — Fe — blood
I — Thyroid
Cu — Blood cells.

CALCIUM

— Total body content 850 — 1.400 gm. (1.5 - 2%)
— 99% in bones, blood 10 mg/100 ml
: dynamic equilibrium
— maintained by parathyroid glands + Vit D

Func — 1) Bones + teeth
2) coag: of blood.
3) neuromusc. irritability + cap. permeability
4) muscular contractility
5) enzy.

Sources — 1) Milk
2) Fish.
3) Veg — radish, beetroot, tamarind, curry leaves, drumstick leaves
but oxalic acid
4) fruits — guava
dried — raisins, dates, apricots
5) cereals — ragi — phytates.
6) Drinking water
7) Betel leaves.

Req — 400 - 500 mg/day. — adults
Pregnancy — 1000 mg/day
Infants — 5 - 600 mg/day

Def — No clear cut
Rickets/osteomalacia : V. D !

IRON

- Total body content 3-4 g.
- 75% in blood.

Func - i) O_2 transport + cellular resp.
ii) component of Hb, myoglobin, cytochromes, catalase, peroxidase.

Sources - i) Animal - liver, meat, egg, fish, milk & poor source
ii) Plant - GLV
cereals esp ragi
pulses, nuts, oilseeds
Breadfruit
Jaggery - phytic acid
iii) cooking vessels

Abs° - in duo & upper S.I
- 10% of that in cereals, pulses & veg. & 20% of animal foods
- facilitated by red. sub eg Vit C.
- Depends on body sat :, activity of bone marrow, girth & preg.
- impaired by phytate / PO_4
- recycling - on breakdown of RBC

Loss - Menses
urine, sweat, bile.
integ. tissues.

Def - Hypochromic microcytic Rh, atrophic glossitis, koilonychia, angular stom. dysphagia :
- sideropenia

- Rqmt - Adult 20 mg/day, Men - 30, Preg 40, Lact 30,

IODINE

- Synth - thyroxine + triiodothyronine
- source - sea foods + water
- Def - goitre
- Rx - Iodized salt - 1 in 40,000
  .. oil - poppy seed oil

FLUORINE

Def - caries
Xs - Fluorosis - dental + skeletal, pem yellow
optimum - 0.5 - 1 ppm. APTN

Stirrup pump - W.T.

NUTRITION I

NUT 6.19

Already dealt in biochemistry but now the applied aspects

I Intro: - History. - the imp. of in health

As with many fields in medicine, nutrition was also discovered at the turn of the century.

Between the 2 world wars ie after 1918 research was centred on vitamins. After the 2nd world war ie 1944-45 research on proteins gained momentum. In the past decade the role of fats in the pathogenesis of atherosclerosis & coronary artery disease has been studied. Recently the trace elements eg cadmium copper, molybdenum & zinc are receiving attention as possibly being of etiological importance in cardiovascular diseases.

II Problem & Importance.

Malnutrition has direct & indirect effects: -

i) Direct - No of people & found frank deficiency diseases eg Kwashiorkor, marasmus, vit A def, Anemia, beri beri, pellagra, goitre, rickets. - run into millions. & for every advanced case there are several cases of lesser degree.

(b) In developed countries they have the problem of overnutrition leading to obesity, diabetes, cardiovascular dis, etc.

(12)

(c) Malnutn. plays a contributory role in ↑ susceptibility to infections + in aggravating the course of such infections after they have set in. Illustrated by the "triple M syndrome" viz Malnutrition - Morbidity - Mortality. - eg of mort conditions leading to malnutn - measles, whooping cough, chronic diarrhoea. — this occurs esp. in younger vulnerable children. The vicious cycle of undernutn + infection can also be called part of the "poverty syndrome" afflicting many parts of the world.

(d) Pr is closely related to paediatrics - Malnutn can cause irreversible changes in physical + mental development. (t) In occ developing countries 50% of deaths in the under 5 age group & the major underlying cause is malnutn.

(e) pregnancy & lactation.

(ii) Indirect - lowered ind'ality + high sickness rates affect the economy. High infant mortality, lower expectation of life ↓ productivity, absenteeism, esp ♀ workers

III Food/Foodstuffs/Nutrients vs Nutrition

a dynamic process.

Sometimes food & nutrition are spoken of as being synonymous. But food is equivalent to nutrients whereas nutrition is the dynamic process of utilization of food.

IV Classification or Types of foodstuffs - 6 grps

a) Proteins. } Proximate principles. 17%
Fats. } 12%.
Carbohy. } 1%.
Vit.
Minerals. 7%
Water. 63%

} composition of human body.

b) energy yielding - carbo, fats.
body building - prot.
protective foods - prot, vit, minerals.

V Proteins - The word is derived from "protos" which means it is of first importance. they

composition are complex organic nitrogenous subs. (C, H, O, N, - S, in some P, Fe etc). Differ from carbo & fat in that they contain N_2.

They are made up of amino acids, 22 of which are needed by the body. 8 of these are "essential" ie the body cannot synthesize them in sufficient quantity + therefore they must be obtained from the food we eat. They are. (1) lysine (2) leucine (3) isoleucine (4) methionine (5) phenylalanine (6) theonine (7) tryptophan (8) valine. + in infants histidine.

Functions - i) for growth + dev.
(ii) repair + maintenance
(iii). Synth of Ab, enzy, hor.

- When consumed in excess proteins are used as a source of energy — a waste.
- When carbo/calories are less, they are again used as a source of calories. ∴ adequate calorie intake essential for proper utilizn of protein. - 1gm prot = 4 Kcal

Sources. - Body proteins are constantly being breakdown into amino acids + resynthesized. only 1/5th of a.a. are

derived from the diet, the rest from breakdown of body protein.

- Dietary sources of 2 types : Animal, Vegetable or plant.

- animal ptn. are "biologically complete" ie contain all essential a.a. in adequate amounts to meet human requirements. But are expensive & in short supply ie most of it is utilized by ? 1/2 nd of the world ppn.
- Vegetable proteins are biologically incomplete ie lack one or more of the essential amino acids. However by a proper combination of 2 or more foods, this problem is overcome

eg rice is deficient in ~~tryptophan~~ lysine
dhal " " " methionine, but a combination is commonly used in India & some old traditions & custom are good. This is called "supplementary action of proteins." Veg. proteins are also cheap & readily available. Pulses are called "poor mans meat".

also deficient in tryptophan

(82)

- protein content of some foods (gm/100 gm)

animal - Milk 1.2% - human. 3.2 - 4.3 - casein, lactalbumin lactglobulin.
Meat - 18 - 26.
Fish - 15 - 23.
Egg - 13.00.

Plant - Cereals - 6 - 13.
Pulses - 21 - 28 (legumes - incl. peas, beans, lentils, gram)
Nuts - 4.5 - 29
Soyabean - 43.2. - Malaysia.
Veg + fruits - 1 - 3.

ground nuts - 25%
g. nut milk - milkmaid
g. nut cake.

oils / fats / sugar / jaggery - nil.

∴ often asked whether 100 gm of milk & cereals contains more prot - quantitatively much less, only quality difference.
Majority of our protein input in India derived from cereals due to the bulk in which they are eaten. Eg. reference protein

- protein requirements perfect prot - ∴ of high biological value + digestability used in nutrition work as a reference prot. for comparison & other proteins. Average egg weighs 60 gm.

- Protein requirements

vary with age, sex, weight, physiological conditions like pregnancy & lactation, other factors like emotional disturbance infection & stress situations - burns, blood loss, surg, parasitic infest

Recommended allowances by ICMR

i) Normal adults 1 gm/kg bodyweight.

ii) Pregnancy - additional 10 gm/day during 2nd half of pregnancy. (fetus 800 gm).

iii) Lactation - losses 10 gm milk prot/day + 2 gm of food prot req'd to make 1 gm of milk protein. ∴ additional 20 gm of dietary protein req'd.

iv) Infants 0 - 3 mths - 2.3 gm/kg
3 - 9 " - 1.8
9 - 12 " - 1.5 gm/kg.

? v) children

vi) Aged - same as younger adults. In India many adults have low body stores of protein ∴ in pregnancy & lactation a higher intake of protein than what is indicated would be to their advantage.

- Deficiency states

PCM - protein calorie malnutrition
PEM - " energy " - a spectrum

Kwashiorkor mainly prot. deficiency →

marasmic kwashiorkor ⇒ marasmus mainly calorie malnutrition.
will be dealt in later.

* Lathyrism, Aflatoxicosis

VI Carbohydrate

1. – composition – Carbon, H_2 & oxygen.
– function – supply energy / gm = 4 kcal.
– transformed into body fat. They are the chief source of this fat. The [redacted] the chief sources. body requirement only 500 gm.
– Sources – 3 types ← starches, sugar, cellulose.

i) starches ⇒ cereals – rice, wheat – main source
– roots & tubers ← potatoes, yam, radish, carrot. (subsidiary foods)
– banana.

ii) Sugars – monosaccharides glu, fructose, galactose
disaccharides – sucrose, lactose, maltose
jaggery better than sugar. ∴ Fe content + carotene
milk – lactose. less sweet: readily fermented.
Honey: sugar!

iii) cellulose – fibrous husk of cereals, fruits & vegetables – roughage, facilitating bowel movements, no nutritive value.

– Carbo. content of food stuffs.
cereals – rice (staple food of more than half the human race) – 78.2% (raw, milled
– whole wheat – 71.2%
– Maize – 66.2%

Cereals are the cheapest - sources of calories
carbohy-content 65-78%. Development of
high yielding strains is a major
breakthrough in nutrition research. They also
contain more protein. Miracle rice IR5
- indica, japonica, indica-japonica hybrid
- jowar - high lysine content - pellagra
72.6% carbo.
- Maize - deficient tryptophan → pellagra
- Ragi - 72.0%.
- Bajra 67.5%
- Requirements - approx 50-60% of total calories
in India upto 80%.
- Deficiency - PEM/PCM.
Kwashiorkor - MK. - Marasmus

VII Fats.

- Composition - C, H, O.

Composed of fatty acids - i) Unsaturated F.A. - liquid
at room temp because they have a low
melting point - veg. fats
ii) saturated fats - solid at
room temp - animal fats
essential fatty acids - are those req by the body
for growth + maintenance of the integrity of
the skin. They are polyunsaturated F.A eg
linoleic + arachidonic acids. Deficiencies
associated with follicular hyperkeratosis or
phrynoderma (toad skin) [also in Vit-A def]

— Functions

i) concentrated source of food energy
1 gm = 9 Kcal. ie double that from carbo & fats.

ii) carry fat soluble vitamins - A, D, E, K present mainly in fats from animal sources

iii) provide essential F.A.

iv) support many organs in the body. insulation against cold.

— Sources.

i) Animal - ghee, butter, lard, fish oil.
More saturated F.A. → atherosclerosis
contain Vit A + D.

ii) Vegetable - groundnut, mustard, sunflower, cottonseed, gingelly (til), coconut oil.
More unsaturated except coconut oil & is saturated fat. No Vit A except in Red palm oil

Hydrogenation of vegetable oils - decreases the proportion of unsaturated F.A. - reducing the ~~was~~ essential F.A.

Vanaspati eg Dalda. hydrogen of usually groundnut or cottonseed oil.

Adv - ghee like consistency
keeping quality
fortified ~ Vit A - 2500 I.U.
& Vit D - 175 I.U. / 100 gm

Invisible fats - in milk, eggs, meat & nuts.
ie that which we cannot see.
Average Indian diet contains 15-16 gm of invisible fat.

- fat contents of some foods:-

i) Milk cow – 4.1 g/100 gm. | used to test milk – lactometer
buffalo – 8.8 g/100 gm.

ii) cereals – 0.5 - 3.5 g/100 gm
+ millets.
maize + bajra have more.

iii) pulses – soya bean 20 g/100 gm fat.
bengal gram 5.3 g/100 gm.

iv) Meat – 13.3 g/100 gm.
Egg – " "
Fish – 1.6 "

v) ghee + oils are pure fats.

vi) groundnuts – 40 % fat.

- Fat requirement.

Not fixed & accuracy. But the following values have been suggested

adults – 15 - 25 % of total calories (30 % not > 10 % sat. FA
children – 20 - 30 % " "
Infants – 30 - 40 % " "

~~Excessive consumption~~

Deficiency / excess

– Def. of essential F.A – phrynoderma.
– Xs. – Obesity, vascular disease

Studies show that if the diet contains fat calories more than 40 % – hypercholesterolemia & coronary heart disease are widely prevalent. There is also increasing evidence that-

intake of unsaturated fats may exert a preventive action against atherosclerosis.

VIII Malnutrition

i) Undernutrition
ii) Overnutrition
iii) Imbalance
iv) Specific deficiency.

PCM or PEM or PCD.

- One of the most serious health problems in many areas of the world esp. in early childhood
- Causes growth retardation - mental & physical. 90% of dev. of the brain occurs by the time the child is 5 yrs old. The retardation is irreversible.
- Mild degrees of PCM cause mild retardation
- More severe degrees lead to 2 distinct clinical syndromes. viz Kwashiorkor & marasmus thought to be due to protein & calorie deficiency But Gopalan & coworkers have found that there are no qualitative & quantitative differences in the diets of children who subsequently developed Kwashiorkor & marasmus ie it is not due to a difference in diet but a difference in the capacity of the child to adapt
- PCM is more due to a "food gap" rather than an isolated "protein gap"

Kwashiorkor

- commonly in weaning + post-weaning periods. ie mainly between 1-4 yrs
- normal weaning std start at 4 mths: by 6th mth with the child rgs. supplement of breast milk.
- Sy + signs - oedema, growth failure, muscle wasting, mental changes & apathy, hair changes - flag sign, brittleness, dermatosis - crazy pavement pigmentation, anaemia, hepatomegaly, usually associated c other vitamin deficiency, anorexia, poor digestion, diarrhoea.
- In India abt 1% of preschool children & for every kwashiorkor baby there are 10 others with borderline malnutr.
- causative factors -
  - poverty
  - ignorance of child care
  - faulty feeding - overdiluted cows milk. premature termination of breast feeding, powdered milk
  - infections - measles, large family size.
- Preventive measures
  - curative, Nutri, immunizn.

- Marasmus - severe wasting
  - diet deficient in both prot. & calories
  - with retardation, wasting of muscle, & subcutaneous fat.
  - reduced to "skin & bones" - monkey face or old man face.
- Must specify marasmus nutritional because it may also be due to TB, congen. syphilis, & gastro enteritis.

- Kwashiorkor - Kwashiorkor
- Aflatoxicosis - aspergillus flavus & parasiticus
- Epidemic dropsy - argemone oil

Learning about Diets of People

To Discuss before 7/7

1. What do they eat?
   ↓
   Cereals
   Pulses
   Veg - Root
   GLV
   Other

   What is available
   When is it available
   Cost of item (cheaper costlier)

   Really poor | which part

   Local explanations

2. How do they prepare? — Powdering | Fermenting
   Why do they prepare?
   usual prepar

3. What are the combinations
   a) usual diet
   b) Seasonal additions
   c) Festival foods

4. Who eats what? Adults, Children, Ill people

5. What is the choice of
   a) Poor / Middle / Rich classes
   b) Christian / Muslim / Hindu
   c) Food taboos

6. What are the traditional practices / new innovations

7. Changes in diet pattern

'C' group – ~~the~~ comprised 11 members
Chairman – Sr. Rita, social worker, SMH.
Secretary –

Q1. what do you understand by having a nutrition programme. –

A nutrition programme is a programme aimed to create an awareness of nutritional needs among the family members & to put this into practise to improve the nutritional status of the family.

This comprises of the following: –

i) Educating the mother how to properly feed her child in her own circumstances using local foods – the relationship between mother & child being very important.

ii) The father also should be made to feel responsible.

iii) Education of all personnel including doctors. so that they can give the proper advice.

iv) Have programmes & teaching in schools.

Q2 What expense would be involved in preparing a diet for a family of five - father, mother + 3 young children

The question is not answered because

i) the type of work of the parents is not indicated
ii) same with the age of the children
iii) the socioeconomic status
iv) the place.

Q3 What other activities would you have to make the programme meaningful

A rural program is indicated comprising -

i) working with a group of mothers in mahila mandals etc.
ii) encouraging kitchen gardens
iii) demonstrations
iv) hygiene & sanitation
v) Teach children in schools as they are good agents of change.
vi) gen. education
vii) Social activities, recreation & play.
viii) Home economics.
ix) Bridge the gap between the concept of us + them which causes a

communication + cultural gap which makes our health education futile

ix) To improve the standard of life.

~~It~~ It was felt that nutrition or malnutrition is a symptom of a deeper social problem & with our limited involvement we cannot expect a big change in a field which has social & emotional & economic implications.

Q4 Criticize the diet sheet given.

- It is not mentioned for what age & that cond.
- for how many people the diet is meant for.
- It is economically not feasible
- It is a waste of protein - used as calorie
- Inadequate cereals (carbohydrate)
- Too little veg. & fruit.
- Inadequate oil.
- ~~Unpalatable diet~~

Vani Nidhi Kendra -

a central Govt. aided adult-Education Project & HQ here Mr. Satyanarayana - Sec.

Iron Tonic.

1kg jaggery.

500 ml water.

Heat, Boil till golden colour forth, see thickness before it is too Thready. or too thick.

Bottle — clean & dry.

FACTS ABOUT OUR DIET

FOOD AND NUTRITION BOARD
MINISTRY OF AGRICULTURE & IRRIGATION
KRISHI BHAVAN, NEW DELHI

FACTS ABOUT OUR DIET

An important factor contributing to malnutrition in India is lack of awareness about the importance of balanced diet and want of knowledge about locally available and relatively inexpensive foodstuffs which can be consumed to prevent or overcome malnutrition.

One of the most significant findings of modern nutritional research is that calorie protein malnutrition in growing infants can lead to

serious ill-effects, resulting in mental retardation and even irreversible brain damages. It has been reported by nutritionists that many pre-school children in several regions in our country suffer from mental dwarfism. During the months of breast feeding, children normally grow at a rate comparable to well-nourished children, but after six months of age, if weaning food is not given, growth of children in a majority of cases is progressively retarded. It is therefore necessary that proper care is taken of infants at this stage.

Nutrition is accomplished by the consumption of the right food in proper amounts and correct proportions. The primary step towards elimination of malnutrition is, therefore, to make available to people different kinds of foodstuffs in amounts and quality required to achieve a balanced diet.

Balanced diet is essential to sustain good health. We take food not just to make life possible but to lead a healthy and active life. Food contains many nutrients required to make the body grow, keep it healthy and provide energy for work.

Essential nutrients present in food are carbohydrates, proteins, fats and oils, vitamins and minerals and, of course, water, which helps in vital processes of the body. A complete and balanced food should contain elements which are essential to good nutrition—proteins to build muscles and tissues; carbohydrates and fats to supply energy; mineral salts to develop healthy bones and blood and vitamins for healthy life and growth of the body.

The requirements for the body of the various nutrients—carbohydrates, proteins, fats, vitamins and minerals—depend on age, sex, physical work and other physiological conditions. A manual labourer engaged on heavy work requires more of energy-giving food than a person doing office work. A growing child requires more protein and minerals per kg. of his body weight than an adult. Pregnant women and nursing mothers require more protein and minerals because of physiological changes taking place during this period of their lives.

A diet containing all the required nutrients in proper quantities and proportions has, therefore, to be taken by an individual

depending upon such factors as age, sex, working conditions etc., to meet the requirements of the body. A diet which satisfies these needs is known as a balanced diet. It can be prepared by a judicious combination of foodstuffs from the following food groups:

(a) *Energy-yielding Foods*

Foods rich in carbohydrates and fats are called 'energy-giving foods'. Cereals, roots and tubers, dry fruits, sugar, oils and fats are included in this group.

(b) *Body-building Foods*

Foods rich in proteins are known as 'body-building foods'. Milk, meat, fish, eggs, pulses, oilseeds, nuts and low-fat oilseed flours are good examples of such foods.

(c) *Protective Foods*

Foods rich in proteins, vitamins and minerals are termed 'protective foods'. Milk and milk products, eggs, liver, green leafy vegetables and fruits form part of this group.

The diet of a vast majority of people in India is predominant in cereals and defi-

cient in other essential nutrients. Improvement in the diet can be brought about generally, by diversifying it in such a way that the consumption of cereals, wherever high, is reduced and that of other items of food which provide the needed proteins, vitamins and minerals, increased. The use of such foods, wherever available, as also of those saved from loss through preservation and the application of science and technology, can help in an overall improvement in nutrition. There is also considerable scope for utilising the available foods more effectively by reducing nutritional losses through improved techniques of cookery. Prolonged boiling or frying of food results in considerable loss of nutrients. Adequate care has, therefore, to be taken to see that food is properly cooked.

Nutritional requirements and balanced diets for individuals of different age groups as well as functions of nutrients and their sources are given in the succeeding tables. The data presented in these tables are based on compositions given in the book "Nutritive Value of Indian Foods" published by the National Institute of Nutrition, Indian Council of Medical Research, Hyderabad.

FUNCTIONS OF NUTRIENTS AND THEIR SOURCES

TABLE I

NUTRIENTS	FUNCTIONS
1 PROTEIN	To build and repair body tissues, muscles and vital fluids like blood; to help form enzymes and antibodies to fight infection.
2. FAT	To serve as a concentrated source of energy and supply fat solvable vitamins.
3. CARBO-HYDRATES	To supply energy to the body.
4. VITAMIN A	To help keep the skin and mucous membranes healthy and to protect against night blindness.

RICH SOURCES

Fresh or dried milk, cheese, curd, oilseeds and nuts, soyabean, yeast, pulses, meat, liver, fish, egg and cereals.

Butter, ghee, vegetable oils and fat, oilseeds and nuts, fish liver oils and egg yolk.

Cereals, millets, roots and tubers, such as potatoes, sweet potatoes, yam, tapioca etc., and sugar and jaggery.

Fish liver oils, liver, milk and milk products (curd, butter, ghee) carrots, fruits and green leafy and yellow vegetables.

FUNCTIONS OF NUTRIENTS AND THEIR SOURCES

TABLE I

(Continued.)

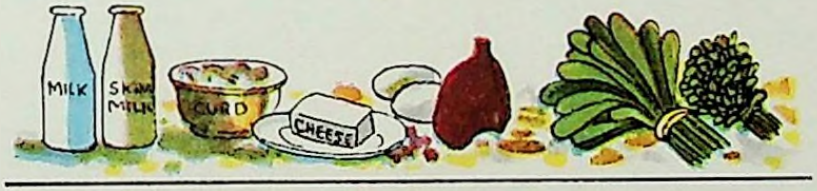
NUTRIENTS	FUNCTIONS
5. VITAMIN B 1 (Thiamine)	For normal appetite and digestion, healthy nervous system, and to help change good carbohydrates into energy for work.
6. VITAMIN B 2 (Riboflavin)	To help the cells use oxygen, to keep vision clear and smooth, skin without scaling around mouth and nose or cracking at the corner of the mouth
7. NIACIN	To preserve health of the skin, functioning of the stomach and intestines and nervous system.
8. VITAMIN C	To help cement body cells together, strengthen the walls of blood vessels, provide resistance to infection and help in healing.

RICH SOURCES

F

Liver, eggs, pork, legumes, pulses, nuts, oilseeds, fruits, yeast, whole-grain cereals and parboiled rice.

Milk, skim milk, curd, cheese, eggs, liver and leafy vegetables.



Cereals, whole-grains, meat, liver, yeast, oilseeds, nuts, legumes and pulses.

mla, guava, citrus fruits, fresh vegetables, salad, and green
routed pulses.

TABLE I

(Continued.)

FUNCTIONS OF NUTRIENTS AND THEIR SOURCES

NUTRIENTS	FUNCTIONS
9. VITAMIN D	To help the body absorb calcium and to help build strong teeth and bones.
10. CALCIUM AND PHOS-PHORUS	To help build bones and teeth as also the blood to clot and assist muscles and nerves to react normally.
11. IRON	To combine with protein to make haeomo-globin—the red substance in the blood which carries oxygen to the cells.

F H SOURCES

Sunlight, butter, cheese, fish liver oil, ghee, egg yolk and milk.

Milk and milk products, leafy vegetables, small fish, cereals, whole-grains, and gingelly seeds.

Liver, yeast eggs, vegetables, oilseed nuts, legumes pulses brown sugar (jaggery), dried fruits and leafy vegetables.

TABLE II

BALANCED DIETS FOR ADULT MAN

	Sedentary work		Moderate work		Heavy work	
	Vegetarian (gm)	Non-vegetarian (gm)	Vegetarian (gm)	Non-vegetarian (gm)	Vegetarian (gm)	Non-vegetarian (gm)
Cereals	400	400	475	475	650	650
Pulses	70	55	80	65	80	65
Green leafy vegetables	100	100	125	125	125	125
Other vegetables	75	75	75	75	100	100
Roots & Tubers	75	75	100	100	100	100
Fruits	30	30	30	30	30	30
Milk	200	100	200	100	200	100
Fats and oils	35	40	40	40	50	50
Meat and fish	—	30	—	30	—	30
Eggs	—	30*	—	30*	—	30*
Sugar & Jaggery	30	30	40	40	55	55
Groundnuts	—	—	—	—	50**	5

* One egg.

** An additional 30 gm. of fats and oils can be included in the diet in place of groundnuts.

TABLE III

BALANCED DIETS FOR ADULT WOMAN

	Sedentary work		Moderate work		Heavy work		Additional allowances during	
	Vegetarian (gm)	Non-vegetarian (gm)	Vegetarian (gm)	Non-vegetarian (gm)	Vegetarian (gm)	Non-vegetarian (gm)	Pregnancy (gm)	Lactation (gm)
Cereals	300	300	350	350	475	475	50	100
Pulses	60	45	70	55	70	55	—	10
Green leafy vegetables	125	125	125	125	125	125	25	25
Other vegetables	75	75	75	75	100	100	—	—
Roots & Tubers	50	50	75	75	100	100	—	—
Fruits	30	30	30	30	30	30	—	—
Milk	200	100	200	100	200	100	125	125
Fats & oils	30	35	35	40	40	45	—	15
Sugar & Jaggery	30	30	30	30	40	40	10	20
Meat & Fish	—	30	—	30	—	30	—	—
Eggs	—	30*	—	30*	—	30*	—	—
Groundnuts	—	—	—	—	40**	40**	—	—

* One egg.
** An additional 25 gm. of fats and oils can be included in the diet in place of groundnuts.

TABLE IV

BALANCED DIETS FOR ADOLESCENT BOYS & GIRLS

	Boys				Girls	
	13-15 years		16-18 years		13-18 years	
	Vege-tarian (gm)	Non-vege-tarian (gm)	Vege-tarian (gm)	Non-vege-tarian (gm)	Vege-tarian (gm)	Non-vege-tarian (gm)
Cereals	430	430	450	450	350	350
Pulses	70	50	70	50	70	50
Green leafy vegetables	100	100	100	100	150	150
Other vegetables	75	75	75	75	75	75
Roots & tubers	75	75	100	100	75	75
Fruits	30	30	30	30	30	30
Milk	250	150	250	150	250	150
Fats & oils	35	40	45	50	35	40
Meat & fish	—	30	—	30	—	30
Eggs	—	30*	—	30*	—	30*
Sugar & jaggery	30	30	40	40	30	30
Groundnuts	—	—	50**	50**	—	

* One egg.
** An additional 30 gm. of fats and oils can be included in the diet in place of groundnuts.

TABLE V

BALANCED DIETS FOR CHILDREN

	Pre-school children				School children			
	1-3 years		4-6 years		7-9 years		10-12 years	
	Vegetarian (gm)	Non-vegetarian (gm)	Vegetarian (gm)	Non-vegetarian (gm)	Vegetarian (gm)	Non-vegetarian (gm)	Vegetarian (gm)	Non-vegetarian (gm)
Cereals	150	150	200	200	250	250	320	320
Pulses	50	40	60	50	70	60	70	60
Green leafy vegetables	50	50	75	75	75	75	100	100
Other vegetables & Roots & tubers	30	30	50	50	50	50	75	75
Fruits	50	50	50	50	50	50	50	50
Milk	300	200	250	200	250	200	250	200
Fats & oils	20	20	25	25	30	30	35	35
Meat & fish / Eggs	—	30*	—	30*	—	30*	—	30*
Sugar & jaggery	30	30	40	40	50	50	50	50

* One egg.

TABLE VI

DAILY ALLOWANCES OF NUTRIENTS FOR INDIANS

(RECOMMENDED BY THE NUTRITION EXPERT GROUP IN 1968)

Group	Particulars	Calories	Proteins (gm)
MAN	Sedentary work	2400	55
	Moderate work	2800	
	Heavy work	3900	
WOMAN	Sedentary work	1900	45
	Moderate work	2200	
	Heavy work	3000	
	Pregnancy	+300	+10
	(second half of pregnancy)		
	Lactation (up to 1 year)	+700	+20

Calcium (gm)	Iron (mg)	Vitamin A Retinol (μg)	Vitamin A or β-carotene (μg)	Thiamine (mg)	Riboflavin (mg)	Nicotinic acid (mg)	Ascorbic acid (mg)	Folic acid (μg)	Vitamin B_{12} (μg)	Vitamin D (I.U.)
0·4 to 0·5	20	750	3000	1·2 1·4 2·0	1·3 1·5 2·2	16 19 26	50	100	1	
0·4 to 0·5	30	750	3000	1·0 1·1 1·5	1·0 1·2 1·7	13 15 20	50	100	1	
1·0	40	750	3000	+0·2	+0·2	+2	50	150-300	1·5	
	30	1150	4600	+0·4	+0·4	+5	80	150		

TABLE VI

(Continued.)

DAILY ALLOWANCES OF NUTRIENTS FOR INDIANS

Group	Particulars		Calories	Proteins (gm)
INFANTS				
	0-6 months		120/kg.	2·3-1·8/kg.
	7-12 months		100/kg.	1·8-1·5/kg.
CHILDREN				
	1 year			17
	2 years		1200	18
	3 years			20
	4-6 years		1500	22
	7-9 years		1800	33
	10-12 years		2100	41
ADOLESCENTS				
	13-15 years	Boys	2500	55
		Girls	2200	50
	16-18 years	Boys	3000	60
		Girls	2200	50

Calcium (gm)	Iron (mg)	Vitamin—A Retinol (μg)	or β-carotene (μg)	Thiamine (mg)	Riboflavin (mg)	Nicotinic acid(mg)	Ascorbic acid(mg)	Folic acid (μg)	Vitamin B_{12} (μg)	Vitamin D (I.U.)
	1/kg.	400								
0·5-0·6		300	1200				30	25	0·2	
0·4 to 0·5	15-20	250	1000	0·6	0·7	8				200
		300	1200	0·8	0·8	10				
		400	1600	0·9	1·0	12				
		600	2400	1·0	1·2	14				
0·7	25	750	3000	1·3	1·4	17	30-50	50-100	0·5-1·0	
	35			1·1	1·2	14				
0·5-0·6	25	750	3000	1·5	1·7	21				
	35			1·1	1·2	14				

davp