CHAPTER-XIII

CHAPTER NO : XIII NUTRITION

Nutrition may be defined as the science of food and its relationship to health. It is concerned primarily with the part played by nutrients in body growth, development and maintenance (Park & Park, 1991). The word nutrient or "Food factor" is used for specific dietary constituents such as protiens, Vitamins and Minerals. Man needs a wide range of nutrients to perform various functions in the body and to lead a healthy life. The nutrients include proteins, fats, carbohydrates, Vitamins and minerals. These nutrients are chemical substances which are present in the food we eat daily. The foods containing these nutrients which we consume daily are classified as cereals, legumes (Pulses), nuts and oilseeds, vegetables, fruits, milk and milk products and flesh food (fish, meat and poultry). Most foods contain almost all the nutrients in various proportions, some foods being rich in certain nutrients. Depending on the relative concentration of these nutrients, foods are classified as protein-rich foods, and fat-rich food etc. Some foods provide only a single nutrients as in the case of sugars which are source of only carbohydrates while oils, ghee, etc, provide only fats.

13.1 Recent Geographical Concept :

Dietary patterns are an integral part of a group's culture, and thus studies of diet and nutrition are closely linked with

cultural geography.Geography of nutrition is one of the most recent approaches to medical geography to emerge. The importance of nutritional status of a population is fundamental in medical geography and should not be under estimated. Those who doubt this fact may look to the childhood mortality' rates for measles or whooping cough in any west African city compared with rates for north American cities ; the difference is nutrition. Host generation of antibodies to defened against infectious disease is largely dependent upon nutritional, espically protein status.

It has been said that most nutrition scientists are far more at home with rats than with humans. Of greater significance during recent year is that the science of nutrition has moved out of laboratory and linked itself to epidemiology. Thus association has given birth to newer concepts in nutrition such as epidemiological assessment of nutritional status of communities, nutritional and growth monitoring, nutritional rehabilitation, nutritional indicators and nutritional interventions - all parts of what is broadly known as nutritional epidemiology.

Another concept that has emerged in recent years is that nutrition is a cornerstone of socio-economic development, and that nutritional problems are not just medical problems but are "multifactorial" with roots in many other sectors of development such as education, demography, agriculture and rural development. It has become apparent that lasting improvement in the health and

nutritional status of people can be brought about only through a successful attack on the basic problems of poverty and injustice. The old concept that the community has faded away. It is now realized that a board intersectoral and integrated approach of sectors of developments is needed to tackle today's nutritional problems.

Epidemiological methods are new increasingly used not only in elucidation of disease aetiology and identification of risk factors of disease but also in the planning and evaluation of nutritional programme. With these newer concepts and newer approaches nutritional science has become more dynamic. Diet surveys are usually carried out by house to house vists in which information about food consumption, the number of inmates with their age and sex, income of the family are collected. From these data one can derive the quantity of foodstuffs actually consumed per capita in the family and calculate the intake of nutrients by a standard reference table. Thus one can then proceed to suggest improvement in the diets.

The study of nutritional status has a direct link with ecological approach to medical geography. Many geographical factors are involved in nutrition. Among them, topography, climate and soil are very important (For e.g., calorie requirements vary according to temperature condition. Also, the need for salt

is greater in tropical climates, as much is lost in the form of sweat). Thus, this has direct link with the food intake habit, the type of food used and the quantity utilized at all three levels. Although it is very difficult to analyse it at the individual level, the family and the community attitude towards diet give an idea of the custom and tradition, economic conditions, etc., which, in turn, can be linked with the body immune system. It also supplies energy for both internal and external system of the body. The immunity of the body with respect to diet can be a probable cause for the age and sexwise variations in the incidence of the disease.

13.2 Information of Diet among Leprosy sufferers and non - sufferers:

During the door to door survey done in the course of this study, information was collected on diet. This was basically confined to the type and quantity of food stuff used per day by sufferers and non - sufferers who were interviewed. It may be noted that oil and condiments used for the preparation of food and also the effect of processing of food, were not taken into consideration in the study. Later, per 100 gm calorific value and protein, found in the edible portion of the food stuff has been calculated by using standard table (C. Gopalam, 1991) in order to analyse the nutritional status. The English, Gujarati and Scientific name of the food stuff with amount of protein and calories

found in per 100 gm are shown in table 13.1.

Table 13.1 : Details of food stuff with calories and protein per 100 gms. of edible part of it, with English, Gujarati and Scientific name of food stuff.

Sr. No	English Name of foodstuff	Scientific Name of foodstuff	Gujarati Name of foodstuff	Protein /100 gm	Calorie /100 gm
I	CEREALS				
1	Bajra (Dehu-sked)	Pennisetum typ-hoideum	Bajri	11.6	361
2	Maize (Grain)	Zea Mays	Makai	4.7	125
3	Rice (milled)	Oryza Sativa	Chokha	6.4	345
4	Rice Flakes	Oryza Sativa	Pohva	6.6	346
5	Wheat (atta)	Triticum Aest-	Ghau	12.1	341
II	PULSES & LEGUMES				
1	Bengalgram	Cicerarictinum	Chana ni dhal	20.8	372
2	Blackgram	Phaseolus Mingo	Aalad ni dhal	24.0	347
3	Cowgram	Vigha Catiang	Lobiya	24.6	327
4	Field beam dry	Dolichas lablab	Walpapadi	24.9	347
5	Greengram	Phaseolus Aureus Roxb	Mung ni dhal	24.5	348
6	Lentil	Lens exculanta	Masur ni dhal	25.1	343
7	Peas roasted	Pisum Sativum	Vatana	22.9	340
8	Redgram	Cajanus Cajan	Tura ni dhal	22.3	335
9	Raivan	Vijna Sinensis	Chola	23.4	344
III	VEGETABLE				
1	Spinach (Only leaves)	Spinacea oler-acea	Palak	2.0	26
2	Bathua (Only leaves)	Chenopadium album	Chilni Bhaji	3.7	30
3	Cabbage	Brassica Oler-aceavar capitata	Kobi	1.8	27
4	Carrot Leaves	Daucus Carsta	Gajarna pan	5.1	77
5	Cauliflower gross	Brassica Oler-acea van Botrytis	Ful Gobi	5.9	66
6	Chowli	Vigna Catiang	Chowli	3.4	36
7	Onion Tops	Allum Cepa	Kanda	1.2	33
8	Fenugreek leaves	Trigonella toe-num Graecum	Methi	4.4	49
9	Beans	Phaseolus Cocc-ineus	Sem	7.4	158

Cont...

Sr. No	English Name of foodstuff	Scientific Name of foodstuff	Gujarati Name of foodstuff	Protein /100 gm	Calorie /100 gm
10	Brinjal (Flesh part only)	Solanum Melongena	Ringna	1.4	24
11	Calabush Cucumber	Lagenaria Sicerarla	Dudhi	0.2	12
12	Lady's Finger	Abelamaschus esculentus	Bhinda	1.9	35
13	Onion Stalks	Allum Cepa	Dunglina Dakhodi	0.9	41
14	Peas English	Pisum Sativum	Watana	7.2	93
15	Sword Beams	Canavalia Glad	Abbaya ni shing	2.7	44
IV	ROOTS & TUBERS				
1	Carrot	Duscus Carota	Gajar	0.9	48
2	Onion Big	Allium Cepa	Kando	1.2	49
3	Potato	Solanum Tuberosum	Batata	1.6	97
4	Radish White	Raphamus Sativas	Mula	0.7	17
5	Sweet Potato	Ipomoea Butatas	Sakkaria	1.2	120
V	NON - VEGETARIAN ITEMS				
1	Goggler Fish	Caranax Cruneno pthalmus	NA	18.7	93
2	Sea Prawns	Peneus Monodon	NA	17.6	82
3	Rohu	Labeo Rohita	NA	16.6	97
4	Beef Muscle	Bostawcus Gomas	NA	22.6	114
5	Goat Meat	Capra Hyrchusb	NA	21.4	118
VI	MILK FOOD				
1	Cow Milk	-	Dud	3.2	67
2	Buffalo's Milk	-	"	4.3	117
3	Butter Milk	-	Chhas	0.8	15

Source : C. Gopalam, et al 1991, Page : 47 to 58 & 95 to 117.

13.2.1 Information of Non-Vegetarian food stuff :

Seeing their diet habit, nearly 66% of the sufferers and 72% of non-sufferers are supposed to have both type of food (Veg & NonVeg). While rest of them are strictly vegetarians. In order to know the amount of energy and protein they get by consuming the vegetarian and non-vegetarian food stuff the following procedure has been followed.

The total consumption of each item of food stuff in a family was divided by the number of family member to obtain the per capita consumption of that item per familly. Summing up these per capita values for all the families of sufferers enabled the computation of the average per capita consumption of a particular food item. The same process was repeated for the families of non-sufferers. The consumption values obtained have been rounded off to the nearest 10 gm.

Thus it was found that the average quantity of consumption of edible portion of non-vegetarian food stuff per individual in a sufferer's family was approximately 40 gm while in non-sufferer's family it was approximately 62 gms. The average protein content in the above quantities was 7.4 gms and 12 gms respectively. Similarly, calories consumed per individual was found to be 40 in a sufferer's family while in non-sufferer it was 62.

Table 13.2 : Details of non-vegetarian food stuff consumed by individual sufferer and non-sufferer along with protein and calories content found in the edible part of foodstuff.

Non Veg Food Items	Per individual Sufferer			Per individual Non-Sufferer		
	Qty per meal (gms)	Protein Content	Cal: intake	Qty per meal (gms)	Protein Content	Calori intake
Goat Meat	48	10	57	60	13	71
Chicken	38	NA	NA	62	NA	NA
Beef	37	8	42	70	16	80
Sea Prawns	42	7	34	65	11	53
Rohu Fish	32	5	31	58	10	56
Goggler Fish	38	7	35	52	10	48
Average	40	7.4	40	61	12	62

Note : * The quantity of chicken is not taken into calculation because equivalent quantity of it per 100 gms was not available.

It was found that among sufferers the non-vegetarian food items were consumed after every fortnight while in case of non-sufferers it was consumed every week.

13.2.2 Information of Vegeterian food stuff :

Although most of the vegetarian food items are easily avaliable in the district, due to the low per capita income, the intake of green yegetables was found to be poor. Although each family of sufferer and non-sufferer does not take all the items in their daily meal, there are various combinations of these food

products that have been noted. The table 13.3 shows the information of various vegetarian food items with the content of calories and protein consumed by the individual in the family of sufferes and non-sufferer.

Table 13.3 : Details of Vegetarian food stuff consumed per individual in family of sufferer and non-sufferer with quantity per meal, protein and calories found in edible part of food stuff.

Name of Food Items	Per individual Sufferer			Per individual Non-Sufferer		
	Qty per meal (gms)	Protein Content	Cal: intake	Qty per meal (gms)	Protein Content	Calo intake
CEREALS						
Bajra atta	210	24.36	758	282	32.7	1018
Maize atta	225	10.57	281	317	14.9	396
Rice Milled	102	6.5	352	178	11.4	614
Rice Flakes	80	5.3	277	128	8.5	443
Wheat atta	128	15.5	437	182	20.0	621
Average	149	12.5	421	218	17.5	618

The individual sufferer on an average, can consume 149 gm of cereals in which approximately 12.5 gms protein content and 421 calories were found while in case of non-sufferers, on an average the per capita consumption was 218 gm of cereals in which 17.5 gms of protein content and 618 calories were found.

Name of Food Items	Per individual Sufferer			Per individual Non-Sufferer		
	Qty per meal (gms)	Protein Content	Cal: intake	Qty per meal (gms)	Protein Content	Calor- intake
PULSES & LEGUMES						
Bengal gram	11	2.3	41	16	3.3	60
Black gram	12	2.8	42	22	5.3	76
Cow gram	15	3.7	49	24	5.9	78
Field beam	13	3.2	45	28	7.0	97
Green gram	16	3.9	56	24	5.8	83
Lentil	9	2.2	31	26	6.5	89
Peas roasted	14	3.2	48	15	3.4	51
Red gram	15	3.3	50	19	4.2	64
Raivan	18	4.2	62	28	6.6	96
Average	14	3.2	47	23	5.4	77

An individual sufferer, on an average, consumed 14 gm of pulses and legumes in which 3.2 gms of protein content and 47 calories were found. In case of non-sufferers the per capita consumption was 23 gms of pulses and legumes in which approximately 5.4 gms of protein content and 77 calories were found.

Name of Food Items	Per individual Sufferer			Per individual Non-Sufferer		
	Qty per meal (gms)	Protein Content	Cal: intake	Qty per meal (gms)	Protein Content	Calor- intake
VEGETABLES						
Spinach leaves	20	0.4	5	28	0.56	7
Bathuva leaves	32	1.2	10	48	1.8	14
Cabbage	22	0.4	6	37	0.7	10
Carrot leaves	28	1.4	2	37	1.9	28
Cauliflower	26	1.5	17	41	2.4	27
Chawli	30	1.0	11	43	1.5	15

Cont...

Name of Food Items	Per individual Sufferer Qty per meal (gms)	Protein Content	Cal: intake	Per individual Non-Sufferer Qty per meal (gms)	Protein Content	Calor-intake
Onion Tops	37	0.4	12	44	0.5	14
Fenugreek	32	1.4	16	38	1.7	19
Beans	30	2.2	47	48	3.6	76
Bringjal	35	0.5	8	55	0.8	13
Calabus Cumber	28	0.06	3	37	0.07	4
Lady finger	30	0.6	10	44	0.8	15
Onion stalks	32	0.3	13	39	0.3	16
Peas English	37	2.7	34	42	3.0	39
Sword beans	25	0.7	11	28	0.8	12
Average	30	1.0	14	41	1.4	20

Individual sufferers, on an average, consumed 30 gm of vegetables in which 1.0 gms protein content and 14 calories were found, while in case of non-sufferers per individual, the average consumption was 41 gms of vegetable in which 1.4 gms was the protein content and 20 calories were found.

Name of Food Items	Per individual Sufferer Qty per meal (gms)	Protein Content	Cal: intake	Per individual Non-Sufferer Qty per meal (gms)	Protein Content	Calor-intake
ROOT & TUBERS						
Carrot	17	0.1	0.4	28	0.3	1
Onion Big	26	0.3	13	42	0.5	21
Potato	38	0.6	37	48	0.8	47
Radish white	24	0.2	4	36	0.3	6
Sweet Potato	28	3.0	34	42	0.5	50
Average	27	0.8	18	40	0.5	25

Individual sufferer, on an average, consumed 27 gms of roots and tubers in which 0.8 gms of protein content and 18 calories were found, while in case of non-sufferer on an average the consumption of roots and tubers was 40 gms in which approximately 0.5 gms of protein content and 25 calories were found.

Name of Food Items	Per individual Sufferer			Per individual Non-Sufferer		
	Qty per meal (ml)	Protein Content	Cal: intake	Qty per meal (ml)	Protein Content	Calor- intake
MILK						
Cow's Milk	52	1.7	35	68	2.1	46
Buffalo's Milk	48	2.1	56	70	3.0	82
Butter Milk	82	0.7	12	98	0.8	15
Average	61	1.5	34	79	2.0	48

A sufferer, on an average, consumed 61 ml of milk in which 1.5 gms of protein content and 34 calories were found. In case of non-sufferer per individual average consumption was 79 ml of milk in whch 2.0 gms of protein content and 48 calories were found.

13.3 Nutritional status of leprosy sufferers and non-sufferers :

The nutritional status has been derived on the basis of the foregoing details available regarding the diet of sufferers and non-sufferers.

Table 13.4

English name of food item	Per individual in family sufferer			Per individual in family of non-sufferer		
	Average Quantity (gms/ml)	Average Protein	Average Calories	Average Quantity (gms/ml)	Average Protein	Average Calories
Cereles	149	12.5	421	218	17.5	618
Pulses & legumes	149	3.2	47	23	5.4	77
Vegetable	30	1.0	14	41	1.4	20
Roots & Tubers	27	0.8	18	40	0.5	25
Non-vegetarian Items*	40	7.4	40	61	12.0	62
Milk	61	1.5	34	79	2.0	48
One time in a day	456	26.4	574	462	38.8	850
Two time in a day	912	52.8	1148	924	77.6	1700

As already noted (Table II-3&4) majority of the patients belong to, at best, moderate socio-economic group (Classification of activities based on occupation). Based on their occupations, age and sex, the average requirement of protein and calories is as follows:

Man (adult)	2800 cal	55 Protein
Women (adult)	2300 cal	45 Protein

Source : C. Gopalan et al 1971 :

In the study area, one time meal of a sufferer consists of 456 gms of the food items which have approximately 26.4 gms protein and 574 calories. Thus per day an individual sufferer will have 912 gm of food items with 52.8 gms protein and 1148 calories, which is below the standard requirement of an individual as

stated above. The nutritional status of the non-sufferers is certainly better, although the quantities consumed by them also fall short of the sandard requirement.

However, it is amply clear that there is a considerable difference in the nutritional status of the sufferers and non-sufferers. It has been said that good and balanced food provide better immunity to the body from the invasion of diseases (Park & Park, 1992). Thus how far the factor of nutrition is related to the occurrence of leprosy can therefore provide the subject matter for futher scientific investigations.