## The Green Revolution and Nutrition

Much has been written about the Green Revolution in India and elsewhere . Below we very briefly look at the Green Revolution from the point of view of nutrition and sustainable processes for the poor.

We have discussed in Chapter 3, some of the effects of the Green Revolution technology aids like new seeds, pesticides, fertilisers, excessive irrigation, indiscriminating tapping of ground water resources, and so on. This kind of technology requires more money just to get going and as a result the large amounts required have led to a debt trap for the poorer peasants. Those who find this technology economically viable are those with medium and large farm holdings. A related issue is how today in India the politics of agriculture and rural economy is one that is largely addressed to the concerns of the richer farmers, thus further marginalizing the poorer peasants, the landless and low income share croppers.

Another area of concern related to the Green Revolution in India is the emphasis on producing , procuring and maintaining a large food stock, with its related compulsions for appeasing the big farmer lobby by giving periodic increases in procurement prices of grains, by periodically subsidising fertilizer companies* to the relative neglect of bothering whether food really reaches the hungry and whether we are doing anything really to increase the ability of poor people to eat better ?

Apart from the long term ecological damage done to the land,soil, and water, to the pool of traditional seeds, to naturally occurring pests and to human beings by eating pesticide and fertilizer infested foods, the Green Revolution by focussing on a few areas of the country has resulted in the neglect and fund starvation of large areas of the country. The Seventh Plan document admits that developed areas accounting for less than 15 percent of the area under food grains in the country, contributed as much as 56 percent of the in food grain production in the post Green Revolution period , which means that 85 percent of the area under foodgrains in the country contributed as little as 44 percent of the increase in the post Green Revolution period.

There are also disputed questions about the employment effects of Green Revolution and the money making and the consumerist ethos that the post-Green Revolution phase has triggered. Some sociologists have found connections between the Green Revolution characteristic of selective affluence in a few pockets of Punjab, the resulting glaring disparities and the instability in Punjab during the late seventies and early eighties. There are others who see the Green Revolution as an outstanding example of a patriarchal science and technology that denies the feminine principle in nature. It is pointed out that the states that are most successful in the Green Revolution, Punjab and Haryana, are also the states with the most adverse sex ratio.

While we will not examine these, mention must be made of at least three other trends which have marked the post-Green Revolution phase and that have a direct bearing on nutritional status of large populations. The first is the relative neglect and decline in some cases, of pulse crops and of millets, which constitute the staple food of some of the poorest people. The second is the ‘Green Revolution type’ revolution: the white (milk) and the oilseeds revolution. The third trend is the widespread propagation of the Green Revolution as the major paradigm of ‘progressive’ agriculture.

## Millets

Millet crops are grown on roughly 35 million hectares of land in India, mostly in semi-arid, unirrigated conditions with low rainfall. Millets include jowar (sorghum), finger, millets (ragi, marua and nagli), bamyard millet (sanwa), Italian millet (tenai), Kodo millet (kodon), common millet (chena, parivaraga), foxtail millet (kukum) and little millet (samai,sawan). These millets are hardy and can grow in adverse conditions known to exist over various parts in India. Sanwa, samai and sawan are especially known to withstand drought and water logging.

Table 4 shows the change in pattern of food production from the early fifties to the early eighties. The relative decline of jowar with respect to wheat and rice is evident. In 1950-51, the production of barley, ragi, sanwa, kodo, etc. was together almost equivalent to that of wheat (64 million tonnes). While it is difficult to trace the cause of this per capita decline in the availability of millets, one reason certainly appears to be the focus of the government on the Green Revolution miracles...rice and wheat. This is a matter of concern especially as many of these millets have high nutritional value.

**Table 4**
**Foodgrains production (in million tonnes)**
(Approximate percentage share in total foodgrain production is given in brackets)

| **Description** | **1950-51** | **1983-94** |
|---|---|---|
| Rice | 20.6 (40%) | 59.2 (39%) |
| Wheat | 6.4 (13%) | 45.2 (30%) |
| Jowar | 5.5 (11%) | 11.9 ( 8%) |
| Bajra | 2.6 ( 5%) | 7.6 ( 5%) |
| Maize | 1.7 ( 3%) | 7.9 ( 5%) |
| Other cereals | 6.1 (12%) | 6.5 ( 4%) |
| Pulses | 8.4 (17%) | 12.6 (8%) |
| Total foodgrains | 50.8 (100%) | 151.5 (100%) |
| Source : Based on data given in Sixth and Seventh Plan documents and Annual Economic Surveys. From Dogra, op.cit. | | |

## Pulses

Every Indian family would like to use some form of pulse (dal or lentil) with their daily staple food. Pulses are important sources of protein in an essentially cereal based diet of a population that is largely vegetarian. **Being legumes, they are good natural nitrogen fixers and enrich the soil fertility by adding up to 30 kgs of nitrogen per hectare--which is a far more energy efficient process than one based on industrially produced nitrogenous fertilizers and soil nutrients**. Table 5 gives the production of pulse grams in India and the Table 6 shows how pulse production has virtually stagnated in India . The reason for this include: high risk

small proportions of irrigated area, low profitability, inadequate use of modern inputs and gaps in technology.

Table 7 on availability of pulses and cereals shows a 50 percent decline in quantity of pulses available per capita from 1961 to 1988. Table 8 gives a comparative performance of various food crops.

Pulse production has occurred in the 85 percent of the non-Green Revolution area mentioned above. The stagnation of pulse production is really a "part of the overall stagnation of agricultural production in the vast main land of Indian agriculture, only in this case low productivity in the mainland is not offset by the relatively much high productivity in a few pockets".

**Table 5**
**Pulse Crops of India**

| | **Production** | **Area** |
|---|---|---|
| | (million tonnes) | (million hectares) |
| | | |
| Bengal-gram (chana) | 4 to 5 | 7 to 8 |
| Black-gram (urad) | 1 | 2.5 |
| Green gram (mung) | 0.8 | 2.5 |
| Horse gram (kulthi) | 0.5 | 2.0 |
| Lentil (masur) | 0.45 | 0.9 |
| Moth bean (moth) | 0.2 | 1.7 |
| Peas (matar) | 0.47 | 0.5 |
| Pigeon pea (arhar) | 1.8 | 2.5 |
| Cow-pea (lobia) | - | - |
| Chickling pea (khesari) | - | - |
| Pulses (All) | 11 to 12 | 22 |

Source : Handbook of Agriculture, Indian Council of Agriculture Research, 1980. Quoted in Dogra, op. cit
Note : Other pulses grown in India include rajma (frenchbean), Sem (Indian bean), clusterbean (guar) and some others.

**Table 6**
**Performance of Pulse Crops**

| | Area | Yeild | Production |
|---|---|---|---|
| | (million | (Kgs. per | (million |
| | hectares) | hectare) | tonnes) |
| First Plan Average 1951-56 | 21.1 | 474 | 10.1 |
| Sixth Plan Average 1979-84 | 22.9 | 480 | 11.0 |
| Source : Derived from Annexure 1, Planning Commission, Seventh Plan document. Quoted in Dogra, op. cit. | | | |

**Table 7**
**Availability of Foodgrains**

| | Net quantity available | | | | |
|---|---|---|---|---|---|
| | Annual total* (Million tonnes) | | Per capita per day (Grams) | | |
| | Cereals | Pulses | Cereals | Pulses | Total |
| 1961 | 64.6 | 11.1 | 400 | 69 | 469 |
| 1971 | 84.0 | 10.3 | 418 | 51 | 469 |
| 1981 | 104.9 | 9.4 | 416 | 38 | 454 |
| 1985 | 113.9 | 10.5 | 416 | 38 | 454 |
| 1986 | 121.5 | 11.7 | 434 | 42 | 476 |
| 1987 | 124.4 | 10.2 | 436 | 36 | 472 |
| 1988 | 118.7 | 9.7 | 408 | 33 | 441 |
| * 87.5% of total domestic production, the balance 12.5% being provided for feed & seed requirements etc. plus imports, minus exports and net changes in Government stocks. Source : Statistical Outline of India 1989-90, Tata Services Ltd., Bombay, July 1989. | | | | | |

## Towards Sustainable Food Production

One of the major long-term consequences of the Green Revolution and of the post-Green Revolution phase is the denial, neglect or lack of serious debate about other modes of agricultural production or other methods of agricultural knowledge practices. The Green Revolution culture is advertised as the major model of ‘successful’ and ‘progressive’ agriculture. Wherever such intensive large-scale deployment of technology and management has gone in as in oil seeds or operation flood (for creating milk surpluses), often, traditional, more sustainable forms of food production that guaranteed food access to more of the poor

tend to be overlooked. A feature that goes with these intensive applications of technology is the incorporation of ordinary food items like milk and oil as part of a centralized market economy with little possibility of control or influence by actual users. Often attempts to modernize the oilseeds and milk economy have resulted in upsetting the ecology of animal nutrition flows in rural areas. Oil cakes are far less easily available as feed concentrates to individual milch cow owners. When milch cows are scientifically bred to enhance lactation, the male is often unequal to the purpose of draught.

**Table 8**
**Agricultural Production**

| | 1987-88 (Prov) * | 1986-87 | 1985-86 | 1980-81 | 1970-71 |
|---|---|---|---|---|---|
| | Million tonnes | | | | |
| Food grains | 138.4* | 143.4 | 150.4 | 129.6 | 108.4 |
| Cereals | 127.4 | 131.7 | 137.1 | 119.0 | 96.6 |
| Rice | 56.4 | 60.6 | 63.8 | 53.6 | 42.2 |
| Wheat | 45.1 | 44.3 | 47.1 | 36.3 | 23.8 |
| Jowar | 11.9 | 9.2 | 10.2 | 10.4 | 8.1 |
| Bajra | 3.3 | 4.5 | 3.7 | 5.3 | 8.0 |
| Maize | 5.6 | 7.6 | 6.6 | 7.0 | 7.5 |
| Others | 5.1 | 5.5 | 5.7 | 6.3 | 6.9 |
| Pulses | 11.0 | 11.7 | 13.4 | 10.6 | 11.8 |
| Gram | 3.6 | 4.5 | 5.8 | 4.3 | 5.2 |
| Tur | 2.2 | 2.3 | 2.4 | 2.0 | 1.9 |
| Others | 5.2 | 4.9 | 5.1 | 4.3 | 4.7 |
| Oilseeds# | 12.4 | 11.3 | 10.8 | 9.4 | 9.6 |
| Groundnut (in shell) | 5.7 | 5.9 | 5.1 | 5.0 | 6.1 |
| Rapeseed & Mustard | 3.4 | 2.6 | 2.7 | 2.3 | 2.0 |
| Others | 3.3 | 2.8 | 3.0 | 2.1 | 1.5 |
| Tobacco | 0.3 | 0.46 | 0.44 | 0.48 | 0.36 |
| Cotton (lint)$ | 6.4 | 6.9 | 8.7 | 7.0 | 4.8 |
| Jute $ | 5.8 | 7.4 | 10.9 | 6.5 | 4.9 |
| Sugarcane (cane wt.) | 196.7 | 186.1 | 170.7 | 154.3 | 126.4 |

| | | | | | |
|---|---|---|---|---|---|
| Tea@ | 0.67 | 0.62 | 0.66 | 0.57 | 0.42 |
| Coffee | 0.12 | 0.19 | 0.12 | 0.12 | 0.11 |

* 1988-89 (170 million tonnes)
# Comprising groundnut, rapeseeds and mustard, sesamum, linseed, castorseed, nigerseed, safflower, sunflower and soyabean.
$ Cotton in million bales of 170 kg. and jute in million bales of 180 kg. each.
@ Calender years
Source : Tata Services Ltd., Op. cit.

The milk revolution has drained milk out of rural areas to the extent that even buttermilk --a good source of nutrition---that was freely available in rural areas is not anymore available.1 While we are not arguing against an oil seeds or milk revolution, care must be taken to make milk and edible oil easily accessible to the poor in rural and urban areas, 2 as well as not upset overnight the ecological balances built over centuries.

There has been however responses in India and the world over that show an alternative way of farming and growing food. We mention these here not as definitive answers but as indications of possibilities.

Appendix 2 is a brief description of **Fukuoka's** One-Straw Revolution, an attempt to grow food without resort to modern tools like fertilizers, pesticides, etc. Appendix 3 is an extract from Dr. R. H. Richharia's Rice in Abundance for all times through Rice clones - A Genetic Forecast.

Dr. Richharia, a scientist, and ex-director of Central Rice Research Institute, Cuttack, suggests a system of hybridization of rice seeds that are indigenous to the country. At one time, he had collected more than 4000 varieties of rice grown in India, revealing in the process an amazingly large number of varieties being grown by tribal farmers. Many of the traditional varieties, were capable of giving yields equal to or greater than the Green Revolution HYVs (High Yielding Varieties) with much lesser fertilizers and with no pesticides.

Some of Fukuoka's and Richharias techniques have been implemented with good results at Friend's Rural Centre, Hoshangabad, MP, and at the Gloria Land farm at the Sri Aurobindo Ashram in Pondicherry--both places have combined elements of organic farming and natural pest management with the above.

The Green Revolution was thus a 'revolutionary' phenomenon in some areas and for some crops and is being sought to be extended for even other items like milk and oilseeds. However, a true revolution based on the nature of ownership of cultivable land is yet to come. The West Bengal government's land reforms (Operation Barga) over the last 12 years is therefore something to be commended and studied for its effect on nutritional status, keeping in mind, of course, the complex of factors outlined in Figure 2 earlier that go to determine nutritional status.

At the risk of overdramatisation, let us quote Susan George on Norman Borlaug :

- Dr. Norman Borlaug, one of the Rockefeller Foundation's original bright young geneticists who founded CIMMYT, received the Nobel Peace Prize (Peace, not

Biology) in 1970 for his contribution to the development of the Green Revolution. He concluded his acceptance speech to the Nobel Academy with his passage from Isaiah :

*And the desert shall rejoice, and blossom as he rose--and the parched ground shall become a pool, and the thirsty land springs of water....(35:1,7).*

- Dr. Borlaug did not tell the Academy that the Prophet foresees certain changes as imperative before this blossoming can take place:

  *And the eyes of them that see shall not be dim, and the ears of them that hear shall hearken ...the tongue of the stammerers shall be ready to speak plainly.*
  *The vile person shall no more be called liberal, nor the chart said to be bountiful.*
  *For the vile person will speak villainy and his heart will work iniquity; to practice hypocrisy...to make empty the soul of the hungry, and he will cause the drink of the thirsty to fail.*
  *The instruments also of the churl are evil: he deviseth wicked devices to destroy the poor with lying words, even when the needy speaketh right. (32:3-7).*

## Distribution of Malnutrition in India

## Problems, Programmes and Policies

Examination of national Nutrition Monitoring Bureau (NNMB) data, ICDS (Integrated Child Development Scheme) and other data reveal briefly the following features about nutrition.

1. Taking average nutritional status of households, severe malnutrition is more prevalent in the eastern states, and in UP, MP and Kerala (See for instance Table 9A for Rural Bihar).
2. The nutritional status of scheduled castes and tribes was substantially lower than the recommended minimum in most states. In particular, the intakes of scheduled casts in Kerala, Maharashtra, Tamil Nadu ,MP and UP and tribes in MP, Gujarat and West Bengal were alarmingly low. (See for instance Table 9B where this comes out clearly). The figures for Karnataka which has a high poverty ratio and for Kerala whose low average in a spite of a supposed high standrs of health, remains a puzzle. Kerala's very poor agricultural performance and the very high free market retail price(40% higher than the all India price of rice) are possible explanations. Also considering the fact. that the decline in poverty ratio was lowest among SC and ST groups, their nutrition probably has not much improved since 1980-81.
3. 
    a. The incidence of acute malnutrition is definitely high among children, especially in the age group 0-3 years in almost all states, it being higher in tribal tracts. (See Table 9C and 9D). In a number of states, the percentage of children with adequate caloric protein intakes were much lower than the corresponding percentage for households, Children of Scheduled Castes and Tribes in all cases where data was available, suffer from a high incidence of malnutrition.
    b. ICRISAT data for extremely backward arid zone (for 1976) confirms the incidence of severe malnutrition among children in the age group 1-3 among all classes, with incidence of energy deficiency higher among children of landless laboureres and small farmers.1
    c. Others have tried to show the prevalence of malnourished children of Scheduled Castes and Tribes groups to be higher in districts that are less developed (irrigation ratio was found associated associated inversely with malnutrition).2
    d. Table 9E on 'Summary Nutritional Status by Age in Bihar Villages' shows that nearly half of the children aged less than 54 months suffered from a nutritional deficiency, the figure being 78% for 6-18 months group. On the average only 53.5% of all households was normal.
4. Although research and scholarly data is not very conclusive, there is field experience of several activists to suggest that there is a gender discrimination in food intake against very young girls, not only in North India (which the research data tends to agree),but elsewhere too. There is general gender discrimination with respect to providing quality of life to all women, either it be health care when sick or education or sharing of drudgery. However, it should be noted that the NNMB data does indicate higher incidence of protein-energy malnutrition among especially the school children, even though caloric inadequacy is comparatively lower among girls. Table 9F also indicates that during the period 1975-80, both males and females suffered to the extent from

caloric inadequacy (calorie intake two standard derivations or more below the average). Infact,Table 9F shows figures slightly less for females.

**Table 9A**
**Summary Nutritional Status of Households in Rural Bihar by Social Class (% Distribution)***

| Class | Normal | Wasted | Stunted | Acute | N |
|---|---|---|---|---|---|
| Agricultutral Labour | 43.7 | 31.0 | 15.1 | 10.2 | 270 |
| Agricultural Labour tied | 45.6 | 28.6 | 14.5 | 11.3 | 103 |
| Poor- Middle peasant | 57.6 | 27.9 | 9.3 | 5.2 | 73 |
| Middle peasant | 75.4 | 17.1 | 4.9 | 2.0 | 90 |
| Big Peasant | 57.3 | 31.1 | 8.3 | 3.3 | 243 |
| Landlord | 70.6 | 20.6 | 8.4 | 0.3 | 164 |
| Non-Agricultural | -- | -- | -- | -- | -- |
| No Activity | 45.2 | 31.4 | 11.8 | 11.6 | 49 |
| All | 53.5 | 28.4 | 11.3 | 6.8 | 992 |

* The norms used by the authors for defining "normal", "stunted", etc. are as follows:

| | Weight for age | |
|---|---|---|
| over 85% | over 85% | "normal" |
| less than 85% | over 85% | "stunted" |
| over 85% | less than 85% | "wasted" |
| less than 85% | less than 85% | "acute" |

Source : P.H Prased et. al "The Pattern of Poverty in Bihar" (World Employment Programme Research), Working Paper No. 152.

**Table 9B**
**Stage-wise calorie intake (Kcal/cu) 1975-80**
**Average (Rural) by Social Class**

| | | Calorie Intake Of Schedule Castes as a percent of | | Calorie Intake Of Schedule Tribes as a percent of | |
|---|---|---|---|---|---|
| States | State Average | State Average | Recommended Daily Allowance (2400) | State Average | Recommended Daily Allowance (2400) |
| Karnataka | 2837 | 86.6 | 102.4 | SS | -- |
| Andhra Pradesh | 2517 | 96.3 | 101.0 | SS | -- |
| Orissa | 2324 | 94.1 | 91.0 | 96.3 | 93.3 |
| Tamil Nadu | 2292 | 88.7 | 84.7 | SS | - |
| Maharashtra | 2286 | 85.6 | 81.5 | 98.1 | 93.5 |
| West Bengal | 2227 | 98.7 | 91.5 | 92.2 | 85.5 |
| Gujarat | 2211 | 98.0 | 90.3 | 92.4 | 85.1 |
| Madhya Pradesh | 2160 | 92.5 | 83.3 | 89.4 | 80.5 |
| Uttar Pradesh | 2123 | 97.2 | 86.0 | SS | - |
| Kerala | 1942 | 94.1 | 67.4 | SS | - |

SS : Small Sample
Source : Computed from disaggregated NNMB data.

## Nutritional Problems in India

The major nutritional problem in India is therefore PCM or protein calorie malnutrition, especially among most vulnerable groups like children, pregnant women, lower income groups and population living in tribal tracts. The term PCM implies the problem of malnutrition is one of primarily calorie or energy intake deficiency, the protein deficiency being secondary, since in Indian conditions, the dietary sources of proteins and calories are the same, an adequate qota of calories will expectedly take care of an adequate proteinin the diet.

The other major nutritional deficiency diseases are Vitamin A deficiency, goitreand iron deficiency anemia. In certain parts of India fluorosis is also a problem due to the presence of excessive amounts of fluoride in drinking water. Pellagra, caused due to niacin or nicotinic acid deficiency is prevalent in populations whose staple diet is maize. Pellagra has also been reported in jowar caters, although there is no niacin defiency in this millet

**Table 9C**

**Percentage of Malnourished (Gr. III + IV) Children in ICD Projects by Caste Status, 1981***

| | Average | | Scheduled Castes | | Scheduled Tribes | |
|---|---|---|---|---|---|---|
| | 0-36 months | 0-72 months | 0-36 months | 0-72 months | 0-36 months | 0-72 months |
| | 9.6 | 8.6 | 10.4 | 8.3 | 9.9 | 7.5 |
| Bihar | 31.8 | 31.7 | 39.5 | 40.9 | - | - |
| Gujarat | 7.3 | 6.2 | 6.0 | 3.9 | 11.7 | - |
| Haryana | 4.6 | 3.5 | - | - | | - |
| Himachal Pradesh | 5.3 | 4.3 | 7.0 | 9.3 | | - |
| Karnataka | 8.8 | 8.3 | 10.1 | 8.5 | 5.0 | 2.5 |
| Kerala | 7.7 | 7.8 | 11.0 | 10.2 | 17.5 | 15.6 |
| Madhya Pradesh | - | - | - | - | 24.3 | 12.7 |
| Maharashtra | 15.8 | 13.3 | 16.7 | 14.8 | 23.7 | 20.7 |
| Orissa | 16.7 | 13.0 | 19.0 | 16.8 | | - |
| Punjab | 8.6 | 8.2 | 13.9 | 12.3 | | - |
| Rajasthan | 8.2 | 8.7 | 17.3 | 12.1 | 8.1 | 7.6 |
| Tamil Nadu | 8.1 | 6.4 | 10.1 | 7.1 | | - |
| Uttar Pradesh | 13.1 | 10.5 | 17.1 | 13.2 | 16.3 | 13.4 |
| West Bengal | 19.9 | 17.3 | 26.5 | 21.3 | 17.0 | 12.1 |

* ICDS authorities follow the Indian Academy of Paediatrics (IAP) classification, as shown below :

- <50% weight for age : Grade IV malnutrition
- 51-60% weight for age : Grade III malnutrition
- 61-70% weight for age : Grade II malnutrition
- 71-80% weight for age : Grade I malnutrition
- >80% Normal

Source : Compiled from Child in India. A Statistical Profile, Ministry of Welfare, Government of India

**Table 9D**
**Percentage of Malnourished (Gr. III + IV) children * (0-36) months of Scheduled Castes and Tribes in Rural/Urban/Tribal ICDS Projects, 1981 (%)**

| State | Average | Rural@ | Tribal# | Urban$ |
|---|---|---|---|---|
| Andhra Pradesh | 9.6 | 11.0 | 10.8 | 10.3 |
| Himachal Pradesh | 5.3 | 8.1 | 12.4 | 26.3 |
| Maharashtra | 15.8 | 27.3 | 14.3 | 16.4 |
| Uttar Pradesh | 13.1 | 30.8 | 13.9 | 20.8 |
| West Bengal | 19.9 | | 16.2 | 33.8 |

- * IAP classification (defined in footnote to Table 9C).
- @ and $ Children of Scheduled Castes
- # Children of Scheduled Tribes

Source : Compiled from Child in India. A Statistical Profile. Ministry of Welfare, Government of India.

**Table 9E**
**Summary Nutritional Status by Age (% Distribution) in Bihar Villages***

| Age | Normal | Wasted | Stunted | Acute | N |
|---|---|---|---|---|---|
| 6 Months but less than 18 | 22.8 | 42.5 | 22.8 | 11.9 | 41 |
| 19 Months but less than 54 | 36.7 | 33.1 | 19.3 | 10.9 | 248 |
| 54 Months but less than 114 | 52.5 | 31.0 | 9.9 | 6.6 | 419 |
| 114 Months or more | 76.3 | 17.9 | 3.7 | 2.2 | 279 |
| All | 53.5 | 28.4 | 11.3 | 6.8 | 992 |

* For definitions of "normal", "wasted", etc., see footnote to Table 9A
Source : P.N. Prasad, et al., "The Pattern of Poverty in Bihar" (World Employment Programme Research) Working Paper No. 152.

**Table 9F**
**Calorie Inadequacy* Among Adult Males and Females**
**(Perecent of Population)**

| | 1975-1979 | | 1980 | | | |
|---|---|---|---|---|---|---|
| States | Males | Females | Males | Females | Males | Females |
| < Kerala> | 60.8 | 50.9 | 60.6 | 54.6 | 81.8 | 58.5 |
| Madhya Pradesh | 48.4 | 28.8 | 63.3 | 55.0 | - | - |
| West Bengal | 45.7 | 38.4 | 53.1 | 54.6 | 35.3 | 30.4 |
| Orissa | 42.6 | 24.0 | 39.6 | 22.1 | 39.3 | 20.3 |
| Maharashtra | 40.3 | 27.9 | 44.0 | 36.9 | - | - |
| Uttar Pradesh | 36.7 | 32.2 | 28.8 | 29.5 | 38.4 | 25.8 |
| Andhra Pradesh | 35.6 | 18.5 | 22.9 | 7.7 | 35.1 | 24.1 |
| Gujarat | 35.2 | 27.3 | 24.2 | 17.2 | 29.3 | 20.9 |
| Tamil Nadu | 34.8 | 25.4 | 15.7 | 16.7 | 41.4 | 36.1 |
| Karnataka | 18.8 | 10.4 | 19.8 | 7.9 | 11.0 | 10.3 |

* Intake two standard deviations or more below the mean
Source : NNMB data, as reported in Kamala S. Jaya Rao, "Undernutrition Among Adult Indian Males", NFI Bulletin, July 1984.

Lathyrism is especially prevalent in MP, Bihar, UP, etc. among landless labourers and poor farm workers, who are usually the victims and who often get Khesari Dal as a form of wages. The pulse itself is rich in protein. Harmful effects of this pulse are produced if a diet in 2-4 months contains more than 40 percent of Khesari Dal. The disease manifests itself in the form of paraplegia with most victims crippled for the rest of their lives. Khesari is often used for adulteration of other pulses, which is one more vested interest to ensure its cultivation. Soaking of Khesari in hot water to detoxify it is not feasible because of fuel shortage. Studies of the University of Dhaka have shown that boiling the seeds with water five times did not detoxify it. The only solution seems to be ban its cultivation in MP, Bihar and West Bengal as has been done in other states.

Also in India there are a host of other mineral and vitamin deficiency diseases, other deficiency anemias, like folic acid, vitamin B12 and B6 deficiency anemias, and problems caused by food toxicants like epidemic dropsy (adulteration of usually mustard oil with argemone seed oil), alfatoxicosis (due to consumption of ground nut flour becoming now common for the school children' diets- that has been contaminated by a particularly toxic fungal growth in groundnut seeds). An epidemic of Veno-Occlusive disease (VOD) of liver hit Surguja district in Eastern MP in 1973 and again in 1975. VOD is apparently caused by contamination of seeds of Crotalaria mana with Gondli millet. Guinea worm infestation of water is also a major problem as also a whole host of problems affecting nutrition that are caused by unclean drinking water,

chief of which are diarrhoea and intestinal parasitic infestation (including hookworms) that promote chronic blood loss and in turn aggravate iron deficiency.

**Table 9G**
**Average Intake of Food- stuffs (g/cu/day)* in Different Urban Groups**

| Income Group | Middle Class | Slum Dwellers | RCI(Sedentary) | RDI (Moderate) |
|---|---|---|---|---|
| Cereals and Millets | 316 | 416 | 460 | 520 |
| Pulses | 57 | 33 | 40 | 50 |
| Leafy Vegetables | 21 | 11 | 40 | 40 |
| Other Vegetables | 113 | 40 | 60 | 70 |
| Roots and Tubers | 82 | 70 | 50 | 60 |
| Nuts and Oil Seeds | 21 | 9 | -- | -- |
| Fruits | 124 | 26 | -- | -- |
| Fish | 12 | 10 | -- | -- |
| Other Fresh Foods | 19 | 9 | -- | -- |
| Milk | 424 | 42 | 150 | 200 |
| Fats and Oils | 46 | 13 | 40 | 45 |
| Sugar and Jaggery | 434 | 20 | 30 | 55 |
| *Grams per consumption unit per day<br>NNMB Report on Urban Population (1975-79), published 1984, NIN | | | | |

**Table 9H**
**Average Weights and Heights of Adults (20-25 years) in Different Urban Groups**

| | Males | | Females | |
|---|---|---|---|---|
| Income Group | Height (cms) | Weight (Kgs) | Height (cms) | Weight (Kgs) |
| Middle class | 166.4 | 50.4 | 154.6 | 46.8 |
| Slum–dwellers | 161.4 | 46.6 | 150.1 | 41.7 |
| Source : NNMB Report on Urban Population (1975-79), published 1984, NIN. | | | | |

## Dietary Patterns of the Affluent

As Indian populations, move up in social scale, important changes that appear to take place are:

1. Substitution of 'coarse' grains like millets for more 'prestigious' cereals like wheat and rice. There is also a progressive increase in use of polished varieties of rice. The total substitution of millet by rice or wheat would decrease fibre content in diet by about 50% (See Table 10 on 'Fibre Content of Indian Foods').
2. Increase in intake of vegetable oils and ghee with often vanaspati (hydrogenated fat) replacing, vegetable oils.

3. Increase in intake of sugar.
4. General increase in calorie intake not related to sedentary nature of occupations.
5. Increased intake of pulses, vegetables and milk—this may be considered beneficial.
6. More consumption of market processed and commercialized foods, some of which include junk foods high in calories, fats, salt and sugar--all contributory of heart disease and strokes. The upper five is also the more exposed to international (read Western) dietary tastes and therefore exposed to wider junk food choice.

The affluent group of Indians has had prevalence of economy heart disease (CHD) comparable to the affluent in the first world, with prevalence of type II diabetes, there to five times that of similar groups in West. Indians who become affluent appear to be particularly genetically prone to diabetes and CHD, especially when devoid of dietary discipline. Fat intake (in the form of ghee, vanaspati, edible oils) in Indians is particularly bizarre with the 5% of population consuming 40% of the available fat. Acharya has shown that practically every Indian diet consists of some fat--as 'invisible fat'.2 Using more recent information available on total lipids in food materials, especially, rice, wheat and other cereals, and the average rural dietary data for 1980,the intake of invisible fat was shown to be 20 to 50 gms a day, averaging 29.0 gms. Large coconut intakes in Kerala and Tamil Nadu led to high levels of invisible fat in these states. Staples (tapioca being included in this category in Kerala) contributed to the bulk of the invisible fat (31-88%; average 68%) and milk and pulses an average of 11.4% and 2.4% respectively. Total fat intakes, both visible and invisible made an average contribution of 14.7% in 10 states of India.

**Table 10**
**Fibre Content of Indian Foods**

| | |
|---|---|
| **Millets** | |
| Bajra (Penniseum typhoideum) | 20.4 g % |
| Jower (Sorghum vulgare) | 14.2 g% |
| Maize (Zea mays) | 6.8g% |
| Ragi (Elensine coracana) | 18.6g% |
| **Wheat** | |
| Wholemeal (100%) | 9.6g% |
| Refined | 3.0g% |
| **Rice** | |
| Raw (brown) | 5 to 8 g% |
| Polished | 2.4 g% |
| **Chemical Nature of Cereal Fibre** | |
| Non-Celluloid polysaccharide | 48.9 - 61.5% |
| Celluloid | 31.8 - 32.7% |
| Liguin | 6.7 - 18.4% |

| Estimated Total Fibre Contents of Average Indian Cereal-based Dietaries | |
|---|---|
| Wheat based | 57.7 g/day/person |
| Rice based | 33.2 g/day/person |
| Millet based | 90.0 g/day/person |
| Source : R.D. Sharma, National Institute of Nutrition, Personal Communication. Quoted in Gopalan, op. cit. | |

The upshot of these findings is that even poor Indian diets are reasonably adequate in fat. For the affluent sections, intakes of edible fat of the order observed are wholly unnecessary if not dangerous.

A related point to be noted is that the fashion among the affluent to go in for safflower oil and sunflower oil, based on their reported superiority due to high content of polyunsaturated fatty acids (PUFA), instead of traditional vegetable oils like groundnut, may actually be misplaced. These never oils contain 70% of linoleic acid (an essential fatty acid) as compared to 30% linoleic acid for groundnut and sesame oils. Excess linoleic acid could lower blood cholesterol--a feature desirable for coronary heart disease pone populations. Excess linoleic acid is also suspected to lead to certain types of tumors and suppression of immune response.

## Dietary Guidelines for the Affluent

Lest dietary guidelines for the affluent be thought of as an irrelevance, one should remember that even at 5% (let us assume only 5% have affluent characteristics described above) of the total population of India, they constitute about 40 million, which is a big number of people at nutritional risk, not to speak of the economic costs of keeping this 5% healthy.

Dietary guidelines are just that, merely guidelines for nutritional discipline. They may not solve all health problems of the affluent but could certainly help minimize the nutritionally related risk factors in, for instance CHD or diabetes. These guidelines2 should form part of school curricula in especially upper class schools.

1. Overall energy intake should be restricted to levels commensurate to the sedentary occupations of the affluent, so that obesity is avoided.
2. Highly refined and polished cereals should be avoided in preference to under-milled cereals.
3. Green leafy vegetables (a source not only of carotene but also of linoleic acid derivatives) should be included at least in levels recommended by ICMR.
4. Edible fat intake need not exceed 40 gms and total fat intake should be limited to levels at which fat will provide no more than 20% of total energy. The use of ghee, clarified butter, a prized item in the Indian culinary system should be restricted for occasions and should not be a regular daily feature.
5. The intake of sugar and sweets should be restricted.
6. High salt intake should be avoided. In households in some parts of the country, diets contain unnecessarily high levels of salt, spices and condiments. High salt intake certain certainly serves no useful nutritional purpose and is generally best avoided, and especially by those prone to hypertension.

## Dietary Guidelines for the Poor

The Indian Council for Medical Research (ICMR) makes periodic recommendations on desirable diets for Indian populations. Considering the fact that at least one-third of the households in India are not able to afford even the minimum nutritional requirements (these households spend 80% of their income on food), the ICMR felt that its Recommended Diet Intake (RDI) should also have practical suggestions as to how the recommended nutrient allowance could be procured from low-cost diets. The model least cost diets per day that are 'balanced' are shown in Tables 11 and 11B. In recommending diets for poor Indian Groups, the ICMR has been guided by the following considerations:

1. Diets recommended should be least expensive and conform to traditional and cultural practices as closely as possible.
2. Energy derived from cereals need not exceed 75% of the total energy requirement.
3. Pulse (legume) intake should be such that the ratio of cereal protein to pulse protein does not exceed 5:1.
   This would imply that pulse intake should be at least around 9% to 10% of the cereal intake. The diet should provide for a minimal milk intake of 150 ml. These recommendations regarding intake of pulses and milk were designed to improve the protein quality of the predominantly cereal-based diet, usually devoid of animal protein to minimal acceptable levels.
4. About 150g of vegetables (leafy and other vegetables) should be provided. These were considered as levels, which will not unduly increase the bulk of the cooked food-a major consideration in all diets that are heavily cereal-based.
5. Energy derived from fat and oil need not exceed 15% of total calories. This takes into consideration the fact that cereal diets already provide invisible fats at levels of about 10% of total energy.
6. Energy derived from refined carbohydrates (sugar or jaggery) need not exceed 5% of total calories.

In reality as already seen from Table 11A and 11B actual intakes are far lower than RDI.

**Table 11A**

**'Balanced Diet's Recommended by ICMR on the Basis of RDI**

| | **Adult Men** | | | **Adult Women** | | | **Children** | | **Boys** | **Girls** |
|---|---|---|---|---|---|---|---|---|---|---|
| **Food Items** | **Sedentary** | **Moderate Work** | **Heavy Work** | **Sedentary** | **Moderate Work** | **Heavy Work** | **1-3 years** | **4-6 years** | **10-12 years** | **10-12 years** |
| Cereals | 460 | 520 | 670 | 410 | 440 | 575 | 175 | 270 | 420 | 380 |
| Pulses | 40 | 50 | 60 | 40 | 45 | 50 | 35 | 35 | 45 | 45 |
| Leafy Vegetables | 40 | 40 | 40 | 100 | 100 | 50 | 40 | 50 | 50 | 50 |
| Other Vegetables | 60 | 70 | 80 | 40 | 40 | 100 | 20 | 30 | 50 | 50 |
| Roots and tubers | 50 | 60 | 80 | 50 | 50 | 60 | 10 | 20 | 30 | 30 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Milk | 150 | 200 | 250 | 100 | 150 | 200 | 300 | 250 | 250 | 250 |
| Oil and fat | 40 | 45 | 65 | 20 | 25 | 40 | 15 | 25 | 40 | 35 |
| Sugar or Jaggery | 30 | 35 | 55 | 20 | 20 | 40 | 30 | 40 | 45 | 45 |
| * Grams per day for each category<br>Source: Recommended Dietary Intakes for Indians, ICMR, 1984 | | | | | | | | | | |

**Table 11B**
**Average Intake of Nutrients (cu/day) in Different Urban Groups**

| | **Middle Class** | **Slum-dwellers** | **Recommended Intake (ICMR-1981)** |
|---|---|---|---|
| Protein (g) | 73.1 | 53.4 | 55.0 |
| Calories (Kcal) | 2603 | 2008 | 2400(sedentary)<br>2500(moderate) |
| Calcium (mg) | 1121 | 492 | 400-500 |
| Iron (mg) | 27.3 | 24.9 | 24.0 |
| Vitamin A Retinol (µg) | 881 | 248 | 750 |
| Thiamine (mg) | 1.47 | 1.27 | 1.20 |
| Riboflavin (mg) | 1.52 | 0.81 | 1.40 |
| Niacin (mg) | 15.3 | 14.6 | 16.0 |
| Vitamin C (mg) | 93 | 40 | 40 |
| Source : NNMB Report on Urban Population (1975-79), published 1984, NIN. | | | |

Additional messages that need to be got across with respect to children are:

1. Breast food as long as possible.
2. Introduce semi-solids from 6 months.
3. Feed young children 3 to 6 times a day.
4. Do not reduce food in illness.
5. Use available health services, immunize your child. Keep the family and surroundings clean even as you drink clean water.
6. Do not ignore mother's health and food needs during pregnancy and lactation. Most mothers in India being anaemic require appropriate iron-folic acid supplements.(See also Table 11C and box).

**Table 11C**
**Additional Allowances During Pregnancy and Lactation**

| Food Items | Pregnancy | Calories (K Cal) | Lactation | Calories (K Cal) |
|---|---|---|---|---|
| Cereals | 35g | 118 | 60g | 203 |
| Pulses | 15g | 52 | 30g | 105 |
| Milk | 100g | 83 | 100g | 83 |
| Fat | -- | -- | 10g | 90 |
| Sugar | 10g | 40 | 10g | 40 |
| Total | -- | 293 | -- | 521 |

Source : RDI, ICMR (1981)

**A Good Diet for Pregnancy and Lactation**

During pregnancy and lactation a woman needs more food and a greater variety of food. More food is the first and most important thing. Diets based on cereals are generally good, but the woman needs more of them. She should eat one-fourth more food than she was eating before she became pregnant (25% extra) Find out how much she was eating before. Divide that into 4 portions. Tell her, or better show her, how much one of these portions is. This is the extra food she should eat, not only in pegnancy, but right through lactation.

**Pregnant and nursing mothers should eat for two persons**

A variety of foods will supply most of the nutrients a pregnant woman needs. These are listed below:
The cereal which are suitable for her diet include wheat, maize, sorghum, rice, and millet.
It is better not to use refined or polished cereals because the nutritious part of the cereals is lost during such processing. Parboiled rice is more nutritious than polished white rice.
Similarly, brown wheat flour (whole flour) is better than white refined flour. In some countries casava, Yams, plantains, and potatoes are used in place of cereals.
Legumes or pulses are valuable, particularly for those cannot afford animal food or who do not eat them. The legumes include peas, beans, lentils, etc.
Vegetables, especially dark green leafy and coloured ones, such as tomatoes and carrots, supply special nutrients. Other vegetables and fruits are also useful.
Edible oils, butter, and sugar or molasses and their derivaties make food more tasty. They also supply energy in a concentrated form.
Animal foods are valuable but not essential. Do not emphasize meat, eggs, fish, etc. in group teaching, if such foods are beyond the means of the community.

Source: **Guidelines for Training Community Health Workers in Nutrition.** 2nd Edn. WHO.(Geneva,1986).

## Guidelines for other Major Nutritional Problems

1. **Iron-deficiency anemia:** Usually responds well by iron salts like ferrous sulphate tablets. These are very low cost, much cheaper than iron tonics and vitamin preparations.
   Iron is found in green leafy vegetables (Palak, amaranth, drum stick leaves, coriander, etc.) ragi and . dried fruits. The average Indian diet provides as high as 30 gm iron daily. However, the simultaneous presence of phytate and tannins inhibit iron absorption. There is also low level of calcium and ascorbic acid (vitamin C)--a factor that could augment net bioavailability of iron.
   Mass strategies that have been suggested are prophylatic administration of iron and folic acid to women and children in poor communities as part of routine PHC services through MCH centres and schools.

2. **Vitamin A Deficiency :** Vitamin S as retinol is mostly drived from beta-carotene. Absorption of beta-carotene from carrots and papayas has been shown to be good when diets have even low fat content.
   Intake of green leafy vegeables are recommended by ICMR in its model least-cost blanced diets for adults would provide 600mg of retinol dilay and 300 mg daily for the pre-school children (about 40 gms of green leafy vegetables). Usually many of the foods rich in iron are also rich in retinol. Thus intake of greens will help in both vitamin A and iron deficiency. It is an irony that green leafy vegetables, though comparatively inexpensive, are as people go up the social scale, not considered 'prestige food'. The colostrum, usually not given to the child by many mothers on accounts of certain beliefs, is rich in vitamin A. Other strategies for combatting vitamin A deficiency, especially in cases of repeated infections and despite recommended intake of green leafy vegetables (and at present low levels of knowledge about bioavailability of retinol from various varieties of greens), is prophylactic administra tion of massive doses of vitamin A ( 2 lacs IC once in 6 months) for children under 3 years.
3. **Goitre/Iodine Deficiency :** Studies need to be made as to how new goitre-endemic areas emerge. It has been sugested that the Green Revolution type technology could have induced iodine deficiency in soils and foods that are grown in such soils. But for the present, strategies to combat goitre seem to be universal iodisation of common salt and banning of unfortified salt. There are of course many logistical problems about universal iodisaion of salt.
4. **Fluorosis:** Simple techonologies for defluoridation or drinking water with the upper limit for flouride set at 1 PPM. Strategies for lowering fluoride content found to be extent of 10 mg/kg in staple food items like rice, corn, wheat, cabbage, potatoes, etc. are yet to be clearly thought about.
5. **Lathyrism :** No other alternative, but banning of cultivation of Khesari dal is the most appropriate and just policy.

There are dietary guidelines that have been formulated for a host of other deficiency problems but the above to be the major ones. Particular guidelines will have to be worked out considering location specific conditions.

## Some other Issues in Food and Nutrition

In this section, we discuss a few other issues relevant to our quest for a holistic concept of nutrition. This is done at the risk of appearing selective from a whole range and complex of issues concerning one of the oldest concerns of humankind.

### Food Ideology, Food Preferences and Food Counter-Culture

Why people eat what they eat and especially, what they would like to eat, given no resource constraint, is often a matter of belief systems about food.

Food prefrences --the degree of like or dislike for a food--is determined by food ideology. Food ideology is the world view regarding foods, the set of attitudes, beliefs, customs and taboos affecting diet and nutrition. A certain degree of commitment to a particular food ideology, usually at variance and in opposition to prevailing dominant ideologies, results in what is seen as faddism or a food counter-culture.

'Food fads' and 'food counter-cultures' therefore serve a particular need, usually demonstrating a particular world view that is critical of the majority world view. Thus the food faddists' food preferences often end up making a public statement about self politics, society and/or religion (ansd not infrequently about health and nutrition too)through the kind of food practices they propagate. And for that matter, any kind of food one eats is a statement made or a commentary proferred. Reason and Logic as one undersands is modern science and nutrition is therefore not often the sole determinant of food preferences and certainly not of food tastes. That this is so has to be respected in making decisions about dietary guidelines for entire populations. The rise in food counter -cultures to the extent they are advocating ecological sistainability and equitable devlopment, have to be supported, for they question baisc issues that are taken for granted by many. Food tastes, therefore, in populations are a result of the collective hertiage of a group of what is good and bad food, what is rich/poor food, and what is prestige/non-prestige food. Constraints of food, and of cooking and natural resources as also constraints imposed by weather and climate considerations, determine a whole culture of food. Thus rice and curds, are considered excellent, tasty foods in climate like that of Tamil Nadu while in North India, it is more likely to be considered relatively tasteless. The reverse holds for wheat products like rotis in the South. Whether rice came to be revered in South India after its easy cultivation was discovered, or vice versa, is difficult to say now. So also would one wonder about the metaphor of rotis as life giving bread in Hindi, Punjabi,etc. (Though today after the Green Revolution, Punjab is the leading rice growing state in India!).

Food preference in India which was largely a function of castes and linguistic groups, is in contemporary India,also a function of class-- especially in the mobile top 5 perent of the population.

Traditional food ideologies are slowly, if imperceptibly, giving way to newer ideologies, at least among the literate middle and upper classes. In this, media and advertisement have had a large role to play.

As appreciation of food ideologies in ancient Indian scriptures is often useful in understanding food ideologies of large sections of people in India even today.

Food, anna or ahara, has had multiple roles in ritualistic offerings to propitate the gods and the dead, and for appeasing priestly classes, for invoking the power of purity in celibacy and for virginity, and so on.

**Types of Food Faddists and the Patterning of Self-Needs Their Feeding Practices Serve**

| | Type of Food Faddist | Need Served by the Fads |
|---|---|---|
| 1. | Miracle-seeker | Patterning need to establish stability regarding health, energy, etc Accompilished by diets intended to forestall aging or restore organism to health. Ego defense need to reestablish positive self concept and feeling of self-worth. |
| 2. | Antiestablishmentarian | Self-realisation need to express self in a manner consistent with self-concept and value system. |
| 3. | Super health seeker | Ego defense need to forestall aging process. Accomplished by diet intended to give super health. Self-realisation need to present front of strength and health. |
| 4. | Distruster of medical | Ego defense need to establish control profession over own destiny and not be dependent on unknown others. |
| 5. | Fashion-follower | Ego defense and patterning need to establish an identity to gain approval and acceptance from others. |
| 6. | Authority-seeker | Self-realisation need for recognition of self- competency, provided by apparent knowledge in area of food information. |
| 7. | Truth-seeker | Patterning need to process existing claims concerning nutrition. |
| 8. | One concerned about | Patterning need for anchors and stability uncertainties of living concerning the world. |
| Source : V.A. Beal. 'Food Faddism and Organic and Natural Foods'. Paper presented at National Dairy Council Food Writer's Conference, Newport RI. May 1972. Quoted in Diva Sanjur. **Social and Cultural Perspectives in Nutrition.** Prentice-Hall. Inc. (N.J., 1982). | | |

In the Bhagvat Gita, Krishna classifies kinds of foods eaten by men of Sattva, Rajas and Tamas

Food which promote longevity, intelligence, strength, health, happiness and delight, which are sweet, bland, nourishing and agreeable, are dear to the Sattvic type of men.

Foods which are bitter, acid, salted, very hot, pungent, dry. burning and giving rise to pain, grief and illness aredear to the Rajasic type of men.

Foods which are bitter, acid, salted, very hot, pungent, dry, buning and giving rise to pain, grief and illness are dear to the Rajasic type of men.

Food whih is self-cooked, insipid, putrid, stale and polluted and aslo impure is dear to the Tamasic type of men.

Without debating the correctness of such a classification, it may be at best viewed as a food ideology. The underlying belief is that food determines character and character of person in turn determines intake of kind of food.

It is interesting to read MahatmaGandhi's interpretation of the above verse

If we cling to this classification, we shall not come to the right conclusion. Shrikrishna has first explained the qualities of the sattvik man and then his taste, etc. Ladu Lovers have included ladus in sattvik food. They do not help one safeguard one's brahmacharya. In interpreting the meaning of Rasya (relishing)too, we should use discrimination. There must have been a reason in that age for making such a classification, for there must have been persons even then who would eat a handful of chillies at a time. In the present age, there is no need for eating snigadha(containing fat) foods. If therefore we start eating ghee, our food would be, not sattvik or rajasik, but such as a demon would love. The inclusion of bitter, sour and saltish foods is quite correct. Then the verse mentions food which has been left over. Stilton cheese (a food containing countless gems) is of this class. Daliya and mamaru (processed gram and rice) do not belong to this class.

Food in the Vedic religion is also seen both as a source of temptation, a means to get ensnared in this worldliness and also as a means of transcending this world. Inthe Taittiriya Upanishad, the Creator is quoted as saying ' I am food...I am the eater of the food'. And him who eats food by himself I eat as food'.In the Kathopanishad, Nachiketa I stold, Who knows where He is - He to whom both Brahmins and Kshatriyas are as food, and death itself is condiment?'.

The cow, divine one like Kamadhenu, are a source of plenty of food and happiness...evidence certainly of a pastoralist view of life.

At most places, in Vedic texts, however,food is seen only as a means for attaining God. Restraint, poise and calmnessis advocated in taking food- the qualities of sattva. The Brahmasutra at one point equates 'eating'as the process of attaining the Absolute.(1.3.6)

-Bhrigu in Taitiriya Upanishad had described as realising food as Brahman, the Absolute(Annam Brahmati Vyajanat). 'For it is verily from food that all these beings take birth, on food they subsist after being born and they move towards and merge into food..."(III.ii.i).

A great deal of Indian food ideology is alo influenced by Ayurvedic, Siddha and Unani Systems of medicine as also in particular regions, the folk systems of medicine. Justice cannot be done to this vast area in the short scope of the present chapter. We, howver, refer the reader to Appendix 6 which is basically a brief survey of Ayurvedic perspectives on food.

Much of this Ayurvedic perspective, is, as the reader will note has passed into common popular wisdom in many parts of India.

The normal pusuits (eshana) of a healthy individual are threefold: to live long, to earn wealth as a means of fulfilment of passions and desires, and to have a plaesant existence beyond. These

are respectively described in Charaka Samhita as: Pranaishana, Dhanaishana and Paralokaishana. Ayurveda is the science of first of these normal pursuits. To an extent , this is a concession of the Upanishadic and Vedic idealists to demands of real life. Divorced from the rigours of producing things or getting things done in the mundane sphere, the Brahminical iedalists could set forth on their mystical wanderings in which food is viewed in terms of going beyond. Baudhayana even went to the extent of observing that the Vedas and agriculture were destructuve of each other (Baudhayana Dharma Sutra - i.5.101).

Food counter-culture, or food ideology if you will , have therefore in a sense existed all the time in India. Every one of the myraid castes of India have their own do's and don'ts regarding food, tastes, digestion and seasonality of food intake, that each of them desrve a separate study. Invariably this has meant abjuring certain kinds of food on certain days or during certain seasons and investing each such act with religious and mystical sanctivity. The many food sub-cultures and counter-cultures traditionally prevalent in India probably correspond to the many ways of finding solace, of the many ways the self could relate to enviornment and universe beyond to find fulfilment and peace within. However, there is a certain a certain ambivalence anbout all this--a desire to have the best of both the worlds. Thus Krishna, the darling butter-thief in Gokul of preoperation flood era, is also the mischievous lover, and the man who divulges his Viswarupa while expounding on the battle field a philosophy, the Bhagavad Gita, that attempts to be at once pragmatic and idealist. The same Krishna elsewhere shares with his poor friend Sudama, the humble beaten rice, with great delight and relish, much to the wonder of his courtiers. One has to thank Indian heritage for this incident for it tends to promote a semblance of reverence towards simple foods in generations of children when the story is told and retoldon the laps of their mothers*

In twentieth century India, Mahatma Gandhi used food at several levels: the symbolic, the political and the political and spiritual. The Dandi March was a powerful use of the symbolism of salt while his abjurement of food, the hunger fast, was sused effectivley at the political level.

Food Counter-Cultures and Fads in the West.

The concept of natural, raw foods as superior food goes back in India at least, to Vedic ideology,where Sattvik persons relied apparently more on natural foods. Also in modern times in the West, natural foods are a reaction to the high degree of processing of foods by centralised big business, in effectalienating the consumers from earth, which is the source of all vegetarian foods. This is basically a socio-political response. More conservative nutritionists and toxicologists nevertheless tend to point out that 'naturalness' of natural foods is difficult to define.

If one decides that natural means that which is based on nature or, better still, which is imposed by nature, then there would appear to be an infinite variety of natural things. The composition of a foodstuff can vary considerably. This also holds true for meat; There is no such things as a meat; there are only meats!' Given such variety, how can one possibly select the truly natural product? How can one choose between wheat produced on land rich in selenium and wheat grown on normal land, which lacks this trace-element which these wheats is natural? Both can be considered natural, but wheat produced both on land over-rich in selenium and on land compeletely lacking it can be harmful to the consumer.

Food counter-cultures and fads in the last 20 years in the West have become more prominent becuase of their effective use of various forms of the media. The trend alternatively syled as the health food movement, in its recent incarnation, is a legacy of the counter-culture movements of the sixties, the Ant-Vietnam War movement, the increasingly critical consumer consciousness and of course the interest in mediation, eastern mystiicism and vegterarianism. The belief systems, governing these can be described as follows:

**The Natural Food Idea**

With three principal motifs: (a) the vitamin motif where nutritional requirements are viewed in scientific terms like proteins, vitamins,etc. Recommendations include intake of certain vitamins and nutrients in quantities that nutritional scientists would consider far in excess of what is normally required. Vitamin motif adherents may also avoid starchy vegetables or food that has been processed like bleached flour and white rice. (b) the organic motif where a distinction is sought to be made between 'organic' and 'chemical'and generally this motif promotes organic farming that avoids use of fertilizers, pesticides, preservatives, artificial flavouring and colouring agents, injection of growth hormones in animals and meat from such insights from such animals, etc. This motif is applied in arange of strictness. It has contributed positively by critically and sympathetically looking into traditional farming practices and cooking practices, and by trying to integrate such insights from a perspective of ecological balance.2 (c) the mystical motif attrributes life energy to uncooked foods, sprouts, fruits, etc. Foos are eaten for their sybolic properties rather than necessarily for modern scientific nutrient contents. An example is that of macrobiotic vegetarians (sometime called practitioners of Zen Macrobiotics) who believes in an ideal balance of 'poisitive'and 'negative' forces-of Yin and Yang, activityand passivity, expansion and contraction--in brown rice.

**The Vegetarian Idea**

These diets are marked by avoidance of animal proteins, eggs, chicken, fish, red meat, milk and sometimeseating only raw foods or grains--in varying combinations. Beliefs about non-violence to living creatures,ecoloical concerns about the high cost of producing animal proteins, its unhealthiness for the humanbody, its possible physio-logical and psychological effects on behaviour, govern the vegetarian idea.

This idea has resulted in and partially come out of the questioning of American agribusiness that raises animals on grain grown in Third World, and the consequent colonising of poor underdeveloped countries by agribusiness by turning such countries into cash economies. Also the myth that to be healthy and eat nutritious food, one has to eat non-vegetarian food per se has at least in some educated circles of the West been exploded by the vegetarian idea.

**The Spiritual Idea**

This is somewhat akin to the Vedic and and the Upanishadic perspective mentioned above. Food intake is means of practising the righteous life and conduct, of a means of achieving spiritual fulfilment.

The above belief systems are found in varying degree of combination among its followers. All these developments are to be viewed with great interest and respect because the followers of these various belief systems in the West have been more

effective in grasroots dietary changes and in promoting public awareness towards ecologically more sustainable practices than most big funded nutrition education programmes of universities and government agencies.

## Diet and Behaviour and Brain Sensitivity

The effects of nutrition on behaviour are subtle. It is generally accepted that some foods and nutrients affect certain behaviours.1 'Behaviours' like sleep, alertness and performance are or of course affected by foods and nutrients; alertness and performance can be affected by meal composition and size. Evidence available does not seem to support diet as a significant factor in mediating hyperactivity and criminal behaviour. Sucrose ingestion does not aggravate hyperactivity or contribute to learning or behavioural problems in children, as has been believed. The above is a very brief summary of a symposium on diet and behaviour (cited above), essentially from a modern scientific theoretical standpoint.

Traditional Indian medicine, as we have already seen, views the question differently . The three doshas of Ayurveda - Vata, Pitta and Kapha-affect the individual according to her/his development, age, diumal and climatic changes and to the intake of food from external sources(see box on Tridoshas, Diet and Behaviour")

Trishodas, Diet and Behaviour

The doshas are specific in their functions: vata is responsible for circulatory, respiratory and digestive systems and for enthusiasm, speech, and sense acuity; pitta for digestion, heat in the body, vision, hunger, thirst, taste, softness of the body, pigmentation of the skin, lustre of the skin, intelligence, cheerfulness and courage; kapha for nourishment, viscidity, solidarity of the body, strength of the joints, sexual vigour, patience, forbearance and fortitude. The separation of limbs and the specificity of their functions even in the womb are due to vata: the strengthening of the limbs is due to pitta and the nourishment of blood and semen is due to kapha.

The three doshas are differentially related to the individual's own development stages, to the intake and food from external sources, and to the diumal and climatic changes in the surroundings. In infancy and childhood, kapha prevails in the body; in youth pitta and in old age vata. When one begins to eat food, kapha becomes predominant, halfway through pitta takes over and at the end vata. In the morning, it is kapha that prevails, during midday pitta and towards evening vatas likewise, in the first part of the night kapha, at midnight pitta and towards dawn vata. During the rainy season, vata is aggravated, during autumn pitta and in spring kapha.

The normal balance and proportion of the doshas are disturbed by articles of food, food-habits, behavioural peculiarities, seasonal influences, aging process and accidental occurances. The disturbances are manifested by characteristic symptoms. There are three possible conditions in which the balance of the doshas may be disturbed: (a) one, two or all three of the doshas may suffer waning, diminution, reduction (kshya), (b) one, two or all three of the doshas may increase or aggravate (vidhi) in the two stages by acceleration (prakopa) or accumulation(chaya), and (c) a dosha may leave its own area and move on to the area

specific to another dosha (prasara)

When there is a diminution of vata, the individdual feels uneasy, loses consciousnrss and is in state of langour. However, when there is an aggravation of vata, roughness of voice, emaciation, constipation, insomnia and weakness are the guiding symptoms. In the diminution of pitta, burning sensations, desire for cold things, yellowish colour in the eyes, skin, faces and urine,in sufficient sleep, fainting fit,and weakness of the organs of the sense. When kapha suffers a diminution, dryness of skin, sensation of internal burning, feeling of emptiness in the stomach and other other cavities of the body, looseness of joints, thirst, weakness and insomnia are the symptoms. In the aggravation of this dosha, heavyness of the limbs, feeling of cold, drowsiness, excessive sleep, loose feeling of the joints and paleness of complexion are the symptoms.

Treatment consists in aggravating the dosha that has become diminished , diminishing the dosha that has become aggravated extracting the errant dosha and preserving the doshas that are in a state of balance.

Each of the three doshas is regarded as having five functional varities, each of which has specific locations (Ashtaanga-Hrdaya, Vagbhata, Sutra 12 and so on).

Source: Encyclopaidia of Indian Medicine, Vol. 2 Rao (1987). op. cit.

More recently some authors in the West have been developing the concept of brain sensitivity defined as a cross between anallergy and an addiction, a condition in which the person affected actually develops a craving for the food outside her/his awareness. Brain sensitivity is not only caused by food but also by various inhalants and chemicals. Brain sensitivity according to these authors, appears to be the cause of a whole range of major to minor problems, from barely noticeable irritations to acute forms of psychosios. It has been known to cause small discomforts, headaches, restlessness and more severe symptoms like anxiety, depression, outbursts of violence, migraines, etc. Fasting and deliberate food testing and recommended as a two step procedure for uncovering food sensitivities.

While more research is neededon this whole issue, it ought to be mentioned that some participants in groups and workshops conducted by the authors have been able to connect acute physical discomfort with various foods and sources of smell and dust. Once the connection becomes obvious, steps to cure and remission were seen to be relatively easy.

## Commercialisation of Food

As already discussed, commercialisation of foods results in undesirable effects on people's nutrition--chief of which are shift in people's tastes--because of massive advertisements and sales promotion towards these commercial foods often at the expense of more nutritious, low cost, traditional foods. While poor people become poorer in the process, the beneficiaries are usually the ruling elite of politicians, business class and bureaucracy.

## Baby Foods:

The baby food contraversy and the Pepsi-Cola deal are discussed here as examples from the many one can cite.

In the baby food contraversy, expensive baby foods like Amul, Lactogen, Farex, and milk powder and other so-called formula foods like Cerelac were promoted, and still continue to be promoted though more subtly, especially in poor countries. Physicians and paediatricians were given allurements to prescribe, saleswomen were disguised as nurses to recommend baby food associating it with mother's love and care. Many even went to say formula milk was better than breast milk. Mothers especially poor ones, would neglect breast feeding of infants as also not give them simple easily available mashed cereals and vegetables. When babies started dying because of bottle feeding (due to unhygienic boiling and in adequate nutrient intake) in African Hospitals, everybody concerned sat up. The WHO and UNICEF cmae out with codes to regulate the baby food industry.Several concerned people and physicians demanded banning of bottle feeding.

As of 1989, the Infant Milk Foods and Feeding Bottles Bill (1986) has been passed by the Rajya Sabha. The bill is yet to be passed by the Lok Sabha for it to become an Act. While key features of the bill (see box 'Clauses of the Baby Food Code')are commendable, it needs to be further strengthened by extending its scope to incorporating the following key issues:1

1. The scope of the bill should be extended to include complementry foods/wearing foods, follow-up formulas and pacifiers alongwitth infant formulas. This is so because the marketing of foods other than milk formulas has become increasingly aggressive. Also they are known to be bottlefed and therefore hazardous to the unavoidable hygiene problems. Such products are a double drain on the nation's economy. Locally available home made soft foods should be given as complementary food.
2. The advertisement of all these above mentioned products should be totally banned throughany of the media.
3. Free or subsidised supplies or donation of the above mentioned products should be prohibited, provided that this prohibtion shall not apply to donations and purchases which are produced from a government sponsored programme for the promotion of appropriate and adequate nutrition.
4. No manufacturer, distributor or retailer of these products should distribute or donate or display any informational or educational equipment or educational equipment or material related to infant foods or feeding bottles to any person or organization.
5. This is so because their primary object and intention is promotion of their products and their own commercial gain.
6. A consumer caution on the lable of these products should be written in the main regional language and should warn against the dangers of malnutrition etc., associated with bottlefeeding.
7. The punishment for violation of the code should be more stringent to act as an effective deterrent. Therefore payment of fine instead of imprisonment should not be allowed.
8. There should be a provision prohibiting all donations or financial inducements or payments or gifts in any form, direct or indirect to the health worker or to any member of his family or to the health care organisations including academic bodies, by the manufacturer or distributor or retailer or agent of these products, for the purpose of promoting the use of inant foods or feeding bottles.
9. The Bill is silent on implementation of its provisions hence rules for implementation should be stated.

10. The Bill does not say anything on infrastructure of monitoring of its implementation. This needs to be spelled out. There is need for a provision for safeguarding consumers through an association of non-governmental organisations to be involved with the goverment in monitoring of its implementation.

**Clauses of the Baby Food Code**

1. Information and Education
    - Should be scientific and factual.
    - Should explain the benefits of breast feeding and the costs and hazards of artificial feeding.
2. General Public and Mothers
    - No advertising to the public.
    - No free samples.
    - No promotion in health care institutions.
    - No company nurses to advise mothers.
3. Health Workers
    - No gifts or personal samples.
4. Labelling
    - No words of pictures idealising artificial feeding.
5. Quality
    - All products should meet ISI standards.
6. Implementation
   All manufacturers and distributors of products within professional groups, institutions and individuals concerned are responsible for the implementation of the code. Violations should be reported to the government authorities.

   Courtesy: IIFM,June 1989

## The Pepsico Deal

The Pepsico deal illustrates how governments can be opportunistic, sacrifice the pattern of socio-economic and agricultural development, and not worry about long term effects for short term gains.

India has had a vigorous soft drink industry (the relevance of soft drinks is itself questionable from nutritional and socio-economic points of view) especially after the enforced exit of Coca-Cola during the Janata regime. However, both Coca-Cola and Pepsi Cola, arch rivals internationally, have been knocking on Indian doors ever since the fall of Janata government (1980).

The Pepsi deal, basically to promote Pepsi Cola, was sought to be made attractive by playing the Punjab Card--typical of the aggressive marketing strategy of multinationals. The focus of the project was cleverly shifted to as one of advanced food processing and bringing in foreign exchange to the country by way of promised exports.

Government spokespersons have listed the following advantages of the deal:

1. The project will create employment for 50,000 people nationally including 25,000 extra jobs in Punjab.
2. 25% of the total fruits and vegetables crop in Punjab would be processed in this project.

3. I will bring an advanced technology to food processing and provide the required thrust to marketing of Indian products abroad since the company is already established.
4. 74% of the total proposed investment is in food and agroprocessing.
5. 50% of the total value of production will be exported.
6. Manufacture of soft drink will be limited to only 25% of the total turnover of the project.
7. Additional tax revenue of Rs.274 crores per annum will be generated.
8. The terms agreed to by Pepsico in India are far better than their existing agreements with Russia, China and various other countries. In Russia and China, they have an export -import ratio of 1: 1, whereas in the case of India the ratio will be 5:1.
9. In Russia and China the concentrate is imported from their own plants outside the country. In India, concentrate will be manufactured within India and in a company in which majority share (60%) will be held by Indian companies.
10. Export obligation to extent for 10 years, instead of the usual 5 years.
11. Net foreign exchange earning equal to more than 5 times of the total foreign exchange outflow. This means that for every dollar that India spends in foreign exchange on this project, the company will ensure an export earnin of 5 dollars.
12. The company would be allowed to repatriate profits only after they have fulfilled the export obligations; i.e. only after they have earned 5 dollars will they be allowed to repatriate of spend in foreign exchange even one dollar.
13. Imports will be totally according to the existing policies of the Government of India and will bear all customs duties as in vogue at the time of import.
14. The promoter has agreed that export activities can start immediately on approval and within first year they will delive export of agriculatural products worthatleast 20 crores.
15. The Agro Research Centre to be established by Pepsico will function in consultation with the ICAR and Punjab Agricultureal University, Ludhiana.
16. No foreign brand names will be sued fordomestic sales.

The main components of the project are thus :

1. a soft drink concentrate manufacturing plant,
2. a potato/grain based snack food processing unit,
3. a fruit/vegetable processing unit, and
4. an Agro Research Centre.

Table 14 and Table below give the capacities of the Pepsico units and the projected invcestment and sales.

**Table 14**
**Capacities of the Pepsico Units**

| | Unit | Capacity Sanctioned | Projected Sales (5 year) |
|---|---|---|---|
| 1. | Processed potato/grain foods | 8,000 MT | 7450 MT |
| 2. | Soft drink concentrates | 20,000 units* | 20,431 units* |
| 3. | Processed fruit/gege | 12,000 MT | 11,755 MT |
| * one unit produces 1800 cases each case of 24 services of 225 milliliters each. Source: DSF. Ibid | | | |

**Table 15**
**Project Investment and Sales.**

| | Unit | Investment | | Annual Sales (Year 5) Ex-factory | |
|---|---|---|---|---|---|
| | | Value (Rs.Crore) | % of Total | Value (Rs. Crore) | % of Total |
| 1. | Soft drink Concentrate | 5.55 | 26% | 15.32 | 30.0% |
| 2 | Fruit/Vegetable Processing Unit | 7.30 | 34% | 13.52* | 26.5% |
| 3. | Potato/Gram Processing Unit | 8.00 | 37% | 21.96 | 43.1% |
| 4. | Agro Research Centre | 0.65 | 3% | 0.20 | 0.4% |
| | | 21.50 | 100% | 51.00 | 100.0% |
| Source : PAIC (1986) p.8 and p.11-14. Quoted in DSF, Ibid | | | | | |

The soft drink concentrate plant is really the focal point of the joint venture. With an investment of Rs.5.5 crores, it is expected to contribute at least 30% of the ex-factory sales of the centure. The concentrate will be sold to independent 100% Indian bottlers. The potato/grain processing plant is expected to produce 43% of the sales and the much advertised fruits and vegetable processing unit would contribute 26.5% of ex-factory sales. Apart from making potato wafers, soft drinks, and processed vegetables and fruits available in attractive packs, the whole deal will promote consumerism and wasteful expenditure and promote intake of calories at much higher cost than is possible.

A panel discussion organised by the Delhi Science Forum, Agricultural Research Service Scientists Forum and the CSIR Scientific Workers' Association put forth the following reasons also for abandoning the deal:

1. It involves the annual drain of Rs.3.2 crores for the import of soft -drink concentrate, a non-essential item for whose production, cost-effective local technology is avilable.
2. It allows the entry of a multinational into potato-wafer making for local market for which the technology is already available and being used commercially.
3. The export commitment of fruit juice is not reliable and it is not based on any analysis of local needs of fruit consumption, cost of production and export prices.
4. It makes the peasantry dependent on a multinational as an outlet for their produce, reduces their bargaining strength and threatens their incomes in the long-run.
5. It opens the flood gates to other soft-drink multinationals such as Coca Cola.
6. It distorts the pattern of agricultural development in Punjab by reorienting production structure in rural areas.

The following general points also considered by the above panel:

1. Permission to import linked to export performance should be given for products essential for maintaining exports.

2. Food processing industries should be linked to the process of rural industrialisation. The superiority of large-scale capital intensive projects over more labour-intensive projects should be proven before they are set up.
3. Import of technology should be allowed only if it can be shown that they are better in serving national interest than the technologies developed indigenously in the national laboratories or elsewhere.
4. Multinationals should not be allowed into food processing industries and preference should be given to processing units set by agricultural producers co-operatives.

Here again we have a major venture, affecting rural peasantry, a process in which they will be made to be dependent on a multinational, thus further colonising the rural hinterlands. One shudders to think the long term nutritional effects of such colonisation, and of subjecting major agricultural areas to experimentation of hybrid seedswith attendant new viruses and diseases.