



**AgEcon** SEARCH  
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

*The World's Largest Open Access Agricultural & Applied Economics Digital Library*

**This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.**

**Help ensure our sustainability.**

Give to AgEcon Search

AgEcon Search  
<http://ageconsearch.umn.edu>  
[aesearch@umn.edu](mailto:aesearch@umn.edu)

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

Vol XXXII  
No. 3

ISSN 0019-5014

CONFERENCE  
NUMBER

JULY-  
SEPTEMBER  
1977

# INDIAN JOURNAL OF AGRICULTURAL ECONOMICS



INDIAN SOCIETY OF  
AGRICULTURAL ECONOMICS,  
BOMBAY

## AN ECONOMIC ANALYSIS OF NUTRITION PROBLEM IN INDIA

J. L. Kaul, S. S. Grewal and P. S. Rangit\*

The problem of human hunger has always remained the topmost problem with man through the ages. It has defied solution in a large part of the world barring some of the developed nations which have tackled this problem. About two-thirds of the world population today is inadequately fed according to modern nutritional norms. The problem of undernutrition and malnutrition is particularly severe in the third world countries including India. The availability of adequate and balanced diets holds the key to all economic development through its effect on growth and efficiency of the human beings.

Although we know, in a general way, about the nutritional problems of the country, little information is available on the nature and magnitude of the problem across different States/regions on important aspects of calorie and protein deficiency. The extent to which we are deficient in calorie and protein intake and also the imbalance in diet keeping in view the prevalent nutritional norms is not precisely known. It is equally important to probe into the factors associated with malnutrition in different areas and among different socio-economic groups. An attempt is made in this paper to analyse the dietary survey data in order to find out, (i) Statewise disparities in calorie and protein intake, (ii) the imbalance in diets in various States and among different socio-economic groups, and (iii) various economic and other variables responsible for the prevailing disparity in food intake.

## THE DATA

The data analysed here are drawn from various reports published by the National Institute of Nutrition, Indian Council of Medical Research, Hyderabad and National Sample Survey of India and FAO. The National Institute of Nutrition based its results on the dietary surveys conducted in various States from 1960 to 1969. The number of surveys in different States was not uniform. The results are based on the average of different surveys. The varying number of surveys in different States, though a limitation, was not considered serious enough to vitiate the results of the study.

## RESULTS

To begin with, we are presenting the factual position of food intake in India in relation to other countries of the world. Afterwards, the position pertaining to different States in the country is discussed. This would throw light on the nature and magnitude of the problem. After analysing the facts, the factors responsible for this malady are analysed and finally some policy implications are discussed.

---

\* Department of Economics and Sociology, Punjab Agricultural University, Ludhiana (Punjab).

*An International Comparison*

India presents a very gloomy picture of its nutritional intake as compared with other developed countries of the world (Table I). U.S.A. tops in regard to the calorie intake with 3200 calories per capita followed by U.K. (3150), G.D.R. (2960) and Japan 2460. India does not come anywhere near these figures. Our calorie intake (1800) was far below the suggested norm of 2400 calories required per person per day. Most of the calorie intake (67.50 per cent) is obtained from cereals. Pulses accounted for only 9.11 per cent. Only about 10.21 per cent of calories is derived from eggs, meat, fish, milk and fats. Against this, only 29.04 per cent of calorie intake in U.S.A. is obtained from cereals, pulses, vegetables and fruits and the rest from eggs, meat, fish, milk, etc. In the U.K. only 28.43 per cent of calories is obtained from foods of vegetable origin and 48.61 per cent from diets of animal origin. The same is true for G.D.R. Japan derived 66.01 per cent of the calorie intake from cereals, pulses, vegetables and fruits but the diet of animal origin was almost two times as high as in India.

## INTER-STATE COMPARISON

*Calorie Intake*

Indian diet is deficient in calories in almost all the States except Madhya Pradesh and Punjab where it exceeded the recommended level of 2400 calories<sup>1</sup> (Table II). Punjab with 2832 calories stands first followed by Madhya Pradesh (2779). States like Uttar Pradesh, Maharashtra, Jammu & Kashmir and Mysore come somewhat close to the recommended level, the intake in these States ranging from 2220 to 2307 calories. But States like Tamil Nadu, Gujarat, Kerala, Bihar and West Bengal are quite deficient in calorie intake. In Tamil Nadu, the average intake is only 1498 calories per day per person. The figures for Gujarat, Kerala and Bihar are 1612, 1842 and 1865 respectively. This picture is a real matter of concern.

*Protein Consumption*

Table II also presents the average protein intake in various States. Taking into account the age and sex composition of the population, the average per capita per day requirement of protein has been recommended at about 44 grams. The figures show that protein intake (55 gm.), on an average, was more than the recommended level. Madhya Pradesh had the highest average intake of proteins which was 98 grams per day followed by Punjab (84 gm.) and Rajasthan (77 gm.). Tamil Nadu was the only State where the per capita protein intake fell below the recommended norm.

---

1. The results are discussed for the 13 States for which data were available.

TABLE I—PER CAPITA INTAKE OF CALORIES IN SELECTED COUNTRIES

Country	Cereals (1)	Pulses (2)	Vegetables (3)	Fruits (4)	Total (1+2+3+4) (5)	Eggs, meat and fish (6)	Milk (7)	Fats (8)	Total (6+7+8) (9)	Others (10)	Total calories (11)
U.S.A.	645 (20.15)	106 (3.31)	73 (2.28)	105 (3.30)	929 (29.04)	728 (22.75)	386 (12.06)	453 (16.97)	1657 (51.78)	1657 (19.18)	3200 (100.00)
U.K.	707 (22.44)	67 (2.12)	45 (1.43)	77 (2.44)	896 (28.43)	618 (19.62)	382 (12.13)	531 (16.86)	1531 (48.61)	1531 (22.96)	3150 (100.00)
G.D.R.	695 (23.48)	57 (1.92)	40 (1.35)	141 (4.76)	933 (31.51)	506 (17.09)	279 (9.43)	651 (22.00)	1436 (48.52)	1436 (19.87)	2960 (100.00)
Japan	1334 (54.22)	152 (6.18)	93 (3.78)	45 (1.83)	1624 (66.01)	205 (8.33)	70 (2.84)	200 (8.13)	475 (19.30)	475 (14.69)	2460 (100.00)
India	1222 (67.50)	165 (9.11)	—	25 (1.38)	1412 (77.99)	10 (0.55)	98 (5.41)	77 (4.25)	185 (10.21)	185 (11.80)	1810 (100.00)

Note:—Figures in parentheses are percentages.

Source: World Health Organization: Energy and Protein Requirements: Report of a Joint FAO/WHO Expert Group, FAO Nutrition Meetings Report Series No. 52, Geneva 1971.

TABLE II—INTAKE OF CALORIES AND PROTEINS IN DIFFERENT STATES IN INDIA

State	Calories	Proteins (gm.)	
		Total	Animal origin
Andhra Pradesh .. .. .	2040	53	5
Bihar .. .. .	1865	56	3
Gujarat .. .. .	1612	54	2
Jammu & Kashmir .. .. .	2265	63	1
Kerala .. .. .	1842	47	11
Madhya Pradesh .. .. .	2779	98	7
Maharashtra .. .. .	2281	68	6
Mysore .. .. .	2220	66	3
Punjab .. .. .	2832	84	16
Rajasthan .. .. .	2044	77	5
Tamil Nadu .. .. .	1498	36	4
Uttar Pradesh .. .. .	2307	66	5
West Bengal .. .. .	1927	48	7
All-India .. .. .	1985	55	6
Recommended level .. .. .	2400	44	—

Source: National Institute of Nutrition, Diet Atlas of India, Indian Council of Medical Research, Hyderabad, 1971.

Another feature worth noting is the proportion of proteins from vegetable origin and animal origin. Proteins from animal origin formed only a fraction, *i.e.*, 11 percent of the total intake. Most of the protein intake is of vegetable origin. It is desirable that proteins in human diet are obtained from animal and partly from vegetable sources.<sup>2</sup> In India, however, the proteins of animal origin formed a minor fraction of the protein intake. It has been shown by Patwardhan (1967) that even the proteins of vegetable origin are equally efficient provided these are well distributed among various sources of food like pulses, vegetables, etc.

The data so far presented reveal that 11 of the 13 States are deficient in total calorie intake although the problem is more alarming in the States like Bihar, Gujarat, Kerala and Tamil Nadu. The protein crisis, on the other hand, is not so serious as reflected by the average intake of proteins. Tamil Nadu was the only State where the protein intake fell below the recommended norms. This supports the viewpoint that the problem in the

2. World Health Organization: Protein Requirements: Report of a Joint FAO/WHO Expert Group, FAO Nutrition Meetings Report Series No. 37, Geneva, 1965.

country is not so much of protein shortage as that of overall low food intake reflecting the overall problem of hunger in a major part of the country.

### *Consumption Pattern for Different Food Items*

The consumption of various items of food such as cereals, pulses, vegetables, fruits, milk, meat, etc., in different States is shown in Table III along with the suggested level of consumption for each item. The data show that except cereals, the per capita consumption of all other constituents of the diet fell far below the recommended allowance. Indian diet in all the States is heavily dominated by cereals—the main source of calories. Pulses seem to be the main source of proteins. Madhya Pradesh has the highest cereal consumption (652 gm. per day) followed by Mysore (607), Jammu & Kashmir (589) and Punjab (519). Once again, the per capita consumption of cereals of Tamil Nadu was the lowest and lower than the recommended level. In all other States barring Tamil Nadu, the intake of cereals was higher than the required quantity of 370 gm. per capita per day. Although Madhya Pradesh had the highest consumption of pulses, *i.e.*, 55 gm., yet it was below the recommended level of pulse consumption of 70 gm. per capita per day.

TABLE III—FOOD CONSUMPTION PATTERN IN DIFFERENT STATES OF INDIA (1960-69)

State	<i>(per capita/day)</i>								
	Cereals	Pulses	Leafy vegetables	Other vegetables	Fruits	Fats and oils	Milk and milk food	Meat, fish and eggs	Sugar and jaggery
Andhra Pradesh ..	466	29	9	34	1	11	65	11	9
Bihar ..	453	42	21	69	3	8	20	8	5
Gujarat ..	425	43	26	49	—	5	17	6	6
Jammu & Kashmir	589	8	163	63	—	10	14	3	12
Kerala ..	341	24	8	170	36	7	52	52	18
Madhya Pradesh ..	652	55	4	41	86	19	138	11	38
Maharashtra ..	498	33	17	62	9	15	49	27	31
Mysore ..	607	26	9	19	1	2	56	3	N.A.
Punjab ..	519	35	44	93	13	17	317	7	97
Rajasthan ..	457	43	10	30	1	34	94	2	16
Tamil Nadu ..	356	16	8	52	5	6	26	13	6
Uttar Pradesh ..	448	55	38	97	21	16	91	8	32
West Bengal ..	422	30	51	112	3	17	52	30	22
All-India ..	434	34	21	71	10	12	69	14	19
Suggested allowance	370	70	110	125	37	38	180	35	40

Source: Diet Atlas of India, *op. cit.* N.A.=Not available.

It is striking to note that in almost all the States, the consumption of all other food items was much below the suggested norms. For example, the consumption of leafy vegetables in each State did not come closer to even half the suggested norm except in Jammu & Kashmir where its consumption exceeded the recommended allowance. Punjab and West Bengal come a little closer to half. The consumption of fruits was very low. The same was true for fats and oils. Milk and milk products were no exception. Punjab was the only State where milk consumption (317 gm.) was much more than the recommended norm of 180 gm. per day. Madhya Pradesh comes a little closer to the norm in milk consumption with a daily intake of 138 gm. per person. All other States consumed less than half the recommended quantity. In Kerala and West Bengal because of popularity of fish, the consumption of meat, fish and eggs comes closer to the recommended levels. The table brings out that even our total protein intake is not distributed evenly among various food constituents. It is mainly derived from cereals and to some extent from pulses. It is found that cereals contributed 63.21 per cent of available proteins in Indian diet.

The facts presented so far indicate in a clear-cut manner that not only our total intake of food energy is inadequate but it is also highly imbalanced. This imbalance in diet mix needs to be corrected. Pulses have an important place in Indian diet. It is disquieting to note that the per capita availability of pulses in India is on the decline. Table IV shows the net availability of

TABLE IV—NET AVAILABILITY OF CEREALS AND PULSES

Year	Population (million)	Per capita net availability (gm./day)		Pulses/Cereals Index
		Cereals	Pulses	
1961	442.4	399.7	69.0	100.0
1962	452.2	399.0	62.0	89.9
1963	462.0	384.0	59.8	90.1
1964	472.1	401.0	51.0	73.6
1965	482.5	418.6	61.6	85.1
1966	493.2	360.0	48.2	77.5
1967	504.2	361.7	39.7	63.5
1968	515.4	404.1	56.0	80.2
1969	527.0	397.9	47.3	68.8
1970	538.9	403.1	51.9	74.5
1971	550.8	417.3	51.3	71.1
1972	562.5	420.2	47.1	64.9
1973	574.2	382.3	41.4	62.7
1974	586.1	411.6	40.9	57.5
1975	597.9	369.5	40.1	62.3
1976*	609.3	404.3	51.5	73.7

\* Provisional.

Source: Government of India: Economic Survey, 1976-77, Ministry of Finance, New Delhi, 1977, p. 65.



cereals and pulses for the period 1961 through 1976. It is evident that the net availability of pulses per head per day was between 60-69 gm. in the early 'sixties and has declined to about 40-51 gm. in recent years. The gap between the availability of cereals and pulses per capita per day is widening. The area under cereals has increased at the cost of area under pulses. The superior production technology for cereals has tilted the balance against pulses. Unfortunately, little progress has been made in the field of yield-increasing technology in pulses. This distortion needs major policy action by way of intensification of research effort in this direction.

#### IMBALANCE IN DIET

Tables II and III are further analysed to see the imbalances in the diet mix. The recommended norms show that calories and proteins should bear a ratio of 54.5 :1.<sup>3</sup> Deviation from this ratio results in imbalance of diet. Table V reveals the extent of imbalance in the diet of people of various States. Although Madhya Pradesh is second in calorie intake and also tops in protein intake, the imbalance in diet in this State is reflected in the ratio of 28.3:1. Punjab also shows this imbalance. Tamil Nadu and West Bengal rank very low in their calorie and protein intake, yet these States show relatively less calorie/protein imbalance. The recommended ratio in which cereals need be combined with pulses in a balanced diet is 5.3:1. The ratios away from this would reflect imbalance in the contents of food. The extent of imbalance judged from this criterion of imbalance is again obvious from this table. The diet is highly cereal dominated.

TABLE V—RATIO OF CALORIES TO PROTEINS AND CEREALS TO PULSES IN THE DIETS IN VARIOUS STATES AS AGAINST THE RECOMMENDATIONS

State	Calorie/Protein ratio	Cereals/Pulses ratio
Andhra Pradesh	38.5	16.0
Bihar	33.3	10.8
Gujarat	29.3	9.9
Jammu & Kashmir	35.9	73.6
Kerala	39.2	14.2
Madhya Pradesh	28.3	11.8
Maharashtra	33.5	15.1
Mysore	33.6	23.3
Punjab	33.7	14.8
Rajasthan	26.5	10.6
Tamil Nadu	41.6	22.2
Uttar Pradesh	34.9	8.1
West Bengal	41.1	14.1
All-India	36.1	12.7
Recommended	54.5	5.3

3. This ratio is 33.4 : 1 in the case of a normal adult male. But when age, sex and occupation are taken into consideration, on an average, it works out as reported above.

There is an immediate need to correct these imbalances and to incorporate important ingredients like proteins, vitamins and minerals in the diet of our people. One would be tempted to argue that "modern technology could provide a solution to this problem through foods fortified with amino-acids, but the problem of low economic development in the country and the population pressure does not support the case for rushing into such factory produced foods."<sup>4</sup> Cereals and pulses-based diets supplemented by fruits, vegetables, milk and eggs would be an ideal solution.

#### FACTORS BEHIND INTER-STATE DISPARITY IN FOOD INTAKE

The overall low standard of nutrition in the country was the outcome of low level of development of the economy. The inter-State differentials in the nutritional standards could arise out of low purchasing power of the people as well as low production and availability of food in these areas. Factors like food habits, social and religious taboos play their part although these are of secondary importance. It was hypothesized that the problem of malnutrition would be less severe in States which have high per capita income or larger availability of food or both. This hypothesis was tested with the help of data presented in Table VI. The table gives information on the intake of calories along with per capita income (reflects purchasing power) and per capita availability of cereals and pulses in each State.

TABLE VI—PER CAPITA INCOME, CALORIE INTAKE AND AVAILABILITY OF FOODGRAINS IN VARIOUS STATES OF INDIA

State	Per capita income	Daily calorie intake	Availability of foodgrains (gram per capita/day)
Punjab	938	2832	1541
Madhya Pradesh	469	2779	603
Uttar Pradesh	518	2307	463
Maharashtra	752	2281	388
Jammu & Kashmir	497	2265	545
Mysore	495	2220	582
Rajasthan	497	2044	479
Andhra Pradesh	521	2040	521
West Bengal	522	1927	442
Bihar	403	1865	369
Kerala	542	1842	172
Gujarat	696	1612	277
Tamil Nadu	536	1498	370
Recommended level		2400	

Note:—Per capita income figures relate to the year 1969 which was the terminal year for the dietary surveys.

4. P. V. Sukhatme, "Presidential Address—Protein Strategy and Agricultural Development," *Indian Journal of Agricultural Economics*, January-March, 1972.

A careful look at the figures shows that Punjab State had the highest intake of calories both due to highest per capita income and highest availability of foodgrains (cereals and pulses). Madhya Pradesh was the next State in the matter of food intake. Although it had low per capita income, the availability of foodgrains was next to the State of Punjab. Uttar Pradesh came next State in order of food consumption. Its food availability was slightly less than Mysore and Rajasthan and was almost at par with Andhra Pradesh. Maharashtra ranked fourth in the matter of calorie intake. This seemed to be associated with its higher per capita income which was next only to Punjab, although it was lower down in regard to foodgrains availability. The case of Gujarat State further supports the viewpoint. It was third in order of per capita income, but had the lowest calorie intake (more than Tamil Nadu only). This could be because of the lowest availability of foodgrains which was more than Kerala only. The States of Mysore, Kerala and West Bengal had low intake of calories because of low purchasing power as well as low availability of foodgrains.

Theoretically speaking, one could argue that States like Gujarat which had higher per capita income should not lag behind in food intake because the foodgrains could be transferred from other surplus areas to this State where the purchasing power was higher. But in reality it has not happened because of certain reasons such as the zonal policy of foodgrains and transport bottlenecks even when there are no restrictions. The possibility of mal-distribution of purchasing power in a State like Gujarat where much of the purchasing power is concentrated in the big urban centres could also deprive the large masses in the rural areas from adequate intake of food. We would also argue that those States where the internal production of foodgrains was higher would have higher intake of calories irrespective of the purchasing power. This stems from the fact that most of the food producers in these States raise food enough for their own consumption.

#### RURAL-URBAN CONSUMPTION PATTERNS

The rural-urban consumption patterns are expected to be different because of differences in the purchasing power and also on account of the availability of some home raised products in the villages. This aspect has been studied for the Punjab State with the help of National Sample Survey data of the 26th Round. The available data pertain to per capita monthly consumption for important food items according to five expenditure classes (Table VII).

#### *Consumption in Rural Areas*

The figures bring out that the consumption of relatively superior foods, *i.e.*, milk, meat, eggs, vanaspati, sugar, and also wheat is positively correlated with the income level of the individuals. Maize and rice, however, show no

TABLE VII—MONTHLY PER CAPITA CONSUMPTION OF MAJOR FOOD ITEMS IN RURAL AND URBAN PUNJAB, 1971-72

Monthly per capita expenditure class (Rs.)	Rice (kg.)	Wheat (kg.)	Maize (kg.)	Other cereals (kg.)	Total (kg.)	Milk (litre)	Vanaspati (gm.)	Meat (gm.)	Eggs (No.)	Sugar (gm.)
<i>Rural</i>										
Less than 24 ..	0.78	8.30	1.18	—	11.26	2.35	155	37	0.18	155
24—<34 ..	0.18	8.52	1.09	0.34	10.13	4.79	159	43	—	488
34—<43 ..	0.55	8.70	1.66	—	10.91	5.50	181	55	0.12	741
43—<75 ..	0.84	10.44	0.33	—	11.61	8.45	189	82	0.20	1005
75 and above	0.67	9.66	0.48	0.03	10.34	19.11	346	113	1.64	1389
Average ..	0.62	9.75	0.72	0.08	11.17	7.86	196	83	0.30	819
<i>Urban</i>										
Less than 24 ..	0.13	5.59	4.39	—	10.11	1.25	188	—	—	390
24—<34 ..	0.71	8.49	1.68	0.05	10.93	2.91	230	50	0.03	730
34—<43 ..	0.41	9.80	0.65	0.06	10.92	3.75	347	63	0.13	1279
43—<75 ..	0.66	9.75	0.78	0.13	11.32	6.69	426	70	0.29	1402
75 and above	0.93	9.33	0.53	—	10.79	10.64	541	229	2.28	1913
Average ..	0.67	9.32	0.90	0.07	10.96	6.39	400	100	0.69	1380

*Source:* Consumer Expenditure in Punjab (A Report based on National Sample Survey, 26th Round, 1971-72), Economic Advisor to the Punjab Government, Chandigarh, Tables 4A, 4B, 5A and 5B.

clear-cut relationship. Maize, being inferior food compared with wheat, its consumption was higher in the lower income brackets, and with increase in income there was possibility of substitution for maize. Rice consumption at the higher level of income was almost the same as at the lower level. This could be because of the substitution of superior type of rice for inferior varieties in the high income groups.

The most striking fact here is that even in a relatively well-developed State like Punjab, the consumption of superior foods was much higher in the upper income groups compared to the low income groups. The consumption of milk and eggs in the highest income bracket was eight times that of the bottom group, that of vanaspati about two times, meat three times and sugar about eight times (exclusive of jaggery).

#### *Consumption in Urban Areas*

The urban consumption also depicts the same trend as observed in the rural areas. The consumption of different food items increases with increase in income, with the exception of maize and to some extent rice. This is due to reasons explained above. In the urban areas also, there is striking disparity in the consumption patterns of the top and bottom income groups.

*Rural-Urban Comparison*

The consumption of cereals was about the same in the rural and urban areas although the average consumption in the rural areas was slightly higher, *i.e.*, by 0.21 kg. per capita per month. As regards other items of food, the consumption of milk was higher in the rural areas for all income brackets. The consumption of vanaspati, meat, egg and sugar, on the other hand, was much higher in the urban areas.

The above analysis again supports our contention that consumption is largely a function of purchasing power of the people and production of food items by the consumers themselves. It is for this reason that the consumption of milk and to some extent cereals was higher in the rural areas. Even the lowest income group of rural population (majority of which belongs to landless classes), has higher consumption of milk than those in the comparable income brackets of the urban areas.

*Some Suggestions*

Although an ultimate solution lies in speeding up the process of economic development to improve the purchasing power of the people, yet we have to think of measures which can prove effective to tackle the problem in the short-run. We have seen that almost all the States consumed very little quantities of vegetables and eggs compared with the suggested norms. Vegetables and eggs are the items which can be produced for meeting family needs by a vast majority of the people in the rural areas because these items do not need much of the land and capital when raised on a small scale. The only thing is that the people need to be educated on the vital role of these items in human diet.

The analysis has brought out clearly that in some States like Punjab which has the highest per capita income, people were over-eating cereals and there was an acute deficiency of protective foods in their diet. This was true for higher income groups also. There was widespread ignorance about the importance of balanced diet. An intensive extension education effort is needed to educate the people in this direction. This would stimulate demand for diets of animal origin, and would help in the diversification of agriculture.

It is also observed that the extent of malnutrition was more serious in States where internal production of foodgrains was low even when the purchasing power was not that bad. This would call for implementation of measures which ensure uniform distribution of available supplies as far as possible by rationalising the transport and distribution system. A well-knit organization of fair price shops particularly in remote places of scarcity prone areas need to function on regular basis.