

The National Nutrition Scene: An Analysis of Results of Two National Surveys

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There have been several small scale surveys of health/nutrition in India but the data from these may not be representative of the country as a whole. The two major national surveys which provide data related to nutrition and covering large sections of India's population are: (i) the surveys carried out by the National Nutrition Monitoring Bureau (NNMB) of the National Institute of Nutrition, Hyderabad(1-3), and (ii) the recent National Family Health Survey (NFHS)(4). The data derived from these surveys have their limitations and are not strictly comparable. The NNMB surveys cover only eight states of the country and the latest data pertain to 1991.

The NFHS was initiated by the Ministry of Health and Family Welfare, Government of India. The International Institute for Population Sciences (UPS), Bombay, was designated as the nodal organization, responsible for providing coordination and technical guidance for the NFHS. A uniform sample design (systematic multistage stratified) was adopted in all 'NFHS states' (24 states and the National Capital Territory of Delhi) to interview 89,777 ever-married women in the age group 13 to 49. The NFHS covers

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an area comprising 99 per cent of the total population of India. The 88,562 household covered in the NFHS included 500,492 residents. However, with the emphasis in NFHS being on reproductive health, data related to nutrition are somewhat limited.

An attempt has been made in this paper to rank different states of the Indian Union on the basis of such criteria as: (a) nutritional status of the under-fives; (b) life expectancy; and (c) 'knowledge' as reflected by literacy level and years of schooling. This categorization does not take into account the 'economic development' criterion for each state. Besides this, the exercise attempted here has several other limitations. Even so, it may provide some measure of the prevailing profile of health/nutrition status, and order of social development of different states of the country. It must, however, be remembered that within each state (intra-state), inequities are often glaring and the order of such inequities may differ as between different states. As such, 'average figures' for a whole state may not reflect the true picture. These possibilities are fully recognized.

In both the above surveys, the assessment of nutritional status was largely based on the measurement of growth-performance in under-fives. Our observations in this paper on the 'National Nutrition Scene' also relate to only this important parameter of a population's nutritional status. We do recognize that for a truly comprehensive picture of the 'National Nutrition Scene', other indicators of nutritional status such as prevalence of anemia, goiter and micronutrient deficiencies in the population also need to be taken into account. While this criticism is valid, the use of

growth-performance in under-fives as the most convenient index of a population's nutritional status will be justified not only as being most easily measurable and quantifiable but also as reflecting the status of a highly (nutritionally) vulnerable and important segment of the population.

NNMB Surveys

NNMB had brought out two valuable reports containing the results of its annual surveys: One of these covers the period 1974-79(2) and the other 1988-90(1). The computation of under nutrition in children in these surveys using anthropometric indices had been earlier carried out using the conventional IAP (Indian Academy of Pediatrics) system of classification wherein the degree of under nutrition (deficits in weight-for-age) was expressed as a percentage of the median standard. In line with more recent practice, NNMB has now re-analyzed its raw data and has now converted these original computations in terms of percentage of children with weight-for-age falling below either $<-2SD$ or $<-3SD$ of the standard (Z score system)(3). The values for percentage of children with weight-for-age falling below $<-3SD$ are bound to be significantly higher than the estimates of 'severe under nutrition' arrived at with the use of the earlier IAP approach wherein weight-for-age deficits were expressed as a percentage of the standard ($<60\%$); the cut-off points in the two approaches are different and the estimates therefore are not comparable(5). Failure to understand this significant difference in estimates arrived at by the two different approaches may lead to the erroneous and alarming inference that 'severe malnutrition' in children in the country has increased (which certainly is not the case).

The NNMB data from the two surveys pertaining to eight states of India are shown in (Tables I & II). The states

covered in the surveys have been 'ranked' 1 to 8. (the best being 1 and the worst 8), with respect to 'nutritional status' as measured by the prevalence of under nutrition in children and 'food energy consumption' as measured by calorie intake per day at the household level. Some of the salient findings may be summarized as follows:

(i) The most recent survey report (1988-90) indicates that between 42.5% under-fives (in Kerala) and 69.5% (in Orissa) could be considered as undernourished using the $<-2SD$ of median (Z score) criterion; between 11.8% (in Kerala) and 41.8% (in Madhya Pradesh) were below $-3SD$.

(ii) There has been a significant decline in the prevalence of undernutrition in children in all but one state (Orissa) between 1979 and 1989-a 10-year period, the decline being most striking in Kerala and least striking in Madhya Pradesh. The situation in Orissa in 1989 was actually worse than in 1979.

(iii) The prevalence of 'severe malnutrition' was marginally higher in girls than in boys in all states surveyed (Table II). The rather curious and inexplicable finding was that higher prevalence of 'severe malnutrition' in girls as compared to boys was observed even in Kerala - a state considered to be the most (socially) progressive. On the other hand, when prevalence of all grades of malnutrition (including mild, moderate and severe, that is, $<-2SD$) was considered as a whole, the girls were generally better off. This would suggest that the neglect of the girl-child is probably more with respect to the promptness with which medical attention is sought during illnesses (which generally tend to convert 'moderate' malnutrition into the severe form), rather than in the matter of the general sharing of the family food pot between

TABLE I—Ranking of States According to Nutritional Status and Energy Consumption (NNMB data—1988-90 and 1974-79)

State	Ranking* by nutritional status	Nutritional status of children <4 yrs		Ranking** by energy consumption	Average Consumption of nutrients (Cal/day) (at household level)	
		<-2 SD	<-3 SD		Energy (Kcal)	Protein (g)
Kerala	1 (1)	42.5 (61.2)	11.8 (28.9)	6 (7)	2140 (1978)	52.9 (46.4)
Tamil Nadu	2 (3)	56.6 (66.3)	22.6 (34.7)	7 (5)	1871 (2275)	45.6 (54.8)
Maharashtra	3 (7)	60.1 (72.8)	24.0 (40.6)	5 (3)	2211 (2300)	61.7 (64.5)
Andhra Pradesh	4 (4)	60.7 (66.9)	28.4 (35.6)	4 (2)	2340 (2447)	55.7 (59.8)
Karnataka	5 (6)	65.9 (71.6)	31.3 (36.4)	2 (1)	2431 (2932)	65.4 (79.3)
Gujarat	6 (8)	67.2 (74.4)	36.9 (43.4)	3 (6)	2375 (2162)	69.3 (64.2)
Madhya Pradesh	7 (5)	68.9 (70.8)	41.8 (41.3)	1 (4)	2614 (2283)	82.5 (71.5)
Orissa	8 (2)	69.5 (62.8)	35.7 (33.2)	NA NA	U U	U U

Note: Figures in parentheses correspond to 1974-79 values.

* Rank of the state with lowest % of under nutrition= 1

** Rank of the state with highest level of energy consumption = 1

U= Not available; NA=Not applicable.

boys and girls. We offer further comments on gender differences in the latter part of this paper.

(iv) A striking finding was the lack of parallelism between the average household calorie and protein consumption in a given state on the one hand, and the prevalence of under nutrition in its children on the other. Thus the state which showed the best record (the lowest prevalence) with respect to under nutrition in children, namely Kerala, was the poorest with respect to house-hold food consumption.

The state with a fairly poor record with respect to the prevalence of under nutrition in children (Madhya Pradesh) showed the best figures for household food consumption, (figures for household food consumption from Orissa were not available). This would suggest that either intra-familial distribution of food was more unfavorable with respect to children in states like Madhya Pradesh as compared to Kerala or that infections which contribute to malnutrition are more promptly and efficiently

TABLE II—Gender Difference in Child Nutrition: Per cent* Distribution of Underweight Girls Under Four Years (as percentage of Underweight Boys) [NNMB-1989-90 and 1974-79].

State	Percentage of girls Nutritional status (weight-for-age)	
	< -3SD	< -2SD
Andhra Pradesh	109.6 (95.3)	98.2 (95.6)
Gujarat	104.7 (119.1)	99.9 (98.7)
Karnataka	101.9 (119.2)	104.8 (100.8)
Kerala	159.1 (112.9)	82.0 (94.0)
Madhya Pradesh	104.4 (109.4)	94.2 (98.3)
Maharashtra	132.0 (111.7)	100.2 (96.4)
Orissa	133.4 (120.4)	111.9 (98.6)
Tamil Nadu	137.7 (107.5)	101.6 (105.4)

$$* \text{ Per cent} = \frac{\% \text{ of girls } < -3 \text{ SD (or } -2\text{SD)}}{\% \text{ of boys } < -3\text{SD (or } -2\text{SD)}} \times 100$$

Note: Figures in parentheses correspond to 1974-79 values.

combated in a state like Kerala with a better health care system than in states like Madhya Pradesh with poorer systems. Moreover, 'average' figures of consumption may not necessarily reflect actual consumption; the actual distribution of consumption data may perhaps reflect a better picture.

(v) There is a direct relationship between the level of energy consumption and protein consumption. This is to be expected considering that the main source of calories and of protein in the habitual diets of the poor is nearly the same—consisting of a single staple cereal

with insignificant amount of fat (calorie-rich) and protein-rich foods like pulses or meat.

The NFHS Data

The NFHS data do not provide information on food consumption but include figures regarding child mortality rates besides data on growth performance of under fives. The salient features which emerge from these data can be summarized as follows:

(i) The reported prevalence of under-nutrition in children ('total' as well as 'severe') in all states was considerably less than those indicated by the NNMB reports. It seems unreasonable to assume that the difference in the prevalence of under nutrition of the order observed can be totally accounted for by the fact that there was an interval of nearly five years between the latest NNMB report and the NFHS data. The difference may be attributable to the fact that the sampling designs were different, apart from the fact that the NFHS operations covered far more states than the NNMB had done. It would seem reasonable to argue that the NNMB operations, largely confined as they were to the rural poor, captured relatively poorer and more deprived sections of the country's population than the NFHS study did.

Whatever may be the explanation, and irrespective of which of the two surveys is truly representative of the country, the NFHS data provide a less depressing picture of the state of child nutrition in the country than the NNMB data. The prevalence of over-all under nutrition ranged from 28% in Mizoram and Kerala to 63% in Bihar—generally considered among the most backward from the point of view of health/nutrition; severe malnutrition likewise ranged from around 6% in Kerala and 5% in Mizoram to

31%-again in Bihar.

(ii) Gender differences with respect to both total and severe under nutrition appear even less remarkable than in the NNMB data, and the girl-child does not seem to be worse off than her counterpart in most states.

(iii) Neonatal mortality rate ranges from 8.3 (Mizoram), 10.0 (Nagaland) and 15.5 (Kerala) per 1,000 live births to 59.9 (UP) and 64.7 (Orissa) per 1,000 live births. Bihar (54.8), MP (53.2), West Bengal (51.8) and Assam (50.9) closely follow them. Infant Mortality Rate (IMR) also follows the same pattern with Orissa being the worst. The IMR for Orissa is 112.1 and that for UP are 99.9. The infant mortality rates for Mizoram, Nagaland, Kerala and Goa are 14.6, 17.2, 23.8 and 31.9, respectively. Under-five mortality is 142.2 in Assam, 141.3 in UP, 131.0 in Orissa and 130.3 in MP as against 20.7 in Nagaland, 29.3 in Mizoram and 32.0 in Kerala (*Table III*).

On the basis of all these data it would appear that Assam, Bihar, Orissa, MP and UP would rank among the most backward and Kerala, Nagaland, Mizoram and Goa among the best of the states surveyed.

(iv) There is generally a rough correspondence between performance with respect to child mortality and child nutrition in most states. States with the lowest child mortality rates have the lowest prevalence of child malnutrition (for example, Kerala and Goa). Similarly, those with the worst performance with respect to child mortality (Orissa, Assam, Bihar, Uttar Pradesh, Madhya Pradesh and Rajasthan) are also the worst with respect to child nutrition (*Table III*).

In this connection, it may be mentioned that the NFHS data also provide a more favorable picture of demographic indicators than the SRS (Sample Registration System). This would again

raise the question of the relative representativeness of the different survey samples.

Index of Nutrition and Social Development

Using NFHS data, an attempt has been made to evolve an Index of Nutrition and Social Development (INSD) with respect to different states (*Table IV*).

The INSD in the present paper is based on three variables: longevity, knowledge and nutritional status of children under four years of age. In this case, the economic criterion (the GDP) has not been included since reliable state-wise data for the same are not available.

The index sets a fixed range (maximum and minimum) for each dimension and shows where each segment of the population (state-in the present case) stand in relation to these scales expressed as a value between 0 and 1.

With respect to the knowledge component, rather than considering 'mean years of schooling', as was done in the case of the Human Development Index (HDI) by UNDP(6), we have used 'median years of schooling' as the criterion. This median has a range 0 to 15 years.

For the calculation of the nutritional component of the index, the international reference yardstick-NCHS-has been used. The percentage of children $>-2SD$ of the NCHS standard has been treated as the percentage of healthy children. This percentage has a range of 0 to 100.

The longevity index and the knowledge index have been calculated using the same method as followed by UNDP in the calculation of the HDI. The nutritional index has been expressed as:

$$\% \text{ of children above cut-off point}/100.$$

The (G)INSD (INSD adjusted for gender

TABLE III— State-Wise Comparison of Nutritional Status and Mortality Rates of Children Under Four Years (NFHS, 1992-93).

State	Sex of child	Nutritional Status (weight-for-age) %		Mortality rates*			Death rate** (0-4) yrs
		<-3SD	<-2SD	Neonatal	Infant	Underfive	
India	M	20.2	53.3	57.0	88.6	115.4	23.0
	F	21.0	53.4	48.1	83.9	122.4	23.6
	T	20.6	53.4	52.7	86.3	118.8	23.3
Andhra Pradesh	T	15.6	49.1	45.3	70.4	91.2	18.5
Arunachal Pradesh	T	14.5	39.7	17.5	40.0	72.0	U
Assam	T	18.7	50.4	50.9	88.7	142.2	32.1
Bihar	T	31.1	62.6	54.8	89.2	127.5	28.0
Delhi	T	12.0	41.6	34.9	65.4	83.1	18.6
Goa	T	8.9	35.0	20.6	31.9	38.9	4.9
Gujarat	T	17.6	50.1	42.3	68.7	104.0	20.6
Haryana	T	9.0	37.9	38.4	73.3	98.7	22.1
Himachal Pradesh	T	12.9	47.0	34.2	55.8	69.1	15.5
Jammu Reg (J&K)	T	13.8	44.5	31.9	45.4	59.1	15.6
Karnataka	T	19.4	54.3	45.3	65.4	87.3	13.7
Kerala	T	6.1	28.5	15.5	23.8	32.0	3.8
Madhya Pradesh	T	22.3	57.4	53.2	85.2	130.3	27.3
Maharashtra	T	21.3	54.2	36.4	50.5	70.3	12.1
Manipur	T	7.2	30.1	25.1	42.4	61.7	U
Meghalaya	T	17.2	45.5	37.8	64.2	86.9	U
Mizoram	T	5.3	28.1	8.3	14.6	29.3	U
Nagaland	T	7.6	28.7	10.0	17.2	20.7	U
Orissa	T	22.7	53.3	64.7	112.1	131.0	27.3
Punjab	T	14.2	45.9	31.2	53.7	68.0	14.9
Rajasthan	T	19.2	41.6	37.2	72.6	102.6	26.3
Tamil Nadu	T	13.3	48.2	46.2	67.7	86.5	17.7
Tripura	T	18.6	48.8	43.6	75.8	104.6	U
Uttar Pradesh	T	24.6	59.0	59.9	99.9	141.3	31.6
West Bengal	T	18.6	48.8	51.8	75.3	99.3	18.7

U = Not available; M = male; F = female; T = total.

* Mortality rates for India are calculated for the 10-year period preceding the survey while the mortality rates for the states are for a five-year period preceding the survey in 1992-93.

** The age specific death rate is based on the annual number of deaths reported during the two-year period prior to the NFHS, 1992-93.

disparity): The INSD is not an all encompassing index. It can be used to compare the performance of different countries or states on a single nutritional and social

TABLE IV—Ranking of States According to (G)INSD* and INSD (NFHS, 1992-93)

State	(G) INSD Value	Rank According to (G) INSD
Kerala	0.7273 (0.7406)	1 (1)
Tamil Nadu	0.4479 (0.5585)	2 (4)
Punjab	0.4467 (0.5719)	3 (2)
Maharashtra	0.4244 (0.5484)	4 (6)
Gujarat	0.4072 (0.5525)	5 (5)
West Bengal	0.3552 (0.5010)	6 (8)
Assam	0.3536 (0.4647)	7 (10)
Haryana	0.3533 (0.5717)	8 (3)
Karnataka	0.3364 (0.5128)	9 (7)
Andhra Pradesh	0.3023 (0.4702)	10 (9)
Orissa	0.2881 (0.4559)	11 (11)
Madhya Pradesh	0.2785 (0.4359)	12 (13)
Rajasthan	0.2766 (0.4557)	13 (12)
Uttar Pradesh	0.2550 (0.4146)	14 (14)
Bihar	0.2392 (0.3779)	15 (15)

* (G) INSD: Gender adjusted INSD.

Note: Figures in parentheses indicate corresponding figures (value and rank) with respect to Index of Nutrition and Social Development (INSD).

development scale. But it does not reflect intra-state disparities (with respect to different socio-demographic characteristics). So, the index needs to be refined.

The INSD can be refined to reflect gender disparity. Expressing the female values for each component of the INSD (such as life expectancy, literacy, median years of schooling and nutritional status of children) as a percentage of the corresponding male value and averaging these percentages, we get a gender disparity factor (GDF) for each state. A state's INSD is then multiplied by its GDF to give its (G) INSD. Thus:

$$(G) INSD = GDF \times INSD.$$

Gender disparity: It was mentioned above that the observed data in both

surveys (NNMB and NFHS) do not show 'remarkable' gender differences with respect to the nutritional status of children. While this may be true, going purely by the proportions of growth retarded children of the two sexes, more careful scrutiny of the related data show that there is, in fact, considerable gender disparity.

As shown in *Table III*, the age-specific death rate for females (age 0 to 4 years) exceeds the male rate by 3%. Within this age group, only the neonatal period is favorable to female children (57 male deaths and 48 female deaths per 1,000 live births). This is due to the greater biological vulnerability of the male infant during this period and therefore, may not be a reflection of gender disparity. On the other hand, post-neonatal mortality is 13% higher for females than for males. The largest differential is in the child mortality (age 1 to 4 years) rate which is 43% higher for females than for males. The higher mortality (post-neonatal and child) among girls, it seems, could have masked the prevailing order of gender discrimination (against girls).

Indeed the reported figures of mortality in girls appear to be an underestimate. The reported sex ratio even at birth for 'living' children in India ranged from 954 in 1982 to 878 in 1993, figures less than would be normally expected. This would suggest that even still-birth rates of girls far exceed those of boys—a finding that cannot be explained on biological grounds. This would seem to lend support to the suspicion that the higher still-birth rate in girls could be indicative of relative neglect or worse.

There are marked regional differences with respect to gender disparity within the country. Thus, going by the INSD (which does not take gender disparity into account), Haryana has been ranked third amongst the 15 states of India. On the other hand, by (G) INSD ranking, Haryana

is eighth in rank. In fact, no state improves its INSD value after it is adjusted for gender disparity. Rajasthan has the lowest GDF (0.607) among all states. Even in progressive Kerala with the highest female literacy, gender disparity is evident though to a much lesser degree.

Concluding Comment

The foregoing analysis would show that there are striking regional differences with respect to nutritional status between different states of the country with the states of the Indian heartland being the most backward. There are also gender disparities from which even progressive Kerala is not exempt. On the other hand the repeat survey data from the NNMB do indicate a general trend towards improvement, however slow. There is still considerable distance to be covered before the goal of optimal nutritional status is achieved. It is to be hoped that the increased awareness of the problems and the new initiatives now on the anvil will quicken the pace of progress.

Acknowledgement

The authors are grateful to Dr. C. Gopalan, President, Nutrition Foundation of India for all his help and advice in the preparation of this paper.

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NOTES AND NEWS

XVI ANNUAL CONVENTION OF NATIONAL NEONATOLOGY FORUM

This event is to be held in Chandigarh from November 1-3, 1996. For further details please contact Dr. Anil Narang, Organizing Secretary, Department of Pediatrics, Post Graduate Institute of Medical Education and Research, Chandigarh 160 012.