

Calorie Norm and Calorie Deficiency

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SUMMARY

The analysis has shown that there is significant change in the age, sex, occupation structure of the population. Due to this the calorie requirement estimated is around 2150 Kcal per capita per day. In terms of per cu per day also the norm is around the same. With this norm the percentage of households below RDA is estimated as 50 per cent, it being 57 per cent in urban and 49 per cent in rural.

Using the intake at individual level, the percentage of persons below RDA was estimated as 35 per cent. Further, the calorie deficiency was lowest among children followed by adults. The calorie deficiency was highest among elderly.

The household level analysis implicitly assumes the entire household below RDA or above RDA. However the study revealed that among those households below 2150 Kcal the percentage of persons below RDA were 51.5 as against 14.7 for these households above 2150 Kcal.

In conclusion, the study highlights the differences in the findings on calorie deficiency by household approach and the individual approach. There are vast intra-family differences in the calorie deficiency. The children appear to be cared most followed by adults. Study suggest that the elderly might be the most sufferers who are given least preference and attention in the household. These findings are of great practical importance having bearing on National Programme and Policies.

Key words : Calorie norm, Calorie deficiency, Poverty measurement, RDA.

1. Introduction

Improvements in standard of living and reduction in poverty have remained basic objective of Indian planning. Man requires a wide range of nutrients to keep him healthy and active. The measures of nutritional status are the intakes level vis-à-vis the requirement norms as also anthropometric measurements and clinical signs associated with nutrition. Expert Committees of different countries examine the available information on nutrient requirements and the national food habits and arrive at what is normally called Recommended

Dietary Allowances (RDA), which is defined as the intake of nutrient derived from diet which keeps nearly all people in good health. RDA are given for different groups; adults, infants, children, pregnant and lactating women. The total energy requirement of an individual is made up of two main components: (a) basal or resting energy requirement for such vital functions as respiration, circulation, etc. and (b) the energy required for the actual physical activity of the individual. It is the latter component that varies depending on the type of occupation of an individual. For the sake of computation of energy requirement, occupations have been classified as light, moderate and heavy. Quantitative food requirements are usually estimated in terms of energy, i.e. calories. Whenever calorie as a unit is mentioned in the text, it is the physiological calorie or kilocalorie.

The first attempt to recommend dietary allowances of energy and protein for Indians was made by the Nutrition Advisory Committee of the Indian Research Fund Association (now ICMR) [10], following the recommendations of the League of Nations in 1937. The then existing diets of Indians particularly of the poor were inadequate in meeting these norms. In the wake of recommendations of energy and protein requirements, by the Food and Agriculture Organization (FAO) ([5], [6]), an attempt was made by the Indian Council of Medical Research (ICMR) in 1958 to define protein and calorie requirements of Indians based on data available at that time. Expert Committee constituted by the ICMR made recommendations on dietary requirements in 1988. This Committee revised the earlier recommendations wherever new data were available.

Practical nutrition work often involves the assessment of the intake of a group of persons. In such cases, it is usual to assess the needs of women and children in terms of those of the average man by applying appropriate coefficients to the different age and sex groups. The coefficients of calorie consumption have been suggested for practical nutrition work in India. The energy consumption of an average male during a sedentary work is taken as one unit and the other coefficients are worked on the basis of their calorie requirements relative to that of a sedentary man. This is termed as consumption unit.

The National Nutrition Monitoring Bureau (NNMB) under National Institute of Nutrition (NIN), Hyderabad established in 1972 has been providing information to assess dietary and nutritional situation in the country. The Food and Nutrition Bureau, Department of Women and Child Development, has sponsored studies to cover most of the states which were not included in the NNMB surveys. The results available through these provide a good picture for assessing the trend as also cross-sectional comparison of nutritional status.

2. Poverty Measurement

In defining poverty line, Planning Commission had utilized the calorie requirement norm of 2400 Kcal per capita per day for rural areas and 2100 Kcal for urban areas. This norm is based on age, sex, occupational structure of the population and the corresponding recommended dietary allowances for each category. National Institute of Nutrition refers the norm of 2425 Kcal per consumption unit per day.

With demographic transition and general development, the age, sex, activity structure of the population has undergone sea change. Therefore the norms based on past information may or may not be appropriate in the present context. Hence it is appropriate to examine the appropriateness of the norms with the change in the age, sex, and activity structure. This section examines the issue of computation of the norms. Also estimation of calorie deficiency has been attempted using household level data as also individual level data.

3. Calorie Norm

The data collected in the IRMS study on State Nutrition Profile for Rajasthan has been utilized to estimate the composition of the population according to age, sex, occupation structure. For each age, sex, occupational category information on the Recommended Dietary Allowances per person is available in Indian Council of Medical Research [3]. Further, for each age, sex and occupation category associated consumption units are available in Indian Council of Medical Research [3]. All these have been used to estimate the per capita as well as per cu calorie requirement norm.

Table 1 presents the age, sex, occupational structure of the population for the year 1977-78 as used by the Planning Commission [17] (Report of the Study Group on estimation of poverty line). This will be used as the reference for comparisons with the corresponding observed distribution in the present study.

The structure of the population by age, sex, occupation categories as observed using the data of IRMS study for Rajasthan, is presented in Table 2. It has been observed that for the state as a whole the percentage of adults engaged in heavy activity is less than one per cent which is much lower as compared to the level of over 20 per cent used by Planning Commission for 1977-78 and conversely the percentage of adults engaged in sedentary activities is higher in the present study.

The details of estimation of calorie norm using the present methodology are given in Table 3.

The average calorie requirement norm for rural areas in per capita terms is estimated as 2042 Kcal. For urban areas the calorie norm works out as 2036 Kcal. This is mainly because of decline with time in the percentage of population engaged in heavy activities.

Table 1. Age, sex and occupation structure of the population (percentages)

Age, sex, occupational categories	Rural	Urban
< 1 year	2.97	2.56
1-3 year	8.67	7.44
4-6 year	8.31	7.19
7-9 year	7.91	7.09
10-12 year Male	3.89	3.70
10-12 years Female	3.57	3.58
13-15 year Male	2.41	2.35
13-15 year Female	2.22	2.25
15 + years Male		
Heavy activity	22.03	4.27
Moderate activity	2.51	8.11
Sedentary activity	2.74	15.02
Non-workers	3.29	7.25
15 + years Females		
Heavy activity	10.51	1.64
Moderate activity	0.92	1.77
Sedentary activity	0.50	3.23
Non-workers	17.55	22.55

Source: Report of the Study Group, Planning Commission [17].

Table 2. Age, sex, occupational structure, Rajasthan

Age, sex, occupational categories	Urban	Rural
<1 year Male	1.4	2.0
<1 year Female	1.4	1.9
1-3 year Male	3.3	3.7
1-3 year Female	2.9	3.4
4-6 year Male	4.7	5.2
4-6 year Female	3.6	4.5
7-9 year Male	3.9	4.3
7-9 year Female	3.8	3.9
10-12 year Male	4.4	4.5
10-12 year Female	3.8	4.1
13-15 year Male	3.7	3.3
13-15 year Female	3.4	3.0
16-17 year Male	2.0	1.6
16-17 year Female	1.6	1.1
> 18 year Male		
Sedentary	25.2	16.0
Moderate	3.6	11.0
Heavy	0.1	0.3
> 18 year Female		
Sedentary	26.7	24.1
Moderate	0.4	1.9
Heavy	0.0	0.0

Table 3. Estimation of average calorie requirement per capita and per cu, Rajasthan

Age, sex, occupational categories	Urban			Rural		
	Sample (%) (N _i)	RDA (R _i)	CU (C _i)	Sample (%) (N _i)	RDA (R _i)	CU (C _i)
<1 year Male	1.4	760	0.3	2.0	760	0.3
<1 year Female	1.4	760	0.3	1.9	760	0.3
1-3 year Male	3.3	1240	0.5	3.7	1240	0.5
1-3 year Female	2.9	1240	0.5	3.4	1240	0.5
4-6 year Male	4.7	1690	0.7	5.2	1690	0.7
4-6 year Female	3.6	1690	0.7	4.5	1690	0.7
7-9 year Male	3.9	1950	0.9	4.3	1950	0.9
7-9 year Female	3.8	1950	0.9	3.9	1950	0.9
10-12 year Male	4.4	2190	1.0	4.5	2190	1.0
10-12 year Female	3.8	1970	0.9	4.1	1970	0.9
13-15 year Male	3.7	2450	1.1	3.3	2450	1.1
13-15 year Female	3.4	2060	1.0	3.0	2060	1.0
16-17 year Male	2.0	2640	1.2	1.6	2640	1.2
16-17 year Female	1.6	2060	0.9	1.1	2060	0.9
>18 year Male						
Sedentary	25.2	2425	1.0	16.0	2425	1.0
Moderate	3.6	2850	1.2	11.0	2850	1.2
Heavy	0.1	3800	1.6	0.3	3800	1.6
> 18 year Female						
Sedentary	26.7	1875	0.8	24.1	1875	0.8
Moderate	0.4	2225	0.9	1.9	2225	0.9
Heavy	0.0	2925	1.3	0.0	2925	1.3

Urban

$$\text{Average calorie norm per capita} = \frac{\sum N_i R_i}{\sum N_i} = 2036 \text{ Kcal}$$

$$\text{Average calorie norm per cu} = \frac{\sum N_i R_i C_i}{\sum N_i C_i} = 2127 \text{ Kcal}$$

Rural

Average calorie norm per capita = 2042 Kcal

Average calorie norm per cu = 2161 Kcal

Thus, the calorie norm of 2400 Kcal for rural areas and 2100 Kcal for urban areas per capita per day as used by the Planning Commission requires revision. It is revealed that there is not much of difference in the norm for rural and urban areas, which could be rounded to 2150 Kcal. This has implication on defining poverty line.

In per consumption unit terms the norm for urban areas works out as 2127 Kcal and for rural areas as 2161 Kcal. The average norm per cu from the present data works out as 2150 Kcal which is much lower as compared to 2425 Kcal as used/referred to as norm by NIN, Hyderabad.

4. Calorie Deficiency

As mentioned in methodology, the information collected in the study has been utilized for studying the calorie deficiency using the data both at the household level and the individual level. Data used relates to 2724 households covering 14367 individuals.

Table 4. Household characteristics of individuals

	Residence				Combined	
	Urban		Rural			
N	100%	2634	100%	11733	100%	14367
Caste						
SC/ST	20.4%	538	30.4%	3566	28.6%	4104
Others	79.6%	2096	69.6%	8167	71.4%	10263
Type of House						
Pucca	81.4%	2145	47.0%	5517	53.3%	7662
Kucha/Semi-Pucca	18.6%	489	53.0%	6216	46.7%	6705
Seperate room as kitchen	27.9%	736	38.8%	4551	36.8%	5287
No separate kitchen	72.1%	1891	61.2%	7182	63.2%	9073
Source of lightening electricity						
Yes	91.2%	2403	67.4%	7912	71.8%	10315
No	8.8%	231	32.6%	3821	28.2%	4052
Drinking water facility						
Piped drinking water	78.4%	2066	27.9%	3268	37.1%	5334
Handpump/Well/Others	21.6%	568	72.1%	8465	62.9%	9033
Toilet facility						
Flush	59.4%	1564	8.9%	1044	18.2%	2608
Toilet pit/Bush/field	40.6%	1070	91.1%	10689	81.8%	11759

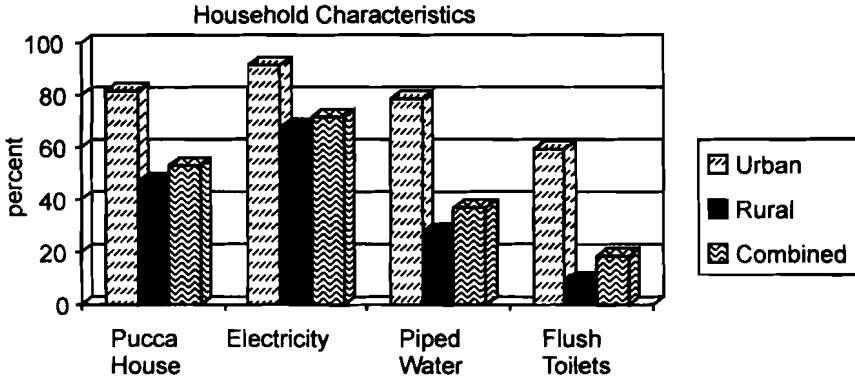


Table 4 presents the socio-economic characteristics of the households. Over 20 per cent in urban and about 30 per cent in rural belonged to SC/ST. Over 80 per cent in urban areas and 47 per cent in rural areas were living in pucca houses. In urban, over 90 per cent of individuals were having the houses with electricity as against the corresponding percentage of 67 per cent in rural. For drinking water 78.4 per cent in urban and 27.4 per cent in rural were using piped drinking water. In urban areas around 60 per cent were using flush toilets while in rural areas only 9 per cent were using flush toilets.

5. Households Below RDA

The per cu calorie norm of 2150 Kcal has been used in estimating the percentage of households below RDA. Table 5 presents the results on percentages household below intake of 2150 Kcal per cu. The percentage of households below the average RDA of 2150 Kcal per household per cu was estimated as around 50 per cent, it being lower 49% for rural as compared to 57% for urban.

Table 5. Percentage of households below 2150 Kcal per cu

	n	Households below RDA (%)
Residence		
Urban	525	56.8 %
Rural	2199	48.8 %
Overall	2724	50.4 %

6. Persons Below RDA

As against this, using data at individual level as unit of analysis. About 35 per cent of persons were estimated below their individual RDA. It is desirable to

know whether the extent of calorie deficiency is uniform for children, adolescent, adults and elderly. Table 6 presents the per cent of persons below RDA separately for children, adolescents, adults and elderly. It is observed that children had the lowest level of calorie deficiency (16%) followed by adults (33%). Elderly had the highest level of calorie deficiency of over 51 per cent.

Table 6. Percentage of persons below RDA

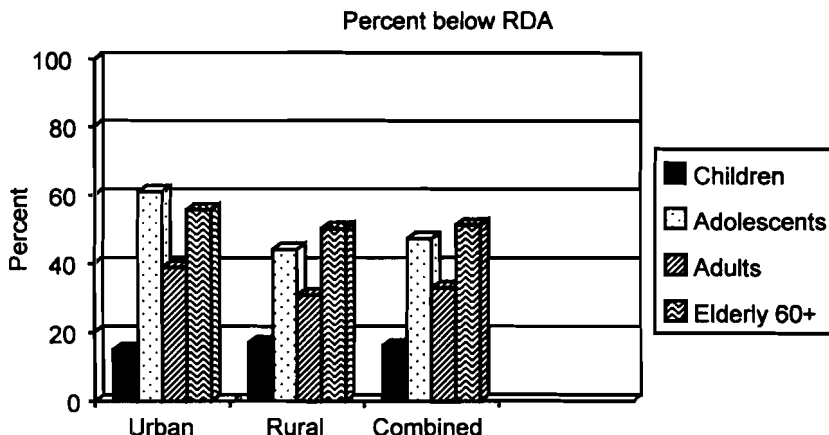
Category	n	Below RDA
Children 1-5 years	1536	16.6 %
Adolescents 10-17 years	2677	47.2 %
Adults 18-60 years	7107	33.0 %
60+ years	579	51.3 %
Overall	14367	34.7 %

The results on calorie deficiency separately for rural and urban areas are presented in Table 7.

Table 7. Percentage of persons below RDA

Residence	n	Percent below RDA
Urban		
Children 1-5 years	253	15.0
Adolescents 10-17 years	472	61.0
Adults 18-60 years	1381	38.9
60+ years	113	55.8
Combined	2634	42.3
Rural		
Children 1-5 years	1283	16.9
Adolescents 10-17 years	2205	44.2
Adults 18-60 years	5726	31.6
60+ years	466	50.2
Combined	11733	33.0

It would appear that the percentage of adolescents, adults and elderly below RDA were higher in urban areas as compared to rural areas.



7. Interrelationship of Household Level Intake and Persons Below RDA

With the objective of assessing the reasons for difference of about 15 percentage points in the estimates by two methods an in-depth analysis of data has been undertaken

For this in-depth analysis households were categorized according to per cu energy intake as under

- <1500, 1500-1600, 1600-1700, 1700-1800, 1800-1900, 1900-2000, 2000-2100
- 2100-2150, 2150-2200, 2200-2300, 2300-2400, 2400-2500, >2500

For each of above categories analysis of percentage of persons below individual RDA was undertaken.

Table 8 presents the extent of deficiency of individuals below RDA, according to household level calorie intake. It has been observed that in each category there are persons both below RDA and above RDA. Though, there is a broad inverse trend in the percentage of persons below RDA with per cu household energy intake, it is observed that among households below 2125 Kcal only 51.5 per cent were below RDA, On the other hand among those above 2150 Kcal around 15 per cent were also below their individual RDA. Results separately by residence and by caste are presented in Table 9 and 10.

Trend is similar by sex, residence and caste as observed for total.

Table 8. Households level calorie intake and individuals below RDA

HH intake Kcal/CU	Sex										Ind. A	RDA	Ind. B	RDA
	Male					Female								
	Ind. A	RDA	Ind. A	RDA	Ind. A	RDA	Ind. A	RDA	Ind. A	RDA				
<1500	15.3%	187	84.7%	1037	53.2%	618	46.8%	544	33.7%	805	66.3%	1581		
1500-1600	23.8%	81	76.2%	260	58.2%	203	41.8%	146	41.2%	284	58.8%	406		
1600-1700	30.5%	127	69.5%	290	61.2%	240	38.8%	152	45.4%	367	54.6%	442		
1700-1800	37.0%	172	63.0%	293	66.2%	286	33.8%	146	51.1%	458	48.9%	439		
1800-1900	42.1%	186	57.9%	256	67.3%	274	32.7%	133	54.2%	460	45.8%	389		
1900-2000	52.1%	235	47.9%	216	72.3%	289	27.8%	111	61.6%	524	38.4%	327		
2000-2100	58.3%	277	41.7%	198	74.0%	321	26.0%	113	65.8%	598	34.2%	311		
2100-2150	64.5%	142	35.5%	78	73.8%	155	26.2%	55	69.1%	297	30.9%	133		
2150-2200	65.3%	154	34.7%	82	78.9%	172	21.1%	46	71.8%	326	28.2%	128		
2200-2300	68.5%	257	31.5%	118	81.9%	285	18.1%	63	75.0%	542	25.0%	181		
2300-2400	73.8%	271	26.2%	96	85.2%	304	14.8%	53	79.4%	575	20.6%	149		
2400-2500	82.8%	255	17.2%	53	85.2%	259	14.8%	45	84.0%	514	16.0%	98		
>2500	88.7%	1825	11.3%	232	91.3%	1804	8.7%	172	90.0%	3629	10.0%	404		
Combined	56.5%	4169	43.5%	3209	74.5%	5210	25.5%	1779	65.3%	9379	34.7%	4988		
HHs below RDA	34.9%	1407	65.1%	2628	63.0%	2386	37.0%	1400	48.5%	3793	51.5%	4028		
HHs above RDA	82.6%	2762	17.4%	581	88.2%	2824	11.8%	379	85.3%	5586	14.7%	960		

Table 9. Household calorie intake & per cent of individual below RDA

HH intake Kcal/CU	Residence							
	Urban				Rural			
	Ind. A	RDA	Ind. A	RDA	Ind. A	RDA	Ind. A	RDA
<1500	33.2%	220	66.8%	443	34.0%	585	66.0%	1138
1500-1600	43.4%	49	56.6%	64	40.7%	235	59.3%	342
1600-1700	37.0%	51	63.0%	87	47.1%	316	52.9%	355
1700-1800	48.1%	111	51.9%	120	52.1%	347	47.9%	319
1800-1900	44.6%	58	55.4%	72	55.9%	402	44.1%	317
1900-2000	57.7%	101	42.3%	74	62.6%	423	37.4%	253
2000-2100	60.0%	90	40.0%	60	66.9%	508	33.1%	251
2100-2150	59.2%	29	40.8%	20	70.3%	268	29.7%	113
2150-2200	68.3%	69	31.7%	32	72.8%	257	27.2%	96
2200-2300	69.7%	108	30.3%	47	76.4%	434	23.6%	134
2300-2400	80.4%	127	19.6%	31	79.2%	448	20.8%	118
2400-2500	85.7%	72	14.3%	12	83.7%	442	16.3%	86
>2500	89.5%	436	10.5%	51	90.0%	3193	10.0%	353
Combined	57.7%	1521	42.3%	1113	67.0%	7858	33.0%	3875
HHS below RDA	43.0%	709	57.0%	940	50.0%	3084	50.0%	3088
HHS above RDA	82.4%	812	17.6%	173	85.8%	4774	14.2%	787

Table 10. Household level calorie intake and percent of individual below RDA by caste

HH intake Kcal/CU	Caste									
	SC/ST					OTHERS				
	Ind. A	RDA	Ind. A	RDA	Ind. A	RDA	Ind. A	RDA	Ind. A	RDA
<1500	31.5%	207	68.5%	450	34.6%	598	65.4%	1131		
1500-1600	38.3%	59	61.7%	95	42.0%	225	58.0%	311		
1600-1700	47.8%	107	52.2%	117	44.4%	260	55.6%	325		
1700-1800	51.6%	130	48.4%	122	50.9%	328	49.1%	317		
1800-1900	54.0%	161	46.0%	137	54.3%	299	45.7%	252		
1900-2000	60.8%	113	39.2%	73	61.8%	411	38.2%	254		
2000-2100	64.2%	170	35.8%	95	66.5%	428	33.5%	216		
2100-2150	73.8%	90	26.2%	32	67.2%	207	32.8%	101		
2150-2200	72.8%	83	27.2%	31	71.5%	243	28.5%	97		
2200-2300	78.1%	189	21.9%	53	73.4%	353	26.6%	128		
2300-2400	79.4%	170	20.6%	44	79.4%	405	20.6%	105		
2400-2500	83.7%	174	16.3%	34	84.2%	340	15.8%	64		
>2500	88.8%	1037	11.2%	131	90.5%	2592	9.5%	273		
Combined	65.5%	2690	34.5%	1414	65.2%	6689	34.8%	3574		
HHS below RDA	48.1%	1037	51.9%	1121	48.7%	2756	51.3%	2907		
HHS above RDA	84.9%	1653	15.1%	293	85.5%	3933	14.5%	667		

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