

NUTRITIONAL STATUS AND SOCIOECONOMIC EMPOWERMENT OF FISHERWOMEN IN THE COASTAL ECOSYSTEM OF ANDHRA PRADESH, KARNATAKA, KERALA AND TAMIL NADU, INDIA

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Abstract

This study was carried out in the coastal areas of Andhra Pradesh, Karnataka, Kerala and Tamil Nadu. From these states, 13 districts and 28 villages were selected. A total of 5,744 households were covered. Cereal consumption was highest in Andhra Pradesh followed by Kerala, Karnataka and Tamil Nadu. Pulse consumption was high in Kerala when compared to other states. The overall energy intake of the fisherwomen was 1,827 kcal/day; protein intake was 50.6 gm/day; carbohydrate intake was 343.5 gm/day; and fat intake was 27 gm/day. The mean intake of micronutrients was less than the recommended dietary allowance. The mean body mass index was 21.3. The nutritional status of the women was: 49% normal; 17% low normal; 10.5% mildly malnourished; 4% moderately malnourished; and 2.9% severely malnourished. About 11.5% of the fisherwomen were overweight and 4.6% were obese. A subsample of 915 women was clinically observed: 34.8% were diagnosed with angular stomatitis; 31% with cheelosis; 42.8% with bleeding gums; and 44.2% with dry skin. Some 72% of the women were anemic.

An assessment of the socioeconomic status indicated that very few households (15.4%) maintained livestock for income generation. About 60% of the fisherwomen carried out post-harvest activities to earn income. Food expenditure comprised 60.7% of the earned income contributing to the major share of the spending. Debt servicing was a serious problem faced by 44.9% of the respondents who had procured loans mostly from non-institutional sources.

Introduction

In India, women constitute about 50% of the population and comprise one-third of the labor force. Women contribute significantly to the fishery sector of the Indian economy. Out of the 5.4 million active fishers in India, 3.8 million (70.4%) were fishermen and 1.6 million (29.6%) were fisherwomen (Ashaletha et al. 2002). Women constituted an estimated 25% of the labor force in preharvest activities of fish; 60% in export marketing; and 40% in internal marketing (Dehadrai 2002). Srinath (1987) described the role of women in small-scale fisheries, while Dubey and Kohli (2001) presented an overview on the contribution of women in Asian fisheries. Ashalatha et al. (2002) depicted the changing role of fisherwomen in India. Sathiadas et al. (2003) gave an account of the socioeconomic profile of women workers in post-harvest marine fisheries sector in Kerala.

Diet is a vital determinant of health and nutritional status. The dietary habits of people/families/communities vary according to socioeconomic factors, regional constraints and traditions. Precise information on the food consumption pattern of people, through the application of appropriate methodology, is often needed, not only for elucidating the relationship of nutrient intake with deficiency, but also for the detection of degenerative diseases. Information on food consumption patterns is also essential for assessing the food needs of population groups at national and regional levels. In recent years, economists have been making use of dietary energy data for defining poverty levels of population groups.

Anthropometry is one of the methods used in nutritional assessment. From the public health point-of-view, identification of subclinical forms of malnutrition is very important for planning programs on nutritional intervention so as to prevent milder cases going into severe forms with consequent risk of high mortality. Clinical examination is an important practical method for assessing the nutritional status of a community. The clinical examination method was based on an examination for changes believed to be related to inadequate nutrition that can be seen or felt in superficial epithelial tissues, especially the skin, eyes, hair and buccal

mucosa, or in organs near the surface of the body, such as the parotid and thyroid glands. The current information on socioeconomic and nutritional status of fisherwomen in India is inadequate to suggest appropriate interventions to improve income generation and nutritional status. Hence an attempt was made to study the socioeconomic status of fisherwomen in the coastal areas of Andhra Pradesh, Karnataka, Kerala and Tamil Nadu.

Methodology

Information on the food consumption of fisherwomen in the selected villages was obtained through a detailed study for one month on the food consumed, the frequency and amount purchased, as well as the total amount of each food consumed. The nutritional status of fisherwomen was assessed by noting the type of food and weighing the amount of food they consumed over a day. The cooked ingredients were measured using standardized cups and then converted to their equivalents as raw ingredients. The mean intake of the raw equivalents was calculated from the intake of cooked food amounts using the formula developed by Thimmayamma (1987):

$$\text{Individual intake of items in raw equivalents (gm/ml)} = \frac{\text{Total raw amount of each ingredient used in preparation} \times \text{Individual intake of cooked amount}}{\text{Total cooked amount of each preparation (g/ml)}}$$

The nutritive value of the foods consumed was calculated as per Gopalan et al. (1989).

Anthropometry

The height and weight obtained by the survey were compared to the National Centre for Health Statistics (NCHS) standards.

$$\text{Body mass index (BMI)} = \frac{\text{Weight in (kg)}}{\text{Height in (m)}^2}$$

The BMI was used as an indicator of the nutritional status of the fisherwomen. The different degrees of chronic energy deficiency (CED) and obesity are given below (Table 1), following the scale developed by James et al. (1988).

Table 1. Scale of degrees of chronic energy deficiency and obesity (James et al. 1988).

BMI	Nutritional grade
<16.00	Malnourished (III degree)
16.0 – 17.0	Malnourished (II degree)
17.0 – 18.0	Malnourished (I degree)
18.5 – 20.0	Low normal
20.0 – 25.0	Normal
25.0 – 30.0	Overweight (I degree obese)
>30.0	Over obese

Clinical examination

The medical assessment of the nutritional status was based on the clinical examination of the hair, face, eyes, lips, tongue, teeth, gums, glands, skin, nails, subcutaneous tissue, and muscular and skeletal systems.

Assessment of socioeconomic status

The socioeconomic status of the fisherwomen's household was assessed by their occupation pattern, income level, income and expenditure, and level of involvement in loan servicing. A comparative assessment was made among the four states.

Estimation of standard of living

The socioeconomic assessment helps to estimate the standard of living of the different groups of the people from whom the data were collected. An attempt was made to compare the annual per capita income and the Engel's coefficient of the fisher's household. The Engel's coefficient was calculated as follows:

$$\text{Engel's coefficient} = \frac{\text{Annual expenditure on food}}{\text{Annual total expenditure}} \times 100$$

Statistical analysis

Frequency distributions, mean and standard deviations (SD) and tests of significance were calculated for each of the variables studied. Analysis of variance, chi-square test and multiple comparison 't' test procedures (Visveswara Rao 1996) were utilized to test for significant differences in the data collected.

Results and Discussion

Food intake of fisherwomen

Details of food consumption among fisherwomen are provided in Table 2. Cereal consumption was highest among those of Andhra Pradesh, followed by Kerala, Karnataka and Tamil Nadu.

Table 2. Food intake of fisherwomen (g/per capita/day).

State	Cereals	Pulses	Green leafy vegetables	Other vegetables	Fat and oil	Fruits	Sugar and jaggery	Milk	Poultry	Fish
Andhra Pradesh	469 ± 124.0	19.5 ± 9.0	21.6 ± 12.7	23.19 ± 17.7	19.1 ± 6.7	25.0 ± 8.7	19.81 ± 7.3	38.4 ± 30.7	15.4 ± 23.7	14.2 ± 42.5
Karnataka	246 ± 20.8	7.1 ± 5.4	3.6 ± 5.8	11.61 ± 4.4	8.3 ± 0.1	7.21 ± 10.6	8.0 ± 2.3	8.82 ± 2.9	12.31 ± 9.42	92 ± 10.8
Kerala	384 ± 11.4	31 ± 3.5	15 ± 4.1	71 ± 20.1	16.0 ± 3.8	31.0 ± 4.2	17.0 ± 2.4	111 ± 38.7	129 ± 19.49	163 ± 71
Tamil Nadu	224 ± 52.8	15.0 ± 3.0	8.2 ± 1.3	14.2 ± 2.3	12.2 ± 1.9	12.2 ± 1.9	21.7 ± 3.4	40.0 ± 8.0	12.0 ± 2.5	147 ± 56
Overall	330	18.2	12	30	13.9	20.8	16.6	49.5	22.1	136
RDA	300	40	100	100	20	120	20	200	-	-

Notes: Figures given are mean + SD; RDA - recommended dietary allowance.

Nutrient Intake

Macronutrient intake

Higher intakes of energy, carbohydrate, protein and fat were found among the fisherwomen of Kerala followed by Tamil Nadu and Andhra Pradesh (Table 3). Percentage adequacy of macronutrients in each of the states is given in Figure 1. Karnataka fisherwomen had the lowest intakes.

Table 3. Macronutrient intake by the fisherwomen (per capita/day).

State	Energy (kcal)	Protein (gm)	Carbohydrate (gm)	Fat (gm)
Andhra Pradesh	1,470 (376)	35.6 (9.2)	289.0 (60.4)	19.0 (4.6)
Karnataka	1,053 (99)	20.4 (2.7)	220.4 (20.0)	10.0 (2.2)
Kerala	2,967 (414)	97.0 (24.0)	512.0 (20.1)	59.0 (11.6)
Tamil Nadu	1,786 (254)	49.3 (13.9)	352.7	19.8 (5.3)
Mean	1,820	50.6	343.5	27.0
RDA	2,225	50.0		20.0

Note: Figures inside parentheses indicate SD values.

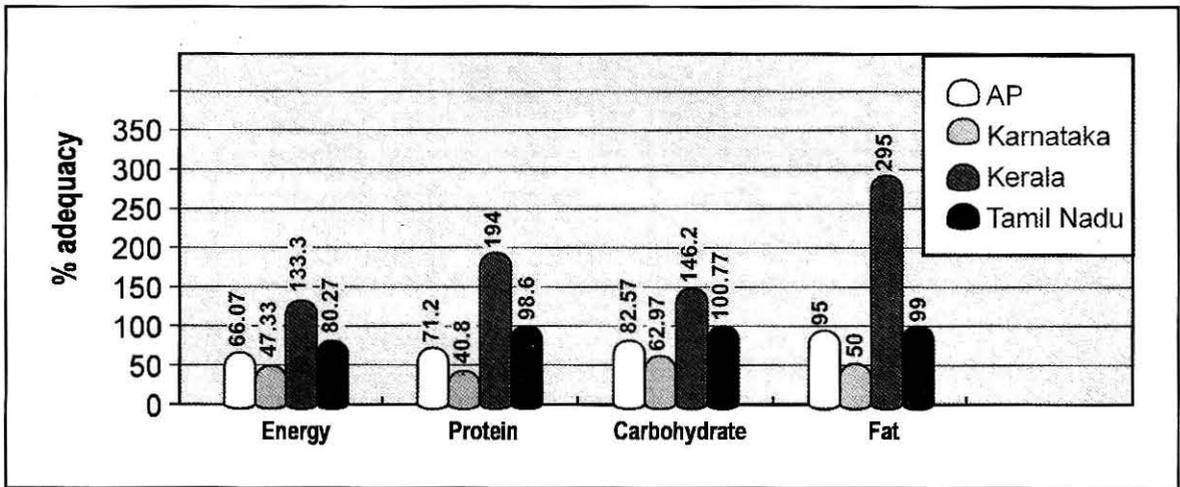


Figure 1. Percentage adequacy of macronutrient intake by fisherwomen in the different states studied.

Vitamins

The overall intake of B1, B2, Niacin and Vitamin C by fisherwomen in the states studied was lower than the RDA (Table 4). High intake of micronutrients was recorded among the fisherwomen of Kerala, followed by Tamil Nadu. This might be because of the parboiled rice consumed in that region.

Table 4. Vitamin intake of fisherwomen (per capita/day).

State	B1 (mg)	B2 (mg)	Niacin (mg)	Vit C (mg)
Andhra Pradesh	0.57 (0.2)	0.59 (0.2)	10.62 (2.9)	29.1 (6.9)
Karnataka	0.56 (0.05)	0.16 (0.02)	10.30 (5.1)	4.9 (5.9)
Kerala	1.0 (0.0)	1.00 (0.0)	19.00 (4.5)	35.0 (29.3)
Tamil Nadu	0.84 (0.2)	0.80 (0.5)	12.80 (2.6)	37.9 (4.0)
Overall mean	0.74	0.63	13.19	26.7
RDA	1.1	1.3	14	40

Note: Figures inside parentheses indicate SD values

Percentage adequacy of vitamins in the different states is given in Figure 2.

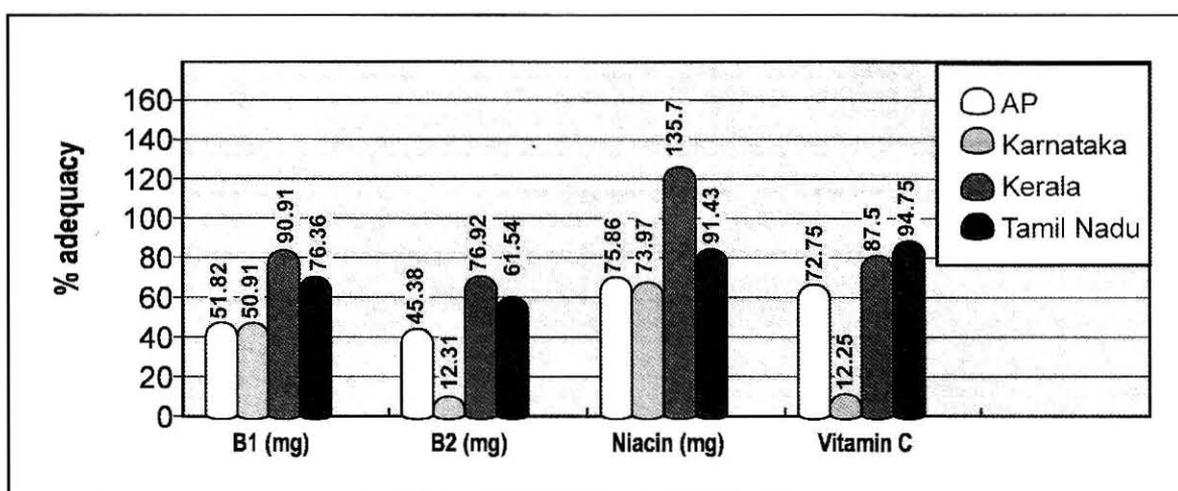


Figure 2. Adequacy of vitamin intake by fisherwomen in the different states studied.

Minerals

Table 5. Mineral intake of fisherwomen (per capita/day).

State	Iron (mg)	Calcium (mg)
Andhra Pradesh	20.3 (5.1)	415.8 (129)
Karnataka	3.5 (0.6)	155.3 (74)
Kerala	27.8 (8.4)	539 (85)
Tamil Nadu	22.8 (9.0)	391 (90)
Overall mean	18.6	375.3
RDA	30	400

Note: Figures inside parentheses indicate SD values.

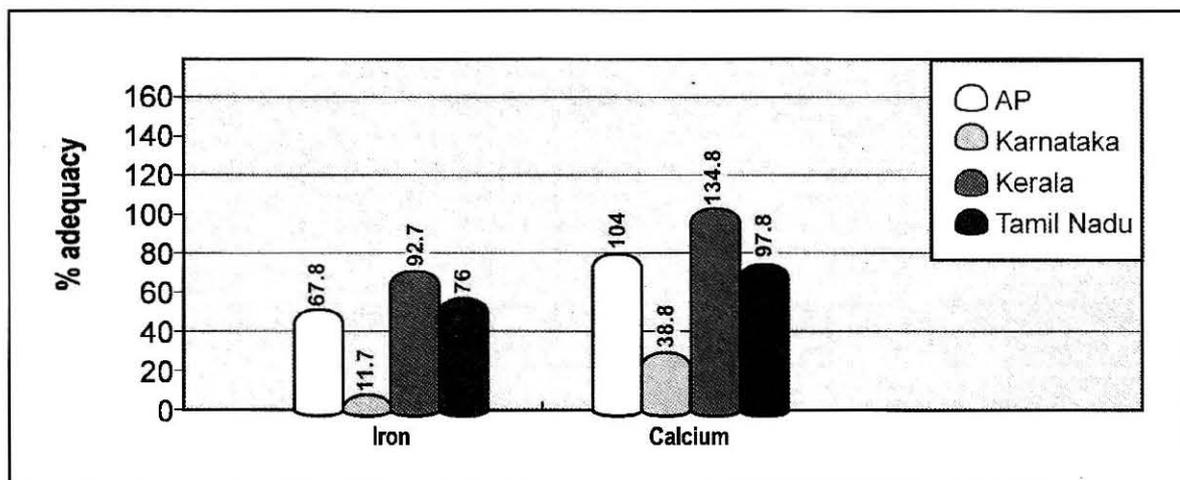


Figure 3. Adequacy of mineral intake by fisherwomen in the different states studied.

The iron and calcium intakes of fisherwomen in the four states are shown in Table 5 and the adequacy of their mineral intake is given in Figure 3.

Anthropometry

The average anthropometric measurements of fisherwomen are shown in Table 6.

Table 6. Average anthropometric measurement of fisherwomen surveyed.

State	Anthropometric measurements		
	Height (cm)	Weight (kg)	BMI
Andhra Pradesh	153 (5.5)	48.0 (6.3)	21.4 (2.9)
Karnataka	151 (5.2)	47.1 (5.7)	20.5 (7.6)
Kerala	149 (3)	47.3 (3.5)	21 (1.1)
Tamil Nadu	149 (8)	52.0 (13.0)	22.6 (5.3)
Mean	150	48.5	21.3

Note: Figures inside parentheses indicate SD.

Forms of malnutrition of women based on James' classification

Based on BMI, the women were categorized as obese, overweight, normal, low normal, mildly malnourished, moderately malnourished and severely malnourished (see Table 7).

Table 7. Forms of malnutrition of women based on BMI.

State (number surveyed)	Forms of malnutrition						
	Severe	Moderate	Mild	Low	Normal	Overweight	Obese
Andhra Pradesh (625 women)	4 (0.6)	13 (2.1)	51 (8.2)	121 (19.4)	377 (60.3)	57 (9.0)	3 (0.4)
Karnataka (210 women)	0 (0.0)	0 (0.0)	14 (6.7)	63 (30.0)	127 (60.4)	6 (2.9)	-
Kerala (165 women)	10 (6.1)	4 (2.4)	19 (11.5)	29 (17.6)	84 (50.9)	11 (6.7)	8 (4.8)
Tamil Nadu (538 women)	31 (5.8)	46 (8.6)	78 (14.5)	51 (9.5)	173 (32.1)	8 (1.5)	54 (10.0)
Overall (1,538 women)	45 (2.9)	63 (4.1)	162 (10.5)	264 (17.2)	761 (49.5)	178 (11.6)	65 (4.2)

Note: Figures inside parentheses indicate percentages.

Clinical Studies

Clinical symptoms observed in women are given in Table 8.

Table 8. Prevalence rates of clinical nutritional deficiency signs in women.

State	No. surveyed	Anemia	Angular stomatitis	Cheelosis	Bleeding gums	Dryness of skin
Andhra Pradesh	490	392 (80.0)	133 (27.1)	80 (16.3)	76 (15.5)	146 (29.8)
Karnataka	210	178 (84.4)	89 (42.4)	96 (45.7)	147 (70.0)	123 (58.6)
Kerala	215	92 (42.8)	-	-	-	-
Tamil Nadu	-	-	-	-	-	-
Total	915	(69.2)	(34.8)	(31.0)	(42.8)	(44.2)

Note: Figures inside parentheses are prevalence rates in percentages.

Occupational Patterns

The details of the occupational patterns of fisherwomen are presented in Table 9.

Table 9. Occupational patterns of fisherwomen.

States	Occupation				
	Fishing	Fishery-related and aquaculture	Non-fishery	Others	Total
Andhra Pradesh	575 (41.2)	452 (32.4)	299 (21.4)	70 (5.0)	1,396
Tamil Nadu	0 (0.0)	169 (52.0)	0 (0.0)	156 (48.0)	325
Kerala	687 (27.0)	1,257 (49.0)	592 (24.0)	0 (0.0)	2,536
Karnataka	330 (50.2)	0 (0.0)	297 (45.1)	31 (4.7)	658
Total	1,592 (25.8)	1,878 (30.4)	1,188 (19.3)	257 (5.2)	4,915

Note: Figures inside parentheses indicate percentages to the corresponding row total.

Maintenance of livestock

Only 15.4% of the respondents maintained livestock to support or generate income for the family. Among those who maintained livestock, 50.9% had poultry and 36.4% cattle. The maximum average annual income realized from maintaining livestock was Rs 7,358 in Andhra Pradesh and Rs 3,520 in Tamil Nadu. Fishing communities in the two coastal districts in Karnataka traditionally do not own any livestock. Only a few families reared poultry for domestic consumption.

Post-harvest activities

Fisherwomen play a vital role in the post-harvest operation of fish. Once the fish are landed, the women are responsible for sales, drying and processing, and related aspects. Their efforts have not been quantified effectively so far and the details of their involvement in different post-harvest activities are given in Table 10. Out of 5,744 households, women in 3,241 (56.4%) households involved themselves in post-harvest operation of fish besides looking after household activities. About 50% of fisherwomen were involved in value addition in Kerala. This is mainly because of the number of processing industries in the state, especially in the Alapuzha district.

Table 10. Number and percentage of women involved in post-harvest activities.

State	Post-harvest activities					Total
	Sun drying	Smoking of fish	Salting	Value addition and processing	Fish vending	
Andhra Pradesh	228 (28.2)	23 (2.8)	129 (16.0)	0 (00.0)	429 (53.0)	809
Karnataka	647 (64.2)	0 (0.0)	0 (00.0)	0 (00.0)	361 (35.8)	1,008
Kerala	50 (04.0)	0 (0.0)	151 (12.0)	602 (48.0)	452 (36.0)	1,255
Tamil Nadu	42 (24.8)	0 (0.0)	0 (00.0)	0 (00.0)	127 (75.2)	169
Total	967 (29.8)	23 (0.7)	280 (08.6)	602 (18.6)	1,369 (42.2)	3,241

Note: Figures inside parentheses are percentages.

Annual Income and Expenditure

Annual income was analyzed based on four categories: less than Rs 24,000; between Rs 24,000 and Rs 36,000; between Rs 36,000 and Rs 48,000; and above Rs 48,000. Overall, 40% of the respondents earned an income of less than Rs 24,000 per annum and 26% between Rs 24,000 and Rs 36,000. Some 80% of income earners in Karnataka and 57% in Andhra Pradesh earned below Rs 24,000. The maximum number of respondents earning the highest income above Rs 48,000 was found in Kerala (36%) and Tamil Nadu (37%). The income from fisheries accounted for 93.5% of the annual income followed by income from other sources (5.9%). Aquaculture was an economic activity in Andhra Pradesh only. Food expenses occupied the major share of income (61%) followed by clothes (9%) and medicines (6%).

Standard of Living

The welfare of the households was measured in terms of their standard of living. There are a few measures of standard of living. Each one has its own merits and demerits. The following measures were analyzed in this study.

Annual household income and per capita income

The income from all sources earned by the fisheries household was pooled and divided by the average family size of the fishers' household to arrive at the per capita income (see Table 11). Fisherwomen from Andhra Pradesh had a higher standard of living than the others. This may be due to the fact that they earned additional income from aquaculture.

Table 11. Annual household income and per capita income (Rs).

State	Source of household income				Family size	Per capita income
	Fishery	Related	Others	Total		
Andhra Pradesh	29,923	818	2,580	33,821	4.0	8,455.25
Karnataka	21,785	0	0	21,785	5.0	4,357.00
Kerala	22,194	0	5,206	27,400	4.0	6,850.00
Tamil Nadu	13,464	0	312	13,776	5.0	2,755.20

Engel's coefficient

This measure indicates percentage of expenditure on food in relation to total expenditure (see Table 12). The higher the Engel's coefficient, the lower is the standard of living.

Table 12. Engel's coefficient of standard of living.

State	Expenditure on food	Total expenditure	Engel's coefficient
Andhra Pradesh	23,256	33,861	68.7
Karnataka	17,265	21,785	79.3
Kerala	67,130	137,000	49.0
Tamil Nadu	5,715	13,776	41.5
Average	28,342	51,601	54.9

Comparative Socioeconomic Assessment

The socioeconomic status of the fisherwomen's households was compared; parameters used include literacy level of the respondent's household, housing pattern, electrical facilities, per capita household income and Engel's coefficient.

Table 13. Comparative socioeconomic status of the fisherwomen households in the selected states (ranks).

Sl. no.	State	Literacy level	Housing pattern	Electricity facilities	Per capita household income	Engel's Co-efficient	Total of ranks	Grading of overall ranks
1	Andhra Pradesh	IV	II	II	I	III	12	II
2	Karnataka	III	I	III	III	IV	14	IV
3	Kerala	II	III	IV	II	II	13	III
4	Tamil Nadu	I	IV	I	IV	I	11	I

None of the states have maintained a consistency in the rankings of the selected parameters (Table 13). It is very difficult to rank the socioeconomic status of the four states. If the percentage of the ranks scored by the states was used for ranking, Tamil Nadu came first in 3 out of 5 parameters (60%), thus topping the list. If Engel's coefficient was used as an indicator, Tamil Nadu also ranked first since only 41.5% of income was spent on food and the rest was for other uses.

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