

# Under Nutrition among Reproductive Age Women: A Persistent Public Health Problem in a North-Eastern State of India

## Research Article

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### Abstract

**Background:** Though overweight and obesity is a major problem in western countries, under-nutrition is still a big threat to women in developing countries like India.

**Objectives:** 1. To study the prevalence of underweight among reproductive age women in Tripura. 2. To assess the socio-demographic factors affecting underweight among the study population.

**Materials and Method:** This cross-sectional study was conducted in Tripura among 2000 women of reproductive age group selected by Cluster Sampling Method using PPS (Probability Proportionate to size) technique.

**Results:** The study revealed that 28.10% of the reproductive age women were underweight. Regarding the factors associated with under-nutrition, Multiple logistic regression analysis showed that women who were between 15-29 years of age were significantly more underweight compared to women between 45 to 49 years of age. Again those women who belonged to scheduled tribe had 32% less chance [OR-0.68 (0.51-0.91)] of having underweight and it was statistically significant (p value-0.01). Again women who belonged to nuclear family had 22% less chance [OR-0.78 (0.63-0.98)] of having underweight compared to women who belonged to joint families.

**Conclusion:** Effective policies, information and health with a special focus on women belonging to young age and joint families. education programs with nutritional support for women are required to reduce the high burden of underweight among the reproductive age women in the state.

**Keywords:** BMI; Underweight; Reproductive age women; Tripura

## Background

Malnutrition is a public health problem worldwide. Nutritional status of a nation is closely related to the level of poverty, status of women, rate of population growth, and access to health education, safe drinking water, environmental sanitation, hygiene and other

social services. As overweight and obesity is a major problem in western countries, under-nutrition is still a big threat to women in developing countries like India.

As per NFHS -3 report 33% of Indian women between 15 to 49 yrs were underweight (with a BMI of <18.5) [1] whereas 35.10% of

reproductive age women in Tripura were underweight [2]. But no studies have been conducted thereafter to assess and compare the current status of under-nutrition among reproductive age women of Tripura with the NFHS data. Hence, the present study was conducted to study the prevalence of underweight among reproductive age women in Tripura and to assess the socio-demographic factors affecting underweight among the study population.

### Materials and Method

This community based cross-sectional study was conducted in the northeastern state Tripura among reproductive age women in between age of 15 to 49 years. The study area was 30 clusters selected by probability proportionate to size sampling method for all over the state, calculating cumulative population according to Gram Panchayet and Nagar Panchayet population.

Considering prevalence of under-nutrition among reproductive age women (age 15-49) to be 35.10 percent (p) [2], allowance of error of 10 percent of the under-nutrition, and the level of significance (or type 1 error) as 5 percent, the minimum required sample size for assessing the nutritional status was calculated to be 710, using the formulae,

$$\frac{Z^2_{\alpha/2}pq}{E^2}$$

But since, cluster sampling through PPS Technique was considered, to overcome design effect the sample size was multiplied with a design effect of 2. Hence, the minimum required sample size was calculated to be 1420. A 10 percent non response rate was considered and the sample was rounded to 2000. In the next stage approximately 66 number of eligible female in the age group of 15 to 49 years was selected by simple random sampling from each cluster.

The randomly selected women was interviewed in their home after taking written informed consent from them and information regarding Socio-demographic particulars, height & weight measurements, etc were taken.

The unit of analysis of this study i.e., the outcome variable is the 'underweight'. The 'underweight' status was measured from BMI with the BMI being calculated as follows:

$$\text{BMI} = \text{Weight in kg} / (\text{Height in meter})^2$$

Thus, the BMI was classified according to WHO (2000) [3]: Underweight = BMI < 18.5 kg/m<sup>2</sup>, Normal weight = BMI 18.5 to 24.9 kg/m<sup>2</sup>, Over weight = BMI 25.0 to 29.9 kg/m<sup>2</sup>, Obese = BMI ≥ 30.0 kg/m<sup>2</sup>.

### Results

The study revealed that majority of the study participants were between 20 to 29 year age group (41.50%) and were Hindu by religion (84.30%). Majority of the participants belonged to Scheduled Tribe (33.90%) and 92.50% participants were married. The study also showed that most of the participants were housewife (71.50%) with primary education (52.10%) and had a per capita monthly income of < Rs 2500 (86.40%) (Table 1).

**Table 1:** Socio-demographic profile of the study participants.

|                           |                      | Frequency | Percent |
|---------------------------|----------------------|-----------|---------|
| Age group in years        | 15 to 19 years       | 215       | 10.8    |
|                           | 20 to 24 years       | 415       | 20.8    |
|                           | 25 to 29 years       | 413       | 20.7    |
|                           | 30 to 34 years       | 260       | 13.0    |
|                           | 35 to 39 years       | 207       | 10.4    |
|                           | 40 to 44 years       | 158       | 7.9     |
|                           | 45 to 49 years       | 332       | 16.6    |
| Religion                  | Hindu                | 1686      | 84.3    |
|                           | Muslim               | 206       | 10.3    |
|                           | Christian            | 90        | 4.5     |
|                           | Buddhist             | 18        | .9      |
| Caste                     | General              | 474       | 23.7    |
|                           | Scheduled Caste      | 357       | 17.9    |
|                           | Scheduled Tribe      | 678       | 33.9    |
|                           | Other Backward Class | 491       | 24.6    |
| Marital status            | Married              | 1851      | 92.5    |
|                           | Unmarried            | 149       | 7.5     |
| Education                 | Illiterate           | 257       | 12.9    |
|                           | Primary              | 1041      | 52.1    |
|                           | Secondary            | 650       | 32.5    |
|                           | Graduate & Above     | 52        | 2.6     |
| Occupation                | Govt. Service        | 198       | 9.9     |
|                           | Business             | 13        | .7      |
|                           | Skilled Labour       | 61        | 3.1     |
|                           | Unskilled Labour     | 194       | 9.7     |
|                           | Housewife            | 1430      | 71.5    |
|                           | Student              | 104       | 5.2     |
| Per capita monthly Income | 80-2499              | 1727      | 86.4    |
|                           | 2500-4999            | 224       | 11.2    |
|                           | 5000-7499            | 32        | 1.6     |
|                           | 7500-9999            | 6         | .3      |
|                           | 10000-30000          | 11        | .6      |

**Table 2:** Distribution of study participants according to the BMI.

|             | Frequency | Percent |
|-------------|-----------|---------|
| <18.50      | 561       | 28.1    |
| 18.5- 24.99 | 1202      | 60.1    |
| 25-29.99    | 215       | 10.8    |
| ≥ 30        | 22        | 1.1     |
| Total       | 2000      | 100.0   |

The study revealed that 28.10% of the reproductive age women had a BMI of <18.50 i.e. they were underweight, whereas 10.80% were overweight and 1.10% of the participants were obese (Table 2).

Table 3 shows that majority of the underweight women were below 30 years of age and statistical analysis using chi-square test showed that age of the participants were significantly associated with nutritional status (p value-0.00). Beside the study also showed that the religion (p value-0.02), community (p value- 0.00), occupation (p value-0.00) and income of the participants (p value-0.00) were also significantly associated with the nutritional status. Again table 3 also showed that the marital status and type of family were also

**Table 3:** Socio-demographic factors affecting treatment adherence.

|                                 |                      | BMI          |               | X <sup>2</sup> value | df | P value |
|---------------------------------|----------------------|--------------|---------------|----------------------|----|---------|
|                                 |                      | <18.5        | ≥18.5         |                      |    |         |
| Age Group                       | 15 to 19 years       | 89 (16.00%)  | 126 (8.80%)   | 42.59                | 6  | .000    |
|                                 | 20 to 24 years       | 136 (24.50%) | 276 (19.20%)  |                      |    |         |
|                                 | 25 to 29 years       | 118 (21.30%) | 292 (20.30%)  |                      |    |         |
|                                 | 30 to 34 years       | 53 (9.50%)   | 207 (14.40%)  |                      |    |         |
|                                 | 35 to 39 years       | 51 (9.20%)   | 156 (10.80%)  |                      |    |         |
|                                 | 40 to 44 years       | 39 (7.00%)   | 119 (8.30%)   |                      |    |         |
|                                 | 45 to 49 years       | 69 (12.40%)  | 263 (18.30%)  |                      |    |         |
| Religion                        | Hindu                | 470 (84.70%) | 1211 (84.20%) | 9.45                 | 3  | .024    |
|                                 | Muslim               | 67 (12.10%)  | 138 (9.60%)   |                      |    |         |
|                                 | Christian            | 16 (2.90%)   | 74 (5.10%)    |                      |    |         |
|                                 | Buddhist             | 2 (0.40%)    | 16 (1.10%)    |                      |    |         |
| Community                       | General              | 126 (22.70%) | 346 (24.00%)  | 16.877               | 3  | .001    |
|                                 | Scheduled Caste      | 115 (20.70%) | 241 (16.70%)  |                      |    |         |
|                                 | Scheduled Tribe      | 155 (27.90%) | 520 (36.10%)  |                      |    |         |
|                                 | Other Backward Class | 159 (28.60%) | 332 (23.10%)  |                      |    |         |
| Education of the respondent     | Illiterate           | 69 (12.40%)  | 187 (13.00%)  | 4.09                 | 3  | .251    |
|                                 | Primary              | 307 (55.30%) | 730 (50.70%)  |                      |    |         |
|                                 | Secondary            | 168 (30.30%) | 481 (33.40%)  |                      |    |         |
|                                 | Graduate & Above     | 11 (2.00%)   | 41 (2.80%)    |                      |    |         |
| Occupation                      | Government Service   | 26 (4.70%)   | 172 (12.00%)  | 42.07                | 4  | .000    |
|                                 | Business             | 5 (0.90%)    | 8 (0.60%)     |                      |    |         |
|                                 | Labor                | 67 (12.10%)  | 188 (13.10%)  |                      |    |         |
|                                 | Housewife            | 408 (73.50%) | 1016 (70.60%) |                      |    |         |
|                                 | Student              | 49 (8.80%)   | 55 (3.80%)    |                      |    |         |
| Per capita income of the family | <2500                | 502 (90.50%) | 1220 (84.80%) | 12.49                | 3  | .006    |
|                                 | 2500 to 4999         | 47 (8.50%)   | 176 (12.20%)  |                      |    |         |
|                                 | 5000 to 7499         | 4 (0.70%)    | 28 (1.90%)    |                      |    |         |
|                                 | ≥7500                | 2 (0.40%)    | 15 (1.00%)    |                      |    |         |
| Marital Status                  | Married              | 495 (89.20%) | 1350 (93.80%) | 12.39                | 1  | .000    |
|                                 | Unmarried            | 60 (10.80%)  | 89 (6.20%)    |                      |    |         |
| Type of family                  | Nuclear              | 372 (67.00%) | 1078 (74.90%) | 12.55                | 1  | 0.000   |
|                                 | Joint                | 183 (33.00%) | 361 (25.10%)  |                      |    |         |

significantly associated with the nutritional status of reproductive age women.

Factors which were found to be significantly associated with underweight; using bivariate analysis in table 3 were used as independent variables in Multiple logistic regression analysis in Table 4. The study revealed that women who were between 15-19 years of age were 1.95 times (1.24-3.05) more underweight compared to 45 to 49 year aged women. Similarly women who were between 20 to 24 year age, and 25 to 29 year of age were 1.79 times (1.26-2.53) and 1.60 times (1.13-2.26) more underweight compared to 45 to 49 year aged

women. Again those women who belonged to scheduled tribe had 32% less chance [OR-0.68 (0.51-0.91)] of having underweight and it was statistically significant (p value-0.01). The study also revealed that women who were at government service had 86% less chance [OR-0.24 (0.10-0.56), p value- 0.00] of having underweight and women who were skilled labor they had 71% less chance [OR-0.29 (0.11-0.77), p value- 0.01] of having underweight compared to students. Again women who belonged to nuclear family had 22% less chance [OR-0.78 (0.63-0.98), p value- 0.03] of having underweight compared to women who belonged to joint families.

**Table 4:** Multiple logistic regression analysis showing factors affecting underweight among reproductive age women.

| BMI(a)                    |                      | Sig. | Odds ratio | 95% Confidence Interval for OR |       |
|---------------------------|----------------------|------|------------|--------------------------------|-------|
| Age Group                 | 15 to 19 years       | 0.00 | 1.95       | 1.24                           | 3.05  |
|                           | 20 to 24 years       | 0.00 | 1.79       | 1.26                           | 2.53  |
|                           | 25 to 29 years       | 0.00 | 1.60       | 1.13                           | 2.26  |
|                           | 30 to 34 years       | 0.82 | 1.04       | 0.69                           | 1.57  |
|                           | 35 to 39 years       | 0.12 | 1.39       | 0.91                           | 2.12  |
|                           | 40 to 44 years       | 0.12 | 1.44       | 0.91                           | 2.28  |
|                           | 45 to 49 years       | .    | 1          | .                              | .     |
| Religion                  | Hindu                | 0.22 | 2.54       | 0.57                           | 11.32 |
|                           | Muslim               | 0.16 | 2.93       | 0.63                           | 13.55 |
|                           | Christian            | 0.46 | 1.81       | 0.37                           | 8.78  |
|                           | Buddhist             | .    | 1          | .                              | .     |
| Caste                     | General              | 0.20 | 0.83       | 0.62                           | 1.11  |
|                           | Scheduled Caste      | 0.83 | 1.03       | 0.76                           | 1.40  |
|                           | Scheduled Tribe      | 0.01 | 0.68       | 0.51                           | 0.91  |
|                           | Other Backward Class | .    | 1          | .                              | .     |
| Occupation                | Govt. Service        | 0.00 | 0.24       | 0.10                           | 0.56  |
|                           | Business             | 0.94 | 1.05       | 0.26                           | 4.12  |
|                           | Skilled Labor        | 0.01 | 0.29       | 0.11                           | 0.77  |
|                           | Unskilled Labor      | 0.25 | 0.65       | 0.31                           | 1.36  |
|                           | Housewife            | 0.11 | 0.55       | 0.26                           | 1.15  |
|                           | Student              | .    | 1          | .                              | .     |
| Per capita monthly Income | 80-2499              | 0.25 | 2.41       | 0.53                           | 10.89 |
|                           | 2500-4999            | 0.56 | 1.56       | 0.33                           | 7.31  |
|                           | 5000-7499            | 0.92 | 0.91       | 0.14                           | 5.81  |
|                           | 7500-9999            | .    | 1          | .                              | .     |
| Marital Status            | Married              | 0.68 | 1.15       | 0.59                           | 2.23  |
|                           | Unmarried            | .    | 1          | .                              | .     |
| Type of family            | Nuclear              | 0.03 | 0.78       | 0.63                           | 0.98  |
|                           | Joint                | .    | 1          | .                              | .     |

## Discussion

The present study conducted among 2000 reproductive age women of Tripura selected through cluster sampling by PPS technique revealed that the prevalence of underweight among the study population was 28.10%. This finding was lower than the NFHS 3 report of India [1] in 2005-06 where 33% of the reproductive age women had Body Mass Index below normal. This finding was also lower than what was found in Tripura in the NFHS 3 report [2] in 2005-06 where 35.10% of the reproductive age women had Body Mass Index below normal. Hence, it is evident that there has been an improvement of the nutritional status of reproductive age women in Tripura.

However, the study finding is same to a study conducted in Bangladesh by Mostafa Kamal et al. [4] where 28.50% of the reproductive age women were underweight. The study finding was

also similar to a study conducted in Kerala [5] where 18.90 % of the women were underweight, 60.30% women had normal BMI and 20.90% women were overweight. Similar finding was obtained from a survey in Japan done in 2007 [6] where 25.20% of the women were underweight.

But the prevalence of underweight in the present study was very high compared to the developed countries like United States [7] and Europe [8] where the prevalence of underweight was among women 7.50% and 17.50% respectively.

The present study revealed that women who were between 15 to 29 years of age were significantly more underweight compared to women between 45 to 49 years of age. Similar finding was obtained from a study conducted by Mostafa Kamal et al. [4] in Bangladesh, where women bellow 20 years of age were 1.52 times (95% C.I.- 1.24-1.85) more underweight compared to women between 45 to 49

year age group. Again the same study showed that women between 20 to 24 years of age were 1.23 times (95% C.I.-1.02-1.47) more underweight compared to women between 45 to 49 years. Similar finding was obtained from a study conducted in Kerala [5] where women between 35 to 49 years had 50.80% less chance of having underweight compared to women between 15 to 24 years of age (p value <0.001). Thus the present study also showed that 15 to 29 year age group is the most vulnerable period for underweight for the women in reproductive age group which could be due to early marriages and too close pregnancies among them.

The present study revealed that tribal women had less chance [OR-0.68 (0.51-0.91)] of having underweight and it shows that activities focused to improve their nutritional status in the state have been quite successful.

The present study did not show any association between the nutritional status of the women and their education. But a study conducted in Allahabad by Shankar H. et al. [9] showed significant association between education and underweight among women. Similarly a study conducted by Mostafa Kamal et al. [4] in Bangladesh showed that underweight was 6.76 times (95% C.I. - 5.20-8.80) more prevalent among women with no formal education. This study might have failed to show any association due to the fact that the literacy rate of the state is very high [10].

Women who were underweight had significantly higher odds ratios for overtime work in Scania by Sadiq Mohammad Ali et al. [8]. Similar finding was obtained in a study conducted by Mostafa Kamal et al. [4] in Bangladesh where working women were 1.11 times more underweight and it was statistically significant (p value <0.05). But the present study revealed that women who were at government service had 86% less chance of having underweight and women who were skilled labor had 71% less chance of having underweight which is a different finding compared to studies conducted in different parts of the world.

Again in the present study women who belonged to nuclear family had 22% less chance of having underweight compared to women who

belonged to joint families. This shows that women from joint families suffer more from under-nutrition in the state.

Thus the present study revealed that over one-fourth of the women in the state suffer from underweight, which has a grave public health implication. Young aged women and women belonging to joint family were found to be more underweight. Hence, more systematic monitoring and surveillance of the nutritional status is important to address the widespread problem of underweight among them. Effective policies, information and health education programs with nutritional support for women are required to ensure adequate access to health services and to reduce the high burden of underweight among the reproductive age women.

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