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Indian Journal of Forensic and Community Medicine

Journal homepage: <https://www.ijfcm.org/>

## Original Research Article

# Bio-Social correlates of nutritional status among the Bengali Muslim and the Meitei Women of Cachar district of Assam, India

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## ARTICLE INFO

## Article history:

Received 02-12-2023

Accepted 13-12-2023

Available online 04-01-2024

## Keywords:

Adults

Bengali muslim

Meitei

Women

Age group

Income category

## ABSTRACT

**Background:** Nutritional status based on BMI is not only influenced by biological factors but also affected by demographic, economic, socio-cultural and environmental conditions of a population.

**Aims and Objective:** The present paper intends to study the nutritional status with reference to age and family income among the Bengali Muslim and Meitei Women of Cachar District, Assam.

**Material and Methods:** The data have been collected by household census method and nutritional anthropometry among 172 Bengali Muslim and 181 Meitei women of 20 to 64 years age.

**Results:** The study reveals that 40.1% of Bengali Muslim and 30.4% of Meitei women are suffering from CED malnutrition while very few women are found to be overweight or obese in both the communities. Chi-square test doesn't show any significant ( $p < 0.195$ ) difference in nutritional status between the two communities. More than 50% of Bengali Muslim women who belong to higher age group (50+) are found to be suffering from CED malnutrition while frequency of CED malnutrition is high among the middle aged Meitei women. CED malnutrition is found to be more among the Bengali Muslim women of lowest family income category but it is high among the Meitei women who belong to middle income group. Although slight negative correlation exists between BMI and age of the Bengali Muslim women but opposite picture is observed among the Meitei women. BMI of both Bengali Muslim ( $r_{xy} = 0.209$ ,  $p < 0.01$ ) and Meitei women ( $r_{xy} = 0.165$ ,  $p < 0.05$ ) demonstrate significant positive correlation with annual family income.

**Conclusion:** The study indicates the affect of family income in nutritional status. However, further studies are required considering other correlated bio-social factors to get deep insight knowledge on it.

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## 1. Introduction

The body mass index (BMI) is a simple numeric measure to assess fatness or thinness of an individual by comparing an individual's weight and height. It is the most established anthropometric indicator used not only for assessment of adult nutritional status but also the socio-economic situation of a population, especially adult populations in developing

country like India.<sup>1,2</sup> Nutritional status based on BMI is also related to demographic, economic, social and environmental conditions of the population.<sup>3,4</sup>

India is one of the few countries in the world where males and females have nearly the same life expectancy at birth.<sup>5</sup> The distinctive female advantage in life expectancy is not observed in India which advocates that there are organized problems with women's health. The health of Indian female is basically linked to their status in society as most of the Indian communities follow patrilineal social structure which bears strong influence on gender differences. Studies

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revealed that CED malnutrition based on BMI reduces physical capacity, increases mortality and morbidity.<sup>1,6,7</sup> But the prevalence of different grades of nutritional status varies from one population to other.

Geographically Cachar district is located in the southernmost part of Assam. It lies between 90°4'E and 93°15'E latitude and 24°22'N and 25°8'N longitude and covers an area of 3786 sq.km. Cachar district is considered as a plain district but a number of hills spread across and surrounding the district. It is one of the most economically backward districts of India which is largely due to geographical barrier with the rest of the country. The district has a population of 1,736,319 with a sex ratio of 958 females per 1000 males and a literacy rate of 80.36%.<sup>8</sup>

The people inhabiting in the district are primarily known as Sylheti Bengali (Bengali people who speak in sylheti, a Bengali dialect). Besides, there are different endogamous ethnic communities also inhabiting in the district such as Bengali, Meitei, Brishnupriya, Dimasa Kachari, Hmar, Khasi, etc. Linguistically the Bengali Muslims belong to the Indo-Aryan ethnic group of Caucasoid racial stock but Meiteis belong to the Tibeto-Burman ethnic group of Mongoloid racial stock.<sup>9</sup> Bengali Muslims follow Islam but Meiteis follow Hinduism. Rice is their staple food and agriculture is their mainstay of livelihood. Their family structure is patrilineal in nature and marriage by negotiation is the prevailing practice among them. Present study attempts to know the influence of age and family income on the nutritional status of Bengali Muslim and Meitei women of Cachar District of Assam.

The main objectives of the present research are

1. To assess the nutritional status based on BMI among the Bengali Muslim and Meitei women.
2. To compare the prevalence of Chronic Energy Deficiency (CED) malnutrition between Bengali Muslim and Meitei women.
3. To see the community wise distribution of nutritional status (especially CED) with reference to age and family income.

## 2. Materials and Methods

The data have been collected by household census method and nutritional anthropometry among 172 Bengali Muslim and 181 Meitei women of 20 to 64 years age of Bhaurikandi Part-II, Ganganagar Part-IV, Dakshin Mohanpur Part-V, Sundari Part-IV and Saint Katherine village of Cachar District, Assam. Out of these villages first two are inhabited by Muslim population while the last three are inhabited by Meitei Population. Socio-economic data have been collected by household census method from 176 Bengali Muslim households and 159 Meitei households. Socio-economic data include the relevant information such as sex, age, education, occupation, income, expenditure, household

assets, cultivable land, crops and vegetable cultivations, etc.

Anthropometric measurements such as weight and height have been taken by using standard techniques.<sup>10</sup> Height and weight have been recorded to the nearest 0.1 cm and 0.5 kg using standard anthropometer and weighing scale respectively. The sample is free from any selection bias. All the available willing individuals who fall within the age group 20-64 years were included in the study. Pregnant women were excluded from the study. Assessment of nutritional status has been done by following James et al. classification.<sup>11</sup> Nutritional status has also been assessed by following WHO classification to compare the present data with earlier findings of NFHS-3 data.<sup>12</sup> All Statistical Analysis have been carried out by using the Statistical Package for Social Science (SPSS) 16.0 version. Chi-square test has been applied and a p value of <0.05 was considered as significant. Pearson's correlation coefficient was performed to see the association of weight, height and BMI with age (year) and family income (INR).

## 3. Results and Discussion

The study reveals that more than 40 percent of Bengali Muslim women (Tables 2 and 3) are having chronic energy deficiency (CED) malnutrition while 30.4% of Meitei women are suffering from CED malnutrition. On the other hand low normal, normal and overweight women are more among the Meiteis compared to Bengali Muslims. While only two Meitei women are found to be obese (1.1%).

In a developing country like India generally a male enjoys better socio-economic status compared to a female. In an earlier research it was expressed that females were more likely to have musculoskeletal problems than males, which perhaps reflect harder life faced by females who never retire from household work unless totally disabled.<sup>13</sup> According to the local people Meiteis are supposed to have better nutritional status compared to Bengali Muslims as they are living in a relatively better socio-economic condition (Table 1). The findings of the present study indicate community differences on nutritional status. Statistically no significant difference (p=0.195) is observed between Bengali Muslim and Meitei women in regard to their nutritional status.

The course of human life is influenced by several factors like biological, cultural and psychological factors. Health is one of the principal assets of every human being and it has a very close association with chronological age.<sup>14</sup> An individual become more vulnerable to multiple diseases with the advancement of age and the affect of which reflects in health status. Age is categorized into three groups such as 20-34, 35-49 and 50-64 years age group. Thereafter, these three groups will be referred to as young aged, middle-aged and old aged respectively to observe the nutritional status with reference to age (Table 4).

**Table 1:** Socio-economic background of the Bengali Muslim and Meitei women

<b>Age Group of the Women</b>				
	20-34 Years	35-49 Years	50-64 Years	
Bengali Muslim	92 (53.5)	53 (30.8)	27 (15.7)	
Meitei	69 (38.1)	61 (33.7)	51 (28.2)	
<b>Educational Status of the Women</b>				
	Illiterate	Literate to Primary Level	Middle to High School	Above Matriculation
Bengali Muslim	58 (33.7)	41 (23.8)	64 (37.2)	9 (5.2)
Meitei	16 (8.8)	41 (14.4)	104 (57.5)	35 (19.3)
<b>Occupational Status of the Women</b>				
	Household Activities	Casual Worker	Service (Govt.)	
Bengali Muslim	164 (95.3)	4 (2.3)	4 (2.3)	
Meitei	170 (93.9)	3 (1.7)	8 (4.4)	
<b>Family Income (Annual)</b>				
	Upto 1 Lac	1 to 2 Lacs	More than 2 Lacs 1,80,999	
Bengali Muslim	111 (64.5)	46 (26.7)	15 (8.7)	
Meitei	70 (38.7)	37 (20.4)	74 (40.9)	

In parentheses the figure shows percentage

**Table 2:** Nutritional status among the Bengali Muslim and Meitei women

<b>Community</b>		<b>CED</b> (BMI: <18.5)	<b>Low Normal</b> (BMI: 18.5-19.9)	<b>Normal</b> (BMI: 20.0-24.9)	<b>Over Weight &amp; Obesity</b> (BMI: ≥ 25.0)	<b>Chi-Square</b>
Bengali Muslim	No.	69	42	57	4	$\chi^2$ -5.294 d.f.-3 p-0.195
	%	<b>40.1</b>	<b>24.4</b>	<b>33.1</b>	<b>2.3</b>	
Meitei	No.	55	48	68	10	
	%	<b>30.4</b>	<b>26.5</b>	<b>37.6</b>	<b>5.5</b>	
Total	No.	124	90	125	12	
	%	<b>35.1</b>	<b>25.5</b>	<b>35.4</b>	<b>3.4</b>	

**Table 3:** Prevalence of CED among the Bengali Muslim and Meitei women

<b>Community</b>		<b>CED</b> (BMI: <18.5)	<b>Non CED</b> (BMI: ≥18.5)	<b>Total</b>	<b>Chi Square</b>
Bengali Muslim	No.	69	103	172	$\chi^2$ -3.664, df-1, p-0.059
	%	<b>40.1</b>	<b>59.9</b>	<b>100.0</b>	
Meitei	No.	55	126	181	
	%	<b>30.4</b>	<b>69.6</b>	<b>100.0</b>	
Total	No.	124	229	353	
	%	<b>35.1</b>	<b>64.9</b>	<b>100.0</b>	

It is observed from the study that CED malnutrition is very high (51.9%) among the Bengali Muslim women of old aged group in comparison to young and middle-aged women. It is observed that Bengali Muslim women of middle-aged group enjoy better nutritional status (low normal-26.4% and normal-39.6%). But a small proportion of middle aged Bengali Muslim women are found to be overweight (3.8%). Earlier findings also mentioned about high prevalence (40.86%) of CED malnutrition among the Dimasa women living in the same environment.<sup>15</sup>

On the other hand, young aged Meitei women show healthier nutritional status (low normal-33.3% as well as normal-40.6%) compared to middle and old aged group. Although overweight status is prevalent among the middle and old aged Meitei women but two women are found to be obese in young aged group. Middle aged Meiteis are more prone to CED malnutrition (37.7%) in comparison to other two age groups. Chi square test doesn't show any statistical significant difference (chi square) on the prevalence of CED malnutrition among the three age groups of both Bengali

**Table 4:** Prevalence of CED on the basis of age group among the Bengali Muslim and Meitei women

Age Group in years)	Bengali Muslim		Meitei		Chi Square (Between Community)
	CED (BMI: <18.5)	Non CED (BMI: ≥18.5)	CED (BMI: <18.5)	Non CED (BMI: ≥18.5)	
20-34	No. 39	53	16	53	$\chi^2$ -6.464, df-1, p-0.012
	% 42.4	57.6	23.2	76.8	
35-49	No. 16	37	23	38	$\chi^2$ -0.712, df-1, p-0.434
	% 30.2	69.8	37.7	62.3	
50-64	No. 14	13	16	35	$\chi^2$ -3.128, df-1, p-0.091
	% 51.9	48.1	31.4	68.6	
Chi Square (Within Community)	$\chi^2$ -3.920, d.f.-2, p-0.141		$\chi^2$ -3.258, d.f.-2, p-0.196		

Muslim and Meitei women. But the occurrence of CED malnutrition shows significant difference (p-0.012) between the two communities in young aged group.

Occupation of an individual is greatly influenced by his or her educational status which in turn made an impact on his or her income in specific and overall family income in general. Nutritional status of the individuals has been studied against family income by dividing the yearly family income into three categories such as upto 1 lac, 1 lac to 2 lacs and more than 2 lacs (Table 5). Thereafter, these three categories will be referred to as low, medium and high income group.

CED malnutrition is found to be very less among the Bengali Muslim (26.7%) and Meitei (23.0%) women whose family income is more than 2 lacs (annual) in contrast to other two income groups. Frequency of normal nutritional status is found to be very high among the women of both the communities (Muslim-40.0% and Meitei-44.6%) who belong to high income group. So, the result indicates that individuals whose family income is high enjoy better nutritional status. Chi-square tests do not provide any statistical significant difference among the three income groups of both the communities. Earlier study indicated that some important aspects of living circumstances such as food, shelter, health, etc. matters much more than the conventional income.<sup>16</sup>

A negligible positive association (Pearson's correlation coefficient) is observed between BMI and age of the Bengali Muslim women ( $r_{xy}=-0.042$ ) but it has significant positive correlation with annual family income ( $r_{xy}=0.209$ ,  $p<0.01$ ). Earlier findings pointed out a negative association between age and BMI of adults.<sup>17</sup> Same correlation coefficient (Table 6) among the Meitei women indicates that BMI has very low positive association with age ( $r_{xy}=0.080$ ) and but significant positive correlation exist between BMI and yearly family income ( $r_{xy}=0.165$ ,  $p<0.05$ ). A sizeable number of middle aged Meiteis (especially 50-59 age groups) live in relatively better socio-economic condition due to which a positive relation may be observed between age and BMI of the present study. Some of

the earlier researchers mentioned that women malnutrition is associated with different bio-social factors like age, occupation, education, standard of living, etc.<sup>18-20</sup>

National Family Health Survey-3 data (NFHS-3 during the year 2005-06) of state of Assam showed that the frequency of underweight, normal, overweight and obese women are 34.4%, 56.0%, 8.3% and 1.3% respectively.<sup>21</sup> Normal nutritional status is found to be very high (69.6%) in the North-East zone (Table 7) against country's (55.8%) scenario. Underweight (19.7%), overweight (9.2%) and obese individuals (1.5%) are found to be very less in the north east zone in comparison to overall picture of the country (29.0%, 11.7%, and 3.5% respectively).

North-east zone consists of 8 (eight) different states such as Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura. But apart from Assam and Tripura numerically dominant inhabitants of other six states are tribal population. Comparison of nutritional status of the Meitei women of the present study indicates that it is worse than North East zone scenario but better than state and country picture (Table 7). Although same trend is also visible among the Bengali Muslim women but the prevalence of underweight is found to be very high among them. So, the result may be an indication of the role genetics as well as other socio-environmental factors on the nutritional status which were not considered in the present study.

#### 4. Conclusion

The present study reveals that Meitei women are enjoying better nutritional status in contrast to Bengali Muslim women. Frequency of CED malnutrition is found to be high among the old aged Bengali Muslim women. But the frequency of normal nutritional status is high among the middle aged Bengali Muslim women due to which a negligible negative correlation between BMI and age. Although young aged Meitei women enjoy healthier nutritional status but the prevalence of CED malnutrition is comparatively high among the middle aged Meiteis resulting very low positive association between age and

**Table 5:** Prevalence of CED on the basis of Annual Family Income (category) among the Bengali Muslim and Meitei women

Annual Family Income (INR)		Bengali Muslim		Meitei		Chi Square (Between Community)
		CED (BMI: <18.5)	Non CED (BMI: ≥18.5)	CED (BMI: <18.5)	Non CED (BMI: ≥18.5)	
Upto 1 Lac	No.	51	60	23	47	$\chi^2$ -3.043, df-1, p-0.081
	%	<b>45.9</b>	<b>54.1</b>	<b>32.9</b>	<b>67.1</b>	
1 to 2 Lacs	No.	14	32	15	22	$\chi^2$ -0.921, df-1, p-0.363
	%	<b>30.4</b>	<b>69.6</b>	<b>40.5</b>	<b>59.5</b>	
More than 2 Lacs	No.	4	11	17	57	$\chi^2$ -3.094, df-1, p-0.746
	%	<b>26.7</b>	<b>73.3</b>	<b>23.0</b>	<b>77.0</b>	
Chi Square Community)	(Within Community)	$\chi^2$ -4.495, d.f.-2, p-0.106		$\chi^2$ -3.928, d.f.-2, p-0.140		

**Table 6:** Pearson's correlation coefficient between BMI and age and family income

Pearson's Correlation Coefficient	Age	Family Income	Weight	Height	BMI
Bengali Muslim (No. of Individuals-172)					
Age (in Years)	1	-0.052	-0.097	-0.178*	-0.042
Yearly Family Income (in INR)	-0.052	1	0.205**	0.081	0.209**
Weight (in Kg)	-0.097	0.205**	1	0.574**	0.931**
Height (in cm)	-0.178*	0.081	0.574**	1	0.238**
BMI (in Kg/m2)	-0.042	0.209**	0.931**	0.238**	1
Meitei (No. of Individuals-181)					
Age (in Years)	1	-0.040	-0.048	-0.275**	0.080
Yearly Family Income (in INR)	-0.040	1	0.190*	0.063	0.165*
Weight (in Kg)	-0.048	0.190*	1	0.336**	0.880**
Height (in cm)	-0.275**	0.063	0.336**	1	-0.147*
BMI (in Kg/m2)	0.080	0.165*	0.880**	-0.147*	1

\*- Correlation is significant at the 0.05 level.

\*\* - Correlation is significant at the 0.01 level (2-tailed).

**Table 7:** Comparison of nutritional status of Bengali Muslim and Meitei women with state, zone and country data

Nutritional status based on BMI among the adult women					
Area	Underweight <18.50	Normal 18.50-24.99	Over weight 25.0-29.99	Obese ≥30.00	Reference
Bengali Muslim, District1	40.1	57.5	2.3	-	Present Study
Meitei, District1	30.4	64.1	4.4	1.1	
Assam, State	34.4	56.0	8.3	1.3	(Shome et al., 2011)
North-East, Zone	19.7	69.6	9.2	1.5	
India, Country	29.0	55.8	11.7	3.5	

<sup>1</sup>Adult Meiteis of 5 villages of Cachar District of Assam, India

BMI. Prevalence of CED malnutrition is found to be very less among the Bengali Muslim and Meitei women of high family income group. Family income shows a significant positive correlation with BMI in both the communities and so better (normal) nutritional status is observed among the women of high family income group. Further studies are required to get deep insight knowledge as present study is an attempt to get base line information on adult nutritional status of the Bengali Muslim and Meitei community living in five villages of that particular area.

## 5. Source of Funding

None.

## 6. Conflict of Interest

Authors declare no conflict of interest.

## Acknowledgements


Authors are grateful to Dr. Rekha Das, Former Professor and Head, Department of Anthropology, Gauhati University for her kind and able guidance while conducting the field study and preparing the manuscript. Authors are also thankful

to the people of all the studied villages for their kind co-operation and help while conducting the field work. Authors are thankful to Mr. Jaidul Alom Barbhuiya of Bhaurikandi Part-II village as well as Mr. Nilomoni Singha of Dakshin Mohanpur Part-V village for their kind co-operation and help while conducting the field work.

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**Cite this article:** Barbhuiya AFGI, Parveen N, Barbhuiya S. Bio-Social correlates of nutritional status among the Bengali Muslim and the Meitei Women of Cachar district of Assam, India. *Indian J Forensic Community Med* 2023;10(4):152-157.