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RESEARCH ARTICLE

IS CHRONIC ENERGY DEFICIENCY A HEALTH PROBLEM AMONG WOMEN IN EAG STATES?

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ABSTRACT

Malnutrition not only blights the lives of individuals and families, but also acts as a major barrier to social and economic progress In India, particularly in the Empowered Action Group (EAG) States. Under this backdrop, this study aims to assess the degree of chronic energy deficiency and its determinants. Data drawn from the National Family Health Survey-III, conducted 2005-06, on body mass index of 26,728 currently married women, ages 15-49 years. Jharkhand, Bihar and Chhattisgarh reported significantly higher profession of chronic energy deficiency than the rest of the EAG states (around 40percent each). Socio-economic and demographic bi-variate analysis shows that low-BMI (<18.50) women are found in higher proportion among families with poorest wealth index (50.2percent), ST women (49.2percent), women working in agricultural sector (42.5percent), rural areas (40.8percent), illiterate groups (41.percent), and women who ate fruits, and milk occasionally or never (around 40percent each). In addition, the data discloses state differentials Jharkhand show the highest incidence rate of underweight (39.7 percent) and the Uttaranchal recorded the lowest incidence of CED (25.5 percent). The burden of chronic energy deficiency indicates that there is a need for special public health programs that are able to address chronic energy deficiency.

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INTRODUCTION

Malnutrition worldwide includes a spectrum of nutrient–related disorders, deficiencies, and conditions such as intrauterine growth retardation, protein-energy malnutrition, iodine deficiency disorders, vitamin A deficiency, and iron-deficiency anemia, (Ratzan *et al*., 2000). In recent year, dramatic progress has been made globally in tackling malnutrition, however, around 800 million people are chronically malnourished, and more than a billion are sick or disabled because of nutrient deficiencies in the world. Specifically malnutrition poses a variety of threats to women. It weakens women's ability to survive childbirth, makes them more susceptible to infections, and leaves them with fewer reserves to recover from illness. In addition, malnutrition in women undermines their productivity, capacity to generate income, and ability to care for their families. Above all, the malnutrition leads to economic losses for families, communities, and countries. Moreover, women are more likely to suffer from nutritional deficiencies than men are, for reasons including women's reproductive biology, low social status, poverty, and lack of education. Socio-cultural traditions and disparities in household work patterns can also increase women's chances of being malnourished. It is difficult to determine exactly what proportion of those losses are due to maternal malnutrition, but recent research indicates that 60 percent of deaths of children under age 5 are associated with malnutrition - and children's malnutrition is strongly correlated with mothers' poor nutritional status (David L. Pelletier and Edward Frongillo, 2003). Although malnutrition's effects on this group have been recognized for decades, there has been little measurable progress in addressing the specific nutritional problems of women. Ignorance about the symptoms of malnutrition, such as the lethargy and depression caused by iron deficiency, may be dismissed as "normal" or unimportant, further exacerbating the problem (Rae Galloway, 2002). In India, volumes have been written about the nature and cause of adult and child malnutrition and the means of reducing it. But the role of women's chronic energy deficiency in children's nutritional status has gone largely unnoticed until recently. Under this backdrop, this paper made an attempt to investigate the malnutrition problem among mothers and children in EAG states. The main objectives of the study are

- To explore the nutritional status of women in the EAG states
- To investigate the determinants of Chronic Energy Deficiency (CED) and anemia (severe, mild and moderate) among EAG states women

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METHODS AND MATERIALS

The anthropometric data used for analysis in this paper are derived from the National Family Health Survey-III, a nationally represented large scale sample survey conducted in India during 2005-06 (NFHS-III). The study samples are drawn from the Empowered Action Group (EGA) states which comprise totally eight states, namely Uttaranchal, Rajasthan, Uttar Pradesh, Bihar, Jharkhand, Orissa, Chhattisgarh, and Madhya Pradesh. The study covered totally 26,728 married females considered for this study.

RESULTS AND DISCUSSION

Characteristics of currently married women in EAG states

The study covered totally 26728 currently married women in the EAG states of reproductive age group (15-49). With regard to age data, only 6 percent of the women fall in the adolescent married women in the study area, and the young women shared more than one-third of the total sample (20-24: 16.1 percent; 25-29: 19.5 percent). More than sixty percent of the women are residing at rural area (62.3 percent) and overwhelming majority of them are Hindus (85.7 percent).

With regard to the literacy status, more than half of the respondents are illiterate (54.1 percent) and only 7.6 percent completed their higher education. Majority of the women in the study area are fall in the not working category (56.8 percent) and around forty percent are working in agricultural sectors. More than two-fifth of the women in the EAG states are either poorest (23.6 percent) category or poorer category (19.2 percent) and about twenty-three percent fall in the richest group.

Table 1. Percentage distribution of women by their BMI status

Nutritional Grades	Women in 15-49	
	Total number	Percentage
Severe Thinness (less than16.00)	1531	5.7
Moderate Thinness (16.00-16.99)	2295	8.6
Mild Thinness (17.00-18.49)	5240	19.6
CED (<18.50)	9066	33.9
Low Normal (18.50-19.99)	5286	19.8
Well-Nourished (20.00-24.99)	8977	33.6
Normal (18.50-24.99)	14263	53.4
I- Degree Obesity (25.00-29.99)	2621	9.8
II- Degree Obesity (above 30.00)	778	2.9
Obesity (>25.00)	3399	12.7
Total	26728	100.0

Table 2. Percentage distribution of BMI status by EAG states

EAG States	BMI Status			Total number of mothers
	CED	Normal	Obesity	
Uttaranchal	25.5	58.2	16.4	1874
Rajasthan	32.4	56.4	11.1	2796
Uttar Pradesh	29.7	53.6	16.7	7509
Bihar	38.6	53.3	8.1	2568
Jharkhand	39.7	52.0	8.3	1974
Orissa	37.9	52.3	9.8	2987
Chhattisgarh	38.7	52.4	8.9	2487
Madhya Pradesh	34.9	50.9	14.2	4533
TOTAL	33.9	53.4	12.7	26728

BMI Status of women in EGA states

BMI status of 26728 currently married women in the age group15-49 are given in Table 1. About one-third (33.9 percent) of women have chronic energy deficiency (CED) conforming grades I - III underweight (5.7, 8.6 and 19.6 percent respectively). At the other end of the spectrum, the women with obesity percentage in EAG states is almost equal (12.7 percent) to the country's average (12.6 percent) and the obesity I and II degree are found among 9.8 percent and 2.9 percent of women respectively.

It can be inferred that in EAG states underweight problems among women are overshadowed (more than 2.5 times) the overweight problem. Table 2 discloses that the proportion of women suffering from chronic energy deficiency malnutrition is significantly higher in Jharkhand, Chhattisgarh and Bihar states (each around 39 percent), followed by Madhya Pradesh (34.9 percent). The Uttaranchal state registered the lowest prevalence of CED among the EAG states (25.5 percent). Further, the table shows that in the all the EAG states, the CED problems more serious than obese problems among the married women.

Table 3. Percentage distribution of women's BMI status by background conditions

Background Conditions	BMI Status			Total number of mothers
	CED	Normal	Obesity	
Age 5-year groups $\Psi^{2=}$1158.84 **				
15-19	39.0	59.5	1.5	1691
20-24	40.9	55.1	4.1	4294
25-29	36.2	54.9	8.9	5200
30-34	34.5	52.9	12.5	4972
35-39	30.8	51.7	17.5	4413
40-44	28.1	51.5	20.4	3549
45-49	26.8	49.6	23.5	2609
Place of residence $\Psi^{2=}$ 2622.21**				
Urban	22.3	52.4	25.4	9927
Rural	40.8	53.9	5.2	16801
Religion $\Psi^{2=}$158.06**				
Hindu	34.3	53.8	11.9	23003
Muslim	33.0	51.1	15.9	2967
Christian	34.0	54.5	11.5	156
Others	23.8	48.6	27.6	562
Caste $\Psi^{2=}$ 1554.32**				
ST	49.4	48.4	2.2	2818
SC	40.3	51.7	8.0	4797
OBC	34.3	55.4	10.3	11458
None	23.6	53.2	23.2	7597
Mothers' Literacy $\Psi^{2=}$ 2314.30**				
No education	41.1	52.6	6.4	14389
Primary	33.2	54.7	12.2	3720
Secondary	25.7	55.0	19.3	6627
Higher	11.1	51.2	37.7	1989
Mothers' Occupation $\Psi^{2=}$1349.22**				
Not working	28.9	53.9	17.1	15072
Agricultural Sector	42.5	52.5	4.9	10618
Non-Agricultural Sector	18.1	53.7	28.2	1033
Wealth Index $\Psi^{2=}$ 5088.60**				
Poorest	50.2	48.2	1.6	6308
Poorer	43.2	53.6	3.2	5156
Middle	35.4	57.9	6.8	4427
Richer	27.9	57.7	14.4	4680
Richest	13.0	51.9	35.1	6157
Total	9066	14263	3399	26728

**refers to significant at 1% level (chi-square results –Mother's BMI and SED characteristics)

Table 4. Odds Ratios from Logistic regression examining the effect of selected SED variables on CED condition of women in EAG states

SED variables	B	S.E.	Sig.	Exp(B)	95.0% C.I.for EXP(B)	
					Lower	Upper
Age** 15-19 (ref)			.000	1.000		
20-24	.291	.061	.000	1.338	1.187	1.509
25-29	.145	.061	.016	1.156	1.027	1.302
30-34	.059	.062	.334	1.061	.941	1.197
35-39	-.115	.063	.069	.891	.787	1.009
40-44	-.230	.066	.001	.794	.698	.905
45-49	-.268	.071	.000	.765	.665	.879
Residence** Urban (ref)				1.000		
Rural	-.106	.039	.006	.899	.833	.970
Religion* Hindu (ref)			.031	1.000		
Muslim	.116	.047	.013	1.123	1.024	1.231
Christian	-.029	.188	.879	.972	.672	1.405
Caste** ST (ref)			.000	1.000		
SC	-.026	.053	.626	.975	.879	1.081
OBC	-.215	.048	.000	.806	.734	.886
None	-.250	.056	.000	.779	.698	.869
Mothers' Literacy**			.000	1.000		
No education (ref)						
Primary	-.121	.042	.004	.886	.815	.963
Secondary	-.123	.042	.003	.884	.814	.959
Higher	-.448	.088	.000	.639	.537	.760
Mothers' Occupation**						
Not working (ref)			.000	1.000		
Agricultural Sector	.124	.032	.000	1.132	1.063	1.205
Non-Agri. Sector	-.200	.089	.026	.819	.687	.976
Wealth Index***						
Poorest (ref)			.000	1.000		
Poorer	-.183	.039	.000	.833	.771	.899
Middle	-.435	.044	.000	.648	.593	.707
Richer	-.701	.051	.000	.496	.449	.548
Richest	-1.420	.067	.000	.242	.212	.276
EAG states						
Uttaranchal (ref)			.000	1.000		
Rajasthan	.038	.072	.596	1.039	.903	1.195
Uttar Pradesh	-.037	.064	.562	.964	.850	1.092
Bihar	.296	.073	.000	1.344	1.165	1.551
Jharkhand	.199	.077	.010	1.221	1.049	1.421
Orissa	.190	.071	.007	1.210	1.052	1.391
Chhattisgarh	.132	.074	.074	1.141	.987	1.320
Madhya Pradesh	.260	.067	.000	1.297	1.137	1.480
Constant	-.098	.093	.293	.907		

-2 Log likelihood 31358.241

Note: *** significant at 0.001, ** significant at 0.01, * significant at 0.05 level, unmarked = not significant. (Ref.) indicates the reference category of the variable.

Prevalence of CED by characteristics of respondents

Undoubtedly, the socio-cultural and economic characteristics play a significant role in shaping the women's nutritional status. Table 3 furthermore supports this fact that the disparities in background conditions increase women's chances of being malnourished. A comparative study on maternal nutritional status in 16 of the 18 DHS conducted countries (Loaiza, 1997) and several studies in Ethiopia (Zerihun *et al*., 1997; Ferro-Luzzi *et al*., 1990) showed that rural women are more likely to suffer from chronic energy deficiency than women in urban areas. These higher rates of rural malnutrition are also reported by Teller and Yimar (2000). The present study also reflects a similar trend that relatively a higher proportion of the rural mothers (40.8 percent) are suffered by CED problem than urban mothers (22.3 percent). DHS surveys conducted in Burkina Faso, Ghana, Malawi, Namibia, Niger, Senegal, and Zambia and study conducted by Zerihun, (1997) and Winkvisit, (1992) shows a greater proportion of mothers age 40-49 exhibit chronic energy deficiencies (CED) than young mothers.

This study show a different picture that chronic energy deficiency is more severe problem for young and adolescent women (40.9 percent and 39.0 percent) than the aged women (45-49: 26.8 percent). The religion does not play any significant role in the prevalence rate of CED in the EAG states. All the religions reported almost same proportion of incidence of CED (around 33 percent) except the other category. With regard to the caste, about half of the ST women have the nutritional problem (CED). This proportion for SC was 40.3 percent and for OBC is 34.3 percent. In the EAG states, the prevalence of CED is almost four times higher among women with no education than those with 12 and more years of schooling. This result coexists with findings of Loaiza, (1997) and Teller and Yimar (2000). A significant association between malnutrition in women and their working status is also observed. Toyamal *et al*., (2001) found that the children of non working mothers had significantly higher height-for-age z-score (HAZ) ($p < 0.05$) than those of working mothers. This finding is reflected in the present study that the women who are working in the agricultural sector are more

suffered by the CED (42.5. percent) than the not working women (28.9 percent) and women who engaged in the non-agricultural sectors (18.1 percent). A study of most of the DHS surveys conducted in developing countries (Loaiza, 1997) and a study in the Southern Nations, Nationalities and Peoples Region (SNNPR) of Ethiopia (Teller and Yimar, 2000) showed that women from low economic status households are the most affected by malnutrition. The present study also confirms the above results that the women living in the poorest (50.2 percent) and poorer categories (43.2 percent) are reported higher proportion of CED incidence than their counterparts (richer (27.9 percent) and richest (13.0 percent). As can be seen in Table 4, the bivariate analysis is performed using a chi-square (Ψ2) test, and results of this study showed a significant association between nutritional status of women and each of the explanatory variables under study. The analysis of adjusted data for mother's BMI by their socio-economic and demographic status demonstrated that the mother's age, place of residence, religion, caste, education, occupation and their wealth index shows a significant association with nutritional status ($p<0.000$).

Determinants of women's nutritional status

The influences of socio-economic and demographic variables in determining the prevalence of CED are examined by logistic regression among the women. The logistic regression analysis results table 4 shows that almost in each of the variables the odds decrease with the categories of a variable when compared to the respective variable's first category, indicating a decreasing chance for experiencing CED when improving the background conditions of women (except religion). In this model, place of residence, caste, occupation and wealth index are found to be highly significant risk factors of chronic energy deficiency in women. There is a significant positive relationship between age of mother and prevalence of chronic energy deficiency. It is found that the adolescent age group (15-19) and young women in the age group 20-29 years in this EAG states are at a significantly higher risk of CED malnutrition. The regression table revels that women in the age group 40-44 and 45-49 have significantly lower probability of being CED as compared with adolescent (15-19) and young women (OR=0.794 and OR=0.765 respectively). There is a significant association between place of residence and prevalence of chronic energy deficiency that as compared with urban women, the probability of being CED is lower among rural women (0.899).

The results revealed that as compared with ST women, OBC women and none category women are less likely to be malnourished (OR= 0.806 and OR=0.779 respectively). However, the religion failed to show a significant association with the prevalence of CED (except Muslim). The illiterate women have a significantly higher probability of being CED. It found that higher educated mothers have a 0.639 (95% CI: 0.537 to .760; $p< 0.000$) lesser chance of being seen as underweight than illiterate. When compared with not working women, women working in agricultural sector have significantly higher probability of being CED (OR=1.132). The women working in the non-agricultural sector have a 0.819 lesser chance of being malnourished than the not working category women. As compared with women living in poorest wealth index, women residing in richer and richest are less likely to be CED (OR=0.496 and OR=0.242). It can be inferred from table 5 that the logistic regression analysis identified the most important explanatory variables of nutritional status in EAG states women. In this model, age, place of residence, caste, education, household economic status (WI) and employment status of women are found to be determinants of women nutritional status. Finally, the table reveals that women in Bihar, Jharkhand, Orissa and Madhya Pradesh are more than 1.2 times more likely to be chronic energy deficit problem than women in Uttaranchal.

Conclusion

The overall goal of this study is to explore the nutritional status of mother in EAG states and its determinants. It is can be concluded that the EAG states women facing higher degree of nutritional disorder. It is found from the study that the chronic energy deficiency is more severe problem in the EAG states than the obese problem. The prevalence rate of CED is nearly equal to (33.9 percent) to national average (35.6 percent). This study found evidence that socioeconomic and demographic variables have a significant influence on the odds of CED in EAG states women.

Recommendation

From the above observation, the study highlights the need for re-examining the existing programs, identifying their limitations, ensuring logistics and feasibility rather than proposing new programs. Therefore following strategies and programs should include in the government planning

- to develop community-based interventions giving priority to rural and very poor households with aim to reduction of poverty
- to empower women could therefore be important interventions to improve their nutrition status
- to generate greater access to health services and awareness about the importance of health services and nutrition education and micronutrient supplementation among the women.

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