

Double Burden of Malnutrition among women in the reproductive age group in India and Factors influencing Malnutrition

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ABSTRACT

Earlier research suggests that double burden of malnutrition, i.e., co-existence of underweight and overweight among women continues to be an important health issue in developing nations. Nutrition research in India is focused mainly on under-nutrition. This study aims to understand the levels and trends in the double burden of malnutrition among reproductive age women for states of India and to identify the determinants of malnutrition in India. Data from the five rounds of the National Family Health Survey is used. Association of background characteristics of women with nutritional status of women viz., underweight and overweight/obese, is assessed. Multinomial regression is used to determine the factors influencing the prevalence of underweight and overweight. Results clearly establish that the double burden of malnutrition exists among reproductive age women in India in most of the states. Age, education, religion, caste, number of children, wealth status of the household, place of residence and experience of severe form of spousal violence appears to be the predictors of both forms of malnutrition. Immediate action is needed to enhance the knowledge on food intake and physical activity in order to avoid the pandemic of overweight or obesity as it leads to further complications, particularly, non-communicable diseases. Different strategies should be adopted and different policies should be framed to tackle the problem of underweight and overweight separately as both these need to be dealt differently.

Key Words: Double Burden, underweight, Overweight, NFHS, Multinomial

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1. INTRODUCTION

According to WHO [1], globally 1.9 billion adults are overweight or obese while 462 million are underweight. Earlier research suggests that double burden of malnutrition, i.e., co-existence of underweight and overweight among women continues to be an important health issue in developing nations. The double burden of malnutrition is evident in population which has a history of under nutrition and currently undergoing nutrition transition [2]. As evident from the literature, India is undergoing such transition. Nutrition transition refers to major cyclical changes in the nutritional profile of human populations produced by modifications in both dietary and nutrient expenditure patterns due to economic, demographic and cultural changes occurring in the society [3]. However, nutrition research in India is focused mainly on under-nutrition. Small scale studies conducted in India found that proportion of overweight population in Indian cities and towns are increasing [4-5]. Developments in the economic, demographic and other dimensions are well documented in many countries and in India too. However impact of these changes on the nutritional status is still to be explored.

Studies have also shown that the prevalence of high level of overweight is mainly due to very rapid changes in the food system, particularly the availability of cheap ultra-processed food and beverages, and major reductions in physical activity at work, transportation, home, and even leisure due to introductions of activity-saving technologies [2, 6]. Moreover, several studies have pointed out that obesity as a major reason for non-communicable diseases or conditions such as diabetes, cholesterol, hypertension, coronary heart diseases, sleep disorders etc. [7-9]. Earlier research has pointed out that individual level factors such as educational level of women, age of the respondent, number of children etc. have significant impact on their nutritional status [10-11]. It is also evident that wealth status of the household influences both underweight among women as well as obesity among women [12-14]. Studies have brought out that urban women are prone to obesity whereas rural women are at high risk of underweight.

Fourth and fifth rounds of National Family Health Survey (NFHS) brought out that though the prevalence of underweight among women is decreasing over a period of time, still a significant proportion of reproductive age women suffer from under-nutrition. Further, another alarm regarding the nutrition status of women given by the recent rounds of NFHS is that the prevalence of obesity is increasing at a faster pace. Moreover, the fifth round of the survey reported higher prevalence of overweight than the prevalence of underweight in most of the states. Though many studies have focused on underweight among women in the existing literature, there is a gap in terms of addressing double burden of malnutrition among women in India. Some micro level studies have highlighted the issue. However, a holistic approach on the double burden of malnutrition is lacking. NFHSs have collected information on height and weight among reproductive age women, and provide Body Mass Index (BMI), which gives the sophistication of analyzing the trends as well as levels in the prevalence of underweight and overweight for states of India over a period of time.

2. DATA and METHODS

The study uses data from the five rounds of the National Family Health Survey in order to understand the levels and trends in underweight and overweight among reproductive age women. For further analyses, data from the fifth round is used. The National Family Health surveys provide information on population, health and nutrition for India and its states. The National Family Health Surveys provide the measurement of Body Mass Index (BMI) for the reproductive age women which is used in this study to understand the prevalence of underweight and overweight.

Dependent Variables considered in the study are: Malnutrition in terms of underweight and overweight are examined in this study. Underweight among women refers to BMI lower than 18.5 and overweight category includes both overweight and obese women i.e., women who have BMI of 25 and more. *Explanatory variables* used in the study are: Current Age of Women (age of women at the time of survey is categorized as 15-19, 20-29, 30-39 and 40-49). Educational Level of Women (categorized under four categories: Illiterates, primary, secondary and higher). wealth status of the household (divided into five categories: Poorest, poorer, middle, richer and richest, place of residence (Urban and rural), Religion (Categories: Hindu, Muslim, Christian and others), Caste (Information on caste is divided into three categories: SC/ ST, OBC and others), Number of living children (categorized as no children, having one child, having two children and having three or more children), food factors (factor scores of two factors).

In the first step, levels and trends in underweight and overweight/ obese were assessed using data from the five rounds of NFHSs for major states of India. In the next stage, association of background characteristics of women with nutritional status of women viz., underweight and overweight/obese, is assessed. Finally, multinomial regression is used to determine the factors influencing the prevalence of underweight and overweight.

3. RESULTS

Levels and Trends of prevalence of underweight and overweight/obese among women for states of India are presented in table 1. It is seen that in all the states, the prevalence of underweight is decreased. In some states, the decrease in malnutrition level is very evident as the prevalence of underweight is decreased significantly between 1st round and 5th round of the survey. Though it is interesting and positive to note that the prevalence of underweight is decreasing rapidly in many of the states, it is also seen that in some states (Bihar, Gujarat, Madhya Pradesh, Maharashtra, Orissa, Rajasthan, Jharkhand and Chhattisgarh) still high prevalence of underweight among women exists. On the other hand, it is alarming to found that prevalence of overweight/ obese is increasing in all the Indian

states. In some states, the percentage change is huge between NFHS 1 and NFHS 5. In states such as Tamil Nadu, Andhra Pradesh and Sikkim, the difference between the first and fifth round of the survey is more than 20 percentage points. It is noticed that the percentage increase between 4th and 5th rounds of the survey alone in the prevalence of overweight/ obese is 12. Many states such as Karnataka, Kerala, Manipur, Orissa, Punjab, Sikkim, Tamil Nadu, New Delhi, Arunachal Pradesh, Tripura, Uttarakhand and Chhattisgarh have shown more than more than 5 percent increase in overweight/ obesity between 4th and 5th rounds of the survey. The study also revealed that the total burden of malnutrition i.e., underweight and overweight put together, in the states of Andhra Pradesh, Goa, Punjab and New Delhi, more than half of women in the reproductive age are malnourished. Further, as many as, 14 states have total burden of malnutrition in the range of 40 to 50 percent and eight states are in the range of 30-40 percent.

Table 1: Levels and Trends in the Prevalence of Underweight and Overweight/ Obese

States	Underweight					Over Weight and Obese				
	NFHS1	NFHS2	NFHS3	NFHS4	NFHS 5	NFHS1	NFHS2	NFHS3	NFHS4	NFHS 5
Andhra Pradesh	37.1	37.4	33.5	17.6	14.8	11.9	14.2	15.6	33.2	36.3
Assam	27	27.1	36.5	25.7	17.6	4	4.9	7.8	13.2	15.2
Bihar	38.5	39.3	45.1	30.5	25.6	3.6	4.2	4.6	11.7	15.9
Goa	26.8	27.1	27.9	14.7	13.8	21.3	25.5	20.2	33.5	36.1
Gujarat	36.7	37	36.3	27.2	25.2	15.3	20.2	16.7	23.8	22.6
Haryana	25.6	25.9	31.3	15.8	15.1	16	20.5	17.4	21	33.1
Himachal Pradesh	29	29.7	29.9	16.2	13.9	12.7	15.4	13.5	28.7	30.4
Jammu	26.2	26.4	24.6	12.1	5.2	13.2	16.8	16.7	29.1	29.3
Karnataka	38.5	38.8	35.5	20.8	17.2	13.2	16.5	15.3	23.3	30.1
Kerala	18.4	18.7	18	9.7	10.1	20.4	24.4	28.1	32.4	38.1
Madhya Pradesh	37.4	38.2	41.7	28.4	23	5.8	7.3	7.6	13.6	16.6
Maharashtra	39.3	39.7	36.2	23.5	20.8	11.2	14.6	14.5	23.4	23.4
Manipur	17.8	18.8	14.8	8.8	7.2	10.4	12	13.3	26	34.1
Meghalaya	24.5	25.8	14.6	12.1	10.8	5.5	7	5.3	12.2	11.5
Mizoram	21.9	22.8	14.4	8.4	5.3	5	5.8	10.6	21.1	24.2
Nagaland	18.3	18.4	17.4	12.3	11.1	8	8.9	6.4	16.2	14.4
Orissa	47.2	48	41.4	26.5	20.8	4.2	5	6.6	16.5	23
Punjab	17	16.9	18.9	11.7	12.7	29.4	39.3	29.9	31.3	40.8
Rajasthan	35.1	36.1	36.7	27	19.6	6.6	8.7	8.9	14.1	12.9
Sikkim	10.9	11.2	11.2	6.4	5.8	14.6	18.2	15.4	26.7	34.7
Tamil Nadu	28.3	29	28.4	14.6	12.6	14.7	17.4	20.9	30.9	40.4
West Bengal	43.9	43.7	39.1	21.3	14.8	8.1	9.9	11.4	19.9	22.7
Uttar Pradesh	35.1	35.8	36	25.3	19	7.3	9	9.2	16.5	21.3
New Delhi	12.1	12	14.8	14.8	10	33	43	26.4	33.5	41.3
Arunachal Pradesh	10.7	10.7	16.4	8.5	5.7	4.8	5.7	8.8	18.8	23.9
Tripura	34.7		36.9	19	16.2	8.4		7.1	16	21.5
Uttarakhand			30	18.4	13.9			12.8	20.5	29.7
Jharkhand			43	31.6	26.2			5.4	10.3	11.9
Chhattisgarh				18.4	23.1				20.5	14.1
India	32.5	35.8	35.6	22.9	18.7	10.9	12.8	12.6	20.7	24

3.1 Association between Background Characteristics of Women and Underweight and Overweight/ Obese

According to 5th round of NFHS, age of women has negative association with the prevalence of underweight and positive association with the prevalence of overweight/ obese. Higher the age of women, lower is prevalence of

underweight and an inverse relationship is noticed in the case of overweight/obese i.e., higher the age higher is the prevalence of overweight/ obese. Results revealed that women in rural areas, Hindu women, women belonging to SC/ ST and women belonging to poorest and poorer households have higher prevalence of underweight and lower prevalence of overweight/ obese compared to their counterparts. Women who have no children are at risk of underweight while women with two children and women with three or more children are at a risk of being overweight.

3.2 Multinomial Regression Results

It is necessary to use appropriate multivariate technique in order to understand the net effect of explanatory variables on the prevalence of underweight and overweight/ obesity. Therefore, multinomial regression technique is used as the dependent variable is trichotomous. Results exhibited that increase in age decreased the likelihood of prevalence of underweight whereas it increased the likelihood of being overweight. Urban women, women who are educated and women who belong to higher household economic status have lower odds for being underweight and higher odds for being overweight as compared to their counterparts. The likelihood of being underweight is lower and likelihood of being overweight is higher among Muslim, Christian and women belong to other religion as compared to the Hindu women. The likelihood of double burden of malnutrition is lower among women belong other caste and OBC than SC/ST women. Increased in number of children increased the risk of underweight and decreased the risk of overweight. Another significant factor affecting the malnutrition is experiencing severe violence. Women's experience of severe violence increased the risk 1.1 times and 1.2 times respectively for underweight and overweight.

Table 2: Background Characteristics of women and prevalence of Underweight and Overweight/Obesity

Background Characteristics of Women	Percentage of Women	
	Underweight	Overweight and Obese
Current Age of Women		
15-19	39.1	5.6
20-29	20.3	17.2
30-39	11.3	32.0
40-49	9.4	36.9
Place of Residence		
Urban	13.1	33.2
Rural	20.9	19.6
Educational Level of Women		
No education	17.5	21.2
Primary	15.9	25.5
Secondary	20.8	23.4
Higher	14.2	28.3
Religion		
Hindu	19.1	23.1
Muslim	16.0	25.9
Christian	12.4	31.0
Others	15.5	30.9
Caste		
SC/ST	21.5	18.7
OBC	18.5	24.4
Others	14.7	30.6
Wealth Index		
Poorest	27.5	10.0
Poorer	22.4	16.3

Middle	18.1	23.6
Richer	14.5	30.4
Richest	10.3	38.6
Number of Living Children		
0	30.4	11.2
1	14.6	27.0
2	11.9	32.4
3 and above	13.8	27.7
Experienced Severe Violence		
No	13.6	28.9
Yes	15.9	26.6

4. CONCLUSION

Assessment of levels and trends of double burden of malnutrition in terms of underweight and overweight/ obesity using data from the four rounds of National Family Health Surveys indicated that the co-existence of both forms of malnutrition, i.e., in many states, underweight is declining at a slower pace and overweight/ obesity is increasing at a rapid pace. As noticed in the case of fertility transition and epidemiological transition, In India, each state is undergoing this shift in malnutrition in its own pace. However, it is alarming to found that almost all the states are under the double burden of malnutrition, some are at slow pace and some are at rapid pace. It is also evident that the prevalence of underweight and overweight/ obesity put together contributed to more than 40 percent in many of the states. This is not unique to India. Earlier research has shown that many countries are facing the issue of double burden of malnutrition. The main reasons discussed for the co-existence of underweight and overweight/ obesity is that change in dietary pattern and physical activity. The co-existence of underweight and overweight/ obesity calls for immediate attention. Measures to prevent these are necessary. Controlling underweight is related to development measures in the country or community whereas controlling overweight/ obesity is more related to the awareness and knowledge level of the individual. In India studies have shown that more than half of above age 20 are physically inactive and women are at higher risk of being inactive. Further research is required to understand the dimensionalities of obesity. Immediate action is needed to enhance the knowledge on food intake and physical activity in order to avoid the pandemic of overweight or obesity as it leads to further complications, particularly, non-communicable diseases. Efforts are needed in terms of controlling the obesity. It is often argued that urban residents are prone to obesity. The rapidly increasing trend of obesity clearly indicates that it will be a cause for concern soon irrespective of communities. Further, the issue should be dealt at the state level or even at the lower level of governance as the action should be immediate and in India, eating patterns differ much across levels. It is also found that background characteristics of women have significant influence on the prevalence of underweight as well as overweight. But the pattern clearly indicates different strategies should be formed and different policies should be framed to tackle the problem of underweight and overweight separately as both these need to be dealt in a different manner. Though findings from the study are significant, there are several limitations in the study. Moreover, NFHS is a cross sectional survey. It is ideal to study the factors responsible for malnutrition using a longitudinal data. However, in the absence of such information, findings of the present study can be helpful in conducting further research and is useful to take immediate actions against dealing with the double burden of malnutrition, particularly, when the prevalence of obesity is at the starting level in some of the states.

Table 3: Multinomial Regression Results of Prevalence of Underweight and Overweight/ Obesity among Reproductive Age Women

Background Characteristics of Women	Underweight		Overweight	
	Coeff	OR	Coeff	OR
Current Age of Women				
15-19 (Ref.)				
20-29	-0.273	0.761***	1.296	0.860***
30-39	-0.722	0.486***	1.892	6.633***
40-49	-0.892	0.410***	2.152	3.654***
Place of Residence				

Rural (Ref.)				
Urban	-0.144	0.866***	0.238	1.269***
Educational Level of Women				
No education (Ref.)				
Primary	-0.117	0.890***	0.207	1.230***
Secondary	-0.128	0.880***	0.280	1.323***
Higher	-0.401	0.670***	0.209	1.233***
Religion				
Hindu (Ref.)				
Muslim	-0.251	0.778***	0.232	1.261***
Christian	-0.327	0.721***	0.310	1.363***
Others	-0.209	0.811***	0.154	1.166***
Caste				
SC/ST (Ref.)				
OBC	0.016	1.016	0.140	1.150***
Others	-0.118	0.889***	0.120	1.128***
Wealth Index				
Poorest (Ref.)				
Poorer	-0.927	0.746***	0.444	1.559***
Middle	-0.798	0.664***	0.812	2.552***
Richer	-0.410	0.450***	1.027	2.794***
Richest	-0.293	0.396***	1.326	3.766***
Number of Living Children				
0 (Ref.)				
1	0.141	1.152***	-0.114	0.892***
2	0.100	1.106***	-0.032	0.969*
3 and above	0.144	1.154***	-0.181	0.835***
Ever experienced severe violence				
No (Ref.)				
Yes	0.082	1.085***	0.153	1.165***

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