

Changing scenario of obesity and underweight among women in India – Revisited

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Abstract

Introduction: Obesity and underweight are a concern at global level, and its public health impact can be observed both in developed and developing countries.

Objective: To evaluate percent change in prevalence of obesity and underweight and their associated factors.

Methods: The NFHS-2 (1998-99) and NFHS-3 (2005-06) were used as the data source for our study. A stratified cluster multistage sampling design was used by NFHS to collect data from the 24 states, The variables used for present analysis were prevalence of nutritional status indicators such as obesity/overweight or underweight prevalence among ever married women aged 15-49 years for different factors of age, Residence, Education, Religion, Caste/tribe, Standard of living index.

Results: The prevalence of obesity was 2.8% in NFHS 3 (2005-06) resulted from increase of 27.3% from NFHS 2 (1998-99). A south region of India was having highest magnitude of obesity (3.7-5.1%). Prevalence of Underweight was 35.2% in India and was declined by only 0.6% in NFHS 3 from NFHS 2. Maximum prevalence of underweight was found in East (34.1-44.0). Factors associated with obesity were age cut off of less than 20 years (10%) and wealth index.

Conclusion: Problem of underweight continue to exists at the same level while obesity is on rise and appropriate public health measures to check them is essential.

Keywords: Obesity, Overweight, Underweight, Women, Nutritional status

Introduction

Obesity and underweight are of public health concern the impact can be observed both in developed and developing countries.⁽¹⁾ Trends over 40 decades in 200 countries predicted global obesity to reach 18% in men and 21% in women by 2025.⁽²⁻⁴⁾ The world's poorest regions especially in South Asia, underweight problem exists further. In most of the regions of the world, overweight predominates underweight among women of reproductive age.⁽⁵⁾ It was reported by the World Health Organization that over one billion adults were overweight and 600 million were obese globally. Overall, about 13% of the world's adult population (11% of men and 15% of women) were obese in 2014.⁽⁵⁻⁶⁾

Various factors are associated with increasing rate of obesity and overweight in all over world. The major ones are diet and physical activity related factors. There is a marked shift observed, over a decade's, especially in diet related factors.⁽³⁾ Besides these dietary factors various lifestyle factors and socio-demographic factors, have also been associated with obesity and underweight.^(3,7,8)

Most developing nations like India are also burdened with the problem of underweight and under nutrition. Further the country is also facing the problem of obesity and overweight. India is a country of more than 30 million of obese people and the number is increasing rapidly.⁽⁹⁻¹⁰⁾ Women are more affected than men especially in urban areas where more than 23% of women are either obese or overweight, which is exceeding the prevalence of among men i.e. 20%.⁽¹¹⁾

Therefore, the problem of underweight and obesity making it difficult for the nation's development. Unlike developed countries where obesity is generally found in women of low/middle income group, in India the problem of obesity is more prevalent among high income group, besides under nutrition that prevails among women of low income strata.⁽¹³⁻¹⁵⁾ Both underweight and obesity have adverse health outcomes due to which the risk of morbidity and mortality increases.⁽¹⁶⁻¹⁸⁾

Earlier studies using NFHS data described prevalence and explored the association of obese and underweight related factors among women in India.^(5,19-21) The present study aimed to evaluate further unexplored aspect of the percent raise in obesity and underweight along with associated factors in India and their diversities among various socio-demographic and ethnic groups. This attempt is to examine the changing scenario of under and over-nutrition problems over the past years.

Methods

The NFHS is a large scale, multi round survey conducted in a representative sample of households throughout India. The NFHS data for different years in 24 states of India as NFHS-2 (1998-99) and NFHS-3 (2005-06) reports were used as the data source for the study. NFHS-2 collected data on 90303 ever married women (15-49 years) from 92486 households, whereas the next round (NFHS-3) of the survey included never married women (total 124,385) from 109,041 households, with 94.5% of response rate, for the same

age group. A two stage sample design used for rural areas. Villages were shortlisted in the first stage with the help of a list of villages obtained from the national census. In the second stage households were selected for collecting required data from the villages by using a systematic random sampling. A three stage sample design was used for the urban areas. In the first stage, wards were selected on the basis of probability proportion to population size. In the second stage, census enumeration block (CEB) was randomly selected from each ward. In the third stage, households were selected from CEB by systematic random sampling technique. The following variables collected from NHFS were nutritional status and obesity/underweight prevalence among ever married women aged 15-49 years; Age, Residence, Education, Religion, Caste/tribe, standard of living index. The study assessed the nutritional status of ever married women by finding the BMI and prevalence of obesity and underweight among ever married women in India from NFHS-2 to NFHS-3. WHO reference standard was used to classify underweight women with BMI < 18.5 kg/m² and obese women with BMI ≥30 kg/m². The latest NFHS-4 data

is not included in the study as the report in full is not available yet for the individual states of India.

Results & Conclusion

The percentage of obese women has increased by 27.3% from 1998 to 2006. The percentage of underweight significantly increased in Arunachal Pradesh by 53% followed by Assam by 34.7%. In Arunachal Pradesh there was increase of 83.3% in obese. There was a marked regional variation found in the nutritional status. The percentage of underweight decreased in 13 states out of 24 states of our study with Sikkim presented no change. The percentage of obese was decreased in only 3 states out of twenty 24, i.e. in Meghalaya 33.3%, Delhi 15.2% and Himachal Pradesh 8.7%. There was a significant increase of 140% in obese women in Mizoram. The other states with major increase in percentage of obese were West Bengal 53.8%, Manipur 58.3%, Arunachal Pradesh and Orissa 83.3%, Andhra Pradesh 86.4%, Tamil Nadu 88.9% (Table 1).

Table 1: Percentage change in BMI among ever married women age 15-49 years by state from the 1998-99 and 2005-06 NFHS surveys

State	Underweight (BMI < 18.5 kg/m ²)		Obese (BMI ≥ 30 kg/m ²)	
	2005	Change from 1998-99	2005	Change from 1998-99
India	35.6	-0.6	2.8	27.3
North				
Delhi	14.8	23.3	7.8	-15.2
Haryana	31.3	20.8	4.4	12.8
Himachal Pradesh	29.9	0.7	2.1	-8.7
Jammu & Kashmir	24.6	-6.8	3.3	10.0
Punjab	18.9	11.8	9.1	0.0
Rajasthan	36.7	1.7	1.8	12.5
Central				
Madhya Pradesh	42.55	11.4	1.35	12.5
Uttar Pradesh	33	-7.8	2.2	46.7
East				
Bihar	44.05	12.1	0.75	50.0
Orissa	41.4	-13.8	1.1	83.3
West Bengal	39.1	-10.5	2	53.8
Northeast				
Arunachal Pradesh	16.4	53.3	1.1	83.3
Assam	36.5	34.7	0.9	28.6
Manipur	14.8	-21.3	1.9	58.3
Meghalaya	14.6	-43.4	0.8	-33.3
Mizoram	14.4	-36.3	1.2	140.0
Sikkim	11.2	0.0	3	20.0
West				
Goa	27.9	3.0	4.8	11.6
Gujarat	36.3	-1.9	4.6	4.5
Maharashtra	36.2	-8.8	3.6	24.1
South				

Andhra Pradesh	33.5	-10.4	4.1	86.4
Karnataka	35.5	-8.5	3.7	27.6
Kerala	18	-3.7	5	31.6
Tamil Nadu	28.4	-2.1	5.1	88.9

Note: In Table-1 and Table-2, the percentage with +ve sign indicates an increase from NFHS-2 to NFHS-3 and the percentage with -ve sign indicates a decrease from NFHS-2 to NFHS-3.

Table 2: Percentage change in obesity and overweight among ever married women age 15-49 years on the basis of background characteristics from the 1998-99 and 2005-06 NFHS surveys

Background characteristics	Underweight (BMI < 18.5 kg/m ²)		Obese (BMI ≥ 30 kg/m ²)	
	2005	Change from 1998-99	2005	Change from 1998-99
India	35.6	-0.55	2.8	27.27
Age				
15-19	46.8	20.6	0.2	100.0
20-29	38.1	-5.8	1.4	-12.5
30-49	28.7	-13.2	5.15	-18.3
Marital status				
Currently married	33	-7.3	3.4	54.5
Not currently married	33.7	-14.2	3.45	64.3
Residence				
Urban	25	10.6	6.1	5.2
Rural	40.6	0.0	1.3	44.4
Education				
Illiterate	41.7	-2.1	1.4	55.6
< middle school	37.2	14.1	2.1	-22.2
Middle school complete	34.55	23.4	3.3	3.1
High school complete and above	25.6	43.8	5.1	-20.3
Religion				
Hindu	36.4	-1.4	2.6	30.0
Muslim	35.1	2.9	3.5	25.0
Christian	23.2	-5.7	3.6	5.9
Sikh	17.8	8.5	10.1	26.3
Buddhist/Neo-Buddhist	40.4	21.3	1.5	-46.4
Jain	21.8	38.0	6.2	-36.7
Other	41.1	-16.8	0.9	125.0
Caste/tribe				
Scheduled Caste	41.1	-2.4	1.6	77.8
Scheduled tribe	46.6	0.6	0.5	0.0
Other backward class	35.7	-0.3	2.5	47.1
Other	29.4	-3.6	4.5	21.6
Wealth index				
Low	48.9	1.7	0.35	16.7
Medium	38.3	7.6	0.9	-40.0
High	23.55	36.1	5.65	-16.9

Note: In Table 1 and Table 2, the percentage with +ve sign indicates an increase from NFHS-2 to NFHS-3 and the percentage with -ve sign indicates a decrease from NFHS-2 to NFHS-3

In a number of background characteristics observed there was an increased prevalence in obese over underweight. The change in percentage of underweight presented contrasting of high prevalence in the highly educated society with better wealth index by 43.8% and 36.1% respectively. The second most

significant increase was seen in the women of Jain religion by 38%. There was a decrease of 14.2% of unmarried as against 7.3% in married women suffering from under nutrition. Rural and urban areas also showed a 10.6% increase of undernourished women in urban and no change in rural areas. The lower age

group of 15-19 years with an increase by 100% and the other backward classes by 125% were significantly affected by obesity. In the rural areas there was 44.4% increase in obese but only 5.2% increase in urban area. The women with educational qualification of middle school and high school presented decrease percentage of obese by 22.2% and 20.3% respectively. Among all religion Buddhist/Neo-Buddhist and Jain presented a significant decrease in percentage of obese by 46.4% and 36.7% respectively. The obese percentage was increased in schedule caste by 77.8% and in low wealth index group by 16.7% (Table 2).

The prevalence of obesity was 2.8% in NFHS 3 (2005-06) with increase of 27.3% from NFHS 2 (1998-

99). South regions of India having highest magnitude of obesity (3.7-5.1%) followed by West (3.6 -4.8%), North (1.8-9.1%), Central (1.4-2.2), East (0.75-2.0%) and North East (0.8-1.2%). Prevalence of Underweight was 35.2% in India and was declined by only 0.6% in NFHS 3 from NFHS 2 except Delhi, Himachal Pradesh and Meghalaya where the % declining was 15.2%, 8.3% and 3.3% respectively. Maximum prevalence of underweight was found in East (34.1-44.0) followed by central (7.8 to +11.4%), West (8.8 to +3.0%), South (10.4 to -2.1%), North (6.8 to +23.3%) and East (13.8 to +12.1%). (Table 3)

Table 3: Prevalence and Percentage change in Obesity among ever married women age 15-49 years by different region of India from the 1998-99 and 2005-06 NFHS surveys

Regions of India	Prevalence of Obesity (BMI \geq 30 kg/m ²)		Prevalence of Under weight (BMI < 18.5 kg/m ²)	
	2005-06 (NFHS -3)	% Change from 1998-99 (NFHS-2)	2005-06 (NFHS -3)	% Change from 1998-99 (NFHS-2)
India	2.8	27.3	35.2	-0.6
North Region	1.8-9.1	0.0-12.8#	14.8-36.7	-6.8 to +23.3
Central Region	1.4-2.2	12.5-46.7	33.0-42.6	-7.8 to +11.4
East Region	0.75-2.0	50.0-83.3	39.1-44.0	-13.8 to +12.1
Northeast Region	0.8-1.2	20.0-140.0\$	11.2-36.5	-43.4 to +53.3
West Region	3.6-4.8	4.5-24.1	27.9-36.3	-8.8 to +3.0
South Region	3.7-5.1	27.6-88.9	18.0-35.5	-10.4 to -2.1
All regions	0.8-5.1	0.0-140.0	11.2-44.0	-43.4 to +53.3

Note: The percentage with +ve sign indicates an increase from NFHS-2 to NFHS-3

and the percentage with -ve sign indicates a decrease from NFHS-2 to NFHS-3. BMI: Body Mass Index

In North region, obesity decline only in Delhi (-15.2%) and Himachal Pradesh (-8.7%).

\$ In North East region, obesity decline only in Meghalaya (-33%)

BMI: Body Mass Index

NFHS: National Family Health Survey

Table 4: Factors associated with underweight and obesity among ever married women age 15-49 years NFHS-2 and NFHS-3 survey

Body Mass Index (BMI)	Age		Marital status		Residence		Education		Religion		Caste/tribe		Wealth index	
	<20 years	≥20 years	Married	Not Married	Urban	Rural	Illiterate	literate	Jain	Other	Backward Classes	Other	Lowest	Other
NFHS - 2														
% of obese (BMI ≥ 30.0 kg/m ²)	0.1	4.0	2.2	2.1	5.8	0.9	0.9	4.1	9.8	3.2	1.0	3.7	0.3	4.15
No of women obese	7	1634	1586	106	1193	509	398	1347	28	2481	476	1123	74	2144
OR (95%CI)	39.37 (18.18,90.04)		1.04 (0.85, 1.28)		6.78 (6.10, 7.54)		4.71 (4.20, 5.28)		3.25 (2.15, 4.88)		3.68 (3.30, 4.11)		14.34 (11.30,18.22)	
% of underweight (BMI<18.5 kg/m ²)	38.8	36.8	35.6	39.3	22.6	40.6	42.6	26.1	15.8	32.5	41.4	30.5	48.1	26.45
No of women underweight	2602	15199	25665	1975	4647	22962	18851	8587	45	24899	19087	9255	11827	13667
OR (95%CI)	1.09 (1.03, 1.15)		1.17 (1.10, 1.24)		2.34 (2.26, 2.43)		1.10 (2.03, 2.16)		2.57 (1.85, 3.59)		1.61 (1.56, 1.66)		2.58 (2.50, 2.66)	
NFHS – 3														
Percentage of obese (BMI ≥ 30.0 kg/m ²)	0.2	3.3	3.4	3.45	6.1	1.3	1.4	3.5	6.2	3.7	1.5	4.5	0.35	3.275
No of women obese	44	2936	2793	193	2218	980	629	1878	22	4119	1130	1671	66	3039
OR (95%CI)	17.01 (12.52,23.20)		0.98 (0.85, 1.14)		4.93 (4.57, 5.33)		2.55 (2.33, 2.80)		1.76 (1.11, 2.75)		3.03 (2.80, 3.27)		9.71 (7.56, 12.50)	
% of underweight (BMI < 18.5 kg/m ²)	46.8	33.4	33	33.7	25	40.6	41.7	32.5	21.8	32.3	41.1	29.4	48.9	30.925
No of women underweight	10365	29938	27108	1881	9092	30619	18734	17410	76	35997	30320	10917	9289	28694
OR (95%CI)	1.75 (1.70, 1.81)		1.03 (0.97, 1.09)		2.05 (1.99, 2.11)		1.49 (1.45, 1.53)		1.71 (1.32, 2.22)		1.68 (1.63, 1.72)		2.14 (2.07, 2.21)	

Factors associated with obesity were age cut off of less than 20 years (10%) and wealth index were where having high and age more than 20 years had 39.37% risk and higher (14%) wealth index risk. Residency area, educational states, caste and religion were also associated with increased risk of 6.78 (6.10, 7.54), 4.71(4.20, 5.28), 3.68 (3.30, 4.11) and 3.25 (2.15, 4.88) respectively (Table 4). Alarming increased change in obesity among Indian women. Underweight also still prevails among low economic group the amount of reduction is negligible. Being underweight or obese has no association with marital status while all the other factors studied were associated. As such the concept of transition from under-nutrition to obese is misleading and both the issues requires alternate strategies to control related health problems. This study considered changes from NFHS-2 to NFHS-3 only before the release of the data for NFHS-4 publically available. These aspects can further be studied by including NFHS-4 data.

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