

Obesity and Expenditure on Health: A Comparison among Normal Weight, Overweight, Obese and Medically Obese Women in India

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Abstract

Obesity is a multifaceted problem with wide-reaching medical, social and economic consequences. We compared the health care expenditure among normal weight, overweight, obese and medically obese in India in a follow-up survey of 325 ever-married women aged 20-54 years residing in Delhi, India, systematically selected from National Family Health Survey (NFHS-2, 1998-99) Delhi samples who were re-interviewed after four years in 2003. Women's health expenditure has been seen as gross and as a ratio of total household expenditure. About 28% overweight women spent more than 100/- Indian rupees per month for their health problems compared to 35% of obese women and 48% of the medically obese women. About 15% of overweight women's expenditure on health was more than 5% of the total household expenditure, which increased to 16% among obese women and more than two-fifths of the medically obese women. Prevention is obviously more cost effective than treatment, both in terms of economic and personal costs.

Keywords: BMI; women; healthcare expenditure; follow-up survey; Delhi; India

Introduction

Obesity is a multifaceted problem with wide-reaching medical, social and economic consequences. For the obese person, excess weight denotes an increased risk of disabling chronic diseases, lowered quality of life and loss of earnings. For society, obesity is a major economic burden and treatment costs of diseases directly attributable to obesity are estimated to correspond to about 2-10% of the total health care expenditure (ref). The indirect costs arising from loss of productivity due to obesity are even higher (Rissanen, 2001). India's rapid increase in diet-related non-communicable diseases and their costs project similar economic cost of undernutrition and overnutrition (Popkin et al 2001).

Often overshadowed by the health and social consequences of obesity is the economic cost to society and to the individual. The economic costs of obesity rise with the increasing BMI due to the escalating risk, prevalence and morbidity of co-morbid disease (ref). Three of the major co-morbidities associated with obesity – type 2 diabetes, hypertension and dyslipidemia-create challenges for clinical disease management. In general, disease prevalence and total direct medical costs increase as patients gain weight. Visits to the clinicians increase significantly with obesity.

A recent study (ref) reported that severely obese persons (BMI of 35 or higher) have a 24% higher rate of outpatient visits and 74% more hospital days than those with a BMI below 30. Two large-scale studies (ref) have shown that overweight young adult women in the UK and US earn significantly less than non-overweight women. British women in the top 10% of the body weight range at age 16 earned 7% less than their non-overweight peers at age 23, and those in the top 1% earned 11% less (ORIC, 1997). It is noted that social trends responsible for the obesity epidemic that pervades our society and affects all of us and the economic cost of obesity are born by everyone (Colman, 2000).

Most available recent data from India showed overweight and obesity together among women is 12.6% and almost similar percentage of underweight and overweight women coexists in urban India (25% underweight and 23.5% overweight or obese) [4]. In the light of the increases in population weights in India, it is worthwhile to examine the economic consequences of excess weight gain in terms of individual's expenditure on health care more specifically among adult women in India who are the sufferer of largest weight gain as compared to men [4]. In this study, we examined the economic burden in terms of expenditure on health care due to obesity among women in India. We particularly compared the health care expenditure pattern both individual and household among women according to their level of BMI.

Methods

Study location and population

The present paper utilises data collected for the Doctoral dissertation by the first author [21]. Full details of the study have been presented elsewhere [21]. Briefly, during May-June 2003, a follow up survey was carried out in the national capital territory of Delhi using the same sample derived from the National Family Health Survey-2 (NFHS-2) conducted during 1998-99. Delhi which has a heterogeneous, multicultural population representative of the Indian urban scenario was

chosen as the preferred location for this study. NFHS-2 collected demographic, socio-economic, and health information from a nationally representative sample of 90,303 ever-married women aged 15-49 years in all states of India (except the union territories) covering more than 99% of the country's population with a response rate of 98%. Details of sample design, including sampling frame are provided in the national survey report [22].

From the 1998-99 NFHS-2 Delhi samples, 325 women aged 15-49 years chosen systematically, were re-interviewed in a follow up survey after four years in 2003 using an interview schedule. Their weights and heights were again recorded in the follow-up study by the researcher (using the same equipment used in NFHS-2) to compute their current body mass index. In addition to these measurements, detailed information was collected on their dietary habits, lifestyle behaviour, psycho-social problems (asked only to overweight and obese women) along with other socio-demographic characteristics. Self-reported information on woman's day to day problems, body image dissatisfaction, sexual dissatisfaction and stigma and discrimination which are the main response variable in this study were sought through face-to-face interview with a interview schedule.

Sample Selection, response rate and sample size

Earlier studies on obesity in India and other developing countries have shown that overweight and obesity are predominant in urban areas and among women [23]. Therefore, only urban Primary Sampling Units (PSUs) were chosen for the follow-up survey in Delhi. The sample frame for the follow up survey was fixed to include women in all BMI categories and literacy levels. The aim was to have a sample size of at least 300 women, 100 from each of the three BMI categories (normal, overweight, and obese). At the time of revisit, several issues such as migration, change of address, non-response and non-availability of respondents tend to reduce the desired sample size. Potential loss during follow-up [24-25] was dealt with increasing the initial sample size (double than required) to get the desired sample size for the study.

In NFHS-2 Delhi sample, 1117, 500, and 203 women were normal, overweight and obese respectively. In NFHS-2 survey questionnaire respondents were asked, 'Would you mind if we come again for a similar study at some future date after a year or so?' Those women who objected for a revisit were excluded from the follow up survey, and thus there remained 1050 normal, 476 overweight, and 177 obese women in the sampling frame. Samples were drawn from each of these three categories through systematic stratified random selection using a random number. From the normal BMI category, every fourth woman and from the overweight category every second woman was drawn. In the obese category all women were included in the sample to get the desired sample size. This resulted into selection of a total of 677 women—262 normal, 238 overweight and 177 obese. For the follow up survey, the addresses of the selected women were obtained from the NFHS-2 Household Questionnaires. Sample size was further reduced due to non-availability of some questionnaires and non-identified addresses. Finally, a total of 595 women—217 normal, 227 overweight and 151 obese were selected for the follow up interview. Details of the sample selection and response rate is illustrated in the schematic diagram (Figure 1).

<Figure 1 here>

In the follow-up survey, 57% of the eligible samples (337 women) were successfully interviewed—113 normal, 124 overweight and 100 obese women. 43% of the sample (258 women) could not be interviewed as they were out of station (16%), had migrated (22%), their residence was un-located (1%), died (1%) or refused for an interview (3%). Women who were pregnant (n=9) at the time of the follow-up survey, women who had given birth during the two months preceding the survey (n=2) and underweight women (n=1) have been excluded from the final analysis. Therefore, the findings are based on the remaining 325 respondents of the follow up survey. A separate analysis using NFHS-2 data shows that the socio-demographic characteristics of those interviewed and those could not be interviewed in the follow up survey were similar (data not shown) indicating that the follow-up sample appears representative of the NFHS-2 sample population.

Anthropometric measurements

In NFHS-2 (executed by the field investigators) as well as in the follow-up survey (executed by the researcher), each ever-married woman was weighed in light clothes with shoes off using a solar-powered digital scale with an accuracy of ± 100 gms. Their height was also measured using an adjustable wooden measuring board, specifically designed to provide accurate measurements (to the nearest 0.1 cm) in a developing country field situation. These data were used to calculate their individual BMIs. Practical and clinical definitions of overweight and obesity are based on the BMI, which is computed by dividing weight (in kilogram) by the square of height (in meter) [kg/m²] [24]. A woman with a BMI between 25 and 30 is considered to be overweight, a BMI of greater than 30 is considered to be obese. A woman with a BMI between 18.5 and 24.9 is considered normal, and if the BMI is below 18.5 the woman is considered to be underweight [24].

Variables studied

We assessed the response to the question on “How much is the average expenditure (in rupees) of your family in different items, such as food, house rent, clothing, education, *health*, entertainment, others etc., to analyse the health expenditure in the study. Women’s health expenditure has been seen as gross and as a ratio of total household expenditure.

Characteristics of the respondents that are included as potential confounders in the study are: age (20-34, 35-54), education (illiterate, literate but <middle school complete, middle school complete, high school complete and above), religion (Hindu, Muslims, Sikh and Others), caste/tribe (Scheduled caste/tribes, Other backward class, Others), household standard of living (low/medium, high), employment status (not working, working), and media exposure (never reads newspaper, reads newspaper occasionally, reads newspaper daily). For a full definition of variables see Table 1.

Statistical methods

Data are analyzed using descriptive statistics. The association between overweight/obesity and health expenditure was estimated using multiple logistic regression models after controlling for socio-economic and demographic factors and examining for the independent effects of covariates. All analysis were done using SPSS Version 19 (IBM SPSS Statistics, Chicago, IL, USA).

Ethical approval

The study received ethical approval from the International Institute for Population Science's Ethical Review Board. Informed consent was obtained from all respondents in both NFHS-2 and the follow-up survey before asking questions and before obtaining measurements of their height and weight. The analysis presented in this study is based on secondary analysis of the survey data with all identifying information removed.

Results

Table 1 presents the characteristics of the study population. In the study sample, there were almost equal percentage of (normal?) overweight (43.6%) and obese (39.4%) women and 17% were medically obese. Almost one third of the respondents were below 35 years and two thirds were over 35 years of age. The mean age of the respondents was 41.2 years. Over half the study population (58%) had completed high school education while one-seventh was illiterate. Almost 80% of the respondents were Hindu, the rest being Muslim, Sikh and Others. Regarding caste/tribe distribution, 'Others' were predominant (84%) and there was equal percentage of Scheduled Castes/Tribes (8%) and Other backward Class (8%). Majority of the respondents (87%) belonged to households with a higher standard of living (SLI) whereas less than 14% women belonged to households with a medium or lower SLI. Majority of women (92%) were not working except for 8%.

<Table 1 here>

Table 2 presents the monthly health expenditure in gross amount spent by normal weight, overweight, obese and medically obese women. A significant increase has been found in the monthly gross expenditure on health care according to the level of BMI. About 28% overweight women spent more than Rs. 100/- per month for their health compared to 35% of obese women and almost half of the medically obese women. The ratio of health expenditure of women to total household expenditure shows that, women with higher BMI put more economic burden on the total household expenditure. About 15% of overweight women's expenditure on health was more than 5% of the total household expenditure, which increases to 16% among obese women and more than two-fifths of the medically obese women.

<Table 2 here>

To write about table 3 and 4

Discussion

It can be said from the above discussion that prevention is obviously more cost effective than treatment, both in terms of economic and personal costs. Health care providers and policy makers need to appreciate the importance of obesity and its prevention and develop effective policies and programmes to prevent obesity.

Conclusion

References

Figure 1: Selection of sample in the follow-up survey and response rate

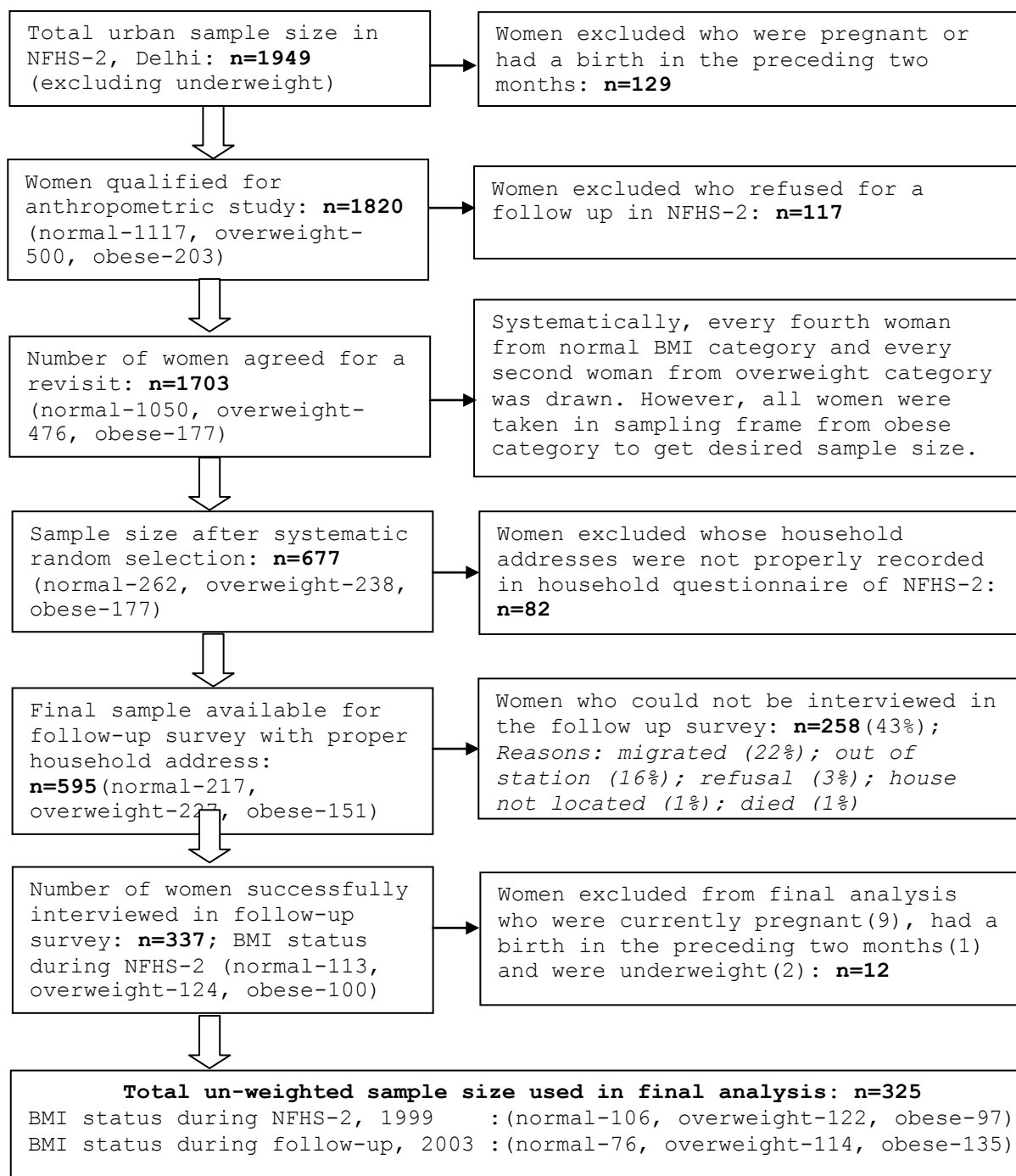


Table 1 Characteristics of the study population (n=236) aged 20-54, Delhi, 2003

Characteristics	Percent	Number of women
<i>Current Body Mass Index (BMI)¹</i>		
Normal (BMI 18.50-24.99 kg/m ²)		
Overweight (BMI 25.0-29.99 kg/m ²)	43.6	103
Obese (BMI ≥30.0-34.99 kg/m ²)	39.4	93
Medically Obese (BMI ≥35.0 kg/m ²)	16.9	40
<i>Age</i>		
20-34	33.1	78
35-54	66.9	158
Mean age	41.2	236
<i>Education²</i>		
Illiterate	13.6	32
Literate, <middle school complete	15.3	36
Middle school complete	13.6	32
High school complete and above	57.6	136
<i>Religion</i>		
Hindu	79.7	188
Muslim	8.5	20
Sikh or Others ³	11.9	28
<i>Caste/tribe⁴</i>		
Scheduled caste/tribes	8.1	19
Other backward class	8.1	19
Others	83.9	198
<i>Standard of living index⁵</i>		
Low/ Medium	13.5	31
High	86.5	199
<i>Employment status</i>		
Not working	92.3	217
Working	7.7	18
<i>Media Exposure</i>		
Never reads newspapers	53.4	126
Reads newspapers occasionally	11.0	26
Reads newspapers daily	35.6	84
Number of women	100.0	236

Note: ¹ Women who were pregnant at the time of the survey, or who had given birth during the two months preceding the survey, were excluded from these anthropometric measurements.

²Illiterate-0 years of education, literate but less than middle school complete-1-5 years of education, middle school complete-6-8 years of education, high school complete or more-9+ years of education

³Buddhist, Christian, Jain, Jewish, Zoroastrian

⁴Scheduled castes and Scheduled tribes are identified by the Government of India as socially and economically backward and needing protection from social injustice and exploitation; Other Backward class category is a diverse collection of intermediate castes that were considered low in the traditional caste hierarchy but are clearly above SC; Others' is a default residual group that enjoys higher status in the caste hierarchy.

⁵Standard of living (SLI) was defined in terms of household assets and material possessions and these have been shown to be reliable and valid measures of household material well-being. It is an index which is based on ownership of a number of different consumer durables and other household items. It is calculated by adding the following scores: house type: 4 for *pucca*, 2 for semi *pucca*, 0 for *kachha*; toilet facility: 4 for own flush toilet, 2 for public or shared flush toilet or own pit toilet, 1 for shared or public pit toilet, 0 for no facility; source of lighting: 2 for electricity, 1 for kerosene, gas or oil, 0 for other source of lighting; main fuel for cooking: 2 for electricity, liquefied natural gas, or biogas, 1 for coal, charcoal, or kerosene, 0 for other fuel; source of drinking water: 2 for pipe, hand pump, or well in residence/yard/plot, 1 for public tap, hand pump, or well, 0 for other water source; separate room for cooking: 1 for yes, 0 for no; ownership of house: 2 for yes, 0 for no; ownership of agricultural land: 4 for 5 acres or more, 3 for 2.0-4.9 acres, 2 for less than 2 acres or acreage not known, 0 for no agricultural land; ownership of irrigated land: 2 if household owns at least some irrigated land, 0 for no irrigated land; ownership of livestock: 2 if own livestock, 0 if not own livestock; durable goods ownership: 4 for a car or tractor, 3 each for a moped/scooter/motorcycle, telephone, refrigerator, or colour television, 2 each for a bicycle, electric fan, radio/transistor, sewing machine, black and white television, water pump, bullock cart, or thresher, 1 each for a mattress, pressure cooker, chair, cot/bed, table, or clock/watch. Index scores range from 0-14 for low SLI to 15-24 for medium SLI to 25-67 for high SLI.

Table 2 Monthly expenditure pattern on health among normal weight, overweight, obese and medically obese women age 20-53 years, Delhi, 2003

Health expenditure	Current BMI			
	Normal	Overweight	Obese	Medically Obese
Monthly health expenditure**				
Nil	64.4	59.6	44.7	34.2
Up to Rs.100	16.4	12.3	20.2	18.4
More than Rs.100	19.2	28.1	35.1	47.7
Mean monthly expenditure in Rs				
Health expenditure as percentage to total household expenditure				
Nil	69.1	67.3	60.0	46.4
Up to 5%	20.6	17.8	24.3	32.1
More than 5 %	10.3	14.9	15.7	21.4
Number of women	73	103	93	40
Significance level by Chi-Sq test: ** at 5% level				

Table 3 Percentage of women reported high (above mean) monthly expenditure on her health and high health expenditure (above mean) as a proportion to total household expenditure according to level of their BMI and background characteristics, Delhi

Women's Characteristics	High monthly expenditure (above mean) on women's health	High health expenditure (above mean) proportion in total household expenditure
<i>Current BMI</i>		
Normal		
Overweight		
Obese		
Medically Obese		
<i>Age</i>		
20-34		
35-54		
<i>Education</i>		
Illiterate		
Literate, < middle school complete		
Middle school complete		
High school complete and above		
<i>Religion</i>		
Hindu		
Muslim		
Others		
<i>Caste/tribes</i>		
Scheduled caste/ tribes		
Other backward class		
Others		
<i>Standard of living index</i>		
Low/ Medium		
High		
<i>Working status</i>		
Not working		
Working		
<i>Media exposure</i>		
Never reads newspapers		
Reads newspapers occasionally		
Reads newspapers daily		
Number of women		

Table 4 Adjusted effects (Odds ratio with 95% confidence interval (CI) of level of obesity on women's high health expenditure (above mean) and high health expenditure in proportion to total household expenditure, Delhi

Characteristics	High monthly health expenditure	High monthly health expenditure proportion (above mean) in total household expenditure
	OR (95% CI)	OR (95% CI)
<i>Current BMI</i>		
Normal ^R		
Overweight		
Obese		
Medically Obese		
<i>Age</i>		
20-34		
35-54		
<i>Education</i>		
Illiterate ^R		
Literate, < middle school complete		
Middle school complete		
High school complete and above		
<i>Religion</i>		
Hindu ^R		
Muslim		
Others		
<i>Caste/tribes</i>		
Scheduled caste/ tribes ^R		
Other backward class		
Others		
<i>Standard of living index</i>		
Low/ Medium ^R		
High		
<i>Employment status</i>		
Not working ^R		
Working		
<i>Media exposure</i>		
Never reads newspapers ^R		
Reads newspapers occasionally		
Reads newspapers daily		
Number of women		