

## Assessment of Nutritional Status of Urban Women of Maharashtra, India

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**Abstract:** India's evolving economy and rapid urbanization are affecting nutrition statuses of Indian women. Along with under-nutrition, over-nutrition co – exists in urban women, which needs attention to prevent the development of non - communicable diseases. This study aims to assess the nutritional status of urban women and find out the factors affecting it. A cross sectional study of randomly selected 550 women of age group of 18 - 60 years was conducted in Mumbai and Pune. Nutritional status was measured using BMI and cut off points given by WHO. Pre-validated questionnaire was used to acquire information about eating habits and background characteristics. Data was analysed based on percentages and relationship between variables were established using Pearson's Chi – square test. Overall prevalence of underweight, normal and overweight and obese women were 8%, 48% and 44%, respectively. Family history of medical condition ( $p=1.0E-08$ ), consumption of junk foods ( $p=2.5E-20$ ), frequency of exercise ( $p=6.4E-04$ ), type of exercise ( $p=1.01E-06$ ), family income category ( $p=3.3E-13$ ), marital status ( $p=0.002$ ) and education level ( $1.2E-36$ ) were significantly related to overweight and obesity. BMI status was related to the ailments with which the women suffered in the population ( $9.5E-30$ ). Prevalence of overweight and obesity seemed high in these women, focussing the probable changes in lifestyle and increasing income levels.

**Keywords:** BMI, Nutritional Status, Obesity, Underweight, Urban Women

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### I. Introduction

The health of Indian women is intrinsically linked to their status in society. Women in poor health are more likely to give birth to improper weight infants and are also less likely to be able to provide food and adequate care for their children. A woman's health affects the household economic well-being and when women become healthier and better nourished, their status in society improves [1, 2]. The multiple roles of household work, child rearing and paid work that women carry out has implications for their physical and mental health [3].

India is urbanizing rapidly. Its urban population has increased from 27.8% in 2001 to 31.2% in 2011 and is expected to increase further to 535 million (38%) by 2026 [4]. Because of the rapid urbanization and improvement in standard of living, urban women are also contributing to the family income along with taking care of house – hold work. This, at times, tends to put an extra burden on these women due to which their health and nutrition requirements get overlooked. Women's physiological makeup calls for special nutritional supplements. Menstruation and childbirth are iron depleting physiological processes. Further, cultural practices disadvantage women in many ways and add to their poor nutritional status [5-7].

It is very important to identify health issues of women so that they can be treated or prevented before they manifest into severe health hazards. Data of nutritional status of women is scarce as not many studies have been done so far. Thus, this study was done to assess the nutritional status of urban women in Maharashtra, where disparities in socio – economic status and education level exists.

### II. Materials and Methods

A cross-sectional epidemiological study was carried out on randomly selected 550 women of age 18 – 60 years having varied socio – economic background, religion and ethnicity from Mumbai and Pune. Oral Consent was obtained from concerned authorities prior to data collection, after explaining the objectives and methods of the study. A pretested questionnaire was distributed among the respondents prior to the day of anthropometric assessment which was to be filled by them. This questionnaire helped in obtaining the information about the socio – demographic background characteristics of the respondents. Ages of the women were calculated by their birth dates. Anthropometric measurements of the subjects were taken using standard equipment and methods. Weight was taken using a digital weighing machine, to the nearest 0.1kg and height was recorded using an inch tape to the nearest 0.1 cm. Waist, hip and mid arm circumference was also taken using an inch tape to the nearest of 0.5 cm. Bicep and triceps skin – fold thicknesses were taken using a skinfold callipers. All measurements were taken with the respondents' barefoot and wearing light loose clothing.

Nutritional status was assessed using BMI and central obesity was checked in the respondents using waist – to – hip ratio. BMI was calculated using Quetlet’s Index as weight in kilograms/ (height in m)<sup>2</sup>. Prevalence of obesity was represented as percentage. Central tendency and level of dispersion in the population were calculated using statistical equations and methods like mean, median, maximum, minimum, standard deviation and coefficient of. Chi – square test was done to establish relationship between obesity and risk factors regarding eating habits. SPSS 16.0 and Microsoft Excel 2007 were used for data analysis.

### III. Results

#### 3.1 Central Tendency of the population and level of dispersion

Mean was calculated to find out the central tendency and Coefficient of variance (CV) was calculated using Standard Deviation (SD) to assess the dispersion of anthropometric measurements in the population. These are represented in Table 1.

**Table.1 Anthropometric measurements of the respondents.**

Height (Cm)		Hip Circum. (Inch)	
Valid N	550	Valid N	550
Mean	161	Mean	39
SD	6	SD	6
CV	4%	CV	17%
Minimum	149	Minimum	30
Maximum	178	Maximum	84
Weight (Kg)		W:H (Ratio)	
Valid N	550	Valid N	550
Mean	64	Mean	0.9
SD	12	SD	0.1
CV	19%	CV	9%
Minimum	39	Minimum	0.60
Maximum	100	Maximum	1.00
Waist (Inch)		BMI (kg/m) <sup>2</sup>	
Valid N	550	Valid N	550
Mean	33	Mean	25
SD	5	SD	4
CV	15%	CV	17%
Minimum	24	Minimum	16
Maximum	67	Maximum	37

The average BMI in the population was  $25 \pm 4$  kg/m<sup>2</sup> and the waist – hip ratio was  $0.9 \pm 0.1$ . CV is a standardized measure of dispersion and CV<100% shows low variance. In this sample, each anthropometric factor shows low variance, i.e., the level of dispersion is less around the mean in all three categories.

#### 3.2 Nutritional Status of Urban Women in India

Nutritional statuses are presented as percentages. The study included group a group of 550 women which included 86.4% Hindu, 6.4% Islamic 7.2% other religions; 46% of the respondents were from the age group 21 – 29 years and 42% were from age group 30 – 39 years. Majority were from nuclear families (71%) and were working women (76%); 80% of the respondents were from Middle Income Group, 14% from HIG and 6% from MIG and 73% were married.

**Fig. 1: Nutritional Status of Respondents according to BMI.**

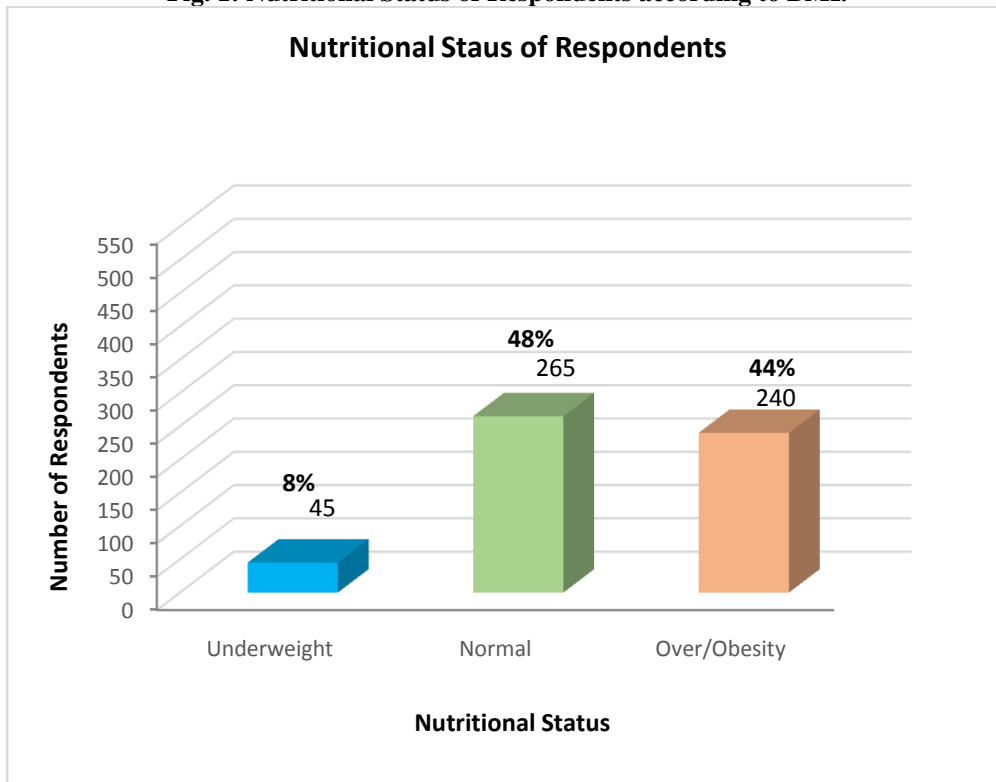
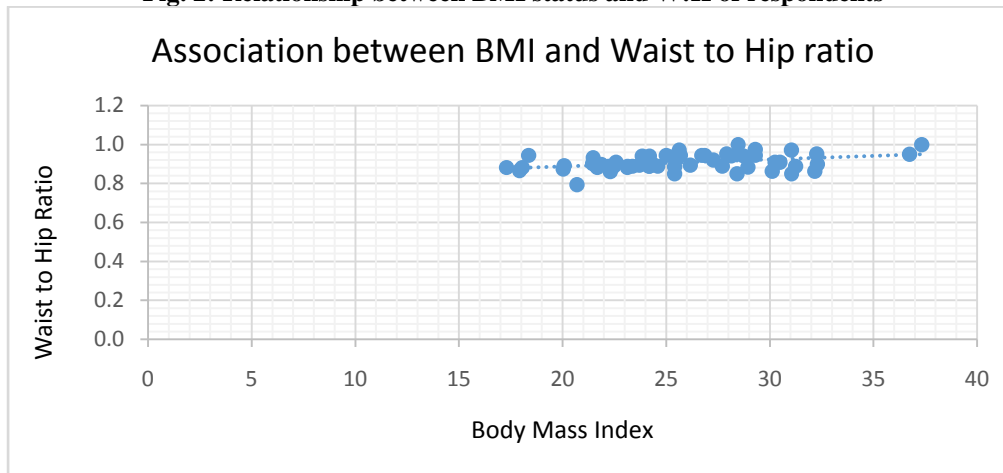


Fig.1 shows that 8% of women were underweight, 44% were overweight and obese and 48% had optimum nutritional status among the sample.

**Fig. 2: Relationship between BMI status and W:H of respondents**



Adjusted R Square	0.138217
p-Value	3.8E-05

Waist – to – Hip ratio is an indicator of central obesity. 54% of women (295/550) showed high W:H ratio, which can be considered as over – nutrition and prevalent central obesity. Fig.2 shows the relationship between BMI status of the respondents and their W:H. While the BMI and W:H ratio are highly related to each other, there is high variability as well, since the value of adjusted R square is very less. This means there are probably more variables than BMI, that effect W:H ratio.

**Relationship between BMI status of Women and other factors**

Association between BMI statuses of women and factors like socio – demographic characteristics, physical activity, eating habits were assessed. Also, relationship between heredity and BMI status was assessed.

**Table.2 Relationship between BMI status and Socio – demographic background of respondents.**

	Body Mass Index Weight Categories					p-value
	Underweight	Normal	Overweight	Row Total		
	Count	Count	Count			
Type of family	Nuclear	25	200	165	390	0.015*
	Joint	20	65	75	160	
	Col Total	45	265	240	550	
Age Group	18-20	0	5	0	5	0.110
	21-29	30	125	100	255	
	30-39	15	110	105	230	
	40-49	0	20	25	45	
	50-60	0	5	10	15	
	Col Total	45	265	240	550	
Family income categories	LIG	15	10	10	35	3.3E-08*
	MIG	25	210	205	440	
	HIG	5	45	25	75	
	Total	45	265	240	550	
Occupation	Working	40	195	190	425	0.014*
	Housewife	0	55	45	100	
	Retired	0	0	5	5	
	Student	5	15	0	20	
	Total	45	265	240	550	
Marital Status	Married	25	200	175	400	0.002*
	Unmarried	20	65	55	140	
	Divorced/ Widow	0	0	10	10	
	Total	45	265	240	550	
Education	Uneducated	15	0	0	15	1.2E-36*
	HSC	0	0	0	0	
	SSC	0	0	0	0	
	Graduate	0	45	95	140	
	PG	25	190	145	360	
	Higher	5	30	0	35	
	Total	45	265	240	550	

According to Table1, Type of family ( $p\text{-value}= 0.015$ ), Family Income ( $p\text{-value}=3.3E-08$ ), Occupation ( $p\text{-value}= 0.014$ ), Marital Status of the respondents ( $p\text{-value}=0.002$ )and Education status of the respondents ( $p\text{-value}=1.2E-36$ ) showed a significant relationship with the BMI status of the respondents.

**Table 3. Relationship between BMI status and family history of medical condition.**

Family History	BMI STATUS			Row Total	p-value
	Underweight	Normal	Obesity		
	Count	Count	Count		
None	20	70	20	110	1.0E-08*
Obesity	0	10	15	25	
DM	5	70	85	160	
HBP	15	90	100	205	
Cardiac	0	5	15	20	
Renal	0	0	0	0	
Cancer	0	5	0	5	
More than 1	5	15	5	25	
Column Total	45	265	240	550	

Family history showed a significant co-relation with the BMI status of the respondents.

**Table2. Relationship between BMI status and ailments, physical activity and food habits of respondents.**

	Body Mass Index Weight Categories					p-value
		Underweight	Normal	Overweight	Row Total	
		Count	Count	Count	Row Total	
Ailments	Allergies	0	5	15	20	9.5E-30*
	Anemia	5	5	5	15	
	Depression	0	5	10	15	
	Respiratory	0	10	5	15	
	GI	5	5	0	10	
	High Chol	0	0	5	5	
	Htn	0	30	15	45	
	Hypothyroid	0	10	15	25	
	Osteo/arthritis	0	5	0	5	
	DM	0	0	0	0	
	Cardiac	0	0	0	0	
	Deficiency	15	5	0	20	
	None	15	180	130	325	
	more than 1	5	5	40	50	
Col Total	45	265	240	550		
Exercise	Never	10	30	10	50	6.4E-04*
	Regularly	15	85	70	170	
	Occasion	15	80	90	185	
	Rarely	5	70	70	145	
	Col Total	45	265	240	550	
Type of Exercise/d	cycle	5	15	5	25	1.0E-06*
	walk	35	185	195	415	
	run	0	25	0	25	
	swim	0	10	0	10	
	Dance/Aerobics	5	5	5	15	
	sport	0	5	0	5	
	others	0	5	0	5	
	none	0	20	20	40	
	Col Total	45	265	240	550	
Consumption of Junk Food	Never	15	10	0	25	2.5E-20*
	Almost never	0	40	30	70	
	Sometimes	20	185	145	350	
	Frequently	10	30	65	105	
	Col Total	45	265	240	550	
Consumption of Fruits and Vegetables/ day	None	0	0	0	0	0.01*
	5	0	0	0	0	

	3-5	20	70	55	145	
	1-2	25	165	175	365	
	<1	0	25	10	35	
	No Fruits	0	0	0	0	
	Col Total	45	265	240	550	
Consumption of Alcohol	Never	35	150	150	335	0.29
	Regularly	0	5	0	5	
	Occasion	0	30	25	55	
	Rarely	10	80	65	155	
	Col Total	45	265	240	550	

Table 2 infers the association between BMI status of the respondents with their ailments, exercise habits and food habits. Type of ailments that the respondents had ( $p\text{-value}=9.5E-30$ ) and Type and frequency of exercise ( $p\text{-value}=1.0E-06$ ,  $p\text{-value}= 6.4E-04$  respectively) showed a significant association with their BMI status. In food habits, frequency of consumption of junk foods by them was significantly associated with their BMI status ( $p\text{-value}= 2.5E-20$ ). Daily consumption of fruits and vegetables also showed a statistical significance with the BMI status of respondents ( $p\text{-value}= 0.01$ ), alcohol consumption did not show any statistical significance.

#### IV. Discussion

The study showed that 8% of the women were underweight, 44% was overweight and 48% were having normal BMI, Hence, it can be said that prevalence of overweight has overpowered the prevalence of underweight in urban women of India, similar results have been found in the studies conducted by Gouda J et al (2014) [8] where more than 23% of women in the urban area are either overweight or obese compared to only 7% of women in rural areas, Sindhu S (2002) [9] where 4.5% women were underweight, 50.2% were normal while 45.3% were overweight and obese and a study conducted by Reddy KS et al (2002) [10] reveals that overweight is widely prevalent in the adult urban Delhi population, whereas underweight is a significant problem in the rural population. Also, as per waist – hip ratio, occurrence of overweight and obesity were higher than underweight. Occurrence of any medical condition in the family also showed statistically significant association with the BMI status of the women ( $p\text{-value}=1.0E-08$ ).

In this study it was seen that nutritional status of the women were related to their income categories ( $p\text{-value}= 3.3E-13$ ). Majority of the population came from Middle Income Group (80%), after that from HIG (14%) and only 6% constituted the LIG. This disparity in the income group is related to the nutritional disparities in the population which was in accordance to a study conducted in Delhi [10]. Other determinants which were significantly correlated to the nutrition status of the respondents were their marital status ( $p\text{-value}=0.002$ ) which was also seen in the study of Gouda et al. [8], education status ( $p\text{-value}=1.2E-36$ ), frequency and type of exercise they preferred ( $p\text{-value}= 6.4E-04$ ,  $p\text{-value}=1.01E-06$ ) and the frequency of junk food they consumed ( $2.5E-20$ ). Also, BMI status showed a significant association with the ailments, these respondents were suffering from ( $p\text{-value}=9.5E-30$ ), thus, to prevent the advancement or cure these ailments in the respondents, their nutritional status needs to be corrected.

#### V. Conclusion

Based on the findings of the study, the overall underweight, normal and overweight and obesity prevalence in the population came out to be 8%, 48% and 44%, respectively. Associated socioeconomic and other demographic factors having a statistical significance with BMI status in these women were type of family, family income, level of education and their marital status. Age group of these respondents did not show a significant association with their BMI status. In food habits, consumption of fruits and vegetables and junk food were significantly associated with the BMI status of the respondents. Type and rate of exercise these women opted for was also related to their BMI statuses. Consumption of alcohol did not show an association with their nutritional status. Relationship between BMI status and family history of medical condition was established which was statistically proven.

Women can help in National development in the country only if their own nutritional status is optimum. Only a healthy woman, free from any infirmities and ailments will be able to contribute towards the social-economic, growth of her family and in turn, the society. Thus measures and plans need to be developed by the Government and Health care providers to educate and help women regarding their health and nutrition.

### **Acknowledgment**

The authors would like to thank all the respondents for their co – operation, support and patience.

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