



Sociodemographic Factors Responsible for Prevalence of Overweight/Obesity Among Bangladeshi Housewives

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Abstract

The study was planned to identify some socioeconomic variables enhancing overweight/obesity among housewives. For this, a group of 995 adults were investigated. In the group there were 177 overweight/obese housewives out of 230 housewives in the sample. It was observed that each of the factor's rural residency, lower medium age, secondary level education, higher socioeconomic status, disability, sedentary activity, physical inactivity, smoking habit, and lower duration of diabetes were significantly associated with overweight/obesity among housewives.

In fitting the binary logistic regression model, it was noted that the one unit increase in each of the variables' socioeconomic status, duration of diabetes, smoking habit, and sedentary activity there was a highly significant increase in the level of overweight/obesity of housewives. With the increase in age there was a declining trend in the level of overweight/obesity. The most responsible variable in discriminating overweight/obese housewives from other adults was sedentary activity followed by smoking habit and socioeconomic status. The other responsible variables for discrimination were level of education, involvement in physical work, prevalence of diseases, age, and residence.

Keywords: Diseases; Discriminant analysis; Housewife; Logistic regression; Overweight; Obesity

Introduction

The prevalence of overweight/obesity is a most common and serious health hazard among the people worldwide as this is the source of many non-communicable diseases [1-8]. Earlier reports were that around 2.5 billion adults of age 18 years and above worldwide were overweight, and 890 million of them were obese [9-11]. The significant sociodemographic variables associated with overweight/obesity were age, education, residence, occupation, economic status, smoking habit, and physical activities [12-19]. The most responsible sociodemographic variables were rural residence, religion, old age, higher education, housewife, higher economic status, physical inactivity, and longer duration of diabetes [13-25].

The problem of overweight/obesity in females is also increasing globally, and the fact is true for both urban and rural women [26-33]. Research findings indicated that overweight/obesity was in higher rate in women than it was in men [26]. Higher rate of prevalence was also noted among urban non-

poor housewives. Significant increase of prevalence rate was in increasing trend with the increase in age, level of education, level of wealth index, employment status, and other socio-demographic characteristics [34-36]. The recent studies in Bangladesh, India, and in other countries also identified the similar sociodemographic characteristics responsible for overweight/obesity [37-42]. In this study, an attempt was made to investigate and to identify the sociodemographic variables influencing the prevalence of overweight/obesity among Bangladeshi housewives.

Methodology

For the study data were collected through a survey based on quota sampling plan to cover male and female adults of 18 years and above in the session 2018 - 19. The quota was decided for males and females in the ratio 50.1: 49.9 as it was the sex ratio of the country during the survey period [43]. Investigation was done in the months of June and July. The respondents were interviewed by some nurses and medical assistants working in

a diagnostic centre located in an urban area. Some respondents were interviewed in another diagnostic centre located in a semi urban area. The centres were selected purposively to cover both rural and urban residents.

The investigated adults were the inhabitants of the localities near the centres, and they were visiting the centres for their blood and urine screening test. The in-service nurses and medical assistants were trained to collect information from the visiting adults. The enumerators were also instructed to interview the respondents willing to provide information on their sociodemographic characteristics including the prevalence of any type of disease and treatment status. The information of each adult was recorded through a pre-designed and pre-tested questionnaire containing the questions on monthly family income and family expenditure.

The total investigated units were 995, out of which 498 were males and 497 were females. The recorded data of each adult were residence, gender, age (in years), education, occupation, marital status, monthly family income and expenditure (in 000 Tk.), smoking habit, physical activity, food habit, sedentary activity, prevalence of disease(s), duration of suffering from disease(s)/diabetes (in years), mode of treatment, mode of diagnosis, consulted the registered medical practitioner. The recorded data were mostly qualitative in nature and each one of this information was transformed to nominal scale for the ease of analysis.

The quantitative variables were age, monthly family income and monthly family expenditure, and duration of diabetes. Each of the quantitative variables was also noted in classes. The classes for age were < 25, 25 - < 40, 40 - < 50, and 50+. The classes of duration of diabetes were < 5, 5 - < 10, 10 - < 15, and 15+. Families were classified into 4 economic classes based on monthly income and monthly expenditure. These classes were identified as lower (if monthly income of a family was < Tk.50 and expenditure was < Tk. 40), medium (if income was Tk. 50 - 100 and expenditure was Tk.40 - < 80), upper medium (if income was 50 - 100 and expenditure was Tk. 80 - < 100) and higher (if income was Tk. 150 and above and expenditure was Tk.120 and above).

These classes were transformed into nominal scale by assigning numbers 1,2,3, and 4, respectively. Nominal measurements for level of education were 1,2, 3, and 4 for illiteracy, primary education, secondary education, and higher education, respectively. Levels of occupation were housewife=1, retired=2, business = 3, farming = 4, and service = 5. The measurements of these three variables were added using the concept of Kuppaswamy scale [44], where minimum value of the results of addition was 3, and maximum value was 13. The new variable socioeconomic status was evaluated using the values 3 - 13 of the 3 characteristics. The new variable had 3 levels viz low (if, sum of the 3 characteristics was 3 - 6; medium (if some of the 3 characteristics was 7-9, and high (if sum of the 3 characteristics was 10 and above).

Body mass index (BMI, weight in kg divided by height in meter²) was calculated to identify the overweight/obese adults. Any one of the investigated adults was identified as underweight (if BMI < 18.5), normal (if 18.5 < BMI < 23.0), overweight (if 23.0 < BMI < 27.5) and obese (if BMI ≥ 27.5) [45,46]. Using the data of blood pressure (BP, mmHg), the adults were classified into 4 classes. The classes were optimal group (if BP < 120/80), normal group (if BP < 130/85), high normal group (if BP < 140/90), and hypertensive group (BP ≥ 140/90 [47,48]. The main analysis was based on the variable prevalence of overweight/obesity among housewives. The number of overweight/obese housewives was 177.

The study variable was not noted among the remaining 818 adults. Attempt was made to discriminate 177 overweight/obese housewives from the remaining 818 respondents. In the analytical process of discrimination some most responsible variables for discrimination can be identified [49-52]. The most responsible variable is one for which absolute correlation coefficient of a variable with discriminant function score is highest. The investigation was also done to observe the association of the study variable with other socio-demographic variables. The study of association also helps to find the risk ratio of a particular level of a variable responsible for prevalence of the characteristic under study [53,54]. Binary logistic regression model was also fitted to decide the increase / decrease in the study variable for one unit increase in predictor [55-58].

Results

The results presented here were based on data collected from 995 Bangladeshi adults of 18 years and above. The investigated units were males (498) and females (497), and some were from rural area (531) and 464 were from urban area. Among the adults 230 were housewives. There were 724 overweight and obese respondents. Out of 230 housewives, 177 were overweight and obese. The main target of the analysis was to identify the responsible variable for the prevalence of coexistence of overweight/obesity and management of household affairs and to detect the sociodemographic characteristics to discriminate these 177 adults from the remaining 818 respondents. The overweight/obese housewives were shown in Table 1.

There were 531 rural respondents including 139 housewives; the prevalence rate of coexistence of the characteristic under study was observed among 20.3% of them. The corresponding percentage among urban adults was 14.9 (Table 2), where there were 91 urban housewives (Table 1). These two proportions were significantly different [$\chi^2= 5.063$, p-value= 0.024]. The rural respondents had 37% more risk of prevalence of the problem under consideration [R.R.= 1.37, C.I. (1.04, 1.80)]. Number of Muslim adults was 848 (85.2%); among them the proportion of housewives having the problem of overweight/obesity was 0.179. The corresponding figure among non-Muslims was 0.170.

Table 1: Classification of respondents according to occupation, and some other demographic characteristics.

Other demographic characteristics	Occupation					Total
	Farming	Business	Service	Retired	Housewives	
Body Mass Index						
Underweight	7	7	10	3	11	38
Normal	23	61	76	31	42	233
Overweight/obese	74	166	219	88	177	724
Total	104	234	305	122	230	995
Residence						
Rural	93	83	166	50	139	531
Urban	11	151	139	72	91	464
Religion						
Muslim	98	196	259	101	194	848
Non-Muslim	6	38	46	21	36	147

Table2: Distribution of overweight/obese housewives according to different sociodemographic Characteristics.

Sociodemographic characteristic	Overweight/obese housewives				Total	
	Yes		No			
	Number	%	Number	%	Number	%
Residence						
Rural	108	20.3	423	79.7	531	53.4
Urban	69	14.9	395	85.1	464	46.6
Total	177	17.8	818	82.2	995	100
Religion						
Muslim	152	17.9	696	82.1	848	85.2
Non-Muslim	25	17	122	83	147	14.8
Age (in years)						
< 25	28	14.3	168	85.7	196	19.7
25 – 40	96	23.9	305	76.1	401	40.3
40 – 50	32	15.8	171	84.2	203	20.4
50+	21	10.9	174	89.1	195	19.6
Marital status						
Currently married	172	18.5	754	81.5	926	93.1
No	5	7.2	64	92.8	69	6.9
Socioeconomic status						
Low	88	43.8	113	56.2	201	20.2
Medium	89	18.8	385	81.2	474	47.6
High	0	0	320	100	320	32.2
Involved in sedentary activity						
Yes	126	28.5	316	71.5	442	44.4
No	51	9.2	502	90.8	553	55.6
Habit of doing physical work						
Yes	65	13.5	416	86.5	481	48.3
No	112	21.8	402	78.2	514	51.7
Habit of taking process food						
Yes	73	20.1	290	79.9	363	36.5
No	104	16.5	528	83.5	632	63.5

Prevalence of disease except diabetes						
None	86	14.2	520	85.8	606	60.9
Heart	33	26.2	93	73.8	126	12.7
Kidney	16	17.4	76	82.6	92	9.2
Eye	26	21.1	97	78.9	123	12.4
Disability	16	33.3	32	66.7	48	4.8
Blood pressure (mm Hg)						
Optimum	104	19.3	436	80.7	540	54.3
Normal	45	16.1	235	83.9	280	28.1
High normal	20	17.2	96	82.8	116	11.7
Hypertensive	8	13.6	51	86.4	59	5.9
Duration of diabetes (in years)						
Did not arise	53	16.2	275	83.8	328	33
< 5	45	15.5	246	84.5	291	29.2
5 – 10	52	25.2	154	74.8	206	20.7
10 – 15	14	14.1	85	85.9	99	9
15+	13	18.3	58	81.7	71	7.1
Total	177	17.9	818	82.1	995	100

These two proportions were statistically similar [$\chi^2=0.072$, p-value= 0.798], though the Muslim respondents had slightly higher rate of prevalence (17.9%) and they had only 6% more risk of prevalence [R.R.=1.06, C.I. (0.72 ,1.56)]. There were 40.3% lower middle age group (25–40) respondents and 23.9% were overweight/obese housewives. This percentage was significantly higher than the percentages noted among affected housewives of other age groups [$\chi^2= 19.160$, p-value= 0.000]. For this group the risk of suffering was 76% more compared to the risk of other similar housewives [R.R. = 1.76, C.I. (1.35, 2.30)].

With the increase in ages there was a downward shift in the rate of prevalence of the problem except the rate prevailed among younger adults. The lowest rate (10.9%) was observed among older people of ages 50 years and above. The percentage of married respondents was 93.1; among them 18.5% were overweight/obese housewives. This percentage was 257% more compared to the percentage prevailed in single respondents (7.2%) of the same category. These two proportions were significantly different [$\chi^2= 5.635$, p-value= 0.18] and the former group had 2.56 times risk of prevalence [R.R.= 2.56, C.I. (1.09, 6.02)]. The percentage of respondents belonging to families of low socioeconomic status was 20.2.

Among this group 43.8% were overweight/ obesity housewives. The nearest percentage of similar housewives was 18.8 and they were from families of middle socioeconomic status. No one of same category housewife belonged to families of high socioeconomic status. The differentials in proportion of overweight/ obese housewives of different socioeconomic status were significantly different [$\chi^2= 162.412$, p-value = 0.000]. This category of housewives of low socioeconomic status had 291%

more risk compared to the risk of other housewives [R.R.= 3.91, C.I. (2.73, 4.99)]. Among the respondents 4.8% were physically disable, among them 33.3% were overweight/ obese housewives.

The corresponding percentages for heart patients and patients with problems were 26.2 and 21.1, respectively. The differentials in percentages among such respondents having different diseases were varying significantly [$\chi^2= 20.328$, p-value= 0.000]. The disabled overweight/obese housewives were at higher risk of suffering by the amount 96% compared to the risk of similar other housewives [R.R. = 1.96, C.I. (1.28, 2.99)]. Optimum blood pressure was noted among 54.3% respondents; among them 19.3% were overweight/obese housewives. This percentage was highest compared to the percentages of other similar groups of respondents. For this group the risk of prevalence of the problem was 20% more [R.R. = 1.20, C.I. (0.91, 1.58)].

However, the differentials in percentages of housewives of different levels of blood pressure were statistically similar [$\chi^2= 2.109$, p-value = 0.550]. Diabetic patients suffering for 5 – 10 years were 20.7% in the sample; among them 25.2% were overweight/ obese housewives. This percentage was significantly higher compared to the percentages of similar category of diabetic housewives suffering for different durations and for this group the risk of becoming overweight/ obese housewives was 1.59 times compared to the risk of other diabetic housewives [$\chi^2= 10.412$, p-value= 0.034 ; R.R.= 1.59, C.I.(1.20, 2.11)].

It was noted that 44.4% respondents were involved in sedentary activities and 28.5% of them were overweight/obese housewives. This percentage was significantly higher than the corresponding percentage of other housewives [$\chi^2= 62.468$,

p-value= 0.000]. For this group the risk of affecting by the problem was 3.09 times compared to the risk of other similar group of housewives [R.R.= 3.09, C.I. (2.29, 4.17)]. The percentage of physically inactive respondents was 51.7. Among them 21.8% were overweight/obese housewives.

This percentage was significantly higher than the percentage noted among physically active group of this category [$\chi^2= 11.638$,

p-value= 0.001] and for the group the risk was 61% more [R.R.=1.61, C.I. (1.22, 2.13)]. The percentage of respondents habituated in taking process food was 36.5, among them 20.1% were overweight/obese housewives. For this group of housewives, the risk of facing the problem was 22% more [R.R.= 1.22, C.I. (0.93, 1.60)], but the percentage of this group of housewives was not significantly higher than the corresponding percentage of other group [$\chi^2= 2.106$, p-value= 0.147].

Results of Discriminant Analysis

Table 3: Results of discriminant analysis.

Sociodemographic variables	Correlation coefficient, r in descending order of magnitude (ignoring sign)	Discriminant function coefficient	Lambda	F	p-value
Socioeconomic status	0.655	0.792	0.811	231.374	0
Gender	-0.654	-0.453	0.816	223.772	0
Sedentary activity	-0.357	-0.136	0.937	66.518	0
Smoking habit	-0.271	0.034	0.963	38.366	0
Habit of doing physical work	0.15	0.41	0.988	11.752	0.001
Prevalence of disease, except diabetes	-0.116	-0.135	0.993	7.008	0.008
Marital status	0.104	0.083	0.994	5.655	0.018
Age	0.102	0.177	0.995	5.396	0.02
Residence	0.099	0.12	0.995	5.079	0.024
Habit of taking process food	-0.063	-0.194	0.998	2.106	0.147
Level of blood pressure	0.055	0.0047	0.998	1.576	0.21
Duration of diabetes	-0.043	-0.243	0.999	0.979	0.323

Related to the objective of the study, we had two groups of respondents; in one group there were 177 overweight/obese housewives and in another group, there were 818. We had the objective to discriminate these two groups in such a way that the groups were significantly different in respect of some sociodemographic variables. The analytical process also identified some responsible variables for discrimination [49-52].

The variables included in the analysis were residence, religion, marital status, age, socioeconomic status, smoking habit, habit of doing physical work, habit of taking process food, prevalence of disease, blood pressure level, and duration of diabetes. The basic analytical results indicated that the two groups of respondents were significantly different [Box's M= 410.820, F = 4.394, p-value= 0.000]. The analysis was also satisfactory [Lambda = 6.55, $\chi^2= 417.082$, p-value= 0.000]. The other results were presented in Table 3 below:

It was observed that the variable socioeconomic status was the most responsible factor in discriminating overweight/obese housewives from other adults. The next responsible variable was gender followed by sedentary activity, and smoking habit. The other factors in discriminating against two groups of respondents were habit of doing physical work, prevalence of disease, marital status, age, and residence. These were noted from the absolute

and significant values of correlation coefficient of the variable with discriminant function score [49-52].

Results of Logistic Regression Analysis

The result of discriminant analysis indicated that most of the values of sociodemographic variables noted from two groups of respondents were not homogeneous. At this stage we can identify the significant impacts of these variables on the study variable. Our study variable was prevalence of overweight/obesity among the housewives, and the remaining variables were explanatory variables. For this, logistic regression model was fitted for the study variable on the explanatory variables. The basic result indicated that the model fitting was satisfactory as - 2 log likelihood = 518.033, p-value=0.000; Nagelkerke R² = 0.559.

The other results were presented in Table 4. It was observed that the factors gender, age, socioeconomic status, prevalence of disease duration of diabetes, process food consumption, and physical activity had impacts on prevalence of overweight/obesity among housewives. The results Exp(B) indicated that one unit change in sedentary activity, there was 0.467 unit change in prevalence of the study variable; one unit change in process food consumption, there was 1.097 unit change in prevalence; one unit change in duration of diabetes, there was 0.366 unit change in prevalence of study variable.

Table 4: Results in fitting logistic regression model.

Sociodemographic variables	Coefficient, B	s.e.	Wald statistic	p-value	Exp (B)
Residence	-0.211	0.236	0.801	0.371	0.81
Religion	-0.012	0.32	0.001	0.97	0.988
Gender	2.778	0.453	37.609	0	16.091
Age	-0.026	0.013	3.934	0.047	0.974
Marital status	-0.856	0.612	1.955	0.162	0.425
Socioeconomic status	-0.75	0.079	89.957	0	0.472
Prevalence of disease	0.102	0.043	5.559	0.018	1.007
Blood pressure	0	0.023	0	0.986	1
Duration of diabetes	0.312	0.125	6.212	0.013	1.366
Smoking habit	-0.25	0.343	0.532	0.466	0.779
Habit of taking process food	0.741	0.289	6.559	0.01	2.097
Habit of doing physical work	-1.656	0.299	30.607	0	0.191
Sedentary activity	0.383	0.24	2.552	0.11	1.467
Constant	1.377	2.155	0.408	0.523	-

Discussion

Key factors responsible for overweight/obesity among adults are some sociodemographic characteristics including residence, gender, age, education, marital status, education, sedentary activity, and employment status in many countries [34,37, 59-64]. This study was to identify some important factors responsible for overweight/obesity among housewives. The analytical results presented here were based on data collected from people visiting two diagnostic centres, one located in urban area, and another located in semi-urban area. Total investigated respondents were 995 covering 498 male adults and 497 female adults of 18 years and above. The objective of the study was to identify the responsible factors for the prevalence of overweight/obesity among the ample housewives.

So, the study variable was prevalence of overweight/obesity among housewives. This variable was noted among 177 housewives. The sociodemographic characteristics of these housewives were compared with the similar characteristics of the remaining 818 respondents. This group of housewives were discriminated from the remaining 818 adults. The process of discrimination helped in identifying the responsible factors for the prevalence of the study characteristics. Also, using the study variable as dependent one binary logistic regression model was fitted. The process of fitting helped in detecting the variable influencing the prevalence of overweight/obesity among the housewives.

From the results of discriminant analysis, it was seen that residence was important in discriminating two groups of respondents. The study of association indicated that the rural overweight/obese housewives had significantly higher risk of facing the problem. The problem of overweight/obesity among housewives was similar for both religious groups of adults. Age had significant impact on prevalence of overweight/obesity among

housewives and age discriminated two groups of respondents well. It was also seen that the overweight/obese housewives of age group 25 – 40 had higher risk of suffering from the problem.

Socioeconomic status had impact in changing the level of the study variable and this factor was most responsible in discriminating against two groups of respondents. It was also seen that low socioeconomic status had very high risk of suffering from overweight/obesity. Prevalence of disease had significant impact on the study variable, and this factor was important in discriminating two groups of respondents. Disable respondents had higher risk of prevalence of overweight/obesity among housewives. Level of hypertension had no impact in changing the prevalence of study variable and it had no contribution in discriminating against the two groups of adults.

The factor sedentary activity was the third most responsible variable in discriminating against two groups of respondents and this factor had significant impact on study variable. Further, it was seen that the risk of suffering by overweight/obese housewives involved in sedentary activity were 209% more compared to the risk of others. For the same group of housewives, the risk of physical inactivity was 61% more. The variable physical activity played an important role in discriminating against two groups of respondents. Overweight/obese diabetic housewives suffering for 5 – 10 years had 59% more risk of facing the problem. It was also noted that duration of diabetes had significant impact on study variable.

Conclusion

The results presented in this paper was based on data collected from 995 Bangladeshi adults of 18 years and above. The adults were classified into two classes, in one class there were 177 overweight/obese housewives, another class contained the remaining 818 respondents. One of the objectives of the analysis was to identify the responsible factors in discriminating against

two groups of respondents. The other objective was to observe the impacts of the sociodemographic factors on prevalence of overweight/obesity among housewives. The study variable was prevalence of overweight/obesity among housewives. It was seen that the sample rural respondents were 53.4% and 20.3% of them had 37% more risk of possessing the characteristic of the study variable.

The sample adults of age group 25 – 40 years were 40.3%; 23.9% of them possessed the study characteristic and they had 1.76 times risk of becoming overweight/obese housewives. The rate of prevalence of the study variable was decreasing with the increase in ages. The percentage of respondents belonged to families of low socioeconomic status was 20.2%. A big group of them were overweight/obese housewives with 3.91 times risk of facing the problem. This factor had significant impact in changing the value of study variable. Also, the factor was most responsible in discriminating against the two groups of adults. Each of the variable smoking habit, physical inactivity, involvement in sedentary activity, and habit of taking process food had significant power to discriminate the two groups of adults. Overweight and obesity are increasing in trend throughout the world. Higher obesity rate in women than men was noted in many regions. The influencing factors for the rise in rate of affected females are sedentary lifestyle including habit of taking process food, higher education, and middle age. The overweight/obesity rate is also observed among urban people. Thus, the problem cannot be avoided, but it can be reduced by improving the situation to maintain the healthy life. Community health workers can do a lot to change the prevalence of overweight/ obesity. Government can propagate about the danger of being overweight/obesity can suggest ways and means to maintain healthy life.

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