Integrating Overweight-obesity and Reproductive Factors of Married Women in Bangladesh

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Abstract

Overweight or Obesity has become a burning question because it is associated with various health complications. It is increasing day by day all over the world. In Bangladesh, it is higher among women than men. Therefore, we aims to integrate the overweight-obesity factors with the reproductive factors among the married women in Bangladesh aged 15-49 years. To conduct this study we used a secondary cross-sectional data on a wide range of indicators relating to population, health, and nutrition from Bangladesh Demographic and Health Survey (BDHS), 2014. In this study, we analysed married women's nutrition-related data using logistic regression model and multi-factor analysis (MFA). The data included 17,863 married women of various ages. Of 17863 women, about 18.8% were overweight and 4.3% were obesity. Women of Khulna, Chittagong and Dhaka division had a higher risk of being overweight or obese compared to the women of Barisal division. The richest women were 6.233 times (95 % CI: 4.004-9.720, p < 0.001) more likely to be overweight or obese compared to poorest women. It was also found that, the prevalence of overweight or obesity was higher in urban (37.5%) women than rural women (19%). From multi-factor analysis we found in overweight-obesity factors- Wealth Index, TV watching and current occupation of women are positively associated with overweight or obesity. Integrating the factors of overweight-obesity with reproductive groups, we found -Wealth index, Current occupational status and TV Watching in overweight-obesity group are positively associated with Educational status and Breastfeeding of reproductive group. Taken together, we can conclude that a large number of married women were suffering from overweight-obesity problems.

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Therefore, special health related programs such as promoting higher level of physical activities, ensuring nutritional food policies and improving awareness through educational institutions should be provided substantially for reducing the prevalence of overweight or obesity of married women in Bangladesh.
Keywords: Integration, Overweight-obesity, Reproductive, MFA, Bangladesh.

Introduction

Overweight or Obesity is a serious issue in public health as it is associated with various health complications and it is increasing day by day. It has become a global public health issue and more than one billion adults estimated to be overweight and over 400 million of them are obese [1]. The World Health Organization (WHO) has declared overweight as one of the top of 10 health risks in the world and one of the top five in developed nations [2]. According to the WHO, there will be about 2.3 billion overweight people aged 15 years and above, and over 700 million obese people worldwide in 2015.Worldwide at least 2.8 million people die each year as a result of being overweight or obese [2]. There are many factors which are responsible for Obesity such as genetic, physiological and behavioural [3]. Women obesity has become a major problem in various developing countries such as Middle East, Latin America and North Africa [4]. In low income or developing countries the middle aged persons more especially women are suffers most by obesity [5].

The women of Bangladesh, India and Nepal have been an overall increase in the BMI from 1996 to 2006 so it represent the elevation of overweight and obese [6]. Evidence shows that the prevalence of overweight and obesity is higher among women than among men in Bangladesh [7].According to the World Health Organization, the prevalence of physical inactivity is higher among Bangladeshi women than among women of other Asian countries [2] and there is a highly difference between the rural and urban women [21].In Bangladesh there were 25.2 percent women are underweight, 15.7 percent were overweight, and 3.9 percent women are obese among ever-married non-pregnant urban women [8]. Bangladesh Demographic and Health Survey (BDHS) declared that the proportion of underweight among ever-married women 15-49 (BMI<18.5) has decreased markedly from 52 percent in 1996 to 19 percent in 2014. At the same time, the proportion of overweight women (BMI ≥25) has increased from 3 percent to 24 percent. If BMI ≥23 is considered, the proportion of overweight women has been increased from 7 percent in 1996 to 39 percent in 2014[7].

The study indicates that a higher number of women are suffers from overweight or obese and there are various reason or risk factor are responsible for it such as age, wealth, food habit etc. [9]. Overweight or obesity is of the risk factor of various non-communicable diseases (NCD)

such as cardiovascular disease, hypertension or stroke [10]. One of the main reasons of infertility is obesity because there is a positive relation between obesity and infertility [11]. Obesity can be treated as a risk factor during pregnancy so should encourage overweight and obese women to maintain weight before being pregnant [12]. During pregnancy, the prevalence of being obese, overweight and normal weight is about 21.2%, 40.1% and 32.8% among all pregnant women in our country [13]. Obesity is the primary cause of diabetes, hypertension and it increase the risk of cardiovascular disease and major cancers such as breast cancer and endometrial cancer are also related with obesity [14]. It is the most important predictor of diabetes and findings support that type 2 diabetes cannot be controlled without a proper healthier lifestyle [22]. Middle aged obese women are in high mortality risk and again irrespective of age underweight is also associated immense mortality risk [15]. From all consideration body weight and mortality were directly associated all middle-aged women comparatively lean women are not in high risk of excess mortality [16]. The BMI has a positive and solid association with the risk of developing NCD diseases [17]. The overweight or obese prevalence in Bangladesh is increasing in both urban and rural women with high prevalence of CED, reveals the crisis of double hamper of malnutrition in Bangladesh [18]. The aetiology of obesity is multi factorial. It is a cause of poor diet and physical inactivity. It is responsible for imbalance between food intake and energy expenditure. Although obesity is affected by interaction between various genes and the environment, the genetic pool is not varying quickly; it is the environmental and social context that has changed and caused the epidemic [19].

World Bank declares Bangladesh as a lower middle-income country in the south Asian region and there was a little information available on correlates of obesity in married women, particularly in lifestyle, socio-economic and anthropometric indicators. That is why, we are interested to integrate the overweight-obesity factors with the reproductive factors among the married women in Bangladesh aged 15-49 years.

Methods

This study used women's nutrition related data. Secondary cross-sectional data was used which was most recently available in the 2014 Bangladesh Demographic and Health Survey (BDHS) including married women of age 15-49 years. The data were nationally representative and ethically approved which is available at the DHS Program website (https://dhsprogram.com/data/available-datasets.cfm).

Different socio-economic and demographic factors were used to conduct the study. The outcome variable for this study were overweight and obesity measured by body mass index (BMI). To calculate the BMI, this study followed WHO criteria. The women were categorised as

neither overweight nor obese when BMI was <25 kg/m^2, overweight if BMI was 25–29.9 kg/m2 and obese if BMI was >30 kg/m^2 [2]. To perform logistic regression analysis, we divided the BMI as two categories- one was Overweight-obese category (BMI>25 was coded 1 for Yes) and another was not (BMI<25 was coded 0 for No). For multifactor analysis, we considered Overweight-obesity as a variable when BMI> 25. We exclude those women who were currently pregnant and non-availability of information on height and or weight.

Different statistical analyses for both univariate and multivariate approach, such as chi-square test, multivariable logistic regression, multifactor analysis (MFA) have been performed to conduct the study. In univariate approach, descriptive information for the selected variables was provided first. The chi-square test was performed to assess the proportional differences in overweight and obesity status across the selected categorical variables. Cross-tabulations were performed to compare the Overweight and obesity across covariate categories. A logistic regression models were also used in univariate cases to identify the significant risk factors for overweight and obesity.

In multivariate cases, this study attempts to perform a multifactor analysis (MFA) technique using FactoMineR package [21, 31, 32,] to show the within group and between group integrations. For this, all the selected factors by the chi-square test were divided into two group of factors- Overweight-obesity group and reproductive group which is given in the Table A.

Table A: Overweight-obesity group (Group 1) and Reproductive group separation (Group 2).

Groups	Variable Names	Variable Details
Overweight-obesity group (Group 1)	Age	Age of women
	Working_Status	Family working Status
	Overweight_Obes	Overweight and Obesity
	Wealth_Index	Wealth Index
	TV_Watching	TV Watching
	Current_Occupation	Current Occupation
	Marital_St.H.N	Marital Status (stay with husband or not)
	No.household	No. of household members
Reproductive group (Group 2)	Age_at_1st.Birth	Age at first birth
	No.Live.Children	No. of live children
	Menoposal. Status	Menopausal Status of women
	C_Use	Current Contraceptive use
	Breastfeeding	Breastfeeding
	Fertility	Fertility
	Educational_Status	Educational Status

Appropriate sample weights provided by the 2014 BDHS were used for analysis. All univariate statistical procedures were performed using the SPSS and multivariate procedures were analysed using statistical software 'R' with FactoMineR package.
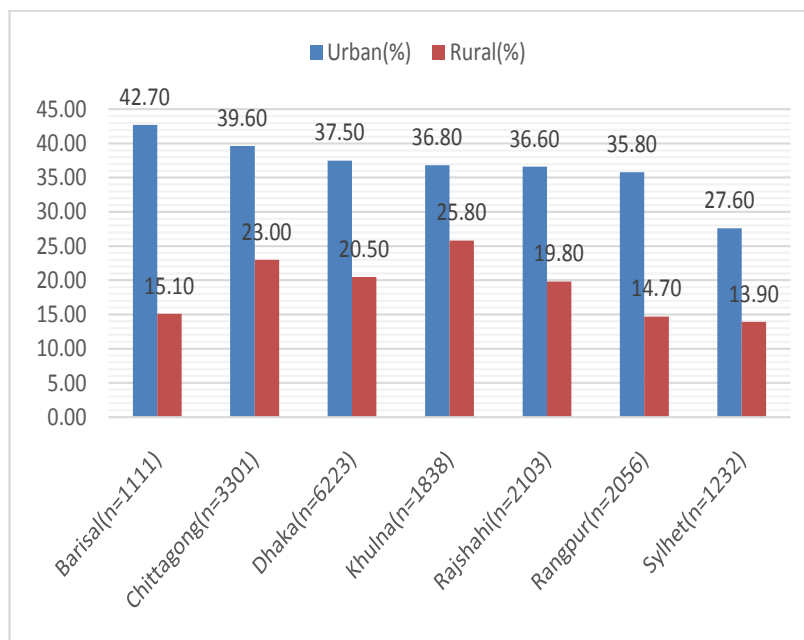
Results

Our final sample included 17,863 married women of various ages. The age of the respondents started from 15 years, with an average age of 30.87 years. The person with age below 20, were 26.4% from urban and 73.6%from rural areas. The Respondents, who was 40 or above were 28.8% from urban and 71.1% from rural respectively. Seven geographical areas were represented in our sample. The women who were from Dhaka region were 36.6%from Urban and 63.4% were from the rural region. Of married women who were living with their husband, about 27.9% were from urban and 72.2% were from rural. In urban areas, about 27.9% were live single. Extremely poor, 9.8% people were from urban and other percentage was from rural. Similarly, about67.1% people were from urban and 33.9% were from rural from total richest women. About 26.5% women did not use contraceptive in urban area and 73.3% from rural. Similarly, 29.5% and 70.5% people used contraceptive for urban and rural area respectively. In urban areas, most of them had 1 to 2 children whereas in rural areas maximum had more than 5 children. About 23.7% and 76.3% had their first child when they were less than 13 for both urban and rural areas respectively. About 19.8% and 80.3% had no education in urban and rural respectively. By statistical techniques BMI had three categories of underweight, overweight and obese. In urban areas, most of them were obese (56.1%). But in rural areas most of them were underweight or good health (76.6%) and 43% women are obese (**Table 1, Appendix**).

Bivariate associations between BMI and socio-demographic factors were displays in **Table 2**. Factors, such as age of respondents, current marital status, type of place of residence, division, number of household members, wealth index, current contraceptive use, menopausal status of women, number of living children, age at first birth, TV watching, husband education level were significantly associated with BMI (P<0.05). Prevalence of normal weight highest at age (15-19) was 92.5%, overweight highest at age (30-34) was 25.1% and obese highest (35-39) was 6.6%. Highest prevalence of overweight was found in Khulna 22.9% on the other hand obese was highest in Chittagong 5.4%. Overweight and obesity were seemly common in Dhaka and Khulna region. According to wealth index, Overweight and obesity highest found in richest family were 35.2% and 11.5%. According to living child prevalence of obesity was highest whom had more than 5 child was 31.1%. The prevalence of overweight and obesity was highest those who were watching TV 24.1%

and 6.1%. Based on husband occupation, the prevalence of normal weight lowest in Higher education was 58.1% and highest in overweight and obesity 32.7% and 9.2% (**Table 2, Appendix**).

The prevalence of overweight or obesity of both urban and rural women, according to their geographical location are depicts in the Fig. 1. From this figure, we found that the prevalence of overweight and obesity was significantly higher in urban areas compared to rural areas (37.5 % vs. 19.8 %, p < 0.001) in all the geographic divisions of Bangladesh. In urban areas of Barisal and Chittagong divisions had the highest (42.70% and 39.60%) prevalence of overweight and obesity compared to other divisions. On the other hand, urban areas of Sylhet had the lowest (27.60%) prevalence of overweight or obesity. However, in the case of rural areas, the prevalence of overweight and obesity was the highest (25.80%, 23% and 20.50) in Khulna, Chittagong, and Dhaka divisions compared to other divisions. The findings revealed that the prevalence of overweight and obesity was the lowest in Sylhet division compared to other divisions.


Fig. 1: Prevalence of overweight or obesity among rural and urban women of different geographical locations in Bangladesh.

Table 3 presents results of analyses of simple binary logistic regression of women's overweight or obesity in Bangladesh according to their background characteristics. From Logistic regressions models, this study found that Women of Khulna, Chittagong and Dhaka division had a higher risk of being overweight or obese compared to the women of Barisal division. For example, women of Chittagong division were 1.225 times (95 % CI · 818-1.835, p < 0 · 324) more likely to be overweight or

obese than women of Barisal division. The wealth index had a strong significant effect on the overweight or obesity status of women. The prevalence of overweight or obesity increased with the increase in household status of the wealth index. The richest Women had a higher risk of being overweight or obese compared to the women of other women. Form the above model the richest women were 6.233 times (95 % CI · 4.004-9.720, p < 0 · 001) more likely to be overweight or obese compared to the poorest women. There was a negative relationship of women's overweight or obesity with the increase of living children. Women with five or more household members were 0 .218 times (95 % CI .494–1 · 283, p = 0· 295) less likely to become overweight or obese than women who had less family members. Educational status also had a significant association with being overweight or obese. Women with higher education were 1.456 times (95 % CI .955 –2.219, p < 0 · 081) more likely to become overweight or obese than non-educated   women. The risk of becoming overweight or obese increased with the increase in age and after a certain age the risk became lower. Women over 35 to 39 years were 5.429 times (95 % CI 3.174 –9.287, p < 0 · 001) times more likely to be overweight or obese than younger women. Again women over above 45 years were 5.212 times (95 % CI 2.98 –9.116, p < 0 · 001) times more likely to be overweight or obese than younger women and this result was strongly significant. Rural women were 0.214 times (95 % CI .628 –9.84, p < 0 · 036) times less likely to be overweight or obese compared to Urban women. Women with lower age of first birth had higher risk of becoming overweight or obese than higher age of first birth. Women with age at first birth 23 and above were 0.233(95 % CI 0.417 –1.490, p < 0 · 393) times less likely to be overweight or obese than a women with lower(less than 13) age of first birth (**Table 3, Appendix**).

Multi Factor Analysis Using FactoMiner Package

The correlation circles of different groups of factors are represented in Fig 2. It shows the integration of two groups (Overweight-obesity group and Reproductive group) i.e. integration between overweight-obesity group and reproductive group. This figure also shows the association among the factors of overweight-obesity group and reproductive group separately. In this figure, longer the vectors indicate more influential and the vectors that are close of each other with same direction indicate highly positive association. Vectors that are opposite direction are showing negative association and the vectors that are almost 90 degree angle are showing no association. First principal component shows around 23% of the variation in the dataset and 2nd one show around 17% of the variation of the dataset.
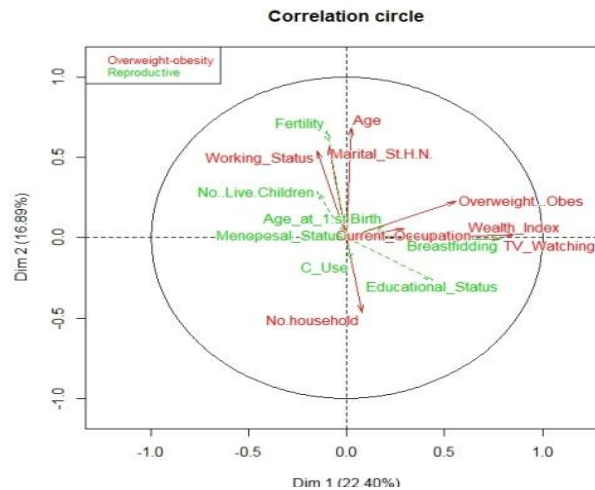
Figure 2: Group Integration of factors using FactoMineR Package in R.

According to the Fig. 2, considering overweight-obesity group, Current occupations, Wealth Index and TV watching are positively correlated with Overweight-obesity; Family working status, Marital status of Women are negatively associated with overweight and obesity; it is also reveals that age of women found approximately zero correlation with overweight and obesity. Similarly considering reproductive group, we can see that Breastfeeding, and Educational status are positively associated to each other. If we consider the group integration, then we see that Wealth index, Current occupational status and TV Watching in overweight-obesity group are positively associated with Educational status and Breastfeeding of reproductive group.

Discussion

Obesity is serious public health concern in the whole world as it is highly associated with cardiovascular diseases [1, 2]. Many environmental and genetic factors are responsible for the obesity [3, 4]. Therefore we are interested to integrate the overweight-obesity factors with the reproductive factors among the married women in Bangladesh aged 15-49 years. To conduct this study we considered a secondary cross-sectional data from Bangladesh Demographic and Health Survey (BDHS) 2014. We used married women's nutrition-related data and analysed by using chi-square test, logistic regression model and multi-factor analysis (MFA)[21, 31 and 32]. At first we have selected the factors that are associated with overweight-obesity in both groups (group1: overweight-obesity, group 2: reproductive). Afterwards we analysed the data by logistic regression model as uni-variate approach and for multivariate approach-to integrate both groups of variables, we used multi-factor analysis.

The findings of our study clearly suggest that the prevalence of overweight and obesity is increasing day by day. The study also showed that the factors which are responsible for being overweight or obese is varying according to place of residence i.e. urban or rural. These

increasing trends of overweight or obesity are now in an alarming position not for only Bangladesh but also for over the world. In order to identify the host factors of being overweight or obesity among women should take seriously the rural and urban circumstance as the indicator of overweight and obesity.

In bivariate analysis division, wealth index, educational status, age, house hold members, no of children, age at first birth had a significant association with the prevalence of overweight and obesity among married women of Bangladesh. It is found that obesity was higher in middle aged people (95 % CI, 3.174 –9.287, $p < 0.05$) and after 45 it tends to decrease. Similar findings were also revealed that prevalence of overweight or obesity is higher in younger age than older age group (16% vs. 8%) [28]. According to the urban-rural comparison, the prevalence of obesity and overweight is higher (37% vs. 19%) in urban areas as compare to rural area. This study also gives the similar result with another study which was conducted by Sharma H. et al. [9]. In the context of geographical division, Khulna and Chittagong were considered as the high-risk divisions for both urban and rural women. Similar findings were found in another two studies, one was conducted by Jesmin Akter et al. [19] and another was conducted by Sharma H et al. [9]. The urban people are in higher risk (95 % CI, 0.628 –9.84, $p < 0.05$) comparatively rural people. One may be interested to know why?, because of monthly income, alcohol, lifestyle [29]. According to another study, the risk is high in urban women that is why they are suffer from various health problem such as diabetes, blood pressure etc.[4]. Our study had found interesting results with the increase of family members. Being married is one of the risk factor of being overweight [30], the increasing number of family member may decrease overweight or obesity prevalence and this result is similar with the study which was conducted in 2016, by Sharma H. et al. [9]. With the increase of wealth index incidence of being overweight or obesity increased. Higher household wealth is associated with an increased likelihood of being overweight and obese among adult women in Bangladesh and Nepal. Lower age of first birth shows high risk for becoming overweight or obese. Young maternal age at first birth might be associated with increased BMI [24, 25].Although now a day's increasing of literacy; maximum girls in rural area are giving birth at very early stage of their life. About 2 million before age 15 and more than 16 million between (15-16) ages giving first birth, most of them are developing countries [26]. In this study, whose age at first birth below 23 they maximum were BMI<25 and the prevalence of overweight obesity higher whose giving birth after 23(29.4%, 7%). Our findings suggest that the educational status of

women has a strong association with women being overweight or obese. Higher educational status means significantly increased odds of women being overweight or obese compared to women who have no education. There may be many reasons behind this but one reason behind result may be that higher-educated women are more likely to engage themselves in jobs that involve less physical movement, resulting in them becoming overweight or obese [25,28]. The prevalence of overweight of contraceptive user was higher than non-user. The reason behind this, taking oral contraceptive is responsible for lower belly fat and condensing fat in other parts of the belly. This study also found TV watching as a significant and positive risk factor of overweight or obesity for both univariate and multivariate cases and this output is similar with the study [33] which mainly focus on the relationship between TV watching and Overweight-obesity for uni-variate cases. From multi-factor analysis we observed in overweight-obesity factors- Wealth Index, TV watching and current occupation of women are positively associated with overweight or obesity. Integrating the factors of both groups, we observed -Wealth index, Current occupational status and TV Watching in overweight-obesity group are positively associated with Educational status and Breastfeeding of reproductive group.

Conclusions

We may conclude that the prevalence of overweight and obesity are responsible for various factors, which was background or main cause for this burning issue. Wealth index, educational status, age, and passing time with watching TV, have a significant association with the prevalence of overweight and obesity for both univariate and multivariate cases. Some strong and positive relationships between Overweight-obesity and Reproductive factors are found in case of multivariate analysis. Rural and urban variation has also notable impact on overweight or obesity. Therefore, interventions need to be tested rigorously to address the overweight and obesity epidemic among Bangladeshi women and to avert their spread as has already occurred among the poorer and rural populations of higher-income countries. As the number of overweight or obesity people increasing rapidly, especially in urban areas hence it would be a big future threat for Bangladesh if proper attention and intervention programs are not taken from now. Although Bangladesh has achieved a lot in health sector but has a lot to be achieved also in future. Special health related programmes such as promoting higher level of physical activities, ensuring proper food policies and improving awareness through educational institutions and via campaigns within communities should be provided substantially for reducing the prevalence of overweight or obesity of married women in Bangladesh.

Limitations

We had some limitations to conduct this study that need to be considered in future studies. This study was based on secondary data and there were some important variables that are the lacking, such as food security and physical activity of women, which we could have used in the models to fully understand the relationship with overweight and obesity status of women. In this study, we use BMI of≥25 kg/m2 as a cut-off point that may not be ideal to predict the metabolic and cardiovascular risk profiles of women. However, using different cut-off points does not appear to change any of the fundamental relationships [30]. Smoking is known to have an inverse relationship with obesity. But we were unable to consider smoking status of women in our analysis, because BDHS 2014 did not collect data on the smoking habits of women in Bangladesh. The probable reason behind this, the smoking habit in Bangladeshi women is rare that is why BDHS 2014 didn't collect data on it. Despite these limitations, this study provides an important contribution to the available data on the association between socioeconomic and demographic variables and the overweight and obesity status of married women in Bangladesh.

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