Factors Associated with Overweight and Obesity among Reproductive Age Women of Kaski District, Nepal

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ABSTRACT

Introduction: Overweight and obesity are associated with numerous comorbidities so they are of great public health concern. In Nepal, the proportion of overweight and obese women of reproductive age has been gradually increasing which marks obesity as a serious public health challenge. The study aimed to assess the factors associated with overweight and obesity among reproductive aged women residing in Pokhara metropolitan.

Methods: A cross-sectional study was conducted among 278 married women of reproductive age at Pokhara metropolitan, Kaski district, Nepal using probability proportional to size sampling method. Face to face interview was conducted among respondents through pretested questionnaire. Similarly, height and weight were also measured. Based on anthropometric measurements, Body Mass Index was computed and defined according to the World Health Organization criteria. The association between overweight/obesity and the explanatory variables were assessed in bivariate analysis using the Chi-square test and the association was further explored by using multivariate logistic regression.

Results: The prevalence of overweight and obesity was 49.6%; with 33.7% of overweight and 15.9 % of obesity. Factors associated with overweight/obesity were age (AOR= 13.85, 95% CI: 5.77-40.80), business as occupation (AOR=7.39, 95%CI: 2.25-14.17), fast food consumption of three or more times a week (AOR=3.42, 95%CI: 1.01-11.63), energy intake above the RDA (AOR=5.45; 95%CI: 2.19-13.55), low or moderate physical activity level (AOR=2.84; 95%CI: 1.18-6.83) and multiparity (AOR=17.80; 95%CI: 4.04-89.06).

Conclusion: The study provides evidence that the prevalence of overweight, obesity is remarkably high in married women of reproductive age in Pokhara metropolitan. The study concluded older age, business as occupation, consumption of fast foods for three or more times per week, low or moderate physical activity level, energy intake above the RDA and multiparity had higher odds of being overweight/obesity. On the other hand fruits and vegetables consumption were found to be protective against overweight/obesity.

Keywords: Overweight, Obesity, Reproductive age, Women, Prevalence

INTRODUCTION

Obesity is increasing at an alarming rate throughout the world and has now become a global epidemic.1 The World Health Organization (WHO) has declared overweight as one of the top 10 health risks in the world and one of the top five in developed nations.2 Once associated with high-income countries; obesity is now also prevalent in low and middle-income countries. Most of the developing countries at present experience a dual burden of disease with over nutrition and under nutrition occurring simultaneously3,4 including Nepal.5,6

Overweight and obesity are associated with numerous co-morbidities. It is of great public health concern, particularly cardiovascular diseases, type 2 diabetes, high blood pressure, high blood cholesterol, high triglycerides, certain types of cancer, and sleep apnea.7,8 There are many obesity-related conditions, which uniquely or mostly affect women. These include: osteoarthritis, birth defects, breast and endometrial cancers, cardiovascular and gall bladder diseases, infertility and gynecological complications and stigma/discrimination.9 In addition, the compromised quality of life resulting from overweight and obesity is related to higher medical, psychological, and social burden to the society.7

Globally, each year at least 2.8 million people die as a result of being overweight or obese. Obesity has nearly tripled since 1975. In 2016, more than 1.9 billion adults, 18 years and older, were overweight; of these, over 650 million were obese. 39% of adults aged 18 years and over were of overweight in 2016, and 13% were obese.1
According to Nepal National Micro-nutrient Status Survey Report -2016, among women of 15-49 year the prevalence of overweight is 18.5% and obesity is 4.6%. Overweight and obesity among adults is increasing and according to Nepal Demographic Health Survey 2016, the prevalence of overweight is higher in females (22%) when it is compared with men (17%). Between 2006 to 2016, the proportion of women who were overweight or obese increased from 9% to 22%. Different studies show that the prevalence is much higher in urban areas compared to the national level and rural areas. Similarly, among non-pregnant women of 15-49 years the prevalence of overweight is 18.5% and obesity is 4.6%. Prevalence of overweight and obesity is high in the age group of 30-44 years (24.6 % overweight and 4.6% of obesity) with overall overweight and obesity being 18% and 3.1% among women of 15-69 years. So this study aimed to assess the factors associated with overweight and obesity among reproductive aged women residing in Pokhara metropolitan.

**METHODS**

A cross-sectional analytical study was conducted among 278 married women of reproductive age (15-49 years) at Pokhara metropolitan, Kaski district, Nepal. Probability proportional to size sampling was used as the sampling strategy for the study. For the sample size calculation, Nepal Demographic and Health Survey 2016 prevalence of overweight and obesity among women was taken as reference which is 22%. Permitted error of 5% was taken (CI= 95%), \( q = 1-p \) (1-0.22 =0.78). Therefore, \( n = \frac{Z^2pq}{d^2} = 1.96^2 \times 0.22 \times 0.78 / 0.05^2 = 264 \). The non response rate of 5% was kept thus the sample size was 278. The data was collected after obtaining informed consent from respondents. Face to face interview was conducted among respondents through pretested questionnaire. Similarly, height and weight were also measured. Based on anthropometric measurements, Body Mass Index was computed and it was defined according to the WHO criteria.

Validity of the instruments was maintained by incorporating expert's opinion and through extensive literature review. Content validity of the tool was established using a panel of three judges, competent in the field of nutrition, who were requested to assess the relevance of the content used in the questionnaire. Tool to determine physical activity level (IPAQ-L) was adopted which have international acceptability and validity. The anthropometric measurement tools were validated from Nepal Bureau of Standards & Metrology (NBSM), (Pokhara branch) which is the National Standards Body of Nepal. A standard weight of 1 kg validated from NBSM was taken and it was used to calibrate the digital weighing scale at interval of five participant’s weight measurement.

Data were entered in Epi data software except for dietary intake and analyzed by using SPSS 20 version software. The association between overweight /obesity and the explanatory variables were assessed in bivariate analysis using the Chi-square test and the association was further explored by using multivariate logistic regression. Ethical approval was taken from Institutional Review Committee of Pokhara University Research Centre. Similarly, administrative approval was also taken from Pokhara metropolitan Health Division.

**RESULTS**

Table 1: Socio-demographic characteristics of the respondents

| Variable                        | Frequency (n=276) | Percentage |
|---------------------------------|-------------------|------------|
| **Age category**                |                   |            |
| <30 years                       | 90                | 32.6       |
| 30-39 years                     | 124               | 44.9       |
| 40-49 years                     | 62                | 22.5       |
| **Mean ±SD : 33.1± 8.14 , Min:18 , Max: 49** |                   |            |
| **Family type**                 |                   |            |
| Nuclear                         | 190               | 68.8       |
| Joint/Extended                  | 86                | 31.2       |
| **Family size**                 |                   |            |
| ≤4 members                      | 154               | 55.8       |
| >4 members                      | 122               | 44.2       |
| **Mean ±SD: 4.8 Min:2, Max: 12** |                   |            |
| **Ethnicity**                   |                   |            |
| Upper Caste                     | 159               | 57.6       |
| Advantages Janajati              | 62                | 22.5       |
| Disadvantages Janajati           | 39                | 14.1       |
| Dalit                           | 13                | 4.7        |
| Others                          | 3                 | 1.1        |
| **Level of Education**          |                   |            |
| Illiterate                      | 8                 | 2.9        |
| Literate with no formal school   | 15                | 5.4        |
| Primary                         | 70                | 25.4       |
| Secondary Level                 | 114               | 41.3       |
| Bachelors and above             | 69                | 25.0       |
| **Occupation**                  |                   |            |
| House maker                     | 135               | 48.9       |
| Students                        | 35                | 12.7       |
| Business                        | 62                | 22.5       |
| Service Sector                  | 24                | 8.7        |
| Agriculture                     | 12                | 4.3        |
| Daily wages                     | 8                 | 2.9        |

Table 1 shows that the mean age of the respondents was 33.1±8.1 years, ranging from 18 to 49 years and almost half (44.9%) of the respondents were between the age of 30 to 39 years. More than two third (68.7%) of the respondents were from...
nuclear family and more than half (55.8%) of the respondents had four or less members in their family. More than half (57.6%) of the respondents were from the upper caste ethnic group. Similarly, more than two fifth (41.3%) of women had educational attainment of secondary level (SLC or +2 level). About two fifth (38.0%) of women had business as the major source of income in the family and about half of the women (48.9%) were house makers by occupation.

Table 2: Prevalence of overweight and obesity according to BMI classification

| BMI Classification | Frequency | Percentage |
|--------------------|-----------|------------|
| Normal/underweight (BMI <25) | 139       | 50.4       |
| Overweight/Obese (BMI ≥25) | 137       | 49.6       |
| Mean ±SD: 25.67 ± 4.51 | Min: 16.94, Max: 42.86 |

Table 2 shows that about half (49.6%) of the respondents were overweight/obese. The mean BMI was 25.67 ± 4.51 ranging from 16.92 to 42.86.

Table 3: Physical activity, dietary practices and reproductive factors of reproductive age women

| Variables                     | Frequency | Percentage |
|-------------------------------|-----------|------------|
| Physical activity             |           |            |
| Low                           | 9         | 3.3        |
| Moderate                      | 119       | 43.1       |
| High                          | 150       | 53.6       |
| Median MET, (Q₁~Q₃) : 3213, (2319.63~3213) |          |            |
| Dietary practice              |           |            |
| Main diet                      |           |            |
| Rice/dal/vegetable            | 273       | 98.9       |
| Wheat Roti                    | 3         | 1.1        |
| Vegetables or fruits servings consumption / week |          |            |
| ≤21 servings                  | 166       | 60.1       |
| >21 servings                  | 110       | 39.9       |
| Eating away from home         |           |            |
| Occasional                    | 76        | 27.5       |
| Once or twice a week          | 98        | 35.5       |
| Three or more times a week    | 102       | 37.0       |

Table 3 shows that more than half (53.6%) of the respondents were highly physically active (MET ≥3000) with median MET of 3212 per week. Under the dietary practices adopted by the respondents, rice was the main diet of the majority (98.9%) respondents. Similarly, three fifth of the respondent (60.1%) consumed less than 21 servings of fruits or vegetables per week. About two fifth of respondent (37.0%) eat three or more time away from home per week. About half of the respondents (47.8%) consumed fast or processed food once or twice a week. The mean age at menarche was 13.58 years, ranging from 11 to 19 years, and about three fifth (59.8%) of respondents menarche age was below 14 years. Of the respondents 16.7% were nulliparous. More than half (52.5%) of the respondents had ever used contraceptive devices and of them, more than two fifth (42.7%) were currently using contraceptive devices.

Table 4: Association of socio-demographic and socio economic factors with overweight including obesity

| Variables                      | Overweight/ Obesity (BMI ≥25) | χ² statistics | p value | UOR (At 95% CI) | AOR (At 95% CI) |
|-------------------------------|-------------------------------|---------------|---------|-----------------|-----------------|
| Age group                     |                               |               |         |                 |                 |
| <30 years                     | 18 (13.1)                     | 165           | <0.001* | Ref             | Ref             |
| 30-39 years                   | 69 (50.4)                     | 111           | 0.012   | 3.151 (4.098-5.992) | 13.855 (5.779-50.801)** |
| 40-49 years                   | 50 (36.5)                     | 12 (8.6)      | 0.230   | 4.098 (1.741-9.647) | 18.794 (4.015-82.969)** |
| Educational level             |                               |               |         |                 |                 |
| Primary or below              | 60 (43.8)                     | 33 (23.7)     | 0.001   | Ref             | Ref             |
| Secondary level               | 57 (41.6)                     | 57 (41.0)     | 0.550   | 0.314-0.964    | 1.504 (0.560-4.036) |
| Bachelors and above           | 20 (14.6)                     | 49 (35.3)     | 0.224   | 0.115-0.439    | 0.922 (0.247-3.446) |
Table 5: Association of behavioral factors with overweight including obesity

| Variables                      | Overweight/ Obesity (BMI ≥25) | \( \chi^2 \) statistics | p value | UOR (At 95% CI) | AOR (At 95% CI) |
|--------------------------------|--------------------------------|--------------------------|---------|-----------------|-----------------|
|                               | Yes                            | No                       |         |                 |                 |
| Vegetables or fruits consumption per week |                                |                          |         |                 |                 |
| ≤21 servings                   | 113 (82.5)                     | 53 (38.1)                | 56.621  | <0.001*         | Ref             | Ref             |
| ≥22 servings                   | 24 (17.5)                      | 86 (61.9)                | 0.131 (0.075-0.229) | 0.141 (0.056-0.354)** |
| Frequency of fast food of consumption |                                |                          |         |                 |                 |
| Occasional                     | 36 (26.3)                      | 49 (35.3)                | 10.206  | 0.006*          | Ref             | Ref             |
| Once or twice a week           | 61 (44.5)                      | 71 (51.1)                | 1.169 (0.675-2.026) | 1.563 (0.595-4.108) |
| Three or more times a week     | 40 (29.2)                      | 19 (13.7)                | 2.865 (1.430-5.743) | 3.427 (1.009-11.632)** |
| Energy intake/day (RDA=2230 kcal/day) |                                |                          |         |                 |                 |
| ≤RDA                           | 67 (48.9)                      | 104(74.8)                | 19.659  | <0.001*         | Ref             | Ref             |
| >RDA                           | 70 (51.1)                      | 35(25.2)                 | 3.104 (1.866-5.164) | 5.452 (2.194-13.550)** |
| Level of Physical activity     |                                |                          |         |                 |                 |
| Low and Moderate               | 76 (55.5)                      | 52 (37.4)                | 9.054   | 0.003*          | 2.085 (1.288-3.373) | 2.844 (1.183-6.837) ** |
| High                           | 61 (44.5)                      | 87 (62.6)                | Ref     | Ref             |                 |

Table 5 shows that as compared to women consuming 21 servings or less fruits or vegetables per week, those consuming more than 21 servings were less likely to be overweight/obese with 85.9% lower odds of being overweight/obesity (AOR=0.141; 95%CI: 0.056-0.354). Meanwhile, women consuming fast food for three or more times a week were 3.4 times more likely (AOR=3.427, 95%CI: 1.009-11.632) to be overweight/obese than those consuming fast occasionally (less than one time a week). Likewise, women who had more energy intake than RDA were 5.45 times (AOR=5.452; 95%CI: 2.194-13.550) more likely to be overweight, including obesity compared to women who had intake energy less than or equal to RDA.

Regarding physical activity level of women this study revealed, those women who had low or moderate level of physical were 2.84 times (AOR=2.844; 95%CI: 1.183-6.837) more likely to be overweight including obesity as compared to women who were highly physically active.
Of the three reproductive variable which were significant in the chi-square, only parity remained statistically significant ($p<0.05$) whereas, variables ever use of contraceptive devices and using any contraceptive devices currently do not remained statistically significant in multivariate analysis.

**DISCUSSION**

The present study was undertaken to assess the prevalence of overweight and obesity and their determinants among married women of reproductive age at Pokhara metropolitan, where socio-demographic, behavioral and reproductive factors were assessed.

This study reported the prevalence of overweight/obesity to be 49.6% (overweight 33.7% and obesity 15.9%) with the mean BMI of 25.67 ± 4.5. Studies from Nepal like step survey of 2003 conducted in Kathmandu reported 41.86% to be overweight/obesity with mean BMI 24.56 (overweight 31.22, obesity 10%). Similarly, studies from Kathmandu and Dharan reported 47.4% and 48% of reproductive age women to be overweight/obese respectively.17,18 Likewise, study among adults from India uttarakhand19 and another study of Delhi reported 55.5% and 50.1% to be overweight including obesity respectively.20 In contrast, this study reported higher prevalence of overweight and obesity among 15-49 years than the prevalence from the national level surveys NDHS 2016 and NNMSS 2016, which reported 22% of overweight/obese respectively among 15-49 non pregnant women. While NCD Step Survey 2016 reported 22.1 % (overweight 17.3% and obesity 4.8%) of 15-69 years non pregnant women were overweight/obese respectively. Similarly, this study also over reported the higher prevalence of overweight/obesity than the study conducted at Ramkot VDC of Kathmandu where the prevalence was 26.3% (overweight 24.5% and obesity 1.8%)16 and a study among ever-married women in India where the prevalence was 34.6% in Delhi and 36.0% in Punjab.21 This indicates that there is a difference in prevalence of overweight and obesity in rural and urban region with urban region having a higher prevalence than in rural area.

Age was found significantly associated with overweight, including obesity from studies in Nepal22,18 and other different parts of the world.23 The results of this study were also consistent with studies in India and Ghana, where in India women age 40-49 years were 12.35 times and age 30-39 years were 8.48 times more likely to be obese21 and in Ghana women within the age 35-44 years had the highest odds (3.55, $p=0.000$) of being overweight or obese.24

The findings of this study showed that occupation was significantly associated with overweight, including obesity, which is similar to the finding from Benin ($p<0.05$)20 and from India.25 The findings of this study showed women having self-run business as occupation (Odds: 7.39) exhibited significantly greater odds for being overweight, including obesity ($p=0.001$) in compared to housewife, this could be compared to the study findings of Bangladesh where women having job that required mostly sitting were more likely to be overweight/obesity in compare with jobs that required manual labor (AOR=2.33; 95%CI: 1.75-3.08).

Studies have documented that fast food consumption is an independent predictor of mean BMI.27,28 This study uncovered women consuming fast food or processed food three or more times a week had odds(3.4 times) of being overweight/obesity(AOR=3.427, 95%CI: 1.009-11.632) in compared to those consuming junk or fast food less than once /week (occasional). The finding was consistent with study in America27. The findings of this study revealed that energy intake was significantly associative with overweight including obesity which was consistent with studies of Kenya(58) and Belgium29. The mean energy intake was 2236.8±281.4 kcal/day, which is slightly lower than the national intake of 2,536 Kcal per capita per day and energyintake at Kathmandu valley 2480 Kcal per day.

Table 6: Association of reproductive factors with overweight including obesity

| Variables | Overweight/ Obesity (BMI ≥25) | $\chi^2$ statistics | p value | UOR (At 95% CI) | AOR (At 95% CI) |
|-----------|-------------------------------|--------------------|---------|-----------------|-----------------|
|           | Yes                           | No                 |         |                 |                 |
| Parity    |                               |                    |         |                 |                 |
| Nulliparity | 7 (5.1)                      | 39 (28.1)          | 40.212  | <0.001*         | Ref             | Ref             |
| 1 parity  | 27 (19.7)                     | 44 (31.7)          | 3.419   | (1.340-8.721)   | 4.646 (1.279-45.304) |
| ≥ 2 Parity | 103 (75.2)                    | 56 (40.3)          | 10.247  | (4.302-24.407)  | 17.803 (4.046-89.067)** |
| Ever used any contraceptive devices | | | | | |
| Yes       | 87 (63.5)                     | 44 (31.7)          | 28.067  | <0.001*         | 3.757 (2.282-6.186) | 1.959 (0.732-5.244) |
| No        | 50 (36.5)                     | 95 (68.5)          | 4.649   | 0.031*          | 1.928 (1.056-3.522) | 2.509 (0.732-8.599) |
| Using any device contraceptive currently | | | | | |
| Using    | 35 (25.5)                     | 21 (15.1)          |         |                 |                 |                 |
| Not Using | 102 (74.5)                    | 118 (84.9)         |         |                 |                 |                 |
capita per day. These differences might be because the national average is for all type of adult population.

In this study overweight and obesity were significantly associated with physical activity and sedentary setting time (p<0.05). Similar results have been reported by different studies from India, Bangladesh, Ethiopia and Australia. Study exhibited that compared to highly physically active women, low or moderately physically active women were 2.84 times more likely (AOR=2.844; 95%CI: 1.183-6.837) to be overweight including obesity, this could be compared with study findings from Ethiopia where women having moderate and low physical activity level were 3.10 times and 4.8 times more likely to be obese and overweight respectively.

This study finding showed that higher parity was significantly associated with overweight and obesity (p<0.05), similar findings were reported by other studies. In compared to nulliparous women, women who had given birth to two or more child (multiparious) were 17.8 times more likely (AOR=17.803; 95%CI:4.046-89.067) to be overweight including obesity.

CONCLUSION

The study provides evidence that the prevalence of overweight and obesity were remarkably high in married women of reproductive age in Pokhara metropolitan. The overall prevalence of overweight and obesity among reproductive age women in Pokhara was 49.6%; with 33.7% of overweight and 15.9% of obesity. The substantial proportion of women had moderate (43.1%) physical activity level.

The study concluded older age, business as occupation, consumption of fast foods for three or more times per week, low or moderate physical activity level, energy intake above the RDA and multiparty had higher odds of being overweight/obesity. On the other hand fruits and vegetables consumption were found to be protective against overweight/obesity. Considering the changing scenario from under nutrition to over nutrition the authorities at Pokhara metropolitan should focus on framing the policies and nutrition programs with special attention among reproductive age women.

CONFLICT OF INTEREST

We declare that we have no conflict of interest.

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