

**Original Article****Study of Prevalence and Associated Risk Factors of Overweight and Obesity among the Residents of Semi Urban Region of Eastern Nepal**Amar Kumar Yadav<sup>1\*</sup>, Manoj Kumar Thakur<sup>2</sup>, Sakar Babu Gharti<sup>1</sup><sup>1</sup>Department of Community Medicine, Nobel Medical College Teaching Hospital, Biratnagar, Nepal,<sup>2</sup>Department of Medicine, Koshi Zonal Hospital, Biratnagar, NepalArticle Received: 12<sup>th</sup> November, 2019; Accepted: 15<sup>th</sup> March, 2021; Published: 30<sup>th</sup> June, 2021DOI: <http://dx.doi.org/10.3126/jonmc.v10i1.37825>**Abstract****Background**

Low-income countries like Nepal experience a double disease burden infectious diseases risk as well as rising incidence of non-communicable diseases. The present cross sectional study assesses the prevalence of overweight and associated factors in ward no. 1 and 3 of Tankisinuwari VDC, Morang.

**Materials and Methods**

A Community based cross sectional study was conducted in ward no. 1 and 3 of Tankisinuwari VDC, Morang. Total 152 (10%) households were selected by systematic random sampling technique and then 590 individuals (male 323 and female 267), with the age ranging from 10 to 70 years were included in the study. Measurement of weight and height was done by calibrated standard weighing scale and measuring tape.


**Results**

The prevalence of overweight was 16.1% which was significantly more among male (11.5%) than in female (4.6%) while prevalence of obesity was 2.5%, which was significantly more among female (2.2%), than male (0.3%),  $P < 0.05$ . The prevalence of overweight was seen more in the age group  $\geq 50$  years (7.1%) and obesity was seen more in age group 30-49 years (2.0%). The prevalence of overweight (13.9%) and obesity (2.4%) among married group were found significantly more than unmarried population where the prevalence of overweight and obesity were (2.2%) and (0.2%) respectively,  $P < 0.05$ . Prevalence of obesity among those who had short sleep of 6 hours (1.4%) and overweight (3.9%) was observed which significantly more than among those who slept 7 hour or 8 hour.  $P = 0.013$ .

**Conclusion**

The role of risk factors in development of obesity like short sleep and long sleep duration, physical inactivity and mode of transport were observed to be associated with overweight and obesity. Demographic factors like age, gender and marital status was found to be associated with overweight and obesity.

**Keywords:** Obesity, Overweight, Sleep-duration

	<p>©Authors retain copyright and grant the journal right of first publication. Licensed under Creative Commons Attribution License CC - BY 4.0 which permits others to use, distribute and reproduce in any medium, provided the original work is properly cited.</p>	<p><b>*Corresponding Author:</b>          Dr. Amar Kumar Yadav          Lecturer          Email: amary729@gmail.com          ORCID: <a href="https://orcid.org/0000-0003-0807-2917">https://orcid.org/0000-0003-0807-2917</a></p>
-------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

**Citation**

Yadav AK, Thakur MK, Gharti SB, Study of Prevalence and Associated Risk Factors of Overweight and Obesity among the Residents of Semi Urban Region of Eastern Nepal, JoNMC.10:1 (2021) 7-11.



## Introduction

Obesity results when too much fat accumulates in the body. A person is normally considered obese when his or her weight is 20% over the normal body-weight for height and age and the Body Mass Index (BMI) measures 30 or more [1]. Obesity may be defined as an abnormal growth of the adipose tissue due to enlargement of fat cell size (hypertrophic obesity) or an increase in fat cell number (hyperplastic obesity) or a combination of both. Obesity is often expressed in terms of body mass index (BMI). Overweight is usually due to obesity but can arise from other causes such as excessive muscle development as in athletes or fluid retention.

The distribution of fat induced by the weight gain affects the risk associated with obesity, and the kind of disease that results. It is useful therefore, to be able to distinguish between those at increased risk as a result of "abdominal fat distribution" or "android obesity" from those with the less serious "gynoid" fat distribution, in which fat is more evenly and peripherally distributed around the body [2]. In the South-East Asia Region, 300 000 die of overweight/obesity. The prevalence of overweight in countries across the Region ranges from 7.6% in male adults in Bangladesh to 53% female adults in Maldives [1].

According to the non-communicable diseases Risk Factor steps survey Nepal (2013), which included 15 of 75 districts and represented all five administrative regions and three ecological regions, estimated the prevalence of overweight at about 21.2% and the prevalence of obesity at around 4.0%. [3].

## Materials and Methods

A Community based cross sectional study was conducted in ward no. 1 and 3 of Tankisinuwari VDC, Morang, during 1st March 2016 to 30 September 2016. Total 152 (10%) households were selected by systematic random sampling technique with population proportionate to size technique was applied to select the households and then 590 individuals (male 323 and female 267), with the age ranging from 10 to 70 years were included in the study..

The data were collected by interview and clinical examination by predesigned and pretested questionnaire through house to house visit. Measurement of weight and height was done by calibrated standard weighing scale and measuring tape. The WHO classification of BMI used as Underweight (BMI<18.5), Normal weight (BMI 18.5- 24.99), Overweight (BMI 25-29.99) and Obese (BMI≥30), the findings were co-related with associated risk factors. Brief diet survey was

undertaken by collecting information about the quantity and different items of the foods they had consumed on previous day of visit. The nutrient contents of the foods consumed should be calculated and per capita consumption of calories/nutrients was arrived. Analysis of the data was done by SPSS version 20.

## Results

Among total study populations 590, male 323 (54.7%) and female 267 (45.3%) were present in this study. Illiterate were 12.5% in the study population while 29.5% had attended secondary education followed by 17.5% Bache-lor and above, 17.3% higher secondary, 12.4% primary and 10.8% lower secondary. In the study group 93.2% were hindu followed by buddhist 4.1% and muslim 2.7%. Also in this study 71.7% were married while 28.3% were unmarried.

Table1: Demographic characteristics

Characteristics	N	%
<b>Age Group</b>		
10-29	248	42.0
30-49	184	31.2
≥50	158	26.8
<b>Gender</b>		
Male	323	54.7
Female	267	45.3
<b>Marital status</b>		
Married	423	71.7
Unmarried	167	28.3
<b>Religion</b>		
Hindu	550	93.2
Muslim	16	2.7
Buddhist	24	4.1
<b>Education</b>		
Illiterate	74	12.5
Primary	73	12.4
Lower Secondary	64	10.8
Secondary	174	29.5
Higher Secondary	102	17.3
Bachelor and Above	103	17.5

The comparison of overweight and obesity according to age group were shown in table 2. The prevalence of overweight were seen more in the age group ≥50 years 42 (7.1%).The prevalence of obesity was found more in age group 30-49 years 12 (2.0%) .

Table 2: Body Mass Index According to Age Group

Age Group	BMI				Total
	< 18.50	18.50 - 24.99	25.00 - 29.99	≥30.00	
10-29	18(3.1%)	213 (36.1%)	16 (2.7%)	1(0.2%)	248(42.0%)
30-49	2 (0.1%)	133(22.5%)	37 (6.3%)	12 (2.0%)	184 (31.2%)
≥50	0 (0%)	114 (19.3%)	42 (7.1%)	2 (0.3%)	158 (26.8%)
Total	20 (3.4%)	460 (78%)	95 (16.1%)	15 (2.5%)	590 (100.0%)

The overall prevalence of overweight was 16.1% which was significantly more among male 11.5% than in female 4.6% while obesity was signifi-



ntly more among female 2.2%, than male 0.3%,  $P < 0.05$  Chi-square = 25.504,  $df = 3$

**Table 3: Body Mass Index in Comparison with Sex**

Sex	BMI				Total
	< 18.50	18.50 - 24.99	25.00 - 29.99	≥30.00	
Male	10 (1.7%)	243 (41.2%)	68 (11.5%)	2 (0.3%)	323 (54.7%)
Female	10 (1.7%)	217 (36.8%)	27 (4.6%)	13 (2.2%)	267 (45.3%)
Total	20 (3.4%)	460 (78%)	95 (16.1%)	15 (2.5%)	590 (100%)

Among total married study population 423 (71.7%), the overweight and obesity were 82 (13.9%) and 14 (2.4%) respectively. Among total unmarried study population 167 (28.3%), the overweight and obesity were 13 (2.2%) and 1 (0.2%) respectively. The prevalence of overweight and obesity were found significantly more among married population,  $P < 0.05$ , Chi-square = 58.248,  $df = 3$

**Table 4: Body Mass Index According to Marital Status**

Marital status	BMI				Total
	< 18.50	18.50 - 24.99	25.00 - 29.99	≥30.00	
Married	2 (0.3%)	325 (55.1%)	82 (13.9%)	14 (2.4%)	423 (71.7%)
Unmarried	18 (3.1%)	135 (22.9%)	13 (2.2%)	1 (0.2%)	167 (28.3%)
Total	20 (3.4%)	460 (78%)	95 (16.1%)	15 (2.5%)	590 (100.0%)

Out of total study group, those who were not involved in any kinds of physical activity had more overweight and obesity 55 (9.3%) and 9 (1.5%) respectively than those involved in physical activity had less overweight and obesity 40 (6.8%) and 6 (1%) respectively, however it was not significant  $P = 0.66$ .

**Table 5: Body Mass Index in Comparison with Physical Activity**

Exercise	BMI				Total
	< 18.50	18.50 - 24.99	25.00 - 29.99	≥30.00	
Walking	3 (0.5%)	140 (23.7%)	31 (5.3%)	6 (1.0%)	180 (30.5%)
Running	1 (0.2%)	24 (4.1%)	6 (1.0%)	0 (0.0%)	31 (5.3%)
Jogging	0 (0.0%)	21 (3.6%)	3 (0.5%)	0 (0.0%)	24 (4.1%)
None	16 (2.7%)	275 (46.6%)	55 (9.3%)	9 (1.5%)	355 (60.2%)
Total	20 (3.4%)	460 (78%)	95 (16.1%)	15 (2.5%)	590 (100.0%)

In the study group, those who sleep 6 hours in night were 186 (31.5%), 7 hours 174 (29.5%) and 8 hours 230 (39%). Prevalence of obesity 8 (1.4%) and overweight 23 (3.9%) was observed significantly more among those who had short sleep of 6 hours than among those who slept 7 hour or 8 hour.  $P = 0.013$ , Chi-square = 16.122,  $df = 6$ .

**Table 6: Body Mass Index According to the Duration of Night Sleep**

Duration of night sleep in hours	BMI				Total
	< 18.50	18.50 - 24.99	25.00 - 29.99	≥30.00	
6	1 (0.2%)	154 (26.1%)	23 (3.9%)	8 (1.4%)	186 (31.5%)
7	6 (1.0%)	134 (22.7%)	30 (5.1%)	4 (0.7%)	174 (29.5%)
8	13 (2.2%)	172 (29.2%)	42 (7.1%)	3 (0.5%)	230 (39.0%)
Total	20 (3.4%)	460 (78%)	95 (16.1%)	15 (2.5%)	590 (100.0%)

The prevalence of overweight and obesity were more among those who used public vehicles as means of transport 47 (8.0%) and 12 (2.0%) followed by Motorcycle 21 (3.6%) and 3 (0.5%), Bicycle 12 (2.0%) and 0 (0%), Car 11 (1.9%) and 0 (0%) and Rickshaw 2 (0.3%) and 0 (0%) users respectively. However it was not significant,  $P = 0.10$ .

**Table 7: Body Mass Index in Comparison with Mode of Transport.**

Mode of transport	BMI				Total
	< 18.50	18.50 - 24.99	25.00 - 29.99	≥30.00	
Bicycle	5 (0.8%)	57 (9.7%)	12 (2.0%)	0 (0.0%)	74 (12.5%)
Motorcycle	4 (0.7%)	103 (17.5%)	23 (3.9%)	3 (0.5%)	133 (22.5%)
Car	0 (0.0%)	15 (2.5%)	11 (1.9%)	0 (0.0%)	26 (4.4%)
Public vehicle	11 (1.9%)	255 (43.2%)	47 (8.0%)	12 (2.0%)	325 (55.1%)
Rickshaw	0 (0.0%)	30 (5.1%)	2 (0.3%)	0 (0.0%)	32 (5.4%)
Total	20 (3.4%)	460 (78%)	95 (16.1%)	15 (2.5%)	590 (100.0%)

## Discussion

Present study found the overall prevalence of overweight and obesity as 16.1% and 2.5% respectively. Similarly, Nepal non-communicable disease risk factors survey in 2013 found that overweight 21.2% and obesity 4% [3]. In this study, the prevalence of overweight were seen more in the age group  $\geq 50$  years 42 (7.1%). The prevalence of obesity was found more in age group 30-49 years 12 (2.0%). In study done by Baidya et al. (2007), the overweight and obesity of age group 35-49 years, 50-64 years and above 65 years were 32.2% and 9.1%, 35.4% and 5.5%, 30.5% and 5.5% respectively. The prevalence of obesity was found more in the age group 35-49 years which is similar to our study [4]. In this study, prevalence of overweight was significantly more among male 11.5% than in female 4.6% while obesity was significantly more among female (2.2%), than male (0.3%). In the similar study done by Kanniyappan et al. (2011) in South India Prevalence of overweight was found more among male (34.2%) than among female 32.44% while obesity was found more among female (28.2%) than among male (24.5%) [5]. In present study, it was found that, the study population who were involved in physical activity had low overweight and obesity 40 (6.8%) and 6 (1.0%) respectively. And those study population who were not involved in any kinds of physical activity were more overweight and obesity 55 (9.3%) and 9 (1.5%) respectively. It was found that the overweight and obesity was inversely proportional to physical activity. The similar study done by Goyal et al. (2010) mentioned in their study that, the respondents who involved in physical activity had lower overweight and obesity 43.8% and 32.2% respectively than who



did not involved in physical activity 61.5% and 72.9%.[6]. In the present study, the overweight and obesity found higher in the study population who sleep 8 hours in night 42 (7.1%) and 3 (0.5%) followed by 7 hours in night 30 (5.1%) and 4 (0.7%) and 6 hours 23 (3.9%) and 8 (1.4%) respectively. In our study, found that the short duration sleep study population had higher level of obesity. In the study conducted by Meyer et al. (2012) in India [7], prevalence estimates of overweight (BMI  $\geq 25$ ) and obesity (BMI  $\geq 30$ ) were inversely associated with sleep duration among men. Sleep duration was not associated with BMI, overweight, or obesity in women. Among women, but not men, there was a statistically significant positive association between trouble falling or staying asleep and mean BMI. Sleep may be an important modifiable risk factor for obesity, particularly in young adult men. According to another study conducted by Chaput et al. (2008) [8], prevalence of overweight and obesity increased in short and long duration sleep. Other similar study done by Bjorvatn et al. (2007) in Norway, mentioned in their study that the short sleep duration should increased overweight and obesity. That study also confirmed our study [9]. In this study, the most prevalent of overweight and obesity found in the study population used public vehicle 8.0% and 2.0% respectively, followed by motorcycle 3.9% and 0.5%, bicycle 2.0% and 0%, car 1.9% and 0%, and rickshaw 0.3% and 0% respectively, however it did not show any significant difference. In the similar study conducted by Millett et al. (2013), the most prevalent of overweight and obesity was found in the study population who used private car 50% and 9.6% respectively followed by public transport 37.6% and 7.1%, and walking 24.9% and 3.6% respectively [10]. Marital status is related to body weight and obesity in many different ways. Obese people are stigmatized, which produces problems in dating and attracting marital partners and in maintaining partners in marriage. Entering and terminating marriage are significant life events when people renegotiate eating and activity patterns which often lead to weight changes. In the present study, the overweight and obesity was found more prevalent in the married study population 82 (13.9%) and 14 (2.4%) respectively than the unmarried study population 13 (2.2%) and 1 (0.2%). The similar study was conducted by Suzana et al. (2012) [11] in which, most prevalence of overweight and obesity was found among the married study population 41.3% and 10.9% respectively than the unmarried study population 38.7% and 10.6% respectively. Other similar study done by

Tian et al. (2014) in China, mentioned that, the high prevalence of over-weight and obesity was found among married 25.5% than unmarried 14.2% [12].

### Conclusion

From the findings of the present study it could be concluded that BMI serves as a simple and efficient indicator of different categories associated with body fat like underweight, overweight and obesity. The prevalence of obesity was 2.5%, little high as compared to national level 1.8%. According to Nepal Non-communicable disease risk factors survey in 2007, the prevalence of obesity was 2.6% and in 2013 obesity was 4% increasing trend. Predictor for the role of various risk factors in development of obesity like sleep duration, physical inactivity and mode of transport were found to be associated with obesity. Demographic factors like age, gender and marital status can be associated with overweight and obesity.

### Recommendation

Obesity is in increasing trend and obesity related non-communicable disease is increasing so that effective and appropriate program should be launched to address this problems. Health education about obesity and non-communicable disease should be given. Counsel to do physical activity, avoidance of fatty food, encouragement to take green leafy vegetable, and daily exercise that prevent from obesity.

### Conflicts of interests: None

### References

- [1] WHO, Overweight and obesity fact sheet. Department of Sustainable Development and Healthy Environments | September 2011. <https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight>, 2016 (accessed 14.05.2016).
- [2] Park K, Park's text book of preventive and social medicine: obesity. 21st ed. Prem Nagar, Jabalpur, India: M/s Banarsidas Bhanot; 2011.
- [3] Nepal Non-communicable Diseases Risk Factor Survey 2013. Ministry of Health and Population; Kathmandu, Nepal 2013. [https://www.who.int/ncds/surveillance/steps/2012-13\\_Nepal\\_STEPS\\_Report.pdf](https://www.who.int/ncds/surveillance/steps/2012-13_Nepal_STEPS_Report.pdf), 2017 (accessed 11.06.2017).
- [4] Vaidya A, Pokharel PK, Nagesh S, Karki P, Kumar S, Majhi S, Association of obesity and physical activity in adult males of Dharan, Nepal, Kathmandu University Medical Journal 4:14 (2006) 192-7. PMID: 18603897
- [5] Tharkar S, Viswanathan V, Effect of obesity on cardiovascular risk factors in urban population in South India. Heart Asia. 1:2 (2010) 145-9. PMID: 273 25967.
- [6] Goyal RK, Shah VN, Saboo BD, Phatak SR, Shah NN, Gohel MC, et al., Prevalence of overweight and obesity in Indian adolescent school going children: It's



- relationship with socioeconomic status and associated lifestyle factors, *Journal of Association of Physician of India*. 58 (2010) 151-8. PMID: 20848812
- [7] Meyer KA, Wall M, Larson NI, Laska MN, Sztainer DN, Sleep duration and BMI in a sample of young adults, *Obesity*. 20 (2012) 1279–1287. DOI: <https://doi.org/10.1038/oby.2011.381>
- [8] Chaput JP, Despres JP, Bouchard C, Tremblay A, The association between sleep duration and weight gain in adults: a 6-year prospective study from the Quebec family study, *Sleep*. 31:4 (2008) 517- 523. DOI: <https://doi.org/10.1093/sleep/31.4.517>.
- [9] Bjorvatn B, Sagen IM, Oyane N, Waage S, Fetveit A, Pallesen S, et al. The association between sleep duration, body mass index and metabolic measures in the Hordaland health study, *Journal of Sleep research*. 16 (2007) 66–76. DOI: <https://doi.org/10.1111/j.1365-2869.2007.00569.x>
- [10] Millett C, Agrawal S, Sullivan R, VazM, Kurpad A, Bharathi AV, et al., Associations between active travel to work and overweight, hypertension, and diabetes in India, *Plos Medicine*. 10:6 (2013) 1-12. DOI: <https://doi.org/10.1371/journal.pmed.1001459>.
- [11] Suzana S, Kee CC, Jamaludin AR, Safiza MN, Khor GL, Jamaiyah H, et.al., Prevalence of obesity and abdominal obesity among the Malaysian elderly population. *Asia Pacific Journal of Public Health* 24:2 (2012) 318–329. DOI: <https://doi.org/10.1177/1010539510380736>.
- [12] Tian X, Zhao G, Li Y, Wang L, Shi Y, Overweight and obesity difference of Chinese population between different urbanization levels, *The Journal of Rural Health* 30 (2014) 101–112. DOI: <https://doi.org/10.1111/jrh.12041>.

