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Prevalence and Factors Associated with Overweight and Obesity among Adults in the Selected Towns of Western Ethiopia: A Community Based Cross-Sectional Study

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Abstract

Objectives: The risk of overweight and/ or obesity is one of the increasing conditions worldwide touching both the developed and developing countries. It is becoming much devastating especially in town population. The aim of this study was to assess the prevalence of overweight/obesity and the associated risk factors among adults residing in the selected towns of western part of Ethiopia.

Methods: A community based cross-sectional study design was conducted in the selected towns of western Ethiopia from June 1-30, 2019. Multistage and systematic random sampling techniques were employed to select 840 study participants. Data were entered in to Epidata 3.1 and cleaned and analyzed by SPSS software version 24. Descriptive statistics and logistic regression were used for the analysis.

Results: The study included a total of 838 respondents with a response rate of 99.7%. Of all participants, 15.8% (95% CI: 13.4-18.3), 2.4 % (95% CI: 1.4-3.5) and 21.5% (95% CI: 18.7-24.3) were recorded to be overweight, obese and overall overweight and obese respectively. The odds of being overweight and obese were higher among females (AOR=1.75, 95% CI :1.07-2.87), married (AOR=3.32, 95% CI: 1.16-9.44), richest household wealth index (AOR= 1.87, 95% CI: 1.87-1.12-3.02), inadequate consumption of fruits and vegetables (AOR=9.12, 95% CI: 6.03-13.18), physically inactive (AOR= 6.46, 95% CI: 4.5-9.27), above normal waist to hip ratio (AOR=3.66, 95% CI:2.13-6.29), high blood pressure (AOR=5.78, 95% CI: 3.24-10.31) and high blood sugar (AOR= 3.08, 95% CI: 2.15-4.41) compared to their counterparts.

Conclusions: About one out of five adults living in the towns of western part of Ethiopia were found to be overweight and obese. Well-defined programs to control overweight and obesity with intersectoral collaboration is urgently required to avert the situation.

Keywords: Obesity; Overweight; BMI; West Ethiopia

List of abbreviations: BMI: Body Mass Index; NCDs: Non-Communicable Diseases; CDC: Center for Disease Control; WHO: World Health Organization; MET: Metabolic Equivalent; AOR: Adjusted Odd Ratio; COR: Crude Odd Ratio; BP: Blood Pressure; SPPSS: Statistical Package for Social Sciences; DM: Diabetes Mellitus

Introduction

Weight that is higher than what is considered as a healthy weight for a given height is described as overweight or obesity. It is often defined simply as a condition of abnormal or excessive fat accumulation in adipose tissue to the extent that health may be impaired. It is a complex and incompletely understood disease. Body mass index (BMI) is a screening tool for overweight or obesity and it is calculated as weight in (kg) divided by height in (m) squared. If an individual has a BMI of 25 to less than 30, he /she is overweight while having a BMI of 30 and above means the individual is obese. Other indices like waist and hip circumferences also measure different aspects of body composition and fat distributions. The prevalence of overweight and obesity is increasing worldwide affecting all age groups, all socioeconomic status and all culturally different groups. High BMI remains a risk factor for the escalating set of chronic diseases including cardiovascular diseases (CVD), diabetes mellitus, chronic kidney diseases, cancers and musculoskeletal disorders [1-5].

There are multiple factors contribute for the increasing trend and prevalence of overweight and obesity both in developed and developing countries. Consumption of unhealthy diet, that is an increased intake of energy dense foods that are high in fat and sugars and decreased level of physical activities due to the increasing sedentary nature of many forms of works, changing modes of transportation and increasing urbanization were some of the potential driving forces [1,2,5,6].

Studies indicated that there were age and sex differences in having overweight and obesity. Women are more prevalent than men and age also found to be the big factor [4,7-9].

A 35 years trend analysis results from 195 world countries indicated that 603.7 million adults were obese with the overall prevalence of obesity as 12.0% worldwide. According to the finding, high BMI contributed for 4.0 million deaths which represented 7.1% of the deaths from any causes and also contributed to 120 million disability-adjusted-life-years (DALY) representing 4.9% of DALYs from any cause among adults [2]. In 2016, 1.9 billion people (39% of the total population) were overweight among which 650 million (13% of the total population) of them were obese. The disease is highly becoming on the rise pace in low-and middle-income countries (LMIC) including Ethiopia, particularly in urban settings [5,6,10]. The prevalence of overweight and obesity in African region nearly doubled from 1980 to 2015 which was 18.5% to 34.5% and 6.2 % to 12.7% respectively [4].

The prevalence of overweight and obesity is dramatically increasing in Ethiopia with women were the leading throughout the decades. The prevalence of overweight increased from 8.3% in 1980 to 14.1% in 2000 to 20.9% in 2016. The prevalence of obesity was also in the same track which is increased from 0.7% in 1980 to 1.9% in 2000 to 4.5% in 2016. The mean BMI also increased from 18.2 kg/m^2 to 20.6 kg/m^2 from 1980 to 2016 respectively [11]. Nationwide study on NCDs risk factors revealed as the mean BMI of the Ethiopian adult population and total prevalence of overweight and obesity was 20.4 and 6.4% respectively [12]. Different local study findings reported varied prevalence of overweight and obesity. For instance, the prevalence of overweight and obesity was reported as 40.1 % and 13.9% from Southern Nation and Nationalities of Ethiopia to 9.3% and 2% reported from northwestern part of Ethiopia respectively. Study from adult population of Hawassa city reported as the prevalence of 28.2% both for overweight and obesity while prevalence of 19.9% and 8.6% was reported from northeastern part of Ethiopia respectively [13-16].

The existing literatures called for the immediate and collaborative activities in halting this devastating condition while a huge discrepancy in having a comprehensive and multi center studies to reveal the updated prevalence of overweight and obesity in Ethiopia remained a big delinquent. Few literatures tried to indicate the prevalence in only single towns and some other literatures focused on institution-based studies with small sample size. Owing these downsides, the present study tried to assess the prevalence and associated risk factors of overweight and obesity among adults in the selected towns of western part of Ethiopia specifically in three capital towns of Wollega zones.

Methods and Materials

Study settings, design and period

The study was conducted in the selected three towns of (Nekemte, Shambu, and Ghimbi), western part of Ethiopia, with the total population of 178,340 according to data from central statistical agency of Ethiopia in 2015. The study areas were selected purposely as they were the towns in which majority of the people resides in western part of Ethiopia. The study used community-based cross- sectional design conducted from June 1-30, 2019.

Source population

All ambulatory adults aged from 18-69 years old residing in the selected towns of western Ethiopia.

Study population

All ambulatory adults aged from 18-69 years old residing in the purposely selected towns who fulfilled the inclusion criteria

Eligibility criteria

All ambulatory adults aged between 18-69 years old [17] who had willing to participate, who can hear and speak were included in the study. Unwilling individuals, critically ill and unstable personnel were excluded from the study.

Sample size

Sample size was calculated by single proportion formula considering 95% confidence interval (CI), 5% of margin of error (d) and proportion (p) of 8.9% from the study conducted in the previous study for the overall prevalence of NCDs in Ethiopia [18].

$$\frac{(Z\alpha/2)^2\, P(1-P)}{d^2} = \frac{(1.96)^2\, 0.089(1-0.089)}{(0.05)^2} = 125.58 \approx 126$$

Based on WHO STEP approach, designing effect of 1.5 and parameter estimates of 2 age groups for each sex (that is 4 age-sex estimates) was considered. Accordingly, 126*1.5*4=756

Then, n is divided by the anticipated non response rate of 10%, which was 0.9 as, $\frac{756}{0.9}$=840**.** Therefore, a total of **840** subjects were participated in the study.

Sampling procedure

Multi stage sampling technique was used. Selected towns of west Ethiopia were selected purposively. Then, the zonal administrative towns were again purposively selected because of their large population density. Kebeles found in each selected town were selected by lottery method. Finally, households were selected by systematic random sampling technique. Eligible person in the household was selected. In case where there was more than one person who fulfills the inclusion criteria, one was selected by lottery method.

Data collection tools, data collectors and data collection procedures

World Health Organization STEP wise approach to NCD risk factor surveillance tool was used to collect data. Step one, two and three were used to assess the risk factors through interviewing, physical measurement and biochemical tests, respectively. In each step we used the core components [19].

Six data collectors and two supervisors were recruited. Two laboratory technicians, two BSc nurses and two public health personnel were recruited as data collectors. All the eligible participants provided written consent. Socio-demographic data and relevant behavioral and life style characteristics (step 1) were recorded in pre-tested questionnaires. Then, they were asked to allow physical measurements for their height, weight, waist and hip (step 2). Finally, they were given chance for biochemical measurements (step 3). Blood pressure was measured three times with the minimum of 5 minutes gaps in between by using adult size blood pressure cuff. Random blood glucose was also measured using glucometer from their fingertip.

Anthropometric Measurements

Waist circumference was measured on a standing position midway between the lower rib margin and the anterior superior iliac crest in the horizontal plane at the end of a normal expiration, with the arms relaxed at the sides using a flexible plastic metric tape and recorded to the nearest 0.1 cm.

Weight was measured using SECA electronic weighing scales, with light clothing & no shoes and was recorded to nearest 0.1 kg. The scale was calibrated after each measurement and after moving the instrument from one room to another.

Height was measured using a portable Stadiometer with the head of participants at the Frankfurt plane, knees straight and the heels, calf, buttocks and the shoulder blades touching the vertical surface of the stadiometer and recorded to the nearest 0.1cm. During the measurement shoes, bulky clothing, pins and braids from the hair that could affect the measurement was removed.

Definition of variables

Adult: A person whose age group found between 18-69 years.

Obese: a BMI greater than or equal to 30 kg/m^2.

Overweight: a BMI ≥25<30 kg/m^2.

Low consumption of Fruits and/ or vegetables: Consumption of fruits and/or vegetables <5 servings /day.

Physically active: If the total physical activity MET minute/week, is at least 600.

Physically in-active: If the total physical activity MET minute/week, is < 600.

Never smoker: an adult who has never smoked, or who has smoked less than 100 cigarettes in his or her life time.

Former smoker: an adult who has smoked at least 100 cigarettes in his or her lifetime but who had quit smoking at the time of interview

Current smoker: an adult who has smoked 100 cigarettes in his or her lifetime and who currently smokes cigarettes.

Data Quality management

The tool was modified from WHO STEP approach for NCD risk factors surveillance. A 3-days training on interviewing technique, questionnaire administration and physical measurement techniques, were given to the data collectors a week before the actual survey. Pre-test was conducted on 5 % of the total sample size (42 individuals) at one of the towns in east Wollega. An Afaan Oromoo translated version of the questionnaire was used to collect the data. Physical measurements were recorded twice and in some case three times in order to minimize observer error in measurements and records, whereas, rotation of data collectors was done to compare values. The supervisors were thoroughly following all the activities each day on the spot. The glucometer device and strips were checked regularly for consistency in reference and test readings. The collected data was coded, cleaned and

recorded each day.

Data analysis

The data was coded and entered in to Epiata 3.1. Then, it was exported to SPSS software version 25 for cleaning and analysis. Frequency distributions and percentage tables were used to present socio-demographic and economic as well as behavioral characteristics. The prevalence of overweight and obesity was shown in percentage. Cross tabulation and 95% confidence interval were used to present results of bivariable analysis. Multivariable logistic regression analysis was employed to control potential confounders. Associated risk factors of diabetes mellitus were declared statistically significant at p-value <0.05 with 95 % CI.

Results

Out of 840 eligible study subjects, a total of 838 (99.7%) adults aged from 18-69 years have participated in this study.

Socio-demographic and economic characteristics

Among the total respondents, 484 (57.8%) were female and 354 (42.2%) were male, with female to male ratio of 1:1.7. The

Variables and Categories		Frequency	Percentage
Sex	Male	354	42.2
	Female	484	57.8
Age category	18-29	255	30.4
	30-44	344	41.1
	45-59	157	18.7
	60+	82	9.8
Marital status	Single	170	20.3
	Married	586	69.9
	Divorced	43	5.1
	Widowed	39	4.7
Educational level	Illiterate	96	11.5
	Primary level	128	15.3
	Secondary level	229	27.3
	College and above	385	45.9
Main work status over the past 12 months	Government employee	239	28.5
	Non-government employee	44	5.3
	Self-employed	231	27.6
	Student	77	9.2
	Home-maker	25	3.0
	Retired	37	4.4
	Unemployed (able to work)	115	13.7
	Unemployed (unable to work)	70	8.4
Wealth Index	Poorest	88	10.5
	Poor	243	29.0
	Medium	238	28.4
	Wealthy	105	12.5
	Wealthiest	164	19.5

Table 1: Socio demographic and economic status of the study participants, selected towns of Wollega zones, western Ethiopia, 2019 (n=838)

age of the respondents ranged from 18-69 years, with the mean and median age of 39.1±14.4 and 35.0 years respectively. The interquartile range for the age of the respondents was between 28 and 48 years.

Regarding marital status, about two-thirds (69.9%) of them were married. Three hundred and eighty-five (45.9%) of the study participants attended level of college and above. Two hundred and thirty-nine (28.5%) were government employers. About one third, (243 (29.0%) and 238 (28.4%) of them were classified under poor and medium household wealth index (Table 1).

Behavioral characteristics

Tobacco consumption and alcohol drinking

The prevalence of cigarette smoking and alcohol use was 7.4 % (95 % CI, 5.7-9.3) and 12.6 % (95% CI, 10.5-14.8) respectively. Majority, 808 (96.4%) of the study participants were not currently smoking. Among 30 (3.6%) who were currently smoking, 27 (90%) of them were daily smoking cigarette during the data collection period. Only five (17.2%) of the respondents claimed that there were some one who smoke in the house in the past 30 days from the data collection period. The mean age at first starting to smoke was 28.21 ± 10.13 years.

Of the total study participants, 36 (3.1%) of them had ever consumed any tobacco product. Almost all of them (97.2%) had history of daily consumption of one of any tobacco products daily. When categorized according to CDC classification for smoking status, the prevalence of current smokers was 2.5% and that of the former smokers was 0.5%. Males whose age was 30-44 years were more prevalent in smoking cigarettes. Regarding to alcohol consumption status of the study participants, 106 (12.6%) of them had history of alcohol consumption among which 96 (91.4%) and 94 (89.5%) of them were drinking alcohol in the past 30 days and 12 months of the study period respectively. Ten, (11.4%) of them were drinking at least one standard alcohol in the past 12 months daily. Specifically, in age group and sex, the prevalence of alcohol consumption was higher in males (8.4%) than females (4.3%). Males whose age ranges from 30-44 years were more alcohol consumers than other age groups (x^2=12.29, p<0.001).

Dietary related

The mean days the respondents eat fruits and/vegetables per week was 1.26± 1.7 and the mean servings of fruits and/or vegetables per day was 2.49 ± 0.9. Majority, 577 (68.9%) of the study participants claimed that they add salt to the cooking wot just after finishing cooking followed by adding in between cooking, 227 (27.1%). Only 6 (0.7%) of them add salt after cooking. Majority, 638 (76.1%) of the respondents eat processed food high in salt always. Six (0.7%) of them did not know the importance of lowering salt in their diet. The prevalence of the participants who did not served adequate fruits/ and vegetables per day was 19.2 % (95% CI, 16.0-22).

Level of total physical activities

Regarding the physical activities experienced by the study participants, only 100 (11.9%) of them involved in vigorous physical exercises while more than half, 566 (67.5%) and 557 (66.5%) involved in moderate physical exercises and use bicycle or walking to get to and from places respectively. The mean day the respondents participated in vigorous activities per week was 0.41 ± 1.23 and the mean time they involved in each vigorous activity per day was 0.21 0.79 hours. The mean days the participants involved in moderate activities per week was 2.93 ± 2.32 and the mean time they involved in the moderate activities was 1.12 ± 1.12 hours. The mean days they walk or use bicycle to and from work per week was 3.22 2.56 with mean time of 1.11 ± 1.13 hours. The mean time spent in sitting in hours was 3.74± 3.65. Generally, among the total study participants, 611 (72.9%) and 227 (27.1%) were physically active and physically inactive respectively.

Prevalence of Overweight and Obesity

The prevalence of overweight and obesity was found to be 15.8% (95% CI, 13.4-18.3) and 2.4% (95% CI, 1.4-3.6) respectively. The prevalence was higher in females than males, 17.6% and 2.7% vs 13.3% and 2.0% respectively. The overall prevalence of

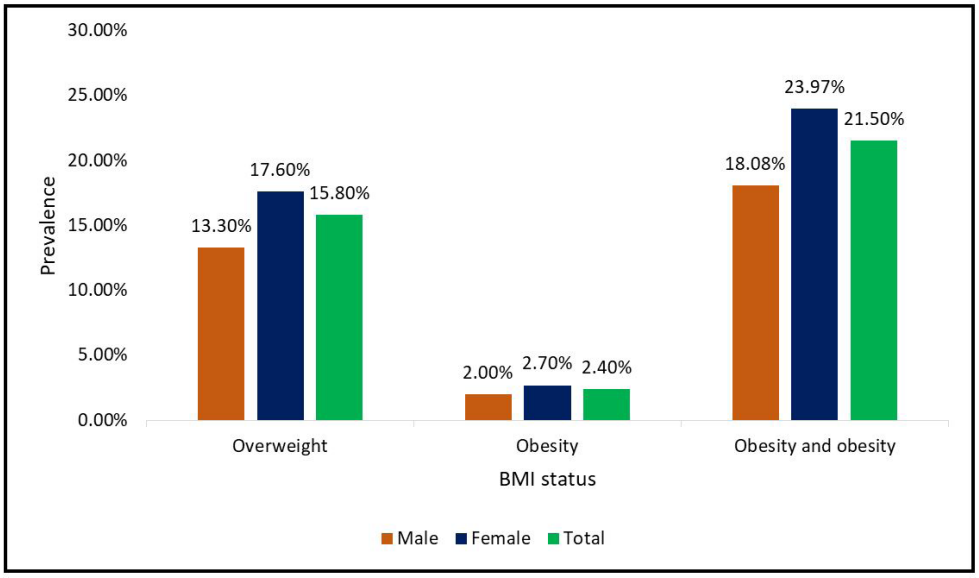

Figure 1: Sex based prevalence of overweight and obesity among adults residing in the selected towns of west Ethiopia, 2019 (n=838)

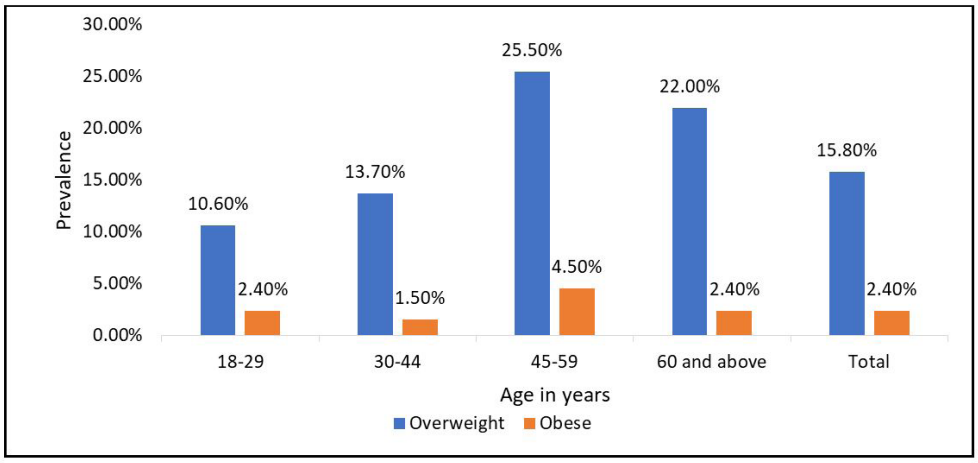

Figure 2: Age based prevalence of overweight and obesity among adults residing in selected towns of west Ethiopia, 2019 (n=838)

overweight and obesity was 21.5 % (95% CI, 18.7-24.3) (Figure 1).

The higher prevalence was recorded in respondents' whose age ranges 45-59 years than other age ranges ($p<0.001$) (Figure 2). The mean BMI was 22.69 kg/m^2.

Factors associated with overweight and obesity among adults

Being female, divorced, medium and richest household wealth index, inadequate consumption of fruits and vegetables, inactive physical activity status, waist to hip ratio above normal, raised blood pressure and high blood sugar were independent factors associated with overweight and obesity.

In this study, females were about 1.75 times higher to be overweight and obese when compared to their counterparts (AOR=1.75, 95% CI, 1.07-2.87). The odd of overweight and obesity was 3.32 times higher in divorced individuals when compared to those who were single (AOR= 3.32, 95% CI 1.16-9.44). The odd of overweight and obesity was about two times higher in those who were in richest household wealth index when compared to those who were poorest (AOR=1.87, 95% CI 1.12-3.02). But those who were medium house hold wealth index was 74% less chance to be overweight and obese (AOR=0.26, 95% CI 0.08-0.88).

The odd of overweight and obesity was 9.12 times higher in those who consume inadequate fruits and vegetables when compared

to their counterparts (AOR=9.12, 95% CI 6.30-13.18). Those who were physically inactive were 6.46 times higher to be overweight and obese when compared to their counterparts (AOR=6.46, 95% CI 4.5-9.27). In this study, having waist to hip ratio above normal were 3.66 times higher to be overweight and obese when compared to those who had normal waist to hip ratio (AOR=3.66, 95% CI 2.13-6.29).

Variables		Overweight/obesity		COR (95% CI)	AOR (95% CI)
		Yes (n, %)	No (n, %)		
Age	18-29	41 (16.1)	214 (83.9)	1	1
	30-44	65 (18.9)	279 (81.1)	1.21 (0.79-1.87)	**1.58 (0.49-5.05)**
	45-59	51 (32.5)	106 (67.5)	**2.51 (1.57-4.03)** ***	**2.233 (0.79-6.32)**
	≥60	23 (28.0)	59 (72.0)	**2.04 (1.13-3.66)** *	**2.02 (0.7-5.75)**
Sex	Male	64 (18.1)	290 (81.9)	1	1
	Female	116 (24.0)	368 (76.0)	**1.43 (1.01-2.01)** *	**1.75 (1.07-2.87)** *
Marital status	Single	21 (12.4)	149 (87.6)	1	1
	Married	133 (22.7)	453 (77.3)	**3.8 (1.75-8.26)** **	**3.32 (1.16-9.44)** *
	Divorced	15 (34.9)	28 (65.1)	**2.08 (1.27-3.42)** *	**1.80 (0.94-3.44)**
	Widowed	11 (28.2)	28 (71.8)	**2.79 (1.21-6.42)** *	**0.81 (0.24-2.64)**
HH wealth index	Poorest	23 (22.1)	81 (77.9)	1	1
	Poor	47 (21.3)	174 (78.7)	0.95 (0.54-1.67)	1.20 (0.89-2.34)
	Medium	9 (4.5)	191 (95.5)	**0.17 (0.07-0.37)** **	**0.26 (0.08-0.88)** *
	Rich	24 (22.9)	81 (77.1)	1.04 (0.54-2.0)	0.78 (0.99-1.65)
	Richest	77 (37.0)	131 (63.0)	**2.07 (1.20-3.56)** *	**1.87 (1.12-3.02)** *
Smoking status	Yes	25 (40.3)	37 (59.7)	**2.71 (1.58-4.63)** ***	1.17 (0.44-3.09)
	No	155 (20.0)	621 (80.0)	1	1
Fruits/vegetables consumption	Adequate	68 (10.9)	558 (89.1)	1	1
	Inadequate	111 (52.6)	100 (47.4)	**11.60(7.02-19.19)** ***	**9.12(6.30-13.18)** ***
Physical activity	Active	114 (18.9)	490 (81.1)	1	1
	Inactive	66 (28.2)	168 (71.81)	**9.62(5.49-16.84)** ***	**6.46 (4.5-9.27)** ***
WHR	Normal	31 (15.2)	173 (84.8)	1	1
	Obese	149 (23.5)	485 (76.5)	**3.83 (1.83-8.00)** ***	**3.66 (2.13-6.29)** ***
High blood glucose	No	131 (16.8)	648 (83.2)	1	1
	Yes	49 (83.1)	10 (16.9)	**6.93(2.73-17.60)** ***	**5.78(3.24-10.31)** ***
Raised BP	Yes	108 (16.6)	541 (83.4)	**3.41 (1.98-5.86)** ***	**3.08 (2.15-4.41)** ***
	No	72 (38.1)	117 (61.9)	1	1

*P<0.05, **p<0.01, ***p<0.001

Table 2: Multivariable logistic regression analysis of overweight/obesity among of adults residing in the selected towns of Wollega zones, western Ethiopia, 2019 (n=838)

The present study indicated that both raised blood pressure and high blood sugar were found to be risk factors for overweight and obesity. In such away, the odd of being overweight and obese was about six times (AOR=5.78, 95% CI 3.24-10.31) and three times (AOR=3.08, 95% CI 2.15-4.41) higher when compared to their counterparts controlling all other variables constant respectively (Table 2).

Discussion

Overall, in this study, we found that approximately one out of five study participants were overweight and /or obese with a large difference between males and females. The overall prevalence of overweight and obesity as well as the mean BMI was found to

be higher than the Ethiopian nationwide study [12]. The result was also higher than the study reported from Northwest Ethiopia, Jimma and Bahirdar [13,20,21]. However, it was lower than studies reported from other areas [15,22,25] and similar with study findings from Brazil and Burkinafasso [26,27]. The inconsistency was observed due to the difference in methodology and study settings. Regardless of the inconsistent numbers reported, almost all the literatures however inclined to witness and recommend that overweight/obesity is in an alarming rate which urges special attention.

In this study, females were found to be higher to be overweight/obese than their male counterparts. This was consistent with other study findings from different corners of countries both in developed and in developing countries [13,14,16,21,23,28-31]. This is because of the fact that there is a vivid difference in behavioral, socio-cultural and chromosomal difference between males and females [32,33]. Older age was one of the significant factor of overweight and obesity which agrees with other study findings as well [16,20,22,24,25,34]. In the same way in this study, married individuals were significantly associated with overweight/obesity. This finding was similar with other study findings [13-16,23,24,35]. Research indicated that three models were utilized to show marital status to overweight/obesity. First, resource model in which married individuals were fully confident to eat more regularly, which in turn leads to weight gain. They also were prone not to smoke, as smoking suppresses appetite leading to weight loss. Second, the attractiveness model, in which married men and women are less likely to be conscious of or concerned about their body weight because they are not actively not seeking mate. Thirdly, the crisis model, focusing on stress associated with change in marital status (marital dissolution) which directly affects psychological, physical and social aspects which in turn leads to weight loss. Those who married are less likely to be affected by these calamities [36].

In this study, household wealth composition affected BMI status. The richest were about two times higher to be overweight and/or obese. Other study findings also supported this finding [20,37,38].

Inadequate consumption of fruits and vegetables was independently associated with the risk of overweight and obesity. This is also in agreement with others study findings [13,20,31,38,39]. This is due to the consumption of complex carbohydrates from different vegetables and fruits and whole sources are good means of gaining vitamins, minerals and fibers. These sources promote weight management in controlling satiety at lower level of calories and fat intake [10,40,41].

In this study the odds of peoples with physically inactive to be overweight and obese was about six times higher when compared to their counterparts. Other study also reported the same scenario. Physical inactivity in adolescence strongly and independently associated with obesity in adulthood, favoring the development of self-perpetuating vicious circle of obesity and physical inactivity [13,31,42]. Physical activity increases energy expenditure and plays in integral role in maintaining body weight. It also helps to reduce body fat and [prevent the decrease in muscle mass often found during weight loss [41].

Those who were diagnosed with high blood pressure and raised blood glucose had positive association with the risk of overweight and obesity. The risk of developing diabetes mellitus type 2 rises progressively with increasing adiposity [43,44].

This study has certain limitations. First, due to the cross-sectional nature of the data, the study could not show a causal and temporal relationship between overweight/obesity and the associated risk factors. Second, the study involved only town residents which make the study findings not representative for the rural residents. Finally, behavioral related data were collected by a structured questionnaire using the interviewer-administered method. Therefore, the effect of recall bias and social desirability bias cannot be ruled out.

Conclusion

The prevalence of overweight and obesity in the study area was found to be considerably higher. Sex, marital status, household wealth index, inadequate consumption of fruits and vegetables, physical inactivity, hypertension and raised blood glucose were associated factors of overweight and obesity. Females oriented, married and higher socioeconomic groups focused strategy

needs to be designed and implemented. Promoting life style changes for hypertensive and diabetic patients is highly recommended.

Ethical approval and consent to participate

The study was reviewed and approved by the Institutional Review Boards of Wollega University Ethical review board. Written informed consent was obtained from the study participants.

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Consent for publication: Not applicable.

Availability of data and Materials

The data sets used for this study are available from the corresponding author on reasonable request.

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Competing interests

The authors declare that they have no competing interests.

Authors' Contributions

BR, BB and GM involved in conceptualization of the study, participated in its design, analyzing the findings; BR: performed result writing, analyze the findings and prepare the manuscript; BB involved in analyzing the findings, BB and GM involved in reviewing the manuscript. All authors read and approved the final manuscript.

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