Determinants of Overnutrition among Urban Adults in Yangon, Myanmar

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ABSTRACT

Background

Over 1.9 billion adults who are 18 years old and older were overweight and more than 6.5 million adults were said to be obese. In 2014 National Step Survey of Myanmar stated that there were 16.9% and 5.5% of overweight and obesity in adults. Due to altering lifestyle and urbanization, it is important to detect the nutritional status and its most influencing factors among urban adults in Yangon.

Objective

To assess the determinants of overnutrition among urban adults in Yangon, Myanmar.

Method

This is a cross-sectional study with a sample of 453 adults aged 18-62 years and structured questionnaires were used. Overweight and obesity were defined according to the WHO classification for Asian adults. Multivariable logistic regression analysis was used to assess independent factors associated with overnutrition.

Result

A total of 453 participants were included for analysis. The prevalence of overnutrition was 49.89% (95% CI, 45.28-54.50). In multivariable analysis, being male (AOR = 3.56, 95% CI = 2.09-6.08, being married/divorced/widowed/ separated (AOR = 2.95, 95% CI = 1.82–4.77), family history of overnutrition (AOR = 6.49, 95% CI = 3.72–11.33, history of DM (AOR = 1.79, 95% CI = 1.11–2.89, consumption of starchy vegetables ≥5 days (AOR = 2.05, 95% CI = 1.27–3.30), not meeting the WHO recommended physical activity (AOR = 3.57, 95% CI = 2.24–5.70), and moderate and low perception (AOR = 2.15, 95% CI = 1.21–3.84) were associated with overnutrition.

Conclusion

We observed high prevalence of overnutrition in this study. Socioeconomic status, health behavior and perception were the factors behind overnutrition. These findings offer important information for establishment of appropriate public health interventions and policies to lessen the burden of overnutrition.

KEY WORDS

Adults, Diet, Low-income country, Overnutrition, Southeast Asia

INTRODUCTION

Globally, more deaths are associated with overnutrition than with undernutrition.[1] It was estimated that by 2030 there will be 1.35 billion and 573 million overweight and obese people.[2] In the past, only high-income countries deal with the concerns of overnutrition, but nowadays it becomes global burden and affecting countries with low and middle incomes. Overnutrition can be considered as one of the major risk factors for non-communicable diseases.[3,4] These include diabetes mellitus, hypertension, coronary heart disease, ischemic stroke and certain types of cancer such as breast cancer and colon cancer.[3,5]

Myanmar is one of the country with a high prevalence of NCD.[4] Due to changes in lifestyle and urbanization over the few decades, NCDs have become a major public health concerns and therefore, Myanmar is now facing double burden of diseases.[6,7] The prevalence rate of overweight has increased from 11.7% to 21.2% in adult males, 17.8% to 27.8% in adult females and obesity have increased from 1.2% to 4% in adult males, 3% to 7.3% in adult females between the period of 2000 to 2016.[8]

Overnutrition is associated with socio-economic, genetic, and behavioral factors such as having higher education, being married, having high income, having family history of overnutrition, less intake of fresh vegetables and fruits, more intake of carbohydrate such as white rice, less physical activity and low health literacy level were contributed to overweight and obesity.[5,9-14]

Although there are previous studies which determine the association between demographic and socio-economic, behavioral factors and overnutrition, recent data are not available. Therefore, it is essential to conduct a new study to reflect the current relationship between the factors and overnutrition and identify which factors have the greatest impact on overnutrition among urban adults in Yangon, Myanmar.

METHODS

This cross-sectional study was conducted between September 2022 - August 2023. The study population was adults aged 18-62 years old in Yangon region of Myanmar. The sample size was calculated by using the sample size estimation formula for the logistic regression analysis of Hsieh by taking references of previous study done on sociodemographic and health characteristics and overweight, obesity in Eastern Sudan with the prevalence rate of 26.8% overweight and 32.2% obesity.[15,16] A sample size of 453 was obtained from the calculation. There are 4 districts and 44 townships in Yangon Region. Among 4 districts of Yangon, Hlaing Township from Northern District, North Dagon Township from Eastern District, Thaketa Township from Southern District and Sanchaung Township from Western District were randomly chosen. After that,

household were selected by proportion to population size. Lastly, the required sample size of 453 participants is collected by systematic random sampling methods. The participants from the selected household will be chosen using the lottery method if there is more than one person who met the inclusion criteria.

The inclusion criteria of the respondents were both sexes aged between 18 to 62 years old and are residing in the study area during the study period and those who are willing to participate in this study. The exclusion criteria were individuals who are pregnant, lactating mothers, bed-ridden people and people with psychiatric disorders who cannot provide information. The participants were interviewed using structured questionnaire and anthropometric measurements were taken after the interview.

A structured questionnaire was used to collect the data of the respondents. The Cronbach's alpha coefficient of health literacy was 0.966, perception was 0.711, knowledge was 0.711, food security was 0.824 and behavioral was 0.717. The questionnaires had been checked by 3 experts for content validation and adapted to improve the validity. The questionnaire consisted of 7 parts: Demographic and Socioeconomic Characteristics; Behavioral factors; Depression index; Food security; Knowledge; Perception and Health literacy. The anthropometric measurements consisted of height in centimeters (cm), body weight in kilograms (kg) and waist circumference in centimeters (cm). A digital weighing scale and stadiometer were used to measure the weight and height. The measurements were done on a flat, uncarpeted section of the floor. The participants were asked to wear light-weighted clothes, remove shoes and anything on the head such as headbands. The participants were asked to stand straight with the eyes looking straight ahead and their line of sight and chin will be parallel to the floor. The body weight of the participants was weighed in kilograms (kg) to the nearest 0.1 kg. The height of the subjects was recorded in centimeters to the nearest 0.1 cm. Waist circumference was measured at the midpoint between the lower border of the last palpable rib and the top of the iliac crest. A non-elastic measuring tape was used. After making sure that the tape is horizontal around the waist and keeping the tape snug around the waist, but not compressing the skin, the waist circumference was measured and recorded in centimeters. Overweight and obesity defined as BMI ≥ 23 kg/m² by WHO for Asian cut-off points was the outcome of the study.[6]

The respondents were requested to sign the consent form after understanding all the information regarding the study. All confidentiality of data was fully assured. The interview was done by the researcher using the structured questionnaire.

The analysis was done by using STATA version 15 (College Station, Texas, USA). The continuous variables such as age,

height and weight were expressed as mean (SD) standard deviation, median (minimum-maximum). The categorial variables such as sex were described as number and percentages. After running the bivariable analysis, the variables with p value ≤ 0.25 were carried over to multiple logistic regression analysis stage. After controlling the confounder effects of variables, the variables with p-value < 0.05 were considered statistically significant and the factors which had the strongest association were reported as adjusted odds ratio (AOR), 95% confident interval (CI) and p-value.

The study obtained ethical approval from Ethical Review committee Khon Kaen University Centre for Research Ethics in Humans (Reference No. HE662093).

RESULTS

Among the participants 21.63% completed high school, 5.74% had a middle school education, 7.06% received primary school education, and 4.19% had no formal education. In terms of employment, 38.85% worked in private companies, 25.17% were unemployed, 21.41% were self-employed, and 8.17% worked in government organizations. Average individual's income ranges from 0 to 2347.62 USD per month with median income of 131.58 USD per month. Monthly family income ranges from 0 to 3289.47 USD with a median income of 234.96 USD per month. In relation to the participants' financial situation 52.76% were enough with no savings and 22.96% were enough with savings. Majority of the participants (75.28%) had no chronic diseases and similarly most of them (70.86%) had no family history of overnutrition and 59.57% had no family history of hypertension. 75.28% of the respondents had no family history of diabetes mellitus. Regarding the dietary habits of the respondents in a week, 42.38% never ate fast food, 20.97% drank 3-4 days of sugar-sweetened beverages, 30.02% ate 3-4 days of sweet fruits while 28.92% ate 3-4 days of unsweet fruits, 36.87 ate 3-4 days of starchy vegetables while 33.55% ate 3-4 days of non-starch vegetables, 39.96% consumed 7 days per week of protein rich food while only 5.52% ate protein with high fat food, 4.42% never consumed protein from vegetables, more than half (56.51%) of the respondents never ate food cooked with animal oil and 32.23% ate 7 days per week of the food cooked with vegetable oil. 54.75% of the participants did not meet WHO recommendation of physical activity for adults, 64.02% had sedentary behaviors of more than 120 minutes and 72.85% had sleep duration of 8 and more than 8 hours per day. Only 5.96% were current smokers and 17.66% were current drinker. 3.09% of the participants had severe depressive symptoms. 5.96% had very low level of food security. 11.92% had poor knowledge and 0.44% had low perception. 11.92% had inadequate and 20.97% had problematic health literacy level (Table 1). Almost half of the respondents (49.89%) were in overnutrition status while 41.06% had normal weight and 9.05% were underweight (Table 2).

Table 1. Demographic and socio-economic characteristics of the respondents (n= 453)

Characteristics	Number	Percent (%)
1. Age (years)		
18-29	191	42.16
30-43	132	29.14
44-55	70	15.45
> 56	60	13.25
Mean (±SD)	36.06	(± 12.89)
Median (mini: max)	30	(18: 62)
2. Gender		
Male	117	25.83
Female	336	74.17
3. Marital status		
Single	265	58.50
Married	173	38.19
Widow/Separated/Divorced	15	3.31
4. Educational Level		
No formal education	19	4.19
Primary school	32	7.06
Middle school	26	5.74
High school	98	21.63
Bachelor's degree	267	58.94
Above bachelor's degree	11	2.43
5. Occupation		
Private company worker	176	38.85
Unemployed	114	25.17
Self-employed	97	21.41
Government worker	37	8.17
Others	29	6.40
6. Monthly individual income[17]		
0-114.68	211	46.58
>114.68-258.50	157	34.66
>258.50	85	18.76
Mean (±SD)	180.68	(±239.24)
Median (mini: max)	131.58	(0:2347.62)
7. Monthly household income (MMK)		
0-114.68	69	2.43
>114.68-258.50	167	36.87
>258.50	217	47.90
Mean (±SD)	414.62	(±479.55)
Median (mini: max)	234.96	(0:3289.47)
8. Financial status		
Not enough with doubt	19	4.19
Not enough	91	20.09
Enough with no savings	239	52.76
Enough with savings	104	22.96
9. Chronic disease		
No	341	75.28
Yes	112	24.72

10. Family history of overnutrition

No	321	70.86
Yes	132	29.14

11. Family history of hypertension

No	249	59.57
Yes	204	45.03

12. Family history of DM

No	341	75.28
Yes	112	24.72

13. Fast food: pizza, Hamburger, Sandwiches, Doughnuts

Never	192	42.38
1-2 Days	186	41.06
3-4 Days	60	13.25
5-6 Days	8	1.77
7 Days	7	1.55

14. Sugar-sweetened beverage: coca cola, Pepsi, coffee with milk, energy drink, and fruit juice

Never	83	18.32
1-2 Days	161	35.54
3-4 Days	95	20.97
5-6 Days	37	8.17
7 Days	77	17

15. Sweet fruits: durian, mango, pineapple, grapes, and banana

Never	67	14.79
1-2 Days	194	42.83
3-4 Days	136	30.02
5-6 Days	30	6.62
7 Days	26	5.74

16. Not sweet fruits: dragon fruit, kiwi, lime, lemon

Never	95	20.97
1-2 Days	177	39.07
3-4 Days	131	28.92
5-6 Days	24	5.30
7 Days	26	5.74

17. Vegetables that contain starch: potatoes, sweet potatoes, taro, corn, and pumpkin

Never	32	7.06
1-2 Days	185	40.84
3-4 Days	167	36.87
5-6 Days	31	6.84
7 Days	38	8.39

18. Vegetables that do not contain starch: carrot, cabbage, cauliflower, mushrooms

Never	14	3.09
1-2 Days	106	23.40
3-4 Days	152	33.55
5-6 Days	57	12.58
7 Days	124	27.37

19. Protein: Lean meat, chicken, eggs, soy products like tofu

Never	7	1.55
1-2 Days	54	11.92
3-4 Days	121	26.71
5-6 Days	90	19.87
7 Days	181	39.96

20. Protein with high fat: cheese, nuts, seeds, streaky pork

Never	94	20.75
1-2 Days	197	43.49
3-4 Days	117	25.83
5-6 Days	20	4.42
7 Days	25	5.52

21. Protein from vegetable: bean, pea, lentils, chickpeas

Never	20	4.42
1-2 Days	134	29.58
3-4 Days	149	32.89
5-6 Days	35	7.73
7 Days	115	25.39

22. Food cooked with animal oil

Never	256	56.51
1-2 Days	105	23.18
3-4 Days	64	14.13
5-6 Days	8	1.77
7 Days	20	4.42

23. Food cooked with vegetable oil

Never	109	24.06
1-2 Days	42	9.27
3-4 Days	96	21.19
5-6 Days	60	13.25
7 Days	146	32.23

24. Physical activity (WHO recommendation)

Not met	248	54.75
Met (150-300 minutes)	205	45.25

25. Duration of the sedentary behaviors of participants (Minutes)

0-120	163	35.98
>120	290	64.02

26. Sleep duration of participants (Hours)

<8	123	27.15
≥8	330	72.85

27. Smoking

Never	369	81.46
Former	57	12.58
Current	27	5.96

28. Alcohol drinking

Never	316	69.76
Former	57	12.58
Current	80	17.66

29. Severity of depression

None (1-4)	274	60.49
Mild (5-9)	121	26.71
Moderate (10-14)	33	7.28
Moderately severe (15-19)	11	2.43
Severe (20-27)	14	3.09

30. Level of food security

High (0)	268	59.16

Marginal (1-2)	95	20.97
Low (3-5)	63	13.91
Very low (6-10)	27	5.96
31. Level of knowledge		
Poor (<60%)	54	11.92
Moderate (60-79%)	85	18.76
High (≥80%)	314	69.32
32. Level of perception		
Low (10-24)	2	0.44
Moderate (25-37)	357	78.81
High (38-50)	94	20.75
33. Level of health literacy		
Inadequate (≤50%)	88	19.43
Problematic (>50-66%)	61	13.47
Sufficient (>66-80%)	170	37.53
Excellent (>80%)	134	29.58

Table 2. Prevalence of overnutrition among urban adults in Yangon, Myanmar (n = 453)

Overnutrition (Yes/No)	Number	Percent (%)	95% CI
Underweight (BMI < 18.5 kg/m²)	41	9.05	6.73 to 12.08
Normal weight (BMI 18.5 to 22.9 kg/m²)	186	41.06	36.60 to 45.67
Overnutrition (BMI ≥ 23 kg/m²)	226	49.89	45.28 to 54.50

Bivariate analysis of the factors associated with overnutrition

The bivariate analysis for the factors associated with overnutrition were identified by using simple logistic regression. The study found that respondents who age between 31 to 62 (OR=3.23, 95%CI: 2.20 to 4.74, p < 0.001) when compared with age group of 10 to 30 years old and male respondents (OR=2.19, 95%CI: 1.42 to 3.38, p < 0.001) when compared with female. In marital status, participants who were married/divorced/widowed/separated (OR=3.63, 95%CI: 2.45 to 5.40, p < 0.001) compared to single participants. Regarding educational attainment, respondents with medium (OR=2.89, 95%CI: 1.58 to 5.27, p < 0.001) and low level (OR=3.36, 95%CI: 1.18 to 9.51, p < 0.001) were likely to be overweight or obese. Participants who were unemployed (OR=1.55, 95%CI: 1.04 to 2.31, p=0.031) when compared with those who were employed. Among the respondents, those whose individual income > 235 USD (OR=1.06, 95%CI: 0.67 to 1.70, p=0.789) compared to income of < 235 USD and household income > 470 USD (OR=1.09, 95%CI: 0.68 to 1.77, p=0.700) when compared to those with < 470 USD. In financial status, participants who were enough with no savings (OR=1.14, 95%CI: 0.72 to 1.80, p=0.584), not enough (OR=1.30, 95%CI: 0.74 to 2.29, p=0.359) and not enough with debt (OR=2, 95%CI: 0.73 to 5.49, p=0.178) when compared to enough with savings group. Respondents who had chronic diseases (OR=4.20,

95%CI: 2.60 to 6.79, p < 0.001), family history of diabetes mellitus (OR=4.20, 95%CI: 2.60 to 6.79, p ≤ 0.001), family history of hypertension (OR=2.07, 95%CI:1.42 to 3.02, p=0.234), family history of overnutrition (OR=6.43, 95%CI: 3.98 to 10.38, p ≤0.001) compared to those who had none of these.

In dietary habits of the respondents per week, sweet fruits consumption ≥ 5 days (OR=1.65, 95%CI: 0.93 to 2.92, p=0.082), starchy vegetables consumption ≥ 5 days (OR=2.08, 95%CI: 1.42 to 3.06, p < 0.001), high fat protein consumption ≥ 5 days (OR=1.16, 95%CI: 0.63 to 2.16, p=0.626) and food cooked with animal oil consumption ≥ 5 days (OR=1.17, 95%CI: 0.54 to 2.52, p=0.687) compared to < 5 days consumption. Individuals who did not meet the WHO recommendation of physical activity (OR=3.54, 95%CI: 2.40 to 5.22, p < 0.001) when compared to those who met the recommendation and sedentary behaviors of more than 120 minutes per day (OR=1.57, 95%CI: 1.06 to 2.31, p=0.022) compared to who had less than 120 minutes. Participants with sleep duration of less than 8 hours per day (OR=1.67, 95%CI: 1.10 to 2.54, p=0.016) compared to more than 8 hours. Current smoker (OR=3.31, 95%CI: 1.36 to 8.01) and current alcohol drinker (OR=1.29, 95%CI: 0.79 to 2.10, p=0.261) when compared to those who never smoked or drank.

Respondents with depression had lesser odds of overnutrition (OR=0.79, 95%CI: 0.54 to 1.15, p=0.273). Those who had low and very low food security level (OR=1.19, 95%CI: 0.75 to 1.89, p=0.465) when compared to high and marginal food secured people. Participants with moderate and low level of knowledge (OR=2.02, 95%CI; 1.34 to 3.03, p < 0.001) compared to those with high level. Respondents with moderate and low level of perception (OR=1.71, 95%CI; 1.08 to 2.72, p=0.021) compared to those with high level. Individuals who had sufficient level (OR=1.21, 95%CI: 0.57 to 1.46, p=0.022), problematic level (OR=1.82, 95%CI: 1.05 to 3.15, p=0.031) and inadequate level (OR=3.63, 95%CI: 1.78 to 7.37, p < 0.001) when compared to excellent level of health literacy (Table 3).

Multivariable analysis of the factors associated with overnutrition (n = 453)

In this study, an association with overnutrition was observed for male gender in comparison to females (AOR=3.56, 95%CI: 2.09 to 6.08, p < 0.001), as well as for married/divorced/widowed/separated individuals compared to those who were single (AOR=2.95, 95%CI: 1.82 to 4.77, p < 0.001). Participants with a family history of overnutrition (AOR = 6.49, 95%CI: 3.72 to 11.33, p < 0.001) and a history of diabetes mellitus (AOR = 1.79, 95%CI: 1.10 to 2.89, p=0.017) were more likely to experience overnutrition compared to those without such histories. The consumption of starchy vegetables for five or more days per week was associated with overnutrition (AOR=2.05, 95%CI: 1.27 to 3.30, p=0.003) compared to those who consumed them for less than five days. Respondents

Table 3. Bivariate analysis of the factors associated with overnutrition (n = 453)

Characteristics	Number	% Over-nutri-tion	Crude OR	95% CI	p-value
1. Age (years)					<0.001
18-30	231	35.93	1	1	
31-62	222	64.41	3.23	2.20 to 4.74	
2. Gender					<0.001
Female	336	44.94	1	1	
Male	117	64.10	2.19	1.42 to 3.38	
3. Marital status					<0.001
Single	265	36.98	1		
Married/ Widowed/ Separated/ Divorced	188	68.09	3.63	2.45 to 5.40	
4. Educational Level					<0.001
High level (Completion of high school, university, or postgraduate education)	376	45.48	1	1	
Medium level (Completion of primary and secondary school)	58	70.63	2.89	1.58 to 5.27	
Low level (Below primary school)	19	73.68	3.36	1.18 to 9.51	
5. Occupation					0.031
Employed	310	46.45	1	1	
Unemployed	143	57.34	1.55	1.04 to 2.31	
6. Monthly individual in-come[17]					0.789
0-235	365	49.59	1	1	
>235	88	51.14	1.06	0.67 to 1.70	
7. Monthly household in-come[17]					0.700
0-470	370	49.46	1	1	
>470	83	51.81	1.09	0.68 to 1.77	
8. Financial status					0.521
Enough with savings	104	46.15	1	1	
Enough with no savings	239	49.37	1.14	0.72 to 1.80	
Not enough	91	52.75	1.30	0.74 to 2.29	
Not enough with debt	19	63.16	2	0.73 to 5.49	
9. Chronic disease					<0.001
No	341	41.64	1	1	
Yes	112	75.00	4.20	2.60 to 6.79	
10. Family history of over-nutrition					<0.001
No	321	37.69	1	1	
Yes	132	79.55	6.43	3.98 to 10.38	
11. Family history of hypertension					0.234
No	249	41.77	1	1	
Yes	204	59.80	2.07	1.42 to 3.02	
12. Family history of DM					<0.001
No	341	41.64	1	1	
Yes	112	75.00	4.20	2.60 to 6.79	
Behavioral Factors					
1. Fast food consumption per week (Days)					0.062
≥5	15	26.67	1	1	
<5	438	50.68	2.83	0.89 to 9.01	
2. Sugar-sweetened beverag-es consumption per week (Days)					0.088
≥5	114	42.98	1	1	
<5	339	52.21	1.45	0.94 to 2.22	
3. Sweet fruits consumption per week (Days)					0.082
<5	397	48.36	1	1	
≥5	56	60.71	1.65	0.93 to 2.92	
4. Not sweet fruits consump-tion per week (Days)					0.068
<5	403	48.39	1	1	
≥5	50	62.00	1.74	0.95 to 3.18	
5. Starch containing vegeta-bles consumption per week (Days)					<0.001
<5	272	42.65	1	1	
≥5	181	60.77	2.08	1.42 to 3.06	
6. Non-starch vegetables consumption per week (Days)					0.012
<5	384	47.4	1	1	
≥5	69	63.77	1.95	1.15 to 3.32	
7. Protein rich food con-sumption per week (Days)					0.730
<5	182	48.9	1	1	
≥5	271	50.55	1.07	0.73 to 1.55	
8. High fat protein consump-tion per week (Days)					0.626
<5	408	49.51	1	1	
≥5	45	53.33	1.16	0.63 to 2.16	
9. Protein from vegetables consumption per week (Days)					<0.001
<5	303	41.91	1	1	
≥5	150	66.00	2.69	1.79 to 4.04	
10. Food cooked with animal oil consumption per week (Days)					0.687
<5	425	49.65	1	1	
≥5	28	53.57	1.17	0.54 to 2.52	
11. Food cooked with vege-table oil consumption per week (Days)					0.201
≥5	206	46.6	1	1	
<5	247	52.63	1.27	0.88 to 1.84	
12. Physical activity					<0.001
Met (150-300 minutes)	205	33.17	1	1	
Not met	248	63.71	3.54	2.4 to 5.22	
13. Sedentary behaviors (Minutes per day)					0.022
0-120	163	42.94	1	1	
>120	290	54.14	1.57	1.06 to 2.31	

14. Sleep duration (Hour per day)					0.016
≥8	123	27.15	1	1	
<8	330	72.85	1.67	1.10 to 2.54	
15. Smoking					0.003
Never	369	46.34	1	1	
Former	57	61.4	1.84	1.04 to 3.26	
Current	27	74.07	3.31	1.36 to 8.01	
16. Alcohol drinking					0.261
Never	316	47.47	1	1	
Former	57	57.89	1.52	0.86 to 2.69	
Current	80	53.75	1.29	0.79 to 2.10	
17. Depression by PHQ-9					0.273
No	274	52.19	1	1	
Yes	179	46.37	0.79	0.54 to 1.15	
18. Level of food security					0.465
High & Marginal	363	49.04	1	1	
Low & very low	90	53.33	1.19	0.75 to 1.89	
19. Level of knowledge					<0.001
High	314	44.59	1	1	
Moderate & Low	139	61.87	2.02	1.34 to 3.03	
20. Level of perception					0.021
High	94	39.36	1	1	
Moderate & Low	359	52.65	1.71	1.08 to 2.72	
21. Level of health literacy					<0.001
Excellent	118	44.07	1	1	
Sufficient	186	41.94	1.21	1.57 to 2.46	
Problematic	95	58.95	1.82	1.05 to 3.15	
Inadequate	54	74.07	3.63	1.78 to 7.37	

who did not meet the WHO recommendation for physical activity (AOR=3.57, 95%CI: 2.24 to 5.70, p < 0.001) were more likely to experience overnutrition compared to those who met the recommended physical activity levels. Individuals with moderate and low levels of perception regarding overnutrition (AOR=2.15, 95%CI: 1.21 to 3.84, p=0.009) were more likely to experience overnutrition than those with a high level of perception.

DISCUSSION

Our study found that the combined prevalence of overweight and obesity among urban adults in Yangon, Myanmar was 49.89% (95% CI: 45.3 to 54.5) with 33.11% of overweight and 16.78% of obesity. The prevalence of overnutrition was higher compared to Myanmar national Diabetes and NCD risk factors survey done in 2014.[18] This might be due to urban conditions such increasing access to unhealthy food and inactive lifestyle.[19] However, the combined prevalence of overweight and obesity were reported to be higher in Northwest China and Eastern Sudan than the current study.[16,20]

Table 4. Multivariable analysis of the factors associated with overnutrition (n = 453)

Factors	Number	% Overweight & Obesity	Crude OR	Adj. OR	95% CI	p-value
1. Gender						<0.001
Female	336	44.94	1	1	1	
Male	117	64.10	2.19	3.56	2.09 to 6.08	
2. Marital status						<0.001
Single	265	36.98	1	1	1	
Married/ divorced/ Widowed/ separated	188	68.09	3.63	2.95	1.82 to 4.77	
3. Family history of overnutrition						<0.001
No	321	37.69	1	1	1	
Yes	132	79.55	6.43	6.49	3.72 to 11.33	
4. History of DM						0.017
No	265	45.28	1	1	1	
Yes	188	56.38	1.56	1.79	1.11 to 2.89	
5. Consumption of starch containing vegetables						0.003
<5	272	42.65	1	1	1	
≥5	181	60.77	2.08	2.05	1.27 to 3.30	
6. Physical activity (WHO recommenda-tion)						<0.001
Met (150-300 minutes)	205	33.17	1	1	1	
Not Met	248	63.71	3.54	3.57	2.24 to 5.70	
7. Level of perception						0.009
High	94	39.36	1	1	1	
Moderate & Low	359	52.65	1.71	2.15	1.21 to 3.84	

Our study found that males have higher odds of being over nourished compared to females. This contradicts to the previous studies done in Northwest China and Eastern Sudan where odds of being overweight and obese were higher in females.[16,20] Both hormonal and social factors might contribute to the gender difference. It appeared that body weight is less of a concern for men and they have less interest in losing weight and taking part in weight-loss programs.[21] Moreover, men typically view the weight-loss programs as having too many obstacles and being as a "feminized realm".[22] Additionally, there are very few programs targeting only for men.[23] Marital status was also associated with overnutrition in this study, and this aligns to the findings from previous studies done in Bangladesh and South-Easten Iran.[10,24] The connection between marriage and overnutrition can be related to altered lifestyle practices and less concern and time to maintain body weight after marriage and childbirth.[25]

Our study further verified that family genetic history was associated overnutrition which aligns with previous finding from a study done in Gambia. Individuals with family history of overweight or obesity had relative risk of 3.1 than those with no such history. A higher mean BMI was also present in participants with family history of obesity.[26] This study found that participants with history of diabetes mellitus were likely to be overweight or obese and this was supported by the findings from meta-analysis in 2022.[27] The impaired leptin action in obese individuals resulted in accumulation of fat in pancreas causing an increase in free fatty acids that induced insulin resistance.[28] The study also revealed that consumption of starchy vegetables ≥ 5 days was linked with overnutrition. Even though consuming more vegetables was negatively associated with weight gain, starchy vegetables such as potatoes, corn, taro are found to increase body weight. These starchy vegetables have high nutritional value, as well as high glycemic load which may account for their positive association with weight gain.[29] The study found that physical inactivity had an association with overnutrition, and this aligns with other study done in Saudi Arabia.[30] Physical inactivity might be due to sedentary behavior at home and at work and the increased use of "passive" modes of transportation.[31] Our study found that participants with moderate and low perception on overnutrition were more likely to be over nourished and this agrees with previous finding.[32]

There were some limitations in this study. As it was conducted among urban adults who were residing in Yangon region, the study cannot be generalized to all urban adults in Myanmar. Moreover, this study was dependent on the respondents' answers to the structured questionnaire. Hence, memory recalling bias, social desirability bias and interviewer bias were not able to exclude. Finally, as this study was a cross-sectional study, it could not establish a cause-and-effect relationship and further longitudinal studies might be beneficial to be done.

CONCLUSION

The current study showed high prevalence rates of overnutrition among urban adults in Yangon, Myanmar

which can be increased the risk of developing associated metabolic complications among the population. Overnutrition had a significant association with male sex, being married, family history of overnutrition and physical inactivity. These findings provide further information and add existing knowledge from previous studies for developing interventions and for the formulation of short-term and long-term policies and strategies for the control and prevention of overnutrition in Myanmar.

Recommendations

Given the association of overnutrition with specific demographics, such as males and married individuals, preventive strategies should place greater emphasis on these groups. Public awareness regarding the significance and advantages of physical activity needs to be heightened through diverse platforms. Encouraging the inclusion of daily physical activity within work environments and communities is recommended. Health promotion is essential to enhance understanding of non-communicable diseases and discourage engaging in risky behaviors to prevent the onset of NCDs.

As this study was a cross-sectional study, it only reflects the association and not a cause-and-effect relationship. Further longitudinal studies are needed. Research focusing on genetics is essential to gain a deeper understanding of the correlation between a family history of overnutrition and the overnutrition of individuals.

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