Gender Differences in Prevalence and Perception of Being Overweight among University Students in Morogoro, Tanzania: A Cross-sectional Study

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Abstract

The prevalence of overweight and obesity is rising at an alarming rate in both developing and developed countries. A cross-sectional survey was done to assess gender differences in the prevalence and perception of overweight and obesity among students of higher learning institutions. The study also explored the gender differences in dietary diversification among the studied students. Mzumbe University was randomly selected from among five other Universities in Morogoro and a total of 222 students were randomly selected. Weight, height, hip and waist circumference were measured using standard procedure. Obesity was defined according to WHO standard categories. Data on socio-demographic and self-perception of body image were obtained using a structured questionnaire. Information on dietary diversity was obtained using FANTA/FAO guideline. Data was analysed using the Statistical Package and Service Solutions (SPSS Inc.) computer software version 20 where inferential and descriptive statistics was presented. The mean age of respondents was 25 (SD 4.4) years. Based on the body mass index (BMI), 37.6% of the females were overweight or obese compared to 23% for males. In contrast, 4% of the females were underweight compared to 6.6% for males. Regarding waist circumference and the waist-hip ratio, more females had increased risk of developing cardiovascular diseases. Among overweight or obese males, 82% identified themselves as having normal weight whereas, 50% of the overweight or obese females thought they were normal. About 85% of the students consumed more than four food groups per day showing that their diet was diversified, although more than half (55%) of the respondents skipped at least one meal per day. There is a high prevalence of overweight and obesity especially among female students of higher learning institutions in Morogoro region. Nutrition education is necessary to the students to reduce the risk for life style related diseases associated with being overweight and obesity.

Key words: *Overweight, perception, gender, students, University, Tanzania*

Introduction

Obesity is a significant public health problem worldwide, and its prevalence is increasing mainly due to changes in dietary habits and activity level. Despite increasing knowledge regarding the dangers associated with obesity, its prevalence within populations both in developed and in least developed countries is increasing at an alarming rate, with about 28% increase in prevalence for the last three decades (Jafari-Adli *et al.*, 2014, Karageorgi *et al.*, 2013, Ogden *et al.*, 2012, Ng *et al.*, 2014).

In Tanzania, the increased prevalence of excessive weight is noted among all age groups and in both sexes. Njelekela and colleagues reported that the prevalence of obesity was 13% for men and 35% for women in the urban area of Temeke district in Dar es Salaam. Likewise, abdominal obesity was much higher among women (58%) compared to men (11%), and women had greater odds of having metabolic syndromes such as abdominal obesity, high fasting blood glucose levels and high density lipoproteins (HDL) cholesterol compared to male participants (Njelekela *et al.*, 2009). Similarly, a community survey in Kinondoni district, Dar es Salaam, showed that the overall prevalence of obesity was 19.2%, with more women being obese (24.7%) than men (9.0%) (Shayo and Mugusi, 2011). The rural population is equally affected; for example, a study in rural Tanzania observed that the prevalence of overweight and obesity among women was 16% and 6%, respectively, which was higher than the prevalence of underweight (7%) amount same sex (Keding *et al.*, 2013).

Various dietary and non-dietary factors are related to obesity and abdominal adiposity. Among dietary factors, include the consumption of many nutrients, foods and food groups (Azadbakht and Esmaillzadeh, 2011). Non dietary factors include levels of physical activities, smoking, mental health, self-perception of body image and genetic factors (Gores, 2008). Dietary habits of University students may be affected by the fast-food culture and/or their sedentary lifestyle.

University students come from different regions in Tanzania and from different social economic background, hence making a heterogeneous population with regard to cultural backgrounds and ethnicity, which may influence their eating habits differently as well as their attitude about obesity. The students comprise of a middle aged young men and women, who face many risk factors such as the fast food culture, a sedentary lifestyle and limited varieties of foods from which to choose around the University campuses. Furthermore, self-perception

of a person's body weight may contribute to their well-being and to their initiatives on weight loss or weight gain (Aryeetey, 2016)

Some studies have assessed the prevalence of overweight and obesity among school children (Mwaikambo *et al.*, 2015, Mosha and Fungo, 2010); while others have reported the perception of body weight among middle aged adults in Dar es Salaam (Muhihi *et al.*, 2012). However, research and documentation works on the prevalence of overweight and obesity and associated risks factors among Tanzanian middle age group are limited. Similarly, there is scanty data on the prevalence of overweight and obesity, perception of body weight, dietary diversity and associated risk factors among University students.

This study aimed at assessing gender differences in the prevalence and perception of being overweight among University students in Morogoro region. The findings will help in designing nutritional programmes that will address lifestyle factors in order to improve the situation.

Methodology

Research design

This cross sectional study was conducted at Mzumbe University, which was randomly selected from among five Universities in Morogoro region. The study population comprised of second and third year undergraduate students regardless of their socio-economic differences, age, sex, and degree programme. Every student had a chance to be selected excluding those who were pregnant, those with chronic diseases, those who were sick or on medications and those with eating disorders during the study period. The sample size was determined using the prevalence of overweight and obesity in Morogoro region, which was 22% among students (Nyaruhucha *et al.*, 2003). Using the confidence level of 95% and expecting a response rate of 90%, the required minimum sample size was 288. A total of 222 questionnaires were completed and analyzed representing a 77% response rate out of the sampled study participants.

Data Collection

The Height of respondents (in cm) was measured without shoes using a height measuring board (Shorr productions, Maryland USA), which was placed against a wall firmly and recorded to the nearest 0.1 centimetre. Weight (in kg) was measured using seca electronic scale (Seca gmbh and Co.kg 22061, Hamburg, German), with minimum clothing and without shoes; and recorded to the nearest 0.1kg. The Body Mass Index (BMI) was calculated as weight divided by height in meter square ($kg\,m^{-2}$). Respondents were grouped as

underweight, normal, overweight or obese according WHO standards, where normal BMI is set at 18.5 to 25 kg/m^2 (WHO, 1995).

A plastic non-stretchable tape-measure was used to measure waist and hip circumferences. Waist was measured at the midway between the inferior margins of the last rib and the crest of the iliac, in a horizontal plane. Each landmark was palpated, marked and the midpoint determined by tape measure. The tape was fitted around the site, but not compressing the soft tissue and they were asked not to tuck their stomach. Then measurements were taken to the nearest 0.1 cm at the end of a normal (gentle) expiration and results were recorded in cm. Hip circumference was measured around the widest part of the buttocks and recorded to the nearest 0.1 cm. The nutritional status of individuals using waist circumference was classified according to WHO classification where high risk with waist-hip ratio of >0.90 for males and >0.85 for females were used (WHO, 2008).

A structured questionnaire was used to obtain information on socio-demographic characteristics, attitudes and perceptions about being overweight and obese. Further, perceptions about their own body weight were obtained through face to face interviews. Participants were asked how they perceived their body weight; whether they thought they were underweight, normal, overweight or obese. The four responses were combined into three categories; underweight, normal, overweight/obese during analysis. The frequencies were compared with the actual BMI categories as defined by WHO cut-off points that was obtained from actual weight and height measurements.

Food consumption (dietary diversity) data was collected using qualitative dietary recall over the previous day covering the past 24 hours before the survey. The respondents were asked to recall all food types including snacks and drinks that they had consumed the previous day. Then the interviewer probed about all the ingredients contained in each specific dish. All the ingredients that exceeded 15grams were counted. Food were categorized into twelve groups which are cereals, roots and tubers, oil and fats, pulses/legumes and nuts, vegetables, fruits, fish and other sea foods, meat, milk and milk products, eggs, sugars and others (Savy *et al.*, 2005). A score of 1 was given if an individual had consumed at least one food item from a particular food group and zero was given if none of the food in a specific food group was consumed. Questions were also asked about food consumed outside home and the number of meals usually eaten in a typical day.

Data analysis

Statistical data analysis was done using the Statistical Package for Social Science (SPSS) computer software version 20. Descriptive analysis was done to obtain characteristics of study population. Means and Standard Deviation values were used for analyzing continuous variables, while frequencies were used for analyzing categorical variables. Analysis for comparing data according to gender was done using Student's *t*-test for parametric variables and *Chi-Square* test for non-parametric variables

Ethical consideration

Permission to conduct the study was given by Sokoine University of Agriculture research committee. The research team also obtained appropriate authorization from district, ward and Mzumbe University authorities. Participation in the study was voluntary and informed written consent to participate was sought from the participants. Confidentiality of participant was ensured by assigning identification numbers for each participant without using their names.

Results

Complete data was available for 222 respondents of whom 54.5% were males, 23.4% were married and 74.8% were single (Table 1). Majority of respondents were direct from school (66.7%) compared to mature age entrants (33.4%). The main source of income for most of the respondents was the Loan Board (64.4%) and a few were supported by their employers (2.2%). The remaining 33.4% were self-financed, mostly supported by their parents, spouses or caretakers.

Table 1: Socio-economic and demographic characteristics of the study population

Characteristic	n	%
Sex		
Male	121	54.5
Female	101	45.5
Marital status		
Married	52	23.4
Single	166	74.8
Co-habiting	4	1.8
Occupation before joining University		
Direct from school	148	66.6
Unemployed	31	14.0
Formal employment	36	16.2
Casual labourer	7	3.2
Main source of income		
Loan board	143	64.4
parents	40	18.0
Self-support/spouse	31	14.0
Relative	3	1.4
Employer	5	2.2

Anthropometric characteristics of the study population are shown in Table 2. Male respondents were significantly older with a mean age of about 26 years compared with 24 years for females. With regard to weight, females were relatively lighter with a mean weight of 63 kg compared to 66kg for males; and shorter with mean height of 160.7cm compared to170 cm for males but with higher BMI of 24.5kg/m^2 relative to 22.9kg/m^2 for males. However, there was no significant difference in waist circumference and waist-hip ratio among males and females (Table 2).

Table 2: Anthropometric characteristics of the study population with respect to gender (Mean and SD)

Characteristic	Male (n = 121)		Female (n = 101)		P-value	Total	
	N	SD	n	SD		n	SD
Age (in years)	25.9	5.3	24.1	2.7	0.002	25.1	4.4
Weight (Kg)	66.4	10.1	63.2	10.9	0.026	64.9	10.6
Height (cm)	170.2	7.4	160.7	7.3	0.000	165.8	8.70
BMI (kg/m^2)	22.9	3.3	24.5	3.9	0.002	23.6	3.7
Waist circumference (cm)	78.8	10.5	79.1	13.2	0.823	78.9	11.8
Hip circumference (cm)	89.3	11.6	95.8	15.9	0.001	92.3	14.1
Waist-Hip ratio	0.89	0.12	0.86	0.30	0.292	0.87	0.22

Nutritional status of Respondents

In total, 12 (5.4%) of the respondents were underweight and 29.7 were overweight or obese. More female respondents were overweight (30.7%) and obese (7.9%) compared to males where 20.7% were overweight and 2.5% were obese. Likewise, using waist hip ratio and waist circumference cut-off points specific for males and females, more females had increased risk for developing cardiovascular diseases compared to males. Generally, overweight/obesity increased with age, with higher prevalence among those of age above 25 years compared to students below 25 years (35.7% vs. 26.1%) (Table 3).

Variable	Female n (%)	Male n (%)	P - value	< 25 years n (%)	≥25 years n (%)	P- value	Total n (%)
BMI							
Underweight	4 (4.0)	8 (6.6)		5 (3.6)	7 (8.6)		12 (5.4)
Normal	59 (58.4)	85 (70.2)	0.055	97 (70.3)	47 (56.0)	0.066	144 (64.9)
Overweight-obese	38 (37.6)	28 (23.1)		36 (26.1)	30 (35.7)		66 (29.7)
Waist-Hip ratio							
normal	67 (66.3)	100 (82.6)	0.005	113 (81.9)	54 (64.3)	0.003	167 (75.2)
Increased risk	34 (33.7)	21 (17.4)		25 (18.1)	30 (35.7)		55 (24.8)
Waist circumference							
Normal	58 (57.4)	110 (90.9)		109 (79.0)	59 (70.2)		168 (75.7)
Moderate risk	20 (19.8)	9 (7.4)	0.000	16 (11.6)	13 (15.5)	0.328	29 (13.1)
Substantial risk	23 (22.8)	2 (1.7)		13 (9.4)	12 (14.3)		25 (11.3)

With regard to the self-perception of the body image 12 (5.4%) were underweight, 144 (64.9%) had normal weight while 22 (29.7%) were overweight or obese. More than half of the underweight respondents (58.3%) identified themselves as having normal BMI and the rest perceived correctly that they were underweight. Meanwhile, most of the respondents who had normal BMI (86.8%), perceived themselves as normal but 8.3% of those who were normal thought they were overweight or obese while 4.9% thought they were underweight. Furthermore, about one third of the respondents (34.8%) who were overweight/obese perceived themselves as being so while the majority (63.6%) felt that they had normal BMI, although they were not (Table 4).

Table 4: Association between respondents perception on self-body image and actual BMI

Actual BMI catergory	Perceived body image							
	Underweight		Normal		Overweight/obese		Total	
	n	%	n	%	n	%	n	%
Underweight	5	41.7	7	58.3	0	0.0	**12**	**5.4**
Normal	7	4.9	125	86.8	12	8.3	**144**	**64.9**
Overweight/obese	1	1.5	42	63.6	23	34.8	**66**	**29.7**
Total	**13**	**5.9**	**174**	**78.4**	**35**	**15.8**	**222**	**100**

With respect to gender, among overweight males, about 82% thought they were normal while 18% identified themselves correctly as overweight/obese. Among female respondents, about half of the overweight/obese thought they were normal (Figure 1).

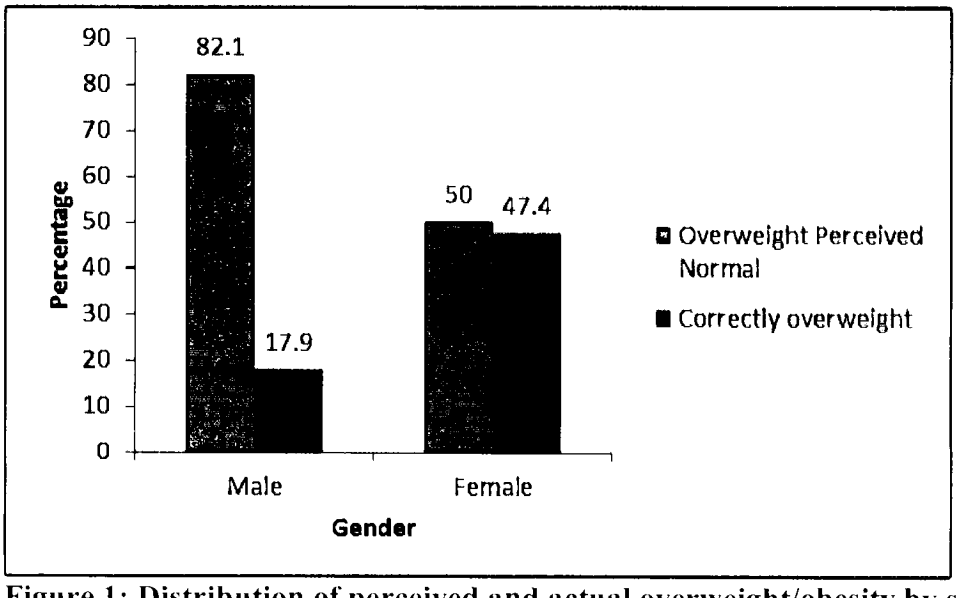

Figure 1: Distribution of perceived and actual overweight/obesity by sex

Knowledge and Perception of Overweight and Obesity

More than 80% of the respondents were aware of the relationship between overweight and obesity with chronic diseases (Table 5). Although slightly more males were concerned about their body weights, about 50% had never checked their body weights compared to about 37% of the females. Majority of respondents perceived being obese as unhealthy but still some respondents associated obesity with being health (18% males and 19% females) while some respondents associated it with being wealthy (17% males and 13% females).

Table 5: Knowledge on causes of obesity and perception of obesity

	Male	Female	P-value
Know the relationship between obesity and chronic diseases			
Yes	99 (85.8)	92 (91.1)	0.047
No	22 (18.2)	9 (8.9)	
Ever measured body weight			
Hospital	31 (25.6)	25 (24.8)	0.004
Home (research)	9 (7.4)	25 (24.80)	
Street	21 (17.4)	12 (11.9)	
Never	60 (49.6)	39 (38.6)	
Concern with your body weight			
Yes	71 (58.7)	63 (62.5)	0.575
No	50 (41.3)	38 (37.6)	
Perception of obese person			
As rich	21 (17.4)	13 (12.9)	0.575
Healthy	22 (18.2)	19 (18.8)	
Un healthy	78 (64.5)	69 (68.3)	

Dietary Diversity

The most consumed food group was cereal followed by vegetables, legumes, nuts, and fruits. Most students skipped some meals; majority were eating one or two meals per day. The most skipped meal was breakfast which was skipped by 28% of males and 20% of females. About 85% of the students consumed more than four food groups implying that their diet was diversified. No gender difference in dietary diversification or in consumption of specific food groups was noted (Table 6).

Table 6: Consumption of different food groups with respect to gender

	Male		Female		Total	P-value	
Variable	**n**	**%**	**n**	**%**		**n**	**%**
Cereals	116	95.6	100	99.0	216	91.3	0.151
Roots and tubers	63	52.1	54	53.5	117	52.7	0.835
Vegetables	118	97.5	97	96.0	215	96.8	0.529
Fruits	105	86.8	86	85.2	191	86.0	0.727
Meat and meat products	94	77.7	80	79.2	174	78.4	0.784
Fish	89	73.6	67	66.3	156	70.3	0.241
Legumes and nuts	99	81.8	88	87.1	187	84.2	0.280
Eggs	65	53.7	53	52.5	120	54.1	0.666
Milk	75	62.0	62	61.4	137	61.7	0.927
Oil and fats	108	89.3	91	90.1	199	89.6	0.837
Soft drinks, tea and coffee	100	82.6	84	83.2	184	82.9	0.918
Others	100	82.6	79	78.2	179	80.6	0.406
Food groups consumed							
<4 food groups	16	13.2	17	16.8	33	14.9	0.286
>4 food groups	105	86.8	84	83.2	189	85.1	

Number of meals consumed per day							
One	16	13.2	16	15.8	32	14.4	
Two	62	61.2	39	38.6	101	45.5	0.331
Three	38	31.4	41	40.6	79	36.6	
Four or more	5	4.1	5	5.0	10	4.5	
Meals skipped							
None	43	35.5	46	45.5	89	40.1	
Breakfast	34	28.1	20	19.8	54	24.3	0.346
Lunch	17	14.0	9	8.9	26	11.7	
Dinner	11	9.1	10	9.9	21	9.5	
More than one	16	13.2	16	15.8	32	14.4	

Discussion

Prevalence of overweight and obesity: gender differences

This study aimed at assessing gender differences in terms of prevalence and perception of overweight and obesity among students at Mzumbe University. Since food service providers at universities serve very similar dishes, and the food habits of university students in Tanzania are very similar, it is expected that similar findings would be found in other universities in Tanzania. According to the findings, overall the prevalence of overweight/obesity was high, which indicates high risk of developing obesity related non communicable diseases among students of higher learning institutions. This prevalence was higher than what was reported in other studies that were conducted in Tanzania (Nyaruhucha *et al.*, 2003). Females had a higher prevalence of overweight and obesity than males while more males were underweight compared females.

In Tanzania, there is a significant variation in the prevalence of overweight and obesity among women depending on the region and population studied especially between rural or urban areas (Keding *et al.*, 2013, Muhihi *et al.*, 2012). The main reason for higher prevalence amount female compared to male students could be a more sedentary lifestyle by female students. Some male students reported to be involved in physical exercise but it was rare to find female students participating in exercises. Some of the female in-service students were married and had children: which was, in other studies, associated with being overweight and obese (Ziraba *et al.*, 2009). Another reason could be the habit of snacking, which is more common among female students compare to their male counterparts. Similar results were reported in studies conducted in other African countries (Olusanya and Omotayo 2011). Other studies reported a relatively higher prevalence of overweight respondents among male students. For example studies in other Asian countries reported relatively a higher prevalence of overweight and obesity among male students (Ziraba *et al.*, 2009,

Yahia *et al.*, 2008, Haleama Al Sabbah, 2012). In addition, among Lebanese students, it was reported that the prevalence of overweight students was higher among male students (27.4%) compared to females (18.9%).

Compared to the studies conducted in past years, there is an increasing trend towards prevalence of overweight and obesity among students in higher learning institutions. Nyaruhucha *et al.* (2003), in a study done in Morogoro education institutions where Sokoine University represented Higher learning institutions reported a prevalence of 22% in 2003, while this study found an overall prevalence of about 30%. This means, a weight reduction campaign through healthy life style should be emphasized among students. Generally, the prevalence of being overweight and obesity increased with age, higher prevalence among those above 25 years. Although males had higher mean age, that did not differentiate their BMI.

Based on the waist circumference and waist-hip ratio, more females had substantial risks for metabolic syndromes compared to males. These findings are similar with what was reported based on a study that was done in Palestine and Lebanon (Yahia *et al.*, 2008) where males were more overweight and obese based on BMI while females were at increased risk based on waist circumference (central obesity). Among Lebanese students, based on their waist circumference, 4.6% of the males and 20.9% of the females were at a higher risk of developing obesity co-morbidities (Yahia *et al.*, 2008). Similar results were also reported in a study among Nigerian students where the prevalence of abdominal obesity was 17.8% and it was more common among females (23.0%) compared to males (12.5%) (Olusanya and Omotayo (2011). Obesity has been associated with metabolic syndrome for example high blood pressure and diabetes, which are related to chronic diseases (WHO, 2000). It is also suggested that waist circumference and waist-hip ratio, when used together with BMI, can make a better prediction of adiposity in case body fat cannot be checked (Amin *et al.*, 2015).

Perception of Body Image

Majority of respondents in the current study perceived an obese person as unhealthy and most respondents associated obesity with the risk of chronic diseases. However, some associated obesity with wealth and a good health status. Understanding the consequences of obesity can trigger weight loss initiatives while those who feel that it is good to be obese may be reluctant to lose weight.

There was gender difference in the attitude towards measuring body weight. More females had measured their body weight compared to males and more females were aware of the consequences of being overweight and obese. This was expected because it is common for women to be worried about their body image compared to men. Overweight respondents existed among females, but quite women were also concerned about their weight status, such that they monitored their body weight regularly. This indicates there is a mismatch between knowledge about obesity and practices to address the problem.

This needs to be explored further to understand barriers and intentions of attaining a healthy body weight. A study by Rustad and Smith in Minnesota University, USA indicated that nutrition knowledge is necessary but not a sufficient factor for changes in practices of an individual (Rustad and Smith, 2013). This corresponds to another study which indicated that clients who were obese and were seeking health care behaviour have knowledge of appropriate strategies for weight loss but they do not translate their desire into practices (Kaufer-Horwitz *et al.*, 2015). In this study, it was similarly revealed that there was no gender difference in terms of initiatives to lose weight. However this is contrary to what has been reported by other studies which established that men were less aware of their status and only few were trying to lose weight (Wardle *et al.*, 2005).

Eating Habits

Eating habits were assessed using dietary diversity score (DDS). The findings showed that only half of the students were taking meals regularly and we did not observe any gender difference. It was however, noted that most students skipped some meals and the most frequently skipped meal was breakfast. Meal skipping could be attributed to university programmes where classes start at 7.45 am, which could be too early for students who are staying off campus to have their breakfast before going to classes.

Another reason could be a money saving strategy for those with limited income. Several studies emphasized regular meals as a way of maintaining health and an acceptable BMI, within the recommended range. Meanwhile, other studies reported an association between skipping meals with school performance (Dubois *et al.*, 2009, Ma *et al.*, 2003, Batista-Jorge *et al.*, 2016). A study in the US reported that individuals who tend to skip breakfast had a significantly higher risk of obesity (had 4.5 times) compared to those who regularly consumed breakfast. Similar results were reported in Brazil where those who omitted breakfast had increased risk of being overweight (OR 2.2; 95% CI 1.4 – 3.6) (Batista-Jorge *et al.*, 2016).

The habit of skipping meals may be dangerous to students because it can reduce concentration in classes. Evidence from various studies indicates that when breakfast is skipped the brain is deprived of its essential start-up energy of a day; hence it tends to compromise other body activities and prioritise vital activities by lowering other energy demanding activities including critical thinking and concentration (Dubois *et al.*, 2009, Acham *et al.*, 2012).

The consumption of different food groups was also high, showing that the diets were generally diversified. Majority of respondents consumed more than 4 food groups and no gender difference observed. This could be attributed to the availability of canteens at the University that serve cheap food. The food venders around university campus tend to serve a variety of dishes. It is important to note that there could be seasonal variation on dietary intake and DDS depending on the time of the year. For instance, during the period when students receive a loan (*Bumu*) for their upkeep, many of them tend to eat more diverse and more expensive less nutritious snacks and soft drinks which are energy dense. Furthermore, there are also seasonal variations in availability of fruits; hence when in season, consumption increases.

Although other studies found a correlation between DDS with abdominal adiposity (Azadbakht and Esmaillzadeh, 2011); this study did not find any correlation between DDS and BMI or with central obesity. Other studies reported that students were taking meals regularly and female students showed healthier eating habits and there was a significant gender difference in frequency of meal intake (Yahia *et al.*, 2008). Generally, other lifestyle habits like smoking and alcohol intake were not common among the studied students.

Conclusions and Recommendations

The prevalence of overweight (25%) and obesity (5%) among students at Mzumbe University in Morogoro was high, and the findings can be generalized to other higher learning institutions, where the prevalence of obesity may be higher, especially among female students. Moreover, there is a high level of misperception about the students' body image based on BMI. Majority of the respondents perceived themselves as being of normal body weight, which may limit their initiatives for weight management.

These findings imply that there is need to create awareness on the consequences of being overweight in order to reduce the risk for life style related diseases associated with problems of being overweight and obese. It is also important to orient university students on healthy dietary and lifestyle practices for them to attain an optimum nutrition status. Universities should

also promote and provide enabling environments for implementing good nutrition practices. For example by introducing regulations targeting food vendors and canteens/cafeteria operating on campus to start serving breakfast early to accommodate students who have early classes so that they do not skip this important meal. Furthermore, it is also important to create gender sensitive facilities for physical activities. The gap between knowledge and practices found in this study needs to be explored further in order to get a better understanding of barriers and enhancers for attaining a healthy body weight.

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