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ORIGINAL ARTICLE

PREVALENCE OF OVERWEIGHT AND OBESITY AMONG OFFICE-BASED URBAN CIVIL SERVANTS IN SOUTHERN NATIONS, NATIONALITIES AND PEOPLES' REGION, ETHIOPIA.

MarkosYohannes, PhD,MED,BED[1*]

ABSTRACT

Background: Information on the magnitude of the overweight and obesity is scarce and these have largely remained unaddressed.

Objective: *The aim of this study was to assess the prevalence of overweight and obesity in office-based urban civil servants working in the eastern part of Southern Nations, Nationalities and Peoples' Region (SNNNPR), Ethiopia.*

Methods: *A cross-sectional study was carried out in Southern Nations, Nationalities and Peoples' Region (SNNPR), Ethiopia in 2015. A stratified cluster sampling method was used to select 374 office workers from three towns. Height/weight was measured using weight scale and height measuring tape. Ethical approval was secured and participation was voluntary and confidential. Chi-square test and multinomial logistic regression model were performed using IBM SPSS version20.*

Results: *The majority of office workers were either overweight or obese. More women than men were obese and more men were overweight compared to women .Being over weight was directly proportional with age. As age increased, so did the likelihood of becoming overweight. There was a statistically significant association between body mass index and gender (p=0.036), age (p=0.000), and marital status (p=0.000). A unit increase in age was associated with 1.51 decrease in the odds of being underweight and a 0.95 decrease in the odds of having optimal (desirable) weight.*

Conclusion: *More than half of the economically productive population from the study was either overweight or obese, or was at risk to develop these conditions. That figure can be expected to increase if no action is taken. Therefore it is recommended to adopt interventions which focus on office workers, particularly addressing older adults and women aimed at promoting lifestyle changes, introducing physical activity and dietary modification to control the emergence of adulthood overweight/obesity problems.*

Keywords: *BMI, Overweight, Obesity, Civil servants, Office workers.*

INTRODUCTION

Obesity or the state of being overweight has been an emerging public health problem which has been increasing significantly over the past few decades in both developed and developing countries, particularly among urban populations (1-3). Mortality arising from this condition is significant; up to 3.4 million people die each year and in 2010 alone, 93.6 million disability-adjusted life years (DALYs) were lost due to this condition (4). Being overweight is defined as an excess amount of body weight that comes from muscles, bones, fat, and water whereas obesity refers to an excess amount of body fat (5-6).

The human body needs calories from its food intake to be able to accomplish basic life functions. If the amount of intake exceeds the amount that the body is able to burn off, the excess calories are accumulated over time and this leads to the development of an overweight or obese condition, referred to as energy

There is a well established link between being overweight/obese and progression to generally poor health outcomes such as developing type 2 diabetes, heart disease, high blood pressure, non-alcoholic fatty liver disease, osteoarthritis, certain types of cancer (breast, colon, endometrial, and kidney) stroke, and diseases of the cardiovascular system (5,6,7,8). Despite the fact that physiological, genetic and environmental factors are contributing factors for weight gain, insufficient energy expenditure due to insufficient physical activity or sitting for prolonged periods is the main physiological factor (9). This sedentary lifestyle with a dietary alteration (fast food) is a vital health behavior responsible for the remarkable increase in obesity or becoming overweight (10-12).

The population most at risk of staying seated for prolonged periods are office workers residing in urban areas (13). This sedentary occupational group sits an average of up to 13 hours a day (14).

[1]Dilla University, College of Natural and Computational Science, Department of Sports Science.
*Corresponding Author e-mail: markosyem@yahoo.com or markosyem2013@gmail.com

This estimate represents the maximum time staying seated in sedentary populations prevalence data because those who sit for a longer period are more likely to sit outside of work as well (15). Hence, if the sedentary occupation is strongly associated with becoming overweight/obese, office workers must be the priority target in overweight/obesity studies.

Evidence shows the prevalence of overweight and obese populations is highest among the upper and middle-income countries. Over 50% of women in Europe, America and the Eastern Mediterranean region are overweight (4,16) but in reality, this is a global public health threat that has been increasing in all countries worldwide. Recent evidence suggests that its prevalence among adults has nearly doubled within 15 years. Thus, more than half a billion adults are classified as obese worldwide (4,12).

In Africa, even though there is a high prevalence of under-nutrition, the prevalence of becoming overweight is increasing at an alarming rate (17). It is a health risk that has been associated with urbanization and urban populations in Africa have a higher prevalence of the problem compared to rural populations. Since 1990 the problem has increased in all African regions (18) and recent estimates suggest that as much as 20-50% of urban populations are either overweight or obese (3). More women were found to be overweight than to men (18).

In Ethiopia, the prevalence of being overweight and obese in the urban setting is 12.1% and 2.8% respectively. Also, a study on adults in Addis Abeba found that 25.7% and 24.7% of women and men respectively were overweight. The same study also reported that 10.2% of women and 2.1% of men were obese (17). Globally more deaths occur from being obese or overweight than from being underweight (19). However, information regarding the magnitude of the problem in Ethiopia, particularly in the study area, is scarce and little or no effort has been made so far to address the issue (10). Hence, the study was conducted to assess the prevalence of obesity and being overweight among urban office civil servants in the eastern part of Southern Nations, Nationalities and Peoples' Region (SNNPR), Ethiopia.

METHODS

Study design and population

The study was a community-based cross-sectional survey conducted from July to September 2015 in southeast Ethiopia. The subjects of the study were selected from three towns in the eastern part of SNNRP Ethiopia (Hawassa, Wolayta Soddo and Dilla). The data were collected from urban civil servants.

Sampling technique and procedure

The study employed a stratified cluster sampling technique. SNNPR governmental organizations are structured in 14 administrative zones, 4 special woredas, the regional bureau and Hawassa city administration. There are 38 administrative sector offices and 38 municipality offices(21). Hawassa is comprised of Sidama zone, the regional bureau and Hawassa city administration. The study population was drawn predominantly from Hawassa (82.1%). Stratification was done by considering zonal towns and the regional city which are geographically spaced apart as distinct strata. Hawassa, Wolayta Soddo and Dilla which are located in the eastern part of the region constituted the three strata. Out of a total of 342 clusters (190 from Hawassa and 76 each from Wolayta Soddo and Dilla), a random selection was made from each strata which was proportional to the size of the population in those towns/cities. Every member of the selected cluster available during the survey became part of the study.

Sample size

The formula developed by the research division of the National Education Association was used to determine the sample size with a tolerable margin error of 5% and 95% confidence level (22-23). Accordingly, from a total target population size of 24,237 residing in the three towns, 374 was the estimated sample size. Thus 308, 39, and 27 samples were selected respectively from Hawassa, Wolayta Soddo and Dilla.

Data collection procedure and quality control

A structured self-administered questionnaire to capture demographic characteristics and current height/ weight measurements was adopted and the English version of the questionnaire was translated to Amharic, the lingua franca, and then back to English by language experts in Dilla University (DU). A review was made for the consistency of the translation. A portable digital weight scale (China) with a precision of 0.5 kilograms was used, with study subjects wearing light clothes and devoid of any significantly weighing objects on their person. A portable, foldable height measuring tape with 2-meter capacity and a margin of error of 1 centimeter was used to measure height of participants without shoes on, or with very low heel shoes (24). A two-day consecutive training was provided for the survey team comprised of twelve recruited data collectors (DU third year Sport Science undergraduate students) who could benefit from the experience, and two supervisors with higher academic ranking (technical assistants working in DU). Pre-testing of the data collection instrument was done before data collection commenced.

Informed consent was obtained from each study participant before conducting the survey. Participation was voluntary and confidential. Also, ethical approval for the study was acquired from DU research ethics review committee. Data was collected by contacting each subject face-to-face at each of the selected offices (clusters) on working days. All selected office members present at the time of the survey and who consented to take part in the study had their height and weight measurements taken until the predetermined sample size was achieved. Participants were encouraged to note their respective height/weight measurements to know their personal status. Height was recorded in centimeters and weight in kilograms. Regular supervision was conducted by the investigator and supervisors. The response and completion rate was 83% and 95% respectively.

Assessing Body Mass Index (BMI)

Body mass index (BMI) was the indicator used to measure obesity/state of being overweight according to a set formula and expressed as kg/m^2 (5,7,16,20,21,24). Despite conflicting opinions, standard BMI categories are widely used worldwide (16,21) and the validity and reliability of such data have been established in different studies (25). According to the updated international classification of adult BMI, the cut-off point is as described below (4,5,7,16,23,24) (Box 1).

Box 1.Weight status categories

BMI (kg/m2)	Weight Status
Below 18.5	Underweight
18.5 to 24.9	Optimal/desirable weight
25.0 and above	Overweight
30.0 and above	Obese

Data Analysis

Statistical analysis was performed using SPSS version 20 (IBM Corporation, USA). The information obtained was described by using frequencies, percentages, and proportions presented in tables. Chi-square test was used to explore the relationship between demographic variables and BMI using cross-tabulation. A multinomial logistic regression model was employed to ascertain the associations between demographic variables and BMI.

RESULTS

Socio-demographic characteristics

In this study, a total of 374 urban civil servants working in various governmental offices in the eastern part of SNNPR, Ethiopia, were recruited as study participants. Sex, age, height, weight, educational status, marital status, income level, occupational responsibility, and town/city of residence were the socio-demographic characteristics studied in relation to BMI.

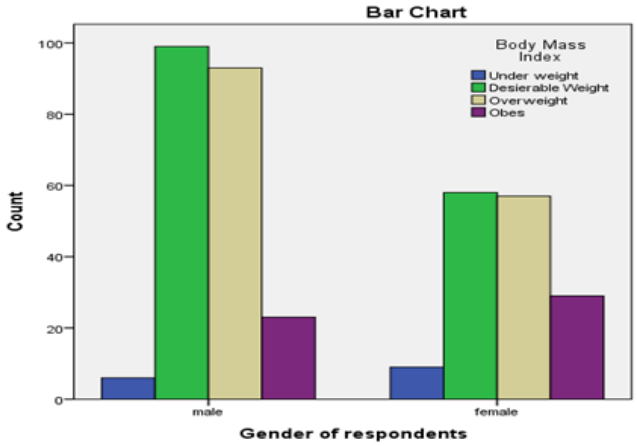
From the total number of respondents, 59.1% and 40.9% were men and women respectively. The highest proportion of individuals were in the age category 31-40 years (36.1%), followed by those aged 18-30 years (26.7%). People in the age group 51-60 years made up just 10.7% of the total.

The majority(63.4%) were university graduates (undergraduate level) and 12.6% had post graduate education. Office workers with a high school level education or below made up just 6.7% of the total. On the basis of monthly earnings, nearly half (47.9%) earned a medium income (between 3,000 – 4,999 birr/month). Those who earned a high income (above 5,000 birr/month) constituted 29.4% of the study population while 22.7% of the civil servants surveyed were earning below 3,000 birr/ month (low income group).

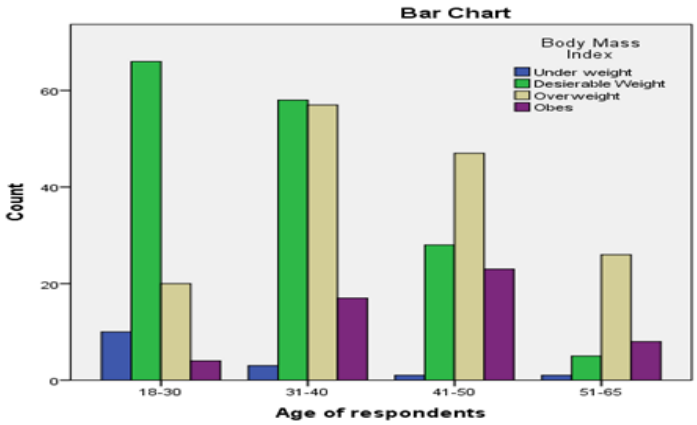
By marital status 68.2%, 28.1% and 1.6% of study participants were married, single, or divorced respectively, while 2.1% fell outside of these three categories. Occupational responsibility was categorized under three headings: group/team leader, technical professional and non-technical staff. Accordingly, the majority of respondents (82.6%) were technical professionals. Residence was categorized on the basis of the geographical location/ towns. Hence, 82.4%, 10.4%, and 7.2% of respondents resided in Hawassa, Wolayta Soddo and Dilla respectively.

One hundred and fifty individuals (40.1%) and 52 (13.9%) were overweight and obese respectively. In total 54% of the office workers were either overweight or obese (31% men and 23% women).

More women were found to be obese (7.8%) as compared to their male counterparts (6.1%), whereas more men tended to be overweight (24.9%) as compared to women (15.2%). (**Figure 1**).



Being overweight was observed to increase with age advancement, 65% of those aged 51-60 years were overweight. The prevalence of being overweight declined with decreasing age: it was 47.5% in participants aged 41-50 years, 42.2% in those 31-40 years and just 20.0% in 18-30 year olds. (**Figure 2**).



Education-wise, the majority of respondents (63.4%) were university graduates and among these individuals, 27.3% and 8.0% were overweight and obese respectively. Increase in obesity revealed a consistent association with education level; as the educational level increased, prevalence of obesity decreased, being lowest in university graduates with an undergraduate degree (12.7%), and highest in those with high school education or lower (24.0%).

Similarly, it was found that overweight or obesity increased as income rose. Prevalence of being overweight was 38.8%, 37.4% and45.5% for low, middle and high income groups respectively while the prevalence of being obese was 11.8%,14.0% and15.5% respectively for low, middle and high-income groups. Analyzing by marital status, study participants who were divorced were found to be more obese (33.3%) compared to other groups.

There was a higher number of individuals who were overweight in the "other" category. From occupational groups, 40.5% and 13.3% of technical professionals were found to be overweight and obese respectively. More group/team leaders (20%) tended to be obese than those in the technical professional category (13.3%).

More than three-quarters of the study participants were residents of the regional capital city Hawassa where 38.6% and 15.3% were overweight and obese respectively. Obesity prevalence was higher in Hawassa (15.3%) compared to Wolayta Soddo and Dilla (7.7% and 7.4% respectively). (**Table 1**)

Table 1: Socio-demographic characteristics of urban civil servants in SNNPR in relation to body mass index (BMI).(N=374).

Variables		Body Mass Index									
		Under weight		Desirable weight		Overweight		Obese		Total	
		Count	%	Count		Count	%	Count	%	Count	%
Gender	Male	6	2.7	99	26.5	93	24.9	23	6.1	221	59.1
	Female	9	5.9	58	15.5	57	15.2	29	7.8	153	40.9
Age (years)	18-30	10	2.7	66	17.6	20	5.3	4	1.1	100	26.7
	31-40	3	0.8	58	15.5	57	15.2	17	4.5	135	36.1
	41-50	1	0.3	28	7.5	47	12.6	23	6.1	99	26.5
	51-60	1	0.3	5	1.3	26	7.0	8	2.1	40	10.7
Educational status	High school & below	2	0.5	7	1.9	10	2.7	6	1.6	25	6.7
	Diploma	4	1.1	31	8.3	20	5.3	10	2.7	65	17.4
	Undergraduate degree	8	2.1	97	25.9	102	27.3	30	8.0	237	63.4
	Masters	1	0.3	22	5.9	18	4.8	6	1.6	47	12.6
Monthly Income (birr)	>5,000	2	0.5	41	11.0	50	13.4	17	4.5	110	29.4
	3,000≥ 4,999	8	2.1	79	21.1	67	17.9	25	6.7	179	47.9
	<3,000	5	1.3	37	9.9	33	8.8	10	2.7	85	22.7
Marital Status	Married	5	1.3	91	24.3	117	31.3	4	11.2	255	68.2
	Single	9	2.4	66	17.6	24	6.4	6	1.6	105	28.1
	Divorced	1	0.3	0	0.0	3	0.8	2	0.5	6	1.6
	Other	0	0.0	0	0.0	6	1.6	2	0.5	8	2.1
Occupational responsibility	Group/team leader	0	0.0	14	3.7	14	3.7	7	1.9	35	9.4
	Technical Professional	12	3.2	131	35.0	125	33.4	41	11.0	309	82.6
	Non-technical staff	3	0.8	12	3.2	11	2.9	4	1.1	30	8.0
Residence of respondents	Hawassa	15	4.0	127	34.0	119	31.8	47	12.6	308	82.4
	WolaytaSoddo	0	0.0	17	4.5	19	5.1	3	0.8	39	10.4
	Dilla	0	0.0	13	3.5	12	3.2	2	0.5	27	7.2

Chi-square test was employed to assess any association between demographic variables and body mass index. Variables which were found to have a significant association with BMI were gender (p=0.036), age (p=0.000) and marital status (p=0.00). On the other hand BMI had no significant association with education, income, occupational responsibility or place of residence (p> 0.05).

Table 2: Socio demographic variables having significant association with body mass index in urban civil servants, SNNPR, Ethiopia.

	Chi-Square Tests			
Variable		Value	Df	Asymp. Sig. (2-sided)
Gender	Pearson Chi-Square	8.559	3	0.036
Age	Pearson Chi-Square	71.190	9	0.000
Marital status	Pearson Chi-Square	51.116	9	0.000

Multinomial logistic regression was calculated to determine the predictability of one or more independent variables on a nominal dependent variable having more than two categories. According to the output "Model Fitting Information", the likelihood ratio chi-square of 120.238 with a p-value< 0.000 demonstrates that our model as a whole fits better than an empty model (i.e. a model with no predictors). Only age showed a predictive effect on being underweight and having a desirable weight whereas male gender had a predictive effect on being overweight.

Marital status also revealed an interactive effect on desirable weight. A one-unit increase in the variable "age" was associated with a 1.51 decrease in the relative log odds of being underweight and a 0.95 decrease in the relative log odds of having desirable weight versus BMI. Also, a change in marital status was associated with a 17-fold increase in the relative log odds of having a desirable weight. The expected risk ratio of being overweight was 0.98 times higher for males. This means male gender was associated with a 0.96 increase in the relative log odds of being overweight. (**Table 3**)

Table 3: Multinomial logistic regression model for demographic variables and BMI.

Model Fitting Information			
Model	Model Fitting Criteria	Likelihood Ratio Tests	
	-2 Log Likelihood	Chi-Square	Df	Sig.
Intercept Only	550.592			
Final	430.354	120.238	39	000

Parameter Estimates

Body Mass Index		B	Std. Error	Wald	Df	Sig.	Exp(B)	95% Confidence Interval for Exp (B)	
								Lower Bound	Upper Bound
Under weight	Age	-1.508	.543	7.717	1	.005	.221	.076	.641
Desirable Weight	Age	-.947	230	17.008	1	.000	.388	.247	.608
	[Marital=1]	16.990	.513	1098.286	1	.000	23918303.971	8756756.171	65330729.061
Overweight	[Gender=0]	.975	.391	6.212	1	.013	2.650	1.231	5.705

a. The reference category is: Obese.
b. This parameter is set to zero because it is redundant.

DISCUSSION

The study found that 54% of the urban civil servants surveyed from three towns in the eastern part of SNNPR had a body mass index which was outside of the normal range (40.1% and 13.9% were overweight and obese respectively). A report from Addis Abeba indicated a higher estimate for the percentage of working adults who were overweight (48%) but a slightly lower prevalence (11%) for those who were obese (26). Recent WHO estimates have recorded a prevalence estimate closer to the findings of the present study (39% overweight and 13% obese) (19). On the other hand studies from specific sub Saharan nations have shown a fewer percentage of individuals to be overweight, 24.1% and 28.1% in Tanzania and Malawi respectively. This is also reflected in another survey of 32 sub Saharan nations where the prevalence was 15.9%.

Generally being overweight or obese might be mainly due to the association of these conditions with the sedentary nature of office work (15) and the disparities in socio-demographic characteristics. The obesity prevalence in this study was lower than the 19.2% found from a study in Tanzania (2).

In this study, women were more likely to be obese compared to men. This is consistent with the findings from a study conducted in Addis Abeba (26) and a prevalence study of obesity in north African nations (27). Such a trend has been reported from elsewhere as well (4,15,28) and fits in with the global trend(4). However the finding that men were more likely to be overweight as compared to women (31% men and 23% of women) is inconsistent with several studies (4,15,26,27) although the reasons for this are not clear. However another study has reported that a greater proportion of men were overweight, 44% as compared to 33% of women (29). These disparities may be due to socio-demographic differences. In this study the prevalence of obesity and being overweight increased with age and this was the case for both sexes, consistent with the report from the National Obesity Observatory (29,30).

There is not much evidence about the relationship between socio-demographic variables and BMI in Africa, or the data are limited and difficult to compare. This study found that a higher level of education was associated with a decrease in obesity which is consistent with has been reported from a study from Hawaii and other Pacific islands (31). This inverse association between education and obesity was also reported by other studies but education is not universally associated with obesity (32).

Despite the argument that education offers a small advantage for being less obese, meta-analysis study discovered a positive-negative association between obesity and education in both men and women (7:7 for men and 13:13 for women). In other words, an equal number of studies reported that a people with a high educational level were more likely to be obese or vice versa (33).

There was a steady increase in obesity with rising income level, which is consistent with a meta-analysis on obesity and socioeconomic status. The majority of the studies included in the meta-analysis showed a positive association between obesity and income, that is the rich were more likely to be obese than the poor. In low-income countries such as Ethiopia, obesity is more prevalent among the higher income groups. This can be explained in terms of higher-income groups having greater access to surplus calorie dense foods and a lower level of engagement in manual work as compared to lower income groups (33). However another study has found an inverse association between income and obesity (34).

In this study, team leaders were more obese as compared to the rest of the office staff. Generally education is a good proxy for occupation since more educated persons are less likely to be engaged in heavy manual work and more likely to have sedentary occupations such as office work. Thus the association between obesity and occupation tends to mirror the association between education and obesity(33).
A higher prevalence of obesity was noted in the relatively more urbanized city in this study which is consistent with findings from a study conducted on Brazilian adults. Obesity status was higher in more developed geographic areas, such as in large urban centers (28).

Limitations of the study

Although it is known that being overweight or obese brings a variety of health complications, no attempt was made to assess such issues in the study population. Secondly, BMI is a proxy for body fat and was applied to all participants regardless of muscle mass, which might have resulted in an overestimation of obesity prevalence for this particular population.

Conclusion:

In this study, the overall prevalence of being overweight or obese in civil servants engaged in sedentary office work was 54%. If no interventions are carried out, this figure may be expected to increase further. .

This is not unique to the study area but part of a global trend which requires the adoption of weight reduction strategies and preventive intervention programs. Mainly focus should be given to lifestyle changes such as the promotion of physical activity in persons with sedentary occupations and the reduction of intake of dense caloric foods. The problem should be addressed at all levels: at the individual, institutional and governmental level, particularly focusing on older adults and women.

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