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Prevalence of Overweight/ Obesity and Some Associated Factors among Rural/ Urbanites of Uasin-Gishu County, Kenya: A Cross-Sectional Study

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A B S T R A C T

Background: This study aimed at estimating the classified prevalence of overweight and obesity status and determine potential influencing factor of age and gender among rural/ urbanites attending Moi Teaching and Referral Hospital.

Methods: A cross-sectional study survey was conducted in Uasin-Gishu County, Kenya, from the month of March to June, 2018. A total of 139 male and 201 female aged 13 to 96 years from general rural/urban population were included using a simple random sampling design. Data was also collected on socio-demographics using a general questionnaire and physical examination for anthropometric measurements. The sampled data was used to estimate the prevalence of overweight and obesity and analyze influencing factor of age and gender through corresponding statistical method done using the Statistical Package for the Social Sciences (SPSS) Software version 22.0 and MS Excel version 2010. Rural/urban setting was considered too. Statistical significance was set at $p<0.05$.

Results: The overall prevalence of overweight was 31.0% of which female were 63.2% and male 36.8%; whereas, the overall prevalence of obesity was 25% of which female 74%; male 24%) among the population sampled. The prevalence of both overweight and obesity were higher in female compared to male. There was no significant difference between rural and urbanites.

Conclusion: The factors of age and gender were significantly associated with an increased risk of overweight and obesity as classified by body mass index. Therefore, further research studies required to explore other indicators, best pointers to understanding of changes in overweight and obesity over time.

Introduction

Overweight and obesity is posing to be a growing global public health concern, owing to its high prevalence and substantial morbidity and mortality leading to a heavy economic burden on families and increasing costs to society throughout the world. Obesity and more so abdominal obesity are associated with an increased risk of multiple chronic diseases, including diabetes, cardiovascular disease (CVD), hypercholesterolemia, asthma and cancer [1]. The overweight and obesity are adaptable risk factors for the development of non-communicable diseases (NCDs). The silent epidemic of overweight and obesity is spreading globally, and compared to 1980, the prevalence of obesity has more than doubled in the world

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[2]. More than 1.1 billion people are estimated to be overweight, of which around 320 million are now estimated to be obese. The International Obesity Task Force estimates that up to 1.7 billion people may be exposed to weight-related health risk of comorbidities [3]. Recent studies have reported a rise in trend to approximately 937 million obese adults and 396 million overweight adults worldwide.

Globally, WHO data reports, 61.9% of the over 20 year old population in America's and 54.8% of the population in Europe has a body mass index (BMI) ≥ 25 [4]. Regionally, the overweight and obesity are increasing in sub-Saharan Africa, including Kenya, at a rate of 5% per year on average [5]. A recent study by Christensen et al. [6] found high rates of overweight and obesity in Kenya. Substantially higher rates were found in urban compared to rural populations among both genders. Therefore, it is anticipated that there will be a likelihood upsurge in NCDs including cardiovascular diseases and type II diabetes. Urbanization is associated with a significant causative role especially when people are exposed to a diet which deviates from that of their normal routine traditional foods, in that they contain high intake of saturated fat, sodium, and added sugar and a low intake of dietary fiber [7]. The Kenya Demographic and Health Survey (KDHS) of 2009 estimated that the national prevalence of overweight and obesity for women up to 49 years old in Kenya was 23%. The ratio of overweight and obese women was higher in urban areas than in rural areas [8]. Overweight and obesity in low and middle income developing countries, has been neglected as most attention is concentrated on food shortage and under-nutrition or malnutrition [9].

According to a WHO report, overweight is defined as a body mass index (BMI) of 25–29.9 kg/m2 and obesity as a BMI ≥ 30 kg/m2 [10]. In 2013, in order to make physicians pay more attention to the condition, the American Medical Association classified obesity as a disease [11]. The rapid increase in the occurrence of overweight and obesity continues to increase the prevalence of chronic diseases. Quality preventive measures need be put in place otherwise; the problem will intensify and overburden the health care system in these areas. This could be achieved through investigating and fully understanding the aetiology of overweight and obesity and the potential factors which give rise to excess weight gain. Although many studies have focused on overweight/obesity and abdominal obesity, there are still noticeable geographical differences that exist. However, there are still no surveys published on the obesity prevalence in urban population of Uasin-Gishu County. Hence the aim of the present study was to determine the prevalence of overweight and obesity among the residents seeking diagnostic services at MTRH, in Uasin-Gishu County, an urban setting of Kenya. The gathered information contributes to guiding the County government health promotion officers in formulating policies to lessen the rate and to control related comorbid disorders.

Subjects and methods

Study design

The prospective cross-sectional and descriptive based study was carried out in MTRH based at Uasin-Gishu County, one of the 47counties of Kenya, located in the former rift valley province.

Study site selection criteria

The site of study was purposively selected because it is a referral medical Centre accessed by majority of the county residents, therefore, can give a good estimate following increasing population growth, education and servers both rural and urbanized lifestyle.

Study Target population

The study and the target population consisted of residents from Uasin-Gishu county aged 13-96 years living in Eldoret Municipality.

Sampling

A representative sample of three hundred and sixty was chosen from those attending out-patient's department for diagnostic services using simple random sampling method. Fisher's et al. formula, as suggested by [12] was used to arrive at a sample size of three hundred and sixty participants (360).

Data collection method:

Anthropometric measurements

The participant's anthropometric measurements which included age, weight and height were taken while at triage in the months of March to June, 2018. Anthropometric information about the study subject was obtained as follows: Age of the respondent was obtained from the clinic admission registration register, which was then confirmed by checking the date of birth from the national identification or child's birth certificate or clinic card for minors; Height was measured to the nearest 0.1 cm using measured using a steel tape which was anchored to a flat wall, and the respondent was asked to stand on a flat surface gazing forward maintaining an erect anatomical posture. The head was positioned in such a way that the angle of the eye and the opening of the external auditory meatus were in a horizontal line. A wooden head rest was placed on the head, which allowed the measurement to be taken at the point perpendicular to the top of the head and the weight was measured to the nearest 0.1 kg using a digital weight scale (7841-Medscale Bluetooth, SOEHNLE), after calibrating it to zero, and after removal of shoes and excess clothing. Both weight and height were taken twice. In order to ensure quality data, the weighing scale was calibrated before measuring of weight began every day and after every five measurements during the measuring exercise. BMI was calculated using the following formula: weight (in kilo-grams) divided by height (in meters) squared (kg/m2). Overweight and obesity were defined as a BMI of 25-29.9 (kg/m2) and BMI≥30 (kg/m2), respectively. To examine the degree of obesity, these cases were further categorized into other groups. Obesity was divided into three categories; grade 1 for BMI of 30-34.9 (kg/m2), grade 2 for BMI of 35-39.9 (kg/m2), and grade 3 for BMI≥40 (kg/m2). Socio-demographic status information was obtained from the participant or parent/guardian (minors) using interviewer administered questionnaire.

Validity and reliability

The questionnaires were pre-tested for accuracy and clarity prior to the main study on a sample of 34 respondents (10% of the sample size) with similar characteristics to the actual sample, but who were not included in the final study. Experts in the field of overweight and obesity research assessed the relevance of the content used in the questionnaire. Also established the extent to which the contents of the questionnaire were consistent in eliciting the same responses every time the instrument was administered.

Data analysis

Completed questionnaires were checked on a daily basis for accuracy and completeness in recording of responses. They were edited and coded before data entry. Before analysis, all the data were cleaned. Data was analyzed using a SPSS version 22.0 and MS Excel version 2010. MS Excel generated frequencies, percentages, means, and standard deviations. The prevalence of overweight and obesity is given in percentages and their 95% confidence intervals (CI). To show the BMI status, the mean, standard deviation, and 95% confidence intervals were determined. To assess the relationship between over-weight and obesity with potential risk factors of comorbidities, we used simple and multiple logistic regression models. In the assessment of relationships with overweight and obesity, among rural and urban population we used people with BMI<25 as the control group. A p-value of less than 0.05 was considered to be significant.

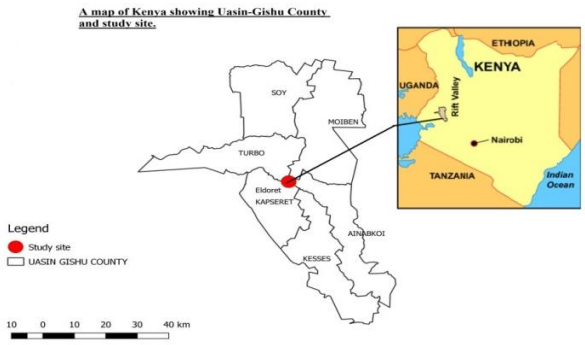

Figure 1. A map showing the study site. Source: Map generated by Sigei and Kariuki, 2018 based on Copyright © 2015 KenyaInformationGuide.com.

Results

The study population comprised of residents from Uasin-Gishu County attending MTRH, a public government referral health facility outpatient department for diagnostic services. A total of 340 respondents aged between 13 years and 96 years participated in the study (Table1). The participants initially were 360 of which 340 gave complete descriptive demographic information and study subject measurements. 20 participants were excluded because of missing information on sex, age, accounting for a response rate of 94.4%.

Out of the 340 respondents, compared with male, female showed slightly more than half values for age (201) 59% (figure 2). The highest frequency of the female respondents were those grouped between 55 - 64 years of age (35.3%) whereas, the least were among the 13-24 years of age (3.5%). By analogy to male respondents, the trend was the same, except that the respondents were fewer at the grouping of between 55- 64 years (20.9%) but more at grouping of 13-24 years of age (5.7%) (Table1).

Table1. Prevalence of overweight and obesity stratified by sex and age

Age (years)	13- 24	25 - 34	35 - 44	45 - 54	55 - 64	65 - 74	75 - 97
Male, N (%)	8 (5.7%)	25 (18.0%)	19 (13.7%)	14 (10.1%)	29 (20.9%)	26 (18.7%)	18 (12.9%)
BMI (kg/m2)	21.4	21.4	25.9	26.8	26	27.8	28.8
Overweight Male, N (%)	0 (0.0%)	3 (8.0%)	5 (13.0%)	7 (18.0%)	5 (13.0%)	11 (28.0%)	8 (21.0%)
Obesity Male, N (%)	0 (0.0%)	2 (9.0%)	3 (14.0%)	1 (5.0%)	3 (14.0%)	7 (32.0%)	6 (27.0%)
Female, N (%)	7 (3.5%)	5 (2.5%)	20 (10.0%)	30 (14.9%)	71 (35.3%)	40 (19.9%)	28 (13.9%)
BMI (kg/m2)	21.5	21.1	26.1	27.1	26	27.9	29.0
Overweight Female, N (%)	2 (3.0%)	0 (0.0%)	10 (15.0%)	12 (18.0%)	24 (36.0%)	11 (16.0%)	8 (12.0%)
Obesity Female, N (%)	0 (0.0%)	0 (0.0%)	6 (10.0%)	8 (13.0%)	21 (33%)	14 (22.0%)	14 (22.0%)

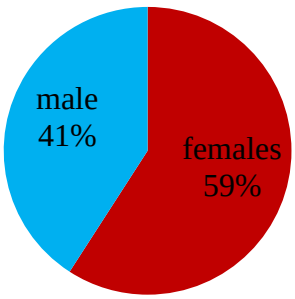

Figure 2. Distribution of study subjects/ respondents (n=340) by gender

Age and gender standardized, the crude mean age (in years), weight (kg) and height (cm) was 56, 70.84 and 164.4 respectively. The median age of the respondents were 58 years. The mean BMI in this study were 26.3 kg/m2. the mean BMI was 24.8 kg/m2 in male and 27.3kg/m2 in female.

Prevalence of overweight and obesity as per Body mass index (BMI) classification

The findings from this study indicate the general disribution of BMI among the respondents classified according to the WHO body mass index definition, as indicated in (Figure 3).

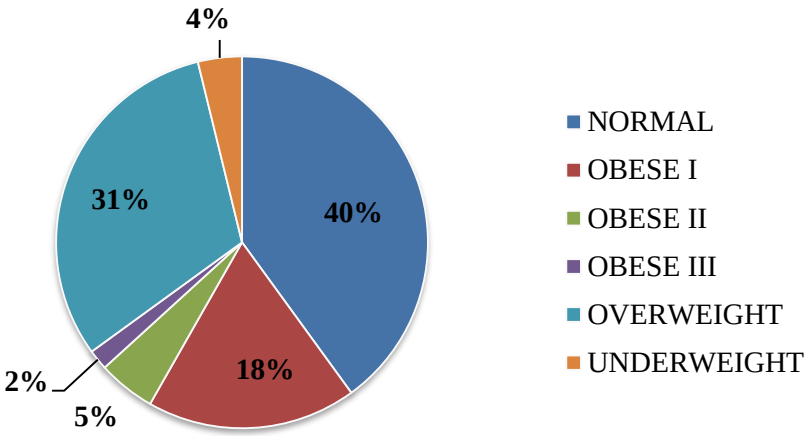

Figure 3. Distribution of categorized BMI among the participants (n=340)

The overall prevalence of overweight (i.e BMI of 25-29.9 kg/m2) was (106) 31% of which majority were female (67) 63.2% whereas, male accounted for (39) 36.8%. The combined Obesity (BMI ≥ 30 kg/m2) overall prevalence was (85) 25%, which was further catergorized into three grades: Obese I (i.e BMI 30 -34.918.5 kg/m2), Obese II (i.e 35 - 39.9 kg/m2) and Obese III (i.e BMI ≥ 40 kg/m2) respectively as shown in figure 3. The respondents who were in the normal range were 40% while those who were underweight (BMI < 18.5 kg/m2) were only 4%.

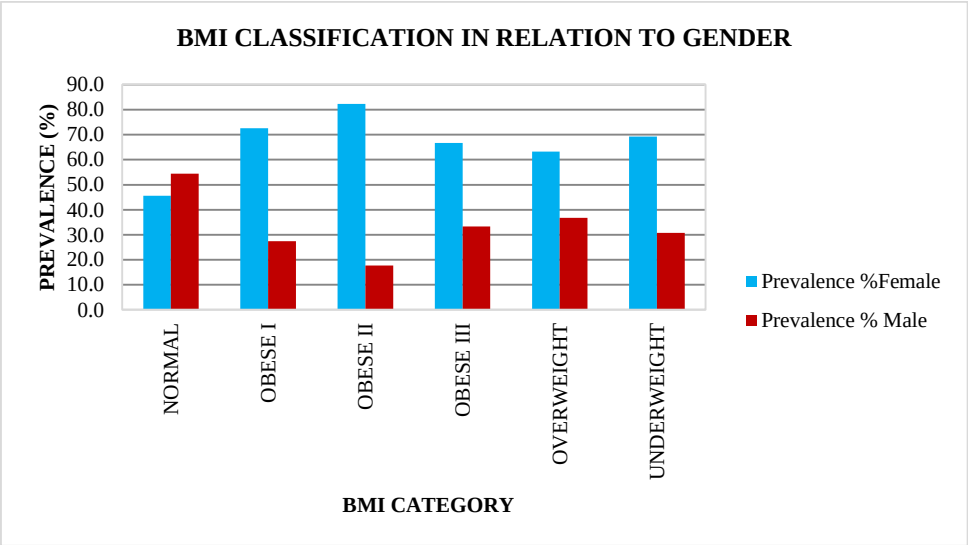

Figure 4. Body mass index prevalences in relation to gender (male n= 139 and Female n=201)

The study respondents were further categorized based on gender and prevalence estimated independently. A significant increase in the prevalence of overweight and obesity was seen with increasing age in both genders. Male reached their highest prevalence of overweight and obesity at 65–74 years of age, accounting for 28% and 32% respectively; whereas, female had the highest overweight and obesity prevalence at 55-64 years of age representing 36% and 33% respectively. The prevalences of overweight and obesity in female were higher than those in male under 65 years of age, but in contrary, these rates were higher in male than female above 65 years of age (Table1). There was a significant tendency regarding the prevalence of overweight and obesity in both genders as shown in figure 4. Additionally, the prevalence of elevated overweight and obesity among female compared to male was statistically significant. ($P < 0.05$) However, there was no significant difference in overweight and obesit between the rural and urban population.

Discussion

Excess body weight and obesity is well renowned risk factor for various comorbidities with demonstrated significant associations with cardiovascular diseases, hypertension and type II diabetes melitus [13]. According to the American Obesity Association, when BMI exceeds 30 kg/m2, the relative risk of death related to obesity increases by 50 percent. at least half the populations of many other developed countries are currently overweight or obese [14].

The overall prevalence of adult obesity varies not only by gender, but also by age groups. This study showed that the overall prevalence of overweight/obesity among sampled population in area of Uasin-Gishu county, Kenya was 56% (31% overweight and 25% obesity). Based on this findings, approximately more than half of the participants (nearly 5 out of 10 people) were either overweight or obesity, which is a relatively high prevalence compared to the prevalence in reviewed in earlier pooled studies showing overweight and obesity in urban areas of kenya at 38%, Tanzania 35% and Ghana 23% [5] and more so Nairobi urban areas at 41% [8]. This differential phenomenon could be speculated to arise due to increase in demographics distribution such as level of environmental factors including increase in level of economic development that have impact on sedentary lifestyle trends and fewer opportunities for physical activities. The aspect of urbanisation did not play any role as there was no significant difference in overweight/obesity among rural compared with urbanites. People in rural areas are thought to be mostly affected by overweight/obesity as they have poor access to public promotional health policies and health care services meant to combat non-communicable diseases. This has longterm implications in macroeconomic production level due to loss of labour productivity.

This finding emphasizes on the observation that obesity is on the increase in Africa, and imparts support to the WHO caution on a looming dual epidemic of communicable and non-communicable diseases in African in the near future [15]. In line with other studies, Mbochi et al. [16], this study reported that out of the overall prevalence of 56% overweight/obesity as shown in figure 3, female had a higher risk for overweight (63.2%) as compared to male (36.8%) and obesity 74% and 26% respectively. There was significant gender difference. Interestingly, Obesity is recognized to play a substantial role in causing poor health in women, negatively affecting quality of life and shortening quantity of life. In contrast to our findings, other studies have revealed that male tend to be overweight/ obese [17]. Postulated reasons for this discrepancy may be associated to differences in lifestyle trends (amount of fat consumed) and socio-economic and demographic variables, as well as other hereditary or behavioral influences.

Furthermore, according to our study findings, there was a significant association between overweight and obesity in relation to age, with the proportional prevalences increasing as age increased in both genders. The prevalence of overweight/obesity in female was higher than that in male under 65 years old, but these rates were higher in male than female above 65 years

of age. This finding coincided with study reported by Khabazkhoob et al. [18] showing that according to WHO data 2008, 151 out of 189 countries showed a higher prevalence of obesity in women as compared to men. Therefore, in line with the findings from this study, a quantitative synthesis has revealed a trend towards increasing prevalences of overweight and obesity over time posing public health concern moreso, among women. Special attention must be given to women. It is imperative for the public to consider the trends as an indicator of a growing disease in its own right and a risk factor for many other co morbidities among rural/urban populations despite the setting and may be education level could be an aspect to differentiate.

Limitation of the study

The data used is cross sectional, whereas the ideal situation would have been to track individuals over time and ascertain changes in body mass index and associated risk factors. he female population used in this study was not uniform to male population to allow stratification of whole population residing in the county, given that the anthropometric measurements used were for those accessing MTRH out patient department for diagnostic services other than related to overweigh/obesity. the study did not measure abdominal obesity, waist circumfrence, body fat and other nutrional status to guide more on correlating BMI and overweight/obese ratios. Attempt to make distinctions and comparisons as the classifications may not be accurate enough..

Conclusion

In conclusion, this study quantitatively revealed the estimated proportion(s) trends of overweight and obesity among the rural/urban population of Uasin-Gishu County, Kenya. The factors of age and gender were significantly associated with an increased risk of overweight and obesity as classified by body mass index (BMI). Therefore, further research studies are needed to explore other indicators such as nutritional knowledge on body fat, waist circumference, dietary intake and physical activity among others to determine the best marker to for understanding of changes in overweight and obesity over time. Global strategy on healthy diet and physical activity is imperative. As compared to developed world, prevention and promotive health is yet to be embraced in large scale by developing countries including sub-Saharan Africa, and near deficiency of these in the sustainable Development Goals (SDGs) worsen the situation.

Recommendations

The results of this study will be submitted to the Health promotion Department of MTRH/Uasin-Gishu County and other relevant departments as a reference, which should draw attention and inform county government health promoters in developing education and publicity to prevent and control the occurrence of overweight and obesity. The study could be replicated in other areas in Kenya, and a comparison made with the current study to establish epidemiological trend of overweight and obesity widespread.

Abbreviations

BMI: Body Mass Index
MTRH: Moi Teaching Referral Hospital
SDGs: Sustainable Development Goals
WHO: World Health Organization

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Ethical consideration

Ethical clearance was obtained jointly from National council of science and technology (NACOSTI) and Kenya Medical Training College (KMTC) research ethical review committee. Permission was also sought from Moi Teaching and Referral Hospital (MTRH) authorities. Interviews and anthropometric measurements of the participants were done upon obtaining their informed and voluntary consent after the purpose of the study had been explained to them. If the study participants or guardians on behalf of the minors/children aged 13–18 years old, were unable to write, then ink

pad fingerprinting was used. Confidentiality was assured and privacy protected for the information collected by using numbers instead of names. Participation in the study was voluntary.

Authors' contributions:

Vivian Patricia Okinyi, Erolls Sigei, and Peter Kariuki were involved in planning of the study, design, field work, data analyses and manuscript writing. Lenson Kariuki and John kimani were involved too in conceptually and review of the manuscript. All authors read and approved the final manuscript.

Conflict of interest

None of authors have conflict of interests.

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