RESEARCH ARTICLES

Prevalence of adolescent overweight or obesity among secondary school students in urban Ndola, Zambia and associated factors

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Overweight and obesity are the fifth leading risk for global deaths and is on the increase among adolescents in developing countries. Zambia is also affected by adolescent obesity epidemic, but the context of obesity and overweight has been under explored in younger age groups. The study aimed to determine the prevalence of overweight and obesity among adolescents in Urban Ndola, Zambia and identify its correlates. A secondary school based cross sectional study was undertaken in selected schools and face to face interviews were conducted with students using structured questionnaires. Associations were established using the Chi-squared test and the Fisher's exact test, where appropriate. The level of statistical significance was set at the 5% level. In determining independent factors associated with overweight/obesity, a multivariate logistic regression was conducted. Adjusted odds ratios (AOR) and their 95% confidence intervals are reported. Of the 400 participants from urban Ndola, Zambia, 7.0% (2.1% of males, 11.5% of females) were overweight/obese. Sex and transport were significantly associated with the outcome. Male respondents were 58% less likely to be overweight/obese compared to females (AOR=0.42; 95% CI [0.24, 0.72]). Compared to respondents who used a car as mode of transport, those who walked or used a bicycle were 38% less likely to be overweight/obese (AOR=0.62; 95% CI [0.41, 0.93]). The observed rate of overweight in the current study has not reached at an alarming rate but measures to control it such as involving students in physical activity must be instituted.

Introduction

Overweight and obesity are defined as abnormal or excessive fat accumulation that presents a risk to health. A crude population measure of obesity is the body mass index (BMI), a person's weight in kilograms divided by the square of his or her height in meters. The body mass index is the standard measure of overweight and obesity for children two years and older [1-4]. A person with a BMI of less than 18.5kg/m^2 is underweight, 18.5 to <25.0kg/m^2 healthy weight, 25.0 to <30.0kg/m^2 overweight and over 30.0kg/m^2 is obese.

Adolescent obesity is one of the most serious public health challenges of the 21st century [5-8]. The problem is global and it is steadily affecting many low and middle-income countries particularly in urban settings.

Adolescent obesity is associated with a higher risk of premature death and disability in adulthood. Overweight and obese children are likely to stay obese into adulthood and more likely to develop non-communicable diseases like diabetes, cardiovascular diseases and certain cancers at a younger age. Overweight and obesity, as well as other related diseases, are largely preventable. Prevention of childhood obesity therefore needs priority [5-8].

The fundamental cause of child hood and adolescent overweight and obesity is an energy imbalance between calories consumed and calories expended and are affected by various genetic, behavioral and environmental factors [9,10]. Global increases in this epidemic are attributed to a number of factors including; a global shift in diet towards increased intake of energy-dense foods that are high in fat and sugars but low in vitamins, minerals and other healthy macro-nutrients; a trend towards decreased physical activity levels due to the increasingly sedentary nature of many forms of recreation times, changing modes of transportation and increasing urbanization.

BMI measurement programs may be conducted for surveillance and screening purposes. BMI surveillance programs assess the weight status of a specific population (e.g.; students in a school, district or state) to identify the percentage of students who are potentially at risk for weight related problems. Surveillance data typically anonymous and can be used for many purposes including identifying population trends and monitoring the outcomes of interventions. BMI screening programs assess the weight status of individual students to identify those at risk and provide with information to help them take appropriate action.

Over the past three decades the prevalence of overweight and obesity has increased substantially [9]. Globally, an estimated 170 million children (aged less than 18 years) are now estimated to be overweight [10]. The highest prevalence of childhood overweight is in the upper-middle – income countries, and when taken as a group, low-income countries have the lowest prevalence rate. However, overweight is rising in almost all countries, with prevalence rates growing fastest in lower-middle-income countries [11]. Globally WHO estimates that 43 million children are overweight and obese and 81% of them live in developing countries. The number is expected to rise to about 60 million over the next decade [12].

Like any other country in Africa, Zambia is also affected by adolescent obesity epidemic,

but the context of obesity and overweight has been under explored in younger age groups. Understanding the current situation and trends will provide useful insights that will assist health professionals and policy makers in decision making and developing future research agenda. Studies carried out on overweight and obesity in Zambia have focused on the adult population and survey information about adolescent obesity does not exist. The study aimed to determine the prevalence of overweight and obesity among adolescents in Urban Ndola, Zambia and identify its correlates.

Methods

The study was conducted in Ndola urban district among school-going adolescents. This study was a cross sectional study.

StatCal program in Epi Info version 7.1.3.3 was used to determine the sample size. A sample size of 400 respondents was determined using a population size of 9500, a prevalence of 50% (as no estimate existed) within 5%, and a design effect of 2. Cluster sampling was used to group the 24 schools in urban Ndola according to their location. Simple random sampling was used to select 5 schools that would participate in the research. From each school, 80 students were randomly selected to participate in the survey.

A questionnaire used to collect the information. The questionnaire captured age, gender, levels of physical activity, type of diet, height and weight.

A stadiometer was used to measure heights of participants in centimeters. Weight was recorded to the nearest 0.1 kg using a standard digital scale.

The body mass index (BMI) was calculated using the formula: BMI=weight in kg/height in meters squared. BMI was categorized into overweight/obese or non-overweight/non-obese. Associations were established using the Chi-squared test and the Fisher's exact test, where appropriate. The level of statistical significance was set at the 5% level. In determining independent factors associated with overweight/obesity, a multivariate logistic regression was conducted. Adjusted odds ratios (AOR) and their 95% confidence intervals are reported.

Table1: Sample description

Factor	Total n (%)	Males n (%)	Females n (%)	p value
Age (years)				0.017
11-15	152 (100)	61 (40.1)	91 (59.9)	
16-20	248 (100)	130 (52.4)	118 (47.6)	
Residential area				0.387
High density	285 (100)	140 (49.1)	145 (50.9)	
Low density	115 (100)	51 (44.3)	64 (55.7)	
Overweight/obese				<0.001
No	372 (100)	187 (50.3)	185 (49.7)	
Yes	28 (100)	4 (14.3)	24 (85.7)	

Ethical considerations

Ethical clearance was sought and granted by the Tropical Diseases Research Centre (TDRC) ethics committee based at Ndola Central Hospital of Zambia. Permission to conduct the study was obtained from the Zambia District Education Board Secretary (Ndola). Verbal consent was obtained from participants of consenting age and assent from headmasters for participants who were below consenting age.

Results

There were 400 participants of which 191 (47.8%) were males. Of the 191 male participants 2.1% were overweight/obese and of the 209 females, 11.5% were overweight/obese (p <0.001). The age and residential area distributions were similar between males and females (Table 1).

Socio-demographic factors associated with overweight in bivariate analyses are shown in Table 2. Only gender was significantly associated with the outcome (p<0.001). Physical factors that were associated with overweight/obese are shown in Table 3. Mode of transport (p=0.009) and type of diet (p=0.020) were significantly associated with the outcome.

Table 2: Socio-demographic factors associated with overweight/obesity

Factor	Non-overweight/non-obese n (%)	Overweight/obese n (%)	p-value
Age			0.884
11-15years	141 (92.8)	11 (7.2)	
16-20 years	231 (93.1)	17 (6.9)	
Residential area			0.201
High density	268 (94)	17 (6)	
Low density	104 (90.4)	11 (9.6)	
Gender			<0.001
Male	187 (97.9)	4 (2.1)	
Female	185 (88.5)	24 (11.5)	

In multivariate analysis only gender and transport remained significantly associated with the outcome. Male respondents were 58% less likely to be overweight/obese compared to females (AOR=0.42; 95% CI [0.24, 0.72]). Compared to respondents who used a car as mode of transport, those who walked or used a bicycle were 38% less likely to be overweight/obese (AOR=0.62; 95% CI [0.41, 0.93]).

Discussion

In the current study the overall prevalence of overweight/obese was 7.0% (2.1% of males, 11.5% of females). Sex and mode of transport were significantly associated with overweight/obese.

The rate among females in the current study is comparable to that of females in Malawi of 14.4% but that of males in the current study was much lower than the one observed in Malawi of 15.9%. Notably, there the rates vary between gender across regions. While in the current study, females had a higher rate than males, there was no significant difference in the same region in Malawi. Meanwhile, in West and North Africa, males had higher rates than females. Further, generally, the rates in the current study were

lower than those observed in West [Benin (females=14.0%; males=19.9%); Mauritania (females=17.9%; males=23.5%); Ghana (females=18.3%; males=33.8%)] and North [Egypt (females=9.9%; males=15.7%; Morocco (female=17.1%; male=29.3%)] Africa [15].

Table 3: Physical factor specific rates for overweight/obesity

Factor	Non-overweight/non-obese n (%)	Overweight/obese n (%)	p values
Physical activity			
Doing sport			0.069
Yes	237 (94.8)	13 (5.2)	
No	135 (90)	15 (10)	
Hours a week			0.229
< 7hrs per week	324 (92.3)	27 (7.7)	
>7hrs per week	48 (98)	1 (2)	
Mode of transport			0.009
Walking/bicycle	226 (95.8)	10 (4.2)	
By car	146 (89)	18 (11)	
Number of meals per day			
< 3 meals	57 (87.7)	8 (12.3)	
>3 meals	315 (94)	20 (6)	
Type of Diet			0.020
Healthy	82 (98.8)	1 (1.2)	
Unhealthy	290 (91.5)	27 (8.5)	
Skip breakfast			0.360
Yes	206 (92)	18 (8)	
No	166 (94.3)	10 (5.7)	

Female gender was associated with overweight in the current study partly because female adolescents tend to be less active than males. Female adolescents tend to stay at home with less physical activity) to help out with household chores compared to males who are physically active as demanded by their societal roles. The finding accords that of Kruer et al [16] who observed that during adolescence males are generally more physically active than females. Another explanation for females to be overweight is that females in our study may regard bigger body image to be favorable than a lean body, especially during the era of the HIV/AIDS epidemic in which more females than males are infected with the virus [17]. A lean body may be associated with HIV. Yet another explanation for gender difference in overweight relates to sexual maturation. During adolescence sexual maturation demands more energy and since females mature earlier than males, females tend to be more overweight than males [18].

Driving to school was associated with overweight in the present study. Similar findings have been reported elsewhere. Wen et al [19] reported that participants who drove to school were associated with overweight. In another study, students who cycled to school were associated with lower odds of being overweight [20]. Cycling to school is associated with lower BMI and lower odds of being overweight or obese. In a large population-based study of Danish adolescents it was observed that walking or cycling to was associated with lower likelihood of being overweight [21]. Sedentary lifestyles have been associated with unhealthy outcome and physical activity must thus be encouraged to avoid diseases associated with inactivity.

There are a number of limitations attributed to the study. Measurement bias could have arisen in determining the level of physical

activity. There could have been bias in choosing the type of diet by pupils as the foods contained in the unhealthy diet is generally associated more with affluence. The number of meals taken per day by a pupil could not be verified and as such may compromise on the findings.

In conclusion, the observed rate of overweight in the current study has not reached at an alarming rate but measures to control it such as involving students in physical activity must be instituted

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References

1.Deurenberg P, Weststrate JA, Seidell JC. Body mass index as a measure of body fatness: age- and sex-specific prediction formulas. Br J Nutr. 1991;65(2):105-14.
2.Ebbeling CB, Pawlak DB, Ludwig DS. Childhood obesity: public-health crisis, common sense cure. Lancet. 2002;360(9331):473-82.
3.Mei Z, Grummer-Strawn LM, Pietrobelli A, Goulding A, Goran MI, Dietz WH. Validity of body mass index compared with other body-composition screening indexes for the assessment of body fatness in children and adolescents. Am J Clin Nutr. 2002;75(6):978-85.
4.Ogden CL, Carroll MD, Curtin LR, Lamb MM, Flegal KM. Prevalence of high body mass index in US children and adolescents, 2007-2008. JAMA. 2010;303(3):242-9.
5.World Health Organization. Global strategy on diet, physical activity and health. May 2004. URL: http://www.who.int/dietphysicalactivity/strategy/eb11344/en/.
6.World Health Orgnization. Noncommunicable diseases and mental health. Global status report on non-communicable diseases 2010. Description of the global burden of NCDs, their risk factors and determinants. Geneva: WHO, 2011. URL: http://www.who.int/nmh/publications/ncd_report2010/en/.
7.Food and Agriculture Organization of the United Nations. The double burden of malnutrition. Case studies from six developing countries. Rome, Italy: FAO, 2006. URL: http://www.fao.org/docrep/009/a0442e/a0442e00.htm.
8.World Health Organization. Global strategy on diet, physical activity and health. Childhood Overweight and Obesity. URL: http://www.who.int/dietphysicalactivity/childhood/en/.
9.Daniels SR, Arnett DK, Eckel RH, Gidding SS, Hayman LL, Kumanyika S, et al. Overweight in children and adolescents: pathophysiology, consequences, prevention and treatment. Circulation. 2005;111(15):1999-2012.
10.Wang Y, Lobstein T. Worldwide trends in childhood overweight and obesity. Int J Pediatr Obes. 2006;1(1):11-25.
11.Lobstein T1, Baur L, Uauy R; IASO International Obesity TaskForce. Obesity in children and young people. a crisis in public health. Obes rev. 2004;5(Suppl 1):4-104.
12.De Onis M, Blossner M, Borghi E. Global prevalence and trends of overweight and obesity among preschool children. Am J Clin Nutr. 2010;92(5):1257-64.
13.Rudatsikira E, Muula AS, Mulenga D, Siziya S. Prevalence and correlates of obesity among Lusaka residents, Zambia: a population based survey. Int Arch Med. 2012;5(1):14.
14.Besa C, Mulenga D, Babaniyi O, Songolo P, Muula AS, Rudatsikira E, et al. Overweight and obesity in Kaoma and Kasama rural districts of Zambia: prevalence and correlates in 2008-2009 population based surveys. J Hypertens 2013;2:1.
15.Manyanga T, El-Sayed H, Doku DT, Randall JR. The prevalence of underweight, overweight, obesity and associated risk factors among school-going adolescents in seven African countries. BMC Public Health. 2014;14:887
16.Kruger R, Kruger HS, Macintyre UE. The determinants of overweight and obesity among 10- to 15-year-old schoolchildren in the North West Province, South Africa - the THUSA BANA (Transition and Health during Urbanisation of South Africans; BANA, children) study. Public Health Nutr. 2006;9(3):351-8.
17.Central Statistical Office (CSO) [Zambia], Ministry of Health (MOH) [Zambia], and ICF International. Zambia Demographic and Health Survey 2013-14. Rockville, Maryland, USA: Central Statistical Office, Ministry of Health, and ICF International; 2014.
18.Wisniewski AB, Chernausek SD. Gender in childhood obesity: family environment, hormones, and genes. Gend Med. 2009;6(Suppl 1):76-85.
19.Wen LM, Orr N, Millett C, Rissel C. Driving to work and overweight and obesity: findings from the 2003 New South Wales Health Survey, Australia. Int J Obes (Lond). 2006;30(5):782-6.
20.Østergaard L, Grøntved A, Børrestad LA, Froberg K, Gravesen M, Andersen LB. Cycling to school is associated with lower BMI and lower odds of being overweight or obese in a large population-based study of Danish adolescents. J Phys Act Health. 2012;9(5):617-25.

21.Laverty AA, Mindell JS, Webb EA, Millett C. Active travel to work and cardiovascular risk factors in the United Kingdom. Am J Prev Med. 2013;45(3):282-8