

ORIGINAL RESEARCH

Physical Activity, Sleep, and BMI Percentile in Rural and Urban Ugandan Youth



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Abstract

BACKGROUND Uganda is experiencing a dual burden of over- and undernutrition, with overweight prevalence increasing while underweight remains common. Potential weight-related factors, particularly physical activity, sleep, and rural/urban status, are not currently well understood or commonly assessed in Ugandan youth.

OBJECTIVE The purpose of this study was to pilot test a survey measuring weight-related factors in rural and urban Ugandan schoolchildren.

METHODS A cross-sectional survey measured sociodemographics, physical activity, sleep patterns, and dietary factors in 148 rural and urban schoolchildren aged 11-16 in central Uganda. Height and weight were objectively measured. Rural and urban youth were compared on these factors using χ^2 and *t* tests. Regression was used to identify correlates of higher body mass index (BMI) percentile in the full sample and nonstunted youth.

FINDINGS Youth were on average 12.1 ± 1.1 years old; underweight (10%) was more common than overweight (1.4%). Self-reported sleep duration and subjective sleep quality did not differ by rural/urban residence. Rural children overall had higher BMI percentile and marginally higher stunting prevalence. In adjusted analyses in both the full and nonstunted samples, higher BMI percentile was related to living in a rural area, higher frequency of physical activity, and higher subjective sleep quality; it was negatively related to being active on weekends. In the full sample, higher BMI percentile was also related to female gender, whereas in nonstunted youth, higher BMI was related to age. BMI percentile was unrelated to sedentary time, performance of active chores and sports, and dietary factors.

CONCLUSIONS This study is one of the first to pilot test a survey assessing weight-related factors, particularly physical activity and sleep, in Ugandan schoolchildren. BMI percentile was related to several sociodemographic, sleep, and physical activity factors among primarily normal-weight school children in Uganda, providing a basis for understanding weight status in the context of the nutrition transition.

KEY WORDS overnutrition, nutrition transition, sleep, physical activity, sub-Saharan Africa

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INTRODUCTION

Sub-Saharan Africa is undergoing rapid transitions in physical activity and dietary patterns, contributing to a 35% increase in overweight and obesity over the past 2 decades.¹ Although chronic undernutrition remains a significant problem, with stunting affecting 38% of children younger than 5 in sub-Saharan Africa,² overweight prevalence is estimated at 15.4% of female and 7.6% of male schoolchildren. Despite the increased prevalence of overweight in recent decades, factors contributing to overweight are not well understood. Further, limited research has led to mixed conclusions; in children in the region, excess adiposity has been related to being female, having high socioeconomic status, and having urban residence,³ in addition to nontraditional risk factors such as stunting⁴ and higher wealth and human development.⁵ One study, surveying adolescents in 7 African countries, even reported that excess weight was related to being younger, having increased fruit consumption, having greater parental involvement, and taking a greater number of physical education classes.⁶ However, because prior research has occurred in relatively small samples and assessed a limited number of factors potentially related to weight, little is known about correlates of body mass index (BMI), and particularly high BMI, in youth in sub-Saharan Africa.

In Uganda, a low-income sub-Saharan African country of 35.8 million, underweight in children younger than 5 years old decreased dramatically over the last 20 years to 16.4% currently; additionally, 5% of children are wasted and one-third are stunted, whereas 3% are overweight.⁷ The coexistence of undernutrition and overweight is striking because both undernutrition^{8,9} and obesity¹⁰ increase chronic disease risk. In Ugandan adults, a recent population-based survey found that almost 95% of those surveyed exhibited at least 1 of 5 noncommunicable disease risk factors assessed.¹¹ Preliminary studies have supported the rise of overweight and noncommunicable diseases and the need for assessing and shifting resources toward noncommunicable diseases.^{12,13} Overweight among adult women has been found to be related to living in urban areas and being in the highest wealth class.¹⁴ Although population-based surveys have assessed weight status and nutritional factors in adults and children younger than 5,^{7,11} few studies have measured weight status and related factors in school-aged youth. One, which surveyed youth in both Uganda and Ghana, found that 10.4% and

3.2% of female and male adolescents were overweight¹⁵ but was unable to report on many potentially confounding factors such as socioeconomic status, rural/urban status, and sleep. These gaps are particularly important because research in the United States and other countries has suggested they play a substantial role in obesity risk.^{16,17} Further, because of the rapid pace of development in Uganda, prevalence of risk factors may be quickly changing and may be especially increasing in urban areas. Prior research has found higher rates of obesity^{3,14,18,19} and diabetes¹⁹ among urban children or adults in sub-Saharan Africa. Although risk factors such as physical activity and sleep are not as well studied in the region, research in China,²⁰ Haiti,²¹ and Brazil²² has suggested that rural-urban differences may exist in sleep quality or deprivation, and research in Cameroonian adults has found lower activity levels in urban dwellers.²³ In Uganda, the limited number of population-based studies, particularly in youth aged 6–18, make it difficult to gain a clear understanding of the risk and protective factors for under- and overweight in the context of the nutrition transition and how public health officials and practitioners can best promote nutrition and child health.

To attempt to address this gap in knowledge surrounding child weight and factors related to child weight, a survey was developed to assess factors associated with weight status in Ugandan youth. This cross-sectional survey was then piloted in a sample of 148 rural and urban primary schoolchildren in 2 central Ugandan schools to provide a baseline description of weight-related factors and investigate their relationship to BMI. Based on prior research in both the US and sub-Saharan Africa, we hypothesized that higher weight status would be related to female gender,^{3,15} urban residence,³ lower physical activity,^{24,25} and lower sleep duration.¹⁶ Because of previous research finding no relationship or very limited relationships between dietary factors and BMI percentile in sub-Saharan African youth,^{6,15} no *a priori* hypothesis concerning dietary factors could be made.

METHODS

Study Design and Setting. Based on an estimated overweight prevalence of 6.8%¹⁵ and 95% confidence, a power analysis found that at least 100 participants would be necessary to effectively study the impact of risk factors on overweight. Students were sampled from a large urban primary school in

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