

# Environment factors associated with adolescents' body mass index, physical activity and physical fitness in Kuching South City, Sarawak: a cross-sectional study

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## Abstract

This study examined the relationship between perceived built environment attributes and physical activity, physical fitness and body weight among adolescents aged 14–16 years in Sarawak. This was a cross-sectional study, using multi-stage sampling. A set of questionnaires consisting of socio-demographic information, a self-administered physical activity checklist and a Neighborhood Environment Walkability Scale-Youth (NEWS-Y) was used. Body mass index (BMI) was measured and physical fitness was tested using a maximal multistage 20 m shuttle run test. Data analysis was done using SPSS version 17.0. A total of 316 respondents participated. The mean BMI for boys was almost equal to the mean BMI for girls. Only 7.9% of the sampled population was found to be overweight or obese. The overall mean duration spent per day on physical activity was 128.4 min (SD 118.43), with mean of 56.1 min (SD 73.94) after school time. Girls reported to spend longer each day taking physical activity before and during school. Boys were found to have significantly higher  $VO_{2max}$  of  $27.79 \pm 5.91$  mL/kg/min as compared to girls ( $t=11.22$ ,  $p<0.000$ ). Based on comparison with other countries, the NEWS-Y scores indicated a mixture of low and high walkability neighborhoods. Respondents who had lower BMIs reported living in lower residential density areas and less risk of crime, and respondents who had better physical fitness reported less suitable infrastructure for walking. Promotion of exercise at all levels should be continuously encouraged as it would lead to improvement in the well-being of an individual.

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## Introduction

Childhood obesity has reached global epidemic levels both for adults and children (1), with nearly 43 million children aged 5 years and below being overweight in 2010 (2). Seventy-five per cent of these overweight and obese children live in low- and middle-income countries, particularly in urban settings. In Malaysia, adult prevalence of overweight and obesity is also reflected in children. For children aged 12–17 years, 13.7% and 6.6% of boys, and 12.9% and 4.8% of girls were found to be overweight and obese, respectively, in four regions of Peninsular Malaysia and the Miri region of Sarawak (3). In an urban setting, 9.7% of boys and 7.1% of girls aged 7–10 years in the primary schools in Kuala Lumpur were found to be obese based on >95th percentile of the body mass index (BMI)-for-age (4). Poh et al. (3) also found a 5% higher prevalence of obesity among urban children compared to those in rural areas. As such, obesity is affecting large numbers of children, who form almost half of the total population in the majority of countries (5). In 2007 UNICEF predicted that six out of every 10 children will live in urban areas by the year 2025 (6). Following the increasing prevalence of obesity in urban children, more children will also become obese.

Childhood inactivity and obesity have become one of the most serious public health concerns in developed and developing countries (7, 8). These problems were found to continue into adolescence (9) and adulthood (10) with significant medical, psychosocial and economic consequences. Low levels of physical activity (PA) and the failure to meet the recommended amount of exercise have notable health consequences among children, including increased risk of obesity, low bone density (11), and a growing list of chronic conditions, such as coronary heart disease, type 2 diabetes, certain cancers, hypertension, osteoporosis, back-pain, anxiety, depression and stress (12).

Despite the escalating rise in childhood obesity worldwide and its health and economic consequences, the mechanism of obesity development is not fully understood. Many PA programs have been conducted, but they have largely focused on the individual level. This is associated with the popular belief that PA is solely the individual's responsibility (13), although health promotion has long endorsed the value of environmental interventions (14). A similar situation is noted in Malaysia.