

Association between proximity of food retailers to schools and dietary intake habits and nutritional status of adolescents of Porto

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ABSTRACT

Introduction: In the past decades the prevalence of childhood overweight and obesity has increased worldwide. In Portugal, in 2003, the prevalence of overweight/obesity, in children with 7 to 9 years old, was 31.6%. Childhood obesity is associated with serious short and long-term adverse effects on the quality of life and well being and is rather a syndrome with a multifactorial etiology, associated to major changes in childhood patterns of food and beverage intake. Strategies to address the childhood obesity epidemic include efforts to improve the food environment at schools and surrounding schools. The relationship between food retailers in the proximity of schools and obesity and food habits have been tested in different studies and some association were proved. The aim of this study is to identify the quantity and type of food retailers in the neighborhood of schools that participated in Epiteen Cohort study and to understand if such food retailers influence food habits, energy and nutritional intake and nutritional status in adolescents.

Methods: A sample of 1513 adolescents (50.9% females) from 44 schools (73.6% from public schools) from Porto was studied. Questionnaires, including a food frequency questionnaire, and anthropometric measures were assessed. To study the adherence to Mediterranean Diet KIDMED scores were calculated. Food retailers in 400 meters surrounding each school were identified and geo referenced with geographic coordinates. Name, address, type of food retailer and activity in 2003 were recovered. Number of food retailers at of 100, 200 and 400 meters from schools were determined and different classes were considered: Vegetables and Fruit Retailers (VFR), where adolescents can only purchase fruit; Markets and Supermarkets (MSM), which are retailers that sale fresh products, including grocery stores, vegetables, fruit retailers and supermarkets; and Fast Food Retailers (FFR), where adolescents can purchase fast-food, that include typical restaurants and other similar food served in another retailers like cafeterias.

Results: 1070 food retailers were identified in the proximity of 400 meters from the 44 schools, being Cafeteria/Bakery/Pastry/ Candy Shop/ bar and snack-bar the most frequent (68.23%). Private schools had higher offer of fast-food and fresh products than public schools ($p < 0.05$). In girls, we found a significant lower energy intake among participants from schools with higher number of mini and supermarkets in the proximity of 200 and 400 meters. Although the difference reaches statistical significance, the difference in the amount of energy among groups was small. In boys and considering food retailers in the proximity of 400 meters from schools, the % of energy provided by carbohydrates intake per day increased with higher number of Mini and Supermarkets (MSM). Comparing with students in schools who did not have any vegetables and fruit retailer (VFR), students from schools with this kind of retailer at 100 and 200 meters from school reported a lower energy intake. However, these relation inverts when the 400m was considered as cut-off for define proximity. Also fiber intake was lower and contribution from proteins for total energy intake higher for girls with at least one vegetable and fruit retailer at 200 meters. Regarding the availability of fast-food and snack retailers (FFR), considering a distance of 200m, we found an increase in total energy intake with the increasing of retailers. However with more than 6 retailers available the total energy intake decreased, reaching statistical significance for girls. In girls, it was found a small decrease on sweets intake among those in schools with higher number of food retailers. The proportion of adolescents with an intake more similar to the Mediterranean Diet (higher KIDMED score) was higher among adolescents enrolled at schools with more availability of food retailers, although only in girls the difference was significant. Among boys, and considering the availability of vegetables and fruit retailers (VFR) at 200 meters from school, we found a lower adherence to the Mediterranean Diet but the opposite was found when we considered the total of vegetables and fruit retailers at 400 meters. The odds to have overweight were almost three fold among adolescents at schools with two or more mini and supermarkets in the proximity of 200 meter from school, OR=2.78 (95%CI: 1.02-7.56) in girls and OR=3.05 (95%CI: 1.16-8.03) in boys. In contrary, the odds of overweight decrease with the increase of the number of fast-food and snack retailers in 200 meters proximity from school.

Conclusions: We found a large number of food retailers in the proximity of schools, mainly in the neighborhood of private schools. In our sample, in general, for all kind of food retailers evaluated, the number of retailers in the schools' proximity was not associated with the individual nutritional intake. However adolescents with a higher

number of vegetables and fruit retailers or mini and supermarkets in the proximity of schools showed the lowest intake of sweets. Regarding nutritional status, we found an association in girls and with the availability of fast-food and snack retailers (FFR), those with lower number of fast-food and snack retailers presented lower odds of overweight and obesity.

However it is important to note that almost all schools had this kind of retailers in the proximity which makes difficult to understand the true effect of the presence of these retailers. More research to assess the relationship between food retailer's proximity to schools and student dietary practices and obesity is needed.

Key words: School, Proximity, Obesity, Overweight, Nutritional Status, Food retailers, Fast-food, Dietary Intake and Mediterranean Diet.