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F&V ACCESSIBILITY

Editorial

How to support fruit and vegetables accessibility for young people

The nutritional messages such as "eat 5 fruit and vegetables per day" are well known, but despite this, the consumption of fruit and vegetables has not increased. In France, younger generations spend four times less in buying fruit than their grand-parents. It is important to have a better understanding of the factors influencing the behaviour of children and teenagers, since this knowledge would suggest new and more effective actions.

To improve the accessibility to fruit and vegetables, it is necessary to emphasize their attractiveness, quality, and the diversity and availability of their sale-points, as well as improving their image and innovation. It is also necessary to show the ease and pleasure of eating fruit and vegetables and to awaken the taste-buds of young people.

This newsletter reports scientific results on the correlation between the fruit and vegetable consumption of children or teenagers and their environment, including availability of the fruit and vegetable at home, distances between the home and food-stores, and the presence of a person cooking at home.

The European Commission would like to launch a programme for distribution of fruit at school, starting in school year 2009. France will support this "school fruit scheme" during its Presidency of the Council of the Union, but will require high quality fruit and a presentation that is fun and interactive for children. Indeed, giving young people a taste and appetite for fruits is very important, but it is also necessary to accompany them in discovering the product they have in their hands and with consideration of their fear and rejection of the unknown.

Laure Souliac,
Head of the Office "Nutrition and Valorization of Food Quality"
Minister of Agriculture and Fisheries, France

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HEAD OFFICE
International Fruit And Vegetable Alliance
c/o Canadian Produce Marketing Association
162 Cleopatra
Ottawa, Canada, K2G 5X2

IFAVA

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E-mail : chairman@ifava.org

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Fresh fruit and vegetable availability in neighborhood food stores and its potential influence on consumption

— J Nicholas Bodor and Donald Rose —

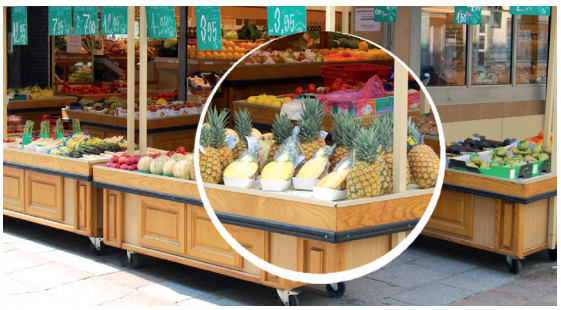
Department of Community Health Sciences, School of Public Health and Tropical Medicine, Tulane University, USA

The intake of fruits and vegetables continues to be inadequate in the general population[1], despite their well substantiated benefits[2,3]. In response to this pattern, an increasing body of research has begun to examine the neighborhood food environment and its potential influence on diet. Prior studies have primarily focused on access to supermarkets and have found positive associations between greater access and improved diet quality[4-7]. Small neighborhood food stores, which are prevalent in urban environments and are frequently within walking distance, may also influence dietary intake. Such food stores may provide a place for the 'fill-in' shopping of perishable items, like fresh produce, and may be especially important for low-income individuals without a car. Little research has been performed assessing the potential influence of small neighborhood food stores on dietary intake. Our research examined this relationship by studying access to small food stores, their availability of fresh produce, and whether these factors were related to fruit and vegetable intake[8].

In the summer of 2001, four adjacent neighborhoods were chosen in New Orleans, Louisiana. This area is typical of many urban mixed-use environments in which neighborhood stores are intermingled with residences. A random sample of residents living in this area was surveyed on their fruit and vegetable intake and their demographic characteristics. All small food stores in these neighborhoods were geo-mapped, as were all nearby supermarkets. Distances were calculated from each household to each food store. In-store surveys collected data on linear shelf space devoted to fresh fruits and vegetables, as well as the number of fresh fruit and vegetable varieties. Composite measures of 'neighborhood availability' were created for each household by summing the amount of fresh fruits and fresh vegetables found in all small food stores within 100 meters of the residence. Similar measures were constructed for the total number of fresh fruit and fresh vegetable varieties within 100 meters. The distance of 100 meters was chosen because it was an approximate size of a city block.

We found that greater fresh vegetable availability within 100 meters of a household was associated with higher vegetable intake. Specifically, each additional meter of fresh vegetable shelf space was associated with a 0.35 servings per day increase in consumption. A similar, but more modest link emerged for the number of fresh vegetable varieties. Each additional variety within 100 meters was associated with a 0.23 servings per day increase in vegetable intake. None of the fresh fruit availability measures were associated with fruit intake. All estimates took into account the demographic characteristics of the respondent, car ownership, and distance to the nearest supermarket. Our analysis did not find supermarket access to be associated with either fruit or vegetable intake.

The findings from our exploratory study suggest that access to neighborhood small food stores and their in-store availability of fresh produce may affect diet, particularly vegetable consumption. Interestingly, unlike prior studies, supermarket access was not related to diet. This may be due to the fact that the residents in the study were within a short driving distance to a nearby supermarket, an average travel distance of 1.3 kilometers. Although many residents did not own a car, most probably went to a supermarket for a large shopping trip and then relied on nearby small food stores for 'fill-in' trips, a phenomenon supported by other studies[9,10]. Thus, in our study sample, the proximity of a neighborhood small food store and its availability of fresh vegetables may have impacted a household's ability to replenish perishable produce until the next opportunity to go to a supermarket. Further research is needed, using a larger sample and covering a wider geographic area, to validate the suggestive findings of our study.



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Accessibility, a determinant of fruit and vegetable intake in low income Mexican children

— Ana Bertha Pérez-Lizaur[1], Martha Kaufer-Horwitz[2], Maite Plazas[3] —

1/ Universidad Iberoamericana, México
2/ Instituto Nacional de Ciencias Médicas y Nutrición Salvador Zubirán and Fundación Mexicana para la Salud, México
3/ Consultoría en Nutrición, México

Factors that influence food consumption[1]

The factors that influence food selection are not restricted to personal preferences; they are also conditioned by social, cultural, and economical circumstances[2], food costs, accessibility, and the knowledge of how to design a healthy diet[3]. According to some authors, groups who have low purchasing power have a greater tendency to consume an unhealthy diet and fewer fruit and vegetables (FV)[4] and others suggest that healthy diets are more expensive than those high in sugars, fat, and refined cereals.

Eating habits that are acquired during childhood may persist into adulthood[6]; therefore, factors that influence food consumption should be identified in order to carry out more effective interventions that will promote a healthy diet during the entire lifespan[7].

According to the National Institute of Public Health[8], the Mexican adult female population consumes two servings of FV per day, which is below recommendations for chronic disease prevention. According to published international studies[9], nutrition education programs for children must include a number of key elements to have a successful outcome. These programs must be based on behavioural and environmental modifications, involve the family when the children are young, engage the school to modify the environment, embrace the community, and include sufficient time to instruct program participants. In order to achieve a successful outcome, it is necessary to know how these factors interact with the target population.

The frequency of fruit and vegetables consumption by urban Mexican school children, and their personal and environmental correlates were studied with 327 children (49.2% males and 50.8% females) attending second, third and fourth grades, with a mean age of 8.8 years, from two socioeconomically deprived state schools in Mexico City.

A validated written self-completed questionnaire was designed and administered to study subjects to identify the environmental (accessibility) and personal characteristics (preferences, expectancy, knowledge, and self-efficacy) that influence FV consumption.

The median intake of FV in our study was one time per day, with only 11% of the children eating ≥ 3 times per day. When analysed by gender, a significant difference existed in the FV consumption between girls and boys ($p< 0.01$), with a higher proportion of girls consuming 3 or more times per day (15.2% vs. 6.7%). This intake is very low when compared with the recommendations made by the World Cancer Research Fund (1997) (≥ 5 servings/day).

In relation to the BMI for age, 63.6% of the boys and 51.5% of girls in the study were overweight or obese, ($\chi 2 = 4.826$; $p< 0.03$). There was a significant difference in time spent watching television or playing video games between boys and girls ($\chi 2 = 7.53$; $p<0.006$); 48.5% of boys and 33.5% of girls spent ≥ 4 hrs per day in these sedentary activities.

There was a significant association was found between self-efficacy for vegetables and higher frequency of FV intake. However, no association was observed betweenfrequency (≥ 3 times /day) of FV intake and knowledge, preferences for fruits or for vegetables, expectancy, or self-efficacy for fruit.

Two factors that most influenced a higher (three or more times/day) intake of fruits and vegetables in this population were high accessibility (OR 3.38, CI 1.26 to 9.0) to FV and being a female (OR 2.2, CI 1.04 to 4.7). Several studies[10], have previously found high accessibility as the variable most associated with FV consumption. Blanchette et al.[11](2005) found that availability, accessibility, and parents' example are the variables that most influence FV intake, and, therefore, intervention strategies to increase consumption should be based on these factors.

In focus groups with parents of similar children in the same schools (Pérez-Lizaur, unpublished data), the parents said that sometimes they find it difficult to prepare FV in a manner that are readily accessible to their children. The parents also believed that their children do not have the capacity and, in some instances, the interest to take part in the food preparation process, limiting their opportunities to be exposed to healthy eating habits. It would be interesting to explore how these beliefs affect children's accessibility to FV, and in what way these barriers could be overcome to benefit both parents and children. Home and school environments that encourage consumption of fruit and vegetables are fundamental for the children to increase their FV consumption. It is also important to find creative ways to involve boys in food preparation activities, to encourage them taste more FV to promote consumption.

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Distance to food stores & adolescent male fruit and vegetable consumption: mediation effects

— Tom Baranowski —
Baylor College of Medicine, Houston, USA

Many children in the USA do not consume five servings of fruit and vegetables per day. Current behavioral models explain a relatively small percentage of the variance in children's fruit and vegetable consumption. Improved understanding of the factors that influence youth fruit and vegetable consumption and how they interact is needed to guide intervention design. A limitation of existing research has been the consideration of psychosocial or environmental influences, separately, on fruit and vegetable consumption. Social cognitive theory suggests that the association between environmental variables and behavior could be either direct or indirect (e.g. a facilitating or buffering effect). An indirect association would suggest that the association is mediated by other variables such as psychosocial variables or home availability of fruits and vegetables. The purpose of this study was to examine associations between distance to food stores and restaurants and fruit and vegetable consumption and the possible mediating role of psychosocial variables and home availability.

Fruit and vegetable consumption of 204 Boy Scouts was assessed by a food frequency questionnaire in 2003. Participant addresses were geo-coded and distance to different types of food stores and restaurants calculated. Fruit and vegetable preferences, home availability and self-efficacy were measured. Regression models were run with backward deletion of non-significant environmental and psychosocial variables. Mediation tests were performed.

Residing further away from a small food store (SFS) (convenience store or drug store) was associated with increased fruit, juice, and low fat vegetable consumption, but proximity to large food stores was not associated with any of the dietary variables. Shopping behavior is considered to be conditional on local supply and the service areas of local grocery stores. If this were true, eating behavior would be a function of distance to a large grocery store as people would need to drive further to get to where they do their regular large shopping. We did not find this association in our data, but we did show that fruit and vegetable consumption was inversely associated with access to small stores. Since small stores usually provide a limited supply of fruits and vegetables [46], reduced proximity to these stores may limit consumption of higher calorie foods, which negatively impact fruit, juice, and vegetable consumption. Moreover, among adolescents, who do not drive, it may be that access to small stores is more important than access to the larger grocery stores that require car access (in the city of Houston).

Twenty six percent of the association between distance to the nearest small food store and low fat vegetable consumption was mediated by preferences. Although the data are cross-sectional and therefore the ability to detect a causal association is not possible, the results indicate that participants who lived further away from small grocery stores had increased preferences for fruit and vegetables. Thus, adolescents who have less access to the smaller food stores, which traditionally carry a wider variety of processed foods and less fresh fruit and vegetables, are perhaps more likely to consume fruit and vegetables [at home or in other locations] and develop preferences for them. Moreover, this group of adolescents are perhaps less likely to visit small stores and buy processed foods. Alternatively, it may be the case that families that like fruit and vegetables elect to live in neighborhoods that are further away from small food stores. Further research will need to clarify these relationships.

Residing closer to a fast food restaurant was associated with increased high fat vegetable, fruit, and juice consumption. This seems logical because high fat vegetables such as French Fries are sold at these restaurants. Thus, perhaps adolescents who live close to a fast-food restaurant are more likely to consume the high fat vegetables provided at these stores, a simple facilitating effect. The association with fruit and juice is more difficult to tease out, but it may be that this association is a function of the fruit and juice that these stores sell, or children mistakenly reporting fruit pies or fruit flavored beverages as fruit consumed. Further research will need to clarify this, as well.

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