

“HOW TO IMPROVE F&V CONSUMPTION AT SCHOOL?”

Editorial

Growing evidence has shown that low consumption of fruits and vegetables (F&V) is associated with the risk of some chronic diseases, particularly obesity. Prevention efforts need to include early interventions to increase F&V consumption of children. Several international studies have shown that school intervention early in childhood is of major importance and that both school and home play a complementary role. So, the question becomes “how to make the consumption of F&V increase in schools?” International initiatives have been developed and have concerned 3 types of experiences:

1. Increasing F&V availability in canteens, like the "Farm to school" program in Michigan, or with vending machines;
2. Organizing gardening activities at school;
3. Offering a fruit or a vegetable for snack, experiences followed in Denmark and Norway. In 2008, this was one of the priority areas of the public health policies of the French Ministry of Agriculture, with the program "un fruit pour la récré" (“a fruit for recreation time”). This type of program will spread all over the European countries by the end of 2009 with the School Fruit and Vegetable Scheme. The purpose is not only to improve children's knowledge, but also to change habits and behaviors.

**Martine Padilla**

Scientific administrator, CIHEAM-IAMM, UMR Moisa.

Editorial Board



- S. Ben Jelloun • INSTITUT AGRONOMIQUE VÉTÉRINAIRE HASSAN II • RABAT • MORROCO
- E. Bere • UNIVERSITY OF AGDER • FACULTY OF HEALTH AND SPORT • NORWAY
- E. Birlouez • EPISTÈME • PARIS • FRANCE
- I. Birlouez • INAPG • PARIS • FRANCE
- MJ. Carlin Amiot • INSERM • FACULTÉ DE MÉDECINE DE LA TIMONE • MARSEILLE • FRANCE
- B. Carlton-Tohill • CENTER FOR DISEASE CONTROL AND PREVENTION • ATLANTA • USA
- V. Coxam • INRA CLERMONT FERRAND • FRANCE
- N. Darmon • FACULTÉ DE MÉDECINE DE LA TIMONE • FRANCE
- H. Verhagen • NATIONAL INSTITUTE FOR PUBLIC HEALTH AND THE ENVIRONMENT (RIVM) • BILTHOVEN • NETHERLANDS
- ML. Frelut • HÔPITAL SAINT-VINCENT-DE-PAUL • PARIS • FRANCE
- T. Gibault • HÔPITAL HENRI MONDOR • HÔPITAL BICHAT • PARIS • FRANCE
- D. Giugliano • UNIVERSITY OF NAPLES 2 • ITALY
- M. Hetherington • UNIVERSITY OF LEEDS • UK
- S. Jebb • MRC HUMAN NUTRITION RESEARCH • CAMBRIDGE • UK
- JM. Lecerf • INSTITUT PASTEUR DE LILLE • FRANCE
- J. Lindstrom • NATIONAL PUBLIC HEALTH INSTITUTE • HELSINKI • FINLAND
- C. Maffei • UNIVERSITY HOSPITAL OF VERONA • ITALY
- A. Naska • MEDICAL SCHOOL • UNIVERSITY OF ATHENS • GREECE
- T. Norat Soto • IMPERIAL COLLEGE LONDON • UK
- J. Pomerleau • EUROPEAN CENTRE ON HEALTH OF SOCIETIES IN TRANSITION • UK
- C. Rémésy • INRA CLERMONT FERRAND • FRANCE
- E. Rock • INRA CLERMONT FERRAND • FRANCE
- M. Schulze • TECHNISCHE UNIVERSITÄT MÜNCHEN • FREISING • GERMANY
- J. Wardle • CANCER RESEARCH UK • HEALTH BEHAVIOUR UNIT • LONDON • UK



IFAVA Board of Directors

- J. Badham • South Africa • 5-a-Day for better health TRUST
- R. Baerveldt • USA • Washington Apple Commission
- S. Barnat • France • “La moitié” • Aprifel
- L. DiSogra • USA • United Fresh
- C. Doyle • USA • American Cancer Society
- P. Dudley • New Zealand • 5+ A day
- M. Richer • Canada • 5 to 10 a day
- E. Pivonka • USA • 5 A Day
- C. Rowley • Australia • Go for 2&5® • Horticulture Australia
- V. Toft • Denmark • 6 a day

IFAVA Contact info

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

IFAVA Committees

Global Leadership Committee

- J. Badham • South Africa
- S. Barnat • France
- P. Dudley • New Zealand
- C. Rowley • Australia

Scientific Clearing House Committee

- S. Barnat • France
- K. Hoy • USA
- E. Pivonka • USA

Communications Committee

- J. Badham • South Africa
- P. Dudley • New Zealand
- C. Rowley • Australia

IFAVA



CHAIRMAN:  
C. Rowley, Australia  
E-mail : [chairman@ifava.org](mailto:chairman@ifava.org)

VICE CHAIRMAN:  
P. Dudley, New Zealand  
E-mail: [vicechairman@ifava.org](mailto:vicechairman@ifava.org)

INFORMATION OFFICER:  
J. Lemaire  
E-mail: [jeanne@ifava.org](mailto:jeanne@ifava.org)

# Restricting snacks in US elementary schools is associated with higher frequency of fruit and vegetable consumption

— Edward A. Frongillo —

School of Public Health, University of South Carolina, Columbia

US children have a diet that is poor in quality, rich in sugar and fats, and low in fruits, vegetables, and whole grains. In its report, the Institute of Medicine proposed to decrease availability of snacks in schools, without decreasing availability of fruits and vegetables (F&V)<sup>1</sup>.

The objective of the authors was to examine whether a policy that restricts the availability of snack foods in the schools is associated with greater F&V consumption in a nationally representative sample of 5th grade children<sup>2</sup>.

## Early Childhood Longitudinal Study-Kindergarten cohort

The Early Childhood Longitudinal Study-Kindergarten cohort includes 10,285 5th grade children from 2065 elementary schools<sup>3</sup>.

Children were asked how many times during the last week they ate green salad, carrots, potatoes (except French fries, fried potatoes or chips), other vegetables and fruits (except fruit juices). Responses were coded as rarely (<1 time/day), occasionally (1-3 times/day) or frequently (>3 times/day). Schools administrators were asked about availability of different snacks in their school in vending machine and canteen, cafeteria, and snack bar. This included snacks rich in sugar and fats (e.g., chocolate bars, candies, cookies, crackers, cakes, ice cream, salty snacks) and also low-fat snacks and bread products (e.g., bread sticks, rolls, bagels). School policy was defined as “restricted” when no snack was available and “unrestricted” when at least one snack was available.

## Availability of snacks and fruits and vegetables consumption

- Children did not consume the recommended daily intake of F&V (table 1).
- 40% of the children consumed fruits rarely (less than 1 time/day) and 61% consumed vegetables less than 1 time/day.
- 9% of the children consumed fruits frequently (more than 3 times/day) and 16% consumed vegetables more than 3 times/day.
- Children reported higher frequency of consumption of F&V when their schools had a restricted snack policy.
- When schools had an unrestricted snack policy, the number or types of snacks available did not play a significant role in defining the association between snack availability and F&V consumption.

## Other factors influence fruits and vegetables consumption

The authors observed modest differences in consumption of f&v between children in schools with restricted policy and children in schools with an unrestricted policy. These modest results are not so surprising when we consider all the other environmental factors that can influence F&V consumption<sup>4, 5</sup> such as availability at home, accessibility, household characteristics, parental intake, and education. Nevertheless a restricted school policy for snacks could play an important role in improving children's diet quality because they spend a lot of time at school and it can help them to make healthier choices.

TABLE 1 - PERCENTAGE OF CHILDREN WHO WERE RARE, OCCASIONAL, OR FREQUENT CONSUMERS OF FRUIT AND VEGETABLES THROUGHOUT THE DAY DEPENDING ON WHETHER THE SCHOOL HAS A POLICY OF RESTRICTING SNACK AVAILABILITY

Snack policy	Schools	Fruits			Vegetables		
		Rare (<1 time)	Occasional (1-3 times)	Frequent (>3 times)	Rare (<1 time)	Occasional (1-3 times)	Frequent (>3 times)
	n	%					
Available	1123	62.8	29.0	8.1	39.9	45.0	15.1
Not available	891	59.25	31.4	9.4	37.4	44.0	18.6



## REFERENCES

1. Committee on Nutrition Standards for Foods in Schools. Nutrition standards for foods in school: leading the way toward healthier youth. Washington, DC: Institute of Medicine; 2007.
2. Gonzalez w. et al. J. Nutr. 2009; 139:142-144,
3. US Department of Education. Early Childhood Longitudinal Study-Kindergarten-fifth grade public-use data file ECLS-K. Washington, DC: US Department of Education; 2004.
4. Cullen KW et al. Health Educ Behav. 2003; 30:615-26.
5. Van der Horst K et al. Health Educ Res. 2007; 22:203-26.

# School fruit tuck shops, school food policies and children's fruit consumption: A cluster randomised trial

— Laurence Moore<sup>1</sup>, Katy Tapper<sup>2</sup> —

<sup>1</sup>Cardiff Institute of Society, Health and Ethics, Cardiff University, UK.

<sup>2</sup>Department of Psychology, Swansea University, UK.

## Background

Governments are increasingly focusing on the role that schools can play in improving children's diet. One strategy is to restrict the availability of unhealthy options at meals and in school vending machines and tuck shops. Many schools also have policies regarding the types of foods that students are allowed to bring to school<sup>1,2</sup>. A complementary strategy is to increase the availability of healthy foods by improving the nutritional standards of school meal options, providing free fruit, or offering only fruit and other healthy food choices in vending machines and tuck shops. In primary schools, fruit tuck shops and school policies are popular interventions since they require limited investment and are both relatively low-maintenance and sustainable initiatives for schools<sup>3</sup>.

However, relatively little is known about the effectiveness of these and other school based actions to improve students' diets. Simply making healthier food options more available may have little impact on students' dietary behaviour. Students dietary choices may not change substantially unless choices are restricted, or their preferences are changed. Increasing healthy food availability may therefore be ineffective in the short run unless accompanied by restrictions on the availability of competing choices, while in the long run it is possible that such changes would eventually occur if preferences change due to factors such as peer influence and taste exposure.

## Methods

The study was a cluster randomised trial among 43 primary schools in deprived areas in south Wales and south-west England. Throughout the study, both intervention and control schools were asked to continue with their existing curriculum and school meal arrangements. Intervention schools set up tuck shops that were not subsidised in any way. Schools were asked to offer a choice of fruit in the tuck shop at a fixed price and to not stock sweets, crisps or other such items. Schools were relatively free to choose how they operated the tuck shop and this resulted in a variety of different approaches<sup>3</sup>. Within the 43 participating schools, repeated cross-sections of children aged 9-11 completed a computerised 24-hour recall questionnaire at baseline (n=1902) and at one year follow-up (n=1924). The primary outcome measure was consumption of fruit and other sweet and savoury snacks, assessed using a

single-day computerised 24-hour recall questionnaire completed by children. Previous research indicated that this measure showed acceptable levels of validity, reliability and sensitivity<sup>1</sup>. The questionnaire recorded the number of servings of 1) fruit, 2) sweets, chocolate, biscuits, and 3) crisps consumed during the previous 24-hour period. For each of these three food types, the number of servings consumed at school and throughout the whole day were calculated. Additional outcomes were collected at follow-up and assessed children's preference for fruit and their peer group norms regarding fruit.

## Results:

Approximately 70,000 fruits were sold over the year in the 23 intervention schools. This is the equivalent of 0.06 fruits per student per day, equivalent to 1 in 4 children eating 1 piece of fruit per week, or 1 in 17 eating fruit every day. Although children in intervention schools were more likely to report eating fruit as a snack at school 'often' compared to those in control schools (OR 1.49 (95% CI: 1.15, 1.95)), the dietary recall data did not indicate any significant differences in children's intake of fruit or other snacks. However, there was a significant interaction ( $p < 0.02$ ) between intervention group and school food policy: where students were only allowed to bring fruit to school, fruit consumption was 0.37 portions per day (0.11, 0.64) higher in intervention schools, compared to 0.14 portions (-0.30, 0.58) where no food was allowed and 0.13 portions (-0.33, 0.07) where there were no restrictions.

## Conclusions:

When introduced in isolation, fruit tuck shops had a limited impact on fruit consumption at school. However, when employed in conjunction with appropriate school policies, their impact was more significant, suggesting that when children and their friends are not allowed to bring unhealthy snacks to school, their willingness to use the fruit tuck shops and eat fruit as a snack in school is greatly enhanced. These results highlight the importance of supporting school health interventions with appropriate school policies and are consistent with socio-ecological models of behaviour change which support the value of mutually reinforcing multi-level comprehensive interventions<sup>4,6</sup>.

## REFERENCES

1. Moore L, Tapper K, Dennehy A, Cooper A: Development and testing of a computerised 24-hour recall questionnaire measuring fruit and snack consumption among 9-11 year olds. *Eur J Clin Nutr* 2005, 59:809-816.
2. Neumark-Sztainer D, French SA, Hannan PJ, Story M, Fulkerson JA: School lunch and snacking patterns among high school students: associations with school food environment and policies. *Int J Behav Nutr Phys Act* 2005, 2:14
3. Moe J, Roberts J, Moore L: Planning and running fruit tuck shops in primary schools. *Health Educ* 2001, 101:61-68.
4. McLeroy, K., Bibeau, D., & Steckler, A: An Ecological Perspective on Health Promotion Programs. *Health Educ Behav* 1988, 15: 351-377.
5. Lister-Sharp D, Chapman S, Stewart-Brown S, Sowden A: Health promoting schools and health promotion in schools: two systematic reviews. *Health Technology Assessment* 1999, 3:22.
6. Summerbell CD, Waters E, Edmunds LD, Kelly S, Brown T, Campbell KJ: Interventions for preventing obesity in children. *Cochrane Database of Systematic Reviews* 2005, Issue 3. Art. No.: CD001871. DOI: 10.1002/14651858.CD001871.pub2.

# The potential for school gardens to enhance health

— Shawn Somerset —

School of Public Health, Griffith University, Brisbane, Australia

Nutrition involves many complex relationships between humans and food. The changing food supply has affected our understanding of the origins and roles of food in our lives. Supermarket shopping and television advertising are examples of major influences on public perceptions of food origins. Although much less present in contemporary urban life, gardening also offers opportunities to explore food origins firsthand.

School-based community gardens are an emerging setting for health promotion activity. This premise is based on community gardening affecting three major environmental influences on longevity: diet, physical activity and psychosocial fulfilment. In our first prevalence study, we found that 24% of primary (elementary) schools in an urban area south-west of Brisbane reported having a functioning vegetable garden, with extensive integration of garden activities across a broad range of curriculum areas, indicating that School-based community gardens represent a significant opportunity to embed nutrition, physical activity and environmental sustainability into mainstream curricula.

## School gardens usage varies according to climate

As a sequel to this earlier work, we conducted a cross-sectional study to determine the prevalence and usage of food gardens in primary schools in three distinct climatic regions of north-eastern Australia. Overall, 29% of schools had functioning food gardens. Climate was a major factor affecting the success of food gardens. Gardens were often used by schools to teach science, environment or social skills. Gardening activities were generally linked to curriculum studies on plants, fruit and vegetable (F&V) intake and healthy eating. The main issues were the time required and

the lack of personnel to coordinate garden activities. Of the schools with food gardens, 92% believed their garden had been a success.

This study confirmed strong grass-roots support for school-based food gardens. Respondents nominated teacher involvement and sustained motivation as essential factors for success.

## School gardens improve determinants of vegetable and fruit intake

Early intervention is integral to chronic disease prevention, with major international initiatives focusing on enhancing diet, especially F&V intake, in children. F&V consumption is driven by knowledge of and attitudes towards such foods, and changes to these factors in children can influence consumption later in life.

We installed a food garden in a suburban state primary school in a low socioeconomic area of Brisbane, Australia. In comparing outcomes at 12 months with control data, we found that children showed enhanced ability to identify individual F&V ( $p < 0.05$ ), greater attention to origins of produce (garden-grown and fresh) ( $p < 0.001$ ), changes to perceived consumption of F&V ( $p < 0.001$ ), and enhanced confidence in preparing F&V snacks ( $p < 0.05$ ).

## School gardens : an opportunity ?

School-based food gardens are a prevalent and expanding phenomenon. Increasing evidence indicates associations between use of school gardens and changes in determinants of F&V consumption. The ways in which such changes might impact on dietary behaviours and intake requires further analysis.



## REFERENCES

Somerset S, Bossard A. Variations in prevalence and conduct of school food gardens in tropical and subtropical regions of North-Eastern Australia. Public Health Nutrition 2009; Epub ahead of print  
Somerset S, MARKWELL K. Impact of a school-based food garden on food knowledge and attitudes: a 12-month intervention trial. Public Health Nutrition 2008; 12(2):214-221

Somerset S, Ball R, Flett M, Geissman R. School-based community gardens: Re-establishing health relationships with food. Journal of the Home Economics Institute of Australia 2005;12(2):25-33.