The Scientific Newsletter

N° 8 • January 2007

Editorial

F&V ACCESSIBILITY

Availability and accessibility of fresh fruit and vegetables (F&V) has become the most important issue in understanding why people do not eat enough F&V everyday: no F&V in vending machines, non existent new distribution systems for F&V, lack of availability at schools, lack of preparation knowledge...

The two most considered questions are the affordability for low income populations and the accessibility at schools.

As concluded in a recent WHO report, low-income populations do not eat what they want or what they know they should eat, but what they can afford[1]. Individuals, particularly those in disadvantaged situations, face structural, social, organisational, financial and other constraints in making healthy choices[2, 3].

The evidence suggests that there is a tendency for poorer populations to eat less healthy than those who are better off, as discussed in the article by N. Darmon. In particular, there appears to be a strong and direct association between socioeconomic status and the consumption of fruit and vegetables (see article by Darmon). Key considerations to make a healthy choice – such as purchasing fruit and vegetables – should thus be accessibility, affordability and practicality[4].

This is confirmed by the articles by E. Bere and D. Herman in this issue. In his paper on promotion of fruit and vegetable at schools in Norway, Bere shows that making fruit and vegetables freely accessible to children on a daily basis is far more effective than only providing information to children and parents (see article by Bere). Herman's paper describes a study which provided low-income, nutritionally at-risk women with a weekly economic supplement for purchasing fruit and vegetables at local supermarkets and farmer's markets: in most cases the recommended daily intake of fruit and vegetables was met, significantly increasing their intake of key micronutrients and dietary fibre (see article by Herman).

As concluded by N. Darmon, it is essential now to focus on national nutrition policies at addressing economic and physical access to fruit, vegetable, particularly for those in the lowest income brackets and for children at school.

Laurent Damiens
Director of Aprifel

1. PAHO. Obesity and Poverty. A New Public Health Challenge. Scientific Publication No. 576. Washington DC: Pan American Health Organization; 2000.
2. McKee M et al. The Lancet. 2005;365:369-371.
3. Kumanyika S. Prev Chronic Dis. 2005;2(4):A02.
4. Dowler, E. Public Health Nutr. 2001;4(2B):701-9.

Editorial Board

IFAVA Contact info

HEAD OFFICE
International Fruit And Vegetable Alliance
c/o Canadian Produce Marketing Association
9 Corvus Court
Ottawa, ON K2E 7Z4 Canada

IFAVA

CHAIRMAN:
R. Lemaire, Canada
E-mail : chairman@ifava.org

VICE CHAIRMAN:
P. Dudley, New Zealand
E-mail: vicechairman@ifava.org

INFORMATION OFFICER:
A. Clark
E-mail: aclark@ifava.org

How to increase school children' intake of fruits and vegetables - experiences from two Norwegian studies

— Elling Bere —
University of Oslo, Department of Nutrition, Norway ;
Erasmus University Medical Center Rotterdam, Department of Public Health, The Netherlands

State of the art intervention strategies?

Extensive reviews of previous school-based fruit and vegetable interventions tell us that, in order to be successful, behavioural interventions should consist of multiple components (such as including both school and home environments), include education directed at behavioural change, be of adequate time and duration, include messages specifically targeting fruit and vegetable intake (as opposed to healthy eating in general) and be based on an appropriate theoretical framework. Study 1[1] evaluated a multi-component intervention consisting of a classroom home-economics curriculum, newsletters sent home to parents and parent meetings at schools. The intervention was delivered in seven sessions over a seven-month period and each session lasted for a duration of three school lessons (i.e. 3 x 45 minutes). A total of six newsletters were sent home to parents. The intervention was directed at behavioural change, it included messages specifically targeting fruit and vegetable intake and it was based on the framework of Social Cognitive Theory.

Although the intervention in study 1 was based on what was perceived as state of the art intervention strategies, it did not have any effect in increasing school children's intake of fruits and vegetables.

Free school fruit is effective

Study 2[2] included the same intervention as in study 1, but in addition it also included participation in the Norwegian School Fruit Programme at no cost to the parents for a whole school year.

The standard Norwegian School Fruit Programme is a subscription programme that currently is offered in all Norwegian elementary schools (www.skolefrukt.no). The pupils who subscribe receive a piece of fruit or a carrot each school day, usually in connection with their lunch (school children in Norway bring their own lunch, usually sandwiches, to school). Very few elementary schools have canteens, and fruit and vegetables have traditionally not been available at school. The cost for the parents is usually NOK 2.50 per school day (approximately EUR 0.30). The programme is subsidised by the Norwegian Government by NOK 1.00 per pupil per school day. A problem with the programme is low participation. Only 41% of the schools participate (spring 2006), and at participating schools, only 28% of the pupils subscribed. Totally, only 12% of the Norwegian school population (grades 1-10) subscribed, and therefore, the effect of the paid programme is limited[3]. A second problem is that participating pupils tend to be a healthier group than non-participating pupils; they eat more fruit and vegetables before the programme starts, they eat fewer unhealthy snacks and their parents are less likely to smoke[3]. Therefore, study 2 included subscription to the Norwegian school fruit programme for free for a full school year.

Results of study 2 showed that fruit and vegetable intake increased in pupils at intervention schools compared to pupils at control schools, both at school and all day. The mean difference was 0.6 portion both measured at school and all day. The effect was sustained also one year after the end of the intervention (mean difference was 0.5 portion). This sustained effect can partly be explained by a higher subscription rate in the standard (paid) School Fruit Programme in the intervention group than the control group the year following the intervention year.

Concluding remarks

Why did study 1, based on state of the art intervention strategies, not increase children's fruit and vegetable intake while the free school fruit clearly did? An important point is that most fruit and vegetable interventions reviewed have not been especially successful. Therefore, the "state of the art messages" from the review articles are based on studies that are only slightly better than other studies. Interventions that really have an impact on children's consumption of fruits and vegetables are dearly lacking from the literature. The present results evaluating a free school fruit programme are very promising[2;3]. It seems to be an effective strategy for reaching all pupils, especially those that need it the most: boys, pupils of low SES families, and pupils with low habitual intake and preferences.

REFERENCES

1. Bere E, Veierød MB, Bjelland M, Klepp K-I. Outcome and process eva luation of a Norwegian school randomized fruit and vegetable interven tion: Fruits and Vegetables Make the Marks. Health Education Research. 2006a; 21:258-267.
2. Bere E, Veierød MB, Bjelland M, Klepp K-I. Free school fruit – sustai ned effect one year later. Health Education Research. 2006b; 21:268-275.
3. Bere E, Veierød M, Klepp K-I. The Norwegian School Fruit Programme: evaluating paid vs. no-cost subscriptions. Preventive Medicine. 2005; 41:463-470.

Impact of vouchers for fresh fruits and vegetables purchase

— Dena R. Herman —
Department of Community Health Sciences, UCLA School of Public Health, Los Angeles, USA

Income and Voucher Provision

Greater consumption of fruit and vegetable intake is associated with reduced risk of cancer[1,2], , stroke, and perhaps other cardiovascular diseases[3]. Given this evidence, why is it that consumption of produce is often lower than recommended, particularly among low-income individuals?

The WIC Program and its Contribution to Dietary Quality

In the United States, the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) is a governmentally funded, locally administered public health program that provides supplemental foods of high nutritional quality, nutrition education, and referrals to health care for low-income and nutritionally at-risk women during pregnancy and the postpartum period and to their infants and young children up to the age of five years[4]. When the program was first implemented, undernutrition was the predominant concern. Legislation directed the program to focus on providing foods that were good sources of calcium, iron, vitamin A, vitamin C, and protein primarily through energy-dense sources including milk, cheese, eggs, infant formula, fortified cheeses, fruit juice, peanut butter and dry beans[5]. Over the last several years there has been considerable discussion of the possibility of adding fresh fruits and vegetables to the WIC food packages for women and children, given the evidence of their value in the construction of optimal diets[6].

Increasing Economic Access to Fresh Fruits and Vegetables

In August 2001, 602 postpartum, WIC-participant, women and their families were recruited to participate in two interventions and one control (200 per site) designed to measure the effectiveness of providing vouchers to increase the consumption of fresh fruits and vegetables. Participants were issued $10.00 (U.S.) worth of vouchers per week to buy produce of the participant's choice at either a supermarket or farmer's market. Vouchers were issued bimonthly and could be spent over the ensuing 2-month period at any time. The intervention participants received these coupons for six months for a total of $240.00 (U.S.) per participant (family). At the control site, no fruit and vegetable subsidy was given but participants received a lesser-value set of vouchers to redeem disposable diapers.

Participants' consumption of fruits and vegetables was tracked over the 14-month time period of the study, monitoring intake both before and after the intervention and in comparison to the community control. Participants were asked what they bought with the fruit and vegetable vouchers they received and voucher redemption rates were tracked.

Participant Purchases Reflected Good Nutritional Choices and a Wide Variety of Fresh Produce

In all, $44,000 (U.S.) of vouchers were issued for the supermarket and $44,960 (U.S.) for the farmer's market. Redemption rates were 90.7% for the farmer's market and 87.5% for the supermarket. Five fruits and vegetables accounted for approximately 70% of the items reported for each group. The ten most frequently reported items were oranges, apples, bananas, peaches, grapes, tomatoes, carrots, lettuce, broccoli, and potatoes. However, participants also purchased a wide variety of items including blueberries, pomegranates, artichokes, and mustard greens showing a full range of seasonal variation in purchase patterns. While a larger number of items was reported in the farmers market condition the total number of types of fruits and vegetables did not differ between the two conditions[7].

Conclusion

Low-income consumers make wise, varied, and nutritious choices from available produce when presented with an economic supplement. With the exception of lettuce and grapes, all of the most frequently purchased items were significant sources of potassium, vitamin C, vitamin A, and/or dietary fiber – food components determined to be of high priority in revising WIC food packages by a recent Institute of Medicine study[6]. The potential for dietary improvement for low-income women and their families when provided with a targeted subsidy that allows free choice within the fresh produce category is significant.

REFERENCES

1. World Cancer Research Fund and American institute for Cancer Research. Food, Nutrition, and the Prevention of Cancer. Washington, DC: American Institute for Cancer Research;1997.
2. International Agency for Research on Cancer, World Health Organization. IARC Handbooks of Cancer Prevention: Fruits and Vegetables. Lyon, France: IARC Press;2003.
3. Bazanno LA, He J, Ogden LG, Loria CM, Vupputuri S, Myers L, Whelton PK. Fruit and vegetable intake and risk of cardiovascular disease in US adults: The first National Health and Nutrition Examination Survey Epidemiologic follow-up study. Am J Clin Nutr. 2002;76:93-99.
4. US Department of Agriculture and Economic Research Service. Briefing Room, The WIC Program. Available at: http://www.ers.usda.gov/Briefing/WIC/. Accessed March 16, 2005.
5. Centers for Disease Control and Prevention. 1996. Nutritional status of children participating in the Special Supplemental Nutrition Program for Women, Infants, and Children – United States, 1988-1991. From the Centers for Disease Control and Prevention. JAMA. 275;10:750-752.
6. Institute of Medicine of the National Academies. WIC Food Packages: Time for a Change. Washington, DC: National Academy Press; 2005.
7. Herman DR, Harrison GG, Jenks E. Choices made by low-income women provi ded with an economic supplement for fresh fruit and vegetable purchase. J Am Diet Assoc. 2006;106:740-744.

Cost constraints on food choices

— Nicole Darmon —
UMR Inserm/Inra, Faculté de Médecine de la Timone, Marseille, France

Diet plays an important role in social inequalities in health

Hypertension, obesity, diabetes, cardiovascular diseases and osteoporosis are more prevalent among socio-economically disadvantaged populations than in populations of high socio-economic status and have a stronger impact on their health. In France, for instance, rates of premature mortality from nutrition-related diseases are 3 times higher for manual workers than for white-collar workers[1]. Dietary behaviours have been shown to be involved in social inequalities in health[2]. Most foods recommended for a good health, such as fruits and vegetables, whole grain breads, fish, seafood and lean meats are consumed in low amounts by people of low socio-economic status, whose diets are mainly based on refined cereals and starchy foods. The consumption of fruit and vegetables, in particular, is strongly and directly associated with socio-economic status. As a result, there is a marked social gradient for the intake of essential micronutrients found in abundance in fruits and vegetables, such as fiber, vitamin C, ß-carotene, folates, polyphenols as well as calcium and potassium, while macronutrient intakes are poorly related to socio-economic status[2-6].

Economic constraints orient food choices towards unhealthy options

In households with limited economic resources, cost is often perceived as a barrier to the consumption of fruit and vegetables and to the adoption of healthier diets[7,8]. This is not surprising since, at a given energy intake, fruit and vegetable-rich diets actually do cost more[9-11]. Indeed, the cost of dietary energy is inversely related to dietary energy density[12], while it is positively related to the intake of essential micronutrients[13]. This has been attributed to the high water content and very low energy density of vegetables and fruit, which makes them expensive sources of energy[14]. Moreover, diet modelling studies with linear programming have shown that a cost constraint alone orients food choices almost necessarily towards the selection of energy-dense[15] nutrient-poor[16] diets. This strongly suggests that unhealthy food choices observed among the poor could be due, at least in part, to economic constraints.

A minimal food budget is required to achieve a healthy diet

Based on linear programming analysis, the lowest cost required to achieve a nutritionally adequate diet in France was estimated to be 3.5 €/d. and 3.2 €/d. for adult men and women respectively[17]. This is lower than the current mean national expenditure for food at home in France (approx. 6.0€/d)[18], indicating that, for the vast majority of French adults, fulfilling the recommendations would be possible without marked increases in their food budget. It will be more difficult, however, to achieve a healthy diet when the budget for food is just above the minimum required. In this case, nutrition education programs must actively focus on promoting relatively inexpensive nutrient dense plant-based foods, such as legumes, roots and nuts, fresh fruit and vegetables such as oranges, bananas, apples, carrots, cabbage, tomatoes, zucchini, celery and onions, as well as frozen or canned vegetables, citrus juices and dried fruits[14,17].

The nutritional quality of food aid needs to be improved

Unfortunately, the minimal cost of a healthy diet exceeds the actual budget for food of people living below the poverty level in France[18], in particular those seeking food aid whose food budget is approximately 2.3 €/d.[19]. Since people in these groups can not afford to consume diets that meet current recommendations, food aid of good nutritional quality should be provided to them. However, charitable organizations often face the same economic and structural barriers than those actually faced by the individuals they are helping. Food-aid recipients and charitable organizations both rely on food donation to acquire food and have problems to transport and stock fresh foods. Providing people in the lowest income groups with economic supplements or vouchers to specifically purchase fresh foods of good nutritional quality may overcome such practical difficulties. As described by D. Herman in this issue of IFAVA, this approach was recently shown to be efficient in a population of low-income women[20].

The nutritional quality of diets has been shown to be directly related to their cost. This probably explains the strong prevalence of obesity and nutrition-related diseases in low-income populations. Nutritional policies aimed at increasing the economic and physical access to fruit, vegetable and fish for the poorest fractions of the population are required to make the right to eat healthily a reality for all.

REFERENCES

1. INSERM-SC8. - Une inégalité inacceptable devant le risque de maladie et la mortalité. www. social. gouv. fr/htm/actu/couv_univ/9. htm, 2006,
2. James W.P., Nelson M., Ralph A., Leather S. - Socioeconomic determinants of health. The contribution of nutrition to inequalities in health. BMJ. 1997; 314:1545-1549.
3. Hulshof K.F., Lowik M.R., Kok F.J. et al. - Diet and other life-style factors in high and low socio-economic groups (Dutch Nutrition Surveillance System). Eur. J. Clin. Nutr. 1991;45:441-450.
4. Arts I.C., Hollman P.C., Feskens E.J., Bueno de Mesquita H.B., Kromhout D. - Catechin intake and associated dietary and lifestyle factors in a representative sample of Dutch men and women. Eur. J Clin Nutr. 2001;55:76-81.
5. Leather S., Dowler E. - Intake of micronutrients in Britain's poorest fifth has declined. BMJ. 1997;314:1412-1413.
6. Bates C.J., Prentice A., Cole T.J. et al. - Micronutrients: highlights and research challenges from the 1994-5 National Diet and Nutrition Survey of people aged 65 years and over. Br. J. Nutr. 1999;82:7-15.
7. Dibsdall L.A., Lambert N., Bobbin R.F., Frewer L.J. - Low-income consumers' attitudes and behaviour towards access, availability and motivation to eat fruit and vegetables. Publ. Health Nutr. 2003;6:159-168.
8. Giskes K., Turrell G., Patterson C., Newman B. - Socio-economic differences in fruit and vegetable consumption among Australian adolescents and adults. Publ. Health Nutr. 2002;5:663-669.
9. Cade J., Upmeier H., Calvert C., Greenwood D. - Costs of a healthy diet: analysis from the UK Women's Cohort Study. Publ. Health Nutr. 1999;2:505-512.
10. Drewnowski A., Darmon N., Briend A. - Replacing fats and sweets with vegeta bles and fruit – a question of cost. Am J Pub Health. 2004;94:1555-1559.
11. Schroder H., Marrugat J., Covas M.I. - High monetary costs of dietary patterns associated with lower body mass index: a population-based study. Int J. Obes. (Lond), 2006.
12. Darmon N., Briend A., Drewnowski A. - Energy-dense diets are associated with lower diet costs: A community study of French adults. Publ. Health Nutr. 2004;7:21-27.
13. Andrieu E., Darmon N., Drewnowski A. - Low-cost diets: more energy, fewer nutrients. Eur. J. Clin. Nutr. 2006;60:434-436.
14. Darmon N., Darmon M., Maillot M., Drewnowski A. - A nutrient density standard for vegetables and fruits: nutrients per calorie and nutrients per unit cost. J. Am. Diet. Assoc. 2005;105:1881-1887.
15. Darmon N., Ferguson E., Briend A. - Do economic constraints encourage the selection of energy dense diets? Appetite. 2003;41:315-322.
16. Darmon N., Ferguson E.L., Briend A. - A cost constraint alone has adverse effects on food selection and nutrient density: an analysis of human diets by linear programming. J. Nutr. 2002;132:3764-3771.
17. Darmon N., Ferguson E.L., Briend A. - Impact of a cost constraint on nutritio nally adequate food choices for French women: an analysis by linear program ming. J. Nutr Educ. Behav. 2006;38:82-90.
18. Caillavet F., Darmon N. - Contraintes budgétaires et choix alimentaires. Pauvreté des ménages, pauvreté de l'alimentation ? Inra Sciences Sociales. 2005;20(vol 3-4) Décembre, 1-4. http://www.inra.fr/Internet/Departements/ESR/publications/iss/index.php.
19. Bellin-Lestienne C., Deschamps V., Noukpoapé A., Darmon N., Hercberg S., Castetbon K. - Consommations alimentaires et place de l'aide alimentaire chez les personnes incluses dans l'étude Abena, 2004-2005. Bull Epidemiol Hebd. 2006;11-12:79-81.
20. Herman D.R., Harrison G.G., Jenks E. - Choices made by low-income women provided with an economic supplement for fresh fruit and vegetable purchase. J. Am. Diet Assoc. 2006;106:740-744.