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F&V availability at home

Whether the quality and amount of food intake are a private matter or a Public health issue may be debated. It is part of anyone's freedom to eat what and when he wishes to do so... in theory. There are several reasons why this issue has limits:

- ▶ The natural history of nutrition teaches us that all populations around the world have managed to reach nutritional balance using local resources: starches, sources of nutrients, proteins and fat, fruits and vegetables (F&V) may vary. At the end of the day a balance which has given the better chance of survival has been found. In extreme cases such as in Inuit groups, genetic or epigenetic changes were the price for adaptation.
- ▶ Public health studies such as those reported by Ong in this issue clearly show that health status is improved by an *ad hoc* consumption of fruit and vegetable.
- ▶ Eating a less than desirable daily amount of F&V is not a voluntary choice but an economical constraint supported by the poorest in Western countries. In pregnant women, there is a double or even triple burden: less *ad hoc* nutrients available during and after pregnancy, for example during lactation and less opportunity offered to the baby and toddler to integrate these tastes into his eating pattern. This last point is a personal paediatric addition to the excellent work presented by Nunnery.
- ▶ In countries where children get an opportunity to choose what they want to eat, education plays a key role. Uneducated children will prefer starchy and fatty foods and be left with narrow spontaneous food choices, typical of the high cardiovascular, obesity and cancer risk diet profiles. Padilla reminds us clearly of this evidence.

Fruit and vegetable consumption have to be supported: adults and especially parents have to know about their benefits and the mandatory role of education in the eating pattern of young children. In low income population, Public health action should allow F&V sustainability, especially during pregnancy and childhood.

The decision of eating or not F&V cannot be considered as a voluntary issue in the absence of information, education and availability.

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Home environment and F&V consumption in children aged 6–12 years

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It is known that a diet rich in fruit and vegetables (F&V) is essential for good health and preventing chronic disease. Still, a high proportion of Western countries' children are still not meeting recommendations for F&V intake. Children's homes are the immediate environment in which the child lives, grows and plays. Moreover, at this age, children enter primary school, become more independent, and are increasingly influenced by media and the school environment.

The major aim of this systematic review of 33 articles was to expand the understanding on the influence of the home environment that have been related to children's F&V consumption among children aged between 6 to 12 years old.

Evidence for children's F&V consumption:

1. Home physical environment : availability and accessibility of F&V

The components of home physical environment are mostly represented by availability and accessibility of F&V and unhealthy food. Five studies have shown a positive association between accessibility and availability of F&V at home and children's combined F&V consumption. Although, in some studies, home availability of F&V was more strongly and positively associated with fruit consumption¹⁻⁵.

2. Home sociocultural environment: parental role modelling of F&V and maternal intake of F&V

The most investigated home sociocultural environment components are parental modelling, parental intake and parental facilitation and support by cutting up and bringing F&V to school. Parental modelling refers to the parents being a role model through their intake and also includes their feeding attitude, eating styles and mealtime behaviors. This component was

positively associated with children's F&V consumption and with higher intakes of F&V^{6,7}.

Regarding parental intake, a study showed a positive association with children's F&V consumption, especially in mothers⁸. Other studies reported an association between maternal intake and fruit but not vegetable consumption^{9,10}.

However, fruit consumption was associated positively and strongly when cutting up fruit and bringing them to school, regardless of gender. Comparably, there was a strong and positive association between cutting up and bringing vegetables to school and girls' vegetable consumption. Also, there was a correlation between cutting up and bringing vegetables to school and boys' and girls' vegetable consumption¹¹.

3. Home political environment: demand and allowance rules

Studies have shown that having demand rules was positively related to children's fruit consumption, but had stronger and more consistent associations with their vegetable consumption. Compared with other components investigated, this association was the strongest and most consistent. However, there was no association between F&V consumption and allowance rules, but positive associations were found with vegetable consumption in girls and in combined boys and girls¹¹.

Strategies to increase F&V consumption by targeting home environment

The systematic review concluded that we can promote F&V consumption by targeting the home environment. Examples of strategies include parental encouragement to eat more F&V, cutting F&V up, bringing them to school and enforcing demand rules at home. Interventions should also aim to improve parents' consumption and not just children's consumption.



Based on:

Ong JX, Ullah S, Magarey A, Miller J, Leslie E. Relationship between the home environment and fruit and vegetable consumption in children aged 6–12 years. *Public Health Nutr* 2017. 20(3): 464-480.

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F&V intake is linked to food security status and home environment among pregnant women

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Food insecurity is the condition of inconsistent or uncertain availability of safe and nutritionally adequate food^{1, 2}. Food insecurity is associated with poor diet quality, weight gain, diabetes and hypertension among adults. Current research suggests that the availability of fruit and vegetables (F&V) in the home is positively associated with daily intake of F&V; this environment where a variety of F&V are available would be considered a positive home food environment^{3, 4}. Studies have shown that food insecurity significantly affects the availability of a variety of foods; more specifically, food insecurity is associated with lower availability of F&V and higher availability of energy-dense processed foods^{4, 5}. The interrelationship between food security status, dietary behaviors, and the home food environment has not yet been investigated.

This study was conducted to assess the food security status, availability of F&V, and dietary behaviors of a group of low-income pregnant women who are at an increased risk of weight gain during pregnancy due to poor dietary habits. The first objective of this study was to determine the differences in availability of F&V at home by food security status. The second objective was to examine the relationships between food security status, availability of F&V at home, and intake of F&V among low-income pregnant women.

198 low-income pregnant women participated

Pregnant women in their second trimester attending the Special Supplemental Nutrition Program for Women, Infants and Children (WIC) clinic were invited to participate in this study (n = 198). During wait times of their maternity appointment at the WIC clinic, women participated in a structured interview where information was collected on F&V: their availability in the home, the variety available, the frequency of consumption and food security status.

Food Security and daily F&V intake

Of the participants, 38% reported full food security, 19% reported marginal food security, 24% of participants reported low food security, and 19% of participants reported very low food security. The mean daily intake for fruit was 1.76 servings (SD 1.23) per day, and the mean daily intake for vegetables was 1.88 servings (SD 1.22) per day.

Variety of available F&V at home by food security level

Among the study participants, the average number of different types of F&V available in the home was 8 types of fruit and 12 types of vegetables. Results revealed that the participants with very low food

security had significantly lower variety of fruit available in the home compared to fully food secure participants; this finding was mirrored in the variety of vegetables available in the home for very low versus fully food secure, but the finding was marginally significant.

Associations between food security status, variety of F&V available, and F&V intake

Food security status did not predict daily fruit or vegetable intake. However, food security significantly predicted the variety of available F&V. When food insecurity increased, the variety of available fruit decreased. Additionally, a one-unit increase in the variety of available fruit was associated with a 0.086 increase in daily fruit intake and the total variety of available vegetables was positively associated with daily vegetable intake.

Mediation analyses indicated that through the availability of variety of fresh F&V at home, there was an association between food security status and the daily intake of F&V. As food security worsened, a decline in the available variety of fresh F&V was observed, which was associated with lower intake.

Study implications and conclusions

Several points should be highlighted:

1. There is a risk of over- or underrepresenting certain population groups because a convenience sampling technique was used to recruit participants. Although, the demographic characteristics of our sample were closely representative of county and state demographics of low-income women.

2. The frequency of daily intake of F&V was measured and is not reflective of quantity of intake.

3. The specificity of the results is limited due to measuring only the availability of variety of F&V, without measuring specific amounts and at what frequency they are available.

4. Generalizability of the results among low-income pregnant women may be reduced due to restricting recruitment to WIC pregnant women.

Food security, home food environment, and diet quality are interlinked. The home environment and food security play important roles in influencing availability and intake of fresh F&V at home. The results from this study indicate the need for nutrition education interventions for low-income families to promote the availability of healthy options at home and improve nutritional outcomes.



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Children's fruit and vegetable practices and preferences related to parent/child relationships

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The family environment has a strong influence on children's fruit and vegetable (F&V) consumption, but children can also influence the family. Marketing specialists consider children to be influencers; their requests impact parents' purchases, thus contributing to increasing F&V availability in the home. This increases children's exposure level, which changes their preferences. However, purchasing and storing F&V does not necessarily make them accessible to children.

An American study¹ clarifies the link between demand, availability at home, and children's F&V consumption based on an intervention completed in 2009-2011 in the US state of Texas.

This intervention aimed to stimulate consumption among 9- to 11-year-old children using a game that was tracked for three months (Squire's Quest II). Parental awareness was increased through newsletters, recipes and advice on a website.

The study was based on a randomised convenience sample of four groups of 100 parent/child pairs. Measurements were taken before the intervention, at the end of the intervention and three months after. They focused on three criteria: (1) frequency child requested F&V over two weeks (1 D = 2 pts); (2) F&V availability at the home measured by the number of F&V over two weeks (1 F&V = 2 pts); (3) child's food intake measured by number of F&V portions consumed in 24 hours (1 P = 1 pt). The child's requests and the availability were tracked with a questionnaire. The child's food intake was measured by summarising what was eaten in 24 hours.

Changes in intervention's efficacy criteria

	T0 (before action)	T1 (end of action)	T2 (3 months after)
Children's requests	9.9	11.8	11
Availability in home	40.1	47	44.9
Consumption	2.1	2.6	2.4

This study shows four main results:

1. There is no predictive power between F&V availability and children's food intake. A previous study showed that a one unit increase in availability led to a 0.14 increase in consumption. This suggests that availability must be significantly increased to have an effect on actual consumption. The intervention focused on children who already consumed some F&V.

2. The intervention increased the requests from children and F&V availability in the home, but did not contribute to a significant increase in food intake.

3. While the intervention appears to be effective at first glance (criteria increase between T0 and T1), the results are not stable. To guarantee the effect, the intervention's duration must be sufficient: from nine weeks to four years.

4. Parental involvement was low: only 28% read the newsletter and 55% visited the website one to five times during the intervention. Yet it has been demonstrated that direct parental involvement is critical.

F&V availability in the home is necessary but insufficient for stimulating children's F&V consumption. Parental behaviour towards children is absolutely essential as Vollmer and Baietto have shown². According to them, a child's food preferences influence the quality of his or her diet. Yet these preferences are largely influenced by parental attitudes and practices. Therefore, studying causal links between a parent's dietary practices and a child's dietary preferences can help guide interventions.

These assertions are based on a study of 148 parents of children aged 3-7 in Illinois using a CFPQ (Comprehensive Feeding Practices Questionnaire) and PALS (Preschool Adapted Food Liking Scale) on fruits, vegetables and foods high in fat and/or sugars. They reveal what the dietary education basics should be to impact children's behaviours.

So, when parents allow children to choose their food, they tend not to prefer fruit. When parents encourage children to participate in making the meal, their preference for vegetables is reinforced.

Children prefer high fat and/or sugar foods in cases where parents use food to regulate children's emotions, use food as a reward, force children to eat more and clean their plate, or severely restrict food considered harmful to health. Restricting foods can be beneficial for children's diet quality before the age of four, but the situation is the opposite thereafter. In contrast, children pay less attention to fatty and/or sugary foods if parents make healthy food available and accessible in the home, if they prepare healthy food in front of children, and if they explain to children why it is important to eat healthily.

Finally, no significant relationship was found between children's preference for high-fat, high-sugar foods and the parents' desire to control children's weight by encouraging food balance and variety, tracking and restricting.

While it is not possible to determine whether the parent influences the child or vice versa, this study provides evidence that coercive dietary practices are detrimental to a child's dietary preferences.

In addition, significant fruit and vegetable availability in the home and compassionate, consistent food education improves the child's interest and consumption. This should guide any interventions with parents intended to improve their children's food preferences.

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