



EDITORIAL

Early life factors among the many influences of child fruit and vegetable consumption ☆,☆☆



Fatores nos primeiros anos de vida que influenciam o consumo de frutas e verduras entre crianças

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Measured in disability-adjusted life years, one-tenth of the worldwide burden of disease can be attributed to dietary risk factors and physical inactivity, outweighing the contribution of tobacco use, hypertension, or any other predisposing risk factor.¹ In particular, low dietary intakes of fruits and vegetables are associated with greater occurrence of cardiovascular disease² and certain forms of cancer,³ together accounting for 6.7 million annual deaths globally.¹ Much of what drives the high volume of global morbidity and mortality attributed to inadequate intake of fruits and vegetables is the pervasiveness with which recommended standards for consumption are failing to be met.

In wealthy and poor countries alike, most adults do not consume the World Health Organization recommended five daily servings of fruits and vegetables. Across 52 low- and middle-income countries, nearly 80% of adults fall short of five fruits or vegetables each day,⁴ and adults similarly miss the mark in Canada⁵ and the United States.⁶ Most adults

also do not reach recommended levels for fruit and vegetable intake in Brazil, with the least socioeconomically advantaged the most likely to founder.⁷ Among Brazilian children and adolescents, recent studies have reported dismal dietary figures for fruits and vegetables: only 2.7% of 6-10 year olds reached five combined servings per day in southern Brazil;⁸ frequency of consuming vegetables trailed well behind that of soft drinks, sweets, cakes, and cookies for adolescents nationally.⁹ This is a complex problem, with deep roots in global economic forces that dictate the cost, accessibility, and marketing of healthy and unhealthy foods, as much as it is a question of consumer behavior and personal decision-making.¹⁰

Feeding habits in infancy and childhood

In the current issue of the *Jornal de Pediatria*, Valmórbida & Vitolo,¹¹ investigators at the Universidade Federal de Ciências da Saúde de Porto Alegre (UFCSA), deliver yet another dose of somber news. Of the 388 low-income preschool children they studied in southern Brazil (age 2-3 years), for both fruits and vegetables, the majority did not obtain even one daily serving, let alone achieve the three servings recommended for this age group: a benchmark reached by just 9% of their study population for fruits and by only one child for vegetables. Striking is how early in life children's dietary

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habits appear to form. The UFCSPA investigators followed a birth cohort of children whose mothers had enrolled in a separate study that had offered nutrition-related training for health professionals employed at municipal health centers in Porto Alegre. In the present publication, Valmórbida & Vitolo report that the child feeding habits they observed in their cohort at age 12-16 months cast a shadow on child fruit and vegetable consumption at age 2-3 years. The more frequently fruits were consumed at 12-16 months, the less likely a child dropped below one daily serving of fruit as a preschooler;¹¹ providing high-sugar content beverages initially was associated with a lower chance of consuming a full serving of vegetables in the future.¹¹

These results have implications for how we design strategies for ameliorating poor dietary habits in children. In a recent systematic review and meta-analysis, school-based interventions, on average, have produced modest improvements in child fruit consumption and little change in vegetable intake.¹² The barriers to the success of any school-based program are numerous,¹³ including but not limited to the need to develop interventions that can be affordably sustained beyond a one-time undertaking.¹² The Porto Alegre findings suggest that, for many children, school-based programs might arrive too late to address in full any dietary deficiencies that trace their origins to the first year of life.

Socioeconomic forces

At least part of the well-documented yet arresting socioeconomic inequities in diet quality could be explained by the generally higher costs associated with nutrient dense foods.¹⁴ This has key implications for public health efforts to improve nutrition in low-resource communities, as interventions that stress education and individual decision-making might not be effective if families view healthier diets as inaccessible or cost-prohibitive.¹⁴ It has been argued that without corresponding efforts to improve community environments, such as by increasing the availability of affordable, fresh produce in disadvantaged neighborhoods, individual-level changes in knowledge and attitudes will do little to address long-standing health inequalities.¹⁵

Counterintuitively, Valmórbida & Vitolo report that among the predominantly low-income families featured in their study, reaching at least a modest level of child fruit consumption was inversely related to household financial resources.¹¹ Children in households earning more than four times the monthly minimum salary had a lower chance of achieving a full serving of fruits than children in households earning less.¹¹ There exists some controversy as to whether low-income households seek to maximize spending power by purchasing foods that offer the greatest amount of energy per unit cost, given that presumably healthier, low-energy dense diets might actually cost less in absolute terms.¹⁶ In low-income households, better child health outcomes might not require greater expenditures on child feeding. For example, in one Brazilian study, families of children who remained free of dental caries through age 4 years did not have greater expenditures on feeding for their children;¹⁷ in fact, presumably tooth-unfriendly diets featuring more sweets, such as soda and chocolate, were associated with greater household expenditures on food for children.¹⁷ Valmórbida

& Vitolo speculate that among socioeconomically disadvantaged communities, rises in family income might lead to replacement of staple and traditional foods with more highly processed and energy-dense options. This hypothesis has major health ramifications for nations, such as Brazil, seeking to tie rapid economic growth to higher earning potential for the poor.

The current UFCSPA publication has significant strengths. Dietary data were collected prospectively from an early age, providing a relatively rare opportunity to examine patterns in child feeding habits in a community-based population over time. Daily servings of fruits and vegetables were calculated using 24-hour dietary recalls and excluded the consumption of potatoes and fruit juice, foods relatively high in energy but not necessarily dense in nutrients. This study is not without limitations. Eight-seven participants, nearly 20% of the potential sample, were excluded due to the absence of at least one 24-hour recall, which reduced statistical power and could have added selection bias if the factors that contributed to missing data did not occur randomly. The principal outcomes of the study – daily servings of fruits and vegetables – allowed for any consumed fruit or vegetable in any form (potatoes and artificial juice aside) to count toward an accumulated serving. This is a perfectly reasonable way to conduct a dietary analysis, especially provided that most expert guidelines implore consumers to raise their intake of fruits and vegetables in terms of serving numbers. However, this raises a related question about how recommendations are communicated to the public. We might ask whether certain foods, such as canned fruits and smoothies, which often deliver large amounts of refined sugar, should have equal standing with lower sugar, more nutrient dense options, when striving to reach serving-number benchmarks.¹⁸

Looking ahead

These new findings from Southern Brazil offer critical insight into early-life determinants of fruit and vegetable consumption in children. It is clear that early experiences matter when shaping a lifetime of healthy eating, and the study's results offer hope that family-focused interventions targeting children and their caregivers from infancy will take a vital place in the public health armamentarium for reducing the global burden of nutritionally-related diseases. As with many public health efforts, however, enhancing knowledge and awareness among the target population is merely one step in the complex process of achieving sustainable behavioral change. For example, the parenting style with which caregivers attempt to facilitate fruit and vegetable consumption in their children is a critical factor in determining whether children's feeding behaviors will respond as intended.¹⁹

Beyond family-level determinants, long-term improvements in fruit and vegetable intake level will require widespread changes to policy and food environments.¹⁵ Aggressive marketing of energy-dense, non-healthy foods is a major barrier to increasing fruit and vegetable consumption and will require coordinated efforts between governments and other stakeholders to increase accountability and to limit or otherwise counter such marketing.¹³ Healthy-eating policy is already taking hold in Brazil, where

standards are in place to assure that unprocessed and locally sourced foods will be served in schools, but major challenges in controlling junk food advertising remain.²⁰ For most of the world, standards for fruit and vegetable consumption are far from being met. The recent work of Valmórbida & Vitolo suggests that a key element toward achieving our dietary goals will be to get an early start.

Conflicts of interest

The author declares no conflicts of interest.

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