

Diet and body weight among pre-school children: there's room for improvement

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It is well known that a healthy diet during the early years of life is associated with good physical, cognitive, motor, and behavioural development in children, as well as with better health status in adulthood.¹ A healthy diet is especially conducive to children's ability to learn, which emerges before they start school.²

Despite the importance of diet in early childhood, until recently there was no source of information in Canada about the extent to which preschooler diets complied with dietary recommendations. *The Nutrition Survey of Four-Year-Old Québec Children*, carried out by the Institut de la statistique du Québec (ISQ) in the spring of 2002, sought to bridge this gap. And indeed, coming into existence as it did two years before the nutrition round of the *Canadian Community Health Survey*, the *Nutrition Survey of Four-Year-Old Québec Children* made it possible, for the first time in Québec, to pull together reliable data about various aspects of the diet of Québec children before they started school (see box on reverse).

The report issuing from this survey, which was made public in the fall of 2005, presents profiles of the children surveyed and their families, including the prevalence of overweight and obesity among children, energy and nutrient intakes, and food consumption in relation to the suggestions in *Canada's Food Guide to Healthy Eating* (CFG). Also discussed are certain eating behaviours and the mealtime context.³ In the hopes of making these data more accessible and thereby assisting those interested in promoting healthy lifestyles and preventing weight-related problems in young children, this article will present the main findings of that report.

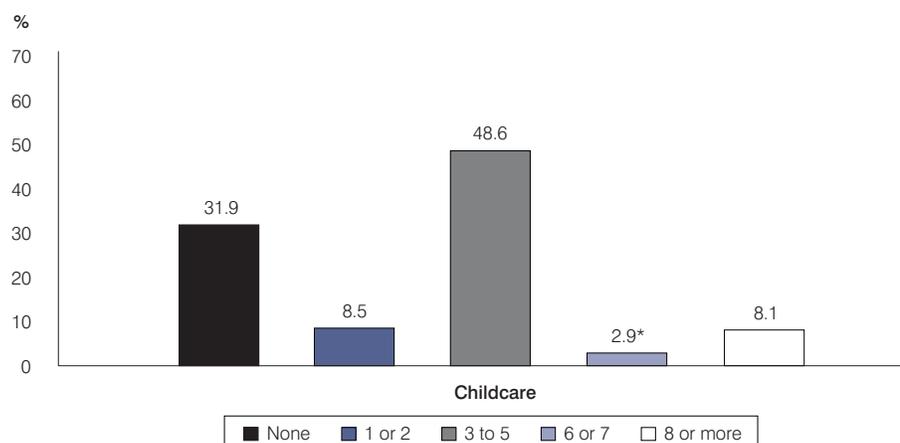
Children's home environments

Families have an important role to play in developing and maintaining healthy eating habits among children. It therefore might be a good idea to give a quick profile of the home environment in which 4-year-old Québec children were living when the nutrition survey was performed. First it should be

noted that around 80% of the children targeted by the survey were, in 2002, living with both biological parents, and a similar proportion belonged to families in which there was at least one sibling, most often an older sibling. As far as their socioeconomic circumstances were concerned, nearly one child out of five (19%) was living in a family whose gross annual income during the year preceding the survey was under \$30,000, in other words, an income level that could be considered low. In addition, about one child out of 10 (11%) was affected by food insecurity (i.e., a lack of food, a monotonous diet, or an inability to have balanced meals because of parental financial problems). Moreover, because their parents were working or going to school, quite a few children took meals where they received childcare. For instance, 68% of the children had taken at least one main meal (more often than not between three and five meals) at a childcare provider outside the home during a seven-day reference period (Figure 1).

1. M. E. SHILS, J. A. OLSON, M. SHIKE and A. C. ROSS (1999). *Modern Nutrition in Health and Disease*, 9th ed., Philadelphia, Lippincott, Williams and Wilkins, 1,951 pp.
2. See, for instance, J. M. MURPHY, M. E. PAGANO, J. NACHMANI, P. SPERLING, S. KANE and R. E. KLEINMAN (1998). "The relationship of school breakfast to psychosocial and academic functioning," *Archives of Pediatrics and Adolescent Medicine*, 152(9): 899-907; N. S. SCRIMSHAW (1995). "The new paradigm of public health nutrition," *American Journal of Public Health*, 85(5): 622-624.
3. H. DESROSIERS et al. (ed.) (2005). *Enquête de nutrition auprès des enfants québécois de 4 ans*, Québec, Institut de la statistique du Québec, 163 pp.

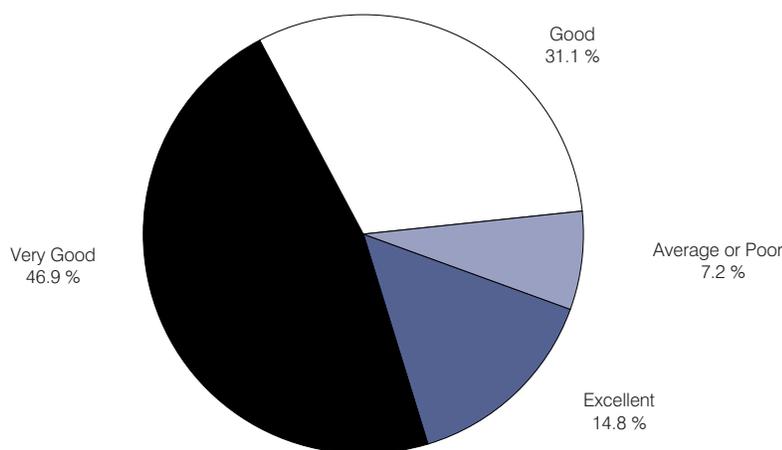
Figure 1
Distribution of 4-year-old children by frequency of meals consumed in childcare settings outside the home over a 7-day period, Québec, 2002



* Coefficient of variation between 15% and 25%; interpret with caution.

Sources : Institut de la statistique du Québec, *Nutrition Survey of Four-Year-Old Québec Children, 2002*, and *QLSCD 1998-2010*.

Figure 2
Perception of the quality of child's dietary habits,¹ Québec, 2002



1. By the person most knowledgeable about the child.

Source : Institut de la statistique du Québec, *Nutrition Survey of Four-Year-Old Québec Children, 2002*.

Eating habits and behaviours

Eating habits and preferences develop early in life and necessarily have an impact on the quality of the diet as a whole. Although a large majority of the children (93%) had eating habits that their parents considered to range from good to excellent (Figure 2), it is no less true that around 16% of the 4-year-old children were considered by their parents to be picky eaters, 11% reportedly ate at irregular times, and about 23% were seen as eating too much or too fast. Moreover, although having breakfast in the morning contributes significantly to daily dietary and nutritional intake,⁴ around 8% of 4-year-old children did not have breakfast every morning; this proportion was higher among children from families that had known situations of food insecurity (15%) and, in general, among those from home environments that were socioeconomically less well-off.

In Québec, as elsewhere in the world, the consumption of food prepared by the restaurant industry is a fact of life that affects young children. Yet in general, restaurant meals, compared with those prepared at home, tend to be lower in fibre and higher in saturated fats, sugar, and salt, and they usually come in larger-sized portions.

Among the children in the target population, 72% had consumed at least one meal purchased from a restaurant establishment during the past seven days, either by going out to eat at a restaurant or by eating a home-delivered meal. For 18% of the children, this situation occurred frequently.⁵ It should be noted that children from low-income families were less likely than others to have consumed a restaurant meal or a home-delivered meal in the week preceding the survey (68% compared with 73%).

4. T. A. NICKLAS, C. E. O'NEIL, and G. S. BERENSON (1998). "Nutrient contribution of breakfast, secular trends, and the role of ready-to-eat cereals: A review of data from the Bogalusa Heart Study," *American Journal of Clinical Nutrition*, 67(4): 757S-763S.

5. This percentage includes children who had eaten at least one meal in a restaurant and a meal delivered to the home, or three or more meals coming from a restaurant establishment, wherever consumed.

Social context of meals

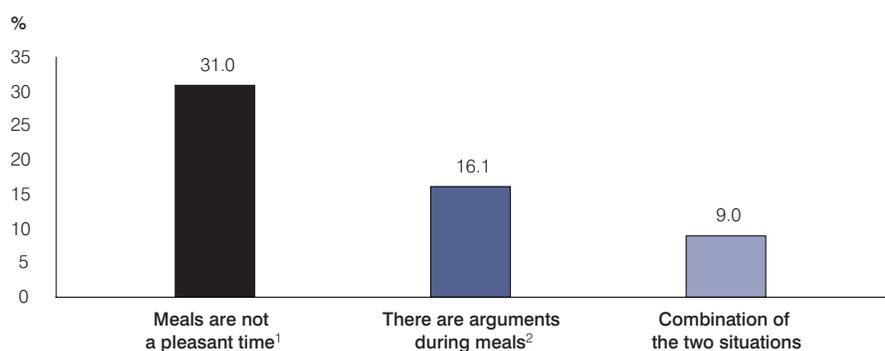
Nowadays the daily schedules of parents and their children can make it more difficult to find the time to eat together as a family. Yet the ambience during meals is important because eating has a social dimension that can

play a determining role in the development of children's eating habits and preferences.⁶

The survey data show that, for a number of children, the ambience at mealtime did not always seem very favourable, which is to say that it would

not be considered pleasant (31%), because meals had to be eaten fast or, according to the parents, they did not afford the chance to talk or carry on a conversation, among other factors. In addition, in 16% of families, mealtimes often gave rise to arguments, whether between children or between parents and children (Figure 3). It was also found that, by 4 years of age 42% of the children were already watching television frequently or very frequently during their meals, boys being more likely to watch TV frequently while eating than girls (30% compared with 25%; Figure 4). This habit seems worrisome since watching television during meals has been associated, among children of various ages, with less healthy eating patterns.⁷ And that is without taking into account the fact that television watching can hinder the give-and-take and the socialization process that typically surround the act of taking meals together.

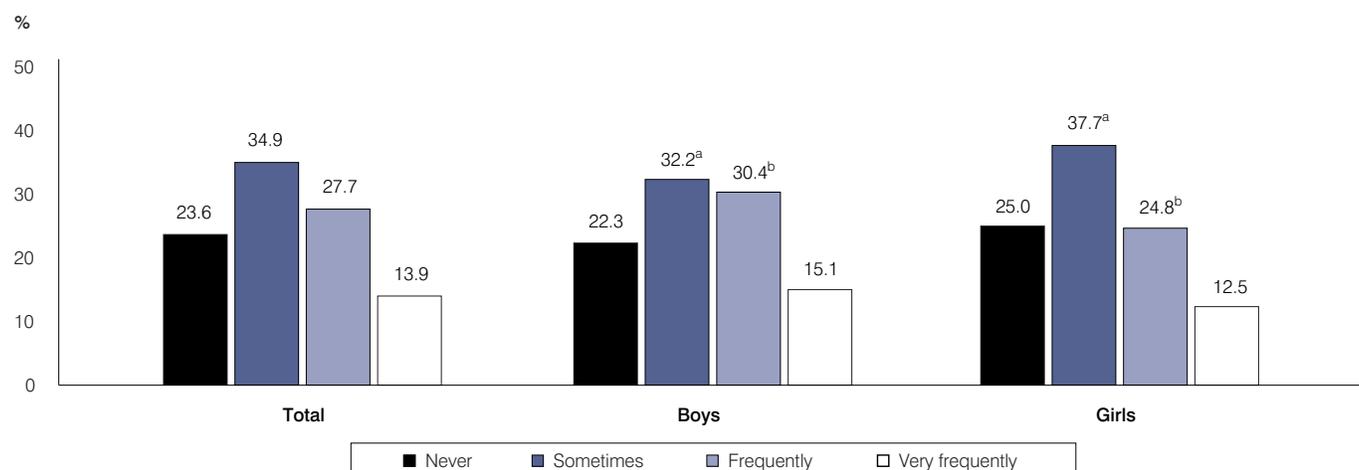
Figure 3
Proportion of 4-year-old children affected by various mealtime situations, Québec, 2002



1. Refers to children living in a family where mealtimes were never, except occasionally, a pleasant time; did not allow, except occasionally, talking or conversing; or had quite often, if not almost always or always, to be finished in a hurry.
2. Refers to children living in a family where there was quite often, if not almost always or always, arguments at the table, whether between children, between parents, or between parents and children.

Sources : Institut de la statistique du Québec, *Nutrition Survey of Four-Year-Old Québec Children, 2002*, and *QLSCD 1998-2010*.

Figure 4
Frequency of television viewing at mealtimes by 4-year-old children, by sex, Québec, 2002



a-b Values with the same superscript letter are significantly different at the 0.05 level.

Source : Institut de la statistique du Québec, *Nutrition Survey of Four-Year-Old Québec Children, 2002*.

6. H. PATRICK and T. A. NICKLAS (2005). "A Review of Family and Social Determinants of Children's Eating Patterns and Diet Quality," *Journal of the American College of Nutrition*, 24(2): 83-92.

7. For Québec, see especially M. MARQUIS, Y. P. FILION and F. DAGENAIS (2005). "Does eating while watching television influence children's food-related behaviours?" *Canadian Journal of Dietetic Practice and Research*, 66(1): 12-18.

What's for dinner?

The CFG emphasizes the importance of eating a variety of foods from all the food groups in order to get all the nutrients necessary for the body to function well. The CFG also suggests a lower and higher number of servings to be consumed each day in each of the four main food groups: between 5 and 12 servings of Grain Products, between 5 and 10 servings of Vegetables and Fruits, and between 2 and 3 servings of Meat and Alternatives. For Milk Products, 2 to 3 servings daily are suggested for children aged 4 to 9 years.⁸ With the exception of this last food group, the lower end of the suggested range may be appropriate for preschool children, while remembering that a child's serving can be between a half and a full serving suggested in the CFG.⁹ For example, for Grain Products and Vegetables and Fruits, the minimum number of servings suggested for preschool children in the CFG current at the time of the survey could range between 2.5 and 5.0 servings.

A look at food consumption levels suggests that there is room for improvement in some food choices. For example, it turns out that 52% of children consumed less than 2 servings of Milk Products on a daily basis (Table 1). About 6 children out of 10 regularly consumed less than 2 servings a day of Meat and Alternatives.¹⁰ For Vegetables and Fruits, it is estimated that one child out of five (21%) did not consume 2.5 servings a day, a minimum quantity when one considers the smaller size of servings that might be eaten by children at this age, whereas 80% of the 4-year-old children had less than 5 servings. The data also indicated that fruits were on the whole more popular than vegetables: the median number of daily servings for fruits was 2.2 com-

Table 1

Distribution of 4-year-old children by number of daily servings consumed¹ from each food group in Canada's Food Guide and by sex, Québec, 2002

	Boys	Girls	Total
	%		
Grain Products			
Less than 2.5 servings ^a	1.5**	4.1 *	2.8 *
From 2.5 to less than 3 servings ^a	3.6 *	11.0	7.2
From 3 to less than 4 servings ^a	29.8	51.4	40.4
From 4 to less than 5 servings ^a	38.7	26.6	32.8
5 servings or more ^a	26.5	6.9	16.9
Vegetables and Fruits			
Less than 2.5 servings ^a	18.9	22.6	20.7
From 2.5 to less than 3 servings	9.2	10.0	9.6
From 3 to less than 4 servings	27.7	28.5	28.1
From 4 to less than 5 servings	22.8	20.6	21.8
5 servings or more	21.3	18.2	19.8
Milk Products			
Less than 1 serving	6.8	8.8	7.7
From 1 to less than 2 servings	44.5	44.4	44.4
From 2 to 3 servings	42.5	37.8	40.2
More than 3 servings	6.3 *	9.1	7.6
Meat and Alternatives			
Less than 1 serving ^a	3.3 *	7.1	5.2
From 1 to less than 2 servings ^a	47.4	64.8	55.9
From 2 to 3 servings ^a	43.6	27.5	35.8
More than 3 servings ^a	5.7	0.6**	3.2

1. Usual consumption.

a. Differences by sex statistically significant at the 0.05 level.

* Coefficient of variation between 15% and 25%; interpret with caution.

** Coefficient of variation greater than 25%; imprecise estimate for descriptive purposes only.

Source : Institut de la statistique du Québec, *Nutrition Survey of Four-Year-Old Québec Children, 2002*.

pared with 1.2 for vegetables (data not shown in table). As for Grain Products, we find that very few children (around 3%) consumed less than 2.5 servings a day, whereas 83% had less than 5.

As shown in Figure 5, Grain Products represent the main source of energy intake among 4-year-old Québec children (27%). The survey also shows that "Other Foods",¹¹ a category that includes mainly food choices that are high in fat (namely, saturated and trans fats), sugar, or salt, made up a sizeable portion (20%) of the energy intake among young children. More

specifically, sweetened drinks, including fruit-flavoured drinks, soft drinks, and sport drinks, which belong in this category, appeared to be popular: one 4-year-old child out of five drank some on a daily basis, in some cases (9% of all children) at a rate of three or more times a day (Figure 6). Similarly, when it comes to liquids consumption, we find that about one 4-year-old Québec child in five (22%) consumed juices at least three times a day.¹² By contrast, quenching thirst by drinking water was a habit that not everyone had adopted: 17% of the children apparently did not drink water every day.

8. HEALTH CANADA (1992). *Using the Food Guide*. Ottawa, Minister of Supply and Services Canada, 12 pp.

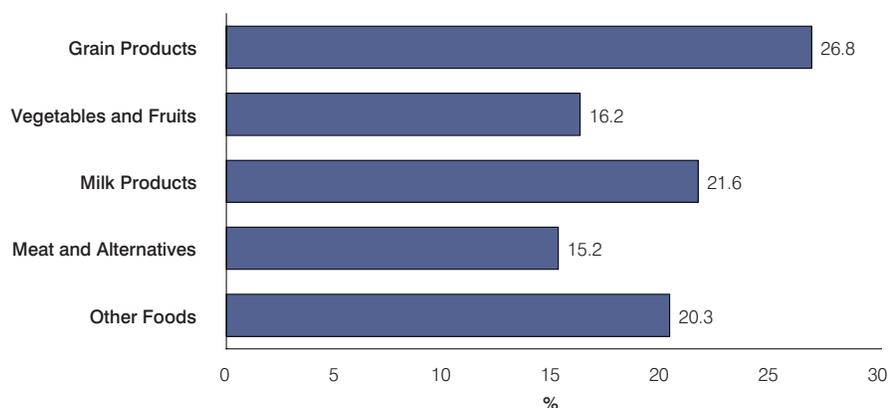
9. HEALTH CANADA (1995). *Canada's Food Guide to Healthy Eating. Focus on Preschoolers: Background for Educators and Communicators*, Ottawa, Minister of Supply and Services Canada, 16 pp.

10. For this food group, the analysis was based on the smallest size of a serving suggested in the CFG, that is to say, the equivalent of 50 g of cooked meat. As an example, this may correspond to one large-sized egg, to 125 ml of legumes, to 30 ml of peanut butter, or to 60 ml of nuts and seeds.

11. In other words, foods not included in the four main food groups.

12. In all or substantially all cases (21%), these were fruit juices.

Figure 5
Contribution of the main food groups to energy intake among 4-year-old children, Québec, 2002



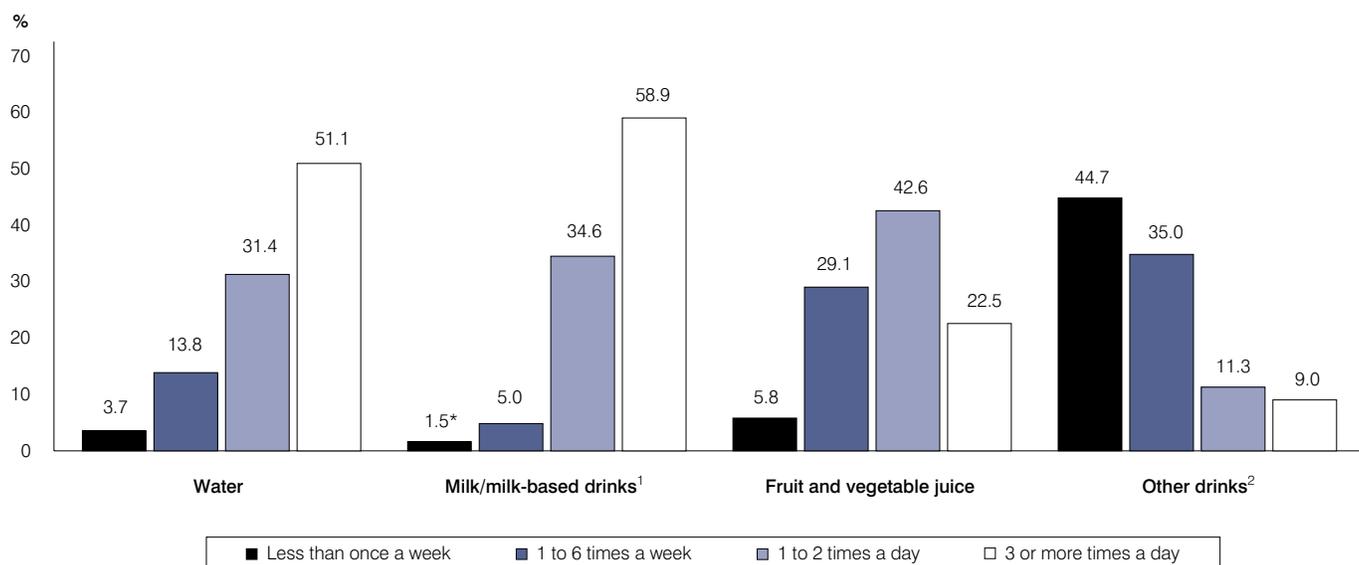
Source : Institut de la statistique du Québec, *Nutrition Survey of Four-Year-Old Québec Children, 2002*.

Dietary intakes : Encouraging a better balance

The survey has also made it possible to estimate usual intakes of energy and macronutrients (proteins, lipids, carbohydrates), as well as micronutrients (certain vitamins and minerals). Insofar as possible, these intakes have been compared with the recommended intakes for 4-year-old children (Dietary Reference Intakes). If the analysis of intakes in energy and nutrients for young children has emphasized some rather positive factors, it has also brought out some worrisome aspects from a longer-term perspective.

As for the positive points, the risk of inadequate intakes seems minimal for proteins and carbohydrates. The same is true for the majority of vitamins and minerals that were examined. Even though the risk of inadequate vitamin and mineral intakes is low, 28% of the 4-year-old children had taken at least

Figure 6
Frequency of consumption of certain liquids by 4-year-old children, Québec, 2002



1. Includes skimmed, partially skimmed, and whole milk, chocolate milk, and yogurt-based drinks.

2. Includes soft drinks (regular and diet), sport drinks (Gatorade, Powerade, etc.), and fruit-flavoured drinks.

* Coefficient of variation between 15% and 25%; interpret with caution.

Source : Institut de la statistique du Québec, *Nutrition Survey of Four-Year-Old Québec Children, 2002*.

one supplement during the preceding 24 hours, more often than not a multivitamin and mineral supplement, and nearly half the children (48%) had consumed some during the month preceding the survey.

Concerning energy intake, the prevalence of overweight in this population (see following section) gives us an indication that, for some children, energy balance was missing and that, in these cases, intakes could exceed needs. Conversely, the vast majority of the children had intakes of fibre that were distinctly below dietary reference values. Moreover, if it is true that some children (9% of boys and 7% of girls) had fat intakes considered to be high (>35% of energy intake), it was the situation concerning the balance of fatty acids that warrants special attention. Indeed, for a majority of children (81% of boys and 88% of girls), saturated fatty acid intakes could be considered high (>10% of energy intake), while conversely, for quite a few children (65% of boys and 78% of girls), polyunsaturated fatty acid intakes appeared low (<5% of energy intake). Let us not forget that, relatively speaking, more girls had saturated fat intakes considered high and fibre and polyunsaturated fat intakes considered low. Likewise, 6% of girls, compared with 2% of boys, had intakes of folate—a vitamin primarily present in fruits, vegetables, legumes, and enriched grain products—lower than the Estimated Average Requirement for children of this age.

Looking at the contributions of different food groups to nutrient intakes nevertheless makes it possible to identify certain approaches that would encourage more balance and greater variety in the diet of young children. For instance, with regard to grain products, children most often eat non-whole

grain enriched products, thus missing out on the foods richest in fibre such as whole-grain cereals and breads. Moreover, as far as vegetables and fruits were concerned, we find that the contribution of fruit juices to energy and nutrient intakes very often equaled that of all fruits. Therefore, to increase their dietary fibre intake, children would do well to consume more whole-grain products. Similarly, juice consumption should not replace the consumption of fruits and vegetables, which are rich in fibre.

Furthermore, although milk products represented the main source of calcium in the diet of 4-year-old Québec children, they also contributed 48% of their saturated fat intake. Given the importance of this food group for growth and nutritional health, it might be very sensible, in some cases, to give preference to foods from this group that are lower in fat. Finally, of the foods in the Meat and Alternatives group, it is the meats, poultry, and processed meats that made the greatest contribution to energy and nutrient intakes. Conversely, fish, as well as legumes, nuts, and seeds, seemed to be, on the whole, little consumed. These are nevertheless deserving of a larger place in the diet of young children; this could lead to a better balance in the intakes of various fatty acids, among other things.

Overall, the results suggest that it would be pertinent to increase the awareness of parents and of the various child-related milieus of the importance of relying on a healthy and balanced diet rather than on nutritional supplements. There would be good reason as well to review the portion of the diet occupied by “Other Foods”, including sweetened drinks, so that they do not take the place of more nutritive foods from the four main food groups.

Overweight and obesity: About one 4-year-old child in seven is affected

Preventing weight-related problems in children, as in the population as a whole, has become a major public health concern in recent years.¹³ Based on international criteria defined by Cole and colleagues (2000),¹⁴ it can be estimated that approximately one 4-year-old Québec child out of seven has excess weight (overweight or obesity). More specifically, 10% of 4-year-old Québec children are overweight, while 3.8% are considered obese. Yet, following the example of what has been observed in other industrialized countries, we are finding that the majority of children who are overweight or considered obese (89% and 54%, respectively) are not perceived to be that way by their parents.¹⁵

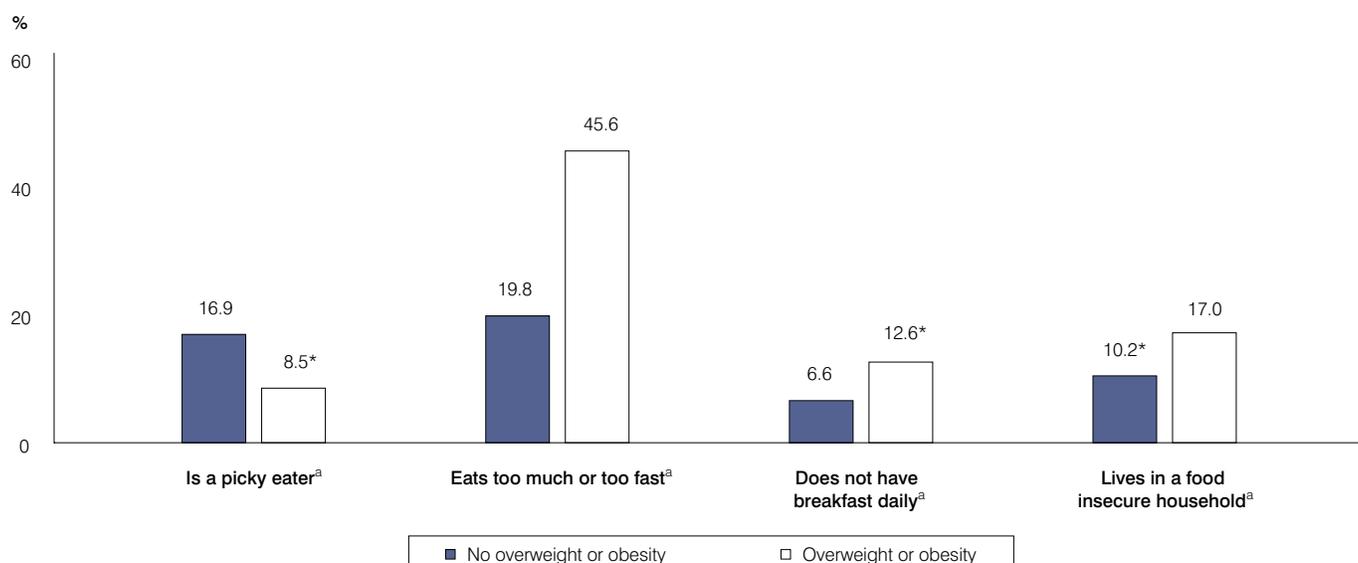
Some eating behaviours stand out as being associated with excess weight, as can be seen in Figure 7. For example, being a picky eater seems to be reported less often among children with excess weight (9%) than among other children (17%). Conversely, eating too much or too fast more often characterizes overweight and obese children (46%) than others (20%). The survey data also bring out the fact that children with excess weight are more likely than others (13% compared with 7%) not to have breakfast every morning or to live in a situation of food insecurity (17% compared with 10%), two characteristics closely associated with family economic status. By contrast, no significant association has been found between excess weight among young children and the frequency with which they have restaurant meals or the frequency with which they watch television during meals.

13. See, among other sources, MINISTÈRE DE LA SANTÉ ET DES SERVICES SOCIAUX (2006). *Investir pour l'avenir. Plan d'action gouvernemental de promotion de saines habitudes de vie et de prévention des problèmes reliés au poids 2006-2012*, Québec, Ministère de la Santé et des Services sociaux, 50 pp.

14. T. J. COLE, M. C. BELLIZI, K. M. FLEGAL, and W. H. DIETZ (2000). “Establishing a standard definition for child overweight and obesity worldwide: International survey,” *British Medical Journal*, 320(3) (suppl.): 1-6.

15. See, on this topic, L. A. BAUER (2005). “Childhood obesity: Practically invisible,” *International Journal of Obesity*, 29(4): 351-352.

Figure 7
Prevalence of food insecurity and of certain eating behaviours and habits among 4-year-old children, by presence of overweight and obesity,¹ Québec, 2002



1. Based on international criteria defined by Cole et al. (2000).

a Chi-square test significant at the 0.05 level.

* Coefficient of variation between 15% and 25%; interpret with caution.

Sources : Institut de la statistique du Québec, *Nutrition Survey of Four-Year-Old Québec Children, 2002*, and *QLSCD 1998-2010*.

Concluding Remarks

On the whole, the findings presented above highlight the importance of putting various measures into place, not only at the individual level, but also at the level of the environments in which children grow up, if we are to promote the adoption of healthy eating habits, prevent obesity-related problems, and foster better health status in the short and long terms. Among potential intervention options, we should emphasize the incorporation of diet and nutrition into basic education starting in early childhood; informing and educating parents and childcare providers about diet; taking measures to reconcile work and family life and further the fight against poverty; adopting dietary poli-

cies in childcare settings and schools; etc. The promotion of physically active lifestyles must obviously also be taken into account in efforts that have as their aim the prevention of excess weight among children, just as in the population as a whole.

The results presented in this article, as well as in the survey report, cover only one small part of the potential analyses that might be performed with the data. In the medium term, the data collected in this nutrition survey will be linked to data collected during various QLSCD (*Québec Longitudinal Study of Child Development*) rounds, like those that have dealt with breast-feeding and the introduction of solid food, family situa-

tions and living conditions, parent-child relationships, child behaviour and temperament, children's cognitive abilities, and their physical condition through the school years. The data will also allow us to explore the persistent or transitory nature of weight-related problems in children. In this way, the data collected from birth on can be taken full advantage of in order to better understand the determinants and consequences of dietary intake and weight problems in children.

About the Survey

The *Nutrition Survey of Four-Year-Old Québec Children (Enquête de nutrition auprès des enfants québécois de 4 ans)* was conducted with 1,550 children, their parents, and childcare providers as part of the *Québec Longitudinal Study of Child Development (QLSCD 1998-2010)*. These children have been followed since 5 months of age with regard to various aspects of their health and development. Note that the target population did not include children born outside Québec (about 4% of the population of Québec 4-year-olds) which, as a result, excluded recent immigrants whose dietary habits may differ. Data collection took place between March 17 and July 8, 2002, a few days after the fifth annual administration of the QLSCD, when the children were between 45 and 57 months of age (median age = 50 months).

The interviews, performed by nutritionists, primarily concerned food consumption during a 24-hour period. Since a person's consumption patterns vary from one day to the next, half the families (chosen at random) were seen a second time on a day different from the first one. A questionnaire intended for the parent most knowledgeable about the child covered some of the child's food behaviours and practices. In addition, the child's weight and height were measured according to a strict protocol. Skinfold measurements (subscapular and triceps) were also taken. To complement the food consumption inventory of the child, interviews were conducted with personnel where the child attended childcare (if applicable).

For more information

The *Nutrition Survey of Four-Year-Old Québec Children (Enquête de nutrition auprès des enfants québécois de 4 ans)* has been funded by the Ministry of Health and Social Services of Québec. The survey report may be downloaded in its entirety at the following address: www.stat.gouv.qc.ca/publications/sante/nutrition4ans_an.htm. A printed version may also be ordered from the Information and Documentation Centre of the ISQ by calling 1 877 677-2087.

For access to the microdata file for the survey, contact the Research Data Access Centre of the ISQ (Centre d'accès aux données de recherche de l'ISQ-CADRISQ) at www.stat.gouv.qc.ca/cadrisq or call 1 514 343-2299.

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