

# Dietitians of Canada

## School Food and Nutrition Recommendations for Ontario Ministry of Education Regarding Snacks and Beverages Dispensed by Vending Machines

Dietitians of Canada (DC) is the nation-wide voice of dietitians - the most trusted source of information on food and nutrition for Canadians.<sup>1</sup> DC brings the knowledge and skills of its members together to inform decisions that affect food, nutrition and health. As an organization DC is active at the local, provincial, national and international levels and our 5000 members meet our academic and experience standards. DC is the accrediting body for all university and training programs that credential dietitians to practice in Canada.

There are approximately 2400 registered dietitians in Ontario whose knowledge and expertise support people in health and illness to make healthy food choices. Dietitians' evidence-based education in food and nutrition, as well as their many skills, position them to practice in widely diverse settings. You will find dietitians working in community health centers, healthcare institutions, government at all levels, sports and recreation facilities, private practice, public health, health related non-governmental organizations, food service and the food industry, academic and research settings.

### **Purpose of this Document**

Dietitians of Canada has produced this background paper as the basis for collaborative work with the Ministry of Education on school food and nutrition recommendations. This document provides background information to help increase understanding about the rationale for healthy eating in childhood, the link between healthy eating and school performance, the importance of supportive healthy eating environments provided by schools, the nutritional needs of children, and a review of current eating habits of school age children. This background paper emphasizes a comprehensive approach to support healthy eating for children in schools. Along with this advice, DC has provided more specific guidance for food choices available from vending machines in elementary schools. Ensuring that vending machines, if available at elementary schools, provide healthy choices is just one of many steps that should be taken to ensure a supportive healthy eating environment at school. We have used a peer review process that has included DC members with expertise in school nutrition and experience in a variety of sectors of practice.

### **Background & Rationale**

Nutrition is important to people of all ages, but it is particularly important to the well-being of children and adolescents.

“Well-nourished children and adolescents are more likely to be better prepared to learn, be active, and maintain their health as adults. Today, many in these age groups have unhealthy eating patterns. Inadequate nutrition can have a detrimental effect on children's learning ability as well as on their physical growth and development.”<sup>2</sup>

"Poor eating habits are contributing to the rising rate of childhood and adolescent overweight, obesity and type 2 diabetes. Poor eating habits in childhood are also likely to be carried into adulthood and increase the risk of chronic diseases such as cancer and cardiovascular disease."<sup>2</sup>

### Eating well is linked to positive school performance

It is well known that poor diet adversely influences the ability to learn and decreases motivation and attentiveness.<sup>3</sup> Many school breakfast programs have demonstrated improved nutrient intakes and school performance, and also improved attendance rates and reduced tardiness.<sup>4,5</sup>

Nutrient deficiencies, particularly iron deficiency anemia, have an adverse effect on cognitive development of children. Iron deficiency anemia is associated with poor performance on intelligence tests, difficulty with learning tasks, and delayed academic achievement.<sup>4</sup>

Several school boards acknowledge the important link between good nutrition and student performance. The Toronto District School Board "recognizes the direct relationship between healthy nutrition and the academic achievement of our students: ...that well nourished students are able to concentrate better, retain and apply information more effectively, and are more likely to demonstrate positive behaviors and relationships with peers"<sup>2</sup>

When nutritionally inadequate foods are available at school every day, it is difficult for students to eat a healthy diet and balance their excesses.<sup>6</sup>

The biggest challenge for children to eat well at school has been identified as the availability of higher fat foods and sugary treats (e.g. fries, chips, chocolate bars, candies or soft drinks).<sup>7</sup> Another related challenge was that students have limited access to nutritious foods because they were not available at school or not brought from home.<sup>7</sup>

Having vending machines in schools reduces fruit intake as low-nutrient vending snacks are chosen over fruit. Also, when children are exposed to less healthful choices at school they do not compensate for this by choosing more healthful choices when away from school.<sup>8</sup>

Students who have skipped breakfast or forgot to bring their lunch may turn to foods available at schools for something to eat. Vending machines, school tuck shops, "special food" days, and in-class celebrations are just some of the sources of foods children have access to at schools. According to information collected by Ontario Society of Nutrition Professionals in Public Health, "common vending machine contents include pop, iced tea, sports drinks, water, granola bars, chocolate bars, rice crisps squares, chewy fruit snacks, chewy candy, corn nuts and chips. Various elementary schools have tuck shops offering a variety of foods, including sweetened beverages, potato chips, granola bars, cheese puffs, popcorn, pepperoni sticks, ice cream, gum and chocolate bars. Occasionally fresh fruit is available."<sup>2</sup>

Schools play an important role in educating students about proper nutrition. When foods with low nutritional value are sold or available in schools this undermines what children are taught in the classroom about healthy eating.

Learning about healthy eating requires consistency between the theory students learn through a formal curriculum in the classroom and the nutrition messages provided by hidden and parallel curricula within the school environment.<sup>2</sup> The Ontario curriculum specifies learning expectations for each grade from Kindergarten through Grade 8, covering various aspects of healthy eating and nutrition.<sup>9,10,11</sup> The hidden curriculum includes the school's philosophy, nutrition policy and norms, consistent messages, and positive role models within the school environment.<sup>12</sup> The parallel curriculum includes external factors such as the home and community environment.<sup>2</sup> Promoting good nutrition at school supports healthy eating at home and visa versa.

Making environmental changes such as providing healthier choices in vending machines is more effective within the school because it is not left up to the student to decide whether to modify their eating habits.<sup>13</sup> Children's food choices are motivated first and foremost by taste.<sup>7</sup> Other "important" influencers are parents and family, friends and peers, the belief that the food is fun or enjoyable, and advertising.<sup>7</sup> Therefore when low nutrient foods are provided along side of those with more health-promoting properties, children are challenged to make the best choices for their health.

In Britain students that received a one-hour session on the adverse effects of sugar and carbonated drinks, along with information on beverage alternatives reduced their soft drink consumption.<sup>14</sup> This suggests that the availability of healthy foods along with reinforcement through education is required to help children make healthy food decisions.

In Ontario, public health nutrition professionals have a mandate to and are available to work with schools and school boards to support the promotion of healthy eating in schools.<sup>15</sup> Public health nutrition professionals include registered dietitians, who can help make the necessary changes to support a healthy eating environment at school.

### **Principles of healthy eating for school age children (4 -13 years of age)**

Why children need to eat well:

- ▶ To get adequate energy and nutrients to support optimal growth, development and activity<sup>4</sup>
- ▶ To establish healthy eating habits, which when adopted early in life can be maintained throughout adulthood and help reduce risk of nutrition-related health problems
- ▶ To promote and maintain a healthy weight and prevent obesity, which is associated with nutrition-related chronic diseases such as heart disease, cancer, and type 2 diabetes<sup>16</sup>

What is a healthy eating pattern for school age children (4 - 13 years of age)?

A healthy diet for school-age children includes a variety of foods provided throughout the day based on *Canada's Guidelines to Healthy Eating* and *Canada's Food Guide to Healthy Eating*. Food patterns should emphasize variety, nutrient-dense food choices, complex carbohydrates and overall energy intake appropriate for growth and development. Three meals each day with one to three planned snacks are recommended.<sup>4</sup> Meals and snacks should include foods from the four food groups in *Canada's Food Guide to Healthy Eating*. These foods are sources of essential nutrients (e.g. vitamins, minerals, protein, fat, carbohydrates) and include grain products, vegetables and fruit, milk products, meat and alternatives. Snacks should be dentally acceptable. High sugar foods that stick to the teeth, such as dried fruit leathers and candies contribute to dental caries and are not appropriate snacks. These foods are best eaten as part of a meal or when it is possible to brush teeth afterwards.

The "Other foods" category in *Canada's Food Guide to Healthy Eating* includes fats and oils, sweets, salty snacks, beverages such as coffee, tea, and soft drinks. These "other foods" provide few nutrients and can be high in one or more of the following: calories, fat, added sugar, salt, caffeine. "Other foods" can be eaten in moderation as part of a healthy diet, provided food group servings have been satisfied.<sup>17</sup> For example, children should consume adequate servings from each of the four food groups to satisfy energy and nutrient requirements, prior to consuming "other foods". Caffeine is not appropriate for children as it may contribute to anxiety and difficulties sleeping.<sup>18</sup>

What are appropriate serving sizes?

Serving sizes should be based on *Canada's Food Guide to Healthy Eating*. Some serving sizes may need to be smaller for younger school-age children. For example, some kindergarten children may still be eating pre-school size servings, which are half the size of adult servings. Active adolescents who have higher energy needs can eat more servings of foods. For example, active male teens may still eat the same serving sizes but might have 10 servings instead of 5 servings from the Grain Products group.

Many foods are currently available in serving sizes larger than necessary for children. For example, the typical bottled fruit juice or fruit drink sold in vending machines today is about 500 mL (2 cups).<sup>19</sup> This serving size would be equivalent to 4 servings of fruit. A smaller 250 mL (one-cup) serving of juice is more appropriate for children. Large volumes of beverages can add significant extra calories to a child's daily diet.

### Appropriate Serving Sizes for Foods\*

Food Group	Serving size
Grain Products (5-12 servings per day)	1 slice of bread 1/2 bagel, pita or bun 30 g (1/2 cup - 1 1/4 cup) of ready-to-eat cold cereal 3/4 cup (175 mL) hot cereal 1/2 cup (125 mL) cooked pasta or rice
Vegetables & Fruit (5-10 servings per day)	1 medium size vegetable or fruit 1/2 cup (125 mL) fresh, frozen or canned vegetables or fruit 1 cup (250 mL) raw leafy vegetables or salad 1/2 cup (125 mL) juice
Milk Products (2-4 servings per day)	1 cup (250 mL) milk 2 oz or 2 slices (50 g) cheese 3/4 cup (175 g) yogurt
Meat & Alternatives (2-3 servings per day)	2- 3 oz (50 - 100 g) cooked meat, fish or poultry 1-2 eggs 1/2 - 1 cup (125- 250 mL) beans 1/3 cup (100 g) tofu 2 tbsp (30 mL) peanut butter

*\* For children 4 and older. Canada's Food Guide to Healthy Eating, Health Canada*

### Energy Needs of School Age Children <sup>20</sup>

Energy needs vary with the child's growth rate, body size, and physical activity level. Depending on the number of servings of foods selected, *Canada's Food Guide to Healthy Eating* provides all the nutrients children need, without including "other foods". In order to maintain a healthy weight, sedentary children should aim for the lower energy level, while active children should aim for the higher energy level.

Although current media emphasizes the rising rates of childhood obesity, the majority of Canadian youth fall into a healthy weight range.<sup>16</sup> Restriction of children's energy intakes are not generally recommended and may have a paradoxical effect resulting in weight gain over time.<sup>21</sup>

Age (years)	Males	Females
4-8	1400-2000 cal/d	1200-1800 cal/d
9-13	1800-2600 cal/d	1600-2000 cal/d

### Nutrient Needs of School Age Children

The following section outlines some of the key nutrient needs of children based on the National Academy of Sciences recommended nutrient intakes.<sup>22</sup> This information is provided as a practical perspective on how these requirements translate into food choices. This information is not intended to be used by consumers to count calories, or grams of carbohydrates, fat or protein for their children. *Canada's Food Guide to Healthy Eating* is the preferred tool to use to educate consumers about planning a healthy diet.

#### Carbohydrate

45 to 65 percent of total daily energy intake for children 4 - 18 years. A *minimum* 130 grams per day is recommended to provide sufficient glucose for the brain.<sup>22</sup>

A child who consumes approximately 2000 calories per day would consume 225 to 325 grams of carbohydrate (based on 45% to 65% of energy). Children can easily satisfy their carbohydrate needs by consuming at least 5 servings of Grain Products, 5 servings of Fruit & Vegetables and 2-4 servings of Milk Products. For example, the following foods provide 235 grams of carbohydrate:

2 slices whole wheat bread (26 g), 250 mL/1 cup macaroni (42 g), 250 mL/1 cup rice cereal (29 g), apple (21 g), banana (27 g), carrot (8 g), 125 mL/1/2 cup broccoli (5 g), 125 mL/1/2 cup corn (22 g), 750 mL/ 3 cups milk (36 g), 175 g yogurt (19 g).

"Other foods" such as soft drinks, sugary beverages and candy also provide carbohydrates but because they do not provide essential nutrients they are not recommended.

#### Fat

25 to 35 percent of total daily energy intake for children 4 to 18 years.<sup>22</sup>

A child who consumes approximately 2000 calories per day should aim for a fat intake between 56 and 78 grams of fat (based on 25-35% of energy). Saturated fat and trans fat are associated with increased heart disease risk and therefore it is recommended that these fats be minimized in the diet. The majority of fat intake should consist of monounsaturated and polyunsaturated fatty acids. Foods that have added fat, without the benefit of other required nutrients, (e.g. deep-fried or high-fat baked or processed foods) are not recommended.

A child can easily exceed their fat requirements by consuming a lot of high fat low nutrient foods. Furthermore, the food choices in the example are typically high in saturated and trans fat. For example, 3 chocolate chip cookies (48 g serving - 15 g fat), 1 chocolate bar (53 g serving - 15 g fat), 20 potato chips (40 g serving - 14 g fat), and 20 French fries, deep fried (100 g serving - 10 g fat). This adds up to 54 grams of fat and does not include foods eaten at other meals or snacks.

## Protein

Protein requirements decrease gradually as peak growth declines. Boys and girls 4-8 years of age require about 19 g of protein per day.<sup>22</sup> Children age 9-13 years of age require about 34 g of protein per day.<sup>22</sup>

The protein needs of children can be easily satisfied by choosing foods from each of the four foods groups in *Canada's Food Guide to Healthy Eating*, particularly the Milk Products and Meat & Alternatives groups. For example, a child who eats 1 egg (6 g protein), 1/2 chicken breast (16 g protein), 250 mL/1 cup 2% milk (9 g protein), and 125 mL/ 1/2 cup of cooked frozen peas and carrots (3 g protein) would consume 34 g of protein and satisfy their daily requirements.

## Vitamins and Minerals

Children should consume a diet that provides essential nutrients in amounts sufficient to meet the Recommended Dietary Allowance (RDA) or Adequate Intake (AI) while not exceeding the tolerable upper intake levels (UL) specified by the Dietary Reference Intakes (DRI) produced by the National Academy of Sciences.

## Fibre

Children may have trouble getting the recommended amount of fibre in their diet due to low intakes of vegetables, fruit, whole grains, beans and legumes.<sup>23</sup> The daily recommendation is 25 grams per day for children ages 4-8 years. Girls ages 9-13 should aim for 26 grams for day and boys the same age should get 31 grams per day.<sup>22</sup>

To get this amount of fibre children need to consume the minimum number of servings from the Grain Products (5 servings) and Vegetables & Fruit (5 servings) groups. Whole grains such as whole wheat breads and cereals have more fibre as do fruits and vegetables with their peels. Fruit juice is not a good source of fibre. Beans and legumes, nuts and seeds also provide fibre.

Some higher fibre foods include:

Baked beans in tomato sauce (250 mL/1 cup) 19.6 g

Bran flakes cereal (200 mL, 3/4 cup) 6.3 g

Pear (1) 5.1 g

Kiwifruit (1) 3.1 g

Apple (1) 2.6 g

Bran muffin (1) 2.5 g

Banana (1) 2.0 g

Whole wheat bread (slice): 1.6 g

Whole wheat pita (16.5 cm diam.): 4.4 g

## Sodium

An adequate intake of sodium for children 4-8 years of age is 1200 mg per day and for children over the age of nine 1500 mg per day.<sup>22</sup> Sodium is widely available in the food supply in processed foods. Most Canadians consume much more sodium than necessary, which may increase risk of heart disease and stroke.<sup>22</sup>

## Water

Water is an important beverage for students. Children need to be properly hydrated at all times. When children are involved in sports and when it is extremely hot outside they even have higher needs for hydration. Water is preferred over fruit drinks and soft drinks as these latter beverages are typically high in sweeteners, additives and sometimes caffeine. Sports drinks are not necessary unless a child is involved in over 90 minutes of continuous intense exercise.<sup>24</sup>

## Current Eating Habits of School Age Children

There is very limited data on the current eating habits and nutrient intakes of Canadian children. Therefore, much of the information provided in the following section draws on studies conducted in the United States. While this research provides an insight as to what may be the case in Canada, more Canadian data is required to provide firm conclusions as to the eating habits and nutrient intakes of Canadian children.

### Energy and Macronutrient Intake

Data on energy and nutrients intakes is limited and inconsistent. Some US studies have observed slight increases in total energy intake, while others suggest that no significant changes have occurred over the past two decades.<sup>16</sup>

The available research suggests that macronutrient distribution within the diet has shifted, particularly where carbohydrate is concerned. US trends data showed percent energy from carbohydrate is increased but that percent energy from protein and fat, and saturated fat decreased.<sup>25</sup> The lower percentages of energy from fat were partly due to increased carbohydrates intakes rather than lower intakes of fat. Also, increased carbohydrates intakes did not result in higher dietary fibre intakes.<sup>25 26</sup>

Dietary changes observed in school age children are reflective of overall trends in the types of foods currently favoured by North Americans.<sup>16</sup> Both Canadian and US studies undertaken since the early 1990's suggest a trend towards decreasing consumption of milk, vegetables, whole grain breads, and eggs, while at the same time increasing intake of fruit and fruit juices, carbonated beverages, salty snacks, poultry, and cheese.<sup>25 27 28 29</sup>

### Nutrient Intakes

Nutrients of most concern for school age children are iron and calcium. Adequacy of iron intake should be evaluated to assess for iron deficiency anemia, a risk factor for poor educational performance in school-age children.<sup>4</sup> At age 9, the recommended intake of calcium for males and females increases from 800 mg/day to 1300 mg/day. Only half of all children have adequate intakes of calcium, essential for bone growth.<sup>30</sup>

Without milk for lunch children will have difficulty satisfying their daily calcium requirement.<sup>31</sup> Children require 2 to 4 servings of Milk Products each day to satisfy nutrient requirements for calcium and Vitamin D. Consuming milk is positively associated with achieving recommended intakes of vitamin A, folate, vitamin B12, calcium, and magnesium. Juice intake is positively associated with increased vitamin C and folate intakes. Carbonated soda consumption is negatively associated with achieving vitamin A, calcium and magnesium.<sup>32</sup> School milk programs increase milk consumption and improve the calcium and vitamin D intakes of participating elementary school students.<sup>33</sup>

### Food Groups

A majority of children and youth do not consume nutritionally balanced or adequate diets. Recent Canadian data show low median intakes for most of the food groups in *Canada's Food Guide to Healthy Eating* for both genders and across several grade levels.<sup>34</sup> Of particular concern are lower than recommended intakes from the Vegetables and Fruit and Milk Products groups. This is corroborated by other research, for example:

- ▶ Only 14% of children between 9 and 12 years of age have four or more servings of vegetables and fruit a day.<sup>35</sup>
- ▶ Only 20% of children ages 6-12 consumed the recommended daily amounts of fruit and vegetables.<sup>36</sup>
- ▶ Only 36% of adolescents between 12 and 19 years of age have five or more servings of vegetables and fruit a day.<sup>37</sup>
- ▶ Half of children between 6 and 12 years of age did not consume any milk products for lunch.<sup>38</sup>

In order to get all of the essential nutrients children need it is important for them to consume the minimum number of servings from each of the four food groups, each day. Of particular importance is getting at least 5 servings of Vegetables & Fruit and 2 to 4 servings of Milk Products each day.

## Snack Consumption

Snacking as a food trend has increased in children over the past two decades. Compared with non-snack eating occasions, the nutrient contribution of snacks in US children decreased in calcium density and increased in energy density and proportion of energy from fat.<sup>39</sup> There are similar findings in Canada:

- ▶ Approximately 27% of boys and 23% of girls in Grades 6 and 8 students consume candy and chocolate bars daily.<sup>28</sup>
- ▶ Approximately 21% of boys and 14 % of girls in Grades 6 and 8 consume potato chips daily.<sup>28</sup>
- ▶ Approximately 5 % of boys and 3% of girls in Grades 6 and 8 consume coffee daily.<sup>28</sup>
- ▶ Some beverages and foods offered in schools contain significant amounts of caffeine. Research shows that children may exhibit altered behaviour, such as anxiety, when they over-consume caffeine.<sup>18</sup>

Low nutrient snacks may be competing with more nutritious foods in the diet of children and also add significant extra calories. Healthy snack choices should be emphasized over those with high-energy and high fat, low vitamin/mineral content snacks. One study showed that even one nutrient dense snack added daily to children's diets can improve overall nutrient intakes.<sup>40</sup>

## Soft Drink Consumption

Soft drinks have become part of the daily diet for many school age children, which is concerning. Soft drink consumption leads to a higher daily energy intake and reduced intakes of some essential nutrients. A US study found that children with the highest soft drink consumption consumed less milk and fruit juice compared with those who drank less soft drinks.<sup>41</sup>

Soft drinks can have a negative impact on bone health, especially in girls, because they displace milk from the diet.<sup>42</sup>

Judging by current beverage trends which favour soft drinks over milk, there is a need to encourage children and adolescents to consume more nutritious beverages.<sup>43,44</sup> This is corroborated by Canadian studies:

- ▶ Approximately one-third of Ontario students in Grades 4 to 8 consume soft drinks daily.<sup>45</sup>
- ▶ Daily soft drink consumption increases from Grades 6 to 8 and is higher in boys than girls. In 1998, 34% of Grade 6 girls consumed soft drinks daily compared to 42% of boys. In Grade 8, 56% of boys and 45% of girls drank soft drinks daily.<sup>28</sup>
- ▶ Children who consume soft drinks average one less serving of milk each day.<sup>38</sup>
- ▶ The consumption of milk is almost 30% lower in schools that also sell soft drinks and fruit drinks.<sup>46</sup>

## Obesity in Canadian Children Has Escalated Over the Past Two Decades

Levels of obesity among Canadian children age 7 to 13 have nearly tripled over the last two decades.<sup>47</sup> Over one-third of Canadian children, ages 2 to 11, are overweight and of these about half can be considered obese.<sup>48</sup> It should be noted that data on weight status of Canadian children is limited and is based on children's and parent's reporting of their child's weight and height so it is anticipated that it underestimates the true prevalence of overweight and obesity. Nevertheless, the data is concerning. Overweight and obesity put children at risk for hypertension, diabetes, asthma, orthopaedic injuries and these children have significantly lower health related quality of life compared to healthy weight children.<sup>16</sup>

Obesity in Canadian children has increased, even though limited research does not indicate large increases in energy or calorie intakes. Therefore other lifestyle factors, including physical inactivity, in children are playing a role. By the time children reach the “tween” years (age 9 to 12), many have lifestyle habits that could put them in the fast lane for developing cardiovascular disease as early as their 30s.

Consumption of soft drinks and sugar-sweetened drinks and low-nutrient snack foods is linked to rising obesity in children

The rising prevalence of obesity in children is linked to the consumption of sugar-sweetened drinks.<sup>49</sup> Between 1977 and 1998 the prevalence of soft drink consumption among children and youth 6-17 years increased from 37% to 56% and the mean intake of soft drinks doubled from 5 to 12 fluid oz. per day.<sup>50</sup>

Energy intake is positively associated with consumption of non-diet soft drinks.<sup>50</sup> Each additional daily serving of a sugar-sweetened beverage consumed by children over an 18 month period increases the risk of becoming overweight by 60%.<sup>51</sup>

A study conducted by the Children's Exercise and Nutrition Centre in Hamilton, Ontario, showed that the diets of both obese and non-obese children are nutritionally poor, and high in empty-calorie sugars, fat and foods considered as 'extras'. This eating pattern was more prevalent in the obese group.<sup>52</sup>

The consumption of soft drinks, low-nutrient sugary beverages, sports drinks and snacks should be reduced in children, and these foods should not be consumed in place of more nutrient-rich foods.

Portion size is implicated in rising obesity rates in children

The portion size of many low-nutrient snack foods and beverages has increased in North America in the past decade and many portions exceed the recommended reference standards.<sup>53 54</sup> For example, serving sizes of carbonated beverages have increased from 6.5 oz. in the 1950s to 12 oz. in the 1960s and 20 oz. by the late 1990s.<sup>55</sup> Portion sizes began to grow in the 1970s, rose sharply in the 1980s, and have continued in parallel with increasing body weights.<sup>56</sup>

Vending machines in schools typically sell high volumes of sweetened beverages with minimal nutritional value, and it is often the larger size varieties that predominate.<sup>2</sup> Chocolate bars and snack food servings sizes (e.g. single serve bags of chips) have also increased in size over the past 20 years.

Because energy content increases with portion size, educational and other public health efforts to address obesity should focus on the need for children to consume smaller portions of foods high in empty calories, sugar or fat.

Inactivity, coupled with poor eating, is a major cause of rising obesity in children

There is an abundance of high-energy, high-fat foods readily available to children. However, the consumption of high-energy foods alone cannot explain completely the exponential increases in the prevalence of overweight seen in recent years. Physical activity is also a key factor in the energy balance equation, and increasingly children are watching television or playing video games in their leisure time.<sup>57</sup>

Trends in energy and fat intakes of US children aged 2-19 years were assessed using 24-h recall from NHANES survey (1988-1994). The lack of evidence of a general increase in energy intake among youths despite an increase in the prevalence of overweight suggests that physical inactivity is a major public health challenge in this age group.<sup>58</sup>

Efforts in schools need to focus on promotion and support for increased levels of physical activity and healthy eating.

## Summary

Children need to eat well to grow and develop properly, to perform well in school and to protect them from unhealthy weights and chronic nutrition-related health problems. Growing obesity in children is of particular concern because it puts children at increased risk of type 2 diabetes, heart disease and cancer.

Nutrition trends over the past two decades do not confirm increasing energy intakes in children but do show an increase in the percentage of energy from carbohydrate and a decrease in the percentage of energy from total fat, particularly saturated fat. Healthy foods choices such as milk, vegetables, whole grain breads, and eggs have decreased, while at the same time intake of fruit juices and carbonated beverages, have increased. Some nutrient needs are not being met by children due to lower intakes of foods from the Vegetables and Fruit and Milk Groups in particular.

Snacking as a trend has increased in children but the nutrient dense choices are not typically the preferred snack. The consumption of foods with low nutritional value (e.g., soft drinks, candy and chocolate bars) are displacing foods and beverages of higher nutritional value (e.g., milk products, vegetables and fruit) and are contributing to the rising rates of childhood overweight and obesity. Excess portion size and physical inactivity are also major contributing factors.

Schools play an important role in promoting healthy eating in children. They are responsible for providing education to children about the benefits of healthy eating in the formal curricula. They should also be responsible for providing an environment that supports healthy eating. Providing foods with low nutritional value at school in vending machines, snack and meal programs, tuck shops, cafeterias, and fundraising programs undermines these efforts. In order to reinforce consistent healthy eating messages at school and to help students eat well and maintain healthy weights school must take the lead and provide a supportive healthy eating environment by eliminating the availability of low-nutrient foods. The following paper outlines Dietitians of Canada's recommendations for food choices suitable for distribution in schools.

## Notes

<sup>1</sup> Omnibus survey conducted by Thomas Lightstone for Dietitians of Canada 2003

<sup>2</sup> Ontario Society of Nutrition Professionals in Public Health School Nutrition Workgroup Steering Committee, Call to Action: Creating a Healthy Eating Environment, March, 2004.

<sup>3</sup> Nutrition-Cognition National Advisory Council, 1996

<sup>4</sup> Dietitians of Canada - American Dietetic Association, Manual for Clinical Dietetics, 6th edition, 2000

<sup>5</sup> Breakfast for Learning Canadian Living Foundation. Breakfast and Learning in Children. A review of the effects of breakfast on scholastic performance, (2000). Internet: [http://www.breakfastforlearning.ca/english/resources/materials/papa\\_report.pdf](http://www.breakfastforlearning.ca/english/resources/materials/papa_report.pdf)

<sup>6</sup> National Consensus Panel on School Nutrition, Recommendations for Competitive Food Standards in California School. California Center for Public Health Advocacy, School Nutrition Consensus Panel. 2002 cited in reference 2).

<sup>7</sup> Dietitians of Canada and Dairy Farmers of Canada, 2004 Report on Healthy Eating for School Age Children and Youth.

<sup>8</sup> Kubik, M.Y., Lytle, L.A., Hannan, P.J., Perry, C. L., Story, M., (2003). The association of the school food environment with dietary behaviours of young adolescents, *American Journal of Public Health* 93(7), 1168-1173.

<sup>9</sup> Ministry of Education and Training. The Ontario Curriculum Grades 1-8. Health and Physical Education. Toronto, ON: Queen's Printer for Ontario, 1998a.

<sup>10</sup> Ministry of Education and Training. The Ontario Curriculum Grades 1-8. Science and Technology. Toronto, ON: Queen's Printer for Ontario, 1998b.

<sup>11</sup> Ministry of Education and Training. The Kindergarten Program. Toronto, ON: Queen's Printer for Ontario, 1998c.

<sup>12</sup> Dixey R, Heindl I, Loureiro I, et al. Healthy eating for young people in Europe. International Planning Committee (IPC) of the European Network of Health Promoting Schools, 1999

<sup>13</sup> Deitz WH and Gortmaker SL Preventing Obesity in Children and Adolescents. Annual Reviews in Public Health, 2001. 22:337-353

<sup>14</sup> James J, Thomas P, Cavan D and Kerr D. (2004). Preventing childhood obesity by reducing consumption of carbonated drinks: cluster randomised controlled trial. *Primary Care: BMJ*, doi:10.1136/bmj.38077.458438.EE (published 27 April 2004)

- <sup>15</sup> Mandatory Health Programs and Services Guidelines (Ministry of Health, Public Health Branch, 1997).
- <sup>16</sup> Dietitians of Canada. Eating, Physical activity and Body Weight Trends in Canadian Children and Youth, December 2003
- <sup>17</sup> Food Guide Facts - Background for Educators and Communicators, Health Canada, 1992.
- <sup>18</sup> Nawrot P, Jordan S. Eastwood J, et al. Effects of Caffeine on Human Health. *Food Additives and Contaminants*. 2003. 20(1):1-30.
- <sup>19</sup> Canadian Pepsi products: Dole Beverages (fruit drinks and juices).
- <sup>20</sup> Energy levels for proposed food intake patterns. USDA Center for Nutrition Policy and Promotion, 2003 (Based on Estimated Energy Requirements from the Institute of Medicine, Dietary Reference Intakes Macronutrients Report, 2002).
- <sup>21</sup> Canadian Paediatric Society. (2004). Dieting in adolescence. *Paediatric Child Health* 9(7): 487-91.
- <sup>22</sup> National Academy of Sciences: Dietary Reference Intakes for Energy, Carbohydrates, Fiber, Fat, Protein and Amino Acids (Macronutrients). National Academy Press. Washington DC, 2000
- <sup>23</sup> American Dietetic Association, Position of the American Dietetic Association: Dietary Guidance for Children aged 2 to 11. *J Am Diet Assoc*. 2004; 104:660-677. Internet: [http://www.eatright.org/Public/GovernmentAffairs/92\\_adap0199.cfm](http://www.eatright.org/Public/GovernmentAffairs/92_adap0199.cfm)
- <sup>24</sup> Mah S. Preventing Dehydration, Ontario Physical Education and Health Association. Internet: <http://www.ophea.net/Ophea/Ophea.net/articleitem.cfm?RSID=2147107194>
- <sup>25</sup> Enns CW, Mickle SJ, Goldman JD. (1998). Trends in food and nutrient intake by children in the United States. *US Department of Agriculture. Family Economics and Nutrition Review*. 2002. 14(2). Internet: <http://www.barc.usda.gov/bhnc/foodsurvey/home.htm>
- <sup>26</sup> Johnson RK. Changing eating and physical activity patterns of US children. *Proc Nutr Soc*. 2000 May;59(2):295-301.
- <sup>27</sup> Page 3. Nicklas TA, Demory-Luce D, Yang SJ, Baranowski T, Zakeri I, Berenson G. Children's food consumption patterns have changed over two decades (1973-1994): The Bogalusa heart study. *J Am Diet Assoc*. 2004 Jul;104(7):1127-40.
- <sup>28</sup> Health Canada (2001). Trends in the Health of Canadian Youth-Health Behaviours in School Age Children. Internet: [http://www.hc-sc.gc.ca/dca-dea/7-18yrs-ans/trends\\_e.html](http://www.hc-sc.gc.ca/dca-dea/7-18yrs-ans/trends_e.html)
- <sup>29</sup> Cavadini C, Siega-Riz AM, Popkin BM. US adolescent food intake trends from 1965 to 1996. *Arch Dis Child*. 2000 Jul;83(1):18-24. Erratum in: *Arch Dis Child* 2002 Jul;87(1):85.
- <sup>30</sup> Gray-Donald, K., Johnson-Down, L. and Jacobs-Starkey, L. Food habits of Canadian; Comparison of intakes in adults and adolescents to Canada's Food Guide to Healthy Eating. *Can J Diet Prac Res*. 2001. 62:61-69.
- <sup>31</sup> Johnson RK, Panely C, Wang MQ. The Association Between noon-time beverage consumption and the diet quality of school-aged children. *Journal of Children and Nutrition Management*. 1998, 2:95-100.
- <sup>32</sup> Ballew, C et al. Beverage Choices Affect Adequacy of Children' Nutrient Intakes. *Arch Pediatr Adolesc Med* 2000;154:1148-1152.
- <sup>33</sup> Ransome K, Rusk J and Field C. "A School Milk promotion program increases milk consumption and improves the calcium and vitamin D intakes of elementary students." *Canadian Journal of Dietetic Practice and Research*, Vol. 59 (4), 1998.
- <sup>34</sup> Hanning R, Jessup L, et al (University of Waterloo Health Behaviour Group) 2002. Food behaviour of Ontario school children. Unpublished data (pending publication) (cited in reference 2).
- <sup>35</sup> Heart and Stroke Foundation of Canada, 2002. Report Card on Health - Tweens Could Be Headed for Trouble. Internet: <http://ww2.heartandstroke.ca/Page.asp?PageID=33&ArticleID=1089&Src=news&From=SubCategory>
- <sup>36</sup> Heart and Stroke Foundation of Canada, 1998. Report Card on Health.
- <sup>37</sup> Statistics Canada, Health Indicators Catalogue #82-221-X1E. Canadian Community Health Survey 2000-2001. 2002(1):1-2.
- <sup>38</sup> Market Facts, 1998. "1997 Canadian Eating Habits" (cited in reference 2).
- <sup>39</sup> Jahns L, Siega\_Riz AM, Popkin BM. The increasing prevalence of snacking among US children from 1977 to 1996. *J Pediatr* 2001 apr;138(4):493-8.
- <sup>40</sup> Sullivan DK, Legowski PA, Jacobsen DJ, Hnyder Heelan KA, Johnson SL and Donnelly JE. (2002). A low-fat afterschool snack improves the nutritional quality of elementary school children's diets. *Journal of the American Dietetic Association*. 102: (5): 707-9.
- <sup>41</sup> Harnack L., Stang J, Story M. Soft drink consumption among US children and adolescents; nutritional consequences. *J Am Diet Assoc*. 1999 Apr;99(4):436-41.
- <sup>42</sup> Whiting SJ, Vatanparast H, Baxter-Jones A, Faulkner RA, Mirwald R, Bailey DA. Factors that affect bone mineral accrual in the adolescent growth spurt. *J Nutr*. 2004 Mar;134(3):696S-700S.
- <sup>43</sup> Rampersaud GC, Bailey LB, Kauwell GP. National survey beverage consumption data for children and adolescents indicate the need to encourage a shift toward more nutritive beverages. *J Am Diet Assoc*. 2003 Jan;103(1):97-100.
- <sup>44</sup> Miller GD, Jarvis JK, McBean LD. The importance of meeting calcium needs with foods. *J Am Coll Nutr*. 2001 Apr;20(2 Suppl):168S-185S.
- <sup>45</sup> Evers S, Taylor J, Manske S, Midgett C. 2001. Eating and Smoking Behaviours of School Children in Southwestern Ontario and Charlottetown, PEI. *Canadian Journal of Public Health*, 92(6):433-436).
- <sup>46</sup> Dairy Farmers of Ontario Database Analysis, school volumes 1998/99.
- <sup>47</sup> Tremblay MS, Wilms JD. Secular trends in the body mass index of Canadian Children. *C.M.A.J.* 2000 Nov 28; 163(11):1429-33.
- <sup>48</sup> Health Canada, National Longitudinal Survey of Children and Youth: Childhood Obesity, Human Resources Development Canada and Statistics Canada, 1999 <http://www.statcan.ca/Daily/English/021018/d021018b.htm>
- <sup>49</sup> Nicklas TA, Yang SJ, Baranowski T, Zakeri I, Berenson G. Eating patterns and obesity in children. The Bogalusa Heart Study. *Am J Prev Med*. 2003 Jul;25(1):9-16.
- <sup>50</sup> French SA, Lin BH, Guthrie JF. National trends in soft drink consumption among children and adolescents age 6 to 17 years: Prevalence, amounts, and sources, 1977/1978 to 1994/1998. *J Am Diet Assoc*. 2003 Oct;103(10):1326-1331.
- <sup>51</sup> Ludwig DS, Peterson KE, and Gortmaker SL. 2001. Relation between consumption of sugar-sweetened drinks and childhood obesity. *Lancet*, 357:505-598. (cited in reference 2)
- <sup>52</sup> Gillis L. Promoting Vitality in Youth. *Canadian Journal of Dietetic Practice and Research*. 2001. 62(2):61-69. (cited in reference 2)
- <sup>53</sup> Nielson SJ, Popkin BM. Patterns and Trends in food portion sizes, 1977-1998. *JAMA* 2003;289:450-3.
- <sup>54</sup> Canadian Food Inspection Agency 2003 Guide to Food Labelling and Advertising, Reference Amounts and Serving Sizes Table 6-3. Internet: <http://www.inspection.gc.ca/english/fssa/labeti/guide/ch6e.shtml#6.2>
- <sup>55</sup> American Academy of Paediatrics, 2004.
- <sup>56</sup> Young LR, Nestle M. The contribution of expanding portion sizes to the US obesity epidemic. *Am J Public Health*. 2002 Feb;92(2):246-9.
- <sup>57</sup> Anderson RE. The spread of childhood obesity epidemic. *CMAJ* 2000; 163(11): 1461-1462.
- <sup>58</sup> Troiano RP, et al, "Energy and fat intakes of children and adolescents in the United States: data from the national health and nutrition examination surveys". *Am J Clin. Nutr* 2000 Nov;72 (5Suppl): 134S-135S.

## Acknowledgements

Dietitians of Canada (DC) thanks the many people who provided the critical review that contributed to the development of this paper on School Food and Nutrition.

Thank you to the dietitians:

<b>Helen Brown</b>	Diploma Nutrition, RD, Senior Nutrition Consultant, Ontario Ministry of Health and Long Term Care
<b>Lynda Corby</b>	MSc, MEd, RD, FDC, Director Policy Communications, Dietitians of Canada
<b>Dr. Susan Evers</b>	PhD, RD, Professor, Department of Family Relations and Applied Nutrition, University of Guelph
<b>Joanne Gallagher</b>	MHSc, RD, Assistant Director, Nutrition Education, Dairy Farmers of Canada (ON)
<b>Eileen Hogan</b>	Ph.D., P.Dt., Nutrition Consultant, Wolfville, Nova Scotia
<b>Colleen Logue</b>	MHSc, RD, Manager, OPHEA, Nutrition Resource Centre, Toronto ON
<b>Pat Martz</b>	RD, Community Health Dietitian, Calgary Health Region, Edmonton, Alberta
<b>Lori Petryk-Leclair</b>	MSc., RD, Anishinaabe Mino-Ayaawin, Winnipeg, Manitoba
<b>Mary Ellen Prange</b>	MHSc, RD, Public Health Nutritionist, Hamilton Public Health and Community Services
<b>Nancy Saunders</b>	P.Dt., Chateauguay Valley Regional High School, Ormstown, Quebec
<b>Flo Woods</b>	RD, School Nutritionist, Food for Thought Project, Prince Albert, Saskatchewan

Special thanks goes to the Ontario Society of Nutrition Professionals in Public Health - School Nutrition Workgroup Steering Committee

The paper was written by DC members Lynn Roblin, MSc., RD and Carol Dombrow, RD.

The coordination of the paper was done by Linda Dietrich, M.Ed, RD, Regional Executive Director, Dietitians of Canada