The Association between the Introduction of a Province-Wide School Nutrition Policy and Food Consumption in Elementary School Children on Prince Edward Island

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Abstract

Although the majority of Canadian provinces have now adopted province-wide school nutrition policies in an effort to improve children's eating habits and reduce childhood overweight, there has been little evaluation of healthy eating policies across the country. Nutrition policies for elementary schools in Prince Edward Island were adopted by all three school districts in 2005-2006, referred to as the PEI School Nutrition Policy in this thesis. This purpose of this study was to describe food consumption of those grade five and six students participating in the *Eating Behaviour Survey* in 2007 and to examine the association between any changes in food consumption and the implementation of the school nutrition policy (2001/02 vs. 2007). An in-class survey was used to describe food intakes according to grade and gender for all grade 5 and 6 children in PEI in 2007 (n=2026). A quasi-experimental, pre-test–post-test design was then used to compare food consumption data from a subset of 11 schools which were included in both a pre-policy (2001/02) survey and the post-implementation survey (2007) (n=1533). Study hypotheses were that 1) daily intakes of Milk and Alternatives (MA) and Vegetables and Fruit (VF) will be higher and intakes of low nutrient density foods (LNDF) will be lower following implementation of the PEI School Nutrition Policy compared to pre-implementation; 2) students will be more likely to consume adequate amounts of MA, VF following policy implementation compared to pre-implementation and 3) students will be less likely to consume three or more servings of LNDF following policy implementation compared to pre-implementation. Hierarchical linear modelling was then used to assess changes in food consumption between 2001/02 and 2007, with survey year as a fixed effect and gender,

grade and the difference in students' total daily number of food servings between the two time periods as covariates.

Results indicated that students in 2007 were more than twice as likely to report consuming less than 3 servings of LNDF compared to those in 2001/02 (OR=2.14 [95% CI 1.63,2.83]). Survey year was also a significant predictor of whether or not students met CFG recommendations for Milk and Alternatives and Vegetables and Fruit. Students who were surveyed in 2007 were 1.3 times more likely to consume the recommended servings of Milk and Alternatives ($p<0.05$) and 1.5 times more likely to consume the recommended servings of Vegetables and Fruit than students in 2001/02.

Study results provide support for our hypotheses in that the introduction of the PEI School Nutrition Policy has been associated with a significant reduction in the consumption of low-nutrient density foods and a modest increase in the consumption of healthier choices from the Vegetables and Fruit and Milk and Alternatives food groups. The results thus underscore the importance of school nutrition policies, which modify the school food environment through the restriction of 'poor choices', in improving children's diet quality and their overall health. Findings are also consistent with a growing number of studies demonstrating the impact of changes to the school food environment on student food and nutrient intakes. While reducing unhealthy foods is a positive change to the school food environment, the lack of improvement in healthy choices may suggest that a more comprehensive intervention is needed where healthy choices are made readily available to students.

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Finally, I offer my deepest gratitude to my family and it is to them that I dedicate this thesis. All of this hard work is truly the result of my husband's hard work. His unwavering support and positive encouragement has been there for every part of this journey. He has stepped up in ways that are, quite simply, too many to mention. And to my charming Cullen, thoughtful Lara, and spirited Maria, your patience and understanding has been sincerely appreciated.

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CHAPTER ONE

The Research Problem

Background

It has long been recognized that healthful eating habits in children help to prevent chronic under-nutrition and growth retardation, as well as acute childhood nutrition problems such as iron-deficiency anemia and dental caries (Centers for Disease Control and Prevention [CDCP], 1996). However, there is increasing recognition that childhood obesity is a major public health problem with significant health implications in both childhood and adulthood, and that unhealthy eating patterns and low activity levels in childhood are contributing to the observed alarming increases in childhood overweight and obesity (Meizi & Beynon, 2006; Veugelers & Fitzgerald, 2005b; Willms, Tremblay, & Katzymarzyk, 2003). As a result, the concern has shifted from a previous focus on under-consumption and nutrient deficiencies to a broader concern with over-consumption and decreased energy expended in physical activity (American Dietetic Association, 2004; Canadian Community Health Survey, 2005). Increasing evidence suggests that Canadian children may be making unhealthy food choices, putting children at risk of, not only caloric excesses, but also nutritional inadequacies (Taylor, Evers, & McKenna, 2005). Moreover, research indicates that eating habits may track into adulthood, and in fact, there may be a further 'decline' in diet quality during this transition (Demory-Luce et al., 2004).

Schools are recognized to have a potentially powerful influence on students' eating habits through healthy eating policies and programs offered (Veugelers & Fitzgerald, 2005). In fact, consensus is emerging within research and stakeholder communities that action at the school level, including nutrition policies, must be a priority to create supportive environments which enable children to make healthy food choices and, ultimately, reduce the future morbidity and mortality associated with overweight and obesity (National Association of State Boards of Education, 2004; Institute of Medicine, 2007). School-based nutrition policies are important to provide infrastructure for co-ordinating school nutrition initiatives and support individual level behaviour change.

The majority of Canadian provinces have now adopted province-wide school nutrition policies. In spite of this increase in policies, and a number of calls for rigorous evaluation of healthy eating policies in Canadian schools, there has been little evaluation of healthy eating policies across the country. Moreover, there is currently no nationally accepted evaluation framework for this purpose. Nutrition policy evaluation is critical in order to monitor progress towards goals, assess effects of the policy, and to provide accountability to stakeholders.

In 2005-2006, all three school districts in Prince Edward Island (PEI) adopted identical nutrition policies for elementary and consolidated schools resulting in a de facto province-wide nutrition policy. This presented us with a policy relevant "natural experiment" upon which it is important to capitalize. The timing is ideal to

examine whether such policies can be effective in changing student eating behaviours. The small, rural and relatively stable population of PEI, the first time implementation of new nutrition policies in elementary schools, the high incidence of overweight and obesity among children and adults, and the poor dietary habits among both adults and children make PEI an ideal natural setting for this research.

The present research is part of a larger 5 year study examining the impact of school nutrition policies on eating habits and the prevalence of overweight and obesity among children and youth.

Research Question/Objectives/Hypothesis

Research Question

Is there a change in food consumption of grade five and six students following the implementation of the PEI School Nutrition Policy?

Objectives

1. (a) To describe the frequency of foods commonly consumed on a daily basis and weekly basis among grade five and six students in PEI elementary schools and assess differences according to grade and gender. (b) To describe the mean intakes of Milk and Alternatives, Vegetables and Fruit, and low-nutrient-dense-foods (LNDF) and assess differences according to grade and gender.

(c) To describe the proportion of students consuming *adequate* servings of Milk and Alternatives, Vegetables and Fruits, according to Canada's Food Guide, and the proportion consuming three or more servings LNDF and assess differences according to grade and gender.

2. To examine the influence of the PEI School Nutrition Policy on food consumption, through the following objectives:

   (a) To assess changes in total daily intakes of Milk and Alternatives, Vegetables and Fruit, and LNDF consumed by grade five and six students prior to and following implementation of the PEI School Nutrition Policy (2001/02 vs. 2007).

   (b) To assess whether students are more likely to consume adequate servings of Milk and Alternatives, and Vegetables and Fruit (according to Canada's Food Guide), and less than three servings of LNDF following the implementation of the PEI School Nutrition Policy (2001/02 vs. 2007) compared to prior to implementation of the policy.

Hypotheses.

1. The daily intakes of servings of Milk and Alternatives and Vegetables and Fruit will increase and the daily intakes of low nutrient density foods (LNDF) will decrease following the implementation of the PEI School Nutrition Policy (2007) compared to pre-implementation (2001/02).

2. Students will be more likely to consume adequate amounts of Milk and Alternatives and Vegetables and Fruit following the implementation of the PEI School Nutrition Policy (2007) compared to pre-implementation (2001/02).

3. Students will be less likely to be consuming three or more servings of LNDF daily following the implementation of the PEI School Nutrition Policy (2007) compared to pre-implementation (2007).

CHAPTER TWO

The following chapter will provide a review of the available evidence regarding children's dietary behaviours and the growing problem of childhood overweight and obesity. The literature on the potential role of school nutrition policies in addressing children's eating behaviours and the problem of overweight and obesity is also reviewed, followed by a brief description of the current situation in PEI.

Literature Review

Dietary Concerns in Children

Concerns regarding the overall quality of children's diets have received considerable attention in recent years. Most information on the food and nutrient intakes of children and youth comes from nutrition surveillance in the United States (Alaimo et al., 1994; Levine & Guthrie, 1997; Lino, Basiotis, Gerrior, & Carlson, 2002; Schwenk, 1997; Wilkinson Enns, Mickle, & Goldman, 2002). Food consumption patterns of children and youth in the U.S. have been described as an "inverted Food Guide Pyramid", with only 2% of children meeting all of the recommendations and only 10% meeting recommendations for four or more food groups (Muñoz , Krebs-Smith, Ballard-Barbash, & Cleveland, 1997, 1998). An examination of American trends in food use among children and youth over the past quarter century indicates a number of areas of nutritional concern, including an increase in soft drinks, fried potatoes, and grain based snack foods and a decrease in

consumption of total vegetables and fluid milk (Cross, Babicz, & Cushman, 1994; Wilkinson Enns et al., 2002). Interestingly, there was little change in Healthy Eating Index scores in children from 1989 to 1994-96/98 (Lino et al., 2002). The Healthy Eating Index is a measure of overall diet quality for an individual that was developed by the United States Department of Agriculture (United States Department of Agriculture, 2005).

In Canada, the *Health Behaviours in School-Aged Children* (King, Boyce, & King, 1999), a cross-sectional national study, provided some insights into Canadian children's dietary behaviours, assessing the frequency of use of 12 foods. A number of nutrition related concerns were identified, including low fruit and vegetable consumption and daily consumption of candy/chocolate bars and soft drinks. Limited food intake data at the provincial level are also available for some provinces. A longitudinal study of children in selected low income Ontario communities, *Better Beginnings, Better Futures*, (Kalin, 2002) indicated that only 29% of school aged children (8 years olds, n=560) consumed the minimum recommended five daily servings of fruits and vegetables; 8% did not consume vegetables on the previous day. Ten per cent of 8 year olds did not consume any milk products; only 40% had a minimum of two servings per day. A more recently published study of Ontario students in grades six, seven, and eight found that reported median intakes of servings were below current recommendations, according to Canada's Food Guide, for Grain Products (4.6 and 3.8 servings for males and females, respectively),

Vegetables and Fruit (3.8 and 4.1 for males and females, respectively), and Milk and Alternatives (2.0 and 1.8 servings for males and females, respectively), with females consuming significantly less of each (Hanning et al., 2007).

One cross-national study reported a decline in daily consumption of fruits and vegetables from 1990 to 1998 for both males and females in grades six and eight (Health Canada, 2000). When the study was repeated in 2001-2002, it was found that only 54-59% of boys and approximately two-thirds of girls ate fruits 5 days of the week, and significantly more girls than boys also consumed vegetables 5 days per week or more (Health Canada, 2004). A comparative study between PEI and Ontario children also revealed lower than recommended daily intakes of fruits and vegetables (4.2 servings/day, ±2.0), with only 39.5% of boys and 41.6% of girls consuming the recommended five or more servings daily (Evers, Taylor, Manske, & Midgett, 2001). A follow-up survey in a larger PEI sample revealed similar concerns (Taylor, Bradley & Peacock, 2003). American studies suggest a similar trend, where a considerable number of 2-19 year olds (46%) in the U.S. have less than one serving of fruit a day; 18% have less than one serving of vegetables (including french fries), and less than one fourth of children 6 to 11 years in 1994-1998 consumed the recommended number of servings for fruits and vegetables (Wilkinson Enns et al., 2002). This corroborates results of other American reports which indicate that vegetable and fruit consumption is low (Neumark-Sztainer, Story, Resnick, & Blum, 1996; Schwenk, 1997). Almost one fourth of all vegetables reported by both

children and adolescents were french fries (Krebs-Smith et al., 1996; Muñoz et al., 1997). The high prevalence of inadequate vegetable and fruit intakes is a concern, since available evidence suggests that a diet rich in fruits and vegetables reduces the risk for certain cancers and other chronic diseases (National Cancer Institute, 2007).

Several studies have documented declining milk consumption patterns among children and adolescents in the last 40 years (Bowman, 2002; Cavadini, Siega-Riz, & Popkin, 2000; French, Lin, & Guthrie, 2003; Popkin & Nelson, 2003; Rampersaud, Bailey, & Kauwell, 2003; Vatanparast, Lo, Henry, & Whiting, 2006). Vatanparast et al. reported that the percent contribution of milk to total caloric beverage intake decreased in boys and girls from 1991 to 2004, while the mean intake of milk significantly decreased over time in girls only. Furthermore, it is was found that, whereas soft drink consumption increased greatly during adolescence, there was a corresponding decrease in milk consumption (Vatanparast et al.) and that children started replacing milk as early as the third grade (Bowman; Lytle, Seifert, Greenstein, & McGovern, 2000). When a similar survey was conducted in PEI and Ontario, it was found that less than half of children in grades 4-6 consumed the recommended three servings of milk daily (Evers et al., 2001). This is a cause for concern, since inadequate calcium intake coupled with a sedentary lifestyle in childhood can compromise skeletal growth and bone mineralization, thereby increasing the diet-related risk of developing osteoporosis later in life (Carter et al., 2001; CDC, 1996; Matkovic et al., 2005).

Not only are Canadian children eating less than the recommended number of servings of nutritious foods from Canada's Food Guide, but they are also eating an *excess* of less nutritious foods (i.e., foods high in fat, sugar, and salt). Of grade six students surveyed in a recent national study, 36-38% had candy and chocolate 5 days a week or more, whereas 28-31% ate french fries twice a week or more, and 42-47% ate potato chips twice a week or more (Health Canada, 2000). Evers et al. (2001) found that children living in PEI consumed significantly more french fries and regular soft drinks ($p<0.05$), as well as potato chips, cakes, cookies, pies, and doughnuts ($p<0.001$) than children in Ontario.

In summary, there are significant nutritional concerns among North American children and youth. These include: (a) low intakes of nutrient dense foods such as fruits and vegetables and milk products; (b) high intakes of less healthy choices, such as soft drinks and high fat, high sugar snack foods; (c) high fat and saturated fat intakes; (d) low folate and calcium intakes; and (e) a decline in dietary quality with age (from pre-school to high school). The impact of these dietary concerns is described below.

Overweight and Chronic Disease Risk Factors in Children

Such poor dietary behaviours are not without implications. In fact, poor diet quality, typically characterized by excessive dietary fat and refined sugars, and inadequate intake of fruits, vegetables, and whole grains, has been identified as one of the primary mechanisms underlying childhood overweight and obesity (Ebbeling,

Pawlak, & Ludwig, 2002; Nicklas & Johnson, 2004). This connection is important because, as of 2004, about 1.1 million (18%) Canadian boys and girls age 2 to 17 years old were overweight, and another half a million (8%) were obese. This means that more than one-quarter (26%) of these young people were overweight or obese (Shields, 2006). These trends are particularly worrisome, given that recent reports indicate that obesity in childhood and adolescence persists or tracks into adulthood (Field, Cook, & Gillman, 2005; Guo, Wu, Chumlea & Roche, 2002; Kvaavik, Tell, & Klepp, 2003; Vanhala, Vanhala, Kumpusalo, Halonen, & Takala, 1998) and is associated with increased overall adult mortality (Engeland, Bjørge, Søgaard, & Tverdal, 2003). One study by Whitaker, Wright, Pepe, Seidel, and Dietz (1997) reported that the overweight status of 6 year old children was found to be predictive of adulthood obesity. There is additional evidence that the probability of childhood BMI being predictive of adulthood overweight and obesity increases with age during childhood and adolescence (Field, Cook, & Gillman; Guo et al.).

Poor diet is associated not only with overweight and obesity but also with the development of cardiovascular diseases (Field, Cook, & Gillman; Daniels et al., 2005), various types of cancers (National Cancer Institute, 2007), and Type II diabetes (CDC, 1996; Daniels et al.). Significant concerns have been expressed regarding the fact that such chronic disease risk factors and Type 2 diabetes are higher in obese children (Dietz, 1998; Fagot-Campagna, Narayan, & Imperatore, 2001; Lau et al., 2007). A report of the *Bogalusa Heart Study* indicated that 58% of

overweight school children had at least one risk factor for cardiovascular disease (Freedman, Dietz, Srinivasan, & Berenson, 1999). Furthermore, total cholesterol and blood pressure levels have been shown to track from childhood to adulthood (Boyd, Koenigsberg, Falkner, Gidding, & Hassink, 2005; Gunnell, Frankel, Nanchahal, Peters, & Smith, 1998). Moreover, there is strong agreement that primary prevention efforts are critical in order to improve eating habits during childhood and ultimately reduce the risk factors for obesity and other related chronic disease during childhood, and consequently later in life (Ernst & Obarzanek, 1994; Raine, 2005).

Determinants of Children's Eating Habits

With so much concern about the declining quality of children's diets, there has been a call for enhanced understanding of those factors that influence an individual's eating habits (Taylor, Evers, & McKenna, 2005). A recent synthesis of the current evidence on the determinants of healthy eating was conducted by Taylor et al., and is structured around individual and collective determinants. *Individual* determinants include biological factors (e.g., age, gender), food preferences, knowledge and attitudes pertaining to health and food, and skill level or capacities; and *collective* determinants were identified as economic (e.g., income/socio-economic status, food pricing, education, and employment), social (e.g., cultural factors, familial factors, peers, and product marketing/mass media), and physical environments (e.g., foods available/portion sizes, and the school food environment) (Taylor et al.). The school food environment, which encompasses the types of foods

available in vending machines, school canteens, and à la carte lines, has received considerable attention for its potential to influence students' dietary intakes (French, Story, Fulkerson, & Gerlach, 2003; Kubik, Lytle, Hannan, Perry, & Story, 2003; Wechsler, Brener, Kuester, & Miller, 2001). It is generally held that community-based and environmental interventions are among the most feasible ways to support healthful lifestyles for the greatest numbers of children and their families (American Dietetic Association, 2006; Campbell, Waters, O'Meara, Kelly, & Summerbell, 2002; Whitlock, Williams, Gold, Smith, & Shipman, 2005).

School Food Environment

The physical and social environments provided in schools have been identified as having the potential to significantly impact children's eating behaviours, and ultimately their health (French et al., 2003; Kubik et al., 2003; Wechsler et al., 2001). Specifically, the school food environment has been identified as having a powerful influence on students' dietary behaviours as it determines the types of foods offered and the frequency with which they are consumed (Weschler, Devereaux, Davis, & Collins, 2000). About one-third of a child's total daily energy requirements are obtained from lunch eaten while at school (Koplan, Liverman, & Kraak, 2005). Recent surveys of food programs in Canadian schools (e.g. New Brunswick, Nova Scotia, Newfoundland, Manitoba and Prince Edward Island) have identified a number of concerns regarding the availability of foods in schools (Coalition for School Nutrition, 2001; Fieldhouse, 2002; Rankine, 1990; Taylor,

Bradley, & Peacock, 2003; Nova Scotia Department of Health, 1993). Regardless of children's knowledge of nutrition, their food choices are influenced by the total eating environment, including the types of foods offered at school, the nutrition education provided in the classroom, as well as any nutrition promotion material that reaches home (Koplan et al., 2005; US Department of Health and Human Services, 2000; USDA, 2005).

School Nutrition Policy

With the increasing awareness of the importance of the school food environment in shaping children's food choices, many nutrition intervention programs occur in schools, and the most effective ones include an environmental component (Hoelscher, Evans, Parcel, & Kelder, 2002; Lytle & Kubic, 2003). The total eating environment is, or has the potential to be, determined by school policy as it relates to nutrition. For this reason, the PEI School Nutrition Policy includes elements which address the school food environment in which children spend their school day. For example, the policy includes lists of food standards that recommend "Foods to Serve Often", which consists of healthy food choices that can be offered daily; "Foods to Serve Sometimes", which consists of foods that are relatively healthy but may be higher in calories, fat, or salt, and can be served two to three times per week; and "Foods to Serve Least Often", which consists of foods that tend to be quite high in fat, sugar, or calories, or offer little nutritional value and should be served one to two times per month or less (Appendix C). The policy recommends

that foods belonging to the Vegetable and Fruit, and Milk and Alternatives food groups according to Canada's Food Guide could be served "Often" or, in some cases, 'Sometimes" and foods that belonged to the "Other" food category and are on the "Foods to Serve Least Often" list. The PEI policy also addresses Student Access to Food (e.g., availability of emergency food cupboards, food pricing) and Nutrition Education (i.e., encourages the development of nutrition curriculum in co-operation with the PEI Department of Education) (www.healthyeatingpei.ca).

Given the potential influence of the school food environment in shaping dietary behaviours, and the well-established link between unhealthy dietary patterns (i.e., diets low in vegetables and fruits and high in fats) and childhood overweight and obesity (Boumtje, Huang, Lee, & Lin, 2005; Veugelers & Fitzgerald, 2005b; Welsh et al., 2005) it is logical to examine food use practices among students for whom the policy was intended.

One study by Vereecken, Bobelijn, and Maes (2005) measured the change in consumption of fruit, soft drinks, and crisps and sweets as one outcome influenced by the school food policy. Findings from this study confirm the potential influence of policy on the environment, and consequently on food consumption, where 'food rules' restricting the consumption of certain unhealthy food items were associated with a lower consumption of crisps ($OR=0.74$, $p<0.01$) and soft drinks ($OR=0.82$, $p<0.01$), and students were more likely to consume soft drinks if they were available at the school ($OR=1.40$, $p<0.001$) (Vereecken et al.). Another study reviewed the

effects of a district-wide nutrition policy change on student eating patterns (as well as school and district revenues) and found that the provision of healthy menu items led to increased participation in the school lunch programs in San Francisco schools (Wojcicki & Heyman, 2006). Still, there is a need for further evaluations that examine the extent to which school nutrition policies can change school food environments and how that will in turn affect students cognitive, and dietary behaviours.

Nutrition or 'healthy eating' policies are critical in order to provide guidelines for planning, development, and implementation of comprehensive nutrition programs (CDC, 1997). Such policies may include adequate time for classroom nutrition curriculum, ready availability of healthy foods, access to low cost or free meals to all students, adequate time for lunch, and limited wait times, among others (Briggs, Safaii, & Beall, 2003). Health agencies in Britain, the United States, Canada and elsewhere have called for the implementation of comprehensive nutrition policies as an effective means to address childhood nutrition problems (McKenna, 2000). This growing awareness of schools' powerful influence on dietary intake and energy expenditure, compounded by the fact that schools often offer less healthy foods for sale, has led to an increase in nutrition policy development and implementation in both the U.S. and Canada in the past 5 years. *The School Health Policies and Practices Study,* conducted in 2000 (Wechsler et al., 2001), and repeated in 2006, detected increases in the number of U.S. schools that

had policies in place regarding the nutritional quality of foods (i.e., prohibiting 'junk foods') from à la carte menus, at concession stands, in school stores, canteens, or snack bars, at student parties, and in vending machines (O'Toole, Anderson, Miller, Guthrie, 2007). Currently, the majority of Canadian provinces (7 out of 10) have indicated that they have adopted new nutrition policies (Centre for Science in the Public Interest, 2007). To date, however, there have been few, if any, systematic evaluations of these nutrition policies in either Canada or the United States (Taylor et al., 2003; Metos & Nanney, 2007).

Recently, Veugelers, Fitzgerald, and Johnston (2005) conducted a comprehensive evaluation of how school-based policies and programs affected eating behaviours, physical activity, and body weights of more than 5000 grade five students, representing 282 schools. Results from this study provided persuasive evidence, for the first time, that comprehensive health promotion and wellness programs can have benefits for Canadian children. Children attending the health promoting schools were 59% less likely to be overweight and 72% less likely to be obese relative to students attending other schools without prevention programs (Veugelers et al.). These students were also found to have healthier diets with more fruits and vegetables, and were more physically active and engaged less in sedentary activities.

Prince Edward Island Context

PEI is a small, primarily rural province (population 140,000) with a generally low socio-economic status and a high rate of unemployment. Island children, in particular, face a dual challenge with the current rate of childhood obesity and reports of unhealthy eating behaviours (Evers et al., 2001; MacLellan, Taylor, vanTil, & Sweet, 2004; Taylor et al., 2005). In response to these concerns, a province-wide school nutrition policy was implemented in all elementary schools in an effort to improve children's eating habits and reduce rates of childhood overweight. Since children's food consumption had been assessed in 2001/02 (Taylor, Bradley, & Peacock, 2003), this presented a unique opportunity to measure the effectiveness of a school nutrition policy in improving childhood eating behaviours by comparing food consumption prior to (2001/02) and following (2007) policy implementation.

CHAPTER 3

Methods

This research is based on the first wave of data collection of a larger study in which data will be collected in 2-year cycles over five years. The methodology employed is consistent with that of the larger study which includes a student questionnaire on eating behaviours, student anthropometric measurements (height and weight), and a parent questionnaire for general demographic information. The current study focuses only on student eating behaviours. This chapter provides a description of the study design, study population, data collection instruments, staff training, data collection procedures, ethics, and data analyses.

Design

The present study utilizes a quasi-experimental, pre-test–post-test design. There are two components to this study. First, an in-class survey was used to collect dietary data of grade five and six students from all PEI schools in order to describe food use for the entire sample surveyed in 2007. Secondly, data from 11 schools in the 2007 survey sample were used to analyze change over time in food use following the implementation of the PEI School Nutrition Policy by comparing it to the same 11 schools surveyed in 2001/02, prior to implementation of the policy. The same dietary methodology was used in 2001/02; this is described elsewhere (Taylor et al., 2003).

Study Population

In Prince Edward Island there are a total of 52 elementary (grades one to six) and consolidated (grades one to eight) schools. Two small schools currently have no students in grades five and six, and an additional six French schools will be surveyed in 2007-2008. Of the remaining 44 schools, 30 schools are in the Eastern School District, with 2193 students; 14 schools are in the Western School Board, with 1127 students. All 3,320 grade five and six students were invited to participate in the larger research project. Students below grade five were not included since previous research has determined that children below this level are less likely to provide valid dietary data (Evers et al., 2001; Taylor et al., 2005). Furthermore, given the documented decline in dietary quality in the intermediate grades, grade five and six are ideal targets for prevention efforts.

Data Collection

Instruments

Eating behaviour survey. The *Eating Behaviour Survey* (EBS) consists of a list of 27 foods in which children indicate the frequency of their intake of each food (Appendix A). The food list was developed using a food group analysis of 24 hour recalls from an Ontario child health study. The reliability and validity of this questionnaire was previously established with this age group (Midgett et al., 2000). The test re-test reliability of the instrument was established by re-administering the survey with a subgroup of grade five and six students (n=123) resulting in

correlations of 0.5 to 0.7 for individual foods. The relative validity was assessed by cross-checking the estimates of nutrient intakes against 24-hour recalls conducted with the same sub-group of students and analyzing the differences between nutrients such as fat, calcium, fiber, vitamins A and C, thiamin, and folate. Mean intakes calculated from the survey data were compared to mean intakes based on the recall data by t-tests and no differences were found (Midgett et al.). For this study, participants were provided with the following options: "at least twice a day"; "once a day"; "4 to 6 times per week"; "1 to 3 times per week"; or "never". The questionnaire was prepared in a computer scannable format for easy data entry.

Training

Ten research assistants were hired and trained regarding data collection procedures. Training was done in a group format and covered the following topics: an overview of the research project, obtaining consent, administering the questionnaires, and working with schools. When all training material was covered, four grade six students were invited to volunteer as participants so that research assistants could practice explaining the study, gaining consent, taking weight and height measures, and administering the survey. The training session was used to adjust the scripts and modify data collection techniques as necessary, such as simplifying the explanation of the questionnaire.

Recruitment

Participants were initially recruited through the school. A description of the study and a consent form were sent home with each child for parents to sign if they agreed to have their child participate (Appendix B). Only those children whose parents consented and who signed the child assent form were permitted to participate in the study. Questionnaires were sent home to parents to collect demographic information such as, education level and household income.

Procedures

The research team (minimum of one supervisor and two to three research assistants) went in to each grade five and six class to introduce the survey. The study was explained to students and the data collection process (i.e., what students would be doing if they participated) was clearly articulated. A sample section of the "Eating Behaviour Survey" was enlarged into a poster and used to demonstrate to students the proper way to complete the survey. Students were given as much time as needed to complete the survey and research assistants were available in the classrooms at all times to respond to questions. A laminated poster with photos of all locally available milk cartons and jugs was used to help students visually identify the brand and fat content of fluid milk available on PEI. An alternate activity sheet was provided for non-participating students to prevent them from being singled out. Research assistants were available to help students who requested assistance or had questions.

Ethics

The present study received ethical approval from the University of Prince Edward Island (UPEI) Research Ethics Board. The certificate of approval from the UPEI Ethics Review Board is provided in Appendix D. Approval to conduct this study in local schools was also obtained from the Eastern School District and the Western School Board. The study protocol was also reviewed with school principals and the District Board of Trustees prior to data collection.

Written, informed consent was obtained from parents before they completed the parent questionnaire and only those children whose parents consented, were approached to participate. Those children were provided with a verbal explanation of the study and a written assent form to sign (Appendix B). Children were reminded of their right to not participate in the study and were asked to sign the assent form only if they were comfortable with participating, regardless of their parents' consent. To protect confidentiality and to link data without names, all student surveys were coded with identification numbers that corresponded to their parent's survey identification numbers.

Data Analyses

Data collected in 2007 were either scanned or entered manually into SAS Version 9.1, while all data from 2001/2002 were entered manually. Data were examined for out-of-range, out of sequence values within student classes, extreme values, duplicate entries, and missing values and were cleaned accordingly.

Objective 1 (a) Daily and weekly food consumption according to grade and gender.

Initially, for the *Eating Behaviour Survey*, participants indicated their frequency of consumption during the past seven days as follows: "at least twice a day", "once a day", "4 to 6 times a week", "1 to 3 times a week", and "never". These five response categories for each food were reduced to three new categories which were termed "daily", "weekly", and "never". If a participant stated that they ate the selected food one or more times per day, they were considered to have a "daily" intake of that food; however, if they stated that they consumed that food between one and six times in the past seven days their intake was recorded as "weekly". Lastly, if participants stated they had not consumed the food in the last seven days, their intake was recorded as "never".

Following all data entry and cleaning, frequency counts were generated for all survey questions and the newly created, daily/weekly/never variables. Frequency of foods consumed daily and weekly were analyzed by grade and gender and assessed for differences using Chi-square analysis.

Objectives 1 (b) Mean intakes of Milk and Alternatives, Vegetables and Fruit, and low-nutrient-dense-foods (LNDF) according to grade and gender.

and (c) Proportion of students consuming *adequate* servings of Milk and Alternatives, Vegetables and Fruits and the proportion consuming three or more servings LNDF according to grade and gender.

For these objectives, foods were sorted based on Canada's Food Guide to Healthy Eating (Health Canada, 2007). Mean servings from the Vegetables and Fruit group and the Milk and Alternatives group were determined by adding all the daily scores for the food items belonging to each of the food groups according to Canada's Food Guide (Health Canada) and calculating the mean. For example, Vegetable and Fruit consumption was assessed using the following food categories: fruit, 100% fruit juice, potatoes (not including French fries), salad and other vegetables. Responses indicating weekly consumption were first expressed as daily servings for each participant by dividing the responses by seven. For weekly responses that included ranges, the mid-point was used (e.g. foods consumed one to three times per week = 2/7 or 0.29 servings per day; foods consumed four to six times per week = 5/7 or 0.71 servings per day). The total number of daily servings of Vegetables and Fruit for each participant was estimated by adding the number of daily servings of each food in that food group. Mean servings were also calculated in the same fashion for foods that were deemed low-nutrient density foods (LNDF). Fries, cakes, snacks, candy, and soft drinks were all classified as low-nutrient density foods based on their high-calorie content relative to their low nutritive value. Differences in mean daily servings of VF and MA between grades and genders were then analyzed using an independent t-test.

Dietary adequacy for the Vegetables and Fruit and Milk and Alternatives food groupings, was assessed using cut points consistent with new dietary

recommendations in Canada's Food Guide (CFG) (Health Canada, 2007). More specifically, adequate intakes were defined as Vegetables and Fruit scores of 6 or more per day, and adequate intake of Milk and Alternatives was defined as milk scores of 3 or more per day, which are the minimum recommendations for youth aged 9 to 13 according to CFG (Health Canada, 2007). The proportion of students meeting these cut-offs (as per the CFG recommendations) was then calculated by grade and gender.

Objectives 2(a) Changes in Milk and Alternatives, Vegetables and Fruit, and LNDF intake prior to and following policy implementation (2001/02 vs. 2007). *and (b)* Likelihood of consuming adequate servings of Milk and Alternatives, and Vegetables and Fruit and less than three servings of LNDF following the implementation of the PEI School Nutrition Policy (2001/02 vs. 2007).

Changes in dietary behaviours (i.e. change over time) between survey years were examined using multivariate multilevel regression models. In order to increase the power of the regression analyses, the procedures were conducted on only the 11 schools common to the two time periods (i.e., survey year = 2001/02 and survey year = 2007). Student survey data from 2001 and 2002, prior to the implementation of the policy, were combined to form the first wave of the survey. Survey data collected in 2007 served as the second wave. Only schools that were surveyed in both waves were considered for this analysis. Students with more than five missing item

responses in the food frequency questionnaire were excluded from the analysis, resulting in a combined total sample of n=1533 for both time periods.

Dependent variables. The number of daily servings for Milk and Alternatives, Vegetables and Fruit, and LNDF was calculated from the "Eating Behaviour Questionnaire" and was used as a continuous variable. Normality of the distribution of each variable was assessed graphically. As the distribution of the LNDF group was skewed to the right, the LNDF variable was subjected to a square root transformation. Adequacy was entered as a binary variable based on whether or not a student met the recommended daily intake of Milk and Alternatives (≥ 3 servings) and Vegetables and Fruit (≥ 6 servings), according to Canada's Food Guide (Health Canada, 2007). Similarly, daily servings of LNDF were used to create binary variables based on whether or not students reported less than three servings of LNDF.

Changes over time in food use between survey years (2001/02 vs. 2007) were examined using hierarchical linear modelling, with survey year as a fixed effect to reflect the multilevel nature of the data. A series of linear random effects regression models were constructed with total daily servings of Milk and Alternatives, Vegetables and Fruit, and LNDF as dependent variables with students nested in schools. Changes in the likelihood of students consuming adequate levels of Milk and Alternatives, Vegetables and Fruit, and less than three servings of LNDF prior to and following policy implementation were assessed using logistic random effects

regression with students nested in schools. Grade and gender were used as covariates in the regression models. To adjust for differences in the overall food intake, models were also adjusted for the student's total daily number of food servings (continuous variable). To assess the between-school variation, the intra-class correlation coefficient (ICC) was calculated using the latent variable approximation (Rodriguez & Elo, 2003)

CHAPTER FOUR

Descriptive Statistics

The following chapter summarizes the results of the data collected from the students surveyed in 2007. Comparisons of this data and the data collected in 2001/02 are presented in chapter five. This chapter will describe the 2007 sample and present the frequency of foods consumed by grade and gender, the mean intakes of MA, VF, and LNDF, and the proportion of students consuming adequate servings of MA and VF according to CFG, and less than three servings of LNDF.

Sample Description

Initially, the population consisted of a total of 3,320 students from 44 elementary schools. Only those students whose parents had returned signed consent forms and had completed the parent surveys were included in the final sample. After accounting for absent or sick children on the day of the survey, a total of 2,026 students participated in the survey, representing a response rate of 61.0%.

Table 1 provides a description of the sample. The sample was evenly distributed across grades and according to gender. Approximately half of the students were 11 years of age, whereas only 0.4% were 13 years old. The remaining students were either 10 or 12 years old (32.5% and 17.9%, respectively). Table 2 provides a description of the sample for grade by gender.

Table 1

Sample Demographics (N=2026)

Variable	n	(%)
Age		
10 years	658	(32.5)
11 years	996	(49.2)
12 years	363	(17.9)
13 years	9	(0.4)
Grade		
5	1006	(49.7)
6	1020	(50.3)
Gender		
Male	995	(49.1)
Female	1031	(50.9)

Table 2

Sample Description: Grade by Gender

	Gender			
	Male		Female	
Grade	n	(%)	n	(%)
5	483	(48.5)	523	(50.7)
6	512	(51.5)	508	(49.3)
Total	995	(49.1)	1031	(50.9)

Objective 1 (a)

To describe the frequency of foods commonly consumed on a daily basis and weekly basis among grade five and six students in PEI elementary schools and assess differences by grade and gender.

Daily Consumption. The total number and proportion of students consuming specific foods on a daily basis are described by grade and gender in Tables 3 and 4, respectively. Milk was the most frequently consumed food of all the foods on the survey, with 76.4% of students consuming milk daily. Daily consumption of milk was higher in grade six students than in grade five and was higher in males compared to females but differences were not statistically significant in either case. Fruit was the second most commonly consumed food among surveyed students, with 55.6% consuming fruit daily. Daily consumption of fruit was slightly higher in grade five compared to grade six, and was significantly higher in females than in males ($\chi^2 = 12.3$, $p<0.05$). Approximately half of students also reported consuming fruit juice daily (49.6%), with consumption being relatively evenly distributed across grades as well as between genders. Similarly, with bread, the next most commonly consumed food, slightly more than half of the total students consumed bread daily (53.7%) with no significant difference in consumption between grades or gender.

Table 3

Daily Consumption of Foods by Grade

Food	Total Consuming Daily N (%)	Grade 5 n (%)	Grade 6 n (%)	$\chi 2$	p
Milk	1536 (76.4)	742 (74.9)	794 (77.9)	3.1	0.21
Cheese	599 (29.8)	323 (32.6)	276 (27.1)	21.9	0.001
Yogurt	503 (25.1)	284 (28.7)	219 (21.5)	15.2	0.001
Eggs	255 (12.7)	143 (14.5)	112 (11.0)	5.6	0.06
Ice Cream	271 (13.5)	177 (17.9)	94 (9.3)	34.1	0.001
French Fries	158 (7.9)	96 (9.7)	62 (6.1)	9.3	0.01
Other Potatoes	380 (18.9)	208 (20.9)	172 (16.9)	10.3	0.01
Salad	257 (12.8)	151 (15.3)	106 (10.4)	10.8	0.001
Other Vegetables	871 (43.6)	436 (44.4)	435 (42.8)	0.5	0.76
Beans	105 (5.2)	61 (6.2)	44 (4.3)	3.6	0.17
Peanut Butter	421 (20.9)	227 (22.9)	194 (19.1)	8.9	0.01
Fruit	1114 (55.6)	561 (56.7)	553 (54.5)	1.6	0.44
Fruit Juice	990 (49.5)	512 (51.3)	478 (47.2)	4.4	0.11
Bread	1078 (53.7)	513 (51.9)	565 (55.6)	3.1	0.21
Rice	200 (9.9)	120 (12.2)	80 (7.8)	10.9	0.001
Spaghetti	220 (10.9)	138 (13.9)	82 (8.1)	20.9	0.001

Table 3 (continued)

Food	Total Consuming Daily N (%)	Grade 5 n (%)	Grade 6 n (%)	$\chi 2$	p
Pizza	169 (8.4)	104 (10.5)	65 (6.4)	14.4	0.001
Cold Cereal	762 (38.0)	396 (40.1)	366 (36.0)	3.7	0.16
Hot Cereal	185 (9.3)	107 (10.9)	78 (7.8)	6.1	0.05
Beef/Pork/Processed Meat	539 (26.9)	280 (28.3)	259 (25.5)	9.15	0.01
Chicken/Turkey/Fish	345 (17.2)	191 (19.3)	154 (15.2)	13.8	0.001
Cakes/Cookies	368 (18.4)	201 (20.3)	167 (16.5)	8.4	0.01
Potato Chips/Snack Foods	348 (17.3)	197 (19.8)	151 (14.8)	11.2	0.001
Candy/ Chocolate Bars	229 (11.4)	132 (13.3)	97 (9.5)	12.5	0.001
Soft Drinks	370 (18.4)	206 (20.8)	164 (16.1)	11.1	0.001

The next most commonly consumed food was "other vegetables", which included all vegetables except salad and potatoes. Daily consumption of "other vegetables" was reported by 43.6% of students overall and by significantly more females compared to males ($\chi^2 = 14.1$, $p<0.001$). Nearly one-third of students consumed cheese on a daily basis (29.8%), with significantly more students in grades six reporting daily consumption than in grade five ($\chi^2 = 21.9$, $p<0.001$). This was in contrast to daily yogurt consumption, where students in grade five were significantly more likely to report consuming yogurt daily than students in grade six ($\chi^2 = 15.1$, $p<0.001$). Daily consumption of yogurt was also significantly higher in females.

Table 4

Daily Consumption of Foods by Gender

Food	Total Consuming Daily	Male	Female		
	n (%)	n (%)	n (%)	$\chi 2$	P
Milk	1536 (76.4)	769 (77.4)	767 (75.5)	4.3	0.11
Cheese	599 (29.8)	288 (29.0)	311 (30.6)	0.7	0.72
Yogurt	503 (25.1)	223 (22.4)	280 (27.7)	10.0	0.01
Eggs	255 (12.7)	147 (14.8)	108 (10.7)	12.9	0.001
Ice Cream	271 (13.5)	138 (13.9)	133 (13.2)	2.4	0.30
French Fries	158 (7.9)	84 (8.5)	74 (7.3)	10.8	0.001
Other Potatoes	380 (18.9)	188 (18.9)	192 (18.9)	0.5	0.79
Salad	257 (12.8)	108 (10.9)	149 (14.7)	46.8	0.001
Other Vegetables	871 (43.6)	393 (39.7)	478 (47.4)	14.1	0.001
Beans	105 (5.2)	63 (6.3)	42 (4.2)	6.7	0.04
Peanut Butter	421 (21.0)	236 (23.8)	185 (18.3)	9.5	0.01
Fruit	1114 (55.6)	523 (52.7)	591 (58.4)	12.3	0.001
Fruit Juice	990 (49.5)	507 (51.3)	483 (47.8)	2.4	0.30
Bread	1078 (53.7)	536 (53.9)	542 (53.6)	0.0	0.98
Rice	200 (9.9)	100 (10.1)	100 (9.8)	1.1	0.58
Spaghetti	220 (10.9)	98 (9.8)	122 (12.0)	8.9	0.01

Table 4 (continued)

Food	Total Consuming Daily N (%)	Male n (%)	Female n (%)	$\chi 2$	P
Pizza	169 (8.4)	85 (8.6)	84 (8.3)	25.1	0.001
Cold Cereal	762 (38.0)	399 (40.3)	363 (35.8)	7.2	0.03
Cakes/Cookies	368 (18.4)	200 (20.2)	168 (16.6)	4.6	0.10
Potato Chips/Snack Foods	348 (17.3)	186 (18.7)	162 (15.9)	5.7	0.06
Candy/ Chocolate Bars	229 (11.4)	122 (12.2)	107 (11.5)	35.7	0.001
Soft Drinks	370 (18.4)	199 (30.0)	171 (16.8)	10.4	0.01

Daily consumption of foods was higher in grade five students compared to grade six for virtually every food on the survey except for milk. This grade difference was statistically significant for 16 of the 25 food items; however while eggs, "other vegetables", beans, fruit, fruit juice, bread, and cold cereal were all higher in grade five, the difference was not significant. Daily consumption of yogurt ($\chi^2 = 10.0$, $p<0.01$), salad ($\chi^2 = 46.8$, $p<0.001$), "other vegetables" ($\chi^2 = 14.1$, $p=0.00$), and spaghetti ($\chi^2 = 8.9$, $p<0.01$) were significantly higher for females compared to males. Conversely, males consumed significantly more eggs ($\chi^2 = 10.0$, $p<0.01$), beans ($\chi^2 = 10.0$, $p<0.01$), fruit juice ($\chi^2 = 10.0$, $p<0.01$), beef/pork/processed meat ($\chi^2 = 10.0$, $p<0.01$), candy/chocolate bars ($\chi^2 = 10.0$, $p<0.01$) and soft drinks ($\chi^2 = 10.0$, $p<0.01$) than females.

Weekly Consumption. A detailed description of weekly consumption of individual foods according to grade and gender are presented in Tables 5 and 6, respectively.

The foods most commonly consumed on a weekly basis were spaghetti and potato chips/snack foods, followed by "other potatoes". Almost two-thirds of students reported weekly consumption of beef/pork/processed meats (64.8%), as well as chicken/turkey/fish (65.0%) and cakes/cookies (64.2%). There were no significant differences in weekly consumption of these foods among grades or genders. However, gender differences can be observed for weekly consumption of pizza. Sixty-three percent of students overall reported consuming pizza weekly with males (67.7%) consuming significantly more compared to females (57.9%) at a significance level of $p<0.001$.

Objective 1 (b)

To describe the mean daily intakes of Milk and Alternatives, Vegetables and Fruit, and low-nutrient-dense-foods (LNDF) and assess differences according to grade and gender.

Mean Servings. Table 7 summarizes the mean servings of foods from the Vegetables and Fruit and the Milk and Alternatives groups according to CFG, as reported by males and females. The difference in mean servings of VF consumed by males and females was assessed by a t-test procedure and indicated that females are consuming significantly more ($p<0.001$). There was no significant difference in mean servings of Milk and Alternatives between boys and girls.

Table 5

Weekly Consumption of Foods by Grade

Food	Total Consuming Weekly n (%)	Grade 5 n (%)	Grade 6 n (%)	$\chi 2$	p
Milk	416 (20.7)	216 (21.8)	200 (19.6)	3.1	0.21
Cheese	1027 (51.1)	454 (45.9)	573 (56.2)	21.9	0.001
Yogurt	838 (41.8)	382 (38.7)	456 (44.8)	15.2	0.001
Eggs	1007 (50.2)	482 (48.8)	525 (51.5)	5.6	0.06
Ice Cream	1189 (59.4)	543 (55.1)	646 (63.6)	34.1	0.001
French Fries	1134 (56.7)	542 (54.8)	592 (58.6)	9.3	0.01
Other Potatoes	1327 (66.1)	621 (62.7)	706 (69.4)	10.3	0.01
Salad	918 (45.8)	435 (44.1)	483 (47.5)	10.8	0.001
Other Vegetables	942 (47.1)	456 (46.4)	486 (47.8)	0.5	0.76
Beans	514 (25.6)	254 (25.7)	260 (25.5)	3.6	0.17
Peanut Butter	936 (46.7)	430 (43.4)	506 (49.8)	8.9	0.01
Fruit	803 (40.1)	383 (38.7)	420 (41.4)	1.6	0.44
Fruit Juice	811 (40.6)	381 (38.6)	430 (42.5)	4.4	0.11
Bread	836 (41.7)	426 (43.1)	410 (40.3)	3.1	0.21
Rice	993 (49.4)	469 (47.4)	524 (51.4)	10.9	0.001
Spaghetti	1387 (69.0)	646 (65.1)	741 (72.8)	20.9	0.001
Pizza	1257 (62.7)	588 (59.5)	669 (65.9)	14.4	0.001
Cold Cereal	933 (46.6)	448 (45.3)	485 (47.7)	3.7	0.16

Table 5 (continued)

Food	Total Consuming Weekly	Grade 5	Grade 6		
	n (%)	n (%)	n (%)	$\chi 2$	p
Beef/Pork/Processed Meat	1299 (64.8)	612 (61.9)	687 (67.6)	9.15	0.01
Chicken/Turkey/Fish	1305 (65.1)	605 (61.1)	700 (69.0)	13.8	0.001
Cakes/Cookies	1287 (64.2)	605 (61.1)	682 (67.2)	8.4	0.01
Potato Chips/Snack Foods	1369 (68.0)	643 (64.7)	726 (71.3)	11.2	0.001
Candy/ Chocolate Bars	1202 (59.8)	557 (56.2)	645 (63.3)	12.5	0.001
Soft Drinks	1103 (54.8)	546 (55.1)	557 (54.6)	11.1	0.001

Table 6

Weekly Consumption of Foods by Gender

Food	Total Consuming Weekly	Male	Female		
	n (%)	n (%)	n (%)	$\chi 2$	p
Milk	416 (20.70)	204 (20.52)	212 (20.87)	4.3	0.11
Cheese	1027 (51.12)	512 (51.56)	515 (50.69)	0.7	0.72
Yogurt	838 (41.77)	414 (41.65)	424 (41.9)	10.0	0.01
Eggs	1007 (50.20)	510 (51.36)	497 (49.06)	12.9	0.001
Ice Cream	1189 (59.39)	600 (60.54)	589 (58.26)	2.4	0.30
French Fries	1134 (56.67)	591 (59.64)	543 (53.76)	10.8	0.001

Table 6 (continued)

Food	Total Consuming Weekly	Male	Female		
	n (%)	n (%)	n (%)	$\chi 2$	p
Other Potatoes	1327 (66.09)	650 (65.52)	677 (66.63)	0.5	0.79
Salad	918 (45.85)	399 (40.22)	519 (51.39)	46.8	0.001
Other Vegetables	942 (47.12)	491 (49.55)	451 (44.74)	14.1	0.001
Beans	514 (25.61)	265 (26.63)	249 (24.6)	6.7	0.04
Peanut Butter	936 (46.66)	453 (45.62)	483 (47.68)	9.5	0.01
Fruit	803 (40.05)	413 (41.59)	390 (38.54)	12.3	0.001
Fruit Juice	811 (40.59)	386 (39.03)	425 (42.12)	2.4	0.30
Bread	836 (41.67)	413 (41.55)	423 (41.8)	0.0	0.98
Rice	993 (49.4)	480 (48.24)	513 (50.54)	1.1	0.58
Spaghetti	1387 (68.97)	673 (67.57)	714 (70.34)	8.9	0.01
Pizza	1257 (62.76)	670 (67.68)	587 (57.95)	25.1	0.001
Cold Cereal	933 (46.56)	457 (46.16)	476 (46.94)	7.2	0.03
Hot Cereal	579 (28.99)	288 (29.27)	291 (28.73)	0.7	0.69
Beef/Pork/Processed Meat	1299 (64.79)	652 (65.66)	647 (63.93)	8.4	0.02
Chicken/Turkey/Fish	1305 (65.05)	637 (64.21)	668 (65.88)	0.9	0.65
Cakes/Cookies	1287 (64.19)	626 (63.17)	661 (65.19)	4.6	0.10
Potato Chips/Snack Foods	1369 (68.04)	679 (68.24)	690 (67.85)	5.7	0.06
Candy/ Chocolate Bars	1202 (59.8)	647 (65.03)	555 (54.68)	35.7	0.001
Soft Drinks	1103 (54.85)	561 (56.33)	542 (53.40)	10.4	0.01

Table 7

Mean Daily Servings of Vegetables and Fruit and Milk and Alternatives by Gender

	Total Mean (SD)	Males Mean (SD)	Females Mean (SD)	t	p
Vegetables and Fruit	3.66(1.88)	3.52(1.89)	3.79(1.86)	-3.26	0.001
Milk and Alternatives	2.89(1.28)	2.89(1.30)	2.89(1.26)	-0.02	0.98

Mean servings of Vegetables and Fruit and Milk and Alternatives according to grade level, as well as the results of the t-test procedure to assess differences are presented in Table 8. Significant differences in reported mean servings of both food groups were observed when analyzed by grade, with students in grade five consuming more mean servings from the Vegetables and Fruit and Milk and Alternatives food groups in both cases.

Table 8

Mean Daily Servings of Vegetables and Fruit and Milk and Alternatives by Grade

	Grade 5 Mean (SD)	Grade 6 Mean (SD)	t	p
Vegetables and Fruit	3.74(1.92)	3.58(1.84)	1.98	0.05
Milk and Alternatives	2.95(1.34)	2.83(1.21)	2.21	0.03

Objective 1 (c)

To describe the proportion of students consuming *adequate* servings of Milk and Alternatives, Vegetables and Fruits, according to Canada's Food Guide, and the proportion consuming three or more servings LNDF (i.e.,"other foods") and assess differences according to grade and gender.

Adequate Intakes. The proportion of students consuming adequate servings of Milk and Alternatives, which is three or more servings per day according to CFG, is presented in Figure 1 according to grade and gender. There were no significant differences in the proportions of students reporting adequate intakes between grades or between boys and girls.

The proportion of students consuming adequate servings of Vegetables and Fruit, which is six or more servings per day according to CFG, are presented in Figure 2 according to grade and gender. There was no significant difference between the proportion students in grade five consuming adequate servings and the proportion in grade six. While a greater proportion of females were consuming adequate servings of Vegetables and Fruit than males, the difference was only approaching statistical significance ($p=0.062$).

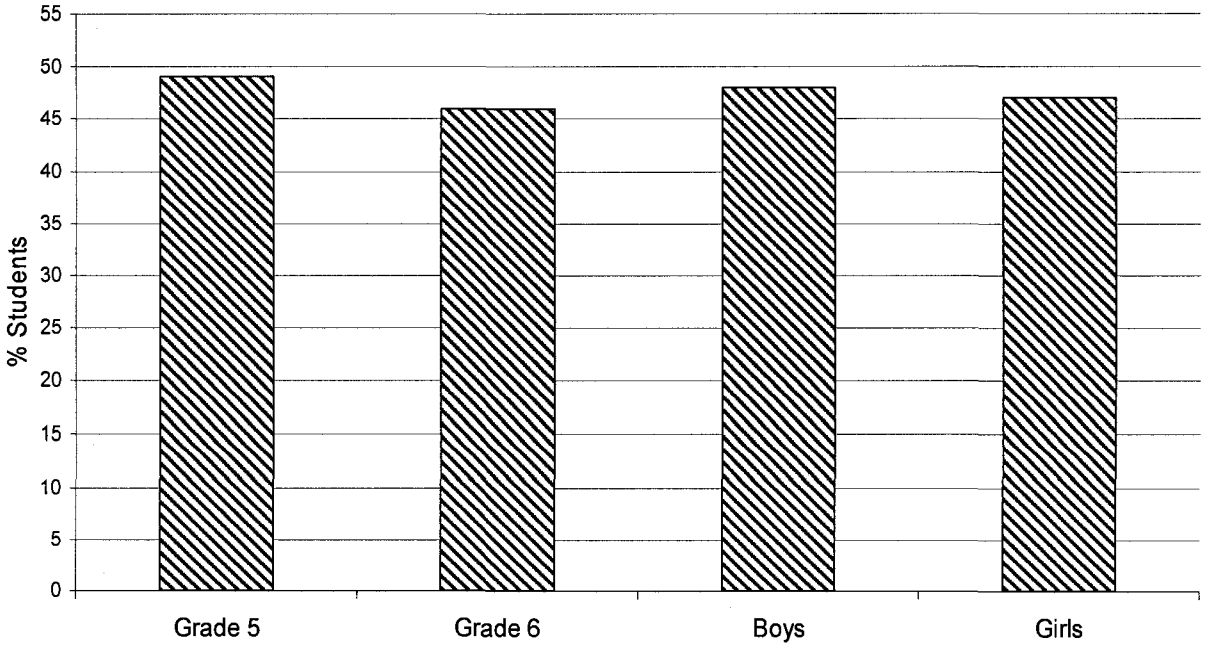

Figure 1. Percentage of Children with Adequate Milk and Alternatives Intakes[a] by Grade and Gender

Note.[a] An adequate Milk and Alternatives intake is defined as three or more servings of MA consumed/day as outlined in Eating Well With Canada's Food Guide (Health Canada, 2007).

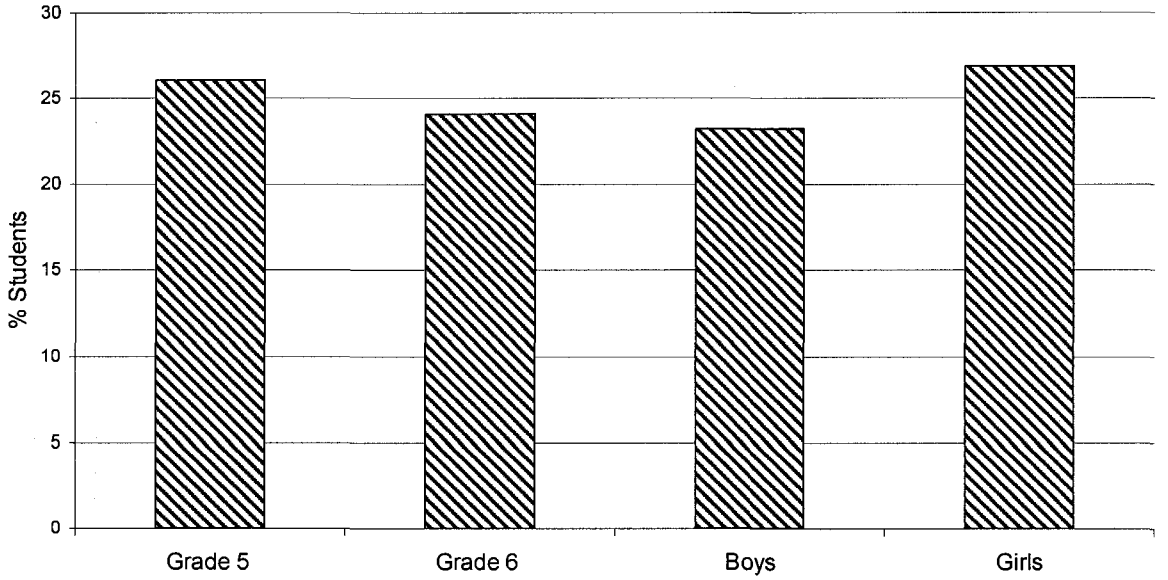

Figure 2. Vegetables and Fruit Adequacy[a] by Grade and Gender

[a] Vegetables and Fruit adequacy is defined as six or more servings of VF consumed per day as outlined in Eating Well with Canada's Food Guide (Health Canada, 2007).

The term 'low-nutrient density foods' (LNDF) includes French fries, cakes, snacks, candy and soft drinks. For the purpose of this analysis, the consumption of three or more of these foods daily was used as a cut-off to identify students with higher consumption levels; this was used in the 2001/2002 survey (Taylor et al., 2003) based on the distribution of the data and the notion that levels above this would likely displace healthy food choices. Figure 3 shows the number of students by grade and gender who reported consuming more than three daily servings of all foods from this category. Significantly more males consumed three or more servings of LNDF daily than females ($p<0.001$) and significantly more grade five students consumed three or more servings of LNDF than students in grade six ($p<0.05$).

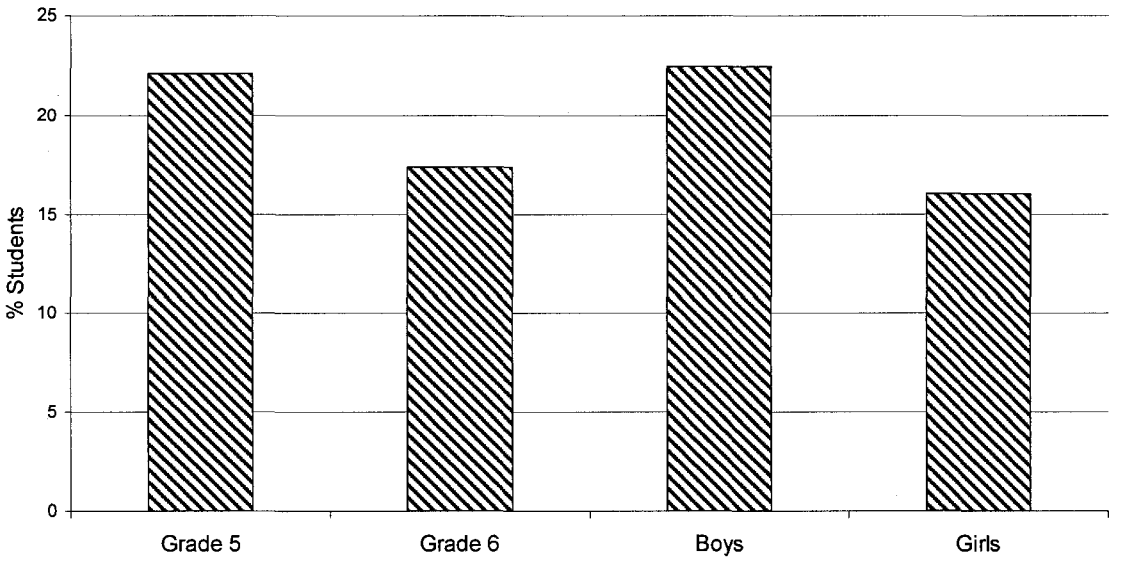

Figure 3. Percentage of Children Consuming More than Three Low-Nutrient Density Foods Daily

CHAPTER FIVE

Regression Analysis

A major aim of this research study was to understand how the introduction of the nutrition policies for elementary schools across Prince Edward Island influenced the food consumption of students in the study sample. In order to assess this, it was necessary to examine food use of a sub-sample of students from 11 schools in this study (survey year 2007) (n=1533) and compare results to data that were previously collected (survey year 2001/02), prior to the implementation of the policy. While the larger study was based on data collected from 44 schools, the following chapter presents the results of the regression analyses, which included only the 11 schools common to the two time periods of data collection. The chapter begins by presenting a description of the two samples being used in the analysis, the mean intakes of Vegetables and Fruit, Milk and Alternatives, and LNDF of the two samples, and the results of the regression models used to identify changes in food use and adequacy of food use prior to and following the implementation of the policy.

A description of the samples from each survey by grade is presented in Table 9. Students were evenly distribution between grade five and six within each survey year, and between girls and boys as well.

Mean Servings by Year

Unadjusted mean servings of Vegetables and Fruit, Milk and Alternatives, and LNDF for both survey years are presented in Table 10. Our Hypothesis 1, that there would be a decrease in the consumption of LNDF between time periods, was supported; there was a

Table 9

Sample Description: Grade by Survey Year

	Survey Year		
Variable	2001/02	2007	Total
Grade n (%)			
5	486 (50.1)	280 (49.8)	
6	485 (49.9)	282 (50.2)	
Total	971 (63.3)	562 (36.7)	1533
Gender n (%)			
Male	497 (51.6)	281 (50.0)	
Female	466 (48.4)	281 (50.0)	
Total	963[a] (63.1)	562 (36.8)	1525

Note. [a] There were 8 missing values for gender in 2001/02

decrease in almost one serving (0.92 serving) of low-nutrient density foods in 2007 compared to 2001/02. When mean servings were compared by year, a slight decrease was also observed for servings of Vegetables and Fruit, as well as Milk and Alternatives from 2001/02 to 2007, which does not support our first hypothesis. However, further analysis using regression (see Table 11) indicates that an increase was observed for these food groups when grade and gender are considered. Since there was a decline in the total number of food servings reported from 15.3 servings in 2001/02 to 13.3 (1.89) servings in 2007, we included this as a co-variate in subsequent regression models.

Table 10

Mean Servings of Food Groups by Survey Year (Unadjusted)

	Survey Year	
	2001/02	2007
Food Group	Mean (SD)	Mean (SD)
Vegetables and Fruit	3.97 (1.87)	3.59 (1.89)
Milk and Alternatives	2.99 (1.30)	2.88 (1.29)
Low-Nutrient Density Foods	2.98 (1.89)	2.06 (1.45)
Total Daily Servings	15.3	13.3

Objective 2(a)

To assess the changes in total daily intakes of Milk and Alternatives, Vegetables and Fruit, and LNDF consumed by grade five and six students prior to and following implementation of the PEI School Nutrition Policy (2001/02 vs. 2007).

The results of the multi-level multivariate linear regression analysis for each food group (Milk and Alternatives, Vegetables and Fruit, and LNDF) using survey year as a fixed effect with gender, grade and the difference in students' total daily number of food servings between the two time periods as covariates are presented in Table 11. Hypothesis 1, that the total daily intakes of servings of Milk and Alternatives and Vegetables and Fruit will increase and daily intakes of low-nutrient density foods will decrease following the policy implementation, was partially supported in that survey year was a significant predictor of Milk and Alternatives and LNDF, but not predictive of Vegetables and Fruit servings in the

Table 11

Summary of Linear Regression Analysis for Associations[a] of Grade, Gender, and Survey Year with Total Daily Intakes of Vegetables and Fruits, Milk and Alternatives, and Low-Nutrient Density Foods[b]

Variable	Vegetable and Fruit Coef.[c] (95% CI)	Milk and Alternatives Coef.[c] (95% CI)	Low-Nutrient Density Foods[b] Coef.[c] (95% CI)
Grade 6 (vs. Grade 5)	-0.05 (-0.18,0.07)	0.06 (-0.03,0.16)	0.02 (-0.02,0.06)
Female Gender (vs. Male)	0.32 (0.20,0.45)*	0.05 (-0.05,0.14)	-0.09 (-0.13,-0.05)*
Survey Year 2007 (vs. 2001/02)	0.09 (-0.04,0.23)	0.19 (0.08,0.29)*	-0.18 (-0.23,-0.14)*

Note. [a]Models are also adjusted for the decrease in total number of daily food servings reported between the two time periods.
[b]Transformed data, expressed as square root.
[c]Coefficients are adjusted mean changes in servings of Vegetables and Fruit, Milk and Alternatives, and Low-Nutrient Density Foods between 2001/02 and 2007.
* $p<0.001$

regression model (Table 11). A mean difference of 0.19 servings of Milk and Alternatives (95% CI 0.08, 0.29) and -0.18 servings of LNDF (95% CI -0.23, -0.14) was observed in students surveyed in 2007 compared to those surveyed in 2001/02. Analysis also indicated that gender was a significant predictor of LNDF, with females consuming fewer servings than males (Table 11). Grade was not a significant predictor of daily servings of Vegetables and Fruit, Milk and Alternatives, or LNDF. Coefficients reported for changes in LNDF are expressed in square root form in Table 11 and when transformed back into servings would represent a change of 0.0324, 0.008, and 0.0004 servings for survey year, gender, and grade,

respectively. Females were significantly more likely to consume more Vegetables and Fruit than males, when adjusting for grade and survey year. Gender was not a significant predictor of reported Milk and Alternatives intake. The intra-class variation, which describes the percentage of total variance explained by the between-school variance, ranges from 13 to 20%.

Objective 2 (b)

To assess whether students were more likely to consume adequate servings of Milk and Alternatives, and Vegetables and Fruit (according to Canada's Food Guide), and fewer than three servings of LNDF following the implementation of the PEI School Nutrition Policy (2001/02 vs. 2007) compared to prior to implementation of the policy.

Results of the random-effects logistic regression modeling, presented in Table 12, provide strong support for Hypothesis 3, that students would be less likely to be consuming three or more servings of LNDF daily following policy implementation (2007) compared to pre-implementation (2001/02). Students in 2007 were more than twice as likely to report consuming less than three servings of LNDF compared to those in 2001/02 (OR=2.14 [95% CI 1.63,2.83]). Females were 1.5 times more likely to eat less than three servings of LNDF on a daily basis than males were. Grade was not predictive of eating less than three servings of LNDF.

Results also provided support for Hypothesis 2, that students would be more likely to consume adequate servings of Milk and Alternatives and Vegetables and Fruit following the policy implementation. Students who were surveyed in 2007 were 1.3 times more likely to consume the recommended servings of Milk and Alternatives (OR=1.30 [95% CI 1.00,1.67])

and 1.5 times more likely to consume the recommended servings of Vegetables and Fruit than those in 2001/02 (OR=1.45 [95% CI 1.01,2.08]).

Females were 1.4 times more likely to report Vegetables and Fruit intakes that met the recommendation of six servings per day according to Canada's Food Guide (Health Canada, 2007) than males (OR=1.41 [95% CI 1.01,1.98]). Grade level, however, was not associated with having an adequate intake of Vegetables and Fruit. Grade and gender also were not associated with meeting the recommended number of servings for Milk and Alternatives according to Canada's Food Guide, respectively.

Table 12

Summary of Logistic Regression Analysis for Associations[a] of Grade, Gender, and Survey Year with Meeting the Recommended Daily Food Intake of Vegetables and Fruit, Milk and Alternatives, or LNDF.

	Recommended Vegetables and Fruit	Recommended Milk and Alternatives	Less than 3 servings Low-Nutrient Density Foods
	OR (95% CI)	OR (95% CI)	OR (95% CI)
Grade 6 (vs. Grade 5)	0.89 (0.64,1.25)	1.07 (0.84,1.37)	1.04 (0.81,1.35)
Female Gender (vs. Male)	1.41 (1.01,1.98)*	1.06 (0.83,1.35)	1.46 (1.13,1.89)*
Survey Year 2007 (vs. 2001/02)	1.45 (1.01,2.08)*	1.30 (1.00,1.67)*	2.14 (1.63,2.83)*

Note. [a]Models are also adjusted for the decrease in total number of daily food servings reported between the two time periods.
*p<0.001

CHAPTER 6

Discussion and Conclusions

A major objective of this study was to assess the association between the introduction of a province wide school nutrition policy on students' dietary behaviours, specifically their consumption of Vegetables and Fruit, Milk and Alternatives, and low-nutrient density foods. The findings from the regression analyses showed promising results with respect to all three food groupings. When survey year was used to differentiate between the absence of a school nutrition policy (i.e., 2001/02) and the introduction of the newly implemented policy (i.e., 2007), we found that students reported consuming less low-nutrient density foods (LNDF) in 2007, following the first year of full policy implementation compared to pre-implementation. Students surveyed in 2007 were consuming almost a full serving less of LNDF than students at the same schools prior to the policy. Even when grade, gender and an overall decline in the number of food servings reported were controlled for, students in 2007 were still twice as likely to report less than three servings of LNDF per day, and 1.3 and 1.5 times more likely to have diets that meet Canada's Food Guide recommendation for Vegetables and Fruit and Milk and Alternatives.

While we cannot clearly establish a cause and effect relationship, our findings are consistent with other studies that have demonstrated an improvement in diet quality with the introduction of school nutrition policies (Cullen, Watson, Zakeri, & Ralston, 2005; Hendy, Williams, & Camise, 2005; Vereecken et al., 2005, Veugelers & Fitzgerald, 2005a). For example, one study conducted by and Fitzgerald (2005a) evaluated the impact of schools offering programs that were consistent with the CDC recommendations for school-based

healthy eating programs on dietary intake of grade five students and found a significant improvement in overall diet quality with the introduction of such programs. This Nova Scotia-based study used a slightly modified version of the "Harvard Youth Adolescent Food Frequency Questionnaire" (YAQ) to yield servings of vegetables and fruit, calories from fat, and an overall dietary quality score (as measured by the Diet Quality Index-International instrument). Interestingly, Veugelers and Fitzgerald found that students attending schools using an integrated, comprehensive approach to healthy eating programs as recommended by CDC had better vegetable and fruit consumption (OR=1.23 [95% CI 1.07,1.40]) and better overall diet quality (OR=1.29 [95% CI 1.11,1.50]) compared to students attending schools with no program at all. The findings from this study are important because of the similar age group to our research, and the fact that it was school-based and set in a relatively similar Maritime province.

The present study demonstrated a significant but modest change in Vegetable and Fruit intake following implementation of the policy. There have been mixed results in the literature with respect to the impact of school nutrition policies on vegetable and fruit intake; some studies have reported an increase while others have found a decrease (Jiménez-Cruz, Bacardi-Gascon, & Jones, 2002; Kubik et al., 2003; Veugelers & Fitzgerald, 2005a). For example, in one U.S. study by Cullen et al. (2005), while an improvement was observed for certain nutrients and milk intake following the introduction of the policy, student intake of vegetables was significantly reduced. It is important to note, however, that in this study, as in the present study, the policy mostly consisted of the restriction of or limiting access to unhealthy foods. This study concluded that policy changes on foods sold at school have the

potential to change student consumption patterns. More specifically, they observed a decline in soft drink consumption from 7.6 to 2.4%, a decline in candy consumption from 24.3% to 3.2%, and a decline in chip consumption from 41.2 to 20.2%, after removing these foods from the school snack bars and re-locating the vending machines from the cafeterias to another area. Another study conducted in Belgium, found an association between school food policies (described by food availability, school food rules, and nutrition education programming) and the reduced consumption of soft drinks, sweets, and crisps (Vereecken et al., 2005). These studies suggest that when the school food environment is modified to reduce the availability of LNDF, students in turn consume fewer servings of these less healthy choices.

This study showed that gender was also a significant predictor of the consumption of LNDF with females consuming fewer servings than males. Similar trends were observed in other studies where males were more likely to report intakes of three or more servings per day and consistent with previous Canadian studies showing males are more likely to consume "snack foods" (Health Canada, 2004; Taylor et al., 2005). Few studies were found comparing LNDF consumption between boys and girls in the elementary population. However, results from one American study of high-school students in Minnesota, examined lunch and snacking patterns across gender and grade levels and reported that boys purchased soft drinks from vending machines on more days of the week than girls (M=1.8, SD=1.8 vs. M=1.4, SD=1.6, [$p<0.001$]). No significant gender differences were found for à la carte, fast food, convenience store, or vending machine purchases (Neumark-Sztainer, French, Hannan, Story, & Fulkerson, 2005).

While reducing unhealthy foods is an important positive change to the school food environment, the more modest improvement in healthy choices between 2001/02 and 2007 may suggest that a more comprehensive intervention is needed where healthy choices are made readily available to students and nutrition education is part of the core curriculum. The previously mentioned study by Veugelers and Fitzgerald (2005a), presents some convincing evidence that such comprehensive, multi-faceted approaches to school nutrition programs can have a significant impact on students' dietary behaviours. It may be that the policy implemented in the current study needs to be complemented with a program component that makes vegetables and fruits easily available to students before a significant increase in consumption can be observed.

There is mounting evidence in the literature demonstrating how daily food intake can be affected by the school food environment to which students are exposed (French, Story, Fulkerson, & Gerlach, 2003; Jiménez-Cruz et al., 2002; Perry et al., 2004; Weschler et al., 2000). A large study with seventh grade students in Minneapolis found that exposure to à la carte food programs was inversely associated with daily vegetable and fruit consumption (Kubik et al., 2003). In fact, students not exposed to school à la carte programs consumed, on average, almost one full serving more of vegetables and fruits than did students from schools with such programs (4.23 vs 3.39 servings [$p=0.02$]) (Kubik et al.). This further supports the important impact that the school food environment can have on students' food choices when healthy choices are made readily available rather than just putting policies into place that limit or discourage certain foods. In light of these findings and results from the current study, future directions for the PEI School Nutrition Policy should consider

increasing its comprehensiveness by including a program component that offers healthy choices on a regular basis.

An overall decline in the total number of foods checked on the "Eating Behaviour Questionnaire" between 2001/02 and 2007 was observed. It is difficult to ascertain exactly why this occurred, but it is possible that students were checking fewer foods in 2007 because they thought it to be socially desirable to do so. There has been considerable promotion and education around the importance of healthy eating in the media, grocery stores, and other locations over the last several years, which may have led to an increased recognition of the social desirability of eating healthy foods. Even though vegetables and fruits are healthy foods, students may have been resistant to checking off too many foods. Students were also made aware of the overall purpose of the study during the consent process and again at the time of data collection. Another factor might be that students knew they were going to be weighed following completion of the questionnaire (as part of the larger study protocol) and were anticipating that a link would be made between the foods checked and their weight. This overall decline in foods checked was measured and factored into the data analyses.

Fluid milk was the most frequently consumed food of those assessed among the grade five and six students participating in the study. In total, 76.4% of students reported consuming milk daily. This is consistent with the findings from two previously conducted studies that used the same instrument to collect dietary data in 1998/99 in Ontario and Prince Edward Island schools (Evers et al., 2001) and another one which was conducted in PEI schools in 2001/02 (Taylor et al., 2003), where milk was also found to be the most frequently consumed food on a daily basis among students in fourth to eighth grade. In both this study,

and the studies previously conducted in PEI schools, daily consumption of milk was higher in males compared to females, though not statistically significant (Evers et al.; Taylor et al.). Results from the current study also indicate daily milk consumption was slightly higher among grade six students than grade five.

Understanding milk consumption rates of children in these grade levels is important because other studies in the literature have documented a decline in milk consumption as students progress into adolescence (French et al., 2003; Popkin & Nielson, 2003; Rampersaud et al., 2003). While this present study did not track milk consumption from grade five to grade six, it is encouraging to know that as many grade six students or more were consuming milk daily as grade fives. In other words, getting off to a good start with milk consumption is essential, given that, according to research, children's intake is likely to decline as they grow older (Cavadini et al., 2000; Vantaparast et al., 2006). Additional research on milk consumption documents a corresponding increase in soft drink consumption with this decline in milk (Cavadini et al.; Vantaparast et al.). Vantaparast et al. also found that milk was substituted by noncarbonated soft-drinks more than by carbonated beverages and girls were more at risk for this substitution than boys. The relatively high rates of milk consumption observed in 2007 may reflect the decreased availability of fruit or sports drinks during the school day, as imposed by the recently implemented policy, and possibly a decrease in the number of children bringing soft drinks to school, reducing the documented substitution of soft drinks for milk. Further, Taylor et al. (2007) has documented a significant increase in the amount of chocolate milk being sold in schools after the nutrition policy was introduced, which may also explain the increased consumption of Milk and

Alternatives in 2007.

The findings from the current study on milk consumption are consistent, although somewhat higher, than the findings published in the most recent report on the *Health Behaviours of School-age Children* survey, where approximately two-thirds of Canadian students in grade six (n=2063) were drinking low-fat or skim fluid milk five days a week or more (Health Canada, 2004).

Canada's Food Guide (Health Canada, 2007) recommends that children aged 9 to 13 consume three to four servings of Milk and Alternatives per day. The mean number of servings for the students surveyed in 2007 was 2.88 (±1.29) servings of Milk and Alternatives per day, just short of the current recommendation. When the reported intakes from students at the 11 common schools that were surveyed in 2007 were compared to intakes of students in 2001/02, we found that students in 2007 were 1.3 times more likely to consume the recommended number of servings from the Milk and Alternatives group.

Furthermore, while daily consumption of fluid milk was slightly higher in grade six than in grade five, the number of mean servings of Milk and Alternatives (including milk, cheese, and yogurt) showed a modest, but statistically significant decline of 0.13 servings from grade five to grade six ($p<0.05$). In other words, while many students are consuming milk daily, by grade six, they are consuming fewer servings from the overall Milk and Alternatives group each day than they did in grade five. While we did not assess factors influencing milk consumption, this may be attributed to the school milk program which offers fluid milk on a daily basis in all elementary schools in the study. Students in grade six may continue to participate in this school-based program because it is convenient and

accessible, but they may not be making as many choices from the Milk and Alternatives food group while at home, contributing to an overall decline in servings. A full understanding of the reasons for these findings would require additional investigation. The decline with grade is, however, in keeping with the trends demonstrated in the studies by Rampersaud et al. (2003) and French et al. (2003) showing decreasing consumption of milk products with the increasing age of adolescents.

Following fluid milk, other foods most commonly consumed on a daily basis were fruit, fruit juice, and bread, in that order. The findings for fruit consumption were similar to the trends depicted from national data where more than half of males and almost two-thirds of females were consuming fruit 5 days a week or more (Health Canada, 2006). The percentage of children consuming fruit 5 days a week or more, when extrapolated from the national data, was slightly higher than the percentage calculated from the data of the present study. This may be due to the sensitivity of the survey tool used in the current study or the wording of the answer options. For example, students may have been more likely to check that they ate fruit "five days a week or more" than they were to check that they ate it "everyday" which is, technically, a higher rate of consumption. Also with respect to fruit, daily consumption was found to be significantly higher in females compared to males, and this again was consistent with findings in the literature. Numerous studies have shown that females do better when it comes to fruit consumption (Corwin, Sargent, Rheaume, & Saunders, 1999; Hanning et al., 2007) and this is also consistent with results observed in national data (Health Canada, 2006). The study by Evers et al. (2001), however, did not find a significant gender difference in daily consumption of fruit among students in grades four to

eight.

Fruit juice and bread were also reported as being consumed daily by approximately half of students, with little variation across grades or genders. This finding is not surprising and can likely be attributed to the common practice of packing juice boxes on a daily basis and with bread likely coming mostly from sandwiches, also a popular children's lunch choice. Again, this finding is consistent with other studies on children's dietary behaviours (Hanning et al., 2007; Health Canada, 2007; Kubik et al., 2003).

In addition to fruit and fruit juice, vegetables can make an important contribution to the Vegetables and Fruit group from Canada's Food Guide. Results from this study reveal that 'Other Potatoes" (i.e., potatoes other than French fries) and "Salad" were consumed daily by a low number of students (18.9% and 12.8%, respectively), and less than half (43.6%) are consuming "Other Vegetables" daily. This is notably lower than what grade six Canadian students reported in the *Health Behaviours of School-age Children* survey, where 63% of boys and 71% of girls reported eating vegetables 5 days a week or more (Health Canada, 2004). When all of the vegetable and fruit items on the questionnaire (vegetables, salad, potatoes, fruit and fruit juice) were summed to provide an estimate of total servings from the Vegetables and Fruit group for the present study, it was found that the mean servings from this group were 3.66 ($\pm$1.88), $p<0.001$. This is well below the current recommendation of six servings of Vegetables and Fruit for children between the ages of 9 and 13 according to Canada's Food Guide (Health Canada, 2007). An Ontario study by Hanning et al. (2007) found similarly low intakes of Vegetables and Fruit servings where 50% of males were consuming only 3.8 servings and 50% of females were consuming 4.1

servings from the Vegetable and Fruit group daily. This is also consistent with surveys from the United States demonstrating that a concerning number of children are not eating adequate servings of vegetables and fruits (Burgess-Dowdell & Santucci, 2004; Kirby, Baranowski, Reynolds, Taylor, & Binkley, 1995; Wilkinson Enns et al., 2002).

We were able to include approximately 60% of the entire population of grade five and six students in our final sample, which is a strength of the study. This is comparable to the study by Veugelers and Fitzgerald (2005a) and it is also promising that the response rate increased as data collection progressed.

Limitations

Given the challenges of applied nutrition research in school settings, and the fact that all PEI elementary schools were requested to implement the nutrition policy, we could not employ a true experimental design, which precludes conclusions related to causality. Specifically, it was not possible to randomize schools or include control schools for evaluation purposes since all elementary and consolidated schools in PEI had already fully implemented the policy as of September 2006. Given that we have evidence that school nutrition policies benefit children's food intake and weight status (Veugelers et al., 2005a) and the recent report titled *Progress in Preventing Childhood Obesity* calling for schools to "...advance school policies and programs that support healthy school environments" (Institute of Medicine, 2006), it would be unethical to ask schools to delay implementing the policy.

Analysis did not consider socio-economic status (SES) or educational level of parents, which has been shown to impact dietary intake and weight status in children.

Children from lower socio-economic groups consume less varied diets (Wolfe & Campbell, 1992) and have fewer fresh fruits and vegetables available (Kirby et al., 1995) compared to those from higher SES groups. Data on income and education level were collected from parents and will be considered in future analyses. We also did not consider school adherence to the policies, which is a measure of their stage of implementation. These data were being collected in late 2007/early 2008 and will be considered in subsequent analyses.

The food frequency questionnaire used has been shown to be a valid measure of key foods that are of concern in children, and thus, for our purposes has been effective in identifying differences among females and males and according to grade and gender. Using this instrument, it was possible to establish a strong association between the consumption of LNDF, for example, and the year that the policy was introduced. The food frequency questionnaire that was used includes only limited numbers of foods/food groupings and short food frequency questionnaires have been found to underestimate food consumption (Kristal, Peters & Potter, 2005). While we have made several comparisons to the study by Veugelers and Fitzgerald (2005a), it is important to note that this Nova Scotia study used a longer food frequency questionnaire, which on the other hand, may overestimate food use.

Like any study relying on dietary recall, there is potential for recall error and particularly when working with children, there may be concerns around reliability of the data (Livingston & Robson, 2000; Livingstone, Robson, & Wallace, 2004; Rennie, Jebb, Wright, & Coward, 2005). Memory, cognitive ability, and attention span can make it difficult to obtain valid dietary data. Furthermore, this tool is designed to assess the frequency of consumption of certain foods and because portion sizes of foods eaten were not assessed, it

does not assess specific quantities of food consumed. While frequency may be approximately related to the actual volume consumed, a direct relationship cannot be inferred directly from the findings presented in this study.

Although we had an acceptable response rate of 60%, the results of the study may not be generalizable to other age groups or other settings. PEI is generally considered to have high proportion of Caucasians, and so it is also unknown how a more culturally diverse population of students may have responded to the survey.

Future Research

The research described in this thesis was a component of a larger study, the School Nutrition and Activity Project "SNAP", evaluating the impact of school nutrition policies in PEI on dietary intake and weight status of grade five and six children. This thesis has included analysis of changes in children's food use between 2002, prior to policy implementation, and 2007, only one year after the policy was implemented. Since changes in school food environments and acceptance of new nutrition policies by schools, students, and families, occur in stages (Fullan, 2001; Evans, 1996; McKenna, 2000) and successful implementation is determined by a number of factors such as presence of school champions (Freeze, 2006), changes in the food supply, and ongoing fund raising concerns (McKenna, 2000), it is important to track changes in children's food use over a longer time period. Further analyses should consider the extent to which schools adhere to the policies, which is a reflection of the success of the policy intervention, as well as parental factors such as education and income level.

Conclusions

Study results provide support for our hypotheses in that the introduction of the PEI School Nutrition Policy is associated with positive changes in food consumption among grade five and six students in Prince Edward Island. Specifically, the policy introduction has been associated with a significant reduction in the consumption of foods of lower nutrient density and an increase in the consumption of healthier choices from the Vegetables and Fruit and Milk and Alternatives food groups. The results thus underscore the importance of school nutrition policies, which modify the school food environment through the restriction of 'poor choices', in improving children's diet quality and their overall health. Findings are also consistent with a growing number of studies demonstrating the impact of changes to the school food environment on student food and nutrient intakes.

The modest changes in the likelihood of meeting Canada's Food Guide recommendations for Vegetables and Fruit and Milk and Alternatives groups following implementation of the nutrition policy suggests there is a need for school nutrition policies to be more comprehensive, including a food program component that offers healthy choices from these food groups and a strong nutrition curriculum. Overall, study results offer promising future directions for the province wide school nutrition policy in Prince Edward Island.

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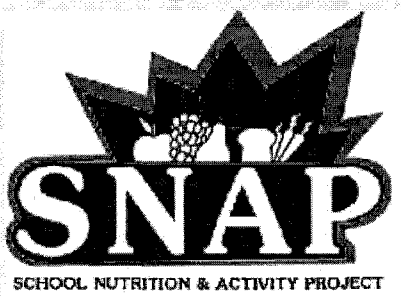
Appendix A

Eating Behaviour Survey: Children's Questionnaire



SNAP Student Survey

These questions are about the health and eating habits of students like yourself. Read each question carefully and be as honest as you can when you answer the questions. Your teachers, principal, parents, etc. will not see your answers. The survey is anonymous so please do NOT put your name on any of the pages.

For each question please mark your answer by making a dark pencil mark that fills the circle completely. Fill in only one (1) circle for each question.

Section 1. All about me.

This section asks questions about you.

1. What grade are you in?

   ○ 5 ○ 6

2. How old are you?

   ○ 10 years or younger
   ○ 11 years
   ○ 12 years
   ○ 13 years or older

3. Are you a girl or a boy?

   ○ Boy
   ○ Girl

4. How often do you have something for breakfast?

   ○ Every day
   ○ Some days
   ○ Rarely
   ○ Weekends only
   ○ Never

5. What type of milk do you usually drink?

   ○ Whole milk
   ○ 2% white
   ○ 1% white
   ○ Skim milk
   ○ Chocolate milk
   ○ Don't drink milk

Section 2. The Foods I Eat

6. How often have you eaten any of these foods in the last seven days? For each food, please fill in the circle.

Food	At least twice a day	once a day	4 to 6 times/week	1 to 3 times/week	never
Milk (alone or on cereal)	O	O	O	O	O
Cheese	O	O	O	O	O
Yogurt and frozen yogurt	O	O	O	O	O
Eggs	O	O	O	O	O
Ice Cream	O	O	O	O	O
French fries	O	O	O	O	O
Other kinds of potatoes	O	O	O	O	O
Salad	O	O	O	O	O
Other vegetables	O	O	O	O	O
Beans (baked, chickpeas, kidney beans, lentils, tofu)	O	O	O	O	O
Peanut butter	O	O	O	O	O
Fruit	O	O	O	O	O
Fruit Juice	O	O	O	O	O
Bread, bagels, pitas, English muffins, crackers, tortillas	O	O	O	O	O
Rice	O	O	O	O	O

Food	At least twice a day	once a day	4 to 6 times/week	1 to 3 times/week	never
Spaghetti, macaroni, or other pasta	O	O	O	O	O
Pizza	O	O	O	O	O
Cheerios, Shreddies Rice Krispies, Corn Flakes, Raisin Bran, Frosted Flakes and other cold cereals	O	O	O	O	O
Oatmeal, Cream of Wheat and other cooked cereals	O	O	O	O	O
Hamburgers, beef, pork, hot dogs, sausages, lunch meats, other meat	O	O	O	O	O
Chicken, turkey, fish	O	O	O	O	O
Cakes, cookies, pie, doughnuts	O	O	O	O	O
Potato chips, tortilla or nacho chips, Cheesies pretzels, other snack foods	O	O	O	O	O
Candy, chocolate bars	O	O	O	O	O
Regular (not diet) soft drinks	O	O	O	O	O

SNAP Project:
School, Nutrition and Activity in Children Project

Dear Parent/Guardian (and Students):

This letter describes a research project being conducted at your/your child's school through the University of Prince Edward Island.

The **purpose** of the study is to collect information on the children's eating habits and physical activity and to assess children's height and body weight.

Why is this study important? As you know, school nutrition policies have been adopted in elementary schools across the province. This study will provide us with important information about the eating habits, physical activity and weight status of children at your school, and whether the new school nutrition policies can help children to be healthier. Although the results may not have an immediate benefit for your child, we believe our study will help us work with schools to improve the nutritional health of students overall.

There are two parts to the research:

1. Students will be asked to complete a paper and pencil survey about their eating habits and physical activity. We will ask that students <u>not</u> put their name on the survey. A trained research assistant will be present while students complete the survey. The survey will take about 15-20 minutes.

2. Students will be asked to be weighed and have their height measured in a separate private room at your school. We will be using strict guidelines developed for measuring children from the Centres for Disease Control in Atlanta, Georgia to make sure we get accurate information, that information is kept private and that we are sensitive to children's needs. We will:

- train our research assistants to make sure they are sensitive to children's concerns and can answer children's questions; we will assure students that this is not about appearance, it is about assessing children's health over time.
- make sure measurements are taken in a PRIVATE room so that others can't see or hear the measurement. Results will NOT be shared with the child, or with anyone else at the school.

- use an electronic scale with a remote display which will make sure that the student cannot see what their weight is
- only present average weights, and the total number of children overweight for district. Students individual data will be kept private.

Only students with written permission from their parents, and who are willing to participate themselves, will be included in the study. If you/your child is not comfortable with him or her being weighed, you and/or he/she have the right to refuse to have this done.

Although we cannot guarantee complete confidentiality among the students who take part, we will ask students to keep what they write confidential. All information obtained from this study will be destroyed after the study is completed. There will be no identifying names on any information we obtain. Only the researchers will see the information.

This project has been reviewed and approved by the UPEI Research Ethics Committee. Although there are no known risks to taking part in the study, this study is voluntary: the final decision to take part rests with you and your child. We will appreciate your co-operation in permitting your son or daughter to join in the research. However, there is no penalty of any kind in terms of his or her grades or school performance if he/she does not take part or if you or your child decides to withdraw from the study later. Either you/your child may withdraw at any time before or during the interview by advising the researcher or research assistant of your decision, even if you agree to take part now. If you have any questions about the study, or wish more information to help you in reaching a decision, please call Dr. Jennifer Taylor (University of Prince Edward Island) at 566-0475.

If you are willing to have your child take part in this study, **please complete the attached permission form and the attached Home Survey by date**, and have your son or daughter bring it to his or her teacher. All students must return a signed permission form in order to take part. Children will not be permitted to take part if he/she does not have the form when he/she arrives.

If you have any positive or negative comments about your participation in this study, please contact the Chair, Research Ethics Committee, University of Prince Edward Island, through the secretary at the Office of Research Development, 566-0637. You can also call Jennifer Taylor at the University of Prince Edward Island, 902-566-0475.

Form A

Appendix B

PARENT PERMISSION FORM

SNAP: School Nutrition and Activity Project

By signing this form, I give permission for my child (print name) _____ to take part in the above study. I understand that my child's participation is entirely voluntary.

I have read the attached letter and I understand the purpose of the study.
If I agree that my child can take part, he/she will be asked to complete an in class survey on the foods he/she eats and his/her activity levels. This will last about 15-20 minutes. Trained researchers will then measure my child's height and weight in a separate PRIVATE room. My child's weight and height will not be revealed to my child or his/her peers, teachers or other members of the research team. This study is completely anonymous and confidential. My child's name will not be recorded at any time, on any question sheet, or any weight and height sheet.

Any reports based on this research will include information for my child's school district only; individual information about my child will not be released. All completed questionnaires will be kept in locked cabinets at the University of Prince Edward Island; only the researchers can see and use it. Although the results may not have an immediate benefit for my child, the study will help improve the health of students overall. There are no known risks in taking part in the study.

My child may refuse to take part or may withdraw from the study at any time without any effect on his or her grades or school performance by indicating her / his wish to the researcher (Jennifer Taylor).

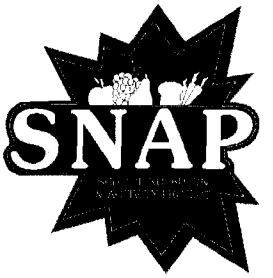
If I have any questions, I can call Dr. Jennifer Taylor (University of Prince Edward Island) at 902-566-0475. I will keep one copy of this form for my records.

I consent to my child's participation in this study by signing below.

Signature of parent _____Date_____

****** Please return this form to your school by May 4th. ******

Appendix B



STUDENT PERMISSION FORM

SNAP: School Nutrition and Activity Project

Jennifer Taylor or her research assistants have told me why this study is being done.

If I am in this in this study, I will be asked to fill out a questionnaire on the foods I eat and the activities I do. This will take about 15-20 minutes. I will also have my height and weight measured in a separate PRIVATE room. I will not be told what my height or weight is, and no one will see my measurements other than the researchers. All students in Grade 5 and 6 in PEI who agree and who have permission from their parents will be measured. Researchers will use this information to understand how schools can help students to be healthy.

My name will not be used in the research. They will use a code number instead. Only the researchers will see my answers. Other people will not find out my results.

My survey will be kept in locked cabinets at the University of Prince Edward Island. Only Jennifer Taylor and her assistants can see my answers.

I understand that **I don't have to be in this study if I don't want to.** I can quit the study any time. Nothing bad will happen if I say I don't want to be in the study.

If I have any questions, I can ask my parents/guardians and they can call Jennifer Taylor (University of Prince Edward Island) at 902-566-0475.

I will keep one copy of this form for my records.

By signing below, I am showing that I want to be in the study.

Signature of student _____Date_____

Appendix C

EASTERN SCHOOL DISTRICT

POLICY STATEMENT

SUBJECT:	**School Nutrition**
DATE OF ADOPTION:	January 12, 2005
EFFECTIVE DATE:	**January 12, 2005**
SUPERSEDES:	October 8, 1997 (Policy EF)
REVIEW DATE:	
CROSS REFERENCE:	
PAGE:	1 of 2

The Eastern School District Board of Trustees believes that nutrition has a significant impact on the health and academic achievement rates of students. Good nutrition is essential for healthy growth and development, and reduces the risk of diseases such as heart disease, cancer, diabetes and osteoporosis. In Prince Edward Island, the incidence of these preventable nutrition related diseases is higher than in many other areas of Canada. It is therefore critical to establish healthy eating behaviours in childhood and provide children and youth with the opportunity to develop healthy eating behaviours for life. Healthy eating behaviours begin at home in early childhood and later become a cooperative effort between the home and the school. Since students spend more time in school than in almost any other environment and may consume 40% of their daily intake at school, the school setting can have a tremendous and positive impact on student health and learning.

The Board encourages schools to maintain supportive environments which promote healthy food choices, both in the foods available at school and through educational programs. The Board provides regulations to assist schools in achieving the objectives of this policy. This policy will be regularly reviewed in accordance with usual Board procedures.

The Eastern School District and administrators will improve student access to food by:

- improving access by all students to healthy, safe, reasonably priced, attractively presented food choices; and
- reducing hunger among children living with food insecurity, through enhanced access to healthy foods within the school setting, provided in a non-stigmatizing manner.

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The Eastern School District and administrators recognize that the quality of food available at school is an important determinant of healthy eating in children. Enhanced healthy eating will be achieved by providing healthy food and beverage choices in vending machines, canteens, and school food programs and using healthy food choices, or non-food items, for fundraising campaigns. The regulations are not meant to be used by teachers and administrators as a tool to evaluate students' lunches from home.

The Eastern School District believes that nutrition education is important and is most effective if a comprehensive approach involving the school and broader community is used. Teachers and school staff are a valuable resource in helping students understand the relationship between nutrition, health and physical activity and developing the knowledge, positive attitudes and skills necessary to make healthy food choices for life.

While recognizing that parents are ultimately responsible for their child's nutritional health, schools should work with their parent groups and other community partners such as the PEI Healthy Eating Alliance to encourage and support parents to:

- ensure that their children eat a healthy breakfast;
- pack healthy lunches; and
- eat healthy meals at home.

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FORMULATED BY ADMINISTRATION CODE: ADG-R

EASTERN SCHOOL DISTRICT

ADMINISTRATIVE REGULATION

SUBJECT: **School Nutrition**
(For Elementary and Consolidated Schools Without Cafeterias)

EFFECTIVE DATE: **May 12, 2005**

SUPERSEDES: January 13, 2005

REVIEW DATE:

CROSS REFERENCE:

Implementation Schedule

Schools will have support for the remainder of the 2004-2005 school year to prepare to implement most of the provisions of these regulations during the 2005-2006 school year, and the provisions regarding fund-raising campaigns will be implemented for the beginning of the 2006-2007 school year.

Therefore:

January-June 2005	Preparation for implementation
September 2005 - June 2006	Implementation of all provisions except those regarding fund-raising campaigns
September 2006	Implementation of provisions regarding fund-raising campaigns

Regulations

The following regulations are set out to assist schools to achieve the objectives of the Eastern School District Nutrition Policy. These were identified in consultation with lead schools in the Eastern School District. There are several documents available to support schools with these regulations; these are listed at the end of the "Regulations" section.

Three sections follow: 1) Student Access to Food; 2) Quality of Food Available at School; and 3) Nutrition Education.

1. Student Access to Food

Programming

All schools will continue to participate in and promote the PEI School Milk Program.

All schools are encouraged to stock an emergency food cupboard with healthy choices for students in need.

Schools are encouraged to provide breakfast or snack programs when a need is identified, which will:

1) Be open to all students but will not be promoted as a replacement for breakfast eaten at home; and will
2) Follow Best Practice Standards from Breakfast for Learning.

Pricing

Schools will support healthy food choices by pricing approaches which encourage students to choose healthy foods over less healthy foods when food is sold at school.

Promotion

Schools will work to develop an environment that promotes healthy eating by:

1) Promoting and/or advertising only healthy food choices (those in the "Foods to Serve Most Often" and "Foods to Serve Sometimes" lists in the *Guide to Food Choices* (appendix)).
2) Not accepting advertising of food products for unhealthy food choices (those in the "Foods to Serve Least Often" list (appendix)).
3) Displaying attractive, current promotional materials (e.g. posters, displays, etc) related to healthy eating throughout schools.
4) Carrying materials that support the Nutrition Policy and Regulations in school resource centres (e.g. books, videos, pamphlets).
5) Participating in PEI Healthy Eating Alliance and Nutrition Month activities, where possible.

Time to Eat

Schools shall:

1) Allow a minimum of 20 minutes for students to eat lunch;
2) Encourage that foods are eaten after outside play, whenever possible.
3) Assure that lunch is eaten in a calm positive atmosphere.

Student Choice

1) Administrators and parent groups should involve students in planning school food choices.
2) Students should be encouraged to choose food from the "Foods to Serve Most Often" and "Foods to Serve Sometimes" lists (appendix).
3) When possible, schools should provide microwaves in classrooms to broaden the range of food choices for students.

2. Quality of Food Available at School

Criteria for Food and Beverages Available in Vending Machines, Canteens, School Lunch, Breakfast Programs, and Snack Programs

1) Foods and beverages sold or made available at school for lunch, canteen, and snack programs will be selected from the "Foods to Serve Most Often" or "Foods to Serve Sometimes" lists (appendix) and will emphasize vegetables and fruit; lower fat white and chocolate milk; whole grain products; lean meats; foods prepared with little or no fat; and foods low in salt, sugar, and caffeine.

2) All food and beverages in vending machines which are accessible to students will be selected from the "Healthy Vending Machine and Canteen Foods" list (appendix). Vending machines will not be used to sell carbonated soft drinks, fruit drinks, fruit juices with less than 100% juice, or sports drinks.
3) Schools will manage and operate vending machines in accordance with the terms of this Policy.
4) Teachers and administrators will encourage students to drink water and can facilitate their doing so by allowing water bottles in the classroom.
5) Schools should try to use local products first, where possible.

Special Functions

1) Although healthy foods should be promoted for daily consumption, as well as on celebration days, it is recognized that schools need to be flexible for celebration days.
2) Schools should not offer less healthy foods (e.g. candy, soft drinks, chips) as a reward to students for good behaviour, achievement, or participation in fundraising activities.

Fundraising

1) Fundraising activities by schools and parent groups should emphasize non-food products or healthy food choices from the "Foods to Serve Most Often" or "Foods to Serve Sometimes" lists (appendix).

Food Safety

1) Administrators will ensure that school staff and parent volunteers are familiar with safe food handling practices.
2) Schools will adhere to the Provincial Anaphylaxis Policy.
3) Students should wash their hands before eating.

3. Nutrition Education

Curriculum

1) The Eastern School District will work with the Department of Education and community partners to promote the further development and enhancement of a current, relevant nutrition education curriculum and enhance the resources available to teachers to support their nutrition education activities.
2) Schools should use a comprehensive approach to nutrition education involving the whole school community (families, individuals and organizations in the community) in nutrition education activities to positively influence students' nutrition knowledge, attitudes, skills and eating habits.
3) When possible, schools should incorporate nutrition education into other subject areas and outside classroom activities.
4) Schools will support opportunities for staff development and training for effective delivery of nutrition curriculum.

Role Models

Recognizing the importance of role modelling in promoting healthy eating:

1) Teachers, administrators, and school staff should act as positive role models to promote healthy eating within the classroom and school environment.

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Appendix 1 - **Guide to Food Choices**

This *Guide to Food Choices* accompanies the Eastern School District Healthy Eating Regulations. It consists of 3 food lists which have been developed based on Canada's Food Guide to Healthy Eating.

They are 1) *Foods to Serve Most Often; 2) Foods to Serve Sometimes;* and 3) *Foods to Serve Least Often.* A list of Healthier Vending Machine and Canteen Foods is also included. These lists are meant to assist schools in selecting healthy choices for when food is available (e.g. canteen, lunch program, snack program, breakfast program, emergency food cupboard, etc.). These food lists can also be used as a guide for parents when selecting foods for lunches.

Note: The food lists are not meant to be used by teachers and administrators as a tool to evaluate students' lunches from home.

Foods to Serve Most Often: Serve These Foods Daily

These foods should be the main focus in a healthy diet, with special emphasis on Grain Products and Vegetables and Fruit. Foods on this list tend to be rich in essential nutrients (vitamins, minerals, protein, carbohydrates, etc.), as well as low in fat.

Grain Products	Vegetables and Fruit	Milk Products	Meat and Alternatives
▸ *Whole wheat or multi-grain* bread, rolls, bagels, English muffins, waffles, pancakes, pita bread, or tortillas ▸ Low fat, high fibre muffins with vegetables or fruit ▸ Cookies (made with oatmeal or dried fruit and whole wheat flour) ▸ Crackers (low fat) ▸ Unsweetened or low-sugar cereal (e.g. Corn Flakes®, Shreddies®, etc.) ▸ Rice cakes, plain popcorn ▸ Corn bread ▸ Whole wheat noodles or pasta ▸ Brown rice ▸ Noodle or rice soup (homemade or canned low fat/low salt) ▸ Pasta salad	▸ Fresh vegetables and fruits ▸ 100% vegetable or fruit juice ▸ Canned fruit (packed in juice or water) ▸ Applesauce or applesauce blend products ▸ Frozen fruit (without added sugar) ▸ Frozen vegetables (without added fat) ▸ Vegetable soups (homemade or canned low fat/low salt) ▸ Vegetables (stir-fried) ▸ Baked potatoes ▸ Salads (without high fat dressing)	▸ White or chocolate milk (2%, 1%, or skim) ▸ Yogurt, frozen yogurt (2% milk fat or less) ▸ Cheese ▸ Cheese strings ▸ Milk-based soups and chowders (homemade or canned low fat/low salt)	▸ ★Chicken or turkey ▸ Fish, Seafood (fresh or frozen) ▸ Lean or extra lean beef or pork ▸ Canned fish (packed in water) ▸ Beans, lentils, dried peas (e.g. baked beans, lentil or split pea soup, chili with beans) ▸ Eggs ▸ Tofu ▸ Peanut butter ▸ Soya beverages ▸ Nuts and seeds (unsalted) ▸ Cottage cheese ★ choose baked or broiled meat and fish; not battered or fried

Foods to Serve Sometimes
Serve These Foods 2-3 Times Per Week

The foods featured on this list are also healthy choices, but they may be higher in calories, fat, salt or more processed than the foods found on the "Foods to Serve Most Often" list

Grain Products	Vegetables and Fruit	Milk Products	Meat and Alternatives
▸ *White* bread, rolls, bagels, English muffins, waffles, pancakes, pita bread, or tortillas ▸ Loaves (vegetable or fruit) ▸ Sweetened Cereal made with oats or whole grains (e.g. Instant Oatmeal, Honey Nut Cheerios®, etc) ▸ Cereal and granola bars (low fat) ▸ Cereal snack mix ▸ Graham wafers ▸ Fruit bars (e.g. fig newtons) ▸ Date squares ▸ Noodles or noodle soup (canned or instant "baked type") ▸ Biscuits, bannock ▸ Scones ▸ Pretzels ▸ Rice cereal squares ▸ Cheese, veggie or Hawaiian pizza ▸ White rice or pasta	▸ Canned fruit (in light syrup) ▸ Dried fruit * ▸ Frozen fruit bars (100% fruit juice) ▸ Fruit crisps ▸ Canned vegetables ▸ Vegetables in sauces (e.g. cheese sauce) ▸ Vegetable soup (canned, regular) ▸ Cheese, veggie or Hawaiian pizza	▸ Milk (whole) ▸ Ice milk ▸ Processed cheese products (e.g. slices, spreads) ▸ Yogurt drinks ▸ Milk based puddings ▸ Flavoured milk drinks ▸ Custards ▸ Cheese, veggie or Hawaiian pizza	▸ Lean cold cuts ▸ Lower fat hot dogs ▸ ★ Lower fat veggie hot dogs, burgers or nuggets ▸ Baked ham ▸ Nuts and seeds (salted) ★ choose baked or broiled vegetarian products; not battered or fried

* Although dried fruit like raisins are nutritious, children should be encouraged to brush their teeth after eating them since they are sticky and naturally sweet and can promote tooth decay.

Foods to Serve Least Often
Serve These Foods Infrequently
(1-2 times per month or less)

The foods on this list tend to be quite high in fat, sugar, calories or offer little nutritional value. The foods on this list should be avoided most of the time, but can fit once in a while in a healthy diet.

Grain Products	Vegetables and Fruit	Milk Products	Meat and Alternatives	Others
▸ Muffins (cake-like, commercially prepared) ▸ Sugary breakfast cereal ▸ Crackers (not low fat) ▸ Granola bars (dipped, not low fat) ▸ Cookies (commercial or higher fat regular recipe) ▸ Noodles or noodle soup (canned or instant "fried type")	▸ Fried vegetables ▸ French fries, all commercial types ▸ Sweetened fruit juice ▸ Fruit pies ▸ Fruit leather	▸ Cream soups ▸ Milkshakes ▸ Regular ice cream	▸ Regular fat processed meats (e.g. Pepperoni, salami, bacon, bologna, etc) ▸ Pizza with processed meats ▸ Hot dogs, regular ▸ Sausages, regular ▸ Fried fish and chicken (e.g. chicken nuggets) ▸ Regular ground beef ▸ Sesame snaps	▸ Potato or nacho chips ▸ Chocolate bars ▸ Cakes ▸ Doughnuts ▸ Squares (e.g. brownies) ▸ Candy ▸ Pop ▸ Iced tea ▸ Sweetened fruit drinks ▸ Sports drinks ▸ Gravy

Healthier Vending Machine and Canteen Foods

The foods included on this list are healthy choices that can be included in vending machines or school canteens.

Beverages	Snacks
▸ Milk ▸ Chocolate Milk ▸ 100% juice ▸ Water	▸ Raw vegetables and dip (refrigeration required) ▸ Fresh fruit - whole, pre-cut with dip, or fruit salad (refrigeration required) ▸ Fruit cups ▸ Applesauce or applesauce blend cups ▸ Yogurt or yogurt tubes (refrigeration required) ▸ Raisins and other dried fruit (e.g. apricots, apple slices, cranberries, pineapple, etc.) ▸ Fruit bars (e.g. fig newtons) ▸ Breadsticks and cheese ▸ Bagels ▸ Pretzels ▸ Rice cakes or rice crisps ▸ Cereal snack mix ▸ Crackers & Topping (e.g. cheese, peanut butter, jam, etc.) ▸ Granola bars (low fat, not dipped) ▸ Nuts & seeds (peanuts, sunflowers, pumpkin seeds, almonds, soy nuts, etc.) ▸ Trail mix (combination of dried cereal, dried fruit, nuts and seeds)

WESTERN SCHOOL BOARD OF P.E.I.
BOARD POLICY MANUAL

Section:	**SCHOOL NUTRITION**	**Index Code:**
Origin:	**WESTERN SCHOOL BOARD SUPERINTENDENT OF EDUCATION**	**Reference:**
Title:	**ELEMENTARY & CONSOLIDATED SCHOOL NUTRITION POLICY**	

Policy Statement:

The Board of Trustees of the Western School Board (the Board) believes that nutrition has a significant impact on the health and academic achievement rates of students. Good nutrition and physical activity are essential for healthy growth and development, and reduces the risk of conditions such as overweight, obesity, heart disease, cancer, diabetes and osteoporosis. In Prince Edward Island, the incidence of preventable nutrition related diseases is higher than in many other areas of Canada. It is therefore critical to establish healthy eating behaviours in childhood and provide children and youth with the opportunity to develop healthy eating behaviours for life. Healthy eating behaviours begin at home in early childhood and later become a cooperative effort between the home and the school. Since students spend more time in school than in almost any other environment and may consume 40% of their daily intake at schooi, the school setting can have a tremendous and positive impact on student health and learning.

The Board encourages schools to maintain supportive environments which promote healthy food choices, both in the foods available at school and through educational programs. The Board provides, through regulation, guidelines to schools to assist them in carrying out this policy. This policy will be regularly reviewed in accordance with usual Board procedures.

The Board and administrators will improve student access to food by:

- improving access by all students to healthy, safe, reasonably priced, attractively presented food choices; and
- reducing hunger among chiidren living with food insecurity, through enhanced access to healthy foods within the school setting, provided in a non-stigmatizing manner.

The Board and administrators recognize that the quality of food available at school is an important determinant of healthy eating in children. This will be achieved by providing healthy food and beverage choices in vending machines, canteens, and school food programs and using healthy food choices, or non-food items for fundraising activities. The regulations are not meant to be used by teachers and administrators as a tool to evaluate student lunches from home.

The Board believes that nutrition education is important and is most effective if a comprehensive approach involving the school and broader community is used. Teachers and school staff are a valuable resource in helping students understand the relationship between nutrition, health and physical activity and developing the knowledge, positive attitudes and skills necessary to make healthy food choices for life.

While recognizing that parents are uitimately responsibie for their child's nutritional health, schools should work with their parent groups (such as the Home and School Federation) and other community partners such as the PEI Healthy Eating Alliance to encourage and support parents to:

- **ensure that their chiidren eat a healthy breakfast,**
- **pack healthy lunches and**
- **eat healthy meals at home.**

The following regulations are set out to assist schools to achieve the objectives of the Western School Board Nutrition Policy. These were identified in consultation with lead schools in the Western School Board. There are several documents available to support schools with these regulations; these are listed at the end of the "Regulations" section.

Three sections follow: 1) student access to food; 2) quality of food available at school; and 3) nutrition education.

Regulations:

1. Student Access to Food

1.1 Programming
All schools will continue to participate in and promote the PEI School Milk Program.

All schools are encouraged to stock an emergency food cupboard with healthy choices for students in need.

Schools are encouraged to provide breakfast or snack programs when a need is identified, which will:

- be open to all students but will not be promoted as a replacement for breakfast eaten at home; and will
- follow Best Practice Standards from Breakfast for Learning.

2.0 Pricing

Schools will support healthy food choices by pricing approaches which encourage students to choose healthy foods over less healthy foods when food is sold at school.

3.0 Promotion

Schools will work to develop an environment that promotes healthy eating by:

- promoting and/or advertising only healthy food choices (those in the "Foods to Serve Most Often" and "Foods to Serve Sometimes" lists in the *Guide to Food Choices* (appendix)).
- not accepting advertising of food products for unhealthy food choices (those in the "Foods to Serve Least Often" list (appendix).
- displaying attractive, current promotional materials (e.g. posters, displays, etc) related to healthy eating throughout schools.
- carrying materials that support the Nutrition Policy and Regulations in school resource centres (e.g. books, videos, pamphlets).
- participating in PEI Healthy Eating Alliance and Nutrition Month activities, where possible.

4.0 Time to Eat

Schools should:

- allow a minimum of 20 minutes for students to eat lunch;
- encourage that foods are eaten after outside play, whenever possible.

5.0 Student Choice

- Administrators and parent groups should invoive students in planning schooi food choices.
- Students should be encouraged to choose food from the "Foods to Serve Most Often" and "Foods to Serve Sometimes" lists (appendix).

6.0 Quality of Food Available at School

6.1 Criteria for Food and Beverages Available in Vending Machines, Canteens, School Lunch, Breakfast Programs, and Snack Programs

- Foods and beverages sold or made available at school for lunch, canteen, and snack programs will be selected from the "Foods to Serve Most Often" or "Foods to Serve Sometimes" lists (appendix) and will emphasize vegetables and fruit; lower fat white and chocolate milk; whole grain products; lean meats; foods prepared with little or no fat; and foods low in salt, sugar, and caffeine.
- All food and beverages in vending machines which are accessible to students will be selected from the "Healthy Vending Machine and Canteen Foods" list (appendix). Vending machines will not be used to sell carbonated soft drinks, fruit drinks, fruit juices with less than 100% juice, or sports drinks.
- Schools will manage and operate vending machines in accordance with the terms of this Policy.
- Teachers and administrators will encourage students to drink water.
- Schools should try to use local products first, where possible.

7.0 Special Functions

Although healthy foods shouid be promoted for daily consumption, as well as on celebration days, it is recognized that schools need to be flexible for celebration days.

Schools are encouraged to offer healthy foods or non-food items as a reward to students for good behaviour, achievement, or participation in fundraising activities.

8.0 Fundraising

Fundraising activities by schools and parent groups should emphasize non-food products or healthy food choices from the "Foods to Serve Most Often" or "Foods to Serve Sometimes" lists (appendix).

9.0 Food Safety

Administrators will ensure that school staff and parent volunteers are familiar with safe food handling practices.

Schools will adhere to the Provincial Anaphylaxis Policy.

Students should wash their hands properly before eating.

10.0 Nutrition Education

10.1 Curriculum

- The Board will work with the Department of Education and community partners to promote the further development and enhancement of a current, relevant nutrition education curriculum and enhance the resources available to teachers to support their nutrition education activities.
- Schools should use a comprehensive approach to nutrition education involving the whole schooi community (families, individuals and organizations in the community) in nutrition education activities to positively influence students' nutrition knowledge, attitudes, skills and eating habits.
- When possible, schools should incorporate nutrition education into other subject areas and outside classroom activities.
- Schools will support opportunities for staff development and training for effective delivery of nutrition curriculum.

10.2 Role Models

Recognizing the importance of role modelling in promoting healthy eating, teachers, administrators, and school staff should act as positive role models to promote healthy eating within the classroom and office environment.

Supportive Documents Available:

- Fundraising Alternatives
- Microwave Safety
- Peanut Alternatives
- Practical suggestions for emergency food cupboard
- Lunch program options
- Plain language document explaining the guidelines for parents (one page)
- Short summary piece available for schools to use in their newsletters and handbook
- A comprehensive Q&A document that provides the rationale for each item of the guidelines. _____

Date Originally Adopted: June 8, 2005
Date of Last Amendment: June 8, 2005
Orlginal Board Policy No.:NA
Date Revised: June 8, 2005

Appendix to Western School Board School Policy on School Nutrition for Elementary & Consolidated Schools (policy)

Guide to Food Choices

This *Guide to Food Choices* accompanies the Western School Board Healthy Eating Regulations.

it consists of 3 food lists which have been developed based on Canada's Food Guide to Healthy Eating. They are 1) *Foods to Serve Most Often; 2) Foods to Serve Sometimes;* and 3) *Foods to Serve Least Often.* A list of *Healthier Vending Machine and Canteen Foods* is also included.

These lists are meant to assist schools in selecting healthy choices for when food is available (e.g. canteen, lunch program, snack program, breakfast program, emergency food cupboard, etc.). These food lists can also be used as a guide for parents when selecting foods for lunches.

Note: The food lists are not meant to be used by teachers and administrators as a tool to evaluate students' lunches from home.

Foods to Serve Most Often: Serve These Foods Daily

These foods should be the main focus in a healthy diet, with special emphasis on Grain Products and Vegetables and Fruit. Foods on this list tend to be rich in essential nutrients (vitamins, minerals, protein, carbohydrates, etc.), as well as low in fat.

Grain Products	Vegetables and Fruit	Milk Products	Meat and Alternatives
▸ *Whole wheat* or multi-grain bread, rolls, bagels, English muffins, waffles, pancakes, pita bread, or tortillas ▸ Low fat, high fibre muffins with vegetables or fruit ▸ Cookies (made with oatmeal or dried fruit and whole wheat flour) ▸ Crackers (low fat) ▸ Unsweetened or low-sugar cereal (e.g. Corn Flakes®, Shreddies®, etc.) ▸ Rice cakes, plain popcorn ▸ Corn bread ▸ Whole wheat noodles or pasta ▸ Brown rice ▸ Noodle or rice soup (homemade or canned low fat/low salt) ▸ Pasta salad	▸ Fresh vegetables and fruits ▸ 100% vegetable or fruit juice ▸ Canned fruit (packed in juice or water) ▸ Applesauce or applesauce blend products ▸ Frozen fruit (without added sugar) ▸ Frozen vegetables (without added fat) ▸ Vegetable soups (homemade or canned low fat/low salt) ▸ Vegetables (stir-fried) ▸ Baked potatoes ▸ Salads (without high fat dressing)	▸ White or chocolate milk (2%, 1%, or skim) ▸ Yogurt, frozen yogurt (2% milk fat or less) ▸ Cheese ▸ Cheese strings ▸ Milk-based soups and chowders (homemade or canned low fat/low salt)	▸ Chicken or turkey ▸ Fish, Seafood (fresh or frozen) ▸ Lean or extra lean beef or pork ▸ Canned fish (packed in water) ▸ Beans, lentils, dried peas (e.g. baked beans, lentil or split pea soup, chili with beans) ▸ Eggs ▸ Tofu ▸ Peanut butter ▸ Soya beverages ▸ Nuts and seeds (unsalted) ▸ Cottage cheese ★ choose baked or broiled meat and fish; not battered or fried

Foods to Serve Sometimes
Serve These Foods 2-3 Times Per Week

The foods featured on this list are also healthy choices, but they may be higher in calories, fat, salt or more processed than the foods found on the "Foods to Serve Most Often" list

Grain Products	Vegetables and Fruit	Milk Products	Meat and Alternatives
▸ *White* bread, rolls, bagels, English muffins, waffles, pancakes, pita bread, or tortillas ▸ Loaves (vegetable or fruit) ▸ Sweetened Cereal made with oats or whole grains (e.g. Instant Oatmeal, Honey Nut Cheerios®, etc) ▸ Cereal and granola bars (low fat) ▸ Cereal snack mix ▸ Graham wafers ▸ Fruit bars (e.g fig newtons) ▸ Date squares ▸ Noodles or noodle soup (canned or instant "baked type") ▸ Biscuits, bannock ▸ Scones ▸ Pretzels ▸ Rice cereal squares ▸ Cheese, veggie or hawaiian pizza	▸ Canned fruit (in light syrup) ▸ Dried fruit ▸ Frozen fruit bars (100% fruit juice) ▸ Fruit crisps ▸ Canned vegetables ▸ Vegetables in sauces (e.g. cheese sauce) ▸ Vegetable soup (canned, regular)	▸ Milk (whole) ▸ Ice milk ▸ Processed cheese products (e.g. slices, spreads) ▸ Yogurt drinks ▸ Milk based puddings ▸ Flavoured milk drinks ▸ Custards ▸ Cheese veggie or hawaiian pizza	▸ Lean cold cuts ▸ Lower fat hot dogs ▸ Veggie hot dogs, burgers or imitation chicken nuggets ▸ Locally produced lower fat hot dogs ▸ Baked ham ▸ Nuts and seeds (salted)

* Although dried fruit like raisins are nutritious, children should be encouraged to brush their teeth after eating them since they are sticky and naturally sweet and can promote tooth decay.

Foods to Serve Least Often
Serve These Foods Infrequently
(1-2 times per month or less)

The foods on this list tend to be quite high in fat, sugar, calories or offer little nutritional value. The foods on this list should be avoided most of the time, but can fit once in a while in a healthy diet.

Grain Products	Vegetables and Fruit	Milk Products	Meat and Alternatives	Others
▸ Muffins (cake-like, commercially prepared) ▸ Sugary breakfast cereal ▸ Crackers (not low fat) ▸ Granola bars (dipped, not low fat) ▸ Cookies (commercial or higher fat regular recipe) ▸ Noodles or noodle soup (canned or instant "fried type")	▸ Fried vegetables ▸ French fries, all commercial types ▸ Sweetened fruit juice ▸ Fruit pies ▸ Fruit leather	▸ Cream soups ▸ Milkshakes ▸ Regular ice cream	▸ Regular fat processed meats (e.g. Pepperoni, salami, bacon, bologna, etc) ▸ Pizza with processed meats ▸ Hot dogs, regular ▸ Sausages, regular ▸ Fried fish and chicken (e.g. chicken nuggets) ▸ Regular ground beef ▸ Sesame snaps	▸ Potato or nacho chips ▸ Chocolate bars ▸ Cakes ▸ Doughnuts ▸ Squares (e.g. brownies) ▸ Candy ▸ Pop ▸ Iced tea ▸ Sweetened fruit drinks ▸ Sports drinks ▸ Gravy

Healthier Vending Machine and Canteen Foods

The foods included on this list can be included in vending machines or sold at school canteens.

Beverages	Snacks
▸ Milk ▸ Chocolate Milk ▸ 100% juice ▸ Water	▸ Raw vegetables and dip (refrigeration required) ▸ Fresh fruit - whole, pre-cut with dip, or fruit salad (refrigeration required) ▸ Fruit cups ▸ Applesauce or applesauce blend cups ▸ Yogurt or yogurt tubes (refrigeration required) ▸ Raisins and other dried fruit (e.g. apricots, apple slices, cranberries, pineapple, etc.) ▸ Fruit bars (e.g. fig newtons) ▸ Breadsticks and cheese ▸ Bagels ▸ Pretzels ▸ Rice cakes or rice crisps ▸ Cereal snack mix ▸ Crackers & Topping (e.g. cheese, peanut butter, jam, etc.) ▸ Granola bars (low fat, not dipped) ▸ Nuts & seeds (peanuts, sunflowers, pumpkin seeds, almonds, soy nuts, etc.) ▸ Trail mix (combination of dried cereal, dried fruit, nuts and seeds)