

**CHARACTERIZING THE SCHOOL FOOD ENVIRONMENT  
IN DOMINICA FOR HEALTH PROMOTION**

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For the Degree of Doctor of Philosophy  
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**By**

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## **ABSTRACT**

The school food environment, defined as, ‘when and where children obtain food and the types of options available during the school day’, has been identified as an ideal setting for health promotion efforts to support and promote healthy eating behaviours. However, characterizing the school food environment is a necessary first step to guide the development of health promotion initiatives. The purpose of this dissertation was to characterize the school food environment in Dominica for health promotion. Three research questions were addressed: 1) What types of food are sold and consumed in public primary schools in Dominica (**Chapter 4-Study 1**)? 2) What are the perceptions of stakeholders of the school food environment (**Chapter 5-Study 2**)? 3) How effective is a recipe challenge in providing children with opportunities to be agents of change in creating healthy food options to promote a healthy school food environment? (**Chapter 6- Study 3**)? Overall, this thesis took a multi-method research design. Data were collected in three phases through a variety of methods, including telephone survey and individual interviews with school principals, focus groups with school teachers, individual interviews with vendors, and individual interviews with personnel from government ministries of health and education, food frequency consumption survey among students and a recipe contest.

The findings suggest that 1) food outlets within the school food environment included tuck shops, vendors, shops, and school feeding programs; 2) a variety of commercially prepared and home-made snack foods were sold from the tuck shops and vendors; 3) stakeholders identified many barriers to healthy eating including parents and peers, food available at food outlets, and lack of a national school food policy and few facilitators to healthy eating including the school meal program and weekly held fruit days. The recipe contest was a modest success in demonstrating the potential for children to create food options to promote a healthy school food environment. The study makes several recommendations for health promotion: government

should capitalize on the food policy option for regulating the school food environment, and link local food production to schools and health promoters should empower children to be agents of change. Recommendations for future research are also provided.

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## **LIST OF ABBREVIATIONS**

ANGELO	Analysis Grid for Environments Linked to Obesity
BMI	Body Mass Index
CARICOM	Caribbean Community
CARPHA	Caribbean Public Health Agency
CDC	Centers for Disease Control and Prevention
CFNI	Caribbean Food and Nutrition Institute
FAO	Food and Agricultural Organization of the United Nations
FFQ	Food Frequency Questionnaire
GSHS	Global School-based Student Health Survey
HCC	Healthy Caribbean Coalition
IOTF	International Obesity Task Force
T2DM	Type 2 diabetes mellitus
MOE	Ministry of Education
MOH	Ministry of Health
NCD	Non-Communicable Disease
OWOB	Overweight and Obesity
PAHO	Pan American Health Organization
SMP	School Meal Program
SFP	School Feeding Program
SSB	Sugar-Sweetened Beverages
UNESCO	United Nations Educational Scientific and Cultural Organization
WHA	Weight-for-Height-for-Age



WHO World Health Organization

WFP World Food Program

## **CHAPTER 1 INTRODUCTION**

### **1.1 Background**

Across the Caribbean region, secular trends in the prevalence of childhood overweight and obesity (OWOB) show that the rates have doubled over the last three decades (Mumena, Francis-Granderson, Phillip, & Gray-Donald, 2018; Fernandez, Kubow, Gray-Donald, Knight, & Gaskin, 2015; Gardner, Bird, Canning, Frizzell, & Smith, 2011; Gaskin & Walker, 2003). These rapidly increasing rates are raising concerns because there is evidence of a positive association between childhood OWOB and serious health consequences such as type 2 diabetes mellitus (T2DM) and high blood pressure among Caribbean children (Maitland & Handfield, 2016; Batson, Teelucksingh, Maharaj, & Cockburn, 2014; Batson et al., 2013; Rivers, Hanna-Mahase, Frankson, Smith, & Peter, 2013; Gaskin et al., 2015). Another worrisome issue for heads of government and public health agencies in the Caribbean is that obese children often develop into obese adults with comorbidities that have serious economic consequences and are the leading causes of mortality in the region (Chao, 2013; Theodore, 2011).

The etiology of childhood obesity is complex and although several factors are believed to contribute to childhood OWOB in the Caribbean, the focus of this thesis is on only one of these: unhealthy eating. The food system and consumption behaviour of the population in the Caribbean region is undergoing significant changes. Moreover, the Caribbean population is transitioning away from diets high in grains, starchy vegetables, local fruits, vegetables, and legumes towards a diet high in energy dense, processed and imported foods due to decreased and diversified food production, increased commercial markets and globalized dietary sources, and increased marketing and household purchasing power (Jolly et al., 2013; Popkin, Adair, & Ng, 2012; Asfaw, 2011; Monteiro,

2009). Because the contribution of food imports continues to outweigh that of local production, the population of most Caribbean countries, are consuming more calories, fats and sugars and fewer fruits and vegetables (Jolly et al., 2013; Gaskin et al., 2012). Data from Caribbean studies show that children consume high quantities of unhealthy food, for example, sugar-sweetened beverages, fried foods, and snack foods high in fat and sugar (Maitland, Malcolm, & Handfield, 2015; Henry, Ramdath, White, & Mangroo, 2013; Gaskin et al., 2012; Francis et al., 2009; World Health Organisation [WHO], 2009).

Despite changing consumption patterns among the Caribbean population, results of school-based studies in the Caribbean country, Dominica, found that children are still consuming more traditional than non-traditional foods (foods that are not used in traditional recipes and/or are highly processed) (Wall-Bassett et al., 2012; Wall-Bassett, Gerard, & Kunkel, 2010). Dominica is known for its deep agricultural and cultural heritage that has shaped the traditional cuisine, i.e., reliance on local and minimally processed foods (Trotman, Gordon, Hutchinson, Singh, & McRae-Smith, 2009; Wall-Bassett et al., 2010; Maglorie & Prevost, 2000). However, against the backdrop of declining agricultural production (Food and Agricultural Organization of the United Nations [FAO], 2015; Trotman et al., 2009), the diets of Dominican children may be transitioning to unhealthy eating habits that promote overweight and obesity. Reports indicate that from 1990 to 1999, childhood overweight and obesity rose from 6% to 9.7% among 5 year olds attending child clinics in Dominica (Xuereb, Johnson, Bocage, Trotter, & Henry, 2001). Data collected from a sample of children (n=199; mean age 8.6 years) in 2005 show that 18.7% were overweight and 7.9% were obese (Wall-Bassett et al., 2012). Another study reported that an estimated

26% of school-going children (n=1642; age 11-17) were overweight and 10% were obese in 2010 (Pengpid & Peltzer, 2014).

It is clear that efforts are needed to improve and sustain healthy eating habits among children in Dominica and the wider Caribbean region. Developing healthy eating behaviours in childhood can be challenging, particularly if the food environment does not support such behaviours. Research has found that changes to school food environments are a powerful strategy to improve dietary behavior and control childhood obesity and related illnesses (Welker, Lott, & Story, 2016; Driessen, Cameron, Thornton, Lai, & Barnett, 2014). The school food environment, defined in this study as the types of options and outlets available in and around school during the school day, (Welker et al., 2016), supported by policies, economics, and sociocultural norms, has been identified as a setting that strongly influences unhealthy eating among Caribbean children (Henry et al., 2013; Francis, Nichols, & Dalrymple, 2010). A healthier school food environment in the Caribbean might curtail rates of overweight and obesity in children. However, before health promotion strategies are developed, the school food environment must be thoroughly understood. There is much value in characterizing the school food environment in Dominica for health promotion purposes.

## **1.2 Rationale for Study**

In 2007, heads of government for the English-speaking Caribbean endorsed a declaration to stop the epidemic of non-communicable disease (NCD). The Port-of-Spain NCD Summit Declaration, "Uniting to Stop the Epidemic of Chronic Non-Communicable Disease," called on government, civil society, and the private sector to jointly tackle the common risk factors for major chronic diseases such as obesity (Samuels & Hospedales,

2011). A variety of nutrition- related commitments emerged from the 15-point declaration, including the creation of healthy school food environments through policy, standards, and healthy eating programs (Samuels, Kirton, & Guebert, 2014). However, reports from the 10th anniversary of the declaration in 2017 indicated that heads of government were particularly concerned about the level of childhood OWOB in many member states and recognised that the community had not sufficiently advanced the recommended actions of the Declaration (CARICOM, 2017). Other reports have also indicated that mandates to create healthy food environments are among those with the lowest performance/compliance scores since the declaration (Samuels et al., 2014).

Caribbean studies have associated elements of the school food environment, such as the food sold at school, to children's eating behaviours (Henry et al., 2013; Gaskin et al., 2012). However, no known Caribbean study has engaged a broad range of stakeholders, taken an ecological approach in understanding the school food environment, or actively engaged children in promoting a healthy school food environment. To contribute evidence to this research gap, this dissertation characterized the school food environment in Dominica. Findings from this study may: 1) provide some of the evidence needed to support the case for the creation of healthy school food environments; 2) provide culturally-relevant information to inform the design of health promotion initiatives targeting school-aged children, and 3) impact national and school nutrition policy for long-term sustainability and effective change. The current research extends the understanding of the food school environment, and the findings provide further evidence of the need to adopt policies that will lead to healthier eating in schools.

### **1.3 Research Questions and Objectives**

**Research Question #1:** What types of food are sold and consumed in public primary schools in Dominica?

**Objectives:**

1. To determine children's options for eating while at school.
2. To determine the types and popularity of food sold within the school environment.
3. To determine the frequency of consumption of food sold at school.

**Research Question # 2:** What are stakeholders' perceptions of the school food environment?

**Objective:**

1. To acquire an in-depth assessment of stakeholders' perceptions of the school food environment, its impact on healthy eating, and opportunities to improve the nutritional quality of food sold.

**Research Question # 3:** How effective is a recipe contest in engaging school children to be agents of change within their school food environment?

**Objective:**

1. To engage children as agents of change in creating healthy foods options to promote a healthy school food environment.

### **1.4 Study Setting**

The study was conducted in Dominica, a country in the Caribbean region, with a population of approximately 72,680 and a total area of 750 km<sup>2</sup>. Dominica is described by the World Bank as an upper middle-income country with an economy based primarily on agriculture and tourism (World Bank, 2016).

The primary educational system of Dominica is administered by the Ministry of Education, Sports and Youth Affairs. There are 60 primary schools in Dominica; of these, 48 are public schools, which are the focus of this study. Primary school education is compulsory and usually begins at age 5; students then move through Grades 1-6. A typical school day for many public school students begins at 9 a.m. and ends at 3:30 p.m., with two school breaks during the day – a morning snack break from 10:30 - 10:45 a.m. and a lunch break from 12:00 to 1:30 p.m.

## **1.5 Definitions**

**Bakes** – A flour-based flat bread prepared by deep-fat frying. Bakes – singular and plural. Other names used for bakes throughout the Caribbean include johnny cake, fried bake(s), festival, fried dumpling, and float.

**Childhood Overweight and obesity** - abnormal or excessive fat accumulation that presents a risk to health. The WHO defines overweight as a BMI above 1SD and obesity as a BMI above 2 SD from the mean of the reference population of the WHO (de Onis et al., 2007).

**Government-Assisted Private School** - A private school that is in receipt of assistance (public funds) under the Education Act 1997 of the Commonwealth of Dominica (UNESCO, 1997).

**Private School** - A school that is owned, managed, and financed by a person, religious community, or body, that is attended by 12 or more students continuously for more than eight hours per week, and that is registered under the Education Act 1997 of the Commonwealth of Dominica (UNESCO, 1997).

**Public School** - A school that is wholly or mainly maintained at the public expense and to which the general public has, subject to the Education Act 1997 of the Commonwealth of

Dominica, 1997 and regulations, unconditional access (United Nations Educational, Scientific and Cultural Organization [UNESCO], 1997).

**School Feeding (or Meal) Program** - programs that provide meals to school children to alleviate short-term hunger, increase attention span, facilitate learning, and obviate the need for children to leave the school to find food. In-school meals also act as an incentive to increase school access. School meals can be prepared in schools or in the community, or can be delivered from centralized kitchens (Bundy et al., 2009).

**School Food Environment** - When and where children obtain food and the types of options for food available during the school day (Welker et al., 2016).

**Shop**- small grocery stores in the community that students encounter to and from school. Items are typically stocked behind a counter and patrons are served by a shop keeper.

**Tuck Shops** – The term “tuck shop” is generally used to describe a formal or informal small shop within the school grounds; these vary in level of affiliation with the school. Some tuck shops are managed by outside individuals (who benefit from the profit but pay rent to conduct business in the school); others are managed by the schools, and the schools benefit from any profit gained (Marraccini, Meltzer, Bourne, & Draper, 2012; De Villiers et al., 2012).

**Vendors**- anybody selling ready-to-eat foods or ‘street foods’ in and around schools or other streets and public places. Vendors differ from tuck shops as they sell from temporary structures such as mobile carts, stands and are not obligated to pay rent to conduct business (De Villiers et al., 2012; Omemu & Aderoju, 2008).



## **1.6 Organization of Chapters**

This dissertation is divided into seven chapters. Chapter 1 introduces the study, providing insight into the magnitude of the study problem through a brief description of the background literature. This chapter also includes the study's setting, rationale, research questions, and objectives. Chapter 2 presents a review of the literature, and Chapter 3 describes the methodological procedures for data collection. Chapters 4, 5, and 6 are three separate studies/manuscripts, which together provide a detailed picture of the school food environment in Dominica. Chapter 4, "Characterizing the School Food Environment in Dominica," corresponds to research question #1. Chapter 5, "Stakeholders' Perceptions of the School Food Environment in Dominica," corresponds to research question #2. Chapter 6, "School Children as Agents of Change in Creating Healthy Foods Options to Promote a Healthy School Food Environment," corresponds to research question # 3. A general discussion of the dissertation as a whole is presented in Chapter 7.

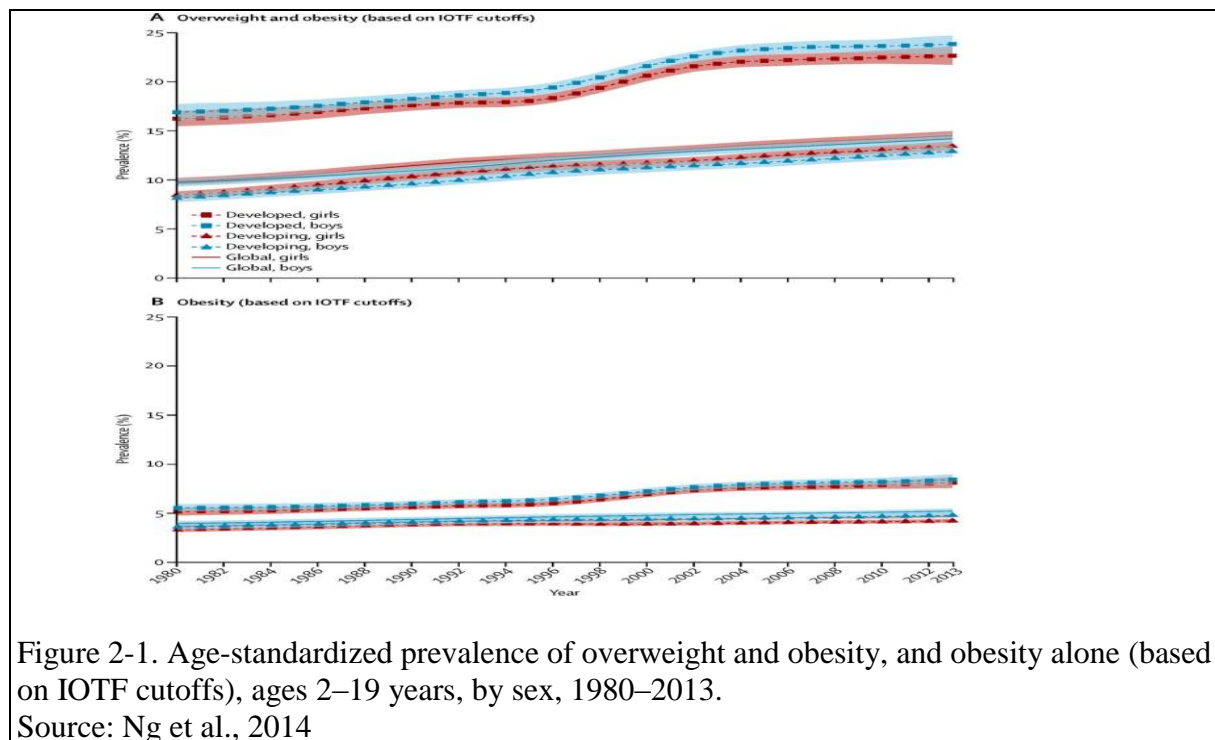
## CHAPTER 2 LITERATURE REVIEW

### 2.1 Introduction

In this chapter, a series of topics are presented to examine the literature on the school food environment. The review is organized around three key areas: childhood obesity, including a review of childhood obesity in the Caribbean; the school food environment, including options for eating and methods of assessment; and creating a healthy school food environment. Overall, the content focuses on studies among school-aged children.

### 2.2 Childhood Obesity and Overweight: A Global Overview

Overweight and obesity are major global public health issues. Results from a systematic analysis show that the prevalence of childhood overweight and obesity increased by 47% between 1980 and 2013 (Ng et al., 2014). Figure 2-1 shows the age-standardized prevalence of overweight and obesity in children for developing and developed countries.



Since 1980, the prevalence of overweight and obesity has increased remarkably in developed countries; 23.8% of boys and 22.6% of girls were overweight or obese in 2013, compared with 16.9% of boys and 16.2% of girls in 1980. The prevalence of childhood overweight and obesity in developing countries increased by a similar percentage, from 8.1% in 1980 to 12.9% in 2013 for boys and 8.4% to 13.4% for girls. In both developed and developing countries, sex differences in the levels and trends of overweight and obesity are small (Ng et al., 2014).

While some studies support increasing trends of childhood obesity (Skinner, Perrin, & Skelton, 2016; Ng et al., 2014), others have found rates have stabilized or decreased in some jurisdictions (Rodd & Sharma, 2016; Keane, Kearney, Perry, Kelleher, & Harrington, 2014; Wabitsch, Moss, & Kromeyer-Hauschild, 2014; Olds et al., 2011; Rokholm, Baker, & Sørensen, 2010). Even if rates of overweight and obese children have plateaued or started to decline, the prevalence is still high and is a cause for concern and action in both developed and developing countries.

### **2.2.1 Consequences of Childhood Overweight and Obesity**

Childhood obesity has been associated with a number of unfavorable physical and psychosocial health and economic outcomes. The physical health consequences of childhood obesity are often long term, manifesting in adulthood and posing a lifetime threat (Finkelstein, Graham, & Malhotra, 2014; Singh, Mulder, Twisk, Van Mechelen, & Chinapaw, 2008). These effects include metabolic complications such as diabetes mellitus, hypertension, dyslipidaemia and non-alcoholic fatty liver disease, menstrual abnormalities,

gallstones, and mechanical problems such as obstructive sleep apnoea syndrome and orthopaedic disorders (Llewellyn, Simmonds, Owen, & Woolacott, 2016; Rosner, Cook, Daniels, & Falkner, 2013; Lee, 2009; Reilly et al., 2003). Psychosocial health problems associated with obesity include low self- and body-esteem, social stigma, low quality of life, reduced school and social performance, depression, anxiety, behavior problems, decreased cognitive functioning, attention deficit hyperactivity disorder, disordered eating, loneliness, and nervousness (Gibson et al., 2017; Carey, Singh, Brown, & Wilkinson, 2015; Caird et al., 2014; Latzer & Stein, 2013; Griffiths, Parsons, & Hill, 2010).

Relative to the literature on overweight and obesity in adulthood, there is limited published evidence on the economic burden associated with child or adolescent overweight and obesity. The cost associated with obesity can be broadly classified into two categories: direct costs (inpatient and outpatient medical costs, prescription costs, and accident and emergency visits) and indirect costs (job absenteeism and lower productivity at work) (Cawley, 2010). While some studies found a significant relationship between healthcare utilization and/or costs and childhood obesity (Doherty, Queally, Cullinan, & Gillespie, 2017; Kinge & Morris, 2017; Hayes et al., 2016; Lynch et al., 2015; Carey et al., 2015; Bianchi-Hayes et al., 2015; Au, 2012), the results of a study conducted by Skinner, Mayer, Flower, and Weinberger, (2008) failed to show a relationship. The researchers found that overweight children have health care expenditures that are no greater than those for healthy-weight children (Skinner, Mayer, Flower, & Weinberger, 2008). Seemingly, there is some level of ambiguity regarding childhood overweight and obesity and healthcare usage in the literature.

### **2.2.2 Dietary Intake and Childhood Overweight and Obesity**

In terms of dietary intake, the contribution of sugar sweetened beverages (SSB), snacking, portion sizes and fast food energy intake to childhood overweight and obesity is being continuously examined in the literature.

*Sugar-sweetened beverages (SSBs):* The main source of added sugar, associated with the development of childhood overweight and obesity is sugar-sweetened beverages (SSBs). Harrington, (2008) defined SSBs as “high-glycemic beverages” (p.5). Examples of SSBs are sodas/soft drinks, fruit juice drinks, syrup-based drinks, flavored water with sugar, and sports drinks. Several reviews have shown that the consumption of SSBs is significantly associated with childhood weight gain, overweight and obesity (Bleich & Vercammen, 2018; Luger et al., 2017; Te Morenga, Mallard, & Mann, 2013; Malik, Pan, Willett, & Hu, 2013; Harrington, 2008). However, a few reviews contend that this evidence is not conclusive (Forshee, Anderson, & Storey, 2008; Gibson, 2008).

*Snacking:* The definition of ‘snacking’ is varied, but there are two coexisting criteria used to define snacking in the literature: 1) a category of food identified by their quality and composition (high quality such as an apple or glass of milk or low or no quality such as ice cream, candies, tea) and 2) every food item consumed between meal time (Hess & Slavin, 2018; Gregori, Foltran, Ghidina, & Berchiolla, 2011; Savige, MacFarlane, Ball, Worsley & Crawford, 2007; Gregori & Maffei, 2007). Generally, snack foods consumed by children tend to be energy-dense, nutrient-poor foods such as sweet bakery goods, sweets, chips, candy, cakes, biscuits, chocolate and savory snacks (Hess & Slavin, 2018; Gregori et al., 2011; Savige et al., 2007; Kubik, Lytle, & Story, 2005). The influence of snacking on childhood overweight and obesity has been gaining much attention. This attention is based on

the observation that the availability and consumption of energy-dense snack foods increases parallel to the rising rates of childhood overweight and obesity (Farley, Baker, Futrell, & Rice, 2010; Piernas & Popkin, 2010; Jahns, Siega-Riz, & Popkin, 2001; Nicklas, Baranowski, Cullen, & Berenson, 2001). A review of snacking patterns among children provided evidence of the positive association between snacking and overall caloric intake; however, none of the reviewed studies associated snacking with childhood overweight and obesity (Larson & Story, 2013). Gregori et al., (2011) called into question the different definitions of snacking and concluded that “the probability of obesity can take a large range of values according to the definition of snacking adopted, and this potentially threatens any conclusion about the role of snacking in inducing obesity” (p.274).

*Portion sizes:* The portion sizes of food, especially energy-dense snack foods, have increased drastically (Young & Nestle, 2002). When larger portions of food are available, this leads to the consumption of more food than when smaller-sized versions are available (Hollands et al., 2013; Ledikwe, Ello-Martin, & Rolls, 2005), especially among older children (Birch, Engell, & Rolls, 2000). Regular consumption of large portions of food can increase total caloric intake (DiSantis et al., 2013; Marchiori, Waroquier, & Klein, 2012; Looney & Raynor, 2011; Piernas & Popkin, 2011; Orlet Fisher, Rolls, & Birch, 2003). Studies have found that BMI was positively associated with total energy intake and portion sizes (Albar, Alwan, Evans, & Cade, 2014; McConahy, Smiciklas-Wright, Birch, Mitchell, & Picciano, 2002); however, to date, there is no evidence of a causal relationship between larger portion sizes and childhood overweight and obesity.

*Fast food:* Fast food or food obtained from fast food outlets facilitates the consumption of SSBs and larger portion sizes of snack foods. Food available at fast food

outlets are mostly energy-dense, nutrient-poor foods which contribute to an excessive caloric and fat intake (Lachat et al., 2012; Rosenheck, 2008; Ebbeling et al., 2004; Bowman, Gortmaker, Ebbeling, Pereira, & Ludwig, 2004). In a systematic review, frequent consumption of fast food was also associated with high BMI in some of the studies examined (Rosenheck, 2008).

It is evident that much work has been carried out on the potential contribution of sugar sweetened beverages (SSB), snacking, portion sizes and fast food in energy intake and contribution to childhood overweight and obesity; however, there are still some critical issues to consider. Obesity is a consequence of an imbalance between energy intake and energy expenditure (WHO, 2018); hence, the dietary factors associated with obesity will have a greater effect among sedentary children. Moreover, the combined effect of sedentariness and poor dietary behaviours are mediated and/or accelerated by biological, social and environmental factors (Davison & Birch, 2001). Of particular interest to this thesis, the school food environment (see section 2.4) is identified as one of the most significant environmental factors shaping the unhealthy dietary behaviours discussed above.

## **2.3 Childhood Obesity in the Caribbean**

### **2.3.1 Secular trends and Prevalence**

There are a number of studies among Caribbean children that shed light on the secular trends in the prevalence of childhood overweight and obesity over the last two decades (Mumena, et al., 2018; Fernandez et al., 2015; Gaskin & Walker 2003; Xuereb et al., 2001). Secular trends indicate dramatic increases in the prevalence of childhood overweight and/or

obesity in some countries. For example, in Barbados, the prevalence of overweight and obesity (OWOB) among children 5-15 years increased from 8.5% in 1981 to 32.5 % in 2010 (Fernandez et al., 2015). In St. Lucia, OWOB among 5-year-old children increased from 4.3% in 1976 to 15.2% in 2006 (Gardner et al., 2011). A study conducted among school-aged children in Trinidad and St. Kitts (n= 336) reported that 15% of the study population became overweight or obese over an 18 month period (Mumena et al., 2018). At baseline, 22.0% of children were overweight or obese, while at follow-up 28.6% were overweight or obese. The incidence of healthy weight children becoming overweight was 8.8% and healthy weight and overweight children becoming obese was 8.1%. A total of 15.1% (n = 48) of children moved up to a higher weight category to become either overweight or obese, while only 1.58% (n = 5) children moved down a weight category (Mumena et al., 2018). A study conducted in Jamaica tracked children's BMI at 7 – 8 years and then at 11 – 12 years and observed that obesity rates increased from 3.5% to 9.5% after follow-up (Gaskin & Walker 2003).

Survey results from the Global School-based Student Health Survey [GSHS] also found very high rates of overweight and obesity among Caribbean teenagers, aged 13 to 17 years (WHO 2009). The GSHS was developed by the WHO and the Centers for Disease Control and Prevention (CDC) in collaboration with UNICEF, UNESCO, and UNAIDS. This ongoing survey is conducted primarily among students aged 13–17 years in many countries. Although factors such as age and definition of obesity, i.e., WHO BMI-for-age, may be consistent between counties, the time span of data collection may not favour comparisons among different countries. Table 2-1 illustrates the rates of childhood overweight and obesity (13-15 years) from several Caribbean countries, based on the GSHS. The data were extracted



from country fact sheets, where available. The fact sheet summarizes data for students aged 13-17 years from the core GSHS questionnaire modules.

Table 2-1. Prevalence of adolescence overweight and obesity in some Caribbean countries, based on the GSHS.

Country	Sample (n=)	Year of Data Collection	Overweight %	Obesity %
Dominica	1025	2009	24.8	9.1
Barbados	1475	2011	31.9	14.2
The Bahamas	1071	2013	44.7	21
Trinidad	1206	2011	25.7	11.5
Jamaica	1192	2010	25.6	10.1
St. Kitts	1192	2011	32.5	14.4

Source: Global school-based student health survey, country fact sheets, (WHO, 2009).

<https://www.who.int/ncds/surveillance/gshs/factsheets/en/>

A high prevalence of overweight and obesity among Caribbean adolescents is reflected in the GSHS survey. More than 25% of the sample from most countries is overweight. If measures are not put in place to control the prevalence of overweight, this figure could increase or overweight adolescents could transition into obese adolescents as demonstrated in Trinidad and St. Kitts (Mumena et al., 2018). The estimated prevalence of overweight (44.7%) and obesity (21%) among adolescents in The Bahamas is very alarming according the GSHS. With one of the highest per capita GDP in the Caribbean (<https://data.worldbank.org/indicator>), The Bahamas is regarded as one the ‘richest’ Caribbean countries. Moreover, the alarming prevalence of overweight and obesity partly reflects the level of economic development and urbanization in Bahamas, where more students may commute via motorized transport and have greater access to high-caloric foods due to their purchasing power and higher national imports, compared to their Caribbean counterparts (Jolly et al., 2013). On the other hand, research in Bahamas has linked the high

rates of obesity to low socioeconomic status (Brathwaite, Brathwaite, & Taylor, 2011). Given Dominica's agricultural heritage and reports indicating that Dominica children are still consuming traditional foods (Wall-Bassett et al., 2010), it is not surprising that Dominica had the lowest percentage of overweight and obese adolescents according the GSHS.

Table 2-2 presents data compiled from a selection of studies carried out over the last two decades in Caribbean countries, including Trinidad and Tobago, Barbados, St. Lucia, Dominica, Turks and Caicos Islands, The Bahamas, and Jamaica.

Table 2-2. Childhood overweight and obesity in some Caribbean countries, compiled from several studies.						
Country	Reference	Year of Data Collection	Sample size/ Age	Measure-ment	% overweight	% obese
Trinidad & Tobago	Gulliford et al., 2001	1999	5688† 4-10	IOTF	8.5	2.4
	Babwah, 2016	2011	363 15-19	IOTF	14.9	15.4
	Mungrue et al., 2013	NA	1896 13-18	WHO	11.7	7.5
	Simeon et al., 2003	NA	1090 14-17	WHO	13Σ	
	Batson et al., 2014	2009-2010	2130† 7-18	WHO	17	15
	Francis et al., 2010	2006- 07	472§ 9-11	CDC	4	18
Barbados	Gaskin et al., 2008	NA	400 11–16	IOTF	32	19
	Gaskin et al., 2012	NA	62* 9-11	IOTF	37.1	NA
	Fernandez et al., 2015	2010	580 8-11	WHO	17.4	17.4
St. Lucia	Gardner et al., 2011	2006-2007	425† 4-6	WHO	14.4	9.2
Jamaica	Blake-Scarlett et al., 2013	2008-2009	5710‡ 6-10	WHO	10.6	7.1
Dominica	Wall-Bassett et al., 2012	2006	197* & 9.6 μ	WHO	17	9.4
Turks &	Maitland et al.,	NA	297*	WHO	17.2	23.6

Caicos Island	2015		10.91 $\mu$			
Grenada	Scribner et al., 2018		639 11-14	CDC	17.6	7.6
Bahamas	Rivers et al., 2013	2012	861 <sup>†</sup> 13-19	WHO	15	15.2
NA Data not available in study ; <sup>†</sup> Nationally representative sample; <sup>‡</sup> Representative random sample of North-East Health region of Jamaica; <sup>§</sup> Rural sample; <sup>¶</sup> Urban sample; * Convenience Sample; $\mu$ Average age reported; $\Sigma$ OWOB						

Nationally representative data from Trinidad and Tobago, St. Lucia and Bahamas show high prevalence of obesity from these countries. For example, the prevalence of childhood overweight and obesity in Trinidad and Tobago was 17% and 15%, respectively, in 2010 among children 7-18 years (Batson et al., 2014); in St. Lucia 14.4% and 9.2%, respectively, in 2007 among children 4-6 years (Gardner et al., 2011); and in the Bahamas 15% and 15.2%, respectively, in 2012 among children 13-19 years (Rivers et al, 2013). Data based on non-representative samples also show high rates of childhood overweight and obesity. For example, a striking 23.6% of children (n= 297; mean age – 10 years) was categorized as obese in a study conducted in Turks and Caicos (Maitland et al., 2015). The available fragmentary data of the prevalence of childhood OWOB presented in table 2-1 indicate that the Caribbean region is not immune to high rates of overweight and obesity among children. In fact, it is reported that Caribbean children have much higher rates than the global average of 5% (Henry, 2016).

### 2.3.2 Determinants of Child Obesity in the Caribbean

Childhood overweight and obesity in the Caribbean is often associated with two key determinants: dietary patterns and level of physical activity among children.

### ***2.3.2.1 Dietary Patterns***

Caribbean studies have associated childhood overweight and obesity to high consumption of SSBs (Francis et al., 2010), low consumption of fruits and vegetables (Mumena et al., 2018; Francis et al., 2010), high energy intake (Gaskin et al., 2012), and eating out and skipping meals (Maitland et al., 2015). The types of food available within their food environments is a key influence on children's dietary choices and low-nutrient, energy-dense processed foods are now readily available and accessible from tuck shops, vendors, and shops in or near school settings (Henry et al., 2013; Francis et al., 2010). The dietary choices made by children are further exacerbated by their lack of knowledge regarding healthy dietary habits (Francis et al., 2009) and low household income (Fernandez et al., 2015). For example, Francis and colleagues demonstrated that following a multi-component education intervention on improving the knowledge, attitudes, and behaviour of primary-school children towards better dietary and activity habits, children reported significantly lower intake levels of fried foods, snack foods high in fat, sugar, and salt, and sodas (Francis et al., 2009). The protective effect of healthy dietary practices was also demonstrated in Caribbean studies among children. For example, lower BMI among children was associated with eating dinner with the family every night (Fernandez et al., 2015) and regular consumption of traditional foods commonly prepared at home (Scribner et al., 2018). Upon discovering that Grenadian children had lower prevalence of overweight compared to their US counterparts, Scribner et al. (2018) postulated that the late introduction of processed foods to Grenada protected this cohort from obesogenic promoters due to a lack of fetal over-nutrition. In Dominica, Wall-Bassett et al. (2010) found that children were consuming more

traditional than non-traditional foods and postulated that this may be a major contributor to maintaining the health integrity of Dominican children.

A dietary transition is partially responsible for the rising rates of childhood overweight and obesity in the Caribbean. Food system and consumption behaviour of the population in the Caribbean region is undergoing significant changes due to decreased and diversified food production and increased marketing and household purchasing power (Henry, 2016). Moreover, the Caribbean population is transitioning away from diets high in grains, starchy vegetables, local fruits, vegetables, and legumes towards a diet high in energy dense, processed and imported foods due to the increase in commercial markets and globalized dietary sources (Jolly et al., 2013; Popkin et al., 2012; Asfaw, 2011; Monteiro, 2009). Because the contribution of food imports continues to outweigh that of local production, the population of most Caribbean countries is consuming more calories, fats and sugars and fewer fruits and vegetables (Jolly et al., 2013; Gaskin et al., 2012).

Estimates of average energy availability in Latin America and the Caribbean by FAO indicates that Calories available per capita per day increased from 2400 kcal/day in 1961 to 2800 kcal/day in 2000 (WHO, 2003). The Caribbean region has available more than 160 percent of average requirements for fat and above 250 percent for sugars (Pan American Health Organization [PAHO], 2006). Generally, this means that there is an overabundance of foods high in fat and sugar that are available to Caribbean populations. Food balance sheets from the Caribbean region also show that energy from fats and sugars has exceeded the population goals from the 1960s, has increased consistently, and is still increasing, with the supply of fat increasing from 54g per capita per day in 1969 to 79g in 1999 (WHO, 2003).

### **2.3.2.2 *Physical Activity***

In several Caribbean-based studies, childhood overweight and obesity have been associated to decreased physical activity. An association between obesity and physical activity was demonstrated in a study conducted in Trinidad and Tobago (Mungrue et al., 2013). In the “normal BMI” group, a significantly higher percentage of students engaged in physical activity (63.4 %) for longer periods, played team sports (59.9 %), and spent less time watching television or on electronic devices (9.5 % and 15.3 %, respectively). Conversely, < 50 % of the overweight to obese categories of students participated in team sports. These students spent considerably more time watching television, using electronic devices, playing video/computer games, and talking on the phone, and they frequently consumed fast food (Mungrue et al., 2013). A study conducted among a sample of children aged 9-11 years in Barbados suggested that children’s self-selected activities at school were significantly and negatively correlated with BMI (Gaskin et al., 2012). Also, in Barbados, another study reported that children who used active transport to get to school had a lower prevalence of OWOB than those who used motorized transport (Fernandez et al., 2015). Maitland and colleagues reported that in Turks and Caicos Islands, children who did not exercise vigorously for at least four days were far more likely to be obese than those who did (Maitland, Malcolm, & Handfield, 2015).

In the studies mentioned above, physical activity was based on self-report rather than objective assessment. Objective assessment of physical activity provides more valid and precise measures of physical activity, and removes the difficulties associated with recalling habitual activities (Katzmarzyk et al., 2015). It also allows for making better comparisons to the WHO recommendation that children aged 5–17 should accumulate at least 60 minutes of

moderate- to vigorous-intensity physical activity daily (WHO, 2011). Although it was based on self-report, results from the Global School-based Student Health Survey indicated that the percentage of students who were physically active for a total of at least 60 minutes per day on five or more days fell below 30% for the English-speaking Caribbean (Figure 2-2). Sedentary activity levels were also alarming with a significant portion of students (30-60%) reporting no weekly physical activity. According to Prince et al. (2008), quantitative estimates of physical activity based on self-report are often inconsistent with object assessment. There is need for more studies which objectively assess physical activity among Caribbean children.

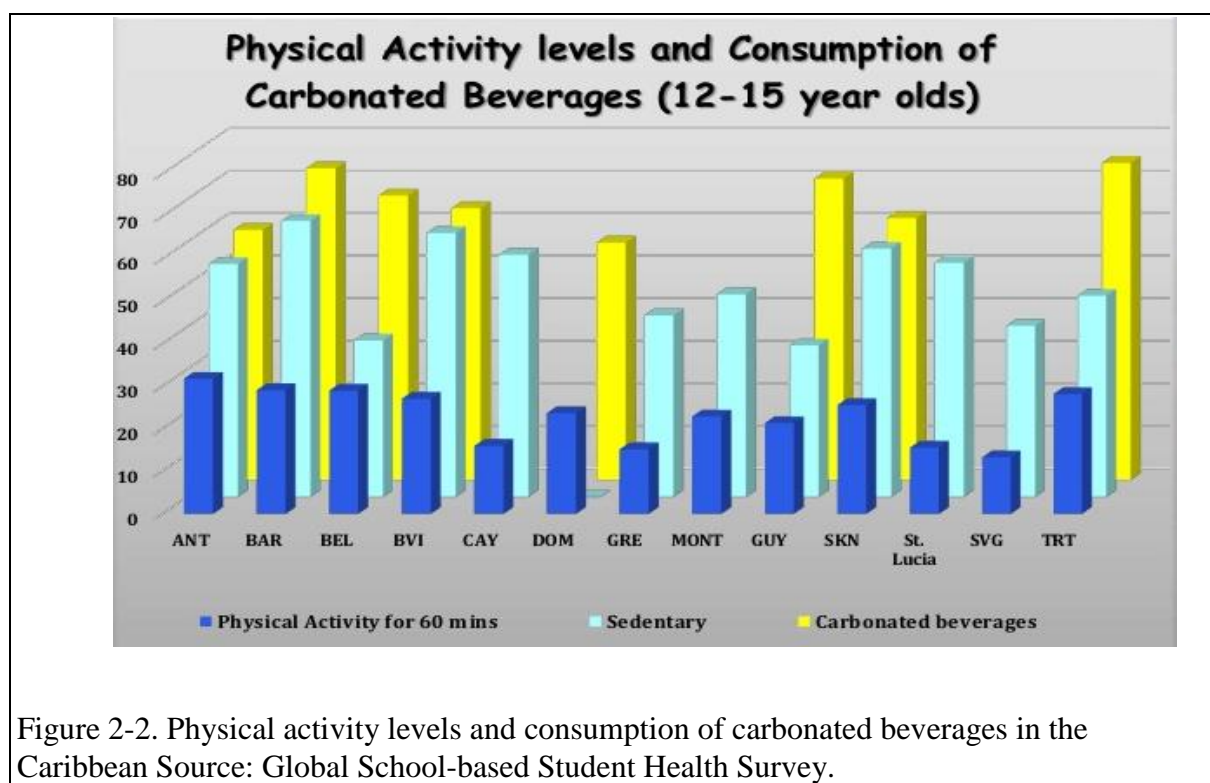


Figure 2-2. Physical activity levels and consumption of carbonated beverages in the Caribbean Source: Global School-based Student Health Survey.

### 2.3.3 Consequences of Childhood Overweight and Obesity in the Caribbean

Childhood overweight and obesity in the Caribbean has been associated with serious health consequences, including type 2 diabetes mellitus (T2DM) and high blood pressure

(Maitland & Handfield, 2016; Conliffe, Frankson, Smith, Hanna-Mahase, & Oriakhi, 2015; Gaskin et al., 2015; Batson et al. 2014; Batson et al., 2013; Rivers et al., 2013). Data on the prevalence of diabetes in children in Trinidad and Tobago showed that type 2 diabetes mellitus is a problem in the school-aged population (Batson et al. 2014; Batson et al., 2013). A national study conducted in 2009 in Trinidad among school children aged 5-17 years identified an overall prevalence of 10.4/100,000 for T2DM and 1.5/100,000 for pre-diabetes and 7.5/100,000 for impaired glucose tolerance. Moreover, all children identified with T2DM or pre-diabetes were overweight or obese (Batson et al., 2013). Similarly, in the Bahamas, higher percentages of overweight and obese students (13-19 years) were identified as having impaired glucose tolerance compared with their normal-weight counterparts (Rivers et al., 2013). There is also evidence of high blood pressure among overweight and obese children (12-18 years) in the Bahamas (Conliffe et al., 2015). In Barbados, Gaskin and colleagues analysed the association between body composition and blood pressure in a sample of children aged 9–10 years and reported that 12% (n =573) had elevated mean systolic blood pressure, which was also related to body size (Gaskin et al., 2015). In Turks and Caicos Islands, a study reported that more overweight/obese than normal/underweight children aged 10-15 (7.9% vs 3.1%) had elevated blood pressure (Maitland & Handfield, 2016). Although there is no evidence of cardiovascular diseases (CVD) among Caribbean children, this should be taken with caution as one study found a significant number of overweight and obese teenagers in Jamaica presenting with several risk factors for CVD (High fasting blood, total cholesterol, waist circumference, waist-to-hip ratio, low physical activity, and a family history of obesity, T2DM and CVDs) (Barrett et al., 2013).



### **2.3.4 Efforts to Control Childhood Overweight and Obesity in the Caribbean**

The magnitude of childhood overweight and obesity (and associated non-communicable disease) is certainly not being ignored in the Caribbean. In response to the growing non-communicable disease (NCD) burden in the Caribbean, in 2007, heads of government for the English-speaking Caribbean endorsed a 15-point declaration to stop the epidemic of non-communicable disease (NCD). The Port-of-Spain NCD Summit Declaration, "Uniting to Stop the Epidemic of Chronic Non-communicable Disease" calls on all governments, civil society, and the private sector to jointly tackle the common risk factors for the major chronic diseases such as obesity. Several countries have recognized the serious threat of childhood obesity and initiated strategies to comply with the mandates of the declaration of Port of Spain. Surveillance activities, such as the WHO STEPwise approach to Surveillance (STEPS) and the Global School Health Survey (GSHS) have been conducted in many of the Caribbean countries. Many countries, including Trinidad and Tobago, Turks and Caicos Islands, Cayman Islands, Dominica and Barbados, have enforced mandatory physical activity in all grades in schools (Samuels et al., 2014). This is important since schools' focus on academics has been a significant barrier to physical activity.

Initially, measures to control the consumption of added sugar were slow in the Caribbean, but several countries have implemented excise tax on SSBs, and others are either exploring the possibility or implementing bans to control the intake of sugar of the population. Barbados was the first CARICOM country to implement a 10% excise tax on SSB on September 1st, 2015. The implementation of the SSB tax in Barbados by the Ministry of Finance was largely a fiscal policy measure, implemented within the context of severe fiscal challenges including slow growth in revenues, increasing government

expenditure, and high levels of debt. It was essentially implemented as a vertical initiative notably devoid of linkages to a wider, national, multi-layered programme aimed at tackling obesity; however, it was given impetus and implemented in an environment in which it was recognised that there was a need to address the consumption of processed, energy-dense, nutrient-poor foods and beverages in the country (Health Caribbean Coalition, 2016).

Most recently, a study aimed at assessing changes in sales of SSBs following implementation of the SSB tax, found that the Barbados SSB tax was associated with decreased sales of SSBs and increased sales of non-SSBs such as water in a major grocery store chain. However, these finding should be interpreted with caution as the data also suggests that brand down-switching may have occurred, with sales of expensive SSBs decreasing by 7.2% and sales of mid-range SSBs increasing by 6.5% (Alvarado et al, 2019). Evidence from other jurisdictions has suggested that taxation of SSB has been effective in promoting healthy behaviours (Nakhimovsky et al., 2016; Colchero, Popkin, Rivera, & Ng, 2016). In September 2015, recognising the challenges posed by unhealthy diets, the Commonwealth of Dominica implemented a 10% tax on drinks and foods with high sugar content. Since then, Bermuda has implemented taxation on SSBs, while Jamaica and Trinidad and Tobago has implemented a ban on SSB at public educational institutions (Healthy Caribbean Coalition).

Food-based dietary guidelines (also known as dietary guidelines) are intended to establish a basis for public food and nutrition, health and agricultural policies and nutrition education programmes to foster healthy eating habits and lifestyles. They provide advice on foods, food groups and dietary patterns to provide the required nutrients to the general public to promote overall health and prevent chronic diseases (FAO & WHO, 1998). Food-based

dietary guidelines (FBDG) have been developed for most CARICOM countries including St. Vincent and the Grenadines, Saint Lucia, Grenada, St. Kitts and Nevis, Jamaica, Bahamas, Barbados, Belize, Guyana and Dominica (<http://www.fao.org/nutrition/education/food-dietary-guidelines/en/>; Albert et al., 2007). Despite the implementation of food-based dietary guidelines in some countries, it remains a challenge to promote the use of and adherence to the guidelines, given the population was already in the midst of a transition away from the traditional foods recommended in the guidelines. Policies and standards to promote healthy eating at school have been implemented in Barbados, Bermuda and Grenada. For many of the other CARICOM countries, for example, Jamaica, Dominica and Trinidad and Tobago, these policies are either in progress or partially implemented (Samuels et al., 2014; Ferguson et al., 2011).

The implementation of the mandates of the declaration has been mixed, being most successful in certain countries for a variety of reasons. First, countries with a higher gross national income (GNI), a higher gross domestic product (GDP), and a larger population (standard measures of overall national capability) are more likely to follow through on their commitments than those with lower GNIs and GDPs or smaller populations (Samuels et al., 2014; Samuels & Hospedales, 2011). For example, Jamaica, the largest of the English-speaking CARICOM countries, has implemented several policy initiatives aimed at stemming the tide of the non-communicable disease epidemic (Ferguson et al., 2011). More specifically, Jamaica has implemented 17 of the 26 indicators, with six partially implemented and only two not yet implemented. Another factor driving implementation is the level of support for each commitment. Ideally, commitments supported internationally and regionally, such as the STEPS and GSHS surveys and Caribbean Wellness Day, were more

likely to be fulfilled. A third factor affecting the implementation of the declaration, especially in areas where policy actions intersect with private sector interests, is the reluctance of companies and businesses to accept government measures that they consider to be overly intrusive or that could in any way impinge upon their profits. Lastly, the multisectoral nature of these initiatives and the number of institutions required to deliver policy outcomes cause bottlenecks in implementation (Knight & Hippolyte, 2016).

There are two Caribbean based organisations which have been rallying around the CARICOM NCD Summit Declaration and using their resources to improve the health of Caribbean people: the Caribbean Public Health Agency (CARPHA) and the Healthy Caribbean Coalition (HCC). CARPHA is the new single regional public health agency for the Caribbean established in 2011. Its mission is to build member states' capacity to prevent disease and promote health and wellness through leadership, partnership and innovation in public health (<http://carpha.org/About>). The HCC was established in 2008 in direct response to the CARICOM NCD Summit Declaration. Its mission is to harness the power of civil society, in collaboration with government, academia, and international partners, and private enterprise as appropriate, in the development and implementation of plans for the prevention and management of chronic diseases among Caribbean people

(<https://www.healthycaribbean.org/about-the-healthy-caribbean-coalition/>).

Several other high-profile meetings/conferences in the region have targeted health challenges such as the obesity epidemic, including the third Pan-American Conference on Obesity with Special Attention to Childhood Obesity held in Aruba in 2013 and the Non-Communicable Disease Child Conference held in Trinidad & Tobago in 2014. The recently convened 38th Regular Meeting of the Conference of Heads of Government in 2017 marked

the 10<sup>th</sup> anniversary of the CARICOM Heads of Government NCD Summit and Declaration “Uniting to Stop the Epidemic of Chronic Non-Communicable Diseases.” However, based on reports, the heads of government recognized that they had not sufficiently advanced the recommended actions concerning the declaration and recommitted themselves to the promotion of healthy lifestyles to combat the epidemic of NCDs.

## **2.4 School Food Environments**

### **2.4.1 What is the School Food Environment?**

The term ‘school food environment’ has not been precisely defined in the literature, but conceptual models of ‘food environments’ have led to an understanding of the features of the school food environment. The school food environment, an important source of food for students, is an organizational nutrition environment within the model of nutrition environments proposed by Glanz, Sallis, Saelens, and Frank (2005). It encompasses all food and beverages available to and accessible by students, supported by policies, economics, and sociocultural norms. Welker and Colleagues defined the school food environment as when and where children obtain food and the types of options available during the school day (Welker et al., 2016). The term ‘where’ should emphasize that in many jurisdictions, students obtain food from outlets both in and around the school. Therefore, the entire span of the school food environment should be categorized and studied, not only in-school eating options.

Traditionally, studies about the internal school food environment, i.e., school meal programs, cafeterias, and vending machines, have dominated research on the food environment at school. However, a recent review reported a decline in studies focused on the

internal school food environment from 2007-2015, and a growing body of research on food outlets around/near schools to which students have access (Lytle & Sokol, 2017). Examples of retail food outlets around/near schools include mobile food vendors, take-out restaurants, and quick-service restaurants, bakeries, kebab/pizza stands, schnitzel stands, supermarkets, fish and chip shops, and fast-food franchises, such as McDonalds, Pizza Hut, and Hungry Jack (Cutumisu et al., 2017; Missbach, Pachschwöll, Kuchling, & König, 2017; Coffee, Kennedy, & Niyonsenga, 2016). A small number of studies have also explored the school food environment by considering both external and internal food outlets to which children are exposed (Azeredo et al., 2016; Callaghan, Molcho, Gabhainn, & Kelly, 2015; Faber, Laurie, Maduna, Magudulela, & Muehlhoff, 2014; Van der Horst et al., 2008). Food outlets, both internal and external to school settings, may be equally important in terms of the influence on children's dietary behaviours. Therefore, comprehensive studies that focus on food outlets both in and around school settings are necessary for providing a more detailed picture of the school food environment for health promotion.

#### **2.4.2 The School Food Environment: An Ideal Setting for Health Promotion**

The school food environment has been identified as an ideal setting for primary prevention efforts aimed at supporting and promoting healthy eating behaviours for several reasons. First, childhood is a critical stage in the life cycle, and there are numerous, well documented benefits of healthy eating during this period (Brown, 2016; Burrows, Goldman, Pursey, & Lim, 2017; Tandon et al., 2016; Jomaa, McDonnell, & Probart, 2011). Healthy eating in childhood helps to promote optimal health, growth, and intellectual development and to prevent immediate health problems, while reducing the risk of long-term health

problems. Many food habits, likes, and dislikes are established during childhood (Brown, 2016). Therefore, interventions that target healthy eating need to occur in early childhood in order to reap the reported benefits of healthy eating during this stage of the lifecycle and to translate these healthy eating habits into adult behaviors. Targeting children at an age when health behaviours are being shaped is regarded as one of the most effective methods of intervention (Racey et al., 2016). The vast majority of children aged 5-18 years are enrolled in school, thus making schools a key venue for promoting healthful behaviours as a norm among children. Children of different genders, age groups, cultures and socioeconomic backgrounds can be reached during school hours. No other public institution has as much continuous and intensive contact with children as do schools (Carter & Swinburn, 2004). Children spend more time in school than in any other environment away from home – on average, six hours a day. Given the length of time young people spend at school, it is an ideal location to reach them.

Second, compelling evidence links factors within the school food environment to obesity risks. More specifically, the access and availability of low-nutrient, energy-dense foods in and around schools have been associated with obesity-related outcomes such as dietary intake (increased SSB and fat and low FV) and BMI (Azeredo et al., 2016; Driessen et al., 2014; Engler-Stringer, Le, Gerrard, & Muhajarine, 2014a; Faber et al., 2014; Mâsse et al., 2014; Williams et al., 2014; Fox, Dodd, Wilson, & Gleason, 2009). Various school-wide practices are not conducive to healthy eating, and instead facilitate consumption of unhealthy food. These include foods used as rewards and incentives in the classroom or sold as part of school fundraising, as well as role modeling behavior of staff and students (Kubik et al.,

2005), and the display of large signage boards sponsored by soft-drink companies that imply the school supports and promotes the use of these particular SSBs (De Villiers et al., 2012).

Third, studies have shown that changes within the school food environment can lead to improved dietary behavior and BMI, and these changes can be powerful strategies to reverse childhood obesity (Welker et al., 2016; Racey et al., 2016; Driessen et al., 2014; Wang et al., 2013; Van Cauwenberghe et al., 2010). Examples include changes to the types of food made available at school (for example, lower-fat entrees, lower-fat milk, increased fresh fruits and vegetables, bottled water, or reduced portion sizes of snack chips and SSBs) (Taber, Chriqui, Powell, & Chaloupka, 2012); changes to dietary intake (Nicholas, Wood, Harper, & Nelson, 2013; Taber, Chriqui, & Chaloupka, 2012) and a positive shift in the nutritional value of food purchased (Snelling & Kennard, 2009).

In the Caribbean, schools have been identified as one of the key settings for implementing childhood obesity management support programs (Henry, 2016; Henry et al., 2013; Francis et al., 2009). Although studies of Caribbean students show that the environments to which children are exposed in their daily lives can influence the healthfulness of their diets (Henry et al., 2013; Francis et al., 2009), there remain gaps in the Caribbean literature as little evidence of effective school-based intervention is available or has been reported.

### **2.4.3 Options for Eating within the School Food Environment**

Globally, school food environments differ in terms of the variety of food outlets in and around the school. National school meal programs are provided in some countries (e.g., the US, the UK, Japan, France, Sweden and many English-speaking Caribbean countries),



but not in others (e.g., Australia and Canada). The quantity and quality of foods available, as well as the cost, availability of subsidies, and presence of other ‘competitive’ foods outlets like vending machines, canteens, or tuck shops, vendors, and other fast-food retail outlets near schools also vary among countries (Hawkes, 2013; Driessen et al., 2014).

#### ***2.4.3.1 School Meal Programs***

School meal programs are called by various names in the literature, including, school-based feeding programs (Gelli et al., 2011), school nutrition programs (Valaitis, Hanning, & Herrmann, 2014; Millimet; Tchernis, & Husain, 2010), or food for education (Jomaa, McDonnell, & Probart, 2011). Other specific terms are also used, such as school lunch program (Ralston, Newman, Clauson, Guthrie, & Buzby, 2008) and school breakfast program (Gleason & Dodd, 2009), which highlight when the meals are provided. These programs refer to coordinated activities intended to provide meals to children attending school (Henry et al., 2003) with both short-term and long-term goals. In the short-term, they aim to alleviate hunger, exist as a social safety net for households with very low incomes, and increase enrollment of children in schools. In the longer term, they aim to tackle rising levels of childhood overweight and obesity and improve the nutritional status, cognitive development, and retention of school children (Oostindjer et al., 2017; Aliyar, Gelli, & Hamdani, 2015; Jomaa et al., 2011).

School meal programs face several challenges, including student acceptance/uptake, sustainability, cost effectiveness, and food procurement in light of the decline in agricultural production and food price fluctuations (Oostindjer et al., 2017; World Food Program [WFP], 2013; Jomaa et al., 2011). Despite the challenges, school meal programs are a primary avenue to help students access nutritious foods throughout the day. There is evidence to

support the positive impact of school meal programs on students' energy intake and micronutrient status in the US (Welker et al., 2016), the UK, (Stevens, Nicholas, Wood, & Nelson, 2013) and in many developing countries (Jomaa et al., 2011; Greenhalgh, Kristjansson, & Robinson, 2007; Frisvold, 2015). In the Caribbean, the limited data available support the positive relationship between school lunches and healthier weight outcomes among public school children. For example, in Trinidad and Tobago, children who participated in the school meal program were lighter and thinner than their counterparts (Gulliford et al., 2002). Similarly, favourable results were observed in an earlier study conducted in Jamaica, where students showed no weight gain following participation in a school meal program (Simeon, 1998). Research conducted in Dominica, highlighted the role of the school meal program in enabling the consumption of traditional foods (Wall-Bassett et al, 2010).

The success of school meal programs in helping students achieve a higher-quality diet can be largely attributed to the use of standards as a tool to increase the nutritional quality of school lunches (Aliyar, et al., 2015; Welker et al., 2016). Several studies conducted in the US have demonstrated that following implementation of state beverage and nutrition policies at school, significant improvements were observed in students' consumption of vegetables and milk and intake of nutrients (protein, vitamins A and C, calcium), while consumption of less desirable items (sweetened beverages, snack chips) decreased, as did percentage of energy from fat (Turner & Chaloupka, 2015; Nicholas et al., 2013; Woodward-Lopez et al., 2010). Caribbean leaders have recognized the importance of school nutrition policies and have positioned the development, implementation, and monitoring of school nutrition policies as one of the core mandates to improve the school food environment (Henry, 2016; Samuels et

al., 2014). However, as previously discussed, very few of these countries have implemented school nutrition policies (Samuels et al., 2014; Ferguson et al., 2011).

In addition to policy implementation, evaluation has a vital role to play in promoting higher-quality school meals (Oostindjer, et al., 2017; Johnner, 2009). Evaluation of school meals is important since school lunches and breakfast have been criticized for promoting higher fat and sodium intake (Clark & Fox, 2009), for elevating obesity risk (Kristjansson et al., 2006), and for yielding similar dietary intakes to schools without a meal program (Campbell, Nayga, Park, & Silva, 2011; Wall-Basset et al., 2012). Evaluation of school meals can inform relevant changes in the types of food provided through policy improvement. The USDA has demonstrated strong leadership in this regard with its School Nutrition Dietary Assessment (SNDA) studies. For example, regular evaluation of the nutrient content of school meals has informed important changes in nutritional quality (Gordon, Niland, & Fox, 2016; Byker et al., 2013). As a result, trends from successive SNDA studies have indicated that the average fat and saturated fat content of school lunches has declined significantly over time (Gordon et al., 2016). In the UK, school meal evaluation and monitoring have also produced dramatic and demonstrable improvements in school food provision and consumption (Nicholas et al., 2013; Nelson et al., 2012). Despite the benefits of evaluating school meals, it is not a popular practice in the Caribbean. Only a very few countries have engaged in this important activity: Dominica (Wall-Basset et al., 2012), Trinidad and Tobago (Gulliford et al., 2002) and Jamaica (Simeon, 1998).

In some countries, continuous improvement of school meal programs has led to the implementation of a ‘system-wide approach,’ which is regarded as a ‘best practice’ for health promotion (Moffat & Thrasher, 2016; Oostindjer, et al., 2017). This approach focuses on

food education, the school social and food environment, and food sustainability. A few countries have engaged in this approach to provide children with the opportunity to learn about food and nutrition in the school meal setting. For example, Japan's school lunch program is both a meal eating opportunity and an educational activity which engages children in lunch preparation and service (Kaneda & Yamamoto, 2015; Tanaka & Miyoshi, 2012). In Finland, France, and Italy, the emphasis has been on the dining environment from which cultural and social lessons about food can be learned within the context of school meal provision. Other lessons include exposure to a set of norms and values related to mealtimes, sociability, and sustainability dimensions such as waste. School children may be seated at round tables with tablecloths, proper crockery, and cutlery to enhance the learning environment surrounding the meal setting (Oostindjer, et al., 2017). In Italy, teachers also reinforce efforts made in school kitchens by linking them to classroom lessons, which include a number of key areas: food, nutrition and life style, cooking, farming, food quality, and, finally, the Italian diet and food culture. This integration also makes use of experiential learning through efforts that include children in the growing and harvesting of produce and the preparation of food (Oostindjer, et al., 2017). According to Moffat & Thrasher (2016), these school meal programs are potential models for long-term and sustainable child nutrition interventions.

#### ***2.4.3.2 Tuck Shops***

The term “tuck shop” is generally used to describe a formal or informal small snack shop (akin to canteens) often managed by the school, but some are managed by outside individuals who benefit from the profit, but pay rent to conduct business in the school (De Villiers et al., 2012; Marraccini et al., 2012; Wiles, Green, & Veldman, 2011). A tuck shop is

one way that schools make food and beverage items available for learners to purchase, but it is also used as a fund-raising opportunity for the school. Students are able to purchase food and beverages during snack and/or lunch break, depending on the hours of operation.

Studies show that tuck shops are popular in South Africa (De Villiers et al., 2012; Marraccini et al., 2012; Wiles, Green, & Veldman, 2011). There is also evidence of the presence of tuck shops in the UK (Moore & Tapper, 2008;) and British Columbia, Canada (Rideout, Levy-Milne, Martin & Ostry, 2007). Although undocumented, tuck shops are also popular in Caribbean schools.

Tuck shops have been highly criticized for offering mostly unhealthy food options (Nortje et al., 2017; Marraccini & Meltzer, 2012; Kruger & De Villiers, 2011). A study done in Cape Town, South Africa found that most of the food purchased by adolescents at school was unhealthy and that tuck shops were the main source of this food. The most commonly purchased unhealthy items were potato chips, sweets, soft drinks, and French fries (Temple, Steyn, Myburgh, Nel, 2006). Primary school tuck shops also sell a variety of unhealthy items such as savory pies, potato chips, and pop (Wiles, Green, & Veldman, 2011). Healthier items sold at tuck shops include canned fruit juice, water, dried fruit, fruit salad, bananas, yoghurt, and health muffins. However, these are rarely purchased by students as a snack option. Despite adolescents' knowledge of which foods are healthy and unhealthy, they are unlikely to purchase healthy foods (Temple et al., 2006).

Regular consumption of food from tuck shops is associated with childhood overweight and obesity. Findings from one study in South Africa indicated that students who bought from the tuck shop frequently had a significantly higher body mass index compared to those who did not (Wiles et al., 2013). Most of these students brought food from home to

eat at school, yet they purchased from the tuck shop, indicating that they did not do so to obtain their main meal, but rather to supplement what they had brought from home (Wiles et al., 2013). Considering the risks associated with tuck shop food, it is not entirely surprising that Nortje and colleagues on addressing the ethical responsibilities of tuck shops posed the following question, “Could/should tuck shops be forced to sell only healthier/perishable food options running the risk of not making a profit?” (Nortje et al., 2017, p.78).

Studies have shown that ‘healthy tuck shops’ have very little impact on improving the availability and consumption of fruits at schools. For example, an intervention study conducted in Korea showed that among the students who used the tuck shop, about 40% purchased fruits; however, overall food purchase and intake patterns did not significantly change during the intervention period. The intervention program included the restriction of unhealthy foods sold in tuck shops, the provision of various fruits, and indirect nutritional education with promotion of healthy food products (Kim et al., 2012). Similarly, one study conducted in the UK found that the presence of a school fruit tuck shop had no impact on children’s consumption of fruit and sweet and savoury snacks (Moore & Tapper, 2008).

A healthy tuck shop guide was developed by Registered Dietitians to assist schools in South Africa in providing children with opportunities to make healthier eating choices every day; however, many tuck shop managers perceived that it is more costly to sell healthier items (Marraccini & Meltzer, 2012). Other barriers for implementing healthy tuck shops include children’s preference for unhealthy foods and a lack of proper facilities (Marraccini & Meltzer, 2012). Tuck shop owners may, therefore, be reluctant to stock healthier food options, as children may not purchase these healthy foods, resulting in the food being thrown away and in lower profits for the tuck shop owner. It is apparent that healthy tuck shop

guidelines only are not sufficient to improve the quality of food sold at tuck shop, and measures to address these barriers are required.

#### **2.4.3.3 *Canteens***

School canteens in this study refer to food outlets on the school premises where there are food-serving counters/stalls and food is sold as a la carte items (Harper, Wood, & Mitchell, 2008). They are typically countries like Australia and Canada where there is no national school lunch program (Tugault-Lafleur, Black, & Barr, 2018; Ardzejewska, Tadros, & Baxter, 2013; Taylor et al., 2011). Studies from Australia have shown that children commonly purchase unhealthy foods (high fat and sugar) from canteens (Cleland, Worsley, & Crawford, 2004; Finch, Sutherland, Harrison, & Collins, 2006). Given the influence of school canteens on children's food choices, they have an increasingly important role to play in ensuring children have a consistent opportunity to choose healthy foods. In that regard, between 2005 to 2011, majority of Canadian provinces (New Brunswick, Prince Edward Island, Newfoundland, Labrador and Nova Scotia, Quebec, British Columbia, Ontario and Saskatchewan) implemented school nutrition standards for foods served in schools (Holmes, 2016). Based on post-implementation evaluation studies many schools have implemented the new standards in PEI (Taylor et al., 2011), Ontario (Vine et al., 2017; Orava, Manske, & Hanning, 2016) and British Columbia (Watts, Mâsse, & Naylor, 2014). However, compliance with these school nutrition standards is a major challenge (McIsaac, Shearer, Veugelers, & Kirk, 2015; Watts, Mâsse, & Naylor, 2014).

In New South Wales (NSW), Australia a policy was launched in 2003 mandating healthy school canteens in all government schools (NSH Health, 2004). As a result, schools

were resourced with the ‘Canteen Menu Planning Guide,’ which entails a nutrient profiling system that categorizes products into ‘green,’ ‘amber,’ and ‘red,’ in which the green should dominate the menu and the red should be limited to two days per term (Ardzejewska et al., 2013). Evaluation results of the Healthy School Canteen program indicated that schools participating in the program were successful in creating small improvements in their food offerings due to the program. Reports also indicate that from 2007-2010, the proportion of schools adhering to strategy guidelines increased slightly. The number of schools that restricted energy dense, nutrient-poor food (red) on their menu increased from 7% in 2007 to 22% in 2010; however, there was no significant change in the proportion of healthier (green) foods offered (Hills, Nathan, Robinson, Fox, & Wolfenden, 2015). However, school directors and students perceived the offering before and after implementation to be significantly healthier (Mensink, Schwinghammer, & Smeets, 2012). While the Canteen Menu Planning Guide seemed like a promising tool to implement changes in the canteen menu, several barriers impacted greater success. Implementation was influenced by the local context, school type, canteen management practices, meal type, and the student body – in particular, their religious practices. Therefore, Ardzejewska et al., (2013) recommended a tailored, wider community approach to take into consideration the operation of the canteen as well as the student population, if compliance with the strategy is to be accomplished (Ardzejewska et al., 2013).

#### **2.4.3.4 Vendors**

Ready-to-eat foods or ‘street foods’ are regularly sold by vendors in many countries, including Africa, the United States, India, South & Central America, and the Caribbean (De



Villiers et al., 2012; Etzold, 2008; Goetz & Wolstein, 2007; Dardano, 2003). Vendors are often women from the community who sell homemade and commercial pre-packaged snacks as an income generating activity. Although vendors operate on school property in many instances, they frequently sell food items in the school's immediate periphery or beyond the school's fence (De Villiers et al., 2012; Goetz & Wolstein, 2007). Nonetheless, a one to two minute walk from the school compound can guarantee access to these vendors.

Many school children are dependent on vendors for reasons such as a guardians' lack of time to buy and prepare food at home, and this occurs, even in the presence of a school meal program. Often, school children are given a small amount of money to purchase a snack or lunch during school breaks (Neffati, Ridha, Kolsteren, & Hilderbrand, 2004; Feeley, Pettifor, & Norris, 2009; Wiles et al., 2013). According to Goetz and Wolstein (2007) students who buy snacks from vendors obtain a large percentage of their daily caloric intake from these unhealthy snacks. Furthermore, this consumption of unhealthy snacks leads students to surpass their daily recommended caloric intake, resulting in weight gain unless balanced by physical activity.

In their review of the nutritional value of street foods, i.e., ready-to-eat food sold by vendors, and their contribution to the diet of consumers, Steyn and Colleagues demonstrated that street foods contributed significantly to the diet of children in developing countries, both in terms of energy, protein and micronutrient intakes and in terms of food groups consumed (Table 2-3) (Steyn et al., 2013). Most of the studies suggest that these foods contributed significantly to the daily intake of protein, often at 50% of the Recommended Daily Allowance (RDA). The daily energy intake in children ranged from 13% to 40%. Few of the studies reviewed provided data on micronutrient intake, but most tended to be high in iron

and vitamin A, while low in calcium and thiamin. In terms of the food groups consumed, the review showed that cereals and grains, fruits, and meat, fish, and legumes accounted for a significant percentage of food sold.

The review also found evidence that items purchased such as candy, chocolate, sweetened drinks, and fried food (meat, bread, dough) have one or more of the following: high sugar, high saturated fat, and high trans-fat, and/or high salt. Findings on fat and carbohydrate intake were a cause for concern because of the association between high intake of fat, trans-fat, salt and sugar with the development of obesity and non-communicable diseases.

Table 2-3. Contribution of food sold by vendors to the diets of children			
Authors	Sample	Methods	Findings
Micah et al., 2012	172 children	FFQ; 2x12hr weighed food record	Food provided about 35.5% of children's total energy intakes; 20% of protein, vitamin B12, zinc & iron, > 40% of vitamin A, & > 50% of calcium
Nago et al., 2010	656 adolescents	2x24 hr recalls	On average 40% of energy, fat, protein, carbohydrate & fibre in the diet came from food sold by vendor. Consumers had a low intake of fruits & vegetables & a high fat intake
Gewa et al., 2007	150 students	2x24 hr recalls in 2 seasons	Total E/I from food sold by vendors were sig. higher in boys (13.5–20.8 %EI) than girls (12.8–17.3 %EI). Food contributed substantially to vit. C (65%) & vit. A requirement (30–65 %)
Source: Steyn et al., 2013			

There are several factors influencing the variety and nutritional quality of food items offered for sale by vendors, including consumers' preferences and their ability to buy (cost). With considerable independence in choosing which foods to consume, school children are more likely to use their money to purchase foods that taste good and are of low nutritional

value (Neffati, Ridha, Kolsteren, & Hildebrand, 2004; Johnson & Yawson, 2000). This, in turn, influences the vendors' decision to sell particular items. Given that healthier food items are not popular among school children, they are rarely offered for sale.

The purchasing power of a student is one of the most significant factors influencing the variety and nutritional quality of food items offered for sale by vendors. The vendors perceive that it is more costly to sell healthier items (Food and Agriculture Organization & Sokoine University, 2006). As a result, they provide a variety of low-cost, energy-dense items, tactically priced to ensure that students can afford the items and a profit can be made from the sales. Furthermore, there is a risk that improvement of the nutritional quality of the food may increase prices, putting them out of reach of consumers (Mwangi, Den Hartog, Mwadime, Van Staveren, & Foeken, 2002). For this reason, it is very uncommon to find vendors selling more costly items such as fruits, flavoured milk, and larger meals constituting foods from different food groups (Food and Agriculture Organization & Sokoine University, 2006).

In the literature there are few examples of school vendors as a unit of intervention in strategies to improve the school food environment (Tester, Yen, & Laraia, 2012; Goetz & Wolstein, 2007; Food and Agriculture Organization & Sokoine University, 2006). Tester, Yen and Laraia (2012) obtained school permission for a fruit vendor (frutero) to sell fruits and vegetables at the entrance to a school property in Oakland, California to examine the feasibility of a sanctioned vendor to sell nutritious food items at school. The vendor sold products that had been precut and packaged in a central kitchen into snack-sized bags holding a one-half cup serving. The results suggested that the presence of this vendor decreased the sales of vendors selling less healthy items, thus increasing access to healthy food.

In the US, vendors are restricted from selling on school compounds (Goetz & Wolstein, 2007). One of the reasons for the restrictions against vendors on school property is that they are considered to encourage consumption of partial meals with low nutritional benefits (De Villiers et al., 2012; Goetz & Wolstein, 2007). Some principals have taken a strong stance against the vendor issue and have made a concerted effort to address it. They have done so by enforcing closed-campus policies, sending letters to parents asking children to stop purchasing food from the vendors, and telling vendors to leave the school periphery. Based on previous experience, these actions all seem to have a positive effect on temporarily reducing vendor use (Goetz & Wolstein, 2007). In many cities, municipal policies and bylaws have also been established to ban vendors from operating in close proximity to schools (American Heart Association, 2012). These local ordinances either ban mobile vendors selling food within a specified distance of schools on all days or during days and hours when children are likely to be present, or restrict mobile vending by zoning code or on a block-by-block basis at all times or during days and hours when children are likely to be present (American Heart Association, 2012). Where they exist, health promotion initiatives involving school vendors are required to help improve healthy eating among children.

#### **2.4.4 Characterizing the School Food Environment: Methodological issues**

The previous section of this chapter summarized some of the evidence that links the school food environment to children's health outcomes. In general, the literature suggests associations between the environmental factors within the school and children's dietary intake and BMI. Understanding how environmental factors influence eating behaviors at school requires the application of a variety of methods and instruments to measure the school food environment.

There is no gold standard for measuring the school food environment (Ohri-Vachaspati & Leviton, 2010). There has been a rapid increase in the number of published instruments for assessing the food environment (Ohri-Vachaspati & Leviton, 2010). Instruments are standardized tools used to assess the observed or the perceived food environment (McKinnon, Reedy, Morrisette, Lytle, & Yaroch, 2009). In their review of instruments to measure organizational food environments, Ohri-Vachaspati and Leviton (2010) reported that the variety of assessment tools developed demonstrates the differences in the information needs and capacities of groups (researchers, practitioners, and community organizations) interested in assessing school food environments. Moreover, choosing the most suitable instrument requires users to consider the pros and cons of each instrument and base their selection on the purpose of their assessment, resources and expertise at hand, and the validity, reliability, and ease of use of the instrument (Ohri-Vachaspati & Leviton, 2010).

An instrument may take the form of a checklist (based primarily on a pre-defined list of indicator foods); market basket (based on a pre-defined list of foods representing the total diet); inventory (the reporting of all foods); or interview/questionnaire (pre-determined list of questions regarding the environment) (McKinnon et al., 2009). Typically, if perceptions are of interest, they may be assessed via surveys and interviews, whereas the actual physical environment may be assessed via observation or documentation using a checklist inventory (Ohri-Vachaspati & Leviton, 2010). The types of policies implemented in school settings and stakeholders' perceptions of food availability and access are often assessed using key informant interviews or focus groups (Arcan et al., 2011; Ohri-Vachaspati & Leviton, 2010; Carter & Swinburn, 2004).

Depending on the nature of the research, student's consumption within the school food environment is also measured. Typically, consumption is measured using a variety of self-report instruments: 24-hour dietary recalls, estimated food records (FRs), and food frequency questionnaires (FFQs) (Tugault-Lafleur, Black, & Barr, 2017; Baranowski, 2012). However, the use of self-report instruments has not escaped criticism and has been challenged in terms of their validity (Subar et al., 2015). In order to mitigate this challenge or improve the validity of self-reports, Sharman and colleagues recommends that "researchers conduct interviews with children about their dietary intake as soon as possible after the eating occasion, ask about one target meal instead of all meals, ask about diet alone (rather than diet and physical activity), and obtain copies of foodservice records to check for intrusions in children's recall" (Sharman, Skouteris, Powell, & Watson, 2016, p.112). Additionally, the researchers suggest the use of retrieval cues, forward-order prompts (for girls) and reverse-order prompts (for boys) (Sharman, Skouteris, Powell, & Watson, 2016).

Cultural differences or country context should be acknowledged in measuring the school food environment (Moore, Roux, & Brines, 2008). Due to differences in the food culture and level of economic development in different countries, there are variations in the types of food outlets in and around schools and their food offerings. For example, fast food franchises and convenience stores are more popular in North America (Williams et al., 2014) than in Africa, India, Latin America and the Caribbean, where (mobile) vendors and tuck shops are more prominent (Nortje, Faber & de Villiers, 2017; Azeredo et al., 2016; Pehlke, Letona, Ramirez-Zea & Gittelsohn, 2016; Marraccini et al., 2012; De Villiers et al., 2012). The variety of differences which exist in the school food environment from country to country limits the use of published, validated measurement instruments. To account for

cultural or contextual differences, research instruments are often adapted for use or new research instruments are developed by researchers. Researchers conducting research in Caribbean countries are largely dependent on culturally- relevant or population-specific instruments developed by the research team (Ramdath, Hilaire, Cheong, & Sharma, 2011; Francis et al., 2010; Sharma et al. 2007).

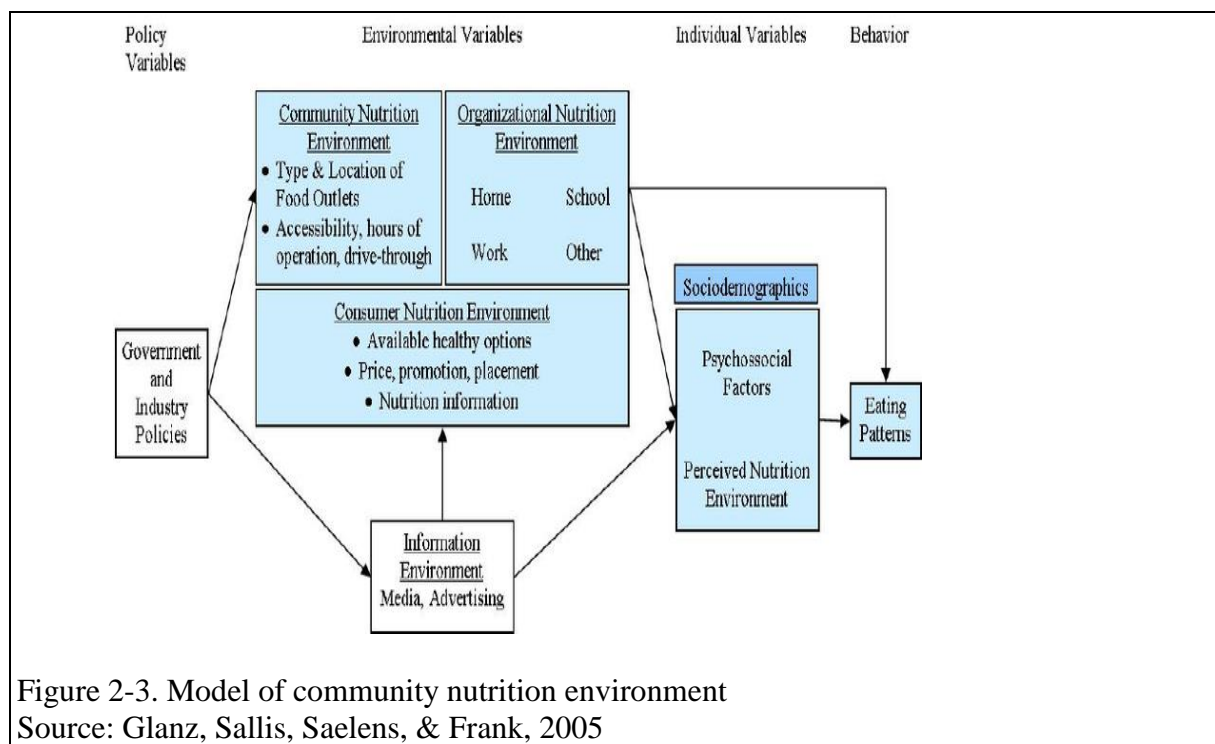
#### **2.4.5 Creating Healthy School Food Environments**

The school food environment exerts a strong influence on children's dietary behaviour. Therefore, healthy school food environments are required to facilitate healthy food choices among children. Some key factors necessary for the successful creation of healthy school food environment are described below.

##### ***2.4.5.1 Ecological Approach***

While the school environment is an ideal setting to encourage healthy eating habits among children, schools cannot achieve success in such an endeavour by themselves. Focusing on the school food environment in isolation, without consideration of a combination of factors outside the school setting influencing children's dietary behaviours, has been identified as a key challenge in school-based health promotion (Stark, Devine, & Dollahite, 2017; Ardzejewska, Tadros, & Baxter, 2013; Townsend & Foster, 2013). Therefore, socio-cultural, physical, economic, and political factors need to be considered in initiatives geared at creating a healthy school food environment (Story, Kaphingst, Robinson-O'Brien, & Glanz, 2008; Glanz et al., 2005). There are several ecological models that have been developed to foster an understanding of the many factors that influence children's eating behaviors.

Glanz et al., (2005) incorporated features of the food environment thought to be related to eating patterns (Figure 2-3), including food access, food availability, food affordability, nutritional quality of food, nutrition information, food quality, promotion, and guiding policies. These environmental influences are also likely to be mediated and moderated by individual level factors: demographic, psychosocial, or perceived environmental variables. Since its publication, the model of nutrition environments has become the conceptual basis for many studies examining food environments (Ding et al., 2012; Williams, Thornton, Ball, & Crawford, 2011).



Story and colleagues proposed a useful ecological framework (Figure 2-4) for achieving a better understanding of the multiple factors that collectively or independently impact dietary behaviours such as those of school children (Story et al., 2008). The framework illustrates that an individual's eating behaviour is influenced by personal factors



(preferences, skills, age), social environment (family, friends, peers), physical environment (access, availability, barriers, opportunities at school and/or home) and macro-level sectors (societal and cultural norms and values, the food and beverage industry, food and agriculture policies, food assistance programs, and government and political structures and policies).

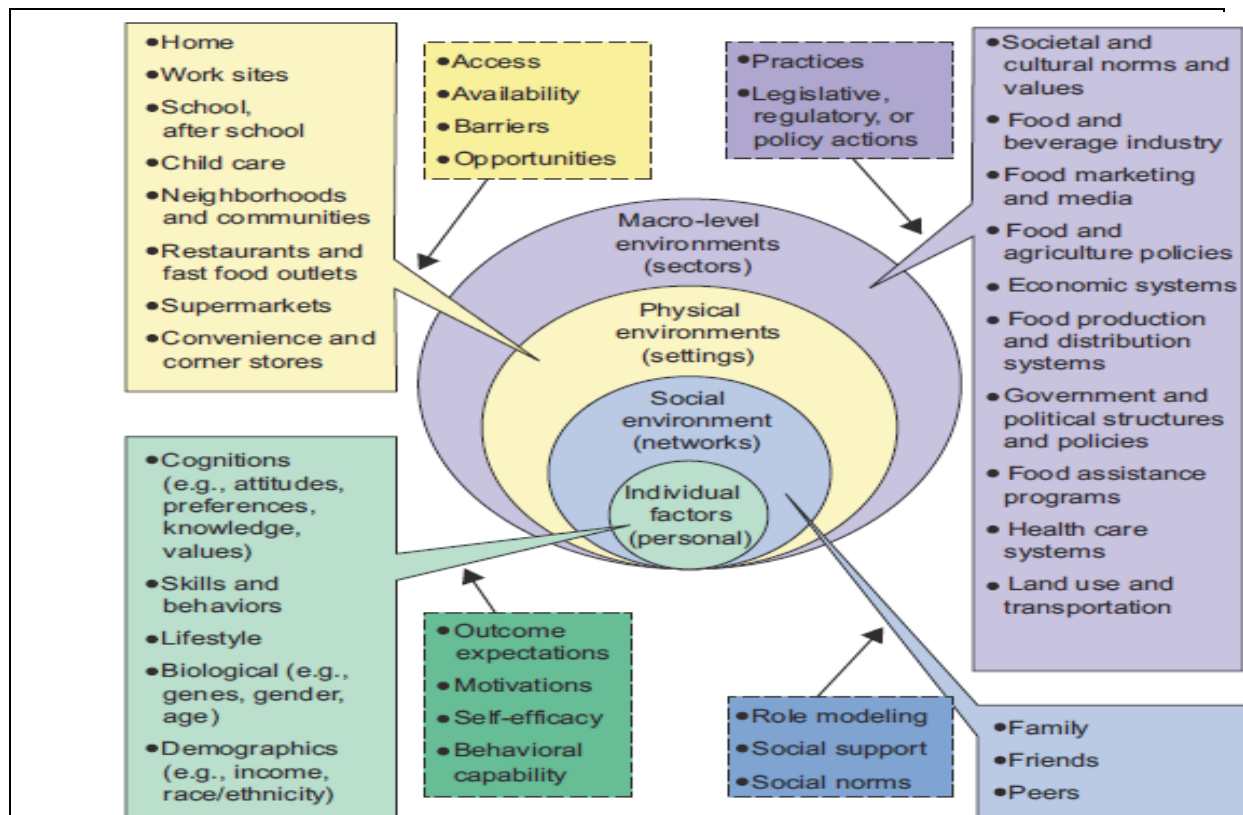


Figure 2-4. Ecological framework depicting the multiple influences on what people eat  
Source: Story, Kaphingst, Robinson-O'Brien, & Glanz, 2008

The features of the school food environment can also be assessed using the Analysis Grid for Environments Linked to Obesity (ANGELO), which was specifically developed to prioritize environmental factors that relate to obesity ('obesogenic environments') in the immediate (micro) and wider (macro) environments. This framework divides the environment into micro and macro environments (the school setting is a microenvironment), and environment type into physical (what is available), economic (what the financial factors

are), policy (what the rules are) and socio-cultural (what the attitudes, perceptions, beliefs, and values are) (Carter & Swinburn, 2004; Swinburn, Egger, & Raza, 1999;).

#### ***2.4.5.2 Stakeholder Involvement***

Sociocultural factors shape the school food environment (Glanz, et al., 2005). The sociocultural environment refers to the attitudes and values associated with stakeholders (Swinburn et al., 1999). Stakeholders are persons who help shape the school food environment, such as school principals, school teachers, education and health ministry representatives, health care providers, food providers, parents, and students. Therefore, their input is critical to further an understanding of: (1) the school community context and culture (Ardzejewski et al., 2013); (2) the connection between children's dietary behaviours and the school food environment (Penney, Almiron-Roig, Shearer, McIsaac, & Kirk, 2014); (3) the role of the school in promoting healthy eating, and how this goal fits within the many competing priorities (Clarke, Fletcher, Lancashire, Pallan, & Adab, 2013; Monterrosa et al., 2015; Goh et al., 2009); and (4) how best to address unhealthy eating within the school food environment.

Given the importance of stakeholder engagement, increasingly, health promotion initiatives within the school food environment are being designed with the participation of stakeholders. For example, stakeholders' perceptions have also been sought in understanding the food practices and barriers and facilitators to healthy eating in the US, (Goh et al., 2009; Kubik et al., 2005), Australia (Hesketh, Waters, Green, Salmon, & Williams, 2005) and India (Rathi, Riddell, & Worsley, 2017). Researchers have also gleaned stakeholders' perceptions in policy development and implementation initiatives for regulating the school food

environment in Mexico (Monterrosa et al., 2015) and Canada (Vine, Elliott, & Raine, 2014; Taylor et al., 2011; MacLellan, Holland, Taylor, McKenna, & Hernandez, 2010).

To achieve consensus and help identify which issues within the school food environment to prioritize, it is critical to capture the views of a wide range of stakeholder groups. This is important because often there are inconsistencies in the views of stakeholder groups. For example, parents' views of the schools' role in regulating unhealthy food may differ from those of teachers and school administrators. Some parents support unhealthy eating during classroom celebrations because they perceive that banning cupcakes and treats during classroom celebrations would be a violation of their child's rights (Connolly-Schoonen, 2007). Similarly, some parents are concerned that banning unhealthy food from the school's canteen would significantly affect the total amount of food children eat daily. On the other hand, teachers and school administrators agree that high-fat and high-sugar foods are used as rewards and incentives in the classroom because students prefer these foods, and it is therefore important for schools to have a written school nutrition policy that addresses food-related issues, such as food in the classroom and food selections in vending machines (Lambert, Monroe, & Wolff, 2010; Kubik et al., 2005; French, Story, & Fulkerson, 2002). There needs to be a shared vision among stakeholders for creating a healthy school food environment. Thus, when consensus is built among stakeholders, greater success is achieved in creating healthy school food environments.

#### **2.4.5.3 *Healthy Food Marketing***

From a health promotion perspective, healthy food and beverage marketing in schools also has the potential to impact students' food purchase behaviour, despite it being uncommon or challenging. This concept was demonstrated in one in-school study which reported that pricing and promotion strategies may have a positive effect on purchases of low-fat snacks from vending machines (French et al., 2001). Low fat snacks at reduced prices (10% reduction, 25% reduction, 50% reduction) were added to the vending machines. Price reductions of 10%, 25%, and 50% on low-fat snacks were associated with significant increases in low-fat snack sales; percentages of low-fat snack sales increased by 9%, 39%, and 93%, respectively. Promotional signage was independently, but weakly, associated with increases in low-fat snack sales (French et al., 2001). These results are promising given that most food marketing targeting children is known to promote unhealthy dietary behaviours (Velazquez, Black, & Potvin Kent, 2017).

The promotion of healthy food such as low fat snacks has been identified as an effective strategy not only to help children and young people meet government-recommended dietary targets, but also to further accelerate the full implementation of Resolution WHA63.14 (Kraak et al., 2016). Resolution WHA63.14 encompasses a set of recommendations by the WHO to restrict the marketing of food and non-alcoholic beverage products high in saturated fats, trans fatty acids, free sugars and/or salt to children and adolescents globally (WHO, 2010). One tool developed to help in this regard is the Nutrient Profile Model, which classifies processed and ultra-processed food and drink products that are in excess of critical nutrients such as sugars, salt, total fat, saturated fat and trans-fatty acids (WHO, 2015).

In terms of marketing, the use of descriptive names may help improve perceptions of foods in institutional settings, and it may help facilitate the introduction of unfamiliar foods, such as healthier food options (Wansink, Van Ittersum & Painter, 2005; Wansink, Van Ittersum, & Painter, 2004).

#### ***2.4.5.4 Food Education and Other Food-Related Teaching and Learning Activities***

Increasingly, schools are being called upon to integrate food education into the required curriculum, given its potential to change children's food knowledge and behaviours (Rojas, Black, Orrego, Chapman, & Valley, 2017; Rojas, Orrego, & Shulhan, 2016; Gibbs et al., 2013; Fahlman, Dake, McCaughtry, & Martin, 2008). There is evidence that countries have heeded the call to integrate food education into the required curriculum. For example, Australia has integrated food and nutrition within curriculum frameworks nationally (Australian Curriculum and Assessment Reporting Authority [ACARA], 2014). In England, France, Italy, Finland and Japan, an emergent approach to food education is currently being applied. This approach, 'food education integrated with school meals', typically includes the opportunity for students to learn about food and nutrition in the school meal setting, in order to help them to gain both social and practical food skills and knowledge (Oostindjer, et al., 2017). Favourable outcomes in eating behaviours have been observed from this type of approach (Moffat & Thrasher, 2016; Oostindjer, et al., 2017).

For decades, food education was dominated by one particular approach to food education that focuses on nutritional knowledge and monitoring food choices, i.e., nutrition education (Currie, 2013). Nutrition education is defined as "any set of learning experiences designed to facilitate the voluntary adoption of eating and other nutrition-related behaviors conducive to health and well-being" (Contento, 2007). This is evidenced by a body of

literature which links nutrition education to diet-related outcomes in children (Contento et al., 2002; Lytle, 1994). Interestingly, as studies began to include food-related components like cooking and gardening to deliver multicomponent interventions, an increased level of effectiveness in modifying behaviours was observed (Van Cauwenberghe et al., 2010). Several studies have demonstrated that combining nutrition education with food related activities such as gardening and cooking as one program are effective means of improving children's dietary behaviors, nutrition knowledge, diet-related skills and self-efficacy (Van Cauwenberghe et al., 2010; Walters & Stacey, 2009; McAleese, & Rankin, 2007). Together, these studies support the need to provide children with opportunities for food and nutrition education rather than nutrition education only.

Despite the emergence of new, 'best' approaches to food education, 'nutrition' still dominates food pedagogy. A similar concept called the 'medicalization of food' has been gaining traction. Essentially, contemporary food pedagogy is being criticized for being too 'medicalized' or for reducing the value of food to its nutrients and their health giving properties (Welch et al., 2012). Several undesirable consequences are linked to this medicalization of food pedagogy. For example, this tendency restricts the avenue for teaching about alternative knowledges of food such as the symbolic roles of food - pleasure, social identity and cultural identity (Wright & Halse, 2014; Welch et al., 2012; Cliff & Wright, 2010). Children's sources of information such as schools and popular media, including TV programs and web-based health, are mostly responsible for valuing food for its contribution to health or disease (Elsden-Clifton, & Futter-Puati, D., 2015; Wright & Halse, 2014). This in itself has significant implications for food education. It highlights the need to consider children's sources of information and to reconcile this with proper food education

that focuses not only on the provision of nutrition information, but also on the development of skills and behaviours related to areas such as food preparation, food production systems, social and cultural aspects of food and eating, enhanced self-esteem and positive body image and other consumer aspects. Moreover, schools are trusted sources of information for children so more attention needs to be paid to school's readiness to deliver the necessary content.

#### ***2.4.5.5 Policy Implementation***

Policy decisions that influence school environments are made at many levels, including national/federal, state/provincial, state/ provincial board of education, local school board and municipal/city. Evidence suggests that over the past 20 years, national and local governments (e.g., state, city) around the world have been taking action to improve school food environments, either through mandatory or voluntary policy mechanisms(Holmes, 2016; Aliyar, Gelli, & Hamdani, 2015; Hawkes, 2013). Several types of policy actions have been taken, including, setting food- or nutrient-based standards, restricting specific types of foods and making specific foods more readily available. School policies may be the most effective action to create healthy school food environments. Although school policies have been effective in improving healthy food access and availability within the food environment and dietary intake in schools (Welker et al., 2016; Aliyar, Gelli, & Hamdani, 2015; Driessen et al., 2014; Nicholas et al., 2013; Mullally et al., 2010), there are several factors which challenges successful implementation and compliance.

The barriers to policy implementation include availability of compliant foods, cost of healthy food for sale, insufficient enforcement of the regulations, sale of food for profit, reliance on fundraising for school related materials, social and cultural aspects of diet

including preference for foods of low nutritional value and access to unregulated spaces near school property, proximity of schools to off-site food outlets, complexity of guidelines , lack of policy clarity, lack of support from key stakeholders, top-down approach to implementation, absence of an educational component encouraging students to select healthy foods (Holmes, 2019; McIsaac, Spencer, Chiasson, Kontak, & Kirk, 2018; Orava, Manske, & Hanning, 2016; Watts, Mâsse, & Naylor, 2014; Vine, & Elliott, 2014; Taylor et al., 2011; McKenna, 2010).

School meal programs are perceived to be healthier than food provided through other outlets in the school food environment because they are usually mandated to provide fixed nutrient goals, which would also result in the provision of healthy meals. However, the effectiveness of school-based healthy eating policy initiatives may be moderated if students have pervasive exposure to retailers or vendors selling snack foods, SSBs, and fast food in the immediate vicinity of the school.

## **2.5 Summary**

This literature review has highlighted factors stimulating the push for changes within the school food environment, i.e., the rising rates of childhood obesity and the recognition that school food environments represent one of the key factors influencing unhealthy eating. The options for healthy eating within the school environment were discussed and the actions that have been taken to improve food made available at these outlets were summarized. There has been progress in improving the school food environment in many developed



countries. Most success is realized from the improvements made through policy actions. In the Caribbean region, the options for eating at school, such as school meal programs, tuck shops and vendors, represent a significant opportunity for health promotion or improving healthy eating. However, progress appears to be slow in the Caribbean region with regards to understanding and creating healthy school food environments.

## **CHAPTER 3 METHODOLOGY**

This chapter describes the overall research methodology, including the theoretical framework, study design, and data collection procedures.

### **3.1 Study Setting**

The study was conducted in Dominica, a country in the Caribbean region, with a population of approximately 72,680 and a total area of 750 km<sup>2</sup>. Dominica is described by the World Bank as an upper middle-income country with an economy based primarily on agriculture and tourism (World Bank, 2016). The primary educational system of Dominica is administered by the Ministry of Education, Sports and Youth Affairs. There are 60 primary schools in Dominica; of these, 48 are public schools, which are the focus of this study. Primary school education is compulsory and usually begins at age 5; students then move through Grades 1-6. A typical school day for many public school students begins at 9 a.m. and ends at 3:30 p.m., with two school breaks during the day – a morning snack break from 10:30 to 10:45 a.m. and a lunch break from 12:00 to 1:30 p.m.

### **3.2 Theoretical Framework**

Story, Kaphingst, Robinson-O'Brien, and Glanz (2008) have proposed a useful ecological framework for better understanding the multiple factors that collectively or independently impact dietary behaviours, such as those of school children. The framework illustrates that an individual's eating behaviour is influenced by personal factors (preferences, skills, and age), the social environment (family, friends, and peers), the physical environment (access, availability, barriers, and opportunities at school and/or home), and macro-level

factors (societal and cultural norms and values, the food and beverage industry, food and agriculture policies, food assistance programs, and government and political structures and policies). This study applied the ecological framework by recruiting participants from all levels of the framework and in designing the interview guides. The framework was also used as a guide for data analysis and reporting, i.e., the facilitators and barriers to healthy eating in Study 2.

### **3.3 Study Design**

Overall, this thesis took a multi-method research design. Multi- method research designs include the use of more than one method of data collection in one project or research study (Hunter & Brewer, 2015; Creswell & Plano-Clark 2007; Johnson & Onwuegbuzie, 2004). Multi-methods are used in a research program when a series of projects are interrelated within a broad topic and designed to solve an overall research problem (Morse (2003). As such, to characterize the school food environment in Dominica for health promotion, data were collected in three phases through a variety of methods, including telephone survey and individual interviews with school principals, focus groups with school teachers, individual interviews with vendors, and individual interviews with personnel from government ministries of health and education, food frequency consumption survey and a recipe contest among students. To my knowledge, this research represents the first multimethod study in the Caribbean region assessing the school food environment for health promotion. Multiple methods facilitate communication and promote collaboration that results in findings that are far more compelling than single method research (Stewart, 2009). It allows researchers to mix and match design components that offer the best chance of

answering their specific research questions (Johnson & Onwuegbuzie, 2004). The use of multiple methods of data collection (data triangulation), across multiple cohorts with differing perspectives ensures credibility of findings and enhances the trustworthiness of the research (Rapport et al., 2018).

The study was carried out in three phases as described below. Each phase relates to different time periods in which participants were recruited and data were collected. The three phases were as follows: phase one – May to June, 2014; phase two – November, 2014 to January, 2015; and phase three – March to July, 2015. Both quantitative and qualitative procedures were used to collect data.

### **3.4 Phase 1**

One of the core features of school-based interventions is a situational analysis or environmental scan conducted at the beginning of the study. A situational analysis helps “to better understand the needs, resources and conditions that are relevant to planning interventions” (De Villiers et al., 2012). In this regard, from May to June, 2014, face-to-face meetings were conducted with stakeholders at the policy level in Dominica. This phase also involved a brief telephone survey among primary schools to determine the options for eating within the school food environment.

#### **3.4.1 Meeting with the Chief Education Officer**

The first meeting was conducted with the Chief Education Officer (CEO). The purpose of this meeting was to: 1) describe the study and its protocols, 2) gain insights that could likely shape the design of the study, 3) seek permission to conduct the study, 4) solicit the support of the Ministry of Education, and 5) schedule an interview with the CEO as a study

participant (in phase 2). The CEO consented to provide a letter granting support and permission. However, she suggested a meeting be held with the Permanent Secretary (PS) of Education as the process for granting permission also falls under the PS's portfolio. The meeting was extended to include the Ministry of Education's statistician, who provided a directory of all the public schools in Dominica. Insights gained from this meeting resulted in the decision to focus on public schools only because the Ministry of Education has limited control over private primary schools.

### **3.4.2 Determining Children's Options for Eating While at School**

A brief, informal telephone survey of public schools was conducted to determine options for eating at school. The telephone survey attempted to reach all public schools (n= 48). However, this was not possible because the listed telephone number was not operational for many of the schools, resulting in a smaller than expected sample size (n= 41). Data collection for assessing the options for eating followed a very brief procedure. Respondents, school principals, were informed of the purpose of the survey and were told that it had been approved by the Ministry of Education. Respondents were asked the question, "What are students' options for eating during snack and lunch breaks while at school"? Where necessary, the following options were used as probes: vendors, tuck shops, school meal programs, vending machines, and shops.

## **3.5 Phase 2**

Phase 2 was conducted from November 2014 to January 2015. It started with a meeting with the PS, as recommended by the CEO. Data were then collected from in-depth interviews with school principals to accomplish the following objectives:

- To determine the types and popularity of food sold within the school environment

- To determine existing policies that govern the sale and availability of food items in the school environment.
- To acquire an in-depth assessment of stakeholders' perceptions of the school food environment, as well as the environment's impact on healthy eating and opportunities to improve the nutritional quality of food sold.

### **3.5.1 Meeting with the Permanent Secretary of Education**

In addition to the PS, the research supervisor was present at this meeting. The study was discussed, and the PS consented to support the study and grant permission to conduct the study in schools.

One key consideration is that this study was initially proposed as a study to promote the role of school vendors in encouraging healthy food choices in primary schools in Dominica. Therefore, the intent, up until this phase, was to purposefully select schools where vendors operated food outlets. However, following the telephone survey in phase 1, it was observed that vendors were only present in five schools, a finding discussed with the PS. The PS shared that, traditionally, vendors were prevalent around most schools; however, this practice has become unpopular. She further stated that a policy is being developed for regulating the school food environment. She claimed that this policy might result in the total departure of vendors because they would refuse to adhere to the guidelines. Following this meeting, in a discussion about the research, the researcher and research supervisor decided to switch focus. They realized they needed to understand the entire school food environment in Dominica and so chose to recruit schools with multiple food outlets, not just vendors. The need for this broadened focus was underscored by the forthcoming school food policy, which will have implications not only for vendors but also for the school meal program and tuck

shops. From this point onwards, the goal of the study was to characterize the school food environment for health promotion. An interview (as a study participant) was requested from the PS but she was unavailable.

### **3.5.2 In-depth Interviews with School Principals**

#### ***3.5.2.1 School selection***

Purposive sampling was used to select a subsample of schools from those who participated in the telephone survey. Purposive sampling allows for the selection of information-rich cases centred on the issue being examined (Russell & Gregory, 2003; Patton 2002). In other words, the researcher determines what needs to be explored and seeks to select participants who can and are willing to give in-depth insights by virtue of knowledge or experience (Bernard, 2002).

In selecting schools, the intent was not to achieve a representative sample, but to select schools with multiple outlets that would help in gaining a comprehensive understanding of the school food environment, including food availability in and around schools, factors influencing healthy eating therein, and recommendations for improvement. Thus, the inclusion criteria required that the school has 1) at least one outlet run by the school, i.e., a school meal program and/or a tuck shop and 2) at least one outlet in or around the school not run by the school that students access during breaks. Including schools with both types of outlets was required because, as the school principals pointed out, considering the diversity of the food environment is critical to develop an understanding of it. Additionally, providing a more detailed picture of the school food environment is essential in

determining health promotion strategies. Based on the above criteria, eight schools were selected from the sample of 41 schools.

### **3.5.2.2 Data Collection**

Approaching school principals to gain an understanding of their school food environment was important for several reasons. First, the level of principals' involvement in managing the affairs of their school food environment rendered them in an ideal position to provide the initial in-depth insight into the school food environment. In Dominica, school principals are responsible for the day-to-day management of tuck shops, including procuring food for resale and scheduling teachers to sell at tuck shops. They are also responsible for approving vending operations (vendors) on school premises. Second, one of the objectives of phase 2 was to determine the existing policies that govern the sale and availability of food items in the school environment, and school principals are the key informants regarding policies within their school food environment. Third, the cooperation and assistance of school principals was necessary to coordinate the recruitment of participants for the next phase of the study (students, teachers, and vendors). For the most part, the ethos of the school food environment in Dominica seems to be related to the attitude of the school principal.

Consent forms detailing what the principals would be asked to do if they agreed to participate were sent to the principals of the eight selected schools through the Chief Education Officer (Appendix A). A week after the letter was sent, the school principals were contacted via telephone to receive oral consent and schedule an interview. The signed consent forms were picked up from the participants on the day of the interviews. To guide data collection with the principals, an interview guide with open-ended questions was used (Appendix B). The major topics explored in the interviews and focus groups included the



types of food sold, factors influencing healthy eating, regulations for food provision, factors influencing types of food sold, the main issues associated with food provision, and approaches to address unhealthy eating.

The interviews were conducted in-person at the principals' offices and were audio-recorded with permission from the principal. Seven out of the eight principals consented to be audio-recorded. Interviews ranged from 17-32 minutes, and at the end of the proceedings, the audio was replayed to the participants to review, at which point they were also invited to provide additional comments or clarification if desired.

### **3.6 Phase 3**

A variety of stakeholders at the school level and the government level were engaged in phase 3. Individual interviews were conducted with government level stakeholders and vendors, and focus group discussions were conducted with teachers to address the following (table 3-1):

- To determine existing policies that govern the sale and availability of food items in the school environment.
- To acquire an in-depth assessment of stakeholders' perceptions of the school food environment, the food environment's impact on healthy eating, and opportunities to improve the nutritional quality of food sold.

A survey was conducted among students to determine how frequently they consumed the food sold at school. Additionally, a recipe contest was held with the goal of engaging school children as agents of change in creating healthy snack options to promote a healthy school food environment. Phase 3 was conducted from March to July, 2015 and the data

collection activities occurred simultaneously during that period due to limited time to achieve the objectives.

Table 3-1. Stakeholders at participating schools, geographic location and food outlets			
School	Participants	Location	Food Access
A	Principal (n=1) Vendors (n=1) Teacher (n=6)	South	School meal program, tuck shop, and vendors
B	Principal (n=1)	South	School meal program, tuck shop, and shops
C	Principal (n=1) Vendors (n=4) Teachers (n=8)	South West	School meal program, tuck shop, vendors and shops
D	Principal (n=1) Vendors (n=1)	West	School meal program, tuck shop, and vendors
E	Principal (n=1)	West	School meal program, tuck shop, and shops,
F	Principal (n=1)	West	School meal program, tuck shop, and shops
G	Principal (n=1) Vendors (n=2) Teachers (n=7)	North West	Tuck shop, vendors, and shops
H	Principal (n=1) Teachers (n=6)	North	School meal program, tuck shop, and vendors

### 3.6.1 Data Collection at School Level

#### 3.6.1.1 School Selection

At this point in the study, a sub-sample of five schools was chosen from the eight schools to better manage data collection, given limited resources and time. The five schools with both tuck shops and vendors were selected as convenience samples.

#### 3.6.1.2 Individual Interviews with Vendors

All vendors who operated on or near these five schools' property (as identified by the principals) were recruited to participate via a brief meeting. This recruitment procedure with vendors was done on the same day that the principals of the corresponding schools were

interviewed (phase 2). Study procedures and ethical considerations were discussed with the vendors, and a schedule was set up for interviews. Twelve vendors were approached, but oral consent was received from only eight. To facilitate the interview process with the vendors, an interviewer-administered questionnaire with a combination of close-ended (primarily) and open-ended questions was used to interview the vendors (Appendix C). The approach of using an interviewer-administered questionnaire to guide data collection among vendors was based on findings from previous studies (Goetz & Wolstein, 2007; Food and Agriculture Organization & Sokoine University, 2006). When questionnaires are completed by the participants or self-administered, low literacy skills can affect participation. On the other hand, when an interviewer administers a questionnaire to participants, this encourages a higher participation among those with low literacy skills as their only requirement is to respond to the questions posed by the interviewer. Because vendors' literacy skills are not strong, it was thought that an interviewer-administered questionnaire would thus be best for the vendor interviews. The topics covered included vending operation logistics, awareness of regulations for food provision, facilitators and barriers to improving types of food sold, and suggestions, if any, for improving the nutritional quality of food. All vendors declined the request to be audio recorded. At the end of the interviews with each vendor, the interviewer re-read the questions and responses aloud for the participants to confirm responses.

#### ***3.6.1.3 Focus Groups with School Teachers***

Teachers were recruited through their school principals. Principals were advised to select one teacher per grade from Grade K to 6 (seven teachers) and to distribute consent forms among teachers. Out of the five school principals asked to recruit their teachers, four indicated an interest from their teachers. Focus groups were held at these four schools. Three

of these focus groups comprised female teachers only, while one focus group comprised one male and six female teachers. Interview guides with open-ended questions were used to guide data collection with the teachers (Appendix G). The major topics explored in the interviews included factors influencing healthy eating, regulations for food provision, main issues associated with food provision, and approaches to address unhealthy eating. Consent forms were collected on the day of the focus group discussion. All focus groups were audio-recorded with permission from the participants. At the end of the proceedings, the audio was replayed for the participants to review, at which point they were also invited to provide additional comments or clarification if desired.

#### ***3.6.1.4 Consumption Survey with Students***

Students from Grade 6 were selected for this activity because of their ability to comprehend survey questions compared with children from the younger grades. The researcher visited the classes in advance to describe the study to the students, to tell them what they would be required to do, and to distribute the consent/assent forms. A total of 125 students from the five schools were invited to participate, but signed parental consent and child assent were received from only 95 students (Appendix D). Students' frequency of consumption of food sold within the school food environment was collected through a food frequency questionnaire (FFQ) (Appendix E). The questionnaire included an inventory of food items commonly sold within the school food environment in Dominica (previously collected from vendors and principals). Categories were established to classify foods as follows: homemade, commercially prepared, beverages, and frozen snacks. Frequency of consumption (over the last months) was as follows: never, 1/month, 2-3x/month, 1/week, 2-3x/week, 4-6x/week, and every day. Along with the researcher, the class teachers facilitated

the administration of the food frequency questionnaire survey by distributing the questionnaire to students, clarifying questions, and ensuring students were completing the questionnaire accurately.

### **3.6.2 Data Collection at the Government Level**

Individual interviews were conducted with stakeholders from two government ministries, i.e., Ministry of Health and Ministry of Education. A total of five participants were recruited by snowball sampling. The snowball sampling originated from recommendations by the CEO. Once the name and telephone number or email of a prospective participant was received, the researcher contacted the participant to describe the study, set out what they would be required to do, and schedule an interview. Signed consent forms were collected on the day of the interview. Interview guides with open-ended questions were used to guide data collection with ministry personnel (Appendix F). The major topics explored included factors influencing healthy eating, regulations for food provision, factors influencing types of food sold, the main issues associated with food provision, and approaches to address unhealthy eating. All interviews were audio-recorded with permission from the participants. At the end of the proceedings, the audio was replayed to the participants to review, so they could check content, provide additional comments, or receive clarification.

### **3.6.3 Recipe Contest- The Healthy Bakes Challenge**

#### ***3.6.3.1 Planning***

A recipe contest called the “healthy bakes challenge” was planned and executed with the collaboration of two members of the research team and stakeholders in Dominica

(nutritionists, the Coordinator of the School Feeding Program, and the Director of the National 4H Club). The National 4H Club has a long tradition of hosting an annual cooking competition called the “President’s Dinner Plate” for 4H clubs in secondary schools. 4H is a non-formal educational program. The learning experiences in 4-H are designed to help youth apply what they learn to real life. The participants set goals, build confidence, learn responsibility, and make decisions. The 4-H philosophy is "learn by doing." Through the projects that youth select, they develop the skills that help them to develop their potential and succeed in life ( <http://youthdivision.gov.dm/programmes/4-h-programme>).

We decided to focus on bakes because their popularity among children makes them a promising vehicle for improving and promoting positive dietary change in the school food environment. The recipe contest was named ‘healthy bakes challenge’ to acknowledge that creating a healthy bake may be a challenge for children, considering factors such as age, nutrition knowledge, and food preference. We chose not to use the word “contest” on the day of the event as members of the planning team indicated that a contest suggests a competitive event and that children’s past experiences with contests may discourage collaboration and information-sharing, thus promoting an anti-social environment during the event.

#### ***3.6.3.2 Participant Recruitment***

A decision was made to channel the recipe contest through the National 4H Club, an established organization experienced in hosting such events. 4H clubs are present in primary and secondary schools; however, the competition was organized for secondary schools (ages 12-18) due to their history with similar contests, the students’ level of maturity, and their relatively advanced cooking skills. An invitation to participate in the contest, including

guidelines for participation and criteria for evaluation, were sent out to nine secondary school 4H clubs through the director of the 4H (Appendix H). Schools were required to select two to three students to participate (cook) on the day of the contest; however, the recipe suggestions were expected to be a school-wide effort among students. All this information was described in detail to the 4H leader (a teacher) of each participating school via telephone. Five schools indicated interest in participating: Dominica Grammar School, Goodwill Secondary School, Castle Bruce Secondary School, Isaiah Thomas Secondary School, and St. Mary's Academy.

On the day of the event, a random sample of 29 students at the event was selected by the 4H director for evaluating the bakes.

#### ***3.6.3.3 Participating Schools' Recipes***

As part of the guidelines for participation, the schools were given the freedom to decide on the recipe and the elements of a 'healthy bake' (Appendix H). Instructions were to *“reformulate the bakes utilizing as many local food/ingredients as possible and/or altering the method of preparation, all in an effort to develop healthier bakes.”* The criteria for evaluation included nutrition standards; in other words, the students considered how well the bakes reflected the food-based dietary guidelines for Dominica. To facilitate purchase of the ingredients, each participating school submitted recipes for their “healthy bakes” one week in advance of the contest. On the day of the contest, the researcher provided the required ingredients to each school.

#### ***3.6.3.4 The “Healthy Bakes Challenge” recipe contest***

The recipe contest formed part of the annual 4H festival, which in 2015 took place on May 29th. On that day, 4H clubs throughout the country participated in several other contests, including chorale speech, public speaking, drama, dance, and the preparation of

African dishes. For the recipe contest, student representatives (from the five schools' participating 4H clubs) prepared their product at a community kitchen located at the 4H festival venue.

Following preparation, each school displayed a few samples of their product on a display table for evaluation by two judges with backgrounds in both nutrition and food product development (an agronomist and a nutritionist). The judging criteria included sensory appeal, creativity, ease of adoption, and nutritional value (Table 3-2). The criteria for evaluation were developed in consultation with the planning team to reflect the requirements of the contest and the ideal characteristics of a homemade school snack: its sensory appeal, creativity, ease of preparation and adoption, and healthfulness. However, the relative weight allotted to each criterion was based on how significant it was to the outcome. For example, the criterion for nutritional value was allotted the most points to emphasize that it was the most important, given that the main focus of the competition was to develop healthy bakes. The planning team considered that, while creativity was encouraged, participants could “get lost” by paying too much attention to this criterion; therefore, this criterion was assigned the least weight.

Table 3-2. Evaluation criteria for healthy bakes competition	
Criteria	Maximum # of points possible
Sensory Appeal (taste, texture, appearance) – bakes have acceptable sensory characteristics, determined by the judges	15
Creativity – resourceful use of local ingredients and presentation to create student-friendly bakes	10
Ease of Adoption – bakes could be easily adopted by vendors in the school food environment (factors to consider: cooking time, ease of preparation/complexity, cost, availability of ingredients)	20



Because the facility did not allow for individual or private evaluation, the students stood along a table to evaluate the products. The students' appreciation for each product was assessed using a 5-point hedonic scale (Stone, 2012) (1= dislike very much; 2= dislike; 3= neither like nor dislike; 4= like; 5= like very much) developed by two members of the research team. Students were instructed (verbally) by the researcher to taste the coded samples of each product (A, B, C, D, and E) that were positioned along the table and indicate their preference for each coded on the evaluation sheet provided. In an effort to ensure that students were not influenced by others' preferences, the researcher also gave verbal commands to students to avoid any verbal or non-verbal communication cues. This process was supervised and overseen by the judges and the researcher.

#### ***3.6.3.5 Development of Data Collection Tools***

All data collection tools, namely, interview guides, the food frequency questionnaire, and judging sheets for the recipe contest were developed in collaboration with supervisor, Dr. Henry and advisory committee member, Dr. Ramdath who worked extensively on the development of the data collection tools. The content was informed by the study's research objectives and a review of the literature. To obtain the face validity of the tools, they were reviewed by two researchers/nutritionists in Dominica prior to data collection. Data collection followed an emergent design that allowed for the constant revision of interview guides, based on what was learned from earlier parts of the study.

#### **3.6.3.6 Data Saturation**

The total number of stakeholders (17 interviews and 4 focus groups) is in line with recommendations to achieve data saturation or informational redundancy (Patton, 2005; Creswell, 2002; Sandelowski, 2008). Data saturation refers to the point in the research process when no new information is discovered in data analysis, and this redundancy signals to researchers that data collection may cease (Patton, 2005). Consistent with this definition, by the 12<sup>th</sup> interview, the research was hearing the same comments again and again, it was observed this recent interview was not adding to the findings but repeating what was already found in the previous interviews. Moreover, the responses of the participants at this point, were already representative of the constructs of the socioecological framework which guided the study.

### **3.7 Ethics Approval**

The study was approved by the Behavioural Research Ethics Board of the University of Saskatchewan. The Chief Education Officer and Permanent Secretary in the Ministry of Educations approved the study and granted permission to collect data in schools.

### **3.8 Data Analysis**

#### **3.8.1 Qualitative Data**

Data analysis began during data collection. Given that data collection followed an emergent approach, audio recordings from interviews and focus group discussions were transcribed verbatim and were analyzed as they were collected, facilitating the revision of ongoing data collection (Pope, Ziebland, & Mays, 2000). Data analysis initially followed an inductive approach, where the transcripts were read several times, first to become familiar

with the data and then to code the data. Memos in the form of short phrases, ideas or concepts on the general themes arising from the transcripts were written during the data coding process. The next stage of analysis involved sorting out quotes, lifting quotes from the original transcript, and re-arranging them under the appropriate thematic codes. The emergent thematic framework was reviewed through an iterative process, and a deductive approach was initiated to fit and test the themes within the constructs of the ecological framework: individual dimensions, social dimensions, the physical environment, and the macro-level environment. To ensure that they corresponded to the identified construct, the quotes within each theme were re-examined by two independent researchers.

### **3.8.2 Food Frequency and Telephone Survey**

Descriptive statistics were used to calculate frequencies for food outlets and food sold and consumed at food outlets. Information collected from the FFQ was used to determine the percentage of students consuming food items almost ‘every day.’ This was calculated by summing the percentage of students consuming the food items 4-6/week and every day, given that there are five school days in a week. All calculations were carried out using Microsoft Excel.

## **CHAPTER 4 STUDY 1- CHARACTERIZING THE SCHOOL FOOD ENVIRONMENT IN DOMINICA**

### **4.1 Preface**

Chapter 4 corresponds to research question #1- What types of food are sold and consumed in public primary schools in Dominica? The introduction describes the rationale for conducting the study and provides some background literature. This is followed by a detailed description of the study's methodology, results, and discussion. The chapter ends with a brief conclusion. A version of this study was presented at the Caribbean Public Health Agency (CARPHA) conference in 2016.

### **4.2 Abstract**

This study aimed to characterize the food environment of primary schools in Dominica. It included three objectives: to determine children's options for eating while at school, to determine the types and popularity of food sold, and to determine the frequency of consumption of food sold. A brief telephone survey was conducted of primary schools (n=41) to determine food outlets available. To determine the types and popularity of food sold, key informant interviews were conducted with the principals of a subsample of eight purposefully selected schools. Students' consumption of the food sold was measured using a food frequency questionnaire. There are a variety of options for eating within and around public primary schools in Dominica, including school meal programs (86%), tuck shops (54%), vendors (12%), shops (32%), and vending machines (2%). Thirty-seven different food products were recorded from vendors and tuck shops. These were categorized as commercially prepared snacks, homemade snacks and beverages and frozen snacks. The most commonly consumed food on a daily basis was local juice (32.6%) followed by fried

bakes and cheese (21.1%). Findings from this study are useful to stakeholders and can provide support to the government's effort to improve the school food environment.

### **4.3 Introduction**

Globally, the impact of the food environment on health-related outcomes such as dietary intake and obesity and other non-communicable disease is a significant public health issue (Glanz et al., 2016; Kirkpatrick et al., 2014). The literature linking these outcomes to the school food environment is well documented (Driessen et al., 2014; Mâsse et al., 2014; Wijnhoven et al., 2014). In some jurisdictions, such as Brazil, the US, and Canada, much work has been done to characterize school food environments. Research from these countries demonstrates that low-nutrient, energy-dense foods are now readily available and accessible in or near school settings at relatively low prices and in reasonably large portions (Azeredo et al., 2016; Callaghan, Molcho, Nic, Gabhainn, & Kelly, 2015; Engler-Stringer, Le, Gerrard, & Muhajarine, 2014a; Engler-Stringer, Shah, Bell, & Muhajarine, 2014b; Faber, Laurie, Maduna, Magudulela, & Muehlhoff, 2014; Williams et al., 2014). There is also evidence which suggest that Caribbean children have pervasive access to low-nutrient, energy-dense foods in and around schools (Henry et al., 2013; Francis et al., 2010).

Due to differences in the food culture and level of economic development in different countries, there are variations in the types of food outlets in and around schools and their food offerings. For example, fast food franchises and convenience stores are more popular in North America (Williams et al., 2014) than in Africa, India, Latin America, and the Caribbean, where (mobile) vendors and tuck shops are more prominent (Nortje, Faber, & de Villiers, 2017; Azeredo et al., 2016; Pehlke, Letona, Ramirez-Zea, & Gittelsohn, 2016;

Moodley, Christofides, Norris, Achia, & Hofman, 2015). The great variety in the school food environment from country to country makes it difficult to generalize findings from research. However, research gaps that exist in some countries demonstrate the need to characterize their school food environment. Research on the school environment is a necessary step to guide the development of health promotion initiatives that address unfavourable health outcomes.

Dominica, a Caribbean country with a deep agricultural heritage, is at the beginning of a nutrition transition (Wall-Bassett et al., 2012; Wall-Bassett et al., 2010). The need for such a transition is seen in the population's poor dietary habits and alarming rates of childhood overweight and obesity. Using data collected from child clinics, reports indicate that from 1990-99, childhood overweight and obesity rates rose from 6% to 9.7% among 5 year olds in Dominica (Xuereb, Johnson, Bocage, Trotter, & Henry, 2001). Data collected from a sample of children (n=199; mean age 8.6 years) in 2005 shows that 18.7% and 7.9% were overweight and obese, respectively. Results from the global school-based student health survey reported that in 2009, an estimated 26% of Dominican school children (n=1642; age 11-17) were overweight and 10% were obese (Pengpid & Peltzer, 2014). In 2016, the World Health Organization estimated that 32.6% of Dominican children aged 5-19 years were overweight or obese.

Although the role of the school food environment in the nutrition transition has been discussed generally, there is a dearth of publications that would lead to understanding the school food environment in Dominica, particularly the foods available at school. The scarcity of data hinders the likelihood of adequately addressing the factors associated with poor dietary habits and unfavourable health-related issues (e.g., obesity, diabetes, dental caries,

and hypertension). The current study sought to gain an understanding of the current school food environment in primary schools in Dominica. Specific objectives of the study were to 1) determine children's options for eating while at school; 2) determine the types and popularity of food sold within the school environment; and 3) determine the frequency of consumption of food sold within the school food environment. Used

## **4.4 Methods**

### **4.4.1 Study Design and Data Sources**

The study applied a mixed methods approach, defined as the process where the researcher mixes or combines quantitative and qualitative research techniques, methods, approaches, concepts or language into a single study (Johnson & Onwuegbuzie, 2004; Creswell & Plano Clark, 2017). In this study, data were collected through a variety of methods to ensure an in-depth exploration of the school food environment (Table 4-1), including telephone survey among public schools to document children's options for eating while at school, individual interviews with school principals to determine the types and popularity of food sold within the school environment and food frequency consumption survey among students. Integration of the methods involved connecting the results from the initial telephone survey to help plan the follow up qualitative data collection with a subsample of principals. This plan included what questions needed to be further probed and what individuals can help best in gaining insight. In turn, the results of the interviews helped design the food frequency questionnaire. Together, the qualitative (interviews) data enriched the survey results and provided a deeper understanding of the school food environment and its influence on healthy among children. Integrating both quantitative and qualitative design

in one study provides a deeper and more comprehensive understanding of the issue being studied (Creswell & Plano Clark, 2017).

Approaching principals was important for this study. In Dominica, school principals are responsible for the day-to-day management of tuck shops, including scheduling teachers to sell and procure food for resale. They are also responsible for approving vending operations (vendors) on school premises. As a result of this level of involvement, school principals were presumed to be knowledgeable about the school food environment. The decision to recruit school principals as informants for this study was also influenced by an interest in having them assist in the selection of participants (vendors and teachers) for study two.

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Table 4-1. Study design

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Objective	Participant	Activity
Determine children's options for eating while at school	Principals/vice principals (n=41)	Telephone survey
Determine the types and popularity of food sold within the school environment	Principals (n=8)	Individual interview
Determine the frequency of consumption of food sold within the school food environment	Students (n =95)	Survey

---

#### **4.4.2 Data Collection**

The data collection methods below are organized according to the objectives: to determine children's options for eating while at school; to determine the types and popularity of food sold within the school environment; and to determine the frequency of consumption of food sold.



#### ***4.4.2.1 To determine children's options for eating while at school***

A list of all primary schools including their telephone contact was obtained from the Ministry of Education statistician, and a brief, informal telephone survey was conducted with a representative of each public school to assess options for eating. The telephone survey attempted to reach all public schools (n= 48). However, this was not possible because the telephone number given was not operational for some schools, resulting in a smaller than expected sample size (n= 41), as shown in Table 4-1. Respondents were informed that the survey was approved by the Ministry of Education, and details of the project were also discussed. Data collection for assessing the options for eating followed a very brief procedure. The principal or delegated person was asked the question, "What are students' options for eating during snack and lunch breaks while at school"? The following options were used as probes: vendors, tuck shops, school meal programs, vending machines, and shops (small grocery stores).

#### ***4.4.2.2 To determine the types and popularity of food sold within the school environment***

*Principals.* Purposive sampling was used to select a subsample of eight schools from those that participated in the telephone survey (Table 4-1). Purposive sampling allows for the selection of information-rich cases centred on the issue being examined (Russell & Gregory, 2003; Patton 2005). In other words, the researcher determines what needs to be explored and seeks to select participants who can and are willing to give in-depth insights by virtue of knowledge or experience (Bernard, 2002). Since school principals are considered managers of school affairs such as food provision within their respective schools, they are in an ideal position to provide insight on the school food environment. The intent was not to achieve a

representative sample, but to select schools that would help in gaining an understanding of factors influencing healthy eating within the school food environment. Thus, schools selected were those with three or more options for eating, including school meal programs, tuck shops, vendors, or shops. A letter outlining the study protocols and an invitation to participate was sent to the eight school principals selected (Appendix A). The Chief Education Officer helped to facilitate this process. A week after the letter was sent, the school principals were contacted via telephone to schedule an interview. To guide data collection with the principals, an interview guide with open-ended questions was used (Appendix B). Interviews were audio-recorded with permission from the participants and ranged from 17-32 minutes. At the end of the proceedings, the audio was replayed to the participants to review, at which point they were also invited to provide additional comments or clarification if desired.

#### ***4.4.2.3 To determine students' food consumption.***

Students from Grade 6 were selected for this activity because of their ability to comprehend survey questions, compared to children from the younger grades. The researcher visited classes in advance to describe the study to the students and what they would be required to do and to distribute the consent/assent forms. A total of 125 students from the five schools were invited to participate but signed parental consent and child assent were received from only 95 students (Appendix D). Students' frequency of consumption of food sold within the school food environment was collected through a food frequency questionnaire (FFQ) (Appendix E). The questionnaire included an inventory of food items commonly sold within the school food environment in Dominica (previously collected from principals). Categories were established to classify foods as follows: homemade,

commercially prepared, beverages, and frozen snacks. Frequency of consumption (over the last months) was as follows: never, 1/month, 2-3x/month, 1/week, 2-3x/week, 4-6x/week, and every day. The class teachers facilitated the administration of the food frequency questionnaire survey along with the researcher by distributing to students, clarifying questions and ensuring students were completing the questionnaire accurately.

#### **4.4.3 Procedures**

Consent was obtained from principals who participated in the study. All guides were developed in collaboration with members of the research team. To obtain the face validity of the questionnaires, they were reviewed by two experts in the field of nutrition and the food environment prior to data collection. Data collection followed an emergent design that allowed for constant revision of data collection tools based on what was learned from earlier parts of the study. Data for this study were collected by the primary researcher in April-July, 2014 and March-July, 2015. The study was approved by the Behavioural Research Ethics Board of the University of Saskatchewan and the Ministry of Education Sports and Youth Affairs, Dominica.

#### **4.4.4 Data Analysis**

Descriptive statistics were used to calculate frequencies for food outlets and food sold and consumed at food outlets. Information collected from the FFQ was used to determine the percentage of students consuming food items almost 'every day' or daily. This was calculated by summing the percentage of students consuming the food items 4-6/week and every day, given that there are 5 school days in a week. All calculations were carried out using Microsoft Excel.

## 4.5 Results

### 4.5.1 Options for Eating While at School

There are a variety of options for eating within and around public primary schools in Dominica, including school meal programs (86%), tuck shops (54%), vendors (12%), shops (32%), and vending machines (2%) (Table 4-2).

Table 4-2. Frequency of food outlets						
Food outlet	# of schools	% of schools surveyed (n=41)	# of school/ education district			
			North	South	East	West
SFP	35	86	13	5	10	7
Tuck shop	22	54	8	4	5	6
Vendor	5	12	1	1	0	3
Shop	13	32	3	4	3	3
Vending machine	1	2	0	0	0	1

School meal programs consist cooked lunch meals prepared in the school kitchen sold to students. The participating principals noted that because many students live within walking distance from school, they go home during the 1 hour 30 min lunch break. Tuck shops are available in 54% of the schools surveyed. School principals indicated during interviews that the tuck shops are operational during snack break only. Table 4-2 shows that students are able to obtain food from vendors in five (12%) of the 41 schools surveyed. Vendors operate from tables or built stalls on the school property in three of the schools and from built stalls directly outside school gates in the other two. Findings indicated that school food vendors are more common in the western education district, while there is a marked absence in the eastern district. Shops are in close proximity to a significant number of schools in Dominica; however, school principals indicated that students are forbidden from going to the shops during snack break unless they have a signed permission slip. Despite the general rule,

purchasing snacks from shops was described as a common practice. As one principal put it, “the children would still line up at my office during snack break to get permission slips to go to the shops.”

#### 4.5.2 Food Items Sold within the School Environment

Thirty-seven different food products were sold within the school food environment, particularly from vendors and tuck shop. The foods can be broadly classified commercially prepared and homemade snacks and beverages, as shown in Table 4-3.

Table 4-3. Inventory of food items sold in the food environment of eight schools

<u>Home-made</u>		<u>Commercially prepared</u>		<u>Beverages &amp; frozen snacks</u>	
Item	Frequency (# of schools)	Item	Frequency (# of schools)	Item	Frequency (# of schools)
Fried bakes w/ meat stuffing	7	Lollipops	2	Homemade yogurt	1
Butter cake	2	Shirley biscuits	2	Iced pop	5
Banana chips	1	Cream-filled sweet biscuits	4	Soft drink	4
Plantain chips	1	Bermudez cream- filled crackers	3	Vita malt	1
Fried plantain	1	Cheese sticks	2	Capri sun	1
Popcorn	2	Cheese balls	1	Box drink	3
Bread & hotdogs	4	Cheese curls	2	Homemade fruit juice	3
Bread & cheese	1	Corn curls	1		
Roasted hotdogs	2	Nacho cheese	1		
Fried hot dogs	1	Tortilla chips	2		
Pizza (pepperoni, cheese)	2	Wheat crisps crackers	2		
Sandwiches (tuna, cheese)	1	Chocolate bars	1		
Pies (chicken, tuna)	1	Wafers	1		
Gooseberry jam	1	Candies	1		
Tamarind balls	2	Chips	1		
Tamarind jam	1				

The range of items sold varies from school to school. However, the most commonly sold items are fried bakes (seven schools), ice pops (five schools), soft drinks (four schools), bread and hotdogs (four schools), and cream-filled biscuits (four schools).

Local juice is the term used to describe any homemade, sugar-sweetened juice prepared from in-season fruits such as citrus, passion fruit, guava, and West Indian cherry. Vendors and tuck shops prepare local juice for resale in 8oz or 12oz Styrofoam or plastic glasses. Bakes refer to flour-based flat bread prepared by deep-fat frying. For service, bakes are sliced and stuffed with commercial animal-based products such as tuna, corned beef, or cheese.

#### **4.5.3 Frequency of Consumption of Food Sold in the School Food Environment**

The results of the FFQ survey represents data collected from five schools across the island of Dominica. Of the 95 students who participated in the survey, 57% were girls and 43% were boys. The average age was 11.6 years, and the children fell within the age range of 9-13 years.

Table 4-4 presents the percentage of students who consumed selected foods at varying frequencies: never, consumed last month, consumed almost every day. From the list of foods included in the FFQ, the 20 most frequently consumed foods were selected and reported in the table. For most of the food items, the percentage of students who consumed the item almost every day was less than 20%, but the study found that 32.6% of the students consumed local juice almost every day. As mentioned above, local juice is the term used to describe homemade fruit juice prepared for sale. The results show that more students consumed local juice almost daily than they did soft drinks. Local juice was followed by

fried bakes with cheese, with 21% of the subjects consuming the item almost every school day.

Table 4-4. Percentage of students who consumed selected foods almost daily.

Food items	Frequencies of consumption (%).	
	Never	Consumed almost daily*
Local juice	34.7	32.6
Fried bakes w/ cheese	45.2	21.0
Lollipops	35.7	18.9
Fried bakes w/ tuna	63.1	16.8
Popcorn	40.0	16.8
Iced pop	32.6	14.7
Cream-filled biscuits	51.5	14.7
Candies	44.2	14.7
Chocolate bars	51.5	14.7
Bread & hotdog	42.1	12.6
Soft drink	57.8	12.6
Cheese stick	42.1	12.6
Tortilla	54.7	11.5
Tamarind balls	43.1	11.5
Plain bakes	58.9	10.5
Pizza	64.2	10.5
Fried chicken	53.6	10.5
Chips	62.1	10.5
Sandwich - cheese	57.8	9.4
Jam	62.1	8.4
*percentage of students who consumed almost daily is the sum of the percentage of students who consumed the food items 4-6/week and every day,		

## 4.6 Discussion

The primary goal of this study was to characterize the current school food environment in Dominica, including children's options for eating while at school, the types of food sold, and the frequency of consumption. The study found that there are a variety of options for eating within and around public primary schools in Dominica, including school meal

programs (86%), tuck shops (54%), vendors (12%), shops (32%), and vending machines (2%).

By determining children's options for eating while at school, this study also provided insight on environmental exposure to food outlets within the school food environment. Tuck shops are present in over 50% of the participating schools. The presence of tuck shops benefits students, as they are often primary sources of food during the school day. For low-resource schools, the sale of snacks in tuck shops represents an essential fund-raising activity. However, this study showed that a variety of commercially prepared and homemade food such as fried bakes, ice pops, soft drinks and cream-filled biscuits are sold during snack break. Although tuck shops can be an asset to schools, studies conducted in other middle-income countries have confirmed that tuck shops and vendors typically sell unhealthy food (Nortje et al., 2017; Azeredo et al., 2016; Pehlke et al., 2016; Wiles et al., 2011).

Furthermore, their existence has been associated with higher intake of deep fried and sweet snacks in public schools (Nortje et al., 2017; Azeredo et al., 2016; Pehlke et al., 2016). The World Health Organisation, through its School Policy Framework, encourages schools to replace energy-dense, micronutrient-poor products with milk, yogurt without added sugar, water, fruit juices without added sugar, sandwiches, fruits, nuts, and vegetables (World Health Organisation, 2008). However, at the time of the current study, none of these healthier items were available for sale in participating schools.

There are several challenges involved with stocking healthier items such as fruits and milk beverages. One of the primary challenges is that healthier items are generally more costly and exceed the buying power of children (Marraccini, Meltzer, Bourne, & Draper, 2012; Food and Agriculture Organization & Sokoine University, 2006). Furthermore, with



considerable independence in choosing which foods to consume, school children are more likely to use their money to purchase foods that taste good and are of low nutritional value (Neffati, Ridha, Kolsteren, & Hildebrand, 2004). There is a risk for providers that improvement of the nutritional quality of the food may increase prices, putting them out of reach of consumers (Mwangi, Den Hartog, Mwadime, Van Staveren, & Foeken, 2002).

Several school-based interventions targeting tuck shops and vendors have attempted to improve the healthfulness of the foods sold from these outlets but have realized little impact on consumption (Pehlke et al., 2016; Marraccini et al., 2012; Tester, Yen, & Laraia, 2012). Methodological issues such as short study duration is a significant factor that can impact the outcome of these interventions. Quite often, a study of a relatively short duration results in a missed opportunity to evaluate the temporal dynamics of exposures and choices (Clary, Matthews & Kestens, 2017). According to Clary et al. (2017), the compilation of exposures to food outlets over time may push people to repetitively form, without much deliberation, healthy or unhealthy intentions regarding foodscape use. There may be value in prolonged exposure to healthy foods from vendors and tuck shops where they become the only choice for children daily.

The current study found that the most commonly consumed food on a daily basis was local juice (32.6%), followed by fried bakes and cheese (21.1%). It is routine for children to purchase bakes along with local juice during snack break. The choice of local juice and bakes eaten together may demonstrate children's desire for food with a high satiety value. School children appear to prefer foods that give them a sense of satiety regardless of nutritional content (Food and Agriculture Organization & Sokoine University, 2006). For example, in one study, school vendors explained that most school children preferred small energy-dense

snacks such as sandwiches as opposed to smaller snacks such as biscuits or candy because they are more filling (Food and Agriculture Organization & Sokoine University, 2006).

There is significant value in understanding the types and popularity of sugar-sweetened beverages (SSB) consumed by children. This data could strengthen interventions geared at reducing the consumption of sugar. More specifically, studies like the current one are valuable in highlighting which beverages need be targeted in health promotion initiatives. In September 2015, the Government of Dominica introduced taxes on SSB in response to the challenges posed by unhealthy diets

(<http://dominicanewsonline.com/news/homepage/news/health/health-minister-justifies-new-tax-on-unhealthy-items/>). Research from other jurisdictions has suggested that taxation of SSB has been effective in promoting healthy behaviours (Nakhimovsky et al., 2016; Colchero, Popkin, Rivera, & Ng, 2016). An interesting observation in the case of Dominica is that the tax applies to soft drinks (pop/soda) prepared by local and foreign producers, but not to homemade (school-made) beverages that are sold by food providers at school. Given that this study found that children consumed local fruit juice more frequently than soft drinks within the school food environment, there need to be measures such as school food policies that regulate homemade SSB offered for sale at school.

Among the limited studies of the school food environment research in the Caribbean, this study's approach was unique in that it characterized food outlets within schools, as well as those vendors around schools, that influence students' dietary choices. The high response rate from participants invited to participate in the study strengthened the findings. However, the study did have some limitations. Data from tuck shops and vendors were collated, therefore limiting an understanding of the contextual characteristics of each school.

Additionally, recall bias may have been an issue as students were asked to remember their food consumption in the school environment over the last 12 months.

#### **4.7 Conclusion**

This study contributes to an understanding of the school food environment in public primary schools in Dominica. For the purpose of health promotion, research is the first step in identifying opportunities and constraints to improving the school food environment. Furthermore, any changes to food access and availability must be informed by knowledge of the types of food outlets in and around schools, the types of food sold, and the types of food regularly purchased by students. Future research should seek to determine the nutritional value of the foods sold at outlets in and around schools. These data would be useful in determining the association between the school food environment (food access, availability, and exposure) and obesity-related outcomes such as dietary intake and BMI.

## **CHAPTER 5 STUDY 2 – STAKEHOLDERS PERCEPTIONS OF THE SCHOOL FOOD ENVIRONMENT IN DOMINICA**

### **5.1 Preface**

Chapter 5 corresponds to research question #2- What are the perceptions of stakeholders regarding the school food environment? By exploring stakeholders' perceptions, this study builds on the previous objective, which identified the types of food sold and consumed in public primary schools in Dominica. Specifically, this study component investigated the factors influencing healthy eating and opportunities to improve the nutritional quality of food sold. The introduction describes the rationale for conducting the study and provides some background literature. This is followed by a detailed description of the study's methodology, results, and discussion. The chapter ends with a brief conclusion of the study.

### **5.2 Abstract**

The health impact of school food environments on children has become a prime concern for governments, public health practitioners, and researchers. Schools have a critical role to play in promoting and establishing healthy behaviours in childhood. In recent years, substantial efforts have been made to improve the food environment in schools. Stakeholder input is a critical part of planning, implementing, and evaluating health promotion activities in schools. This study aimed to investigate stakeholders' perceptions of factors influencing healthy eating within the school food environment in Dominica, a Caribbean country. Data were collected from eight purposefully selected public primary schools and included interviews and focus groups with key stakeholder groups (principals, teachers, vendors, and government personnel). The results revealed a number of barriers to and facilitators of healthy eating within the school food environment. The stakeholders identified many barriers to healthy

eating: parents and peers (social networks); food available at food outlets (the physical environment); and lack of a national school food policy and socioeconomic issues (the macro-level environment). On the other hand, the stakeholders identified only the school meal program and weekly held fruit days as facilitators to healthy eating. The study highlights the necessity for researchers and policymakers to consider and integrate stakeholders' input in health promotion and education programs.

### **5.3 Introduction**

During the last few decades food systems in general, and dietary behaviours have changed dramatically (Aurino, Fernandes, & Penny, 2017; Vepsäläinen et al., 2015; Verstraeten et al, 2014; Baillie, 2008). For example, Aurino, Fernandes, & Penny (2017) documented dramatic and rapid shifts in diets among two comparable cohorts of adolescents in Ethiopia, India, Peru and Vietnam that took place between 2006 and 2013. Specifically, the results highlighted the cross-cohort changes in consumption of individual food groups where plant-based foods were substituted for animal-based foods. The intake of added sugars also increased across the two cohorts.

In the Caribbean region, food systems and the consumption behaviour of the population are also undergoing significant changes due to decreased and diversified food production and increased marketing and household purchasing power (Jolly et al., 2013; Gaskin et al., 2012; Popkin et al., 2012; Asfaw, 2011; Monteiro, 2009; WHO, 2003). In the last 20 to 30 years, the Caribbean has shifted from being a low- to middle-income region; a change that has affected the nutrition of the population, especially of school-aged children (Henry, 2016). Findings from a recent global school-based student health survey indicated

that 55% of students in most English-speaking Caribbean countries drink carbonated soft drinks one or more times per day (World Health Organization, 2009). High intake of fast food, sugar-based food, and fried food, and low intake of fruits, vegetables, and legumes among Caribbean children have also been reported (Maitland, Malcolm, & Handfield, 2015; Francis, Nichols, & Dalrymple, 2010; Francis et al., 2009).

Despite reports of unhealthy eating habits among Caribbean children, it is believed that children in Dominica are still consuming more traditional than non-traditional foods, which are defined as those foods not used in traditional recipes and/or those that are highly processed (Wall-Bassett et al., 2010). Dominica is a country with a deep agricultural and cultural heritage that has shaped the traditional cuisine, i.e., reliance on local/indigenous foods and minimally processed foods (Maglorie & Prevost, 2000). Nonetheless, as local agricultural production declines and food imports increase (Popkin et al., 2012; Asfaw, 2011; Monteiro, 2009; WHO, 2003), the diet of Dominican children may continue to transition into one with more processed foods, especially within the school food environment, where children have access to multiple snack food outlets during the school day.

An assessment of the types of food sold at these outlets indicated that a variety of commercially prepared and homemade snack foods, many of poor nutritional quality, are available (Study 1). The frequent consumption of unhealthy snacks is associated with unfavourable health outcomes, such as increases in dental caries, childhood obesity, and non-communicable diseases. An estimated 26% of school-going children aged 11-17 are reportedly overweight and 10% are obese (Pengpid & Peltzer, 2014). Evidence suggesting that healthy eating habits are developed in childhood (Schwartz, Scholtens, Lalanne, Weenen, & Nicklaus, 2011) and that children spend much of their waking hours at school

(Black & Day, 2012), indicates that efforts within the school food environment are key in helping to shape healthy eating habits.

A critical step in developing health promotion initiatives at school is to gain an understanding of the food environment from the perspective of stakeholders (persons who help shape the school food environment). School-based programs that engage stakeholders have become increasingly commonplace. Stakeholders include school administrators, school principals, school teachers, government representatives, health care providers (e.g., nutritionists), food providers, parents, and students. Previous studies have demonstrated that stakeholder engagement is essential for the development, implementation, and monitoring of food and nutrition initiatives, as well as for regulating the school food environment (Monterrosa et al., 2015; Vine et al., 2014; Taylor et al., 2011; MacLellan et al., 2010). Stakeholders' perceptions have also been sought to gain insight into the barriers and facilitators to healthy eating (Rathi et al., 2017; Clarke et al., 2013; Goh et al., 2009; Hesketh et al., 2005).

This study sought to gain an in-depth understanding of stakeholder perceptions of the factors influencing healthy eating within the school food environment in Dominica. Gaining insight into stakeholder perceptions is critical for understanding the connection between children's dietary behaviours and the internal and external school food environment and for determining how best to address unhealthy eating. Furthermore, understanding the facilitators and barriers that influence healthy eating can substantially contribute to the regional knowledge pool and help tailor appropriate interventions in existing and future nutrition programs and policies for school-aged children.

## **5.4 Methods**

### **5.4.1 Theoretical Framework**

Story, Kaphingst, Robinson-O'Brien, and Glanz, (2008) have proposed a useful ecological framework for achieving a better understanding of the multiple factors that collectively or independently impact dietary behaviours, such as those of school children. The framework illustrates that an individual's eating behaviour is influenced by personal factors (preferences, skills, and age), the social environment (family, friends, and peers), the physical environment (access, availability, barriers, and opportunities at school and/or home), and macro-level sectors (societal and cultural norms and values, the food and beverage industry, food and agriculture policies, food assistance programs, and government and political structures and policies). This study was underpinned by Story et al.'s ecological framework, which was used to identify different stakeholders as potential participants for the study and as a guide to organize the results, i.e., the facilitators and barriers to healthy eating. The framework was also used to determine the level of influence at which engaged stakeholders operated.

### **5.4.2 Study Design and Data Sources**

A qualitative research design was used to explore stakeholders' perceptions of the factors influencing healthy eating within the school food environment in Dominica. Data were collected through interviews and focus group discussions. Specifically, the study included individual interviews with school principals, focus groups with school teachers, individual interviews with vendors, and individual interviews with key personnel from government ministries of health and education.



### **5.4.3 Participant Sampling and Recruitment**

Purposive sampling allows for the selection of information-rich cases centred on the issue being examined (Russell & Gregory, 2003; Patton 2005). In other words, the researcher determines what needs to be explored and seeks to select participants who can and are willing to give in-depth insights by virtue of knowledge or experience (Bernard, 2002). Purposive sampling was used to select eight public primary schools to participate in the study, following a series of planning meetings with stakeholders from the Ministry of Education and a brief telephone survey among school principals to determine children's options for eating while at school (n=41). The intent was not to achieve a representative sample, but rather to select schools that would help in gaining an in-depth understanding of factors influencing healthy eating within the school food environment. Thus, the schools selected were those that were identified as having a variety of eating options (e.g., school meal programs, a tuck shop, and vendors) (Table 5-1). A letter outlining the study protocols and an invitation to participate was sent to eight school principals. The Chief Education Officer helped to facilitate the process (Appendix A). At four out of the eight schools, a subset of teachers (7 teachers per school) were chosen to participate in four focus group discussions. The goal was to select teacher to represent each grade in the school so that they could give insight that would reflect all age groups in the school. The principals assisted in selecting teachers. The participants of three of these focus groups comprised female teachers only, while those in the remaining focus group comprised one male and six female teachers. As well, all vendors who operated on or near school property were invited to participate in the study. Twelve vendors were approached, but oral consent was received from only eight. Study protocols were discussed with them at the time they were approached. At the ministry

level, five participants were selected by snowball sampling. The study selection of stakeholders was in line with previous research that recommends a minimum of five persons per stakeholder group (Patton, 2005; Sandelowski, 1995).

#### **5.4.4 Data Collection**

Interview guides with open-ended questions were used to guide data collection with the principals (Appendix B), teachers (Appendix G), and ministry personnel (Appendix F). The major themes explored in the interviews and focus groups included factors influencing healthy eating, regulations for food provision, factors influencing types of food sold, challenges associated with food provision, and approaches to address unhealthy eating. To facilitate the interview process with the vendors, an interviewer administered questionnaire with a combination of close-ended (primarily) and open-ended questions was used. The approach of using an interviewer-administered questionnaire to guide data collection among vendors was based on findings from previous studies (Goetz & Wolstein, 2007; Food and Agriculture Organization & Sokoine University, 2006). When questionnaires are completed by the participants or self-administered, low literacy skills can affect participation. On the other hand, when an interviewer administers a questionnaire to participants, this encourages a higher participation among vendors with low literacy skills as their only requirement would be to respond to the questions posed by the interviewer. All data collection tools were developed in collaboration with supervisor, Dr. Henry and advisory committee member, Dr. Ramdath who worked extensively on the development of the data collection tools. The content was informed by the study's research objectives and a review of the literature. To obtain the face validity of the tools, they were reviewed by two researchers/nutritionists in

Dominica prior to data collection. Data collection followed an emergent design that allowed for the constant revision of interview guides, based on what was learned from earlier parts of the study.

Data for this study were collected from November 2014 to July, 2015. The proceedings were audio-recorded with permission from the participants. Since vendors declined to give permission for audio recordings, jottings were taken by the researcher during the interviews with the vendors. At the end of the proceedings, the audio was replayed to all the participants to review, at which point they were also invited to provide additional comments or clarification if desired. In the interviews with vendors, the review process was also conducted during the survey, with the researcher reading over the responses aloud for the participants. The study was approved by the Behavioural Research Ethics Board of the University of Saskatchewan and the Ministry of Education Sports and Youth Affairs, Dominica.

#### **5.4.5 Data Analysis**

Given that data collection followed an emergent approach, audio recordings from interviews and focus group discussions were transcribed verbatim and were analyzed as they were collected, facilitating the revision of ongoing data collection (Pope, Ziebland, & Mays, 2000). Data analysis initially followed an inductive approach, where the transcripts were read several times, first to get familiar with the data and then to code the data. Memos in the form of short phrases, ideas or concepts on the general themes arising from the transcripts were written during the data coding process. The next stage of analysis involved sorting out quotes, lifting quotes from the original transcript, and re-arranging them under the appropriate thematic codes. The emergent thematic framework was reviewed through an

iterative process, and a deductive approach was initiated to fit and test the themes within the constructs of the ecological framework: individual dimensions, social dimensions, the physical environment, and the macro-level environment. To ensure that they corresponded to the identified construct, the quotes within each theme were re-examined by two independent researchers.

## 5.5 Results

Details on the stakeholders at the school level who participated in the study and school characteristics are shown **Error! Reference source not found..** School principals from eight schools shared the perceptions of the school food environment. Focus groups were conducted with school teachers from four of the eight schools. Similarly, the vendors who operated at four out the eight schools were interviewed. In addition to the stakeholders at the school level, stakeholders within government ministries of both education and health (n=5) shared their perception of the school food environment.

Table 5-1. Stakeholders at participating schools, geographic location and food outlets			
School	Participants	Location	Food Access
A	Principal (n=1) Vendors (n=1) Teacher (n=6)	South	School meal program, tuck shop, and vendors
B	Principal (n=1)	South	School meal program, tuck shop, and shops
C	Principal (n=1) Vendors (n=4) Teachers (n=8)	South West	School meal program, tuck shop, vendors and shops
D	Principal (n=1) Vendors (n=1)	West	School meal program, tuck shop, and vendors
E	Principal (n=1)	West	School meal program, tuck shop, and shops,
F	Principal (n=1)	West	School meal program, tuck shop, and shops
G	Principal (n=1) Vendors (n=2) Teachers (n=7)	North West	Tuck shop, vendors, and shops
H	Principal (n=1) Teachers (n=6)	North	School meal program, tuck shop, and vendors

### **5.5.1 Factors Influencing Healthy Eating within the School Food Environment**

Participants' perceptions of the factors influencing healthy eating within the school food environment are organized according to the three levels of influence: social environment, physical environment, and macro-level environment. The individual level is not presented as it was discussed in the context of the broader themes. The subthemes that emerged within each level of influence are presented below. Table 5-2, summarizes the themes and presents exemplary quotes from participants.

#### ***5.5.1.1 Social Environment***

*Parents' influence.* Participants expressed that parents influence the types of snack food students consume at school (Table 5-2). They explained that parents act as a barrier to healthy eating behaviours among children as it is common practice for parents to provide children with unhealthy school snacks, such as sodas, corn curls, and sweet biscuits. Several participants suggested that convenience may be the parents' reason for providing unhealthy snacks, especially parents of a low socioeconomic status and those simply lacking the time in the morning to prepare a healthier option.

*Peer pressure.* According to the teachers, the types of foods eaten by children at school are influenced by their peers to some extent (Table 5-2). In three of the four focus groups, teachers were in agreement that healthy eating is seen as socially unacceptable and that children who eat healthier may be mocked by peers. Therefore, in order to identify with their peers and avoid being ridiculed, children choose unhealthy snacks. The teachers also

indicated that children purchase unhealthy foods when their peers, often friends, purchase unhealthy snack foods.

#### ***5.5.1.2 Physical Environment***

*School meal program.* The school meal program at some schools (Table 5-2) was identified as one of the most important facilitators of healthy eating within the school food environment. The school meal program is sponsored by the government and provides a lunch meal to students. Participants (teachers, principals, and policy level stakeholders) indicated that, in comparison to other food outlets available within the school food environment, the program generally provides healthy food. Examples of food items served for lunch include pumpkin soup, rice, root crops such as sweet potato, stewed lentil or red bean, and stewed chicken or fish.

Despite serving generally healthy food, the school meal program is not without problems. A small group of respondents pointed out that concerns about quality and lack of food supply restrict the operation of the school meal program. For example, policy level stakeholder #1 indicated that the school receives “a lot of complaints about the quality of the meals.” The stakeholder went on to say that “a lot of white flour for dumplings” is used when “our local indigenous ground provisions” would be a healthier choice. The stakeholder added that the feedback suggests “that some of [the food is] not up to the nutritive value and up to standard.” In commenting on the problems with the school meal program, school principal #4 indicated that “[at times] you cannot use a menu ... the menu say[s] to provide fish, but we haven’t gotten any fish so we [make] do with what we have and try to make it as healthy.”

Thus, in spite of the best efforts of those who run the school meal programs, the food could be better and healthier.

*Fruit days.* Another facilitator of healthy eating identified by teachers and principals of all the participating schools is a program called “fruit days” (Table 5-2). This was described as an initiative geared at encouraging healthy eating, i.e., through specific days on which children are encouraged to consume fruits, and the availability of unhealthy snacks sold and consumed is restricted. Fruit days are held weekly, mostly on Fridays. On fruit days, children are encouraged to bring fruit from their home as a snack option, and vendors are also encouraged to make fruit available for sale. However, in spite of its initial popularity, the initiative has faced many challenges and has lost support over time. Some of the challenges identified include the decline in the availability of local fruit, the high cost of fruit, ridicule and peer pressure associated with fruit consumption among children, lack of adherence by older children, and lack of consistent enforcement by the schools.

*Unhealthy snack foods available at food outlets.* A variety of descriptors were used to describe what participants consider to be unhealthy food, including phrases such as, “junk food,” “artificial foods,” “sweets,” “high sugar,” “high salt,” “food with lots of food coloring, chips, and corn curls,” and “processed foods like biscuits, corn curls, and cheese curls,” and “fried foods like the bakes and cakes.” Teachers, principals, and other participants at the policy level indicated that vendors sell predominantly unhealthy snacks, and these retail outlets are a significant barrier to healthy eating among students (Table 5-2). Participants also highlighted the role this pervasive access to unhealthy foods plays in undermining the school’s effort in facilitating access to healthy food.

At some of the participating schools, students have pervasive access to vendors who sell a variety of both commercially prepared and homemade snacks and beverages, most of which contain large amounts of salt, fat, and/or sugar. Examples include fried bakes, extruded snacks (corn curls, cheese sticks, and chips), sweet biscuits, chocolate bars, candy, cakes, sodas, and homemade fruit juices. Vendors are permitted to operate either directly outside or within school gates and typically sell from tables or from permanent facilities such as concrete or wooden stalls. Three out of the eight vendors interviewed indicated that they operate during snack breaks only, while the other five operate during both snack and lunch breaks.

Participants at the policy level emphasised that both tuck shops and vendors are barriers to healthy eating. They suggested that both outlets typically sell the same types of foods; the snack foods sold at the school tuck shop are as unhealthy as those sold by vendors.

*Food sold as a fundraising and profit making opportunity.* According to the school principals, the sale of food during snack breaks represents a significant fundraising opportunity for schools to purchase essential supplies such as chalk, books, pencils, and toiletries. The principals also indicated that the need to raise funds largely influences the types of food made available for purchase. In other words, to profit from food sales, they feel obliged to provide food that students prefer and that sells quickly. Often these foods are high in salt, fat and/or sugar. Some of the principals shared their desire to provide healthier food items to students at the school tuck shop; however, they also indicated that the need to raise funds prevails over considerations for providing healthier food (Table 5-2). The relationship between fundraising and the nutritional quality of food being sold at schools was also highlighted by stakeholders at the policy level.



Since the sale of food is also a source of livelihood for vendors, they too sell the types of snack items that children prefer, typically unhealthy ones, in order to profit from sales. When asked why they choose to sell near schools as opposed to in other locations, all the vendors indicated that schools are more profitable than other locations. Their days of operation range from three to five days a week. Much like the school principals, the vendors indicated that if health considerations were considered in the choice of food they sell, sales would be affected.

#### ***5.5.1.3 Macro-Level Environment***

*Lack of national food policy.* At the time of data collection, many participants indicated that government policies regulating food sold are lacking. Nonetheless, they disclosed that a national school food policy was being developed and that representatives from the Ministries of Health and Education had conducted cluster meetings with stakeholders, such as school principals, teachers, and vendors at various schools around the island (Table 5-2). Participants were particularly concerned that the lack of a national policy had contributed directly to the sale and consumption of unhealthy snacks. Also strongly expressed was the view that the lack of policies had indirectly contributed to a variety of nutrition-related health outcomes observed among children. Childhood obesity, dental caries, and hyperactivity were identified as some unfavorable physiological effects observed among frequent consumers of snack foods sold at school. A few principals indicated that despite the absence of a national school food policy, individual schools try to guide what students eat. Several approaches were described: attempts at prohibiting children from purchasing

food from the vendors, banning the sale of soda at school, encouraging parents to provide students with healthy snacks, and holding fruit days, as previously described.

The interview question assessing vendors' awareness of policies to regulate the types of food sold at school generated a variety of responses. In most cases, the vendors asked the researcher to further clarify the meaning of the word policy; therefore, probes such as "rules, laws, guidelines or statements from the school or government indicating what should or should not be sold" were used to explain the term. Three vendors indicated that they were not aware of any policy to regulate the types of food sold. However, two vendors indicated that they are prohibited from selling alcohol, while three vendors commented that the only policy that they were aware of relates to the prohibition of the sale of ice pop for food safety reasons. Ice pop is a homemade frozen snack prepared by freezing fruit juices or artificial drinks such as Kool-Aid in small plastic bags.

Table 5-2. Exemplary quotes from participants to illustrate the themes for the perceived factors affecting healthy eating within the school food environment

Themes	Quotes
<i>Physical Environment</i>	
School meal program	The school feeding program sells healthy food. (Focus Group #3) Some schools have school feeding programs and in those situations they tend to be healthy because some form of guidance, not because of any legislation but more because of consciousness and awareness. (Policy level stakeholder #3)
Fruit days	So we have a fruit day where we teach them that they should eat more fruits than those sweet things, corn curls and those sorts of things. So we try to instill in them that these fruits and vegetables are better than the corn curls and the junk food that they buy in the shop. (School principal #8) We had a fruit day that was working well at one point but now it seems that only grade K does it because it's in them; they have been doing it from preschool. (Focus group #3)
Unhealthy snack foods available at food outlets	The children would leave the healthy food and go for the junk. We provide healthy food when we sell but students are exposed to food sold by vendors on days we don't sell. (School principal #5) I'm aware that the school itself is an outlet, a guilty one too because they

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Food is sold as a fundraising and profit making opportunity	<p>are the ones who provide the high fat and sugar beverages that are laden with sugar. (Policy level stakeholder #1)</p> <p>We want to make a profit, the profitability, and at the same time demand because we can say we will make this because the children like that and when we have this it sells faster. (School principal #7)</p> <p>It's a difficult thing, if you have to take health, we wouldn't sell anything. (Vendor #2)</p> <p>For both the school and the vendors it is an economic thing I don't think nutrition is the first factor they consider. I think they are considering providing something for the children to eat and making some money. (Policy level stakeholder #1)</p>
Parents	<p><i><u>Social Influence</u></i></p> <p>Snacks that the parents provide to children like corn curls and the chubby are unhealthy. (Focus group #2)</p>
Peers	<p>I can see them right in my eye at the supermarket. The parents buy biscuits in bulk to give to the children for snacks. (Policy level stakeholder #2)</p> <p>Some of the students come with very healthy foods and then dump it in the bin and choose the unhealthy one. Especially when they see other students buying it they are influenced by what they see. To them they think a lollipop is better than something that is healthier. (Focus group #1)</p> <p>The other children might condemn the healthy food that some are bringing and make fun of them. (Focus group #2)</p>
Lack of national food policy	<p><i><u>Macro-level Environment</u></i></p> <p>I don't think from a ministry point of view, one is available because I would have preferred to have one. I like standard things. I believe in standards. Vending in schools...these are the 1, 2, 3, 4. Just like the education act. You have an act or a policy for vending at primary schools instead of each school having to do its own thing. That reinvents the wheel. (School principal #3)</p> <p>We have a draft school nutrition policy and it's still in the draft stage. We have conducted a number of consultations which is something we are doing jointly with the ministry of health, so it's not yet an approved policy but it speaks to everything that we would want to do with regards to school nutrition and vending in our schools. (Policy level stakeholder #4)</p> <p>I am not too happy with the sweets that the vendors sell, too many sweets. That's why I would like the ministry to reinforce that so that all vendors will know that you cannot bring the sweets for the children. (School principal #4)</p>

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### 5.5.2 Stakeholders' Recommendations for Improving Healthy Eating

Very little variation was observed in participants' perceptions of approaches to address the most significant problem identified: the pervasive access to and availability of

unhealthy food. Teachers, principals, and policy level stakeholders all indicated that the implementation of government policy would have a great impact on limiting the availability of unhealthy food.

*I would first want to say let us deal with the policy, let it get approval, get the legislation going it would take a little while, but if we have the regulations then we can now go to the public, we can go to the schools and say these are the standards that we will accept at our school and nothing more. And therefore the policy will speak to the quality of the juices, the quality of the beverages, the quality of the snacks, what we want in the school meals. (Policy level stakeholder #1)*

*Well a policy would be a great idea because the children would be more aware of what they eat. And if the school environment is providing healthy meals then they children will have no choice but to eat it, especially if they regulate what the vendors bringing then the children will have no choice they have to eat what they get and that's the healthy things around the school. (Focus Group #1)*

Participants expanded their opinion by stating that the policy should make provisions for the following: delineating what snacks are healthy and unhealthy or allowed or not allowed; educating and training vendors; regulating food brought from home; and improving the role that the Ministry of Agriculture can play in increasing access to fruit on fruit days and improving food supplies for the school meal program.

*They need supporting resources in terms of what's allowed and what's not allowed. Because the standards are written in nutritional terms, they have to be translated into very practical things. (Policy level stakeholder # 5)*

*In the process of having the meeting with the vendors, probably we need someone from the health department with a film or something with a list of healthy and unhealthy food, something educational. (Focus Group # 1)*

Vendors also identified training, nutrition education, and capital (financial assistance) as some of their needs for improving the nutritional quality of what they sell.

A few stakeholders expressed that regulations are required, primarily from the government, but they also indicated that the schools should play a role in regulating their environment in the absence of a national policy.

*And I think as a school we should demand authority, have a list of foods that we don't want at our school and should not be allowed at our school compound. (Focus group #2).*

The level of compliance expected, especially from vendors, once the new policy is implemented was discussed by some participants. Vendors believed that they are obligated to comply with government regulations since non-compliance could result in the loss of an opportunity to sell at the school and earn an income. According to participants, once the policy is implemented, compliance with these regulations may not be a challenge as food providers have complied with food safety regulations in the past. Anecdotal evidence was given by one of the teachers of vendor compliance in the past.

*I don't think it would be a problem. You remember ice pops when they came up with that policy that you should not sell tied ice pops to the children. No one said anything. They abided. (Focus group #1)*

Some teachers shared that, once implemented, the policy may initially negatively affect the children, as they may be unwilling to consume healthy foods.

*Some kids will stay hungry because they eat what they want to eat. (Focus Group #2)*

However, the teachers were also convinced that, with time, the children would adjust.

*I think their eating habits will change if we provide healthier meals for them. One thing I have noticed is that students will buy what is available. If we provide healthy food and they have no other choice they will buy it. (Focus Group #2)*

One stakeholder at the policy level indicated that concern was expressed by school principals during the policy development cluster meetings [conducted by policy makers at various schools] because the new policy calls for a ban on sweetened beverages, particularly sodas, which are a source of revenue for schools. According to this participant, at the meetings, principals voiced that, if this ban went into effect, it would cut down on their revenue and would mean that the ministry would have to increase their budgetary allocation to school.

## **5.6 Discussion**

This study explored stakeholders' perceptions of the factors influencing healthy eating within the school food environment in Dominica. Most of the factors identified were barriers to healthy eating, while limited facilitators of healthy eating were identified. Stakeholders' perceptions of the barriers to healthy eating included food available at food outlets (the physical environment), parents and peers (social networks), and the lack of a national school food policy (the macro-level environment). The school meal program and weekly held fruit days were the only facilitators to healthy eating identified. Similar barriers and facilitators of healthy eating among children were reported in systematic reviews on factors influencing children's eating (Shepherd et al., 2006; Taylor, Evers, & McKenna, 2005). Despite improvements in the school food environment reported in some jurisdictions (Welker et al., 2016), the current study suggests that there is much room for improving opportunities for healthy eating in Dominican schools. The discussion that follows addresses the most salient barriers and facilitators.

The school meal program, part of the physical environment, which provides a lunch meal to students, was described as one of the few facilitators of healthy eating within the school food environment. Previous research on the school meal program in Dominica also

highlighted its role in enabling the consumption of traditional, healthier food (Wall-Bassett et al., 2010). This perception is also consistent with reports from other middle-income countries, like Trinidad and Tobago (Henry, Ramdath, White, & Mangroo, 2013) and Brazil (Azeredo et al., 2016). Similarly, in the US, the National School Lunch program has been identified as a primary source of nutritious food for children (Welker et al., 2016). Much like in Dominica, school meal programs in other developing countries face several challenges, including cost effectiveness, food procurement in light of the decline in agricultural production, and sustainability; nonetheless, these programs are known to positively impact children's health (Jomaa, McDonnell, & Probart, 2011). Given the significance of the school meal program in the diets of children, efforts are needed in Dominica to mitigate these challenges. Moreover, greater attention needs to be paid to sustaining and increasing participation in the school meal program, as well as expanding the program to other meal periods at school, i.e., breakfast and snack break. Such improvement efforts may have the potential to stabilize current unfavourable dietary shifts, i.e., from more traditional to processed food. Given Dominica's agricultural heritage, it is worth patterning Dominica's program on Japan's school lunch program, which incorporates locally available foods from known producers as much as possible and has had a positive impact on children's diet quality (Kaneda & Yamamoto, 2015; Tanaka & Miyoshi, 2012). More importantly, the Japanese program, which is both an educational activity and an eating opportunity, engages children in lunch preparation and service.

Another significant theme that emerged as a barrier within the context of the physical environment was the pervasive access and availability of unhealthy food at snack retail outlets within the school food environment: school tuck shops and vendors. Tuck shops and

vendors are two significant sources of snack food for children in Dominica, and as in other countries where they exist, they are criticized for the variety of unhealthy items they typically sell (Nortje et al., 2017; Azeredo et al., 2016; Pehlke et al., 2016; Moodley et al., 2015; Marraccini et al., 2012; Wiles, Green, & Veldman, 2011). These food outlets are perceived to have a high appeal to children and undermine the efforts of school meal programs. In other jurisdictions, a number of initiatives have targeted vendors and tuck shops to improve the availability of healthy food (Pehlke et al., 2016; Marraccini et al., 2012; Tester et al., 2012). For example, fruit vendors (fruteros) were positioned at the entrance of schools in Oakland, California to sell fruits and vegetables, which resulted in decreased sales at vendors selling less healthy items and increased access to healthy food (Tester et al., 2012). As the California study indicates, modification of the school food environment can encourage healthy eating behaviours among children.

The current study demonstrated that the sale of snack food as a fundraiser for schools and as an income generator for vendors influences the types of foods sold at school, and this, in turn, is influenced by the food preferences of children. It is well known that children prefer foods with high sugar, salt, and fat content (Hoffman, Salgado, Dresler, Faller, & Bartlett, 2016). Not surprisingly, food providers offer foods that align with children's food preferences to generate sales and profits. Other studies have confirmed that quite often food outlets in and around schools are operated primarily for profit (Marraccini et al., 2012; Drummond & Sheppard, 2011; Carter & Swinburn, 2004), highlighting the competing priorities of low-resourced schools where profit generation is seen as a higher priority than fostering a healthy school food environment. The challenge for schools and vendors in stocking healthier items such as fruit and milk beverages is that they are generally in low



demand, are more costly than unhealthy food items, and exceed the buying power of children. In light of the high cost of healthier food items, elements in the macro-level environment such as government, food and agricultural policies, and food assistance programs may have a role to play in subsidizing the cost of healthy food. Additionally, given children's preferences for unhealthy snacks, schools can also benefit from initiatives to introduce children to new, healthier food. These initiatives include cooking programs, taste testing, and gardening programs.

Stakeholders indicated that the types of food children consume at school are often influenced by their parents and peers, both significant actors in an individual's social environment. An existing body of literature provides evidence that parents play a vital role in moulding their children's dietary behaviours (Larson et al., 2017; Faight, Vander Ploeg, Chu, Storey, & Veugelers, 2016; Patrick & Nicklas, 2005; Vereecken, Keukelier, & Maes, 2004). Participants in the current study described the pathways through which parents exert influence, i.e., through the provision of prepackaged, unhealthy snacks to take to school and as a means of convenience when they simply lack time to prepare a healthier snack option. However, another study reported that the commonly cited lack of time is confounded by other reasons such as family preferences, low parental cooking self-efficacy, and poor meal planning ability (Horning, Fulkerson, Friend, & Story, 2017). Children themselves also have a significant role to play in the types of food that their parents purchase as school snacks. For example, Calderon et al. (2017) examined what happened when parents and children go grocery shopping and found that children influence purchases through their own attempts and by parent invitation, and that child involvement in shopping is associated with more products purchased at the child's request. These findings suggest that nutrition education and other

hands-on activities, such as grocery store tours and cooking and meal planning classes, can build the capacity of parents, as well as children, to make more informed decisions about food selection and preparation.

The overarching theme of this study is the absence of a national school food (nutrition) policy, an element within the macro-level environment. This theme was emphasized by teachers, school principals, and key stakeholders within government ministries. Not only did this issue emerge as a barrier to healthy eating, but stakeholders saw policy implementation as a powerful strategy to regulate the food environment and encourage consumption of healthier food. In this study, policy action was discussed primarily as guidelines to delineate food that is permitted (healthy) and forbidden (unhealthy) within the school food environment. Generally, policy actions within the school food environment may include setting food- or nutrient-based standards, restricting specific types of foods, and/or making specific foods more readily available (Hawkes, 2013). Other studies have demonstrated that school food policies, once implemented, have a positive effect on healthy food access and availability within the school food environment and children's dietary behaviours (Welker et al., 2016; Driessen et al., 2014; Mullally et al., 2010). Despite their well-documented impact, school food policies have been criticized for their slow progress on modifying the school food environment (Turner & Chaloupka, 2012), their tendency to relate only to school meal programs and in-school food outlets while ignoring food outlets around schools (Chriqui et al., 2014; Hawkes, 2013; Carter & Swinburn, 2004), and the lack of monitoring and evaluation after implementation (Racey et al., 2016). The US has demonstrated continuous monitoring and improvements in school food policies to ensure that

the school food environment can positively influence children's diets (Welker et al., 2016; Hirschman & Chriqui, 2013).

It is important to note that at the time of data collection, the relevant authorities in Dominica had drafted a school nutrition policy with the overall goal of providing a school environment that enhances learning and develops healthy lifelong eating and activity behaviours. The policy intends to enhance healthy eating habits through recommended strategies and actions in four areas: (1) the school curriculum; (2) the food service environment (school meal programs, cafeterias/canteens, vending machines, tuck shops, food brought to school by students, and food sold by vendors); (3) school health services and nutrition services; and (4) parent and community involvement. Snacks and beverages served as part of the school meal program or sold by vendors on or around school compounds will be required to meet nutritional standards consistent with the national food-based dietary guidelines (Ministry of Health and the Ministry of Education, Dominica, Caribbean Food and Nutrition Institute, 2013). To date (March, 2019) the policy has not been implemented.

The study had several strengths. First, it engaged a wide range of stakeholders: policy makers, teachers and principals who work closely with students, are considered leaders in their respective communities, and are knowledgeable about factors that may influence children's eating behaviours. Researchers such as Monterrosa et al. (2015), Middleton et al. (2014), and Clarke, Fletcher, Lancashire, Pallan, and Adab (2013) argue that collaboration and consensus among stakeholders are key to the success and efficiency of health /nutrition programs. Patton (2005) contends that every person who has a "stake" in a program at any level has a vested interest and therefore should be considered as potential stakeholder, including policy makers, advisors, and those who are beneficiaries of the program,

particularly school-aged children. Greene (2006) advises that stakeholders can play a variety of roles in program planning, implementation, and evaluation. A second strength of the study is the use of a socioecological framework to understand stakeholders' perceptions of the school food environment, particularly the barriers and facilitators of healthy eating among children. Research suggests that health promotion initiatives geared towards improving healthy eating have a greater impact when they address multilevel factors (Stark, Devine, & Dollahite, 2017; Townsend & Foster, 2013; Story et al., 2008). A framework helps isolate and organize these factors.

The study also had limitations. One of these was that relevant stakeholders such as students and parents were not interviewed due to time constraints. The study recognizes the critical role that parents and students play as drivers of nutritional habits. Even though parents may consume different foods from their children, parents do control the choices offered to children (e.g., lunches packed and monies provided to purchase snacks), portion sizes, and role modeling of eating behaviours.

## **5.7 Conclusion**

The results of this study suggest that, based on the perception of stakeholders, a number of factors influence healthy eating within the school food environment in Dominica. The application of the socioecological model was useful as a theoretical framework to understand the factors operating at various levels of influence, thus, highlighting the complexity of and interdependence among factors that influence healthy eating among children. Although increasing access to healthier food and beverage choices may not be sufficient to change children's eating behaviour, desirable effects may be achieved when combined with policies

to restrict the availability of less healthy foods in schools. Since children's preferences influence the food available at school and in the vicinity, these results highlight the crucial role food vending in and around schools can play in helping children to establish healthy eating behaviors. For health promotion in schools to be effective, a comprehensive approach should be adopted that considers the factors influencing healthy eating on all levels represented within the ecological framework. Just as critical, however, is the implementation of an effective food policy and health education for school children.

## **CHAPTER 6 STUDY 3 - SCHOOL CHILDREN AS AGENTS OF CHANGE IN CREATING HEALTHY FOODS OPTIONS TO PROMOTE A HEALTHY SCHOOL FOOD ENVIRONMENT**

### **6.1 Preface**

Chapter 6 corresponds to research question #3: How effective is a recipe contest in providing children with opportunities to be agents of change within their school food environment? This study takes a case study approach to describe the process and outcomes of a recipe contest called “the healthy bakes challenge”, aimed at engaging children as agents of change in creating healthy foods options to promote a healthy school food environment. The introduction describes the rationale for conducting the study and provides some background literature. This is followed by description of the process and outcomes of the recipe contest. Then a discussion of the lessons learnt follows.

### **6.2 Abstract**

Access and availability of low-nutrient, energy-dense foods within the school food environment schools have been associated with obesity-related outcomes such as dietary intake (increased SSB, fat and low FV) and BMI. Changes in the quality of food sold in and around school are needed. The value of engaging children as agents of change in promoting a healthy school food environment has not been fully recognized. This case study describes process of using a recipe contest called, “the healthy bakes challenge” to engage children as agents of change in creating healthy foods options to promote a healthy school food environment. The contest focused on bakes, the mostly commonly consumed food item within the school food environment in Dominica. Students representing five different schools were challenged to modify the traditional recipe for bakes in order to improve its

healthfulness. Data sources included documentation of process and outcomes of the recipe contest, expert opinion, observations, and background literature on the utilization of recipe contest. The case study showed that, in an effort to improve the nutritional value of bakes, all schools reformulated the traditional recipe for bakes, adding or replacing ingredients perceived as healthy, rather than altering the traditional deep-fat frying cooking method. The study discusses the challenges of the recipe contest and three ways that a recipe contest can be used to promote a healthy school food environment.

### **6.3 Introduction**

The inclusion of children in issues affecting them is a right elucidated in Article 12 of the United Nations Convention of the Rights of the Child (Miller, 2008). However, school-based interventions to improve knowledge, purchasing and health outcomes (dietary intake and BMI) still hinge on the child as an object, broadly shaped by the social and/or physical environment. More approaches engaging children as agents of change or active subjects are required (Griebler, Rojatz, Simovska, & Forster, 2017; Hunleth, 2011; Onyango-Ouma, Aagaard-Hansen & Jensen, 2005; Christensen, 2004). Agents of change can be described as individuals who make things happen in different social environments and are capable of manipulating resources and engaging with health knowledge and skills; in other words, these agents are not merely passive recipients of other people's care and interventions (Hunleth, 2011; Onyango-Ouma, Aagaard-Hansen & Jensen, 2005).

A growing body of research explores children as agents of change in health promotion. In Africa, children have been engaged as agents of change for health promotion in sanitation and hygiene (Bresee, Caruso, Sales, Lupele, & Freeman, 2016; Simovska, &

Carlsson, 2012; Mwanga, Jensen, Magnussen, & Aagaard-Hansen, 2007; Onyango-Ouma, Aagaard-Hansen, & Jensen, 2005). These studies have mostly focused on knowledge dissemination in schools and homes, and the participants have ranged from 8-19 years of age. Children's influence on cooking and food selection has also been demonstrated in the US and in the UK (Calderon et al., 2017; Ensaff, Canavon, Crawford, & Barker, 2015). Nonetheless, to date little research has focused on the active engagement of children in creating healthy foods options to promote a healthy school food environment.

A recipe contest is an underexplored strategy in health promotion and intervention research; however, it holds much promise for engaging children as agents of change. Although limited, existing studies on recipe contests have underscored the value of this innovation. For example, recipe contests can facilitate opportunities to increase knowledge and consumption of traditional, healthier foods (Roche, Ambato, Sarsoza, & Kuhnlein, 2017; Shukla, Barkman, & Patel, 2017; Pardee RAND Graduate School, n.d.; Singh & Singh, 2013; Singh, Rallen, & Padung, 2013; Shukla, 2009). Improving knowledge and consumption of healthy food is integral to promoting a healthy school food environment. A recipe contest can be used to engage children as agents of change as it can provide them with opportunities to increase their knowledge of traditional foods, demonstrate their culinary creativity or skills, and influence access to and consumption of healthy food within the school environment.

In Dominica, the rising rate of childhood overweight and obesity is a public health concern, and the school food environment has been identified as a significant contributor to this problem. Recent studies of the school food environment in Dominica (Studies 1 and 2) found that a variety of commercially prepared and homemade, low-nutrient, energy-dense, sugar- sweetened and/or salty snacks are sold from food outlets inside and around primary



schools. These studies found that bakes, flour-based flat bread prepared by deep-fat frying, are the most popular snack food sold in the school environment. Moreover, a consumption survey among students demonstrated that 20% of the students who ate bakes during the last month consumed them almost daily. Frequent consumption of food items like bakes, which are prepared by deep-fat frying, can significantly impact children's nutritional status and pose a risk for overweight and obesity. Because bakes are prepared by deep-fat frying, they are high in fat. Reducing the fat content of foods in school is a goal that any governments strive to achieve (Micha et al., 2018; Hawkes, 2013) including Caribbean Governments (Samuels, Kirton, & Guebert, 2014; Samuels & Hospedales, 2011). Exploring "healthy bakes" through a recipe contest seemed like a worthy endeavour to contribute to efforts geared at creating healthy foods options within the school food environment. The contest was based on the assumption that if children are successful in generating healthy, well-liked bakes, these bakes could be offered for sale by food providers within the school food environment.

#### **6.4 Research Methods**

This case study describes the process and outcomes of using a recipe contest to engage children as agents of change in creating healthy foods options to promote a healthy school food environment. Yin (2009) defines the case study research method as an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used.

## **Community buy-in**

The first stage of this study could be described as a ‘community-buy-in’ phase in which members of the research team partnered with community stakeholders to jointly design the recipe contest. Henry, Ramdath, White and Mangroo (2013) found this stage of the research to be beneficial in improving communication and ensuring saliency and sustainability.

The contest was planned and executed with the collaboration of two members of the research team and stakeholders in Dominica (nutritionists, the Coordinator of the School Feeding Program, and the Director of the National 4H Club). The National 4H Club has a long tradition of hosting an annual cooking competition called the “President’s Dinner Plate” amongst secondary schools. 4H is a non-formal educational program. The learning experiences in 4-H are designed to help youth apply what they learn to real life. The participants set goals, build confidence, learn responsibility and make decisions. The 4-H philosophy is "learn by doing". Through the projects that youth select, they develop the skills that help them develop their potential, and succeed in life (<http://youthdivision.gov.dm/programmes/4-h-programme>).

We had decided to focus on bakes because their popularity among children made them a promising vehicle for improving and promoting positive dietary change in the school food environment. The contest was named ‘healthy bakes challenge’ to acknowledge that creating a healthy bake may be a challenge for children, considering factors such as age, nutrition knowledge, and food preference. We chose not to use the word “contest” as members of the planning team indicated that a contest suggests a competitive event and that

children's past experiences with contests may discourage collaboration and information-sharing, thus promoting an anti-social environment during the event.

### **Sample**

A decision was made to channel the contest through the National 4H Club, which is an established organisation experienced in hosting such events. 4H clubs are present in primary and secondary schools; however, the competition was organized for secondary schools (ages 12-18) due to their history with similar contests, the students' level of maturity, and their relatively advanced cooking skills. An invitation to participate in the contest, including guidelines for participation and criteria for evaluation, was sent out to the nine secondary school 4H clubs through the director of the 4H (Appendix H). Schools were required to select two to three students to participate (cook) on the day of the contest; however, the recipe suggestions were expected to be a school-wide effort among students. All this information was described in detail to the 4H leader (a teacher) of each participating school via telephone. Five schools indicated interest in participating: Dominica Grammar School, Goodwill Secondary School, Castle Bruce Secondary School, Isaiah Thomas Secondary School, and St. Mary's Academy. On the day of the event, a convenience sample of 29 students at the event was selected by the 4H director for evaluating the bakes.

### **Instructions to participating schools**

As part of the guidelines for participation, the schools were given the freedom to decide on the recipe and the elements of a "healthy bake" (Appendix H). Instructions were to *"reformulate the bakes utilizing as many local food/ingredients as possible and/or alter the*

*method of preparation, all in an effort to develop healthier bakes.”* The criteria for evaluation included nutrition standards; in particular, they considered how well the bakes reflected elements of the food-based dietary guidelines for Dominica. To facilitate purchase of the ingredients, each participating school submitted recipes for their “healthy bakes” one week in advance of the contest. On the day of the contest, the researcher provided the required ingredients to each school.

### **Data sources**

Data sources included documentation of the outcomes and processes of the recipe contest. Field notes made by the researcher during the planning phase, served as a source of data and was used to describe the process. As part of the larger project (thesis), interviews were conducted with stakeholders (nutritionist) (Chapter 5-Study 2), who also collaborated in planning the recipe contest. Considering that the interview with those stakeholders occurred after the contest, they were prompted to share their perceptions of the recipe contest as an approach to promote a healthy school food environment. The case study draws on relevant literature, to explore the benefits of using a recipe contest to promote a healthy school food environment. The use of the all the above data sources contributed to triangulation of the data. Triangulation of data sources enhances the credibility of the study (Yin, 2009) and completeness of data. Completeness of data is related to the process of painting a complete picture as possible based of multiple sources of data (Casey & Murphy 2009).

### 6.5.1 The Recipe Contest, “Healthy Bakes Challenge” Event

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### 6.5.2 Judging

Following preparation, each school displayed a few samples of their product on a table for evaluation by two judges with backgrounds in both nutrition and food product development (an agronomist and a nutritionist). The judging criteria included sensory appeal, creativity, ease of adoption, and nutritional value (Table 6-1). The criteria for evaluation were developed in consultation with the planning team to reflect the requirements of the contest and the ideal characteristics of a homemade school snack: its sensory appeal, creativity, ease of preparation and adoption, and healthfulness. However, the relative weight allotted to each criterion was based on how significant it was to the outcome. For example, the criterion for nutritional value was allotted the most points to emphasize that it was the most important, given that the main focus of the competition was to develop healthy bakes. The planning team considered that, while creativity was encouraged, participants could “get lost” by paying too much attention to this criterion; therefore, this criterion was assigned the least weight.

Table 6-1. Evaluation criteria for healthy bakes competition	
Criteria	Maximum # of points possible
Sensory Appeal (taste, texture, appearance) – bakes have acceptable sensory characteristics, determined by the judges	15
Creativity – resourceful use of local ingredients and presentation to create child-friendly bakes	10
Ease of Adoption – bakes could be easily adopted by vendors in the school food environment (factors to consider: cooking time, ease of preparation/complexity, cost, availability of ingredients)	20
Nutritional Value – how well the bakes reflect elements of the food-based dietary guidelines for Dominica	30

### 6.5.3 The Products

The healthy bakes challenge generated five diverse products with creative names (Table 6-2). Overall, the products demonstrated a variety of ways to reformulate bakes using traditional ingredients such as pumpkin, lentil, raisins, coconut, cornmeal, plantain, whole wheat flour, and plantain flour. See the photographs in Appendix I. All participants chose to cook their bakes in the traditional way through deep-frying.

Table 6-2. Names and ingredients of bakes prepared during recipe contest		
Schools	New products	Ingredients
Dominica Grammar School 4H Club	DGS Cookie Bakes	Whole wheat flour, plantain flour, baking powder, salt, yeast, butter, egg + sugar, coconut milk, mashed pumpkin
Goodwill Secondary School 4H Club	Golden Brown Lentil Bakes	All-purpose flour, baking powder, yeast, margarine, eggs + lentil (cooked, seasoned)
Castle Bruce Secondary School 4H Club	Bakes au Plantain	All-purpose flour, baking powder, salt, evaporated milk + grated half-ripe plantains
Isaiah Thomas Secondary School 4H Club	Healthy Johnny Cake	All-purpose flour, baking powder, salt, sugar, butter + coconut milk, cornmeal
St. Mary's Academy	Tropical Raisins & Coconut Bakes	All-purpose flour, baking powder, salt, egg, butter + raisins, dry shredded coconut

Based on the judges' evaluations, the DGS Cookie Bakes (Figure 6-2) emerged as the winner of the healthy bakes challenge. The judges indicated that the DGS cookie bakes were flavourful, soft, and creative (given that the term "cookie" was used to entice children and the product took a variety of leaf shapes). According to the judges, the DGS cookie bakes also incorporated a selection of food items, including whole wheat flour, coconut milk,

mashed pumpkin, which not only reflected Dominica's food-based dietary guidelines but also improved the nutritional quality of the original bakes in terms of protein, fibre, and vitamins.



Figure 6-2. Winner of healthy bakes competition

The runners up were as follows: 2<sup>nd</sup> place – Tropical Raisins and Coconut Bakes, 3<sup>rd</sup> place – Golden Brown Lentils Bakes, 4<sup>th</sup> place – Bakes au Plantain, and 5<sup>th</sup> place – Healthy Johnny Cake.

#### **6.5.4 Student Acceptability**

Because the facility did not allow for individual or private evaluation, the students stood along a table to evaluate the products. The students' appreciation for each product was assessed using a 5-point hedonic scale (Stone, 2012) (1= dislike very much; 2= dislike; 3= neither like nor dislike; 4= like; 5= like very much) developed by two members of the research team. Students were instructed (verbally) by the researcher to taste the coded



samples of each product (A, B, C, D, and E) that were positioned along the table and indicate their preference for each coded on the evaluation sheet provided. In an effort to ensure that students weren't influenced by others' preferences, the researcher also gave verbal command to students to avoid any verbal or non-verbal communication cues. This process was supervised and overseen by the judges and the researcher.

Tropical Raisins and Coconut Bakes were the most-liked product, with almost three quarters (70%) of the judges rating it as “like very much,” and 21% rating it as “like” (**Error! Reference source not found.**). More than half of the students rated the following products as “dislike very much”: DGS Cookie Bakes (59%), Golden Brown Lentil Bakes (53%), and Healthy Johnny Cake (73%).

Table 6-3 Students' (n=29) acceptability of reformulated bakes					
Degree of Appreciation	Percentage of students (%)				
	Bakes au Plantain	DGS Cookie Bakes	Golden Brown Lentil Bakes	Tropical Raisins & Coconut Bakes	Healthy Johnny Cake
5 - Like Very Much	31	3	17	70	10
4 - Like	24	7	17	21	0
3 - Neither Like Nor Dislike	10	10	3	0	0
2 - Dislike	21	21	10	3	17
1 - Dislike Very Much	14	59	53	3	73

### 6.5.5 Stakeholder perception of recipe contest

Although the voices of the participants are missing from this case study, insights were gained from two Dominican nutritionists, who took part in in-depth interviews for a related study (Study 2). These key informants acknowledged the recipe contest as an important window to facilitate learning and improve the nutritional quality of food sold at school. One of the nutritionists had this to say about the recipe contest:

*I think that was very innovative and I think it is one of the things that those who participated for them it was learning experience and secondly it's something that we can say we already have something in place that you can either accept or improve upon and take it further for improving the snacks available at the school because bakes [are] a common item that everybody loves and therefore improving the quality of [them] was a fantastic idea. Congratulations with that.*

## **6.6 Discussion**

The study used a recipe contest to engage children as agents of change in creating healthy food options to promote a healthy school food environment. The recipe contest was a modest success in demonstrating the potential for children to create foods options to promote a healthy school food environment. One of the main observations from the contest was that in an effort to improve the nutritional value of bakes, the participants incorporated a variety of items perceived as healthy. Examples of these healthy foods included lentils, raisins, cornmeal, whole wheat flour, and locally cultivated traditional foods such as pumpkin, coconut, and plantain. Given that many of these foods align with the food-based dietary guidelines of Dominica, which emphasize consumption of root crops, grains, and cereals in the diet (Albert et al., 2007), the contest successfully demonstrated that children are able to identify and select healthy food items from their local food environment foodscape. Additionally, the incorporation of these ingredients may have augmented the quantity of associated micronutrients in the reformulated bakes. In some jurisdictions, street foods like bakes have been a vehicle for improving micronutrient content of people's diets (Steyn et al.,

2013; Darmon, 2009; FAO & Sokoine University, 2006; Tontisirin, Nantel, & Bhattacharjee, 2002; Draper, 1996). Even small improvements in the nutritional quality of the foods children consume can increase their micronutrient intake.

### **6.6.1 Challenges in creating healthier bakes**

In the current study, the participants had the freedom to choose an alternative cooking method to prepare their bakes, but, interestingly all chose the traditional deep-fry method. This preparation method may be the very reason why bakes are considered unhealthy. During the frying process, bakes inevitably absorb some of the fat, thus increasing the fat content (Sumnu & Sahin, 2008; Mellema, 2003). One fried bake (100g) has 1.5g of saturated fat and 3.9% calories from saturated fat; when the product is baked, this figure drops significantly to 0.6g of saturated fat and 1.8% calories from saturated fat (Ramdath et al., 2011). If the healthfulness of bakes is to be improved, an alternative method of preparation should be explored, albeit with caution, given that the palatability and physical characteristics of bakes are influenced by deep-fat frying. Fried foods are tasty with a unique combination of flavor and texture and an attractive appearance that makes these foods very acceptable; however, reducing the fat content of a product often has an impact on organoleptic properties such as taste and mouthfeel (Zhang, Saleh, Chen, & Shen, 2012; Sumnu & Sahin, 2008; Mellema, 2003). The use of a non-fat medium to prepare bakes may alter the authenticity of bakes by producing a less desirable product than traditional bakes. It is plausible that these considerations influenced the children's reluctance to create healthier bakes by using alternative methods of preparation.

What other factors may have contributed to the participants' reluctance to alter the preparation method? Part of the answer may be that bakes are culturally entrenched in Dominicans' food ways and are valued both for their sustenance and pleasure and for their social and economic roles (Maglorie & Prevost, 2000). Bakes are unquestionably a popular street food in Dominica and are sold by street food vendors on city sidewalks and near schools. In the home, bakes often replace bread and are similarly embellished with protein-based stuffing. Moreover, the consumption of bakes is an important food security strategy for many families because they are inexpensive, palatable, and easy to prepare. Altering the authenticity of bakes could affect their acceptability and, in turn, interfere with its current roles. Although improving the nutritional quality of foods such as bakes is a worthy endeavour, it could be interpreted as the 'medicalization of food,' where the value of food is reduced to its nutrient and health-giving properties, while the alternative roles the food plays are marginalized. (Welch, McMahon, & Wright, 2012, p.3). One key lesson learned from the healthy bakes challenge is that caution should be taken in identifying the core food upon which a recipe contest is built.

Unlike the current study, other studies using recipe contests have taken an alternative approach by exploring underutilized plants that are known to have nutritional qualities (Roche, Ambato, Sarsoza, & Kuhnlein, 2017; Pardee RAND Graduate School, n.d.; Singh & Singh, 2013; Shukla, 2009). For example, in Maharashtra, India, a recipe contest was held among women (mainly) and children to document their local knowledge about uncultivated flora with some medicinal or health value (Shukla, 2009). Similarly, in Ecuador, mothers' groups promoted the consumption of wild leafy greens (stinging nettle/*Urtica dioica* L. and round-leaved dock/*Rumex obtusifolius* L.) through community cooking clubs and recipe

competitions (Roche, Ambato, Sarsoza, & Kuhnlein, 2017). In Uganda, recipe contests were launched as part of a traditional grains project to (1) rebrand millet and sorghum by promoting their nutritional value, health benefits, and general desirability through a cook-off competition of innovative recipes and products, and (2) test how this strategy impacted consumer perceptions and consumption patterns (Pardee RAND Graduate School, n.d.). Given Dominica's rich agricultural heritage, a similar focus on local plants (both wild and cultivated) could have been explored in this study. One research review presented a body of work on how wild and cultivated biodiversity in all forms is related to healthy, diversified diets and nutrition in developing countries (Powell et al., 2015).

Given the agricultural background of Dominica, an alternative approach to the recipe contest could be to create food products (healthy snacks) from the abundance of fruits, vegetables and/or root crops grown locally. Fruits and vegetables are a good basis for healthy snacks for adolescents (Grunert et al., 2016). In Oakland, California, Tester, Yen and Laraia (2012) demonstrated that the introduction of fruits vendors who sold precut, packaged fruits at school, resulted in decreased sales of vendors selling less healthy items, thus increasing access to healthy food. According to Bucher, Collins, Diem, and Siegrist, (2016), adolescents are knowledgeable of what is healthy and tend to use the sugar, total fat, fruit, and nut or seed content as the main criteria by which they judge the healthiness of snack foods. In that regard, the outcome of the fruit vendor study might be greater if the snack were developed by children. By so doing, the snacks would be perceived as 'cool' and peer influence would lead to increased sales. Nørgaard, Sørensen, and Brunsø, (2014), points to the importance of considering both preferences and buying intentions in product development processes and sales forecasts. The researchers found that the more a snack is perceived as cool, the higher

the preference and stronger the peer influence is perceived to be; whereas, buying intentions will increase the higher the personal importance of the snack attributes is perceived to be, the higher the willingness to try new snacks among best friends at school and the lower the willingness to try new snacks among other peers outside school.

### **6.6.2 The value of recipe contest**

There are many reasons for why recipe contests are a promising strategy to engage children as agents of change in promoting a healthy school food environment.

First, recipe contests provide children with a platform to create healthier food products. In a systematic review, children's ownership of food was identified as an important facilitator of healthy eating (Thomas et al., 2003). One of the underlying theories linking ownership to healthy eating is that the mere act of preparing food contributes to children's sense of ownership and pride, boosts their liking and consumption of healthy food, and increases their willingness to try unfamiliar, healthier options (DeJesus, Gelman, Herold, & Lumeng, 2019; Ensaff, Canavon, Crawford, & Barker, 2015; Dohle, Rall, & Siegrist, 2014; Van der Horst, Ferrage, & Rytz, 2014). Given the association between ownership and healthy eating, frequent school-based recipe contests focused on creating healthy snacks can be used to promote positive changes in food preferences within the school food environment.

Second, marketing in a social setting is a feasible approach to increase acceptance of new, healthier snacks among children, and a recipe contest is an ideal social setting to facilitate such marketing. Research suggests that new healthy snack products should be designed with use in a social setting in mind, and any testing of such products before market introduction should incorporate these settings (Nørgaard, Sørensen, & Brunsø, 2014;

Nørgaard, Sørensen, & Grunert, 2014). A recipe contest is characterized by a variety of social activities (i.e., tasting, combining products, sharing, talking about snacks/food, and enjoying time together in peer groups), all of which facilitates social marketing. During a recipe contest, children can act as agents of change by promoting the acceptability of and their preferences for new, healthier snacks among their peers.

Third, recipe contests, like other school contests, such as knowledge competitions and biodiversity contests, are promising pedagogical strategies to facilitate food education (Shukla et al., 2017; Singh & Singh, 2013; Shukla, 2009). There has been a call for improving food education among children, including their knowledge of and experiences with the complete (sustainable) food system (Rojas, Black, Orrego, Chapman, & Valley, 2017; Rojas, Orrego, & Shulhan, 2016). A recipe contest exemplifies an informal pedagogical space that facilitates the acquisition and exchange of knowledge related to local food sources and food preparation. The more children become aware of the food system, including food production, distribution, and consumption, the greater their interest in healthier eating and the better prepared they are to create healthy foods options to promote a healthy school food environment

### **6.6.3 Limitations and strengths**

The current case study – using a recipe contest to engage children as agents of change in promoting a healthy school food environment – had one significant methodological limitation. Due to time constraints, the recipe contest was planned as an informal activity, without subjecting participants to an evaluation process (e.g., surveys or interviews). Capturing the stories and experiences of the participants represents an important step in articulating the key lessons learnt from the contest (Yin, 2009). Therefore, there was a

missed opportunity to add to the richness of the data from the case study. An evaluation process could have created an open forum for the exchange of ideas and led to an understanding of the advantages and disadvantages of the recipe contest from the participants' perspectives.

This dissertation focused on primary school students; however, the recipe contest was held among secondary school students. Undoubtedly, teenagers' food preparation abilities and creativity are different from those of younger children. It is likely that younger children may have developed distinctly different recipes. This study could have benefited from the involvement of younger children. Furthermore, the inclusion of only teenagers did not allow the researcher to determine the ability of younger children to be agents of change in promoting a healthy school food environment. Future studies with age specific strategies are needed to explore the concept of children as agents of change.

One of the strengths of the study is that it was preceded by community involvement, where members of the research team collaborated with stakeholders. Consistent with participatory action research, the knowledge, expertise, and resources of the involved community are fundamental.

## **6.7 Conclusion**

This study helps to fill a gap in the underexplored area of engaging children as agents of change in promoting a healthy school food environment. A recipe contest has the potential to provide a platform for promoting food education, exploring local food sources, creating healthier food products, and marketing healthy food. Given these potential outcomes of engaging children as agents of change in promoting a healthy school food environment,



health promoters should capitalize on this underexplored area. Recommendations for future recipe contest are as follows: 1) promote the contest on social media to generate a wider conversation around the issue of a healthy school food environment; 2) provide discrete guidance and food and nutrition education sessions to participants prior to the contest; 3) establish opportunities for individual schools to have a local contest before choosing winners to represent them in a national contest; and 4) include an evaluation process with the participants to understand their perceptions and understanding of the recipe contest.

## CHAPTER 7 GENERAL DISCUSSION

This chapter begins with a synthesis of the key findings from the three studies, followed by a discussion of the main strengths and limitations of the dissertation as a whole. The chapter also highlights implications for health promotion and ends with recommendations for future research.

### 7.1 Synthesis of Key Findings

The purpose of this dissertation was to characterize the school food environment in Dominica. The study was the first of its kind to be completed in the Caribbean region. Three research questions were addressed in three related studies: 1) What types of food are sold and consumed in public primary schools in Dominica (**Study 1**)? 2) What are the perceptions of stakeholders of the school food environment (**Study 2**)? 3) How effective is a recipe contest in engaging school children to be agents of change within their school food environment (**Study 3**)? The next five paragraphs synthesize the three studies, specifically highlighting the relationships and linkages among them.

In general, stakeholders' views from Study 2 were practical and harmonized with the findings from Study 1 about the food outlets available and types of food sold. In other words, qualitative accounts of the school food environment in Study 2 were consistent with findings from Study 1. For example, interviews with participants in Study 2 highlighted several significant barriers to healthy eating within the school food environment, including the unhealthy snack foods sold at food outlets; correspondingly, the assessment of the food items sold within the school environment in Study 1 demonstrates that many foods available from tuck shops and vendors are low-nutrient, energy-dense snacks. These include snacks such as ice pops, soft drinks, and cream-filled biscuits. Based on the ecological framework proposed

by Story, Kaphingst, Robinson-O'Brien, and Glanz (2008), food provision within the school physical environment is influenced by macro-level factors such as food policies. The stakeholders in Study 2 confirmed that there is a lack of policies to regulate what is sold at school. Thus, the findings from Study 1 – that many unhealthy foods are sold at school – correspond with those from Study 2 – that the food available to children at school reflects a school food system underpinned by no or few food policies. Put another way, findings from Studies 1 and 2 suggest that the school food environment supports unhealthy eating among children.

Findings from Studies 1 and 2 do not reflect school food environments situated within a country with an economy based largely on agricultural production. Against the backdrop of local food production, one might expect the school meal program to provide local produce and fruits; however, this was not the case. It was surprising to learn that the lack of food supply restricted the operation of the school meal program. However, the macro-level issue that justifies this problem is that the Caribbean food system has undergone significant changes due to decreased and diversified food production and increased commercial markets and globalized dietary sources (Jolly et al., 2013; Popkin et al., 2012; Asfaw, 2011; Monteiro, 2009). Because the contribution of food imports continues to outweigh that of local production, this limits the availability of local produce for the school feeding program and increases the availability of processed and imported foods, high in calories, fats and sugars. (Jolly et al., 2013; Gaskin et al., 2012). Although the school meal program was the most frequently cited facilitator of healthy eating, its role as a supplier of fresh, local, healthy food is clearly questionable. In the absence of this type of food at school, there is a greater likelihood that low-nutrient, energy-dense snack food will take its place.

‘Children’s influence’ was a consistent theme observed in Studies 1 and 2. The findings from these studies illustrate the relationship between children’s influence on food provision and their eating practices. First, children’s food preferences likely influences the types of food offered for sale; moreover, vendors and tuck shops seek to make a profit by providing the foods children prefer. Study 1 facilitated an understanding of the types of food children prefer through an assessment of the types and popularity of food across participating schools and an assessment of the frequency of consumption. These lists were dominated by foods with high sugar, salt, and/or fat content. It is well documented that children prefer foods high in sugar, salt, and fat (Hoffman et al., 2016). Second, children influenced what other children choose to eat at school through their social influence on eating behaviours. According to stakeholders in Study 2, children hinder their peers from making healthy food choices through ridicule and peer pressure.

Social modelling can be used to promote consumption of health food. It is well documented that children’s social environment has a strong influence on their eating habits (Larson et al., 2017; Faught et al., 2016; Contento, Williams, Michela & Franklin, 2006; Bauer et al. 2006; Salvy, De La Haye, Bowker & Hermans, 2012; Patrick & Nicklas, 2005; Vereecken et al., 2004). Interestingly, there seem to be a lot of studies which demonstrates peer influence on unhealthy eating and a lack of studies which explores how children’s peers can influence healthy eating. This can be partly due to an accurate understanding of which mechanism justifies the effects of peer influence on healthy eating. The majority of the studies seem to assume that this effect is the result of modeling (Salvy, De La Haye, Bowker & Hermans, 2012). This dissertation is unique as it highlighted the two-edged effects of peer influence on eating; meaning while children’s peers /friends can hinder healthy eating, the

opportunity exists for them to also facilitate healthy eating. According to stakeholders in study 2, children hinder their peers from making healthy food choices through ridicule and peer pressure. On the other hand, study 3 argues that a recipe contest can be used a platform to facilitate social marketing of healthier foods and influence the acceptance of new healthy foods among their peers. Capitalizing on the effects of peer-influence on healthy eating is a promising strategy to improve healthy eating within the school food environment.

In keeping with the theme of children's influence and food availability within the school food environment, Study 3 was a suitable innovation to this dissertation. Engaging children as change agents in creating healthy foods options to promote a healthy school food environment challenged the traditional approach to research, which tends to view the child as an object, i.e., as a person acted upon by others and broadly shaped by influences in its social and material environment, rather than as a subject acting in the world (Hunleth, 2011; Christensen, 2004). A child-based recipe contest is largely underexplored in research, yet it has value in demonstrating how promoting a healthy school food environment can be an outcome of the child's own influences rather than that of external influences. For example, Study 3 highlighted the pathways through which a recipe contest can increase children's knowledge of local food, improve their ability to prepare healthy food, facilitate social marketing of healthy food, and reduce food neophobia.

Although this research project emphasized the role of children as change agents in promoting a healthy school food environment (Study 3), it did not discount the stakeholders' recommendations to regulate the school food environment through policy. The challenge in building on the policy option is that Dominica has no implemented policy document to work with. Moreover, before policy action can be taken to improve healthy eating, those preparing

the policy need evidence to help them understand the food environment, explain how this environment affects children's eating habits, and determine which elements to target. In Dominica, such data is lacking. Not only is this study timely, it also contributes to an understanding of the school food environment in Dominica and children's potential role in driving change.

## **7.2 Main Strengths and Limitations**

The strengths and limitations specific to each of the three studies were discussed in their respective Chapters – 4, 5, and 6. However, this dissertation had several strengths and limitations as a whole.

One of the main strengths of the dissertations is that a variety of stakeholders were engaged in early stages of framing the research as well as in data collection. Early involvement of stakeholders, in the form of planning meetings helped in shaping the direction and focus of the study. Additionally, it was important to engage a wide range of stakeholders because teachers, government level stakeholders, vendors, and principals all hold different views of the school food environment. They have different types of interaction with school children and play different roles in food provision at school. For example, unlike school principals, primary school teachers spend many of their work hours interacting directly with school children; hence, this relationship may shape their personal values and, by extension, their perceptions of the school food environment. It has been suggested that teachers' personal values significantly influence their perception of the school food environment (Rossiter, Glanville, Taylor, & Blum, 2007; Kubik, Lytle, Hannan, Story, & Perry, 2002). Engaging a variety of stakeholders facilitated significant benefits to the process

of knowledge production (O'Brien, Marzano, & White, 2013; Phillipson, Lowe, Proctor, & Ruto, 2012). Relying solely on the principals' perceptions would have limited the understanding of the school food environment.

Another strength of this research was that it integrated the 'socioecological framework' to characterize and understand the school food environment. The use of theory establishes a clearer picture of the phenomenon being studied; an important goal of researchers in the field of health promotion research (MacFarlane & O'Reilly-de Brún, 2012). Additionally, this theoretical framework also provides an organizational framework that facilitates the communication of relevant findings to others and rationalizes the dissertation as a whole.

This research project as a whole has two key limitations to consider when interpreting the results. First, purposive sampling was used to recruit schools. The small sample of schools may not be representative of all Dominican schools. As previously described, the study excluded schools on the east side of the island due to the area's limited school food outlets, as well as limited resources and time. Purposive sampling impedes the generalizability of the findings to the entire school food environment in Dominica. The findings are of the greatest relevance to public schools with vendors and tuck shops.

Second, it is a challenge to assure the validity of the data collection tools used in this study. The study was conducted in a developing country where the school food environment and culture are dissimilar to those of other countries where similar research has been done. Therefore, it was difficult to find and apply validated published tools that matched the cultural context of the present study and suited its purpose of the study to characterize the school food environment in Dominica. This difficulty came as no surprise since food environment research is already limited by a lack of validated and reliable environmental

measures (Gebremariam et al., 2017; Lytle & Sokol, 2017). In assuring rigour of the data collection tools used, an important protocol was followed: the tools were developed by academics and experts in food and nutrition and public health policy, including some who are familiar with the cultural context of Dominica.

### **7.3 Recommendations for Health Promotion**

Findings from this dissertation have several significant implications for health promotion. Recommendations for health promotion are considered from three different perspectives or action areas: policy implementation, intersectoral collaboration, and children's empowerment.

#### **7.3.1 Capitalize on Implementation of School Food Policy**

Results from this dissertation suggest that schools in Dominica lack food policy which contributes to the sale of unhealthy food. As emphasized in Study 2, the government should capitalize on the food policy option for regulating the school food environment. It is well documented that the implementation of policies has been beneficial in improving school food environments (Welker et al., 2016; Driessen et al., 2014; Chriqui, Pickel, & Story, 2014). However, as recommended by the World Health Organization (2008), the policy must take a comprehensive approach by considering food available in and around schools, in considering the food children can bring to school, and in involving stakeholders, including food and nutrition experts. A comprehensive approach is needed because improving the availability of healthy food in isolation from other components may fail to improve the school food



environment and healthy eating. Once any policy has been implemented, policy makers should also have strategies in place to monitor and evaluate the policy.

Over the last five years, several media reports have indicated that the government of Dominica is developing a national school food policy. Some stakeholders in this study also alluded to their involvement in the process; however, to date, this policy has not been launched. The successful implementation of school food policies often largely depends on strong support, especially from school principals (Taylor et al., 2011). Therefore, the delay in the national school food policy is perhaps fortuitous since school principals can now play a larger role in advocating for policy action within their respective school food environments. Results from the current study show substantial support among principals for a national school food policy to regulate school food environments. As a result of this strong support, principals can help accelerate the policy process, and support its implementation. In return, policy-related changes to the school food environment can help school principals in regulating food provision. One consideration is the pressure on principals to use school food programs to raise funds or secure capital. A national school food policy could have serious implications for tuck shops and the funds earned from their operation.

### **7.3.2 Link Local Food Production to School Meals**

The school meal program and the fruit day program were identified as the primary facilitators of healthy eating within the school food environment. Nonetheless, stakeholders were concerned with one major issue that challenges the meal program: the lack of a local food supply. In creating a healthy school food environment, policy makers should consider how to overcome this challenge. Given Dominica's agricultural economy, programs linking

local food production to schools (‘farm to fork,’ ‘farm to school,’ or ‘home-grown school meals’) could improve the supply of food to both the school meal program and the fruit day program. For example, in the Caribbean country of St. Kitts, the farm to fork project was crucial in augmenting food offerings in school meals centers, increasing children’s nutrition knowledge, and improving consumption of fruits and vegetables (Phillip, Johnston, & Granderson, 2016; Granderson, Gray-Donald, Patterson-Andrews, Webb, & Johnston, 2014). The farm to fork model formed part of the Caribbean Community (CARICOM) food security project, which aimed to improve nutrition and health outcomes of vulnerable populations (women, children, and the elderly) in CARICOM nations through an integrated approach linking agriculture, food, and health. In the US, farm to school programs have also been beneficial in reducing waste, improving acceptance of healthier school meals, lowering school meal program costs, and increasing participation in school meals (Welker, Lott, & Story, 2016; Joshi, Azuma, & Feenstra, 2008). Procuring local produce from farmers to prepare school meals has other benefits as well: menus at school are more varied and offer nutritious food to which schoolchildren are accustomed; local economies are stimulated as farmers gain a market and source of income; and the intersectorality of the food system is promoted (Aliyar, Gelli, & Hamdani, 2015; Sidaner, Balabana, & Burlandy, 2013).

In applying the farm to school model to improve the school food environment, consideration should be given to the farmers’ ability to meet the requirements of the school meal program. Factors that may come into play include the decline of agricultural production and the reluctance of farmers to accept government measures that they consider overly intrusive or that could lower their profits (Knight & Hippolyte, 2016). As a result, intersectional action to promote the availability of food to school meals in Dominica could be

fulfilled with incentives to increase agricultural production, fair pricing to encourage farmers to make commitments to local schools, and support from regional or international organizations such as FAO or World Food Program [WFP]. Moreover, food policies are needed that articulate measures to provide schools with healthy, locally produced food. For example, in Brazil, a law was signed recently, requiring that 30.0% of the food budget of the national school meal program should be used to purchase foods directly from family farms (Hawkes, Brazil, Castro, & Jaime, 2016; Sidaner, Balabana, & Burlandy, 2013). Once networks and systems are in place, Dominica could consider similar legislation.

The health sectors have made several calls for the agricultural sector to have greater involvement in dealing with the risk factors for childhood obesity and other non-communicable diseases (Hawkes, Brazil, Castro, & Jaime, 2016; Henry, Caines, & Eyre, 2016; United Nations System Standing Committee on Nutrition, 2006). Furthermore, this level of intersectoral collaboration is mandated in the Port-of-Spain NCD Summit Declaration (Samuels et al., 2014). Farm to school programs are the epitome of intersectoral collaboration. To improve the quantity and quality of food in Dominican schools, a similar model could be applied, a critical action considering that the school meal program could be the key to advancing the national school food policy. Moreover, Dominica has been identified as a country that may be at the beginning of a negative nutrition transition from healthy traditional food to unhealthy processed food. To avoid further transition and sustain healthy eating behaviours, the school meal program may hold the key to improving the school food environment and the nutrition and health of children on the island.

### **7.3.3 Empower Children to be Agents of Change**

While external influences, such as restricting the availability of unhealthy food within the food environment, have had their successes in health promotion (Welker et al., 2016; Driessen et al., 2014; Mullally et al., 2010), the effect may be greater when combined with strategies that empower children to be agents of change. Empowering children could occur through school-level initiatives that provide culturally-relevant opportunities for children to build food knowledge and skills. Such opportunities include integrating food subjects into the curriculum, launching food-related contests such as biodiversity knowledge and recipe contests, establishing school gardens, facilitating children's cooking sessions, and promoting programs at school such as the fruit days. Strategies that increase children's knowledge of and experiences with healthy food systems has the potential to improve their relationship with food and direct their attention towards healthier food items (Granderson et al., 2014; Robinson-O'Brien, Story, & Heim, 2009; Joshi, Azuma, & Feenstra, 2008). Of note, empowerment may also increase the likelihood for children to positively influence the food choices of their peers and family members; hence, truly be agents of change.

### **7.4 Recommendations for Future Research**

Several limitations were highlighted in each of the three studies. The recommendations for future research are based on suggestions to address these limitations.

In study 1, Data from tuck shops and vendors were collated, therefore limiting an understanding of the contextual characteristics of each school. Therefore, future research should focus on exploring these food outlets distinctly to understand the difference and similarities between them and how they can impact policy. Additionally, future studies

should measure the nutritional value of the foods and beverages sold within the school food environment. This data would be useful in determining which foods comply with the guidelines in the forthcoming national school food policy. Since this study did not fully explore the school meal program in Dominica, future research on this meal program is needed to understand its operation, the barriers and facilitators of operation, and requirements for improvement. Such information is crucial, considering that the meal program will have a key role in advancing the national school food policy.

In study 2, relevant stakeholders such as students and parents were not interviewed due to time constraints. The study recognizes the critical role that parents and students play as drivers of nutritional habits. Therefore, future studies should explore the perception of these key stakeholders regarding barriers and facilitators of healthy within the school food environment and recommendations for improving the school food environment.

The intervention in this dissertation (Study 3) employed a novel perspective (a recipe contest) that is both dissimilar to other interventions used in this field and consistent with the concept of the child as a ‘subject acting in the world’ or an ‘agent of change.’ There is much room to continue to engage children as agents of change in creating healthier food options to promote a healthy school food environment. Most importantly, study designs should include several components not explored in this study, i.e., investigation of children’s perceptions of healthy snacks and evaluation of the uptake of products. It’s imperative that such evaluation include a debriefing process with children who participants in the contest. An evaluation process can create an open forum for the exchange of ideas and led to an understanding of the advantages and disadvantages of the recipe contest from the participants’ perspectives.

Finally, the dissertation focused on primary school students; however, the recipe contest was held among secondary school students. Undoubtedly, teenagers' food preparation abilities and creativity are different from those of younger children. It is likely that younger children may have developed distinctly different recipes. Future studies should explore the feasibility of engaging younger children in creating healthier food options to promote healthy school food environment.

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## APPENDIX

### A. Consent form- Key Informants

**Introduction:** My name is Leandy Riley and I am a PhD student at the University of Saskatchewan. For my PhD Dissertation, I am conducting a study to gain a better understanding of the food environment and the role food vendors may play in enhancing the diets of school-aged children, as well as the potential for evidence-informed intervention collaboration with the Ministries of Health and Education and other partners. The study will also obtain country-specific information to develop and test qualitative and quantitative instruments to gain children perspectives of the school food environment. I am writing to invite you to participate in the study. The study is described below. Please take your time to read the following information carefully before you decide. If you wish to participate, you are required to sign this form.

**Project Title:** Assessing the School Food Environment in Two Caribbean Islands

**Researcher:** Leandy Riley  
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**Supervisor:** Carol Henry, Ph.D.  
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Email: [cj.henry@usask.ca](mailto:cj.henry@usask.ca)

**Objective(s) of the Research:**

Qualitative techniques are proposed to address the following research questions:

1. What policies/initiatives are in place to guide the provision/sale of foods in school?
2. What types/quality of food and beverages are sold/offered in schools?
3. What are the key issues/concerns about the school food environment?
4. What suggestions participants may have for solving these issues?

**Procedures:**

The study will be conducted on two Caribbean islands, Dominica and St. Kitts. The initial phase is an environmental scan that will be completed on each of the two Islands, January - April, 2014. Qualitative in-depth interviews and participant observation will be used to gather data from key stakeholders (decision makers associated with Ministry of Education and Health on each Island, school staff, researchers, and school food vendors).

If you agree to take part in the study, you will be asked to participate in an in-depth interview in an effort to gain a deeper understanding of the following themes: existing nutrition policies that affect school food environment; types/quality of food and beverages are sold/offered in schools; key issues/concerns about the school food environment; suggestions for solving these issues?

Each interview is expected to last between 45-60 minutes, and will be conducted by the researcher. The interviews will take occur at a place, date and time most convenient for you. The proceedings will be recorded with an audio recorder with your consent. Interview transcripts and field notes from this phase will be analyzed for the presence themes. Issues will also be identified through analysis of secondary data (unpublished data, national documents) and published literature.

**Funded by:** President SSHRC, Isabella Irwin, Pharmacy and Nutrition Graduate Service Award, USFA (Release Time)

**Potential Risks:**

There is no foreseeable risk for you in taking part in this study.

**Potential Benefits:**

Although these benefits are not guaranteed, this could be first step to school-wide efforts to promote healthy weights and wellbeing among school-aged children in the Caribbean and elsewhere. Recommendations from the project are likely to impact national and school health policy for long term sustainability and effective change.

**Compensation:**

N/A

**Confidentiality:**

- See “Right to Withdraw” below.
- The data from this research project will be published and presented at conferences; however, your identity will be kept confidential. Although we will report direct quotations from the interview will be given a pseudonym, and all identifying information will be removed from our report. Moreover, the Consent Forms will be stored separately from the interview scripts, so that it will not be possible to associate a name with any given set of responses.
- **Storage of Data:**
  - All data (tapes, transcripts, correspondence, electronic files and researcher’s notes and drafts) will be securely stored. The identifying information (i.e. consent forms and master list) will be stored in separately from the data collected. All data will be retained for a minimum of 5 years, after work is published. Following the retention period, the data will be destroyed appropriately, either by shredding or electronic file deletion.

**Right to Withdraw:**

- Participation is voluntary for all parts of the study. Participants will have the option of withdrawing at any time. Your right to withdraw data from the study will apply until results have pooled. After such time it will be difficult to accurately determine what pieces of information belong to each student and it may not be possible to withdraw your data.
- If you decide to withdraw there will be no penalty or impact on your position.

**Follow-up:**

You have the opportunity to provide feedback on a summary of the preliminary results of the interview. Once the study is completed, the results will be presented at a stakeholder engagement symposium to which you will be invited.

**Questions or Concerns:**



The research has been approved on ethical grounds by the University of Saskatchewan Behavioural Research Ethics Board on (date to be inserted). If you have any questions or concerns about the study, please contact me or my supervisor Dr. Carol Henry using the information at the top of page.

Any questions regarding your rights as a participant may be addressed to that committee through the Research Ethics Office [ethics.office@usask.ca](mailto:ethics.office@usask.ca) (306) 966-2975. Out of town participants may call toll free (888) 966-2975.

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**PARTICIPANTS PLEASE READ and SIGN YOUR CONSENT**

I have read and understand the goals of the study and my involvement in this study. I am aware that my participation in this study is strictly voluntary and that I may discontinue participation at any time without prejudice. I also understand that the strictest confidentiality will be maintained throughout this study and that only the research team will have access to the confidential information. I acknowledge that I have received a copy of the consent letter for my records. I have had an opportunity to ask questions and my/our questions have been answered. Your signature below indicates that you have read and understand the description provided.

There are several options for you to consider if you decide to take part in this research. You can choose all, some or none of them. Please put a check mark on the corresponding line(s) that grants me your permission to:

I grant permission to participate in interview: Yes: \_\_\_\_ No: \_\_\_\_

I grant permission to be audio taped: Yes: \_\_\_\_ No: \_\_\_\_

I would like to provide feedback on a summary of the preliminary results: Yes: \_\_\_\_ No: \_\_\_\_

\_\_\_\_\_  
*Name of Participant*

\_\_\_\_\_  
*Signature*

\_\_\_\_\_  
*Date*

\_\_\_\_\_  
*Researcher's Signature*

\_\_\_\_\_  
*Date*

***A copy of this consent will be left with you, and a copy will be taken by the researcher.***

## B. Interview guide: Principal

Date:

Respondent

- ☐ Principal
- ☐ Vice Principal
- ☐ School Vendor
- ☐ Other \_\_\_\_\_

Name of School \_\_\_\_\_

Location:

**Script:** Good day, I am going to ask you a few questions pertaining school food environment. They are all long answer questions. I will read the questions you have in front of you aloud and I will give you time to think of your response. If you do not understand the question, do not hesitate to let me know so I can help you. There is no right or wrong answer so please answer the questions to the best of your ability. Please respond to those questions you feel comfortable answering. The interview will be recorded using this audio recorder so that I can remember your answers. However the recorder can be turned off anytime you require. Please be aware that your responses will be kept strictly confidential.

### Section A: Information regarding the variety of food and beverages available for sale during breaks

1. Do you sell food to students during snack break?

- ☐ No
- ☐ Yes

2. What food do you sell during **SNACK** break? Include name and brand or flavour where applicable.

- ☐ Ice pop

\_\_\_\_\_

- ☐ Stuffed Bakes
  - ☐ Tuna
  - ☐ Cheese
  - ☐ Corned beef

- ☐ Other \_\_\_\_\_
- ☐ Pizza \_\_\_\_\_
- ☐ Sandwich
  - ☐ Cheese
  - ☐ Tuna
  - ☐ Other \_\_\_\_\_
- ☐ Soft drink \_\_\_\_\_
- ☐ Local juice
  - ☐ \_\_\_\_\_
- ☐ Bread and hot dog
- ☐ Pies
  - ☐ Meat pie
  - ☐ Vegetable pie
  - ☐ Fish pie
  - ☐ Fruit pie
- ☐ Fried chicken
  - ☐ Drumstick
  - ☐ wings
- ☐ Candies
  - ☐ \_\_\_\_\_
  - ☐ \_\_\_\_\_
- ☐ Tamarind Balls
- ☐ Cake
  - ☐ Home made
  - ☐ Commercially made
- ☐ Biscuits \_\_\_\_\_
- ☐ Crackers \_\_\_\_\_
- ☐ Chips \_\_\_\_\_
- ☐ Other
  - ☐ \_\_\_\_\_
  - ☐ \_\_\_\_\_

- ☐ \_\_\_\_\_
- ☐ \_\_\_\_\_
- ☐ \_\_\_\_\_
- ☐ \_\_\_\_\_

3. Is there a school feeding program at school?

- ☐ Yes
- ☐ No

4. Do you sell food to students during lunch break apart from the school feeding program?

- ☐ No
- ☐ yes

5. What food do you sell/ make available during **LUNCH** breaks? Include name and brand or flavour where applicable.

- ☐ Ice pop \_\_\_\_\_
- ☐ Stuffed Bakes
  - ☐ Tuna
  - ☐ Cheese
  - ☐ Corned beef
  - ☐ Other \_\_\_\_\_
- ☐ Pizza \_\_\_\_\_
- ☐ Sandwich
  - ☐ Cheese
  - ☐ Tuna
  - ☐ Other \_\_\_\_\_
- ☐ Soft drink \_\_\_\_\_
- ☐ Local juice
  - ☐ \_\_\_\_\_
- ☐ Bread and hot dog
- ☐ Pies
  - ☐ Meat pie
  - ☐ Vegetable pie

- ☐ Fish pie
- ☐ Fruit pie
- ☐ Fried chicken
  - ☐ Drumstick
  - ☐ wings
- ☐ Candies
  - ☐ \_\_\_\_\_
  - ☐ \_\_\_\_\_
- ☐ Tamarind Balls
- ☐ Cake
  - ☐ Home made \_\_\_\_\_
  - ☐ Commercially made \_\_\_\_\_
- ☐ Biscuits \_\_\_\_\_
- ☐ Chips \_\_\_\_\_
- ☐ Crackers \_\_\_\_\_
- ☐ Other
  - ☐ \_\_\_\_\_
  - ☐ \_\_\_\_\_
  - ☐ \_\_\_\_\_
  - ☐ \_\_\_\_\_
  - ☐ \_\_\_\_\_

### Section B: Popularity Ranking

6. Which items are your top 5 sellers during snack break?

- ☐ \_\_\_\_\_
- ☐ \_\_\_\_\_
- ☐ \_\_\_\_\_
- ☐ \_\_\_\_\_
- ☐ \_\_\_\_\_

7. Which items are your top 5 sellers during lunch break?

- ☐ \_\_\_\_\_

- ☐ \_\_\_\_\_
- ☐ \_\_\_\_\_
- ☐ \_\_\_\_\_
- ☐ \_\_\_\_\_

### **SECTION C: Vending policies**

8. What do you consider as the school food environment?
  - ☐ Food sold within the school
  - ☐ Food sold around school
  - ☐ Both
9. Do you have any policies or programs which guide the sale of food in the school food environment?
  - ☐ Yes
  - ☐ No
10. Describe the programs/policies which guide the sale of food in the school food environment?
 

At school level:

At government level:
11. To what extent are those policies or programs enforced or monitored?
12. Do you think that the policies or programs are adequate?
13. Describe how you would change them.
14. Besides those policies described above, what factors are taken into consideration when deciding what food to sell students?
15. Do vendors require a food permit (approval) to sell food at the school?
  - ☐ Yes
  - ☐ No
16. Describe the procedures involved in obtaining permission to sell at the school, including personnel involved.
17. Describe your level of involvement/influence on the presence of vendors?
18. What considerations, if any, are given in selecting school food vendors?
19. Describe any restrictions which are placed on school children with regard to purchasing?

## THANK YOU

### C. Interview guide: Vendors

Date:

Location ID:

Respondent ID:

**Script:** Good day, I am going to ask you a few questions about your vending business. Some are multiple choice and some are long answer questions. I will read the questions and answers out loud. I will give you time to think of your response. If you do not understand the question, do not hesitate to let me know so I can help you. There is no right or wrong answer so please answer the questions to the best of your ability. Please respond to those questions you feel comfortable answering. The interview will be recorded using this audio recorder so that I can remember your answers. However the recorder can be turned off anytime you require. Please be aware that your responses will be kept strictly confidential.

#### Section 1: Profile of operation

1. Where do you sell you food?
  - ☐ On the street
  - ☐ On playing field
  - ☐ Immediately outside school gates
  - ☐ Designated room in school
  - ☐ Other
2. Type of operation
  - ☐ Push cart
  - ☐ Table stand
  - ☐ Stall
  - ☐ On the ground
  - ☐ Basket
  - ☐ School tuck shop/ cafeteria
3. Years of operation of food outlet
  - ☐ Less than one year
  - ☐ 1-3 years
  - ☐ 3-6 years
  - ☐ More than 6 years
4. How many days per week do you sell at the school?
  - ☐ 1-2
  - ☐ 3-4
  - ☐ 5

5. Hours of operation
  - ☐ Snack Break
  - ☐ Lunch Break
  - ☐ Snack & Lunch Break
6. Which is the busiest time for you in a day?
  - ☐ Snack Break
  - ☐ Lunch Break
7. Approximately how many children do you sell to in a day?
  - ☐ 20 or less
  - ☐ 21-40
  - ☐ 41-60
  - ☐ 61- 80
  - ☐ 81-100
  - ☐ More than 100

## Section 2: Experiences and Perception of Operation

8. What factors influence the products prepared and food item sold to school children?
  - ☐ Cost
  - ☐ Convenience
  - ☐ student's preferences
  - ☐ preparation skill (What I know how to prepare)
  - ☐ preparation requirements (how much time it takes and how easy it is to prepare)
  - ☐ eating healthy
  - ☐ Other\_\_\_\_\_
9. Why did you choose to sell to near the school as opposed to other locations?
  - ☐ More profitable than other vending locations
  - ☐ School located closer to home
  - ☐ More skilled at preparing food children like
  - ☐ Other\_\_\_\_\_
10. What types of food do sell?
11. Of these foods you sell, which would you say is healthy?
12. If none healthy, why do you sell these foods? Or what is the main purpose of your business?
13. Are you aware of any policies or programs (standards, regulations, guidelines) which guide the sale of food at school?
14. What changes, if any, have you tried/would like to try to encourage healthier eating habits among students?
15. If none, would you consider making minor adjustments to the food you prepare and sell on the street, in order to improve the quality of the food?
16. What prevents you from making changes to make the food you sell healthier?\
17. Have you ever received training on any of these aspects of street food vending?
  - ☐ Food safety and Sanitary
  - ☐ Nutrition
  - ☐ Food preparation/cooking
  - ☐ Other\_\_\_\_\_
  - ☐ I have not received training in any of these areas
18. If a workshop was offered, what aspects would be most useful to you in order to maintain or improve the nutritional quality of the foods you sell?
  - ☐ Food safety and Sanitary
  - ☐ Nutrition
  - ☐ Food preparation/cooking
  - ☐ Other\_\_\_\_\_



### Section 3: Demographic

19. Age:

- ☐ Less than 25
- ☐ 25-34
- ☐ 35-44
- ☐ 45-54
- ☐ 55- 64
- ☐ 65 or more

20. Gender:

- ☐ Male
- ☐ Female

21. What was the highest level of education you achieved

- ☐ No education
- ☐ Primary school
- ☐ High school
- ☐ College
- ☐ Other\_\_\_\_\_

Those are all the questions I have for you. Can you think of anything else you would like to add or you think I have missed? Thanks for participating.

## **D. Consent form: Parents/Children**

**Introduction:** My name is Leandy Riley and I am a PhD student at the University of Saskatchewan. I am writing to invite you to participate in this study, described below. Please take your time to read the following information carefully before you decide.

**Purpose of the Study:** School food vendors and Children as agents of change: Encouraging healthy food choices among primary schools in the Caribbean.

**Aim:** The overall aim of the study is to promote the role of school food vendors in encouraging healthy food choices in the school food environment.

**Researcher:** Leandy Riley  
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University of Saskatchewan  
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Phone: 966-5833  
Email: [cj.henry@usask.ca](mailto:cj.henry@usask.ca)

### **Procedures:**

The study will be conducted in three phases. The first phase, an environmental scan, will employ interviews among school principals and independent school food vendors. The information collected during the interviews will be aimed at assessing children's options for feeding while at school, determining the types and popularity of food items sold within the school environment, and assessing existing policies that governs the sale and availability of food items in the school environment. The second phase includes in-depth interviews with Ministry of Health and Ministry of Education officials, focus group discussion with school staff, interviews among vendors and food survey among students to explore their perceptions regarding the foods sold by independent food vendors. Recipes of food sold at school will be collected from vendors and analyzed for nutritional composition. The food survey among students is also aimed at determining the potential contribution of foods sold at school to their diets. In the third phase an intervention which utilizes vendors to promote the sale of healthy food options in schools will be implemented and evaluated.

If you [your child] agree to take part in the study, you [he/she] will be asked to participate in food consumption survey identified above. The survey is expected to last between 20- 30 minutes, and will be administered by the researcher. The data collection will occur from September 2014 to April, 2015. Principals will be contacted to schedule specific dates for conducting the survey. The surveys will take occur at a place, date and time most convenient for students.

**Funded by:** President SSHRC, Pharmacy and Nutrition Graduate Service Award, USFA (Release Time)  
There is no anticipated conflict of interest in this study on the part of the researchers or sponsors.

### **Potential Risks:**

There is minimal risk in taking part in this study. Nonetheless, measuring heights and weight or sharing information regarding food choices may be uncomfortable or cause some distress

#### **Risk(s) will be minimized by:**

- Reminding participants of the study, and how their information and identity will be used and protected.

- Reminding participants that they are allowed to withdraw at any time during the study including when risk of discomfort is experienced.
- Informing participants of their right to answer only those questions that they are comfortable answering.

#### **Potential Benefits:**

Although these benefits are not guaranteed, participating in study will provide information for literature and policy changes. Understanding children's perception of food sold them could be an important component of school-wide efforts to promote healthy weights and wellbeing among school-aged children in the Caribbean and elsewhere. Recommendations from the project are likely to impact national and school health policy for long term sustainability and effective change.

#### **Compensation:**

A small package of stationery (pencil and book) valued at of \$10.00CAD/\$25.00 XCD will be given to each student as a thank you for participating.

#### **Confidentiality:**

- See "Right to Withdraw" below.
- The data from this research project will be published and presented at conferences; however, your [your child's] identity will be kept confidential. Although we will report direct quotations from the interview, you will be given a pseudonym, and all identifying information will be removed from our report. Moreover, the Consent Forms will be stored separately from the (food frequency questionnaire), so that it will not be possible to associate a name with any given set of responses.
- When conducting group research, there are limits to which the researcher can guarantee the discussion will be kept confidential. The researcher will undertake to safeguard the confidentiality of the discussion, but cannot guarantee that other members of the group will do so. Please respect the confidentiality of the other members of the group by not disclosing the contents of this discussion outside the group, and be aware that others may not respect your confidentiality
- **Storage of Data:**
  - All data (tapes, transcripts, correspondence, electronic files and researcher's notes and drafts) will be securely stored. The identifying information (i.e. consent forms and master list) will be stored in separate filing cabinet from the data collected.
  - The data will be stored for a minimum of 5 years, after work is published. Following the retention period, the data will be destroyed appropriately, either by shredding or electronic file deletion.

#### **Right to Withdraw:**

- Participation is voluntary for all parts of the study. Participants will have the option of withdrawing at any time. Your [your child's] right to withdraw data from the study will apply until results have pooled. After such time it will be difficult to accurately determine what pieces of information belong to each student and it may not be possible to withdraw your data.
- If you [your child] decide to withdraw there will be no impact on access to services provided by the school and your [your child's] grades will not be affected. Students who decline to participate in the study will be given an appropriate assignment prepared in consultation with the class teacher.

#### **Follow up:**

Once the study is completed, the analyzed findings will be made available to the school (in a form a report or a presentation at school assembly) and can be accessed by all participating parents/guardians.

#### **Questions or Concerns:**

The research has been approved on ethical grounds by the University of Saskatchewan Behavioral Research Ethics Board and the National Human Ethics Committee in Dominica.

If you have any questions or concerns about the study, please contact me Leandy Riley or my supervisor Dr. Carol Henry using the information at the top of page.

#### **PARENTS/GUARDIAN PLEASE READ and SIGN YOUR CONSENT**

I have read and understand the contents of the informed consent form. I have had adequate time to consider my involvement in this study and I am aware that my [child's] participation in this study is strictly voluntary and that I [my child] may discontinue participation at any time without prejudice. I also understand that the strictest confidentiality will be maintained throughout this study and that only the research team will have access to the confidential information. I acknowledge that I have received a copy of the consent form for my records. The study was been explained orally and in writing and I have been given the opportunity to ask questions and my questions have been answered to my satisfaction.

Your signature below indicates that you have freely agreed to participate.

There are several options for you to consider if you decide to take part in this research. You can choose all, some or none of them. Please put a check mark on the corresponding line(s) that grants me your permission to:

I grant permission for my child to participate in survey:Yes: \_\_\_\_ No: \_\_\_\_

_____	_____	_____
<i>Name of Parent/Guardian</i>	<i>Parent Signature</i>	<i>Date</i>
_____	_____	
<i>Researcher's Signature</i>	<i>Date</i>	
-----		

**Students Please Read and Sign Your Consent/Assent**

I have read and understand the contents of the informed consent form. I have had adequate time to consider my involvement in this study and I am aware that my participation in this study is strictly voluntary and that I may discontinue participation at any time without prejudice. I also understand that the strictest confidentiality will be maintained throughout this study and that only the research team will have access to the confidential information. I acknowledge that I have received a copy of the consent form for my records. The study was been explained orally and in writing and I have been given the opportunity to ask questions and my questions have been answered to my satisfaction.

Your signature below indicates that you have freely agreed to participate.

There are several options for you to consider if you decide to take part in this research. You can choose all, some or none of them. Please put a check mark on the corresponding line(s) that grants me your permission to:

I grant permission to participate in survey:Yes: \_\_\_\_ No: \_\_\_\_

_____	_____	_____
<i>Name of Participant</i>	<i>Student Signature</i>	<i>Date</i>
_____	_____	
<i>Researcher's Signature</i>	<i>Date</i>	

***A copy of this consent will be left with you, and a copy will be taken by the researcher.***

E. Food frequency Questionnaire

Section 1: Demography

1. What school do you go to? \_\_\_\_\_
2. How old are you? \_\_\_\_\_
3. What grade are you in? \_\_\_\_\_
4. Are you a boy or a girl? \_\_\_\_\_

☐ Boy

☐ Girl

Section 2: Food Frequency Questionnaire

Think about the food that you eat while at school. How often during the last month did you USUALLY eat the following foods?

Food items	How often did you usually eat each food item							
	Never	<Once per month	2-3x per month	Once a week	2-3x a week	4-6x a week	Once a day	2 or > x a day
Fried bakes with cheese								
Fried bakes with tuna								
Fried bakes with codfish								
Fried bakes with corned beef								
Plain Bakes								
Butter Cake								
Banana chips								
Plantain chips								
Fried plantain								
Popcorn								
Bread & hotdog								
Bread & cheese								
Roasted hot dog								
Fried hot dog								
Pizza- Cheese								
Pizza - Pepperoni								
Sandwich- Tuna								
Sandwich - Cheese								
Pies/Patties- Chicken								
Pies/Patties-Beef								
Pies/Patties- Tuna								
Gooseberry jam								
Tamarind balls								
Tamarind jam								
Fried chicken								
Lollipop								
Shirley Biscuits								
Teatime cream filled biscuits								
Festival cream filled biscuits								
Bermudez cream filled crackers								
Cheese sticks								
Cheese balls								
Cheese Curls								
Corn Curls								
Tortilla Nacho Cheese								
Wheat crisps crackers								
Gum filled Candy								
Chocolate bar								
Wafer								
Candies								
Chips								
Local juice								

Home-made Yogurt								
Ice pop								
Soft drink								
Lil B								
Chubby								
Vita malt								
Capri sun								
Box drink								

Thank You!

## F. Interview guide: key Informants

Name and Position of Respondent\_\_\_\_\_

Name of Organization/ School\_\_\_\_\_

**Script:** Good day, I am going to ask you a few questions pertaining school food environment. They are all long answer questions. I will read the questions you have in front of you aloud and I will give you time to think of your response. If you do not understand the question, do not hesitate to let me know so I can help you. There is no right or wrong answer so please answer the questions to the best of your ability. Please respond to those questions you feel comfortable answering. The interview will be recorded using this audio recorder so that I can remember your answers. However the recorder can be turned off anytime you require. Please be aware that your responses will be kept strictly confidential.

1. Are you aware of any regulations or other policies providing for and or regulating school-based feeding or vending programs in Dominica [that is breakfast, lunch, snacks provided to school children] or vending service offered by school vendors?
2. What ministry (s) is responsible for the policies?
3. Are you aware of any attempts to generate national or school level discussions on the adoption or promotion of policies, guidelines or initiatives consumption of food and beverage in elementary (high) schools?
4. What is your perception regarding the importance of a written school food policy to guide the sale of food/beverages in schools, around school premises?
5. In your view, why were these policies/ regulations implemented/developed? Or if there are no regulations or other policies, why do you think this is so?
6. If they are, to what extent are they enforced?
7. Are you aware of the types of food outlets available to children in schools? [School feeding, canteens, vending, other]
  - a. Probe: Who is responsible for these [School personnel, government community, or combination of both, other]
8. In general and for the most part, what kinds of food would you expect to find children consuming in elementary schools [during lunch/ recess periods]?
9. What are your own views on food and beverage provision or consumption in elementary [high] schools ?
10. What are your own views on vending on or around school premises?
11. What do you see as the main issues associated with the provision of food and beverages on and around school premises
  - a. .... Economic issues
  - b. ----- nutritional issues
12. In your view, what do you suggest as approaches to address the issues you identified?

Thank you.

## G. Focus group guide: Teachers

Name of School\_\_\_\_\_

Script: Good day, I am going to ask you a few questions pertaining school food environment. They are all long answer questions. I will read the questions you have in front of you aloud and I will give you time to think of your response. If you do not understand the question, do not hesitate to let me know so I can help you. There is no right or wrong answer so please answer the questions to the best of your ability. Please respond to those questions you feel comfortable answering. The discussion will be recorded using this audio recorder so that I can remember your answers. However the recorder can be turned off anytime you require. Please be aware that your responses will be kept strictly confidential.

1. Do you consider overweight/obesity to be a problem among students at this school?  
Why/why not?
2. In your view, what factors act as facilitators to eating healthy at school?
  - a. and barriers?
3. Are you aware of about how many students participate in [school-based feeding, or buy from vendors] ?
4. How do you compare the food available from the different food outlet in the school environment?
5. How do you balance the role of providing food to students and encouraging students to make healthy choices with providing access only to healthy foods?
6. What changes, if any, have you tried/would like to try to encourage healthier dietary habits among students?
7. What do you see as the main issues associated with the food and beverages sold and consumed on or around school premises?
8. In your view, what do you suggest as approaches to address the issues you identified?
9. Are you aware of any existing governmental regulations or other policies providing for and/or regulating the school food environment [that is breakfast, lunch, snacks provided to school children] or vending service offered by school vendors?
  - a. If they are, to what extent are they enforced?
10. Are you aware of any attempts to generate a national school nutrition policy regarding the sale and consumption of food and beverage in schools?
  - a. What impact, if any, will this have on your school?
11. What is your perception regarding the importance of a written school food policy to guide the sale of food/beverages in schools, around school premises?

Those are all the questions I have for you. Can you think of anything else you would like to add or you think I have missed?

Thanks for participating.



## H. Healthy bakes challenge guidelines

### INTRODUCTION

My name is Leandy Riley, a Dominican student currently pursuing a PhD in Nutrition at the University of Saskatchewan, Canada. The overall aim of my dissertation is to engage stakeholders in health promotion within the school food environment. This healthy bakes challenge forms part of my research dissertation and is aimed at engaging students in developing healthy recipes for promoting a healthier school food environment. As a result, **THE PRODUCT SHOULD BE ONE THAT STUDENTS CAN ENJOY AS A SNACK AT SCHOOL; CHILD-FRIENDLY.** Such a challenge put students as agents of change in promoting healthy food choices within the school for environment.

The challenge is being channelled through the 4H Club as an established organisation in the Commonwealth of Dominica coordinated by Shirley Alexander.

### HEALTHY BAKES CHALLENGE

- The challenge will be held at the Marigot Youth Centre on the May 29<sup>th</sup> as part of the 4H festival.
- A decision was made to have the pre-preparation and preparation done at the site to facilitate standardization of the process, transparency and impartiality.
- Please arrive at the facility by 9am to facilitate pre-preparation and preparation of the bakes.
- Feel free to ask for clarification or new information throughout your participation. For further information please contact coordinator of the healthy bakes challenge, Ms. Leandy Riley
  - Cell phone #: 225 4464
  - Email: [ler149@mail.usask.ca](mailto:ler149@mail.usask.ca)

### Guidelines

#### *Before the challenge*

- Decide on a recipe for the healthy bakes challenge.
  - You may reformulate the bakes utilizing as many local food/ingredients as possible and/or alter the method of preparation, all in effort to develop healthier bakes.
  - **RECIPE SHOULD BE FOR PLAIN BAKES, i.e., BAKES SHOULD NOT BE STUFFED**
- Create original names for your healthy bakes recipe.
- Recipes must include a complete list of ingredients and required quantities, and complete preparation directions.
- Email a draft of the recipe to Ms. Leandy Riley. This draft will be used to estimate the cost of your recipe. All recipes should be submitted by Tuesday 26<sup>th</sup>. Monies for purchasing ingredients will be given on Wednesday 27<sup>th</sup>.
- If you rather have Ms. Riley purchase the ingredients for you, please indicate that.
- Select student competitors / representatives early: (2) two main cooks
- As you decide, focus on the judging criteria: sensory appeal, creativity, ease of adoption, nutritional value

### Additional requirements for all recipes

- The bakes must be prepared using approximately 2lbs of flour

- 1 hour will be allotted for pre-preparations and preparation

*On the day of the challenge*

- Please bring along the following necessities:
  - large mixing bowl
  - measuring cup/spoon
  - kitchen fork
  - kitchen towel
  - display platter
  - items for garnishing your display
- Following preparation, the bakes should be displayed on the tables located in the middle of the kitchen.
- Hard copies of the recipes should be presented to Leandy Riley or Marynese Titre. A final draft should be emailed to Ms. Riley.
- Competitors from each club should be prepared to give a brief description of the recipe and respond to potential questions posed by the Judges.

**Judging**

**The total marks for all clubs will be calculated and the three (3) highest scores will be chosen as the winners.**

**Winners will be rewarded with the prizes as follows:**

1<sup>st</sup> Position- \$200  
 2<sup>nd</sup> Position -\$150  
 3<sup>rd</sup> Position- \$100

*Judging Criteria*

The bakes will be evaluated on the basis of following criteria:

Criteria	Maximum # of points possible	Comments
<b>Sensory Appeal</b> (Taste, texture, appearance)- bakes has acceptable sensory characteristics; determined by judges	15	
<b>Creativity</b> - resourceful use of local ingredients and presentation to create a child-friendly bakes	10	
<b>Ease of Adoption</b> – bakes could be easily adopted by vendors in the school food environment, as it relates to cook time, ease of preparation/complexity, cost, availability of ingredients	20	
<b>Nutritional Value</b> - how well the bakes reflect elements of the food-based dietary guidelines for Dominica	30	

**TOTAL POINTS:** \_\_\_\_\_ /75

I. Additional photos of bakes







