



Perspective

Toward a national school food program in Canada: Understanding current landscape and context

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Abstract

Introduction: In Canada, there is a growing commitment to developing a national school food program (SFP) to improve children's diet and address existing and widening health inequities. Having an understanding of the current landscape of SFP offerings and context is essential to inform the national SFP development.

Methods: Available data are scarce; we drew from three unique school-based surveys: a provincially-representative sample of elementary schools from the Raising Healthy Eating and Active Living Kids in Alberta study (2008-2014), a sample of elementary

schools with active whole-school health promotion intervention called A Project Promoting Active Living and Healthy Eating Schools (intervention years 1-6), and a convenience sample of secondary schools from the Cannabis, Obesity, Mental Health, Physical Activity, Alcohol, Smoking, and Sedentary Behaviour study (2016/17-2021/22). Descriptive analyses assessed the temporal trends in SFP availability, characteristics, and enablers/barriers.

Results: Secondary schools reported a decrease in SFP availability, while the opposite trend was observed in elementary schools, particularly those with a whole-

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school health promotion intervention in place. Elementary schools with an active health promotion intervention also demonstrated improved awareness, incorporation, and compliance with provincial nutrition guidelines. Barriers to SFP included funding constraints and infrastructure challenges, and these remained consistent over the years.

Keywords: Children; diet; health equity; nutrition guidelines; school food policy; school food program

Introduction : On observe au Canada un intérêt croissant pour la mise en œuvre d'un programme d'alimentation scolaire (PAS), à l'échelle nationale, afin d'améliorer l'alimentation des enfants et de lutter contre les inégalités croissantes en matière de santé. Pour guider l'élaboration d'un PAS national, il est d'abord essentiel de bien comprendre le panorama des offres actuelles de PAS et le contexte dans lequel elles s'inscrivent.

Méthodes : Les données sur le sujet sont rares. Nous avons puisé dans trois enquêtes scolaires uniques : un échantillon représentatif à l'échelle provinciale d'écoles primaires issu de l'étude « Raising Healthy Eating and Active Living Kids » qui a eu lieu en Alberta (2008-2014), un échantillon d'écoles primaires ayant réalisé, dans l'ensemble de l'établissement scolaire, une intervention active de promotion de la santé appelée « A Project Promoting Active Living and Healthy Eating Schools » (intervention touchant les années 1 à 6), et un échantillon de commodité d'écoles secondaires issu de l'étude « Cannabis, Obesity, Mental Health, Physical Activity, Alcohol, Smoking, and Sedentary Behavior » (2016/17-2021/22). Des analyses

Conclusion: Given the complexity of factors that impact SFP availability, there is an urgent need for a national SFP and harmonized school food policy to help improve Canadian children's diet, ensure lifelong healthy eating habits, and promote health equity.

descriptives ont évalué les tendances temporelles dans les programmes d'alimentation, en ce qui a trait à leur disponibilité, leurs caractéristiques, les facteurs favorables et les obstacles.

Résultats : Les écoles secondaires ont signalé une diminution de la disponibilité des PAS, tandis que la tendance inverse a été observée dans les écoles primaires, en particulier celles qui ont mis en place une intervention de promotion de la santé à l'échelle de l'établissement. Les écoles primaires ayant mis en place une intervention active de promotion de la santé ont également démontré une meilleure sensibilisation, une meilleure intégration et un meilleur respect des directives provinciales en matière de nutrition. Les obstacles aux PAS comprenaient des contraintes financières et des défis liés aux infrastructures, qui sont restés constants au fil des ans.

Conclusion : Considérant la complexité des facteurs qui influencent l'accès à un PAS, il y a un urgent besoin d'un programme national et d'une politique d'alimentation scolaire harmonisée pour aider à améliorer l'alimentation des enfants canadiens, assurer des habitudes alimentaires saines pour toute la vie et réaliser l'équité sur le plan de la santé.

Introduction

Poor diet of Canadian children has received much attention in recent decades: the majority of children and adolescents (aged 4 to 18 years) do not meet established recommendations for vegetables and fruit intake, their diets contain too much sugar and sodium (Hack et al., 2021), and close to half of their total daily energy intake comes from ultra-processed foods (Polsky et al., 2020). Poor diet places children at a higher risk for chronic diseases, including type 2 diabetes, obesity, heart disease, and some cancers (Uauy et al., 2008). Poor diet has also been linked to impaired cognitive functioning, and poor academic performance and mental health (Haapala et al., 2017; Faught et al., 2017; Loewen et al., 2019). Notably, children from low socioeconomic status (SES) households report worse diets compared to their counterparts from higher SES households (Haapala et al., 2017; Faught et al., 2017). Effective dietary interventions are urgently needed to promote healthy eating while also addressing health inequities.

Children spend most of their waking hours at school where they consume approximately one-third of their daily energy intake (Tugault-Lafleur et al., 2017). School food programs (SFPs), which encompass initiatives such as breakfast, lunch, snack, and milk programs, are being advocated as an effective strategy to foster children's dietary habits by improving access to nutritious meals, exposing children to diverse foods, and teaching cooking skills and food literacy (Guio, 2023). Importantly, these programs also show great potential for ameliorating health inequities by addressing food insecurity and ensuring all students have access to regular and nutritious meals regardless of family SES (Tugault-Lafleur et al., 2017; Olstad et al., 2021). It is estimated that free or subsidized SFPs, implemented in 161 countries,

benefited more than 388 million children in 2020 (World Food Programme [WFP], 2020). These programs have demonstrated remarkable success in improving children's health outcomes and academic performance, tackling food insecurity, and boosting economic growth by creating new jobs (Hernandez et al., 2018; Godin et al., 2019; Fung et al., 2012; APPLE Schools, 2024). Importantly, SFPs are estimated to generate impressive returns on investment of \$3 to \$10 for every dollar spent (WFP, 2020).

Considering the vital role that SFPs play in improving children's diet and reducing health inequities, the federal government committed to developing a national SFP and accompanying school food policy (Liberal Party of Canada, 2024; Stechyson, 2024). Understanding the current SFP offerings and their characteristics is essential to inform the national SFP development. The patchwork of existing programs, funded by municipal and provincial/territorial governments and non-governmental organizations (Ruetz & McKenna, 2021; Ruetz et al., 2023), is complex as these SFPs differ in their mandates and characteristics (Ruetz & McKenna, 2021). At present, available data at the school level are scarce and there is a lack of reliable, representative data on SFPs collected in Canadian schools. Indeed, there is no single school-based data source that would provide comprehensive information on the current SFP offerings in Canada. In this study, we relied on several unique school-based surveys to describe existing SFPs in terms of their availability, characteristics (accessibility, cost, frequency of offerings, location), and enablers and barriers in a sample of Canadian schools.

Methods

We drew data from three school-based surveys: a large convenience sample of secondary schools from the Cannabis, Obesity, Mental Health, Physical Activity, Alcohol, Smoking, and Sedentary Behaviour study (COMPASS), a provincially representative sample of elementary schools that participated in the Raising Healthy Eating and Active Living Kids in Alberta study (REAL Kids Alberta), and a sample of elementary schools with an active whole-school health promotion intervention called A Project Promoting Active Living and Healthy Eating Schools (APPLE Schools).

Launched in the 2012/13 school year, COMPASS is a longitudinal hierarchical research platform that annually collects comprehensive data in a convenience sample of secondary schools located in Alberta, British Columbia, Ontario, and Quebec (Leatherdale et al., 2014). School administrators complete a questionnaire built on the previously validated Healthy School Planner (Joint Consortium for School Health, 2007), to report on school policies, practices, or resources available to support student health and healthy lifestyle behaviours. Specifically, the questionnaire asks school administrators about the availability of school breakfast programs and their characteristics (offered daily, free, universal, and location), and enablers/barriers (Vermeer et al., 2023). We analyzed data from 95 school administrators in 2016/17, 122 in 2017/18, 136 in 2018/19, 102 in 2019/20, 132 in 2020/21, and 182 in 2021/22 school years.

REAL Kids Alberta was a large, provincially representative, population-based survey that collected school-level data from school administrators (Ofosu et al., 2018). School administrators were asked to report on: (1) SFP availability, characteristics (offered daily, free, universal), and alignment with Alberta provincial nutrition guidelines [Government of Alberta, 2012];

(2) presence of school nutrition policies; and (3) adherence of SFPs to Alberta provincial nutrition guidelines (awareness, incorporation, compliance). Surveys were administered biannually between 2008 and 2014. The sampling frame included more than 1400 elementary schools (private, Francophone, on-reserve federal, charter, and colony schools were excluded). To achieve a provincially representative sample, these schools were first stratified based on the geographical area (i.e., metropolitan [~1 million residents], city [>40,000 residents], rural-town [<40,000 residents]), and then randomly selected within each stratum. Overall, 120 to 150 schools participated in each wave.

APPLE Schools is an evidence-based Health Promoting School (HPS) intervention designed to improve student lifestyle behaviours (healthy eating, physical activity) and mental health and wellbeing (Vander Ploeg et al., 2014a; Vander Ploeg et al., 2012; Bastian et al., 2015; Maximova et al., 2015; Tran et al., 2014; Roberts et al., 2016; Vander Ploeg et al., 2014b). APPLE Schools successfully tackles health inequities by targeting elementary schools in socioeconomically deprived neighbourhoods (Vander Ploeg et al., 2012; Vander Ploeg et al., 2014b). Since its launch in 2008, APPLE Schools has been implemented in more than one hundred schools across western Canada (Alberta, British Columbia, Manitoba, Northwest Territories) and has plans to scale-up nationwide. School administrators are asked to fill out the same survey as the one used in the REAL Kids Alberta study to report on school-level policies and practices. This study analyzed data collected from school administrators in 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2016, 2018, and 2021. Baseline data are collected before or during the first intervention year. Given the changing intensity

of the APPLE Schools intervention, data were analyzed by intervention year.

For all three studies, school geographic location was categorized using Statistics Canada's classification: rural or small population centre (PC) with population <29,999, medium PC with population 30,000 to 99,999, and large PC with population ≥100,000 (Statistics Canada, 2017). We used school postal codes to derive material deprivation index from 2016 Canada Census data, with higher quintiles indicating higher material deprivation (more information is available elsewhere (Pampalon & Raymond, 2000). The quintiles were combined to create a binary variable indicating less vs. more deprivation (1-3 vs. 4-5).

Data analysis

Frequencies were calculated for SFP availability, characteristics (accessibility, cost, frequency of offerings, location), and enablers and barriers. Trends in COMPASS and REAL Kids Alberta were examined by calendar year. For REAL Kids Alberta, frequencies

were weighted to accommodate the design effect and represent the provincial estimates. Trends in APPLE Schools were examined by intervention year. Stata/SE 17 (Stata Corp., College Station, TX) was used for data management and analyses. Percentages may not add up to 100 percent due to missing values.

Ethics

All data collection procedures in COMPASS were approved by the University of Waterloo Office of Research Ethics (#30118) and REAL Kids Alberta and APPLE Schools studies by the Health Research Ethics Board at the University of Alberta (Pro00049436 and Pro00061528, respectively) and all participating school boards. Consent from school administrators to participate in the APPLE Schools, REAL Kids Alberta, and COMPASS studies was implied through their completion of the surveys. Analyses in the current study were approved by the Research Ethics Boards of the University of Toronto (#42290) and the University of Alberta (Pro00116888).

Results

Most schools participating in the three studies were located in rural/small or large PCs (Table 1). The majority of COMPASS and REAL Kids Alberta schools were located in less materially deprived areas (quintiles 1-3 of the material deprivation index) whereas

more than one-third of APPLE Schools were located in areas of higher material deprivation (quintiles 4-5), which reflects the APPLE Schools' focus on socioeconomically deprived neighbourhoods.

Table 1: Characteristics of schools that participated in COMPASS, REAL Kids Alberta, and APPLE Schools studies.

	COMPASS						REAL Kids Alberta				APPLE Schools			
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2008	2010	2012	2014	Year 1	Year 2-3	Year 4-5	Year 6+
Number of schools, n	95	122	136	102	132	182	144	132	129	130	46	66	37	26
<i>Geographic area^a, %</i>														
Rural/small PC	39	43	49	42	48	54	46	45	48	52	40	32	35	27
Medium PC	19	10	8	10	8	9	23	23	20	16	18	20	22	35
Large PC	42	47	43	48	44	38	31	32	32	31	42	49	43	39
<i>Material deprivation^b, %</i>														
Less deprived	53	57	56	59	53	39	65	63	61	61	48	50	55	52
More deprived	39	33	34	30	29	22	28	28	30	32	41	41	40	48

Abbreviations: COMPASS: The Cannabis, Obesity, Mental health, Physical activity, Alcohol, Smoking, and Sedentary Behaviour; REAL Kids Alberta: Raising healthy Eating and Active Living Kids in Alberta; APPLE Schools: A Project Promoting Healthy Living for Everyone in Schools; PC: population centre.

^a Rural/small population centre (PC): population <29,999; medium PC: 30,000-99,999, and large PC: ≥100,000.

^b Material deprivation index categorized into quintiles 1-3 (less deprived) vs. 4-5 (more deprived).

Notes: Percentages may not add up to 100 percent due to missing values.

More COMPASS secondary schools in materially deprived areas reported providing a breakfast program than those in less deprived areas (Table 2). However, the availability of breakfast programs among these schools declined steadily over time, from 86 percent in 2016-17 to 45 percent in 2021/22. In schools with breakfast programs, most programs were offered daily (>78 percent), at no cost (>88 percent), and to all students (>88 percent), which remained consistent over time with few differences based on material deprivation. Most breakfasts in secondary schools were provided as a grab-and-go bin located in or outside the homeroom, particularly during the COVID-19 pandemic in the 2020-21 school year, with some schools providing breakfast as a sit-down meal in a designated location.

In elementary schools, the availability of breakfast or morning snack programs increased over time. Provincially, the proportion of REAL Kids Alberta schools offering breakfast or morning snack programs

increased from 24 percent in 2008 to 48 percent in 2012, and even more so among schools located in materially deprived areas (from 25 percent in 2008 to 54 percent in 2014). In APPLE Schools, a breakfast or morning snack program was available in 41 percent of schools in Year 1 of the intervention, and this increased to 73 percent in Year 6+, reaching 78 percent and 69 percent in schools located in more vs. less materially deprived areas, respectively. Not all meals served in Alberta elementary schools complied with provincial nutrition guidelines of including 3 to 4 food groups in meal offerings (59 percent in 2008, 77 percent in 2012, and 58 percent in 2014).

Compliance with this provincial recommendation in APPLE Schools increased from 53 percent in Year 1 to 68 percent in Year 6+ of the intervention, with more schools in deprived areas reporting compliance after Year 1. The availability of lunch programs in Alberta also increased from 49 percent in 2008 to 84 percent in 2014 in REAL Kids Alberta schools. This positive

trend was also observed in APPLE Schools (46 percent in Year 1 to 85 percent in Year 6+). However, compliance of *lunch* programs with this

recommendation remained suboptimal in both samples (58 percent of REAL Kids Alberta and 55 percent of APPLE Schools).

Table 2: School food program availability and characteristics in schools that participated in COMPASS, REAL Kids Alberta, and APPLE Schools studies.

	COMPASS						REAL Kids Alberta				APPLE Schools			
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2008	2010	2012	2014	Year 1	Year 2-3	Year 4-5	Year 6+
Breakfast or morning snack is^a, %														
Provided by school	86	7 1	6 2	5 6	47 5	4 5	24	-	3 3	4 8	4	5 2	5 4	7 3
Less deprived ^b	86	7 0	5 9	5 2	46 2	5 2	25	-	2 9	4 2	3	4 5	4 8	6 9
More deprived	94	7 8	7 4	5 7	51 4	6 4	25	-	3 8	5 4	5 8	6 3	6 3	7 8
Offered daily	84	7 8	8 7	8 6	93 7	8 7	82	-	-	-	1 6	-	-	-
Less deprived	86	7 7	9 1	8 4	94 5	9 5	70	-	-	-	1 4	-	-	-
More deprived	82	7 7	8 2	8 2	10 0	8 8	10 0	-	-	-	1 8	-	-	-
Composed of 3-4 food groups	-	-	-	-	-	-	59	-	7 7	5 8	5 3	6 2	6 5	6 8
Less deprived	-	-	-	-	-	-	52	-	7 4	5 5	7 1	5 3	6 0	6 4
More deprived	-	-	-	-	-	-	80	-	6 7	5 9	4 5	6 5	7 0	7 1
Provided for free	96	9 3	9 3	8 9	95 3	9 3	-	-	-	-	-	-	-	-
Less deprived	95	9 4	9 3	9 0	97 5	9 5	-	-	-	-	-	-	-	-
More deprived	10 0	9 7	9 7	9 4	10 0	8 8	-	-	-	-	-	-	-	-
Available to all students	98	9 2	9 5	8 9	88 0	9 0	-	-	-	-	-	-	-	-
Less deprived	98	9 4	9 5	9 0	91 9	8 9	-	-	-	-	-	-	-	-
More deprived	97	9 4	9 7	8 8	89 6	9 6	-	-	-	-	-	-	-	-
Provided as a sit-down meal in a designated location	36	4 2	4 1	3 8	10 1	2 1	-	-	-	-	-	-	-	-
Less deprived	36	4 5	3 9	3 2	9 9	1 9	-	-	-	-	-	-	-	-
More deprived	35	3 9	4 4	4 7	11 4	2 4	-	-	-	-	-	-	-	-

Provided as a grab-and-go bin in/outside the homeroom	75	6	6	6	93	8	-	-	-	-	-	-	-	-
Less deprived	79	6	6	6	88	8	-	-	-	-	-	-	-	-
More deprived	71	6	6	5	10	8	-	-	-	-	-	-	-	-
		5	2	9	0	4								
Lunch program is, %														
Provided by school	-	-	-	-	-	-	49	-	8	8	4	8	5	8
Less deprived	-	-	-	-	-	-	49	-	3	4	6	2	1	5
More deprived	-	-	-	-	-	-	53	-	7	8	4	7	4	8
Offered daily	-	-	-	-	-	-	53	-	8	2	5	6	8	8
Less deprived	-	-	-	-	-	-	41	-	9	8	4	8	5	7
More deprived	-	-	-	-	-	-	53	-	0	8	7	5	6	8
Composed of 3-4 food groups	-	-	-	-	-	-	41	-	-	-	1	-	-	-
Less deprived	-	-	-	-	-	-	35	-	-	-	9	-	-	-
More deprived	-	-	-	-	-	-	52	-	-	-	3	-	-	-
Students are permitted to eat lunch in the cafeteria	-	-	-	-	47	9	52	-	5	5	6	6	7	5
Less deprived	-	-	-	-	49	9	46	-	7	8	7	9	9	5
More deprived	-	-	-	-	43	8	67	-	6	5	5	6	9	5
Students are permitted to eat lunch in the classroom	-	-	-	-	71	4	46	-	3	5	0	8	0	0
Less deprived	-	-	-	-	70	4	67	-	6	5	8	6	6	7
More deprived	-	-	-	-	73	6	67	-	0	3	9	5	7	1
Students are permitted to eat lunch in other area on school grounds	-	-	-	-	40	6	-	-	-	-	-	-	-	-
Less deprived	-	-	-	-	42	6	-	-	-	-	-	-	-	-
More deprived	-	-	-	-	35	7	-	-	-	-	-	-	-	-
Students go home for lunch	-	-	-	-	60	6	-	-	-	-	-	-	-	-
Less deprived	-	-	-	-	61	9	-	-	-	-	-	-	-	-
More deprived	-	-	-	-	60	2	-	-	-	-	-	-	-	-
Students are permitted to eat lunch in other area off school grounds	-	-	-	-	50	6	-	-	-	-	-	-	-	-
Less deprived	-	-	-	-	49	6	-	-	-	-	-	-	-	-
						6								

More deprived	-	-	-	-	51	7	-	-	-	-	-	-	-
						4							
School allows meal delivery services (e.g., Uber Eats, Skip the Dishes)	-	-	-	4	-	-	-	-	-	-	-	-	-
				2									
Less deprived	-	-	-	3	-	-	-	-	-	-	-	-	-
				8									
More deprived	-	-	-	5	-	-	-	-	-	-	-	-	-
				0									

Abbreviations: COMPASS: The Cannabis, Obesity, Mental health, Physical activity, Alcohol, Smoking, and Sedentary Behaviour; REAL Kids Alberta: Raising healthy Eating and Active Living Kids in Alberta; APPLE Schools: A Project Promoting Healthy Living for Everyone in Schools.

^a The question is limited to breakfast only in COMPASS.

^b Material deprivation index categorized into quintiles 1-3 (less deprived) vs. 4-5 (more deprived).

Notes: Percentages may not add up to 100 percent due to missing values.

Table 3 reports on the positive trends among Alberta elementary schools in school policies and practices that promote healthy eating in schools (i.e., SFP enablers). These improvements were particularly notable in APPLE Schools: in Year 6+ of the intervention, almost all schools provided professional development of staff, communication with staff and parents, accessed expertise from health authorities or other professionals, and established committees to promote healthy food in

schools. There were some disparities between APPLE Schools in more vs. less materially deprived areas, particularly at baseline: 47 percent vs. 82 percent of schools incorporated healthy eating into their policies or guidelines, 74 percent vs. 82 percent communicated with staff, and 84 percent vs. 91 percent communicated with parents. However, these differences decreased substantially over the course of the intervention.

Table 3: School food program enablers in elementary schools that participated in REAL Kids Alberta and APPLE Schools studies.

	REAL Kids Alberta				APPLE Schools			
	2008	2010	2012	2014	Year 1	Year 2-3	Year 4-5	Year 6+
Healthy Eating is, %								
Reflected in school's mission statement and/or strategic plan	32	62	64	62	52	79	81	77
Less deprived ^a	35	67	63	54	55	82	95	75
More deprived	23	49	65	62	53	78	63	78
Incorporated in policies or guidelines	67	64	87	85	65	77	68	81
Less deprived	69	65	88	82	82	82	71	81
More deprived	65	62	86	89	47	70	63	78
Included in professional development of staff	-	-	95	92	24	73	57	96
Less deprived	-	-	93	93	23	24	52	100
More deprived	-	-	95	89	21	67	63	89

	REAL Kids Alberta				APPLE Schools			
	2008	2010	2012	2014	Year 1	Year 2-3	Year 4-5	Year 6+
Communicated with staff	82	77	81	83	76	92	81	96
Less deprived	81	76	82	83	82	97	86	94
More deprived	88	81	78	81	74	85	75	100
Communicated with parents	94	92	92	93	85	97	95	100
Less deprived	96	89	89	92	91	100	95	100
More deprived	98	95	95	97	84	93	94	100
Addressed by committees	32	58	54	59	41	79	78	89
Less deprived	35	58	50	60	45	73	90	81
More deprived	28	57	54	49	42	81	63	100
Access expertise from health authority or other professionals	92	92	93	95	91	97	97	96
Less deprived	91	89	93	93	86	94	95	94
More deprived	98	100	92	97	95	100	100	100
Provincial nutrition guidelines are, %								
Aware	62	95	95	95	87	99	95	100
Less deprived	63	94	92	93	82	100	100	100
More deprived	63	95	100	100	95	96	88	100
Incorporated in school/district policies	10	32	61	60	28	55	62	77
Less deprived	9	27	59	58	27	58	67	75
More deprived	13	43	68	65	32	52	56	78
Complied for most food choices	10	27	54	50	26	71	62	73
Less deprived	11	24	59	57	27	79	76	75
More deprived	8	35	51	51	26	59	44	67
Complied for special food days	-	-	73	61	17	62	51	73
Less deprived	-	-	72	57	14	61	48	63
More deprived	-	-	78	62	21	59	56	89
Not complied	3	25	10	14	17	3	5	0
Less deprived	3	25	8	17	9	3	5	0
More deprived	3	19	11	5	26	4	6	0

Abbreviations: REAL Kids Alberta: Raising Healthy Eating and Active Living Kids in Alberta; APPLE Schools: A Project Promoting Healthy Living for Everyone in Schools.

^a Material deprivation index categorized into quintiles 1-3 (less deprived) vs. 4-5 (more deprived).

Notes: Percentages may not add up to 100 percent due to missing values.

Similarly, there were improvements in the awareness, incorporation, and compliance of SFPs with provincial nutrition guidelines for children and youth among Alberta elementary schools. In REAL Kids Alberta

schools, awareness increased from 62 percent to 95 percent between 2008 and 2014, incorporation from 10 percent to 60 percent, and compliance for most food choices from 10 percent to 50 percent, but the

proportion of schools not following Alberta provincial guidelines increased from 3 percent to 14 percent (Table 3). Differences between schools in more vs. less materially deprived areas were small and decreased over time. In intervention schools, awareness of Alberta provincial nutrition guidelines was already high (87 percent) in Year 1, but only about a quarter of schools incorporated or complied with provincial guidelines at baseline. By Year 6+, all APPLE Schools reported being aware of Alberta provincial nutrition guidelines, and 77 percent and 73 percent reported incorporating and complying with the guidelines for most food choices, respectively. While schools in less deprived areas

reported higher compliance with provincial nutrition guidelines for most food choices, schools in more deprived areas reported higher compliance for special food days. Finally, data on SFP enablers/barriers were only available in COMPASS (Table 4). The most common barriers reported included: limited control over food available (33 percent to 46 percent), loss of revenue due to food restrictions (25 percent to 48 percent), and lack of resources to support the implementation (16 percent to 32 percent). No consistent patterns were observed based on material deprivation.

Table 4: School food program enablers and barriers in secondary schools that participated in COMPASS.

	COMPASS					
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
Enablers						
School offers cooking classes, %	86	79	76	76	-	-
Less deprived ^a	88	77	76	78	-	-
More deprived	83	83	76	70	-	-
School offers media literacy on special topics related to healthy eating, %	68	66	69	39	-	-
Less deprived	65	63	65	37	-	-
More deprived	72	70	74	43	-	-
Barriers						
Lack of resources to support guideline implementation, %	24	31	29	16	17	32
Less deprived	20	32	31	17	19	27
More deprived	28	30	28	17	14	31
Loss of revenue due to food restrictions, %	48	39	34	25	25	29
Less deprived	59	29	33	23	23	34
More deprived	39	50	39	23	24	38
Limited control over food available, %	46	45	40	36	40	33
Less deprived	45	45	40	48	35	41
More deprived	47	40	43	47	38	38
Confusion about how to apply the guidelines, %	17	14	15	15	11	14
Less deprived	10	14	9	17	9	11
More deprived	25	13	28	10	11	10

	COMPASS					
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
Lack of feedback on guideline implementation within the school, %	11	10	13	6	10	15
Less deprived	12	10	12	8	13	11
More deprived	11	13	17	3	3	18
Other barriers, %	12	12	10	12	14	15
Less deprived	10	14	13	13	20	17
More deprived	8	8	9	10	11	10

Abbreviations: COMPASS: The Cannabis, Obesity, Mental health, Physical activity, Alcohol, Smoking, and Sedentary Behaviour.

^a Material deprivation index categorized into quintiles 1-3 (less deprived) vs. 4-5 (more deprived).

Notes: Percentages may not add up to 100 percent due to missing values.

Discussion

We used data from three school-based surveys to describe the current SFP offerings in a sample of Canadian schools. Our findings reveal a decrease in the availability of SFPs in Canadian secondary schools, in contrast with a notable increase in elementary schools, particularly those with an active whole-school health promotion intervention in place. The observed disparities in the availability and characteristics of SFPs and their enablers/barriers contribute to the limited and sporadic access of Canadian children and adolescents to nutritious meals essential for their growth, health and wellbeing.

Our findings revealed that the downward trend in the availability of breakfast programs in secondary schools began before the COVID-19 pandemic, suggesting that other factors are likely at play. For example, most schools in Canada lack the infrastructure and trained staff to prepare and serve meals on-site (Ruetz & McKenna, 2021). Moreover, rising food prices (Dalhousie University et al., 2023) hinder SFP availability, given the lack of adequate and sustained government funding (Employment and Social Development Canada, 2023; Ruetz & Engler-Stringer, 2014). A recent study revealed that only 35 percent of

JK to 12 schools in Canada received government funding sufficient to serve only one in five students and often covering only 25 percent of the costs (Ruetz & McKenna, 2021; Ruetz et al., 2023). On the other hand, we observed a positive trend in the availability of SFPs in elementary schools in Alberta, particularly those with an active whole-school health promotion intervention (i.e., APPLE Schools). This could be partly attributed to a larger proportion of APPLE Schools located in more materially deprived areas (Ruetz & McKenna, 2021). According to the *People for Education's 2022-2023 Annual Ontario School Survey* report, 96 percent of schools located in low-income areas provide SFPs, compared to only 53 percent of schools located in high-income areas (People for Education, 2023).

The increasing availability of SFPs in APPLE Schools also hints at its effectiveness in improving the school food environment (Veugelers et al., 2005). Existing evidence supports this: SFPs implemented in the U.S. were shown to improve children's diet quality (Chen et al., 2021), health (Jia et al., 2020), and educational outcomes (Hinrichs, 2010). Previously, we have reported on the effectiveness of the APPLE

Schools intervention in improving students' dietary habits, with students reporting eating more fruits and vegetables, consuming fewer calories, and having a lower likelihood of being overweight and obese compared to their peers in REAL Kids Alberta schools (i.e., provincial average) (Fung et al., 2012). The current study suggests that an important enabler for these positive outcomes may be the improvements to the school food environment. This finding reinforces the importance of whole-school health promotion programs to encourage SFP implementation, particularly in schools located in socioeconomically disadvantaged areas (Ekwaru et al., 2021).

SFPs are advocated to be free and universal (i.e., available to all students) (Russell et al., 2008; Leos-Urbel et al., 2013). The universality of SFPs encourages student participation by minimizing the social stigma around receiving free food (Employment and Social Development Canada, 2023; Koc & Bas, 2012; Valaitis et al., 2014; Basch, 2011). However, insufficient funding is recognized as the main reason for not providing universal SFPs (Employment and Social Development Canada, 2023), with pay-what-you-can or fixed-fee SFPs emerging as important alternatives. Previous studies estimate that about one-third of SFPs in Canada target low-income households and/or operate on a pay-what-you-can basis (Employment and Social Development Canada, 2023; The Coalition for Healthy School Food, 2023). It is encouraging that breakfast programs offered in most COMPASS schools were free and universal. A school administrator that participated in one of the three school-based surveys reported herein commented: "As someone who works in schools, it's hard to see some children come to school without lunches or haven't eaten breakfast. Some families cannot afford groceries, let alone fresh and healthy items. With the rising cost of groceries, what is going to happen?! I would love to see more schools

offer breakfast programs and lunch. I wish it was affordable and reasonable for all schools to have a kitchen and staff that would make and serve these options." Apart from allocating more funding to SFPs, other strategies to improve access and student participation (e.g., promoting SFPs to all students, serving breakfast in a common location, involving parents and students as the program champions) should also be considered (Employment and Social Development Canada, 2023; Godin et al., 2018).

Nutrition guidelines are based on current research and best practices in healthy eating and are developed to help schools provide nutritious foods to children and youth. Awareness, incorporation, and compliance with nutrition guidelines are important enablers of SFP availability. In this study, we found positive trends among Alberta elementary schools in awareness, incorporation, and compliance with current nutrition guidelines, particularly in schools with an active intervention in place. The improvements were evident throughout the intervention period in APPLE Schools, reaching peak prevalence beyond the sixth intervention year. This is not surprising given that HPS interventions yield the best results if implemented and sustained over a longer period (Jia et al., 2020; Hinrichs, 2010). A decline in awareness, incorporation, and compliance with nutritional guidelines in years four and five could be attributed to the decrease in the intervention dose and intensity whereby dedicated School Health Facilitators (SHFs) in each school are replaced with *volunteers* known as School Health Champions (SHCs). This finding highlights the importance of having experienced and dedicated SHFs and SHCs who work closely with students, parents/guardians, school staff and community partners to collaboratively identify goals, tailor the program to the specific needs of each school

community, maintain the long-term effectiveness of the intervention, and foster a healthy food environment.

Finally, this study revealed major barriers to implementing healthy eating practices and policies in schools, including lack of resources to support guideline implementation, loss of revenue due to food restrictions, and limited control over food available. This finding highlights an urgent need to devise strategies addressing these barriers.

This study contributes to the scarce evidence on SFPs in the Canadian context. Given the lack of reliable, representative data on SFPs in Canada, we used best available data from several unique sources to examine the current SFP offerings and characteristics in a sample of elementary schools from 2008 to 2021 and secondary schools from 2016 to 2021. Several limitations warrant consideration. The surveys were completed by school administrators and may be subject to social desirability bias (Blasius & Thiessen, 2015; Beare et al., 2014). While the COMPASS questionnaire was based on a validated tool (Leatherdale et al., 2014), the survey instrument used in REAL Kids Alberta and APPLE Schools was not consistently validated. While REAL Kids Alberta recruited a representative sample of schools, COMPASS and APPLE Schools are based on convenience samples of schools. Further, data collection in REAL Kids Alberta ended in 2014 and therefore, may not represent recent trends (Fung et al., 2012).

Given the disparate nature of these data, results are reported as frequencies and no statistical analyses of differences were conducted. Finally, in-depth interviews and direct observations could add rich contextual information about SFP enablers and barriers, but these data were not collected in any of the three studies. Given these limitations, and the fact that APPLE Schools is an intervention study, generalisations of the current findings should proceed with caution.

Using disparate but best available data sources, this study provides an overview of the current SFP offerings and characteristics in a sample of Canadian schools. The findings underscore the complexity of factors that impact the availability of existing SFPs. The decline in breakfast program availability among secondary schools is a major concern that highlights the need for sustained SFPs to improve the deteriorating quality of Canadian children's diets and increasing inequities in our society. Greater availability of school breakfast programs in deprived areas speaks to the higher demand and underscores the importance of addressing financial barriers to offering nutritious foods to mitigate health inequities. Overall, results support the urgent need for a national SFP and a harmonized school food policy to help improve Canadian children's diet, ensure lifelong healthy eating habits, and promote equitable access to nutritious food.

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References

- APPLE Schools. (2024). *APPLE Schools history*.
<https://appleschools.ca/about/history/>
- Basch, C. E. (2011). Breakfast and the achievement gap among urban minority youth. *Journal of School Health*, 81(10), 635–640. <https://doi.org/10.1111/j.1746-1561.2011.00638.x>
- Bastian, K. A., Maximova, K., McGavock, J., & Veugelers, P. (2015). Does school-based health promotion affect physical activity on weekends? And, does it reach those students most in need of health promotion? *PLOS One*, 10(10), e0137987. <https://doi.org/10.1371/journal.pone.0137987>
- Beare, P., Torgerson, C., Marshall, J., Tracz, S., & Chiero, R. (2014). Examination for bias in principal ratings of teachers' preparation. *Teacher Educator*, 49(1), 75–88. <https://doi.org/10.1080/08878730.2013.84800>
- Blasius, J., & Thiessen, V. (2015). Should we trust survey data? Assessing response simplification and data fabrication. *Social Science Research*, 52, 479–493. <https://doi.org/10.1016/j.ssresearch.2015.03.006>
- Chen, T. A., Reitzel, L. R., Obasi, E. M., & Dave, J. M. (2021). Did school meal programs and SNAP participation improve diet quality of US children from low-income households: Evidence from NHANES 2013–2014? *Nutrients*, 13(10), 3574. <https://doi.org/10.3390/nu13103574>
- Dalhousie University, University of Guelph, University of Saskatchewan, & University of British Columbia. (2023). *Canada's food price report (13th Ed.)*. <https://www.dal.ca/sites/agri-food/research/canada-s-food-price-report-2023.html>
- Ekwaru, J. P., Ohinmaa, A., Dabravolskaj, J., Maximova, K., & Veugelers, P. J. (2021). Cost-effectiveness and return on investment of school-based health promotion programmes for chronic disease prevention. *European Journal of Public Health*, 31(6), 1183–1189. <https://doi.org/10.1093/eurpub/ckab130>
- Employment and Social Development Canada. (2023). *National school food policy engagements: What we heard*. Government of Canada. <https://www.canada.ca/en/employment-social-development/programs/school-food/consultation-school-food/what-we-heard-report-2023.html>
- Faught, E. L., Ekwaru, J. P., Gleddie, D., Storey, K. E., Asbridge, M., & Veugelers, P. J. (2017). The combined impact of diet, physical activity, sleep and screen time on academic achievement: A prospective study of elementary school students in Nova Scotia, Canada. *International Journal of Behavioral Nutrition and Physical Activity*, 14(29). <https://doi.org/10.1186/s12966-017-0476-0>
- Fung, C., Kuhle, S., Lu, C., Purcell, M., Schwartz, M., Storey, K., & Veugelers, P. J. (2012). From “best practice” to “next practice”: The effectiveness of school-based health promotion in improving healthy eating and physical activity and preventing childhood obesity. *International Journal of Behavioral Nutrition and Physical Activity*, 9(27). <https://doi.org/10.1186/1479-5868-9-27>
- Godin, K. M., Patte, K. A., & Leatherdale, S. T. (2018). Examining predictors of breakfast skipping and breakfast program use among secondary school students in the COMPASS study. *Journal of School Health*, 88(2), 150–158. <https://doi.org/10.1111/josh.12590>
- Godin, K. M., Chaurasia, A., Hammond, D., & Leatherdale, S. T. (2019). Examining associations between school food environment characteristics and sugar-sweetened beverage consumption among Canadian secondary-school students in the COMPASS study. *Public Health Nutrition*, 22(11), 1928–1940. <https://doi.org/10.1017/S1368980018001246>
- Government of Alberta. (2012, September). *Alberta nutrition guidelines for children and youth: A Childcare, School and Recreation/Community Centre Resource Manual*. <https://open.alberta.ca/dataset/1c291796-4eb0-4073-be8e-bce2d331f9ce/resource/3319786c-1df1-43ca-8693-067f733682dc/download/nutrition-guidelines-ab-children-youth.pdf>
- Guio, A. C. (2023). Free school meals for all poor children in Europe: An important and affordable target? *Children & Society*, 37(5), 1627–1645. <https://doi.org/10.1111/chso.12700>
- Haapala, E. A., Eloranta, A. M., Venäläinen, T., Jalkanen, H., Poikkeus, A. M., Ahonen, T., Lindi, V., & Lakka, T. A. (2017). Diet quality and academic achievement: A prospective study among primary school children. *European Journal of Nutrition*, 56, 2299–2308. <https://doi.org/10.1007/s00394-016-1270-5>

- Hack, S., Jessri, M., & L'Abbé, M. R. (2021). Nutritional quality of the food choices of Canadian children. *BMC Nutrition*, 7(16). <https://doi.org/10.1186/s40795-021-00422-6>
- Hernandez, K., Engler-Stringer, R., Kirk, S., Wittman, H., & McNicholl, S. (2018). The case for a Canadian national school food program. *Canadian Food Studies*, 5(3), 208-229. <https://doi.org/10.15353/cfs-rcea.v5i3.260>
- Hinrichs, P. (2010). The effects of the National School Lunch Program on education and health. *Journal of Policy Analysis and Management*, 29(3), 479-505. <https://doi.org/10.1002/pam.20506>
- Jia, J., Moore, L. L., Cabral, H., Hanchate, A., & LaRochelle, M. R. (2020). Changes to dietary and health outcomes following implementation of the 2012 updated US Department of Agriculture school nutrition standards: Analysis using National Health and Nutrition Examination Survey, 2005–2016. *Public Health Nutrition*, 23(16), 3016-3024. <https://doi.org/10.1017/S1368980020001986>
- Joint Consortium for School Health. (2007). *Healthy Schools Assessment Tool Project Decision Document*. <https://www.jcsh-cces.ca/downloads/healthy-school-planner/>
- Koc, M., & Bas, J.A. (2012). Canada's action plan for food security: The interactions between civil society and the state to advance food security in Canada. In R. MacRae & E. Abergel (Eds.), *Health and sustainability in the Canadian food system advocacy and opportunity for civil society* (pp. 173-203). UBC Press.
- Leatherdale, S. T., Brown, K. S., Carson, V., Childs, R. A., Dubin, J. A., Elliott, S. J., Folkner, G., Hammond, D., Manske, S., Sabiston, C. M., Laxer, R. E., Bredin, C., & Thompson-Haile, A. (2014). The COMPASS study: A longitudinal hierarchical research platform for evaluating natural experiments related to changes in school-level programs, policies and built environment resources. *BMC Public Health*, 14(331). <https://doi.org/10.1186/1471-2458-14-331>
- Leos-Urbel, J., Schwartz, A. E., Weinstein, M., & Corcoran, S. (2013). Not just for poor kids: The impact of universal free school breakfast on meal participation and student outcomes. *Economics of Education Review*, 36, 88-107. <https://doi.org/10.1016/j.econedurev.2013.06.007>
- Liberal Party of Canada. (2024). *School nutrition and healthy eating*. <https://liberal.ca/our-platform/school-nutrition-and-healthy-eating/>
- Loewen, O. K., Maximova, K., Ekwaru, J. P., Faught, E. L., Asbridge, M., Ohinmaa, A., & Veugelers, P. J. (2019). Lifestyle behavior and mental health in early adolescence. *Pediatrics*, 143(5). <https://doi.org/10.1542/peds.2018-3307>
- Maximova, K., Khan, M. K., Austin, S. B., Kirk, S. F., & Veugelers, P. J. (2015). The role of underestimating body size for self-esteem and self-efficacy among grade five children in Canada. *Annals of Epidemiology*, 25(10), 753-759. <https://doi.org/10.1016/j.annepidem.2015.07.009>
- Ofosu, N. N., Ekwaru, J. P., Bastian, K. A., Loehr, S. A., Storey, K., Spence, J. C., & Veugelers, P. J. (2018). Long-term effects of comprehensive school health on health-related knowledge, attitudes, self-efficacy, health behaviours and weight status of adolescents. *BMC Public Health*, 18(1), 515. <https://doi.org/10.1186/s12889-018-5427-4>
- Olstad, D. L., Nejatnamini, S., Victorino, C., Kirkpatrick, S. I., Minaker, L. M., & McLaren, L. (2021). Trends in socioeconomic inequities in diet quality between 2004 and 2015 among a nationally representative sample of children in Canada. *Journal of Nutrition*, 151(12), 3781-3794. <https://doi.org/10.1093/jn/nxab297>
- Pampalon, R., & Raymond, G. (2000). A deprivation index for health and welfare planning in Quebec. *Chronic Disease in Canada*, 21(3), 104-113.
- People for Education. (2023, September). *Inequities persist: Extracurriculars, clubs, activities, and fundraising in Ontario's publicly funded schools*. <https://peopleforeducation.ca/report/inequities-persist-extracurriculars-clubs-activities-and-fundraising-in-ontarios-publicly-funded-schools/>
- Polsky, J. Y., Moubarac, J. C., & Garriguet, D. (2020, November). Consumption of ultra-processed foods in Canada. *Health Reports*, 31(11), 3-15. <https://www.doi.org/10.25318/82-003-x202001100001-eng>
- Roberts, E., McLeod, N., Montemurro, G., Veugelers, P. J., Gleddie, D., & Storey, K. E. (2016). Implementing comprehensive school health in Alberta, Canada: The principal's role. *Health Promotion International*, 31(4), 915-924. <https://doi.org/10.1093/heapro/dav083>
- Ruetz, A. T., & Engler-Stringer, R. (2014, April 2). *What needs to happen next for Canada to have a successful school*

- food program*. The Conversation.
<https://theconversation.com/what-needs-to-happen-next-for-canada-to-have-a-successful-school-food-program-226947>
- Ruetz, A. T., & McKenna, M. L. (2021). Characteristics of Canadian school food programs funded by provinces and territories. *Canadian Food Studies*, 8(3), 70-106.
<https://doi.org/10.15353/cfs-rcea.v8i3.483>
- Ruetz, A. T., Tasala, K., McKenna, M., Martin, A., Michnik, K., Edwards, G., Engler-Stringer, R., Everitt, T., Maximova, K., Mosby, I., Seko, Y., & Woodruff, S. (2023, April). *Working paper: School meals case study: Canada*. London School of Hygiene and Tropical Medicine.
<https://doi.org/10.17037/PUBS.04671115>
- Russell, J. A., Evers, S., Dwyer, J. M., Uetrecht, C., & Macaskill, L. (2008). Best practices among child nutrition programs in Ontario: Evaluation findings. *Journal of Hunger & Environmental Nutrition*, 2(2-3), 111-127.
<https://doi.org/10.1080/19320240801891511>
- Statistics Canada. (2017). *Population centre and rural area classification 2016*.
<https://www.statcan.gc.ca/en/subjects/standard/pcrac/2016/introduction>
- Stechyson, N. (2024, April 3). *What we know—and don't—about the national school food program*. CBC News.
<https://www.cbc.ca/news/canada/national-food-program-schools-explain-1.7160901#:~:text=Prime%20Minister%20Justin%20Trudeau%20says,announcing%20the%20program%20on%20Monday>
- The Coalition for Healthy School Food. (2023). *School food program implementation – frequently asked questions*.
<https://static1.squarespace.com/static/5b5b5824f2e6b10639fdaf09/t/65c51e27ef0a6945e3eb6d1b/1707417127465/School+Food+Program+FAQ+Dec+2023.pdf>
- Tran, B. X., Ohinmaa, A., Kuhle, S., Johnson, J. A., & Veugelaers, P. J. (2014). Life course impact of school-based promotion of healthy eating and active living to prevent childhood obesity. *PLOS One*, 9(7), e102242.
<https://doi.org/10.1371/journal.pone.0102242>
- Tugault-Lafleur, C. N., Black, J. L., & Barr, S. I. (2017). Examining school-day dietary intakes among Canadian children. *Applied Physiology, Nutrition, and Metabolism*, 42(10), 1064-1072. <https://doi.org/10.1139/apnm-2017-0125>
- Uauy, R., Kain, J., Mericq, V., Rojas, J., & Corvalán, C. (2008). Nutrition, child growth, and chronic disease prevention. *Annals of Medicine*, 40(1), 11-20.
<https://doi.org/10.1080/07853890701704683>
- Valaitis, R. F., Hanning, R. M., & Herrmann, I. S. (2014). Programme coordinators' perceptions of strengths, weaknesses, opportunities and threats associated with school nutrition programmes. *Public Health Nutrition*, 17(6), 1245-1254. <https://doi.org/10.1017/S136898001300150X>
- Vander Ploeg, K. A., Wu, B., McGavock, J., & Veugelaers, P. J. (2012). Physical activity among Canadian children on school days and nonschool days. *Journal of Physical Activity and Health*, 9(8), 1138-1145.
<https://doi.org/10.1123/jpah.9.8.1138>
- Vander Ploeg, K. A., McGavock, J., Maximova, K., & Veugelaers, P. J. (2014a). School-based health promotion and physical activity during and after school hours. *Pediatrics*, 133(2), e371-e378. <https://doi.org/10.1542/peds.2013-2383>
- Vander Ploeg, K. A., Maximova, K., McGavock, J., Davis, W., & Veugelaers, P. (2014b). Do school-based physical activity interventions increase or reduce inequalities in health? *Social Science & Medicine*, 112, 80-87.
<https://doi.org/10.1016/j.socscimed.2014.04.032>
- Vermeer, J., Radovini, S., Singh, N., Oshan, S., Battista, K., & Leatherdale, S. T. (2023). Redevelopment of the school policies and practices questionnaire (2013 to 2022). *Compass Technical Report Series*, 9(2), 1-23.
https://uwaterloo.ca/compass-system/sites/default/files/uploads/documents/redevelopment-of-the-school-policies-and-practices-questionnaire-2012-to-2022_amended_0.pdf
- Veugelaers, P. J., & Fitzgerald, A. L. (2005). Effectiveness of school programs in preventing childhood obesity: A multilevel comparison. *American Journal of Public Health*, 95(3), 432-435. <https://doi.org/10.2105/AJPH.2004.045898>
- World Food Programme (WFP). (2020). *2020 WFP school feeding infographic*.
<https://www.wfp.org/publications/2020-wfp-school-feeding-infographic>