La Revue canadienne des études sur l'alimentation

Canadian Food Studies

the journal of the Canadian Association for Food Studies
la revue de l'Association canadienne des études sur l'alimentation

Vol 13 No 1 (2026):

TRANSITION, CHANGE, TRADITION, TERRAIN

canadianfoodstudies.ca

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955 Oliver Road
Thunder Bay (ON) P7B 5E1

ISSN: 2292-3071

IN THIS ISSUE

> We also passed Beechville, [sic] a small, but beautiful village, round which the soil is reckoned very fine and fertile; a number of most respectable settlers have recently bought land and erected houses here. The next place we came to was Oxford, or rather Ingersol [sic], where we stopped to dine and rest previous to plunging into an extensive forest called the Pine Woods.
>
> Oxford is a little village, presenting the usual saw-mill, grocery store and tavern, with a dozen shanties congregated on the bank of the stream, which is here rapid and confined by high banks.
>
> — Anna Brownell Jameson (1838)
> *Winter Studies and Summer Rambles in Canada*

Anna Brownell Jameson spent the summer of 1837 travelling around southwestern Ontario. Apart from its built environment and geographical particularities—the stream she describes is perhaps a narrow portion of the Thames River?—Brownell Jameson remembers Ingersoll for the food. She describes "a good dinner, consisting of slices of dried venison, broiled; hot cakes of Indian corn, eggs, butter, and a bowl of milk." Ingersoll is this managing editor's hometown and Oxford is her home county. I am pleased to note its well-stocked pantry. And yet, this exercise in travel writing, now nearly two hundred years old, has the effect of defamiliarizing this familiar patch of land. What makes Beachville settlers particularly respectable? Are they socially acceptable or of good standing, as Brownell Jameson is likely suggesting? If we consider this passage in the context of Indigenous reconciliation, what do we then make of such notions as "respectful settlement" or "buying land" with their contradictions and more-than implications of domination? And did much of that extensive forest pass through the sawmill to make way for farmland? In other words, in what ways was this patch being claimed and adapted? How might we find nuance in this touristic account? Such is the (time) traveller's prerogative—to describe, to seek fresh perspectives, to wonder about home while writing away.

Ellen Desjardins's editorial is a similar exercise in translation. She uses her recent travels to Bhutan as way to think through the articles in this issue and the crossovers between food systems in Bhutan and Canada. Like Brownell, Desjardins knows what it is to lay in a good meal, trading in Ingersoll's bowl of milk for a cup of savoury yak butter tea.

Bonne lecture!

Published: 2026-04-30

cover image: Ellen Desjardins

Vol. 13 No. 1, pp. 1–7 April 2026

Canadian Food Studies La Revue canadienne des études sur l'alimentation

Editorial

Embracing tradition: Lessons from Bhutan

Ellen Desjardins*

Perusing the titles in this issue's articles, the following words jump out at me: alternatives, innovations, transitions, calls to justice, change. While the subject matter differs from piece to piece, there is a clear emphasis on spaces of transformation, where new ideas and practices are actively experimented with and examined. It generates a spirit of optimism that the agri-food industry behemoth can be challenged successfully, bit by bit. Collectively, the authors are seeking fresh perspectives and efforts to enhance inclusion and participation where there were gaps.

Spaces oriented around quests for improvement gain significance when contrasted with places that naturally–and deliberately–have not embraced change. I witnessed this recently in my travels to Bhutan. For two weeks in the fall, my husband Michel and I journeyed across the mountainous country with two Bhutanese guides. Land-locked Bhutan is nestled below the Himalayan Alps, and bordered by Tibet, Nepal, and India. About the size of Switzerland, it has a population close to 760,000. Beyond the capital city, people are spread across the country in small towns, villages, and farms, which can be isolated when the rains arrive and make travel by road difficult. In many ways, it is like going back in time.

How can a country be attuned to the present age, resist poverty, support education and health care for all, and yet avoid the manufactured excesses that we in Canada bemoan? We saw a paradoxical co-existence of both modern conveniences and practices from another era. Most people drive cars or scooters, use cell phones, and enjoy electricity in their homes–even in remote locations. Indeed, hydro-electric power is Bhutan's main export, thanks to cascading rivers from mountain glaciers. At the same time, rice in the fields and terraces is mostly harvested by hand. And in general, people wear traditional Bhutanese clothes every day, made from colourful, durable hand-woven fabrics.

The food! It's local, seasonal, simple, and mostly plant-based. Aside from some shops in the capital city, you will not find highly-processed, packaged edibles or fast-food venues. A key ingredient of most dishes is visible in the fall: brilliant carpets of red chilies drying on the rooftops and strung from the eaves. Everywhere you will be served "ema datshi", a creamy mix of whole chilies and yak cheese.

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DOI: 10.15353/cfs-rcea.v13i1.796
ISSN: 2292-3071

This is complemented with red rice, dumplings, and seasonal local vegetables (also spiced with chilies). Hot yak butter tea is a staple, providing energy during cold winter months. Breakfast might be buckwheat pancakes and eggs (no syrup). Local markets are a visual delight: endless stalls with different rice varieties and heaps of vegetables, both fresh and dried for winter preservation.

The socio-political and spiritual contexts offer clues to the stability of the Bhutanese infrastructure and food system. Most visibly, this country is dominated by a Bhutanese version of Tibetan Buddhism. Scenic temples can be reached along mountain paths, and white stupas dot the landscape. At key locations, such as mountain passes, long strings of colourful prayer flags criss-cross and flutter in the wind. Large brass prayer wheels turn continuously in fast-moving creeks. The Buddha and many other Guardian Deities in the temples are honoured by food offerings of special items like fruit and ornate sugary creations. Red-robed monks and even young novices are a common sight in the streets. All this seems to bring a sense of calm, regularity, peace, and security to the landscape.

Secondly, the country is a constitutional monarchy, lauding ethical and environmental principles and cultural preservation. The Bhutanese love their king like a benevolent father figure. They would be incredulous at the idea of a "no kings" protest. King Jigme Khesar Namgyel Wangchuk created a parliamentary democracy in 2008, handing over government leadership to the prime minister, while remaining the head of state. People voted for the first time[1]. In 2009, the king enacted land reform, promoting widespread rural settlement to support local, sustainable agriculture.

While much of this seems positive, there are, of course, flaws and the inevitable problematic outcomes. For example, we joined a group of disgruntled farmers at a remote farm who were sitting on the ground, chewing paan, and discussing a petition to the government for an overdue upgrade to their narrow, winding, badly rutted mountain road. Still, the fact that they felt they had a voice was good! We also heard about the substantial emigration of young people, especially to Australia, for higher-paying jobs. Immigration is strictly limited, but recently Indian migrant workers have been let in to overcome labour shortages. No one could tell us which indicators are used to measure Bhutan's famous Gross National Happiness, but it is a thing.

We wondered (while sipping local Red Panda beer in Punakha): what can we learn from this unique society, to understand what influences Bhutanese agriculture and diet? We suggest two major factors: geography and religion. Both are constraining and enabling.

Geographically, the country is striated by north-south mountain ranges descending from the northern Alps, with fertile valleys and rivers in between. This has an isolating–but also community building–effect for those in more easterly parts of the country. Crops are planted in terraces, so harvesting by hand becomes a family effort. Cold winters prevent the survival of fruit trees, except in the southern parts. However, the woolly yaks are well suited to roaming around and grazing along roadsides. (Do not open your car window to take a photo.) Arguably, adherence to the traditional seasonal diet, involving home cooking and preservation, contributes to the population's health and strengthens their national identity. Domestic policy aims to preserve this food culture. Certainly, the importation of large quantities of food, processed or otherwise, would threaten the local food economy and undermine culture and agriculture.

Buddhism has been a pervasive force for centuries in Bhutan; it evolved into a specific form that is believed to

[1] See *The Monk and the Gun*, a film by Pawo Choyning Dorji, 2023.

protect the people. Stories and myths abound, depicted vividly on walls inside public buildings and temples, of heroes and deities who have struggled valiantly against outside invaders to preserve peace in Bhutan. Some of these deities live in the snow-capped mountains, hence skiing and high mountain climbing is prohibited. The Buddhist belief in reincarnation means that eating meat is avoided, as mammals are considered sentient beings. Violence is never glorified nor seen as a solution. The Bhutanese experience of religion for the most part reinforces a strong relationship between people and the land. This in turn supports personal and environmental health, ethical forms of governance, and strong family life.

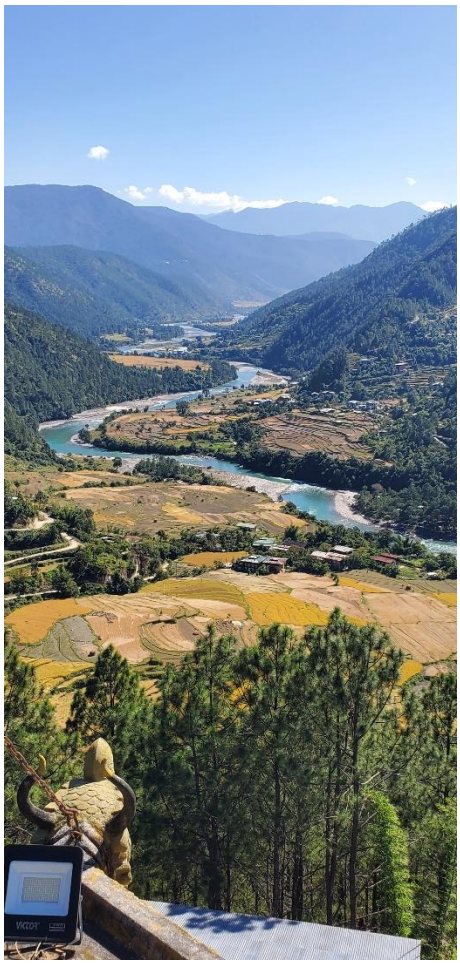
Upon reflection, there is an overlap between Bhutanese values and certain food trends within our own country, ones that promote commensality, small-scale and organic farming, a plant-based, less processed diet, seasonal eating, and a close connection between producers and consumers. For Bhutan, it means protecting the status quo, while in Canada we are perhaps rediscovering, or actively transitioning to, more sustainable, healthier approaches to food along the entire food chain. Our food system includes multicultural diversity and global trade, as well as industrial agriculture and the hegemony of multinational companies. The Bhutanese have so far tried to steer clear of those factors. But it is likely only a matter of time until they too will transition, alter, innovate. Meanwhile, we can appreciate our differences and learn from each other's strengths.

Michel and Ellen with our two Bhutanese guides

Having fun with some young monk novices.

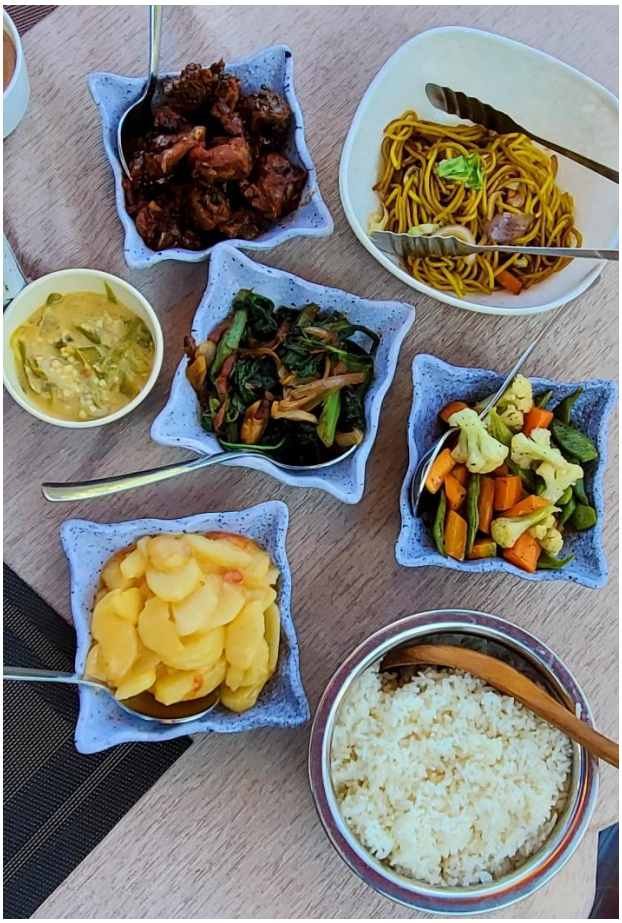
Yak butter tea

Yaks grazing under high altitude power lines.



Bhutanese river valley with terraced agriculture.

A monk offers food to the Buddha in a temple



Typical Bhutanese dishes on our table

Carrying vegetables to market.

A Bhutanese weaver.

Vol. 13 No. 1, pp. 8–17 April 2026

Canadian Food Studies La Revue canadienne des études sur l'alimentation

Commentary

Critical considerations for Canada's National School Food Program: School food labour, mental health, and inclusivity

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Abstract

School food programs (SFPs), which may include breakfast, lunch, and snacks, with or without curriculum integration, have tremendous potential to enhance the health and well-being of Canadian children, youth and communities. However, these programs are often politically undervalued, running on volunteer labour with limited space, equipment, and funding. In 2024, the Government of Canada announced a significant change to this status quo with a $1 billion investment over five years and a new school food policy for the development of Canada's first National School Food Program (NSFP). With the passing of the *National School Food Program Act* in early 2026, permanent funding will be available starting in 2029-30. This new national-scale program will build on existing local, regional, and provincial programs with the long-term goal of ensuring that every child has access to nutritious food in school, with objectives such as universal access, teaching healthful food-related behaviours and attitudes, and inclusiveness. However, for meaningful and equitable advancement of NSFP goals, we propose that the program must first address structural factors: developing the school food workforce, integrating mental health promotion, and culturally tailored programming. Doing so can serve to advance diversity, equity, and inclusion efforts, especially given growing concerns about youth mental health and the need for sensitivity when providing food and engaging youth in food-related discussions. As the NSFP expands, developing school cook training plans that engage local

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DOI: 10.15353/cfs-rcea.v13i1.765
ISSN: 2292-3071

workers and meet the employment needs of equity-deserving women are critical to ensuring programs provide nutritious, healthy, and locally adapted menus. Action in these key areas will help identify and address the social and historical experiences of workers, students, families, and communities, and support holistic and health-promoting programming.

Keywords: Canada; health equity; mental health; school food labour; school food programs; youth

Résumé

Les programmes d'alimentation scolaire (PAS), qui peuvent inclure le déjeuner, le dîner et les collations, qu'ils soient intégrés ou non dans les programmes d'études, ont l'immense potentiel d'améliorer la santé et le bien-être des enfants, des jeunes et des communautés du Canada. Pourtant, ces programmes sont souvent sous-estimés du point de vue politique ; ils reposent sur du travail bénévole ainsi que sur des espaces, des équipements et des ressources financières limités. En 2024, le gouvernement du Canada a annoncé un changement majeur dans cette situation au moyen d'un investissement d'un milliard de dollars sur cinq ans et d'une nouvelle politique concernant l'alimentation scolaire afin de concevoir le premier Programme national d'alimentation scolaire (PNAS) du pays. Avec l'adoption de la loi sur le Programme national d'alimentation scolaire au début de l'année 2026, le PNAS a été pérennisé, avec une promesse de financement de 216,6 millions de dollars par an à partir de 2029-2030. Ce nouveau programme d'envergure nationale sera conçu sur la base des programmes locaux, régionaux et provinciaux existants ; l'ambition à long terme est de garantir à chaque enfant l'accès à des repas nourrissants à l'école, avec des objectifs tels que l'accès universel, l'enseignement de comportements et d'attitudes favorables à la santé en matière d'alimentation, l'inclusion. Cependant, pour que les objectifs du PNAS soient véritablement significatifs et équitables, nous proposons que le programme s'attaque avant tout à des facteurs structurels : il faut augmenter les ressources humaines dans les services d'alimentation scolaire, intégrer la promotion de la santé mentale et être adapté aux spécificités culturelles. Cela peut contribuer aux efforts en faveur de la diversité, de l'équité et de l'inclusion, surtout dans un contexte de préoccupations croissantes concernant la santé mentale des jeunes et devant la nécessité de faire preuve de sensibilité lorsqu'on offre de la nourriture et qu'on ouvre avec les jeunes des discussions sur l'alimentation. Alors que l'on met progressivement en place le PNAS, il est crucial d'élaborer des formations pour le personnel cuisinier des écoles qui fassent intervenir la main-d'œuvre locale et de répondre aux besoins professionnels des femmes en situation de vulnérabilité pour garantir que les programmes offrent des menus nutritifs, sains et adaptés localement. Les actions menées dans ces domaines importants aideront à prendre en compte les réalités sociales et historiques des travailleurs, des élèves, des familles et des communautés, et ainsi à mettre en œuvre un programme holistique favorisant la santé.

Introduction

With the launch of a National School Food Program (NSFP) and Policy in Canada, which includes $1 billion in federal funding over its first five years and permanent funding commencing in 2029, school food programs (SFPs) are rapidly expanding across the country. As of March 2025, all provinces and territories, as well as many First Nations, have signed on to this historic initiative (Employment & Social Development Canada, 2025). The NSFP envisions a country where every child can access nutritious food at school, underpinned by five objectives (Table 1) (Employment & Social Development Canada, 2024a). While these objectives are important and compelling, presenting them as a fixed policy list leaves critical gaps for school food leaders working in diverse and dynamic schools and communities. Increasingly, public health scholars recognize that the unintended consequences of public policies may ultimately make them ineffective and potentially harmful (Oliver et al., 2019), highlighting the need to account for and respond to complex structural and community factors before policy implementation (Bonell et al., 2015).

Table 1: Policy objectives for Canada's National School Food Program

1.	Work progressively towards the long-term goal of universal access
2.	Help children meet their nutritional and health needs, develop healthful food-related behaviours and attitudes, as well as food and nutrition knowledge and skills
3.	Promote programming that is culturally appropriate, relevant, and inclusive
4.	Expand investment in school food so that programs can operate sustainably
5.	Create opportunities for local economies and reflect of local and regional circumstances

Note: Objectives adapted from Government of Canada (2025)

Others have outlined broad considerations for investment and accountability in the implementation, monitoring, and evaluation of the NSFP (Blais et al., 2025), but concerns regarding the school food workforce, student mental health, and culturally tailored programs remain largely unaddressed. For decades, existing SFPs in Canada have operated despite insufficient staffing, space, equipment, and funding (McKenna et al., 2026), and have rarely acknowledged the need for a workforce behind the meals. While evidence shows that SFPs can promote health and well-being, including improved student food literacy, diet quality, academic achievement, sense of cultural identity, and community cohesion, these benefits have not been distributed equally across school communities and, at times, have been entirely neglected (ibid.). Furthermore, young people face barriers to developing holistic, healthful food-related behaviours and attitudes that support mental health within school food curricula that often inadvertently reinforce diet culture. Advancing the NSFP requires that policymakers at all levels of government and school food leaders and partners (i.e., principals, health professionals, community organizations, researchers, families,

teachers) recognize past failings and consider these aspects as foundational before planning a new path forward.

Developing the school food workforce: The "who" behind the meals

The expansion of SFPs in Canada toward universal accessibility (Table 1, Objective 1) is inextricably tied to the "who" behind the meals. Meal planning, cooking, cleaning, and serving food have long been undervalued and politically disregarded as work when carried out at home, and inadequately remunerated in the workforce (Duffy, 2011). Recruitment and retention within the school food workforce is difficult, particularly in rural areas (Cohen et al., 2021). In the U.S., school cafeterias are largely staffed by women who live at or near the poverty line and earn lower wages compared to those in other food service sectors (Gaddis, 2019; Billings et al., 2022). In addition, school cafeteria work is disproportionately performed by Black and Hispanic women when compared to the larger U.S. workforce (Billings et al., 2022). While Canadian research on the SFP workforce is limited, it highlights the lack of full-time hours and training for school cooks. Worse yet, in many cases, schools lack paid cooks, leaving educational staff to prepare often ready-to-make, processed foods. For example, a survey of over half of school divisions in Saskatchewan in 2024-25 revealed that 69% of schools did not have paid cooks (Michnik, 2025b). In addition, Canada's most comprehensive SFP study to date, *Good Food for Learning* (Engler-Stringer et al., 2021), demonstrated the foundational role of school cook training, competitive salaries, and full-time positions in the successful delivery of universal SFPs (Michnik, 2025a).

Research is needed to understand the school food workforce in Canada, including who makes up the workforce, job satisfaction, workplace structure, employment sustainability, and more. However, ensuring sufficient, well-paid school food positions and training for school food workers can start now. School food worker training programs can leverage the knowledge and skills of current school cooks and staff to ensure that local factors, like culture, climate, and community, are central to program design and operation. In addition, the Canadian NSFP can adapt and improve training and staffing practices from long-standing programs around the globe (see Hoyer et al., n.d.; Chef Ann Foundation, 2025; Lewis & Lartey, 2018). Training, alongside adequate kitchen equipment, infrastructure, and competitive wages, will go a long way toward supporting children's and youth's diets, as staff are empowered to prepare healthy, fresh, and culturally appropriate foods to meet *Canadian Food Guide* guidelines (Health Canada, 2019) and the NSFP's goals. We encourage ongoing, hands-on training programs that include mentorship and paid training opportunities. Wages for school cooks can pay a living wage (Living Wage Canada, 2026) or higher and offer full-time positions with options for summer employment. Without local, skilled, and well-cared-for workers in place, the NSFP will struggle to meet its ambitions and objectives.

Integrating mental health promotion: Implications for weight stigma and disordered eating

When promoting healthful food-related behaviours, attitudes, and skills (Table 1, Objective 2), the NSFP must consider implications for mental health, including weight stigma and disordered eating. Weight stigma encompasses negative attitudes and biases toward individuals with higher weights. In childhood and adolescence, experiencing weight discrimination is associated with a higher risk of depression, anxiety, poor sleep, as well as disordered eating and eating disorders (Puhl & Lessard, 2020). Disordered eating includes maladaptive and harmful thoughts, attitudes, and behaviours related to body weight, shape, and appearance, affecting an estimated one-fifth of children and adolescents globally (López-Gil et al., 2023).

Both weight stigma and disordered eating can significantly affect youths' food-related behaviours and attitudes. Individuals who engage in disordered eating endorse high levels of weight-stigmatizing beliefs, even without experiencing direct weight discrimination (Levinson et al., 2024; Jendrzyca & Warschburger, 2016), which underscores the role that weight stigma can play in upholding and reinforcing poor mental health. Further, experiencing weight discrimination is associated with engagement in disordered eating and weight-control behaviours (e.g., binge eating, restriction) (Puhl & Lessard, 2020) that can severely impact overall diet quality.

It is possible that SFPs may aggravate weight stigma and disordered eating among children and adolescents (Ireland et al., 2023; Leme et al., 2020; Tingle et al., 2023), though few empirical investigations have been carried out. One hypothesized pathway is a myopic focus on obesity prevention, in which SFPs and associated curricula emphasize weight loss, body size and shape rather than engagement in healthful food-related behaviours (Ireland et al., 2023; Turner et al., 2024; Aydin et al., 2022). A second hypothesized pathway is through a weight-stigmatizing "diet culture," an environment that promotes conflicting messages and myths about food within a moral hierarchy (e.g., "fat is bad," "thin is good") (Jovanovski & Jaeger, 2022). In SFPs, messages about body weight and the moral value of "good" and "bad" foods can harm food-related attitudes (Ireland et al., 2023). Both pathways have the potential to diminish healthful food-related behaviours among young people, particularly among those with higher body weight. To ensure that the NSFP does not worsen mental health, particularly among youth with higher weights, we encourage the creation of educational materials for staff and students that de-emphasize associations between food and body weight, shape, and/or appearance and endorse healthful food-related attitudes and behaviours through a weight-neutral lens.

Culturally tailored programming: Meaningful engagement and repairing past harms

The NSFP outlines culturally appropriate, relevant, and inclusive programs (Table 1, Objective 3). Between 2001 and 2021, Canada's racialized population increased by 130 percent, from 3.85 million to 8.87 million. Two-thirds of this increase is attributed to immigration from non-European countries (Statistics Canada, 2023b). In 2021, Indigenous Peoples made up five percent (1.8 million) of Canada's total population. Indigenous Peoples are the fastest-growing and youngest demographic group in the country (Statistics

Canada, 2023a). It is vital that the NSFP addresses the needs of an increasingly diverse nation.

Given that racialized communities often experience poorer diet quality and health outcomes than their White counterparts, integrating elements of cultural safety into the NSFP is a matter of health equity (Andreo & Andrade, 2020). A review of nutrition intervention strategies and their impacts on nutrition knowledge, dietary adherence, and health outcomes among Indigenous youth found that programs using a participatory, culturally safe approach to nutrition education improved knowledge and/or dietary adherence (ibid.).

A second potential benefit of more culturally tailored SFPs is that they may help increase knowledge and acceptance of diverse racial and ethnic cuisines (Yan, 2024). This is particularly important in Canada, where SFPs have historically been exploited to exert colonial force over Indigenous communities within the residential school system (Truth & Reconciliation Commission of Canada, 2015). The 2015 Truth and Reconciliation report highlighted the cultural loss of traditional foods and diet at residential schools, noting that this loss "added to the students' sense of disorientation" (ibid., Executive Summary, p. 88). One survivor shared, "I can't cut up caribou meat; I can't cut up moose meat; work with fish and speak my language. So I was starting to become alienated from my parents and my grandparents; everything." (ibid.).

Although nutrition and food programs have been used historically as tools of oppression (Mosby, 2014), they can also uplift the diverse identities of Canadian youth. It is important that we acknowledge the harmful impacts of historical practices of forced assimilation within Canadian SFPs and continually work to promote cultural diversity through exposure to diverse cultural cuisines and inclusive nutrition education. Promoting a diverse array of cultural cuisines within SFPs that reflect and celebrate Canada's diversity is needed. Meals and snacks should be served alongside culturally tailored nutrition education curricula co-created with Indigenous and racialized community partners that complement the NSFP.

Conclusion

With the launching of Canada's NSFP across the country, some school divisions and boards, provinces, and community partners will, for the first time, address questions about hiring and training a school food workforce, integrating nutrition and food education into meal programs and curricula, and designing culturally relevant menus and activities. Ensuring that the benefits of the NSFP are distributed equitably and implemented meaningfully for all students, families, workers, and communities requires elevating the status and value of school food workers while also addressing social complexities, with a view of unravelling past harms. By providing training for school food workers and adequate compensation, we can ensure that food is prepared and served in ways that engage and respect students' mental, cultural, and spiritual well-being and needs. When student identity is centred, and a sense of belonging and care is created in programs, students' well-being (Black et al., 2022; Michnik & Engler-Stringer, 2025) and staff satisfaction, can improve (Michnik, 2025a).

Given the historic under-recognition of women working in kitchens, the lack of funding and inclusivity in food policy, and the rhetoric of control and

colonization over food systems and bodies, moving toward more just and equitable programming will require not only focusing on expected impacts but also on how we can seize this momentum for change to identify harmful patterns and steward new paths forward. Doing so will ensure that investment in the NSFP has the potential not only to improve student nutrition but also to reinforce public policy goals in Canada for improved mental health among youth (Public Health Agency of Canada, 2025; Pan-Canadian Joint Consortium for School Health, 2025), gender equality (Employment & Social Development Canada, 2024b), reconciliation (Truth & Reconciliation Commission of Canada, 2015), and diversity and inclusion (Zhong et al,, 2023). Ensuring that participating school communities maintain control over program aspects such as training, staffing, educational resources, menus, and ongoing funding from all levels of government will help achieve NSFP goals. Critical considerations for the NSFP require a mindful approach to policy goals, cognizant of the lived realities and historical experiences of young people, families, and workers in our school communities, and the wise investment of resources not only to create a program that feeds students but also that deeply nourishes entire communities.

Acknowledgements: We would like to thank Rachel Engler-Stringer, PhD, for her review of this paper.

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Vol. 13 No. 1, pp. 18–26 April 2026

Canadian Food Studies La Revue canadienne des études sur l'alimentation

Perspective

Opportunities and barriers to alternative livestock production in the Kingston, Ontario region

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Abstract

Alternative livestock production is an important transition away from industrialized livestock production and towards more sustainable systems. However, even in areas well suited to alternative livestock production, non-industrial producers continue to struggle to make ends meet. This perspective piece examines the livelihood challenges facing alternative livestock producers in the Kingston, Ontario region based upon key informant interviews with farmers and other key stakeholders. Our findings demonstrate that a decline in the number of provincial processing facilities and poorly scaled regulations are key barriers for producers, while current systems of value are also misaligned. These problems have persisted for many years and need urgent policy attention. We conclude by discussing potential solutions such as mobile abattoirs and increasing technical and marketing support.

Keywords: Alternative food systems; farmer livelihoods; food policy; livestock production

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DOI: 10.15353/cfs-rcea.v13i1.727
ISSN: 2292-3071

Résumé

Transformer l'élevage est un élément important de la transition entre la production industrielle et des systèmes plus durables. Cependant, même dans des régions particulièrement propices aux productions animales alternatives, les producteurs non industriels peinent encore à joindre les deux bouts. Cet article « Perspective » examine les difficultés de subsistance que connaissent les éleveurs adoptant des méthodes différentes dans la région de Kingston, en Ontario, d'après des entretiens menés auprès de fermiers et d'autres acteurs importants du milieu. Nous avons observé que la diminution du nombre d'installations de transformation provinciales et la réglementation peu adaptée sont des obstacles majeurs pour les éleveurs, sans compter que les systèmes de valorisation actuels comportent des incohérences. Ces problèmes persistent depuis plusieurs années et nécessitent une attention politique urgente. Nous concluons en discutant des solutions potentielles, telles que des abattoirs mobiles et le renforcement du soutien technique et commercial.

Introduction

The importance of meat protein in healthy diets and the current unsustainable state of global livestock production make it necessary to transition to alternative methods of livestock production. The consumption of meat offers benefits, including providing a whole protein source that is accessible in most climates, seasons, and areas, including those unsuitable for cropland (Henchion et al., 2017; Katz-Rosene, 2020; Ominski et al., 2021). However, the current globalized and industrial livestock production system is unsustainable by almost every metric; these include greenhouse gas emissions, land use change, biodiversity loss, animal and farm worker welfare, water consumption, fertilizer and pesticide use, and disease outbreaks, as well as social disconnection from food production (Clapp, 2023; Gerber et al., 2015; Weis, 2013; Willett et al., 2019). A transition towards alternative methods of livestock production could play an important role in addressing negative impacts of industrial livestock production. Alternative livestock systems are characterized by short supply chains, improved environmental outcomes, improved animal welfare, and retention of more economic value for farmers (Genest-Richard et al., 2025; Gwin, 2009; National Farmers Union, 2016; Vignola et al., 2015). At the farm and ecosystem levels, alternative livestock systems transition away from the use of feedlots and the purchase of feed and turn instead towards practices of pasturing, rotational grazing, and biodynamic systems that generate value based on positive feedback cycles rather than external inputs and off-site costs (Genest-Richard et al., 2025). However, due to the regionally adapted nature of alternative livestock farms and systems, they are difficult to characterize beyond describing various practices that farmers select from to solve their problems and suit their own needs. For example, farmers engaged in our study mentioned growing and storing their own hay or silage and taking part in rotational grazing and pasturing to feed their livestock; these practices can also help to avoid unpredictable and high feed costs. To support this transition further, policy barriers hindering alternative livestock production must be examined and addressed.

This Perspective paper examines the feasibility of alternative livestock farming in the Kingston, Frontenac,

Lennox, and Addington (KFL&A) region of southeastern Ontario. This region has suitable soils for livestock production, plenty of fresh water, and population centres located relatively close to rural communities. We draw upon interviews conducted with seven farmers, one local abattoir, and one food policy expert within the KFL&A region.

Interviews took place between January and early March of 2024, prior to a devastating fire in June 2024 that burned down one of the provincial abattoirs in the region. Therefore, while the effects of this fire on the community were surely devastating, they are not captured in this study. The producers interviewed in our study do not meet industrial volume requirements for processing in larger federal facilities and thus rely entirely on provincial processing facilities. Among the farms included in the study, cattle were the most common livestock raised for sale, followed by pigs, lamb and goat, and poultry. Selling at the farm gate was the most frequently utilized point of sale, with larger producers finding more value in selling at local farmers' markets.

This paper discusses the impacts of decades of government policies supporting industrial livestock production on alternative livestock farmers and on the status of infrastructure in the KFL&A region. Many of the challenges we identify are also experienced by producers in this sector across Ontario and Canada. We consider how farmers, livestock processors, and consumers can work together to generate social and economic value in alternative livestock networks.

Abattoir access as a limiting factor for rural livelihoods

Years of provincial and federal policies favouring industrial- and export-focussed livestock farming have left alternative farmers in a very difficult position. Studies across Canada have documented how improperly scaled regulations have exacerbated the decline of provincially licensed and inspected abattoirs and created favourable conditions for industrial livestock production to dominate (Barter, 2014; Charlebois & Summan, 2014; Costa, 2021; Gwin & Thiboumery, 2013; Miewald et al., 2015; National Farmers Union, 2021; Richardson, 2022). As a result, many have called for urgent policy reforms to promote sustainable rural livelihoods in this sector. For example, a notable transition occurred in Ontario following the sweeping *Food Safety and Quality Act* of 2001 (Barter, 2014). This represents one of the most significant changes since the 1962 *Meat Inspection Act* was introduced; it included the adoption of the Hazard and Critical Control Point (HACCP) food safety system which eliminated previous exemptions to food safety standards and drastically increased enforcement and auditing in provincially licensed meat plants (Barter, 2014). Barter (2014) and Charlebois and Summan (2014) found that smaller abattoirs struggled with requirements for intensive documentation as well as new facilities and equipment. There has been a notable decline in the number of provincially licensed abattoirs in Ontario over the past two decades, from 183 facilities in 2005 to 142 facilities in 2012, and as of 2025 there are only 100 provincially licensed facilities for all of Ontario (Charlebois & Summan, 2014; Government of Ontario, 2025a). In addition to this dramatic reduction in numbers, the remaining facilities are mostly located in south-central Ontario, leaving many northern and

rural communities without any provincially licensed processing options. Some participants in our study similarly described difficulties with record keeping and an increasingly complex bureaucracy as key challenges for smaller facilities.

Overall, the main livelihood challenges identified by farmers in our study were burdensome travel distance to abattoirs and lack of processing options. Animal products are generally not ready for pickup on the same day as the animals are delivered, meaning that farmers must drive to and from the abattoir twice. An abattoir one hour away—a typical distance for those in the KFL&A region—therefore results in four hours of driving. Since the 2024 fire at the processing facility in Yarker, the closest facilities for farmers in the KFL&A region are those in Picton, Tweed, or Athens (Government of Ontario, 2025b). Long travel times can also impact animal welfare, and a lack of processing options can leave farmers stuck if processing quality decreases. Travel is even more problematic for poultry processing, with many participants reporting that the lack of nearby poultry abattoirs completely prevents poultry production in the region. Participants indicated that these barriers prevent current farmers from growing their production and limit new entrants to the sector. This is particularly concerning because poultry is one of the most accessible forms of livestock for new farmers to raise.

All participants felt strongly that expanding current facilities or opening a new abattoir would significantly benefit producers in the region. Farmers reported selling out of their products each year, indicating that consumer demand is present. Unfortunately, prospects for opening a new abattoir in the region that can support alternative producers are poor. The seasonality of alternative livestock production, expense of processing equipment and facilities, high costs of keeping licenced inspectors on site, and potentially lower weights of animals raised in pastoral systems all make opening and running a new abattoir difficult (Barter, 2014; National Farmers Union, 2021). Some participants were involved in previous community-led efforts to open a new abattoir in the region which fell through due to high costs and difficulty finding a suitable location.

Some participants suggested that low-volume mobile abattoirs operated by licensed inspectors out of existing facilities could be a solution, particularly for smaller producers. One of the older farmers remembered a time when mobile abattoirs operated in the region and described the efficiency they offered for smaller batches of poultry. In a livestock processing policy review, the National Farmers Union (2021) found that on-site slaughter and mobile abattoirs can meet processing regulations, reduce transport times, and significantly improve animal welfare in provinces where they are currently used (also see Pinkney, 2014). Gibson and Epprecht (2017) similarly suggested that a mobile slaughterhouse may revitalize foodways in the rural area of Haliburton, Ontario. The mobile abattoir solution would alleviate initial costs for facilities and difficulties finding a suitable location as they can co-exist with the current processing and regulatory framework and are more easily scalable based on demand. Finding and training operators would necessarily be a priority, but this could be accomplished with the support of existing facilities and abattoir professionals. While it may not be a long-term solution for a full transition to alternative livestock farming, this could help alleviate current stresses and, over time, encourage sufficient growth in alternative production to support a permanent facility.

Finding value in alternative livestock farming

The financial difficulties of alternative livestock production were felt by all participants in our study. Alternative livestock producers face land-access challenges, difficulties finding trained farm workers, labour costs associated with attending farmers' markets, and high costs of any relevant equipment and feed when required. Processors rely on a dwindling number of producers, high seasonal demand, and very high facility and equipment costs. Addressing the root financial difficulties of livestock farming is essential to ensuring that local food production can grow.

Years of competing with low costs of food production in industrial systems have left farmers in the alternative livestock sector undervalued for their labour. Finding economic value in farming was frequently mentioned during interviews; for example, cutting hayfields versus pastorally grazing them, finding the best combinations of methods and locations for selling their products, organic certification, travel times, and whether government farming programs were worth the time spent applying to them were all economic decisions farmers had to weigh. To help alleviate financial stress and uncertainty, most producers or their family members worked a non-farm job to make a livable income, helping the household to maintain a farming lifestyle. This is the reality for many farmers across Canada who increasingly rely on off-farm sources for a growing proportion of their income (National Farmers Union, 2024). Despite selling out of their products each year, farmers still expressed concerns about how lack of consumer reliability makes forecasting and planning for growth difficult. Consumers are not bound to buy products in the same way that processors need farmers and vice versa. If interest or value calculations for consumers change, and in the absence of any other ties to farmers, consumers can shop at grocery stores where meat is typically always available. This struggle for reliability in alternative food systems is summarized well by Mount (2012), who states that "an alternative identity must go beyond brand loyalty and product quality. It must stake out territory, spaces and bonds that cannot be replicated through conventional food chains" (p. 112). While improving the state of processing infrastructure alone may not achieve this, it is certainly a necessary step in creating a thriving system where novel bonds and connections can be formed. These findings indicate a need for strong commitment among all actors—including both producers and consumers—in an alternative food system and highlight the value of personal connections and social engagement between groups.

Across Canada in recent years, farmers' markets and food hubs have been identified as key mechanisms for helping producers capture the full value of alternative products (Andrée et al., 2015; Beckie et al., 2012; Warsaw et al., 2021). In the KFL&A region, a recent study by the City of Kingston (2023) described strong interest in alternative food networks among citizens, with the most popular being farmers' markets. However, most farmers interviewed in this study expressed that the stall costs, time, and travel costs of attending farmers' markets made selling from a farm gate more economical and appealing. Participants were aware of several strong markets in the region. The Kingston Memorial Centre Farmers' Market and Harvest Hastings were held in high regard by participants for preventing reselling and promoting local food producers. Farmers' markets and clustering activities have been noted to increase consumer awareness, promote knowledge sharing, and add to the social value of alternative food systems (Beckie et al.,

2012). However, with most farmers in our study choosing not to attend markets or other clustering activities despite being aware of the potential benefits, methods of supporting food system growth remain a dilemma. This resonates with the findings of Kupke and Page (2015) in *Does the Farmer Want a Market?*, which suggest that any solutions to finding economic and social value in products while growing the alternative food system must be done gradually and must encompass more diverse marketing outlets than exclusively farmers' markets. It is imperative that, in scaling alternative food systems, they do not begin to mimic the industrial production systems they seek to replace (Beckie, & Connely, 2016; Mount, 2012). Notably, scaling up to current industrial levels of meat production is both unlikely and unnecessary; consumers in industrialized countries currently consume much more meat than is nutritionally recommended or necessary (Weis, 2013; Willett et al., 2019). If healthier meat consumption practices become more widespread, the burden of meeting production needs could decrease dramatically.

Conclusion and recommendations

In summary, the state of alternative livestock production in the KFL&A region is tenuous due to limited existing processing capacity and social disconnect between producers and consumers. These challenges are indicative of broader trends of consolidation and regulatory barriers facing this sector across the country. With high costs of increasing local processing capacity, a mobile processing solution could help expand existing processing operations in a lower-risk way. Provincial and municipal governments should consult producers and processors to establish appropriate regulations and funding for mobile abattoir trial studies. In the short term, municipal or provincial funding for pilot projects could offer a concrete way for local governments to support local food system resiliency without tackling difficult zoning and location issues related to establishing a permanent facility. Government-funded abattoir worker training programs would also be an important component.

Alongside enhanced processing capacity, supporting local awareness and marketing initiatives is critical to re-establishing the social and physical place of locally produced food and increasing the "value" of consumer participation in local food systems (Connelly & Beckie, 2016; Feagan, 2007). Promotion of local branding, seasonal products, local farm tours, and regional cooking methods to local communities could contribute to alleviating the disconnect between supermarket prices and the true costs of food production (Feagan, 2007; Weis, 2013). Studies have shown that consumers are willing to pay more for livestock products raised using more sustainable practices (Gwin et al., 2012; Hartmann & Siegrist, 2017).

While farmers' markets are an effective way to establish links between consumers and producers, they require a significant commitment, especially among farmers (Kupke & Page, 2015). A more diversified approach that incorporates other direct marketing methods like farm gate sales may receive more support from producers. As well, creating engagement between producers and institutional buyers such as hospitals, schools, and municipalities could help to provide steady demand that producers can more easily plan for (Friedmann, 2007; Gwin & Thiboumery, 2013). For farmers, establishing technical support for building an

online presence or maintaining local farm and product databases for consumers can also be useful. Ultimately, increasing knowledge and awareness among all food system actors is critical to mitigating the harmful effects of industrial livestock production and transitioning towards alternative livestock systems.

Acknowledgements: First, I would like to acknowledge the participants of my undergraduate thesis study for their time, expertise, and opinions, from which this paper draws heavily to form its perspective. Similarly, thank you to Dr. Markus Taylor for his advice and feedback on my undergraduate thesis and research. Thank you to all the hardworking agricultural producers and food system stakeholders who make the alternative food system in Kingston so vibrant and enjoyable to be a part of. A special thank you to Dr. Kristen Lowitt for all of the expertise and guidance contributed throughout the research for and writing of this paper.

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Vol. 13 No. 1, pp. 27–53 April 2026

Canadian Food Studies La Revue canadienne des études sur l'alimentation

Review Article

Links, ladders, and levers: Basic income and the merits and limits of innovations in the charitable food sector

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Abstract

Ample literature describes the limits of the charitable food sector in meeting the food security needs of individuals. Nascent work now highlights diverse and innovative approaches in the sector in the absence of the right to food. Given the cost-of-living crisis and intensifying food insecurity in Canada, efforts towards greater diversification and innovation may be slowing, and in some cases, advocacy for systems change has been deprioritized in favour of a return to meeting immediate food needs. The evidence is replete with calls for rights-based approaches to hunger; these have often been anchored to demands for greater income security, given that poverty is one of the principal causes of food insecurity. Yet while such calls have languished in a policy climate that appears unresponsive and impervious to human need, practitioners working in the charitable food sector have actively been working towards interim solutions that promote greater dignity, autonomy, and choice for their clients. Using Canada as a case study, this conceptual paper explores the merits, limitations, and tensions of advancing incremental and/or temporary improvements within the charitable food model as we champion and wait for the right to food to finally be enacted. In so doing, the paper examines innovations in the charitable food sector and tests them against the core principles and criteria of a robust basic income guarantee (BIG). We highlight shifts and consider their impacts as interventions that are philosophically sound, practical,

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DOI: 10.15353/cfs-rcea.v13i1.748
ISSN: 2292-3071

and policy-oriented. The paper concludes that while certain shifts and changes in the sector may offer greater degrees of autonomy, dignity, and universality than others, none meet all the core BIG criteria and thus none offer the potential to combat food insecurity in a substantive way. We underscore that a BIG (or variants thereof) would be the only viable intervention to advance an income-oriented, rights-based approach to food.

Keywords: Basic income; charitable food sector; food access; food banks; food security; income security

Résumé

La littérature décrit amplement les limites du secteur alimentaire caritatif pour assurer la sécurité alimentaire des individus. Les travaux récents mettent en lumière des approches diverses et innovantes du secteur, face à l'absence du droit à l'alimentation. Considérant la crise du coût de la vie et l'augmentation de l'insécurité alimentaire au Canada, les efforts pour davantage de diversification et d'innovation peuvent ralentir et, dans certains cas, la mobilisation en faveur de changements systémiques a été reléguée derrière l'urgence de répondre aux besoins alimentaires immédiats. Les preuves de la pertinence d'appeler à une lutte contre la faim fondée sur les droits sont abondantes ; elles sont souvent arrimées à l'exigence d'une meilleure sécurité du revenu, dans la mesure où la pauvreté est une des principales causes d'insécurité alimentaire. Alors que le climat politique néglige ces appels, apparemment peu réactif et plutôt insensible aux besoins humains, les personnes qui œuvrent dans le secteur alimentaire caritatif travaillent activement sur des solutions provisoires pour offrir plus de dignité, d'autonomie et de choix à leur clientèle. En utilisant le Canada comme cas d'étude, cet article explore les avantages, les limites et les tensions liés aux améliorations progressives et/ou temporaires dans le cadre du modèle alimentaire caritatif, alors que nous militons et attendons pour que le droit à l'alimentation soit enfin promulgué. Ainsi, l'article examine les innovations du secteur alimentaire caritatif et les évalue à l'aune des principes et critères fondamentaux d'un solide revenu de base garanti (RBG). Nous mettons en évidence les changements et observons leurs effets comme des interventions philosophiquement fondées, pratiques et axées sur les politiques. L'article conclut que même si certaines transformations du secteur peuvent offrir davantage d'autonomie, de dignité et d'universalité que d'autres, aucune ne satisfait tous les critères fondamentaux d'un RBG, et donc, aucune n'a le potentiel de contrer véritablement l'insécurité alimentaire. Nous soutenons qu'un RBG serait la seule intervention viable pour promouvoir une approche de l'alimentation axée sur le revenu et fondée sur les droits.

Introduction

There is a substantial literature base bringing to light the limits of the charitable model of support in meeting the food security needs of individuals and much work highlighting the laudable goal of shifting towards more diverse and evidence-informed models to combat food insecurity (Smith-Carrier, 2020; Rizvi et al., 2021). The most common charitable food security model, and the most recognized in the eyes and minds of the public, is that of the traditional food bank. Food banking has been a staple of emergency food provision for over 30 years, providing countless items of food to those in need across dozens of countries in the global North (Riches, 2018; Spring, 2023; Tarasuk et al., 2020). But rather than serving as a short-term emergency-oriented solution it was intended to be (Dey & Humphries, 2015), the food banking system has "become a new form of charitable social institution with a long-term life expectancy" (Riches, 2002, p. 652).

The literature is replete with calls for rights-based approaches to hunger (e.g., Smith-Carrier et al., 2017; Chilton & Rose, 2009; Riches, 1999; Riches & Tarasuk, 2014; Sampson et al., 2021). These calls have often been attached to demands for greater income security, given that financial insufficiency is a primary cause of food insecurity (McIntyre et al., 2016b; Riches, 2018; Tarasuk et al., 2022; Tarasuk & Beaton, 1999; Tung et al., 2022) within our market-based system. As such, food studies scholars frequently define food insecurity as "the inadequate or insecure access to food due to financial constraints" (PROOF, n.d.; see also Men et al., 2021). Yet while calls for the right to food have languished in a policy climate that appears unresponsive to human need, practitioners working in the charitable food sector have actively been working towards interim solutions that promote greater dignity and choice for their clients. Using Canada as a case study, this conceptual paper explores the merits and limitations of, and tensions around, advancing incremental and/or temporary improvements within the emergency food model and tests them against seven core principles of a BIG. We argue that this critical evaluation framework be used when defining, considering, and assessing innovations in the charitable food sector. Applying such a framework, we explore whether incremental approaches—sometimes conceptualized as innovations—assist with creating genuine and impactful alternatives for charitable food recipients, or distract from income-based solutions, the absence of which could further entrench hunger.

Food poverty, hunger, and the charitable food sector

The depoliticization of household food insecurity has rendered the work of solving this social problem that much more difficult (Mendly-Zambo & Raphael, 2019). Many have critiqued the stigma, conditionality, and lack of dignity that accompany charitable food receipt (Smith-Carrier et al., 2017), while still others draw attention to the deep corporate power that has come to dominate the food bank industry (Azadian et al, 2023; Fisher, 2017; Mendly-Zambo & Raphael, 2019) and the mutually beneficial pathway forged by the industrial food waste/rescue and overproduction system, providing a win-win to transnational corporate actors and governments alike. As Kenny and Sage (2023) point out, "This model is, of course, deeply

embedded in the neoliberal narrative where food is only ever a commodity—but where philanthropic activities of well-meaning companies can enable the hungry to eat" (p. 9). Here, corporations can rid themselves of unwanted (and often expired; Smith-Carrier et al., 2017) foodstuffs, while at the same time being incentivized and rewarded for their (oft-valorised) donations by tax breaks that reduce their financial liabilities (McIntyre et al., 2017). Left to corporations and charity, food security has been denied a public policy response, and governments have essentially been let off the hook from ensuring the right to food (Riches, 2018). As Sheena Goodyear states, "Optically, it's almost like we give the government a break by being here and looking like we're taking care of it. We kind of take pressure off the government to actually solve the problem" (Goodyear, 2025).

Despite the manifold critiques of charitable food programs (see Loopstra & Tarasuk, 2012; McIntyre et al., 2016a), the reality is that food banking and, in many ways, the entire charitable food provisioning system, is now expected and perceived to make core contributions to the battle against *chronic* food insecurity. In fact, the dominance of food banking and the neoliberal logics that shore it up tend to "crowd out any space for alternatives" (Cresswell Riol & Connelly, 2023, p. 1223). Food banks have become the de facto intervention, gobbling up the lion's share of state and community resources (both human and capital), while continuing to be touted (at least discursively) as the solution to "combating hunger", "tackling food insecurity", "helping the needy" and "leaving no one behind" in the face of mounting evidence to the contrary. Emergency food aid cannot and will not remedy one of the primary causes of food insecurity—poverty (Smith-Carrier, 2020; Tarasuk et al., 2019). In the absence of coordinated advocacy efforts by sector leaders, particularly those who recognize the need for income-oriented responses to food insecurity, there has been little space to explore changes outside the current hegemonic food-based model. Furthermore, while the lack of income is the metric that is commonly used to determine and measure food insecurity, it is important to note that the dispossession of Indigenous land and water by settler colonialism and private property rights have impacted Indigenous food sovereignty and food security in Canada (Kepkiewicz & Dale, 2019; Poirier & Neufeld, 2023). Such a historical and ongoing legacy has implications for attempts to develop a truly equitable, just, and inclusive national food policy (Rotz & Kepkiewicz, 2019), even one that acknowledges the role of targeted income security policies to help combat food poverty.

Despite the laudable goal of providing a measure of relief, however inadequate, to individuals and families through the charitable food sector, practitioners and researchers alike disagree about whether the sector, and the ostensible "innovations" emerging in it, have served to further entrench hunger in the absence of systemic and rights-based interventions that combat poverty. Responding to this debate and in the spirit of much-needed transformation, De La Salle and Unwin (2016) argue that food banks should now focus on

> shifting their role from solely emergency food services to one that supports collaborative long-term solutions for community food security and social justice. This trend also includes the emergence of social justice movements that roundly include food access as a lens to socio-economic issues. (p. 4)

Some, like Berti et al. (2021), suggest that food banks ought to be considered "community-led grassroots innovations" (p. 2) that hold great transformative potential in the wake of recurrent state and market failures. Indeed, there have been some changes made to food banks over time, particularly in

relation to purchasing, donor relations, communications, and service delivery and philosophy (Haynes-Stein & Brinkley, 2023; Martin, 2021). Some even go as far as to suggest that given their reach, food banks may have unique potential for building a movement to end poverty led by those with lived and living experience (Swords, 2022). The latter however puts ever more responsibility on those shouldering the punitive demands and corollaries of neoliberal restructuring (Smith-Carrier, 2017), and does so without acknowledging the tremendous differentials of power among actors (Brennan-Tovey et al., 2023), some of whom benefit enormously from maintaining the status-quo (see Carson, 2013). There are, however, leaders in the broader community food security and food charity sector who likely would support a pathway toward movement-building; they need to be supported and engaged to work in concert with others who can deploy their skills, knowledge, and resources to challenge the extant system.

The literature on how to structure, build, and manage a sustained, pro-active shift with appropriate supports, steps, and foundations, as well as evaluations about whether such incremental approaches assist or distract from the work of income-based solutions, is less robust. Complicating matters further, food deprivation has become more pronounced, with over 25% of individuals reporting some degree of food insecurity and nearly 20% reporting insecurity characterized as "moderate or severe" (Statistics Canada, 2025). In the current cost-of-living crisis, many food banks have had to significantly reduce their food provision and/or cut services, including innovative wraparound supports such as income tax clinics, housing and utilities subsidies, or home deliveries for those with mobility challenges (Feed Ontario, 2024). While there is evidence that some food banks in BC are being forced to "try something new" as a result of rising demand (Food Banks BC, 2024) correspondence with other practitioners indicates that attention and oftentimes limited resources have been channelled into meeting the rising immediate need, leaving less time and energy to enact (and/or evaluate) more effective or transformational alternatives and additions (personal communications, 2024). Yet in the minds of some food security practitioners and leaders, questions of *how* to continue to meet the growing need *and* make progress on much-needed system reforms at the same time remain critical.

Given the gaps identified above, we propose that a critical evaluation of charitable food system interventions and innovations is crucial at this juncture. While many of these innovations *feel* positive and anecdotal feedback from some participants suggests they offer an advancement from the existing traditional model, critical reflection on their potential, including the strengths and limitations of their adoption, remains an important step as we seek to map out where and how to invest in and build food security in ways that will most likely achieve valuable returns in the years ahead. To assist with these timely efforts, we take up the task of developing a conceptual evaluation framework. This framework seeks to apply the principles of BIG, as espoused by a coalition of BIG advocates in Canada, as criteria to evaluate key programs and services associated with the charitable food model.

Conceptual approach

Given that food insecurity is directly tied to household financial sufficiency, the policy approaches that remedy poverty will also be valuable in reducing food deprivation (Tarasuk, 2017). Burgeoning literature describes the efficacy of using cash transfers (e.g., Bastagli et al., 2019; McGuire et al., 2022), and BIG programs specifically, for poverty alleviation (e.g., Forget, 2018). More recently, research has also suggested that such programs are not only necessary to assuage food insecurity, but are central to the transition to a more just food system (Power & McBay, 2022), even while they likely cannot redress all the issues that beleaguer the sector (e.g., high cost of agricultural land, exploitation of migrant workers, etc.). Even so, the "the case for BI [basic income] to address food insecurity is well-established" (Power & McBay, 2022, p. 33). *"The Basic Income We Want"* Consensus Statement (Basic Income Canada Network [BICN], 2023.), delineates the principles of robust BIG programs as reflecting: universality, non-conditionality, security, autonomy, dignity, and economic and gender equality (para. 3). The Ontario Basic Income Network ([OBIN], n.d.; see also Smith-Carrier & Halpenny, 2020) fleshes several of these out further:

1. ***Adequacy***: It's enough money to have one's basic needs met.
2. ***Autonomy***: It offers people more life choices.
3. ***Dignity***: There is no stigma attached to accessing it.
4. ***Non-conditionality***: It is provided with no (or very few) strings attached.
5. ***Universality of Access*:** Anyone who needs it, gets it (para. 2).

In expanding the Consensus Statement (BICN, 2023) principles, we add:

1. ***Security:*** Improves financial stability, reducing risks and threats to economic vulnerability.
2. ***Economic and gender equality:*** Promotes equal opportunities for all, irrespective of background or social identity, including gender.

The principles of a BIG above offer a suitable evaluation framework for several reasons. First, they represent a valuable manifestation of an income-based intervention that would address most, if not all, the inadequacy present in the charitable food model. A BIG is not the sole solution to food insecurity, but it could—if offered at an adequate level—reduce chronic food deprivation for millions of people currently experiencing hunger. It is the most direct and practical intervention that many advocates, activists, academics, and practitioners have been waiting for to remedy a primary cause of hunger and food insecurity: that is, poverty. If we accept that a BIG would be effective in combating poverty (the degree to which would ultimately depend on the proffered benefit amount), we also must then assert that these same principles offer a useful framework for evaluating what a healthy, just, and equitable right to food might resemble.

Table 1: Common food charity projects & BIG criteria evaluation[1]

Food Charity Projects	Adequacy	Autonomy	Dignity	Non-conditionality	Universality of Access	Security	Economic & Gender Equality
Food hampers (pre-packaged)							
Food banks (mediated choice model)							
Food banks (shopping model)							
Food skills (cooking and preserving, nutrition education)							
Local farm procurement contracts							
Food rescue initiatives (varied)							
Affordable markets							
Community gardens							
Community kitchens							
Subsidized seasonal veggie boxes							
Gleaning and food rescue programs (including fruit tree projects)							
Product transformation & creation for social enterprise initiatives							
Voucher/coupon programs for retail or farmers market purchases							

Source: Adapted from BICN (2023) and OBIN (n.d.)

The BIG principles outlined in Table 1 may offer a shared set of criteria that charitable food sector organizations and actors could use to guide their work and critically evaluate the programmatic and incremental, as well as structural and transformative impacts, of their existing and planned interventions. The BIG principles offer clear evaluation criteria and goals to consider. With the full recognition that continued pressure on governments to provide the economic means to enable the right to food for all members of society must be ever present in their work, we maintain that actors and organizations working in the charitable space can articulate and work towards shared national advances in dignity, autonomy, non-conditionality, adequacy, universality, security, and economic and gender equality with clear metrics of progress towards these goals.

The multi-pronged drivers of innovation

How best to propel any kind of meaningful, albeit incremental, change in the charitable food sector is complex, but for the sake of this work, we will consider it to be a two-pronged challenge. On the one hand, decades of research (e.g., Loopstra & Tarasuk, 2012; Tarusuk et al., 2020) highlights the gap between self-reported food insecurity and food bank usage. Using 2008 Canadian Household Panel Survey Pilot data, Tarasuk et al. (2019) showed that only 21.1 percent of the most food insecure households actually used food

[1] Source: BIG evaluation criteria adapted from BICN (2023) and OBIN (n.d.).

banks over the course of that year. Given the multitude of food bank limitations, not least of which includes the tremendous stigma attendant to their use, a huge proportion of households experiencing food deprivation, roughly 80 percent in Tarasuk et al.'s (2019) analysis, employ a range of other coping strategies to survive outside the charitable food model. This body of research underscores the important fact that food bank usage is a poor indicator of overall food insecurity and its various dimensions (Loopstra & Tarasuk, 2012, 2015).

Part of the incongruities of emergency food access, representing the scores of individuals and families in Canada that have avoided food banks at all costs, can be explained by the formidable stigma and undignified processes associated with its use, including means testing, pre-packaged bags/hampers (that offer no choice and are replete with mismatched and/or non-complementary items), unhealthy food items, and long, and in many cases, public, line-ups. The usage mismatch offers opportunities for the creation of new access points, or what Black and Seto (2020) describe as alternative programs, within the constellation of the charitable food space to reach those not utilizing food banks to address household food insecurity. Alongside recent evidence highlighting important shifts happening around inclusive language, personalized metrics, and more inclusive operations (Hamilton et al., 2024), observations and anecdotes from within the sector highlight that innovations in the charitable food space to reach different groups, combat stigma, improve dignity, and introduce greater autonomy are being operationalized through mediated choice models, welcoming environments, wrap-around services, the creation of more inclusive "food centres" or "food access hubs". This is happening alongside a greater diversity of food offerings, including farm fresh vegetables and attention to cultural and/or dietary preferences. Alternative access programs, or what might be called charitable food system innovations, most often revolve around the laudable goal of increasing autonomy and choice.

In exploring the decisions of people on low incomes, choice is, and historically has been, a discourse laden with assumptions (e.g., particularly in relation to motherhood, work expectations, and "welfare dependency"; Smith-Carrier et al., 2024; Solinger, 1998) that generally cast blame on individuals, not only for their poor decisions but for their poor circumstances (see Smith-Carrier, 2011). At face value, the notion of choice suggests that people can make decisions that are in their and their family's best interests, with the agency to weigh the merits and limits of a relatively balanced slate of options. In the case of decisions associated with charitable food aid use, these do not present as preferred options amongst equal alternatives, but as ones each yielding poor outcomes i.e., accepting a measure of relief to stave off hunger can take a toll on one's dignity, hope, and self-esteem (see Middleton et al., 2018; Pineau et al., 2021), skipping meals so as to avoid accessing food programs (and the immense stigma thereof) can lead to range of physical health (Tarasuk, 2004) and mental health problems (Elgar et al., 2021). As food banks have rarely been able to provide true choice to clients in terms of the foodstuffs they might avail themselves of, largely because these derive from an inconsistent and unpredictable stream of volunteer and/or corporately donated food, what some call the system of food waste (Riches, 2018), clients' ability to make healthy decisions about the foods they put on their table is altogether stymied. It is within this backdrop that choice models in food banking have begun to emerge (see Remley et al., 2013; Rivzi et al., 2021).

The literature on the efficacy of choice models at present appears equivocal. Mukoya et al.'s (2017) study

on a food bank directly serving asylum seekers in Melbourne, Australia found that incorporating client choice, while providing an increased measure of dignity to clients, did not dramatically improve the nutritional adequacy of food baskets relative to traditional offerings. However, Rizvi et al. (2021), in Ottawa, Canada, found that choice models, which included additional onsite programming in food banks intentionally integrated in Community Resource Centres, resulted in a modest decrease in the number of people experiencing severe food insecurity, and slight improvements in the mental health scores of participants experiencing moderate and severe food insecurity (albeit scores still less than the general population). Jones and Coffey (2019) highlight the complexity of teasing out choice and increased accessibility drivers in the context of food pantries given the limited exploration of these in the literature. The dearth of research on situational influences and consumption patterns in food pantries exists alongside a deep research base on consumer choice drivers in conventional retail environments. Despite movement towards choice models in Canada, the massive spike in food bank usage is putting added strain on existing limited resources (Mendelson et al., 2024), potentially foreclosing further shifts , diversification, and large-scale advocacy efforts i.e., community-based organizations taking on a larger and more dedicated role in creating access to food in communities (through, e.g., supporting food sovereignty, the right to food), while workers, budgets and organizations seek to meet the ever-rising demand.

Another challenge with the shift from the dominant charitable food model to a diverse, integrated social justice-oriented food system is the chasm between charitable food programs and conventional (or alternative) retail with regards to food access and procurement. On the one hand stands food banks/food pantries, hot meal programs, and other manifestations of "free" supplementary food, many of them rife with stigma (Brenann-Tovey et al, 2023) and limits to choice and autonomy (Booth et al., 2018). On the other, retail market prices and conventional access points, including supermarkets, farmers markets, farm stands, and local community supported agricultural (CSA) box programs. The space between free, supplementary food and the conventional retailer and/or other farm direct options can appear a formidable distance to bridge.

Redressing the income insufficiency at the root of food insecurity, through ongoing, large-scale grocery rebates (e.g., Canada, 2023) that are appropriate to the cost of food and family size, or better yet, through variants of BIG that fully support choice in how people spend their money (see Balintec, 2023), *could* help pave the road to ensure the right to food for all (Silvasti & Riches, 2014). However, we also acknowledge that a BIG may be seen as simply another neoliberal response to the problem. BIG provides economic access to food while not necessarily challenging the underlying and omnipresent market-driven food system—a system known to perpetuate food and income inequalities (see Smith-Carrier, 2021).

A BIG may be subject to a more pronounced critique when considering the sovereignty of Indigenous Peoples and nations, given that receiving it could be seen as imposing another form of financial reliance on the state. Indigenous-led efforts could help "challenge the dependency on capitalist wage-labour relations, allowing for traditional food practices, processing, and self-determination to arise" (Lowitt et al. 2025, para.24). As such, for some, a BIG may not necessarily represent an adequate or sustainable solution to food insecurity for Indigenous Peoples (even though it targets poverty directly) and some suggest that its typical focus on individual autonomy versus collective values such as community, culture, and

kinship (Cameron et al., 2024) could limit its impact in certain contexts. According to Lowitt et al (2025),

> ...[M]uch more consideration needs to be given to understanding the potential impacts of basic income on colonial policies affecting Indigenous food systems, as well as the tensions associated with relying on a policy tool administered by colonial state structures. (Lowitt et al. 2025, para. 27)

Others recognize the power of BIG to offer a "counter to state manufactured poverty" (Canada, 2018, p. 16). The Missing and Murdered Indigenous Women and Girls Call for Justice 4.5, recommends that "we call upon all governments to establish a guaranteed annual income for all Canadians, including Indigenous Peoples, to meet all their social and economic needs. This income must take into account diverse needs, realities, and geographic locations." (National Inquiry into Missing and Murdered Indigenous Women and Girls, 2019, p. 182). A more fulsome discussion with Black and Indigenous communities about BIG (given their overrepresentation among those who are food insecure) would be a welcome addition to the literature in Canada and elsewhere.

The limits to charitable food system transformation

Transformation can take many forms, from incremental reform and adaptations to radical and deep overhauls (Slater et al., 2022). As a result, transformation is often viewed within a spectrum of "reformist, progressive and radical" in terms of actions, intentions and systemic change (Holt-Gimenez & Shattuck, 2011; Poppendieck, 2022). Mapped against the BIG criteria above, we argue, with Loopstra and Tarasuk (2015), that many innovations in the charitable sector that are not income oriented will fail to address food insecurity in meaningful ways. This is not to say that with sustained investment and capacity building such projects and initiatives *couldn't* scale for greater impact; it is simply to highlight the current state of what are common "innovations" within the sector. This analysis would be remiss to overlook the worthy efforts and significant merit in advancing BIG values such as dignity, autonomy, equity and slowly working towards adequacy *within* the existing charitable food model even without the resultant manifest impacts on food insecurity rates.

While questions remain about what role small-scale innovations in the charitable food sector might play in larger food system transformation, it behoves the academic community to put forward and reflect on common examples of incremental shifts in the structure and patterns of the charitable food model, while waiting for evidence-informed income-based policies to be realized. To accomplish this, we employ our three conceptual tools: links, ladders, and levers to showcase the intention of diverse innovations in the sector and then critically reflect on the role of these philosophical, practical, and policy interventions in advancing food security in Canada.

Links: Re-embedding the charitable food sector into the larger food system

Food systems embrace the entire range of actors and their interlinked value-adding activities. These take place in the production, aggregation, processing, distribution, consumption and disposal (loss or waste) of food products originating from agriculture (including livestock), forestry, fisheries and food industries, along with the broader economic, societal and physical environments in which these activities are embedded (Fanzo et al., 2023; Nguyễn, 2018). Concomitantly with efforts to advance the UN Sustainable Development Goals (SDGs), there is growing momentum worldwide to adopt systems approaches and recognize the centrality of food systems to achieve development through an integrated and sustainable approach (Béné et al., 2022; von Braun, 2021).

In spite of recent calls for greater integration and holistic approaches—in scholarship and practice alike—food systems are often enmeshed in parochial and fragmented processes and domains to serve the needs of disparate populations. For example, they are often framed in ways that serve to, according to Woods et al. (2023), "reduce the solution space to dichotomous perspectives" (p. 22). Such dichotomization appears in discourses on local food systems vis-à-vis global ones, or sustainable food systems versus conventional, industrial systems. Attention since the mid-1990s on "local food" has meant that the importance and contribution of food production at different scales has not always been adequately acknowledged (Palmer et al., 2017) despite the fact that while food security depends on local supplies it also requires global trade and the global food industry (Capodistrias et al., 2022; Rapinski et al., 2023). Although charitable food systems are often disaggregated from many of the others, this should not necessarily be the default case. As Schwartz and Caspi (2023) argue, "Charitable sites where food is distributed are deeply connected to specific communities…and because they are hyperlocal, pantries can provide customized and culturally tailored services to meet the needs of nearby residents" (p. 1). The authors go on to note that the charitable food sector often sources products from multiple scales simultaneously.

Haynes-Stein and Brinkley (2023) in California recognize and explore the integral, economic transactions and social roles that connect the local food movement and the charitable food sector. Building on Hinrichs' (2000) concept of embeddedness, the authors highlight the creation of value for both the charitable sector and the local food movement highlighting what they see as the "conjoined development of these two movements" (Haynes-Stein & Brinkley, 2023, p. 684). Many of those working in the charitable food sector could benefit from stronger conceptual tools to reimagine the actions and activities of the charitable food sector as part of larger food systems and subsystems. Here, the concept of links becomes a vital resource.

A link for our purposes is *a tactical choice to connect the activities, services, and discourses of the charitable food sector to the larger system in both offerings and through intentional dialogue*. While the links (and reliance) between the charitable food sector and corporate retailers are known and obvious to practitioners—played out primarily through food rescue "donations" and corporate giving (Black & Seto, 2020) or through bulk buying for consistency and cheaper prices using corporate suppliers—the links between local production and the offerings of local supply chains are often obscured (Haynes-Stein & Brinkley, 2023). Increasingly, more charitable food organizations have begun forging new relationships

with local food system actors to procure new purchases and enlist new donors. While such relationships have brought a local supply of most commonly fresh, seasonal vegetables (and in some cases prepared foods, such as breads, soups, and preserves) into the charitable sector's offerings, it is important to push back against the framing of local procurement for charitable spaces as inherently innovative simply because of spatial proximity.

Several food banks in Southwestern British Columbia (BC) have begun (or have been for some time) sourcing fruits and vegetables directly from local farms. They have built relationships with growers to supply both hampers as well as facilitate a diverse range of alternative programs (i.e., affordable produce markets, meal programs, school food programs, food skills classes). The connections being built do help highlight the role of local production and enhance access to locally grown food.

Recent years have seen the definition of food literacy expanded beyond kitchen skills and nutrition knowledge (i.e., food skills) to include food environments and the food system, but also contextual influences, such as sociocultural and socio-economic factors (Sumner, 2015). This more critical evaluation of power, conditions of production, and food environments (Farrell, 2021), as well as food system crises and opportunities for transformation (Sumner, 2015), is being added to the food skills/food literacy programs that accompany some charitable food organizations. However, research indicates that financial barriers, rather than food skills are a more significant driver of and contributor to food insecurity (Pepetone et al., 2021). The complex reasons for food insecurity mean that food literacy and food skills are only small pieces of the larger problem (Begley et al., 2019). Dachner and Tarasuk (2018) thus point out that "interventions designed to improve the nutrition knowledge or cooking skills of those experiencing food insecurity have limited capacity to lessen problems rooted in abject poverty" (p. 236). So, while there may be some linking potential, if not philosophically, food literacy as an intervention has been shown to not be useful or effective in moving the needle on household food insecurity.

A more useful example of a linkage is represented by the BC Farmers' Market Nutrition Coupon Program ([FMNCP], 2023). This program distributes $3.6 million worth of coupons to 32,000 individuals in 12,000 households through networks and partnerships with 227 charitable food providers and social service agencies. The coupons are for clients to spend at their local registered farmers' market, involving 96 communities and 111 markets (British Columbia Association of Farmers' Markets [BCAFM], 2023). A program such as this increases access to healthier food options, increases the linkages between the diversity of food procurement options, highlights the importance of local production, and results in clients spending an average of $12 beyond the dollar value of the coupons they redeem (BCAFM, 2022). Nascent evidence suggests the program may be effective in reducing short-term food insecurity (Aktary et al., 2023). Lobbying efforts are underway in other provinces to support the adoption of the program elsewhere (see Sustain Ontario, n.d.).

Finally, some local charitable food organizations have begun to offer subsidized local food boxes built through a collective of farmers and offered in a CSA style model. In the case of the One Straw Society in BC, the model consists of most subscribers paying the full amount alongside community contributions that offer the option to have 20-30% of boxes subsidized and picked up at a consistent location for all subscribers. The centrality of the pick-up location and uniformity of the boxes has been shown to significantly reduce

perceived stigma as there is no distinction between paying subscribers, partly subsidized and fully subsidized (free) subscribers (C. Fletcher, personal communication, 2023). A link of this nature offers both locally grown food and a connection back to the regional agricultural economy for those accessing charitable food services outside the traditional food bank model.

Despite the aforementioned benefits and the strong desire to "support local" and harness these links in charitable food environments, there are a few obvious barriers. These include economics (i.e., higher prices), seasonality, and volume (supply). Meagher et al. (2020) found that these linkages are associated with logistical and economic barriers, as well as weak relationships between farms and food banks. Many charitable food organizations are non-profits or faith-based organizations involving volunteers and tight budgets and therefore cannot be expected to fully shift existing relationships between people and food. While seasonal, local procurement is a rising trend, the preference of food banks for long-life supermarket foodstuffs, for reasons of distributional efficiency, has tended to exclude fresh, sustainable and local produce from charitable food parcels (Milbourne, 2024), especially on a consistent, year-round basis.

Choices around purchasing have historically been made through a price lens (i.e., trying to stretch limited dollars further) and through a logistics lens (i.e., utilizing corporate suppliers to ensure consistency, efficiency, quality, and convenience given limited staffing resources). As such, the barriers of price and supply play considerable roles in decision-making and food procurement policy decisions. Feeding people good quality food and maximizing the quantity of that food is a distinct goal of food banks. Supporting local food economies is a different, distinct, and separate ideal and goal than feeding people, which does not inherently need to be a primary concern of food banks per se. However, food banks and other charitable food programs ought to recognize that they have purchasing power and choices of what and how to purchase; in cases where funding permits it, directly supporting local food economies could become part of their decision-making and spending. Even a small percentage of local food purchased and/or coupons for local procurement distributed serves to deepen the link between a local charitable food provider and the local systems and conditions of production. Haynes-Stein and Brinkley (2023) found in their case study that "the food bank, like the farmers market, may be a broker or a bridge between the larger and smaller local food system actors and affiliated movements" (p. 693). Over a decade ago, McEntee and Naumova (2012) noted that there are opportunities to develop collaborative capacity between the charitable food system and the rural local food system in mutually beneficial ways. The recognition and actualization of these links and relationships serves multiple roles in communities and populations where the charitable food sector has, in many cases, seemingly been "lifted" out of the larger food system and siloed as a system of its own.

Upon first reflection, the examples of links above signal a few positive advantages and advances—mainly in terms of philosophical reframing and reflections on the food system beyond the confines of charitable access points and procurement methods. However, the objective of this work is to critically appraise such links and encourage reflection on these (and others) in relation to the BIG criteria. When we subject the example links to the BIG criteria, we do see elements of greater autonomy (a greater variety of product offerings and thus increased choice), dignity (the economic supports to shop in farmers markets and emergency evidence of short term food security advances), and economic and gender equality (access is not restricted to

certain populations). While these are important shifts within the sector, our evaluation shows that none of the links noted above (at least at their current scales and capacity) meet most or all of the BIG criteria and thus none hold the potential to truly remedy household food insecurity over the long term.

Ladders: New projects, access points, and opportunities for spending and engagement

We refer to the range of programs that include pay-what-you-can food access through food markets, subsidized food boxes and meal programs, low-cost and subsidized grocery stores as *ladders.* We define ladders as *programs that create new food access points that act as incremental steps between the charitable model and other forms of personal food procurement.*

With over a decade of research showcasing the gap between self-reported food insecurity and food bank usage, it is becoming clear to practitioners that the gulf between the food bank and the grocery store is wide and potentially overwhelming. Many food banks and integrated food programming organizations are recognizing this gap and beginning to shift programming to meet people where they are at, build programs that are attentive to the various manifestations of food insecurity, and offer access models that require limited financial contributions to offer an alternative to the default charitable response of "free". In BC, a recent report points out that

> Many food banks are exploring cost-recovery or low-cost food provision [...] with the hope that these innovations can meet the needs of those that have been priced out of the grocery store but have some money to spend on food, decreasing the overall demand on the charitable food programs." (Food Banks BC, 2024, p. 18)

Affordable produce markets represent one of the best examples of a ladder in the charitable food space. Affordable produce markets constitute positive tools of action that can be used to advance access to healthy, local food at lower prices. Affordable markets play a different role than food banks, empowering customers to make monetary transactions and encourage autonomous food purchasing. Affordable food markets, or what Nayak and Hartwell (2023) call "Community Markets," revolve around the sourcing of fresh products (strictly local or otherwise) and then reselling purchased goods through a farmers' market type setting. Many individuals and households experiencing financial insufficiency are not able to afford the standard prices at local farmers' markets or farm stands. Affordable markets are also solid options for fresh food provisioning in neighbourhoods and communities, or when a whole farmers' market would not be viable to cover farm costs and offer an alternative, staggered access point to fresh produce offered by traditional food banks (Nayak & Hartwell, 2023; Right to Food, 2019).

Moving beyond the seasonality and scale of affordable markets, low cost, non-profit grocery stores also play an important role as ladders. A reputable example in Southwestern BC is the Quest Food Exchange.

> By bridging the gap between food banks and traditional grocery stores, Quest provides a grocery experience based on principles of dignity, access, and sustainability. Quest believes in a grocery model that simultaneously supports community while reducing greenhouse gas emissions...Almost all of Quest's food is donated by local food partners from across British Columbia and

> delivered across our five Lower Mainland markets at reduced cost to our client communities. (Quest Food Exchange, n.d.)

Quest's values, operations, mission, and logistics fall squarely in the ladder category, as the outfit itself identifies that it acts as a "bridge" between food banks and traditional grocery stores. Quest clients are referred through various channels (e.g., social service agencies, charities, non-profits, etc.) whose mission it is to support individuals facing economic barriers. Another referral-based shopping operation called "The Gathering Markit" has found success in the city of Abbotsford, BC with a mission to turn recovered food into meal kits sold to customers "with dignity, choice and community at the core" (The Gathering Markit, n.d.). Ranta et al. (2024) offer a significant analysis of what are termed Social SuperMarkets (SSMs) in the UK and highlight their important role as procurement options that could be scaled and used in tandem with food banks and pantries. SSMs move beyond models such as Quest and The Gathering Markit, as they do not employ a referral system, do not cap the number of visits, and offer a space to amplify social inclusion and opportunities to connect with wrap-around services (Ranta et al., 2024).

Subsidized and low-cost meals prepared through food access, food literacy, or community building programs of charitable food systems can also act as important ladders. Such arrangements offer a step between the traditional soup kitchen and a full-price meal purchase in a restaurant or conventional retail store. Numerous organizations are leveraging partnerships with schools, chefs with kitchen experience and infrastructure, and community members to create meals for a fee offered through a range of programming to meet a diverse range of needs. Some restaurants have even begun to offer pay-what-you-can or solidarity pricing for members of the community to encourage them to purchase and eat meals in the restaurant space alongside members of their community, rather than in alternate locales—ones that epitomize exclusion, with de-facto designated spaces for those with restricted financial resources.

All of the ladder-type innovations we highlight certainly offer some practical and positive advancements in terms of dignity, autonomy, and universality when it comes to charitable food access. When subjected to the BIG criteria, most of the ladders noted above (Quest, referral-based seasonal food markets, subsidized restaurant meals), still fall short on key criteria such as adequacy (limited and/or insufficient products or quantities) and universality (referral-based, so not universally accessible). As Deaton et al. (2022) rightly point out, "programs that increase accessibility to food may not diminish food insecurity" (p. 306) and various access programs may be experienced differently depending on the severity and manifestation of food insecurity in question. While trends suggest that various ladder-type interventions will continue to grow over the coming years as the charitable model confronts some of its inherent limitations, seeks to diversify access points, and aims to move past the means tested, pre-packed food bank hamper model in the interest of ensuring greater dignity, autonomy and choice, the contextual factors combined with consistent resource scarcity trends (funds and labour) may continue to stymie the collective impact of such ladders.

Levers: Income security is the only meaningful intervention to combat food insecurity

Poverty is the leading killer and greatest cause of suffering in the world (World Health Organization, 1995, as cited in Murali & Oyebode, 2004). It is a driver of poor physical and mental health (Liaquat et al., 2021), poorer access to education and social mobility (Brown & James, 2020), and most relevant to the argument at hand, the adverse effects of a poor, nutrient-starved diet due to limited or restricted food access (Thompson, 2022). At the same time, the research is also clear about the inherent problems associated with income assistance schemes (Smith-Carrier et al., 2020c), which are rife with conditionality and stigma (Jun, 2022; Smith-Carrier, 2023), and that infringe upon human dignity (Whelan, 2021). We know that income security improves people's health and wellbeing—food security included—but the form of delivery matters. Ensuring financial sufficiency through dignified, nonconditional, and non-stigmatized forms of support is crucial. BIG, or variants of it, offer a veritable opportunity to act as a lever that allows individuals to recognize the aforementioned links and utilize the ladders offered. A lever for the purposes of this work can be defined as *a targeted income-oriented policy or set of interconnected policies that give people control of their individual or household food procurement, thereby reducing reliance on charitable food programs.* A BIG is a prime example of a lever that meets such ends.

Canada has already taken up multiple BIG pilots, at both the provincial (e.g., Manitoba and Ontario) and community levels (e.g., the New Leaf Project in British Columbia; Dwyer et al., 2023). These have drawn significant public and political attention to BIG over the years, particularly when the Ontario Basic Income Pilot was introduced (and later dismantled), and the state provided (temporary) emergency benefits in the wake of the COVID-19 pandemic (i.e., through the Canadian Emergency Response Benefit [CERB]). During the roll-out of the CERB, an economic stimulus measure not a direct poverty reduction intervention, food banks across Canada saw significant declines in their uptake, bucking the trend of steadily increasing numbers since the turn of the century. The CERB (a time-bound, short-term BIG variant) had the latent impact of contributing to the lowest rate of poverty in Canada in 20 years and a decline in food bank usage. While numbers (both national poverty rates and food bank visits) have since rebounded and are in fact steadily rising, the CERB experiment demonstrates that a targeted and efficient income delivery system can reduce food bank usage and provide time-limited income security. Furthermore, while BIG would directly address crucial aspects of income insecurity thus assisting with the economic access to food, it may also produce knock-on impacts in supporting sustainability across the whole food system and agricultural economy through encouraging new entrants, reducing economic uncertainty, and building resilience (Lowitt & Levkoe, 2023). In addition, BIG programs can help level nation-wide disparities introducing income alongside existing food subsidy programs like Nutrition North Canada (Deschner, 2018).

Some suggest that food banks and other food access programs hold great potential to become sites of more potent civic engagement. Schwartz and Caspi (2023) argue that

> Moving beyond assisting individual families, the future power of food banking may be its access to people who are not yet civically engaged and empowering them to vote and get involved in shaping policies that will reduce the problem of food security for all. (p. 3)

Engaging a citizenry who is impacted by income insecurity on a daily basis is an important step in galvanizing the political, educational, and advocacy possibilities of BIG experiments on the road to full implementation (Smith-Carrier et al., 2026). Furthermore, in the context of food insecurity, income sufficiency offers more than just income for food purchasing: BIG acts as a lever on the road to charitable food system transformation that can garner weightier benefits, including *a reframing of the historical model through the lens of human rights.* Within the policy domain, the insertion of a rights-based framework in existing federal and provincial/territorial poverty reduction strategies would signal the need for social and economic rights to be progressively realized by policymakers, subject to appropriate accountability measures and timelines (Smith-Carrier & Lawlor, 2017).

If the right to food and thus provisioning and access strategies were made available as substantive rights, the traditional food bank model would be virtually obsolete except for its original intention of short-term, emergency food provisioning. Such a shift in philosophy, and thus governmental obligations, alongside the material means (via a BIG) to achieve food security through autonomous and dignified food purchasing represents a lever that allows food insecure individuals to utilize the diverse options offered through progressive charitable food programs. The continued reliance on time-bound and proscriptive grants, and in-kind corporate and community donations, is unpredictable and offers no solid foundation from which to invest in innovation and transformation. Income security, with BIG as the most effective lever, would relieve the pressure on services, allowing organizations the space, time, and resources to chart a new pathway, both practically and philosophically, for the charitable food system as a whole. BIG may be a relatively straightforward lever to actualize. Some groups (read: traditionally "deserving" populations, including older adults and families with children) already have the groundwork for a BIG through existing programs such as the Guaranteed Income Supplement and Canada Child Benefit (albeit without meeting the adequacy criterion) and these have shown positive impacts on food insecurity (Brown et al., 2022; Kansanga et al., 2022). Other groups (e.g., lone adults in poverty, working and not), however, have habitually been overlooked in the present patchwork of tax benefits and income assistance programs. A BIG, tied to human rights infrastructure, would improve income (and therefore food) security over time (Smith-Carrier & Green, 2017).

Conclusion

To successfully shift away from the charitable food model to a rights-based approach—guaranteeing people the right to food and an adequate standard of living—*people must have the financial resources necessary to obtain their own food* (Davis & Tarasuk, 1994). While the immediate roll-out of a BIG program that provides sufficient financial resources presents an ideal avenue through which income security could be assured, there are likely intermediate steps that could be taken in the interim to shore up the much-needed shift. However,

as discussed, novel food bank models may slightly increase dignity, autonomy, and offer less conditionality than a means-tested hamper model, but still fall short in terms of conditionality or adequacy. Likewise, a low-cost market or grocery store may deal directly with the adequacy and autonomy aspects but still be conditional and non-universal through forms of means-tested memberships, agency referral systems or by people simply not having enough money to purchase food, even at a lower cost.

The presence of these new food access points that involve spending some money and attempting to reach the vast number of individuals and families who are food insecure yet not accessing food bank services—referred to in our conceptual framework as ladders—offer an incremental step on the road to the sovereignty and dignity of food purchasing for all. Such a shift, however incremental, does offer a programmatic restructuring of both how the charitable food sector links back to the larger food system as a whole and the diverse access options it offers those facing varying degrees and conditions of food insecurity. BIG, however, as a specific policy intervention to combat hunger, presents the only solution that meets all seven principles. According to Healy (2019),

> If food poverty is defined simply in terms of hunger and deprivation, then the appropriate response is to give people more food – a role that is currently being filled, to some extent, by food banks across rich, liberal economies. If, however, food poverty is linked more broadly to human rights, social justice and social exclusion, then the appropriate policy response is much broader and rests squarely with government. (p. 106)

Indeed, the state, which holds legal obligations as a duty-bearer of human rights, is charged with enacting policy decisions that redress poverty, and thus, food insecurity. To eschew or delay policy changes that shift away from the charitable food model, with its ineffectiveness and indignities, is to continue violating human rights and to ensure the perpetuation of food deprivation (Smith-Carrier et al., 2017). Hence, it is important to note that the alternative links and ladders, described in the sections above, have significant limitations. As Kenny and Sage (2023) point out,

> The questions remain as to whether these arrangements, while undoubtedly positive, can, or are designed to, tackle the structures excluding people from food systems in the first place. Do these arrangements challenge governments to assume responsibility for ensuring the right to food? (p. 11)

Here, it is imperative to keep the deliberate reformist framing of these interventions, and the critical appraisal of them, against the BIG principles in mind.

Decades of research make clear that income-based, structural solutions are needed to combat poverty, which is at the root of food insecurity (Riches, 2002; Tarasuk et al., 1994). There is widespread recognition in both the BIG movement and critical food studies that large-scale and radical food system transformation is needed (Lowitt et al., 2025) alongside massive shifts in the structural conditions that produce and sustain poverty and food charity reliance. However, this research suggests that none of the charitable interventions outlined have the potential to shift existing structures at magnitudes much different than the traditional food charity model. A national or provincial/territorial BIG program (or at minimum, more targeted BIG variants aimed directly at the overlooked demographics of charitable food services) holds the greatest promise in rendering much of the charitable food system (certainly the traditional, low choice, means-tested hamper-oriented food bank model) obsolete.

Power and McBay (2022) assert that "a basic income is necessary—but insufficient—to move towards justice in the food system" (p. 31). This is especially important to note as we reflect on contexts where food availability, traditional consumption patterns, access to markets and infrastructure pose significant challenges for specific populations, including in rural and remote areas in Canada (McPhee-Knowles & Gatensby, 2023). Furthermore, *injustice* in the food system takes many forms, including those surrounding damages related to labour, profit, environmental degradation, and corporate power and control. Moreover, additional theorizing and empirical work on how BIG might contribute to larger food system transformation and sustainability (Beck et al., 2023; Lowitt et al., 2025; Power & McBay, 2022) remains crucial and timely.

While fully recognizing that BIG is not the panacea to all our challenges, Power and McBay (2022) note that "it could provide the freedom from want, scarcity, and desperation that is essential to imagine and struggle for more just ways of living together on the planet" (p. 36). Or, as Littler (2023) notes, "The income from a UBI (universal basic income) would not provide a luxurious lifestyle, merely one that would allow for a decrease in food insecurity and an increase in dignity" (p. 153). The principles of BIG offer a useful evaluation framework to reflect on the merits and limitations of incremental and more progressive and reformist shifts in the charitable food space. BIG itself—particularly at the national scale—is a lever worth pursuing as it offers a proven structural solution to a known structural problem.

Conflict of Interest: The authors declare no conflicts of interest

Author Contributions: All authors contributed to the manuscript conception and design and writing.

Funding: This study was funded by Canada Research Chairs funding. The authors declare they have no financial interests.

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Vol. 13 No. 1, pp. 54–78 April 2026

Canadian Food Studies La Revue canadienne des études sur l'alimentation

Review Article

Analyzing the NIMMIWG's 231 Calls for Justice through a food studies lens: Inviting food systems scholars to the table

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Abstract

In 2019, the National Inquiry into Missing and Murdered Indigenous Women and Girls (MMIWG) released a report containing 231 Calls to Justice to address the disproportionate level of violence faced by Indigenous women, girls, and 2SLGBTQQIA people in Canada. Six years later, there has been little progress towards implementing the Calls to Justice, and the MMIWG crisis remains urgent. As four women (Indigenous and non-Indigenous) engaged in Indigenous food systems work, we analyzed the calls to action through a food studies lens and highlighted key connections between gendered violence against Indigenous bodies and food studies. Calls for all governments; calls for industries, institutions, services and partnerships; and distinctions-based calls were all deemed relevant to food studies, with areas of interest including human security, culture, extractive and development industry, and correctional services. We offer these connections between MMIWG and food studies as a call to action for settler food systems scholars and practitioners to engage with these calls in their own work in order to advance justice for, and prioritize the safety and wellbeing of, Indigenous women, girls, and 2SLGBTQQIA people. We urge settlers to practice kinship with the land and Indigenous Peoples as a way to hold the government accountable to the 231 Calls, and discuss rematriation as a path towards addressing the MMIWG crisis in Canada.

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DOI: 10.15353/cfs-rcea.v13i1.746
ISSN: 2292-3071

Keywords: Calls to justice; colonialism; gender; Indigenous food systems; MMIWG

Résumé

En 2019, l'Enquête nationale sur les femmes et les filles autochtones disparues et assassinées (ENFFADA) a produit un rapport contenant 231 appels à la justice pour remédier au taux de violence disproportionné que subissent les femmes, les filles et les personnes 2ELGBTQQIA autochtones au Canada. Six ans plus tard, la mise en œuvre des appels à la justice a fait bien peu de progrès, et la crise des FFADA demeure une urgence. Nous, quatre femmes (autochtones et non autochtones) impliquées dans les systèmes alimentaires autochtones, avons analysé ces appels à l'action dans la perspective des études sur l'alimentation. Des liens clés en sont ressortis entre la violence genrée contre les corps autochtones et les études sur l'alimentation. Les appels à tous les paliers de gouvernement, les appels aux industries, aux institutions, aux services et aux associations, et les appels fondés sur des distinctions ont tous été jugés pertinents pour les études sur l'alimentation, touchant des domaines d'intérêts tels que la sécurité humaine, la culture, l'industrie extractive et de développement, les services correctionnels. Ces liens entre les FFADA et les études sur l'alimentation, nous les mettons en lumière comme un appel à l'action lancé aux chercheurs, chercheuses, praticiens et praticiennes des systèmes alimentaires issus du colonialisme : qu'ils et elles intègrent ces enjeux dans leur propre travail en vue de faire progresser la justice envers les femmes, les filles et les personnes 2ELGBTQQIA autochtones, et d'assurer leur sécurité et leur bien-être. Nous exhortons les personnes issues du colonialisme à faire preuve de solidarité avec la terre et les peuples autochtones en réclamant des comptes au gouvernement concernant les 231 appels à la justice, et en abordant la rematriation comme moyen de gérer la crise des FFADA au Canada.

Introduction

From 2019 to 2024, the Yellowhead Institute, an Indigenous think tank in the Faculty of Arts at Toronto Metropolitan University, released independent reports on the federal government's progress in implementing the 94 Calls to Action—legal imperatives within the Truth and Reconciliation Commission's (TRC) 2015 final report on the violent legacy of residential schools in Canada (Jewell, 2024; Jewell & Mosby, 2019-2023). In 2023, the authors wrote that the dismal lack of progress (13 calls completed of 94) no longer warranted a report card. 2025 marked the tenth anniversary of the TRC's 94 Calls to Action, and as Eva Jewell, one of the report's authors, reminds us, "Reconciliation is not just about apologizing for past wrongs, at which Canada is quite adept; it's about ending current wrongs that are happening today, and preventing future wrongs—both of which Canada fails to do" (Jewell, 2024, p. 2).

In a process similar to that of the TRC, the National Inquiry into Missing and Murdered Indigenous Women and Girls (NIMMIWG) was launched to address the

systemic violence experienced by Indigenous women, girls, and 2SLGBTQQIA people. The inquiry was set in motion following the Native Women's Association of Canada's (NWAC) role in spotlighting the MMIWG crisis by creating a database to track reported cases of violence against Indigenous women and girls. Their 2010 report provided the first estimate of all existing reported MMIWG cases in Canada: 582 (NWAC, 2010). NWAC's report sparked outrage across the nation, with many human rights, legal, and social justice organizations, including the Assembly of First Nations, the Canadian Bar Association, the Feminist Alliance for International Action, and the Inuit Tapiriit Kanatami, calling for a formal inquiry into the disproportionate violence faced by Indigenous women and girls (NIMMIWG, 2017). Many activists held vigils, public awareness events, and marches, using art, various forms of journalism, and social media to build support and to draw attention to MMIWG.

Initially, the Conservative government under Stephen Harper dismissed the urgency of addressing the MMIWG crisis despite the concerning data presented by NWAC and the RCMP, and did not support the investigation. This was further evidenced by Harper stating that the MMIWG epidemic "was not high on [his] radar" (García-Del Moral, 2024, p. 2). However, under Justin Trudeau's Liberal government, all ten provincial premiers supported a National Inquiry into MMIWG in 2013. On September 1st, 2016, the NIMMIWG officially commenced, with community visits and discussions with Indigenous and governmental organizations between November 2016 and March 2017, and with the start of statement gathering, or the Truth Gathering Process, in May 2017 (NIMMIWG, n.d.). The final report from the NIMMIWG was published on June 3, 2019 (NIMMIWG, n.d.). It articulates 231 Calls for Justice to end violence against MMIWG, reflecting a similar process to that of the TRC.

The NIMMIWG inquiry process included the development of a national action plan. Released on June 3, 2021, the National Action Plan is guided by a vision of "a transformed Canada where Indigenous women and 2SLGBTQQIA people, wherever they are, live free from violence, and are celebrated, honoured, respected, valued, treated equitably, safe, and secure" (NIMMIWG, 2021, p. 22). One year after its release, progress on the National Action Plan was assessed and published in the *2022 Progress Report on the MMIWG National Action Plan* (NIMMIWG, 2022). While the National Action Plan outlined a detailed operationalization strategy with specific actions, resources, and timelines for short-, medium-, and long-term priorities, the progress report stressed that this had not yet been done. It underlined the urgency of creating a National Action Plan Committee and an implementation plan with clear timelines for immediate next steps to hold government bodies accountable for addressing the 231 Calls for Justice.

The Progress Report concludes that much more work is urgently needed to address violence against Indigenous women, girls, and 2SLGBTQQIA people. Indeed, the actual number of Indigenous women, girls, and 2SLGBTQQIA people who have gone missing or been murdered across Canada remains unknown, as police reporting across the country is inconsistent, riddled with errors, and fails to acknowledge the truth about the staggering number of MMIWG (NIMMIWG, 2017). Statistics Canada (2025) estimated that almost 30 percent of female homicide victims in 2024 were Indigenous – a marked increase from previous years – representing a homicide rate more than six times higher than that of non-Indigenous women (NIMMIWG, 2017).

It's hard not to feel deeply disappointed by the lack of progress on the Calls to Action and the Calls for Justice, especially as reconciliation discourse swept across the

country in the following years. Perhaps more importantly, this lack of progress raises a question: Who is responsible for implementing these calls? In its Calls for Justice report, the NIMMIWG (2019) clearly states that the Canadian government has a legal obligation to implement the calls in line with its own laws and legal principles, and yet, it goes on to say:

> Our Calls for Justice aren't just about institutions, or about governments, although they have foundational obligations to uphold; there is a role for everyone in the short and the long term. Individuals, institutions, and governments can all play a part; we encourage you, as you read these recommendations, to understand and, most importantly, to act on yours. (2019, p. 168)

We take up this statement from the NIMMIWG as researchers, practitioners, and advocates to identify, disrupt, and transform racialized and heteropatriarchal dynamics in the food system. Specifically, we will analyze and highlight how the Calls for Justice are relevant to the broad field of food studies in Canada, which we define as an interdisciplinary field that examines the social, cultural, economic, historical, political, and environmental dimensions of food practices, foodways, and food systems, and how they, in turn, shape societies, cultures, and ecologies. In doing so, we aim to encourage others—particularly settler food studies scholars—to engage with the Calls in their own work. In what follows, we will briefly describe the history of Indigenous-settler food relations in Canada, with particular attention to racialized and gendered dynamics. We will then describe our methodology for assessing the Calls for Justice and their relationship to food studies, and finally, present our analysis and future recommendations for the field of food studies.

Colonialism, gendered violence, and food insecurity

Historical factors

Prior to colonization, Indigenous Peoples' food came from the land and represented a complex web of interactions and interdependencies among people, land, and the spirit world. Food roles and activities were tied to individual and communal responsibilities rather than to gender (Anderson, 2011; Manson, 2013). However, colonialism deeply affected food roles and responsibilities; Western notions of gender and food dominated assimilation projects (Burnett & Hay, 2023). For example, European women were responsible for indoctrinating Indigenous women into the kitchen, where so-called "proper" food belonged, and off the land, where only men belonged (Acoose, 2016). This messaging reduced women and Two-Spirit peoples in their communities, resulting in profound losses of food knowledge, spiritual practice, and connection; eliminated Indigenous economies; and altered family structures (Nickel & Fehr, 2020; Simpson, 2017). Many Indigenous cultures centre the responsibilities of women and Two-Spirit peoples to the land, water, medicines, plants, and seeds. As Kai Pyle (2020) urges, "making a concerted effort to explore and excavate individual teachings of our own peoples may be one way to counteract the tendency to erase the diversity of Indigenous gender" (p. 115).

The imposition of Canadian settler society and governments has disrupted these responsibilities and eroded Indigenous food sovereignty and security, in both direct and indirect ways (Daigle, 2019; Morrison, 2011; Settee & Shukla, 2020). The development of the Canadian settler state was intricately tied to the expansion of settler agriculture, which was a fundamental tool for dispossessing and subjugating Indigenous Nations through a racialized politics of starvation to advance settler land claims and territorial sovereignty (Carter, 1990; Kepkiewicz & Dale, 2018). The government often withheld promised treaty rations to control Indigenous Peoples, and Indigenous women bore the brunt of heteropatriarchal violence by Indian agents, as their bodies could be used to release the rations (Daschuk, 2013).

Even under extreme duress, Indigenous Peoples worked tirelessly to feed their communities, yet settler laws, policies, and institutions have continued to undermine their success (Carter, 1990; Laforge & McLachlan, 2018; Sommerville, 2021). For example, the residential school system—run by Christian churches and sponsored by the Canadian government—stole Indigenous children from their families for generations. Indigenous children were not allowed to speak their languages or to practice their cultures, including hunting, fishing, and gathering. The goal of the residential school system was to assimilate generations of Indigenous children into "heterosexual, cis-gendered, English-speaking, Christian workers who had the skills to participate in the lowest rungs of the wage economy" (Simpson, 2025, p. 169), ultimately reducing Indigenous Peoples' ability to resist settler encroachment on their lands. Indian residential schools thus reinforced the division between Indigenous women and men, including the erasure of Two-Spirit and queer identities and belonging. This had cascading impacts on Indigenous food sovereignty, as land dispossession and colonial development have dramatically increased Indigenous Peoples' food insecurity by eroding the social determinants of health and well-being (e.g., access to territory, food-related knowledge, traditional foods, and self-determination) (Coté, 2016; Dennis & Robin, 2020; Jonasson et al., 2019).

The Indian Act (1876) dramatically reshaped Indigenous governance and lifeways. It diminished Indigenous Peoples' access to their lands and foods by forcing them onto reserves and controlling their movements and activities; disrupted hereditary governance systems, attempting to replace them with elected band councils; stripped Indigenous women of their political and leadership roles while imposing heteropatriarchal values on Indigenous Nations and communities; and disenfranchised Indigenous women of their rights and identity as citizens of their nations (e.g., by restricting Indigenous women's ability to obtain and/or pass on band membership/status) (Robin Martens, 2021; Deschambault, 2019; McIvor et al., 2019; Jacco, 2021). In turn, by severing historically matriarchal governance systems and removing Indigenous women and Two-Spirit people from their positions of political leadership, Indigenous women's "relationship, connection and engagement with their ancestral food systems" was upended (Jacco, 2021, p. 49). Other government policies and programs sought to eliminate breastfeeding in Indigenous communities, positioning milk and pablum as "pure", "clean", and "moral" (Burnett & Hay, 2023). The Family Allowance Program further attempted to segment and reduce women's access to traditional foods, the land, and food activities:

> Under the Family Allowance Program, Indigenous women's bodies became sites of conflict and violence for the colonial state. With the intent of withholding their family allowance benefits as a tool of coercion,

> letters from Indian Superintendents regularly requested that investigations be carried out into the conduct of Indigenous women believed to be transgressors of European-Canadian notions of domesticity and motherhood (Burnett & Hay, 2023, p. 64-65).

As these examples show, the intersections of colonialism, Christianity, and heteropatriarchy introduced food insecurity and economic inequality into Indigenous communities, directly contributing to the heightened vulnerability of Indigenous women, girls, and Two-Spirit people to violence.

Ongoing implications

In Indigenous communities, the impact of Western food economies and their colonial history has created an (*en)forced dependency* on federal government food systems and programs, causing Indigenous Peoples to become food insecure (Burnett & Hay, 2023). The very nature of colonial capitalism undermines the vital relationships Indigenous Peoples have with the land in order to steal the land and incorporate Indigenous Peoples into the Euro-Canadian body politic. Colonialism has especially destroyed Indigenous foodways and traditional practices by profiting from natural resources and criminalizing Indigenous bodies. For example, legislative policies have prevented and prohibited Indigenous Peoples from harvesting and hunting traditional foods, therefore preventing Indigenous communities from achieving food security (Robin et al., 2021). Federal government services and food programs have reinforced Indigenous Peoples' reliance on Westernized food systems as a tactic to control Indigenous populations and bodies (Burnett & Hay, 2023). The reservation systems are used to assimilate, dispossess, and displace Indigenous Peoples from their kinship ties with land.

Outcomes from 500 years of colonial violence against Indigenous Peoples' land, food, and governance systems today include high rates of Indigenous homelessness in Canada, with significant repercussions for Indigenous health and disconnection from traditional territories. Indigenous women, girls, and Two-Spirit people face disproportionately high rates of homelessness, layered violence, and systemic confinement in jails and prisons. Despite systemic barriers to employment, education, and housing, in addition to over-incarceration, poverty, and a lack of services, Indigenous women have shown remarkable resilience; for example, Indigenous women are often the first to defend traditional land and water from resource extraction. Yet Indigenous women are often criminalized and mistreated for their role in land defence, directly contributing to the MMIWG crisis.

In sum, since the arrival of colonists and the establishment of so-called Canada, violence against Indigenous land and food systems has shaped—and been shaped by—particular violence against Indigenous women, girls, and Two-Spirit people. Indigenous feminists have long pointed out these connections and demonstrated how colonialism disrupts Indigenous sovereignty over lands and bodies, while resurgence is about restoring land and body sovereignty (Simpson, 2014; Simpson, 2017). Yet despite the deep entanglement of land and food systems with colonial dispossession and gendered violence, the food studies and food sovereignty communities have had limited engagement with the topic of violence against Indigenous women, girls, and Two-Spirit people in Canada and beyond (Grey & Patel, 2015). While preliminary work has begun to address these topics (Parker, 2023; Xavier & Rotz, 2022; Ferreira et al., 2022; Pictou et al., 2021), here, we make the case that food systems scholars can and should engage more deeply with the gendered and racialized inequities that

shape access to land, food, and safety. In Canada, the MMIWG Calls for Justice provides a framework for food studies researchers and practitioners to carry out research that aligns with demands from Indigenous-led movements for both gender justice and food sovereignty. Informed by Indigenous feminism and anti-colonial/resurgence politics (Million, 2009; Simpson, 2017), we now turn to positioning ourselves and introducing our methodological approach.

Methodology

As a group of Indigenous and non-Indigenous women whose work spans Indigenous food systems and is deeply rooted in Indigenous feminisms and intersectional theories (Green, 2020; Maracle, 1988; Starblanket, 2024; Smith, 2012), we came together to write this paper as a call to action for food studies to explicitly engage with the 231 Calls for Justice. In line with both Indigenous and feminist scholarship, it is important that we situate ourselves in relation to the research. The first author, Tabitha Robin, has mixed settler, Métis, and Cree ancestry from St. Peter's Indian Band and is an Indigenous food systems scholar. She is a gardener, seed keeper, and food scholar who has been carrying on the traditions of her family, living and learning about Indigenous food sovereignty, for 20 years. The second author, Dana James, is a settler of German, British, Dutch, and Polish descent. Through her work with land-based movements over the past decade, she has witnessed the disproportionate legal, physical, interpersonal, and ontological violence that Indigenous Peoples—especially Indigenous women—face when exercising their rights and responsibilities on the land. She therefore comes to this work through a desire to disrupt and dismantle patriarchal settler norms and institutions predicated on logics of power, control, and domination. The third author, Lisa Kenoras is a young Secwépemc woman with deep ties to the lands of her community through the powerful bloodline of her great-grandmother, kye7e and ki7ce. She is inspired by the women in her life who have supported and guided her, reminding her of her place in the world. The fourth author, Stephanie Lin, is a settler of Taiwanese and mixed European ancestry who is engaged in Indigenous food sovereignty initiatives alongside the first author across so-called Canada. Her graduate thesis project illuminated and unpacked the injustices that Indigenous land stewards face when caring for their land and food systems, challenges that are intimately tied to the MMIWG crisis.

Our analysis began in July 2024, when we met to determine a framework for evaluating the 231 Calls for Justice in relation to food studies, which concluded in February 2025. We began by establishing a working definition of food studies. We then independently read the calls and marked them for inclusion based on their alignment with our definition of food studies. Keywords we used to identify a call as relevant to food studies included: Wellness, prevention, healing, food, and culture. Given that Indigenous life is deeply entangled with the intersecting and overlapping colonial systems addressed in the 231 Calls, their relevance to food studies is open to differing interpretations. We therefore held a series of meetings to compare our assessments until we reached a consensus. While not all 231 Calls are highlighted in our analysis, we emphasize that, in many ways, all of the Calls for Justice could be relevant to food studies because they position Indigenous life as valuable.

Dian Million's (2009) felt theory was especially appropriate for this engagement. Million (2008; 2009) positions *affect* as a critical approach to understanding Indigenous history and contemporary realities. Felt theory has also been applied to Indigenous food contexts, with the understanding that Indigenous food experiences are inherently healing at one end of the spectrum and, at the other, intensely traumatic due to the colonial food system (Robin & Hart, 2025). Indigenous food is healing: As medicine, spirit, community, family, and a relationship to Creation. This is why food is utilized prominently in ceremonies (Robin & Hart, 2025; Atleo, 2004). The consequences of the colonial food system are felt deeply within Indigenous communities, including the land and non-human kin. Felt theory argues that Indigenous experience is a valuable source of data and embodied knowledge. With felt theory in mind, we examined the Calls for Justice to assess how Indigenous bodies, cultures, and communities have been affected by colonial violence, particularly that of the colonial food system.

Any interpretation, especially with felt theory, should be Indigenous-led, but the actions they demand apply largely to settler systems and settings. Thus, the experiences of the Indigenous women on our team who are engaged in food sovereignty work are especially relevant; we have shared some of them here to illuminate the applicability of the Calls for Justice. Drawing on our experiences and a desktop review of the literature conducted between March and mid-May 2025, we provide examples that support our analysis of the MMIWG Report and highlight initiatives that connect food to the health, safety, and well-being of Indigenous women, girls, and Two-Spirit people, as felt experience. Lastly, we deliberately engage with citational politics: Indigenous Peoples are best suited to describe the nature of their realities, and we make a concerted effort to engage with Indigenous scholarship throughout this paper (Liboiron, 2022).

Relevant MMIWG Calls for food studies

Land, culture, language, governance, and food are sites and sources of healing—of affect—for Indigenous Peoples. In total, the Calls for Justice should be understood as concrete efforts to end the genocide against Indigenous women, girls, and 2SLGBTQQIA people. Our analysis highlights the following Calls for Justice as relevant to food studies, and they should be understood as opportunities to refocus food studies research in support of Indigenous healing, sovereignty, and gender justice. This list is by no means exhaustive, and as concepts of Indigenous health, well-being, healing, infrastructures, and services continue to grow, so too will this list.

Our results follow the structure of the MMIWG Final Report, which categorized the Calls for Justice into four major groups: 1) For all governments; 2) Industries, institutions, services, and partnerships; 3) For all Canadians; and 4) Distinctions-based calls that address the specific distinctions of Inuit, Métis, and 2SLGBTQQIA populations. Table 1 presents the Calls for Justice for each section that applies to food studies. For each section below, we provide a brief summary of the Calls under the theme, our analysis, and examples of these Calls in action relevant to food studies.

Table 1: Calls for Justice applicable to food studies

Calls for Justice for All Governments	
Human and Indigenous Rights and Governmental Obligations	1.1, 1.2, 1.3, 1.5, 1.6, 1.7, 1.8
Culture	2.1, 2.2, 2.3, 2.4, 2.5, 2.6
Health and Wellness	3.1, 3.2, 3.3, 3.4, 3.6, 3.7
Human Security	4.1, 4.2, 4.5, 4.6, 4.7, 4.8
Justice	5.6
Calls for Justice for Industries, Institutions, Services, and Partnerships	
Media and Social Influencers	6.1
Health and Service Providers	7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 7.8
Calls for Transportation Service Providers and the Hospitality Industry	N/A
Calls for Police Services	9.1, 9.2
Calls for Attorneys and Law Societies	N/A
Educators	11.1
Social Workers and Those Implicated in Child Welfare	12.3, 12.4, 12.5, 12.6, 12.7, 12.12
Extractive and Development Industry	13.1, 13.2, 13.3, 13.4, 13.5
Correctional Service Canada	14.3, 14.6, 14.8, 14.10
Calls for Justice for all Canadians	
Calls for all Canadians	15.1, 15.2, 15.3, 15.4, 15.5, 15.6, 15.7, 15.8
Distinctions-Based Calls	
Inuit-Specific Calls for Justice	16.1, 16.2, 16.3, 16.4, 16.5, 16.6, 16.7, 16.8, 16.9, 16.10, 16.11, 16.12, 16.13, 16.14, 16.15, 16.17, 16.18, 16.19, 16.20, 16.21, 16.25, 16.27, 16.28, 16.30, 16.37, 16.42, 16.44
Métis-Specific Calls for Justice	17.1, 17.2, 17.3, 17.4, 17.5, 17.6, 17.7, 17.8, 17.9, 17.10, 17.13, 17.15, 17.16, 17.17, 17.18, 17.19, 17.20, 17.21, 17.22, 17.23, 17.24, 17.25, 17.26, 17.27, 17.28
2SLGBTQQIA-Specific Calls to Justice	18.1, 18.2, 18.3, 18.4, 18.6, 18.7, 18.8, 18.10, 18.15, 18.16, 18.17, 18.18, 18.19, 18.22, 18.24, 18.25, 18.27, 18.28, 18.29, 18.31

Calls for Justice for all governments

Human and Indigenous rights and governmental obligations: 1.1, 1.2, 1.3, 1.5, 1.6, 1.7, 1.8

Summary: These Calls demand that "equitable access to basic rights such as employment, housing, education, safety, and health care is recognized as a fundamental means of protecting Indigenous and human rights" (NIMMIWG, 2019, Call 1.1, p. 176). They also recognize that systemic and jurisdictional gaps in services contribute to the marginalization of and violence against Indigenous women, girls, and 2SLGBTQQIA people. Governments must also take all necessary measures to "prevent, investigate, punish, and compensate for violence" (ibid., Call 1.5, p. 177).

Analysis: Thus, tangible efforts to eliminate these gaps and prioritize Indigenous women, girls, and 2SLGBTQQIA people's human rights must include long-term, core funding commitments from all governments; program- and project-based funding will not address these gaps. Importantly, these Calls require compliance with relevant rights instruments, including the ICCPR, ICESCR, UNCRC, CEDAW, ICERD, UNCRC, and UNDRIP (see list of acronyms), among others. Fundamentally, the Calls focus on the realization of and respect for the individual and collective rights of Indigenous women, girls, and 2SLGBTQQIA people as prerequisites for Indigenous life and the basis on which Indigenous land and food systems flourish.

Culture: 2.1, 2.2, 2.3, 2.4, 2.5, 2.6

Summary: The Calls related to culture require governments to "acknowledge, recognize, and protect the rights of Indigenous Peoples to their cultures and languages as inherent rights, and constitutionally protected as such under Section 35 of the Constitution" (ibid., Call 2.1, p. 179). Indigenous women, girls, and 2SLGBTQQIA people must have "safe, no-barrier, permanent, and meaningful access to their cultures and languages" by ensuring and protecting the "rights of Indigenous children to retain and be educated in their Indigenous language" (ibid., Call 2.3, p. 179).

Analysis: Support for grassroots and community-led Indigenous food and language programming must be provided, with special attention to those who have been separated from their land and culture through colonialism, as food and language are foundational to Indigenous cultures. One example is Robin and Cidro's (2020) year-long Indigenous food sovereignty project with youth in Manitoba, in which Elders and language teachers co-taught workshops to provide a holistic approach to learning. Additionally, these Calls highlight the need for an empowerment fund to support Indigenous-led language and land-based cultural education programs that operate outside government and educational institutions. Such a fund would support Indigenous families and communities in engaging in healing land-based practices (most involving food harvesting and preparation) and "assist in the revitalization of distinct cultural practices as expressed by Indigenous women, girls, and 2SLGBTQQIA people" (NIMMIWG, 2019, Call 2.5, p. 179).

Health and wellness: 3.1, 3.2, 3.3, 3.4, 3.6, 3.7

Summary: These Calls emphasize that "the rights to health and wellness of 2SLGBTQQIA and Indigenous women and girls must be recognized and equitably protected regardless of jurisdictional lines, geographical location, and Status affiliation or lack thereof" (ibid., Call 3.6, p. 181). They highlight a special need for ongoing healing programs for "all children of missing and murdered Indigenous women, girls, and 2SLGBTQQIA people, akin to the previously established and disbanded Aboriginal Healing Foundation" (ibid., Call 3.7, p. 181).

Analysis: There is a need for stable, adequate, long-term, and/or permanent funding for Indigenous-led, community-based health and wellness services, including mobile trauma and addiction treatment programs paired with mental health services. These services must be available in all Indigenous communities to prevent the need to relocate for services and must "call on Elders, Grandmothers, and other Knowledge Keepers to establish community-based trauma-informed programs" (ibid., Call 3.3, p. 180). A good example of such a service, developed in response to the Calls for Justice, is the Resiliency Lodge model hosted by the NWAC. For example, the Wabanaki Resiliency Lodge sits on 16 acres of farmland in Wabanaki territory and provides land-based, Elder-led traditional healing services and programming. The lodge offers healing ceremonies, sweat lodge ceremonies, medicinal baths, talking circles, art expressions, and Indigenous-led agricultural programming that serves as a global prototype for healing Mother Earth and Indigenous Peoples. Featuring land-based agricultural workshops, medicinal plant teachings, regenerative healing through traditional food methods, and a companion apprenticeship program, the lodge's agricultural programming is grounded in Traditional Knowledge and led by Indigenous Women, Girls, Two-Spirit, Transgender, and Gender-Diverse+ (WG2STGD+) Peoples (NWAC, 2023).

Human security: 4.1, 4.2, 4.5, 4.6, 4.7, 4.8

Summary: These Calls outline how "all governments must immediately ensure that Indigenous Peoples have access to safe housing, clean drinking water, and adequate food" (ibid., Call 4.1, p. 181). The Calls emphasize that "all governments must support Indigenous Peoples' right to self-determination in the pursuit of economic and social development" (ibid., Call 4.5, p. 182).

Analysis: Services and infrastructure must meet the social and economic needs of Indigenous People. This includes: Safe housing appropriate to geographic and cultural needs; long-term, ongoing funding for shelters, safe spaces, transition homes, and second-stage housing; and services, particularly for those experiencing poverty and food insecurity. Funding to ensure adequate infrastructure and safe, affordable transit and transportation should be readily available to Indigenous communities to improve access to both traditional and store-bought foods alike. This should also include expanded, safer access to grocery stores and an examination of the exorbitant costs of food in Northern stores. Liveable incomes are essential for Indigenous Peoples, especially those reliant on Northern stores.

Justice: 5.6

Summary: Call 5.6 states that all governments must develop a comprehensive and holistic approach to

provide healing and necessary trauma supports for Indigenous Peoples, especially for "Indigenous victims of crime and family and friends of Indigenous murdered or missing persons" (ibid., Call 5.6, p. 184). This includes culturally relevant and accessible Indigenous-led services and trauma supports.

Analysis: Many Indigenous Nations incorporate food into their grieving and healing ceremonies, especially in remembrance. One such ceremony is the Anishinaabe *chi bi* ceremony (meaning "ghost ceremony" in English), which honours loved ones who have passed through a feast. An Elder shared with the First Author that during a *chi bi* ceremony, attendees bring foods the deceased enjoyed, while an Elder conducts a pipe ceremony to invite the departed to join the feast with their mourning loved ones (Robin Martens, 2021). Given the power and importance of these ceremonies, which largely involve feasting, funding for feasts should be available to communities, including cultural and mental health supports, so that families can begin to recover from loss.

Calls for Justice for industries, services, and partnerships

Media and social influencers: 6.1

Summary: All media and institutions teaching journalism, governments, and those working in the entertainment industry must use decolonizing approaches in their work to ensure authentic and appropriate representation of Indigenous women, girls, and 2SLGBTQQIA people, and to challenge harmful and violent stereotypes of Indigenous Peoples. Indigenous Peoples must share their stories without discrimination. This is especially relevant in combatting the racist and gendered stereotypes promoted in the media regarding "high-risk" lifestyles, poverty, and child-rearing (Acoose, 2016; Good, 2023).

Analysis: Our work and that of many Indigenous scholars, along with our relationships with Indigenous land protectors, has shown that while Western media has depicted the care and protection of Indigenous food systems by Indigenous land stewards, gardeners, seed keepers, and harvesters as disruptive and violent (Lin, 2024), Indigenous Peoples care for the land in non-violent ways, fuelled by reciprocity with the land, to protect their plant and animal kin that make up their food systems. Those engaged in food studies can create media and publications with Indigenous co-authors or co-creators to accurately portray the stories of Indigenous food systems and food sovereignty.

Health and service providers: 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 7.8

Summary: Indigenous Peoples are the "experts in caring for and healing themselves" (NIMMIWG, 2019, Call 7.1, p. 188), and so health and wellness services must be designed and delivered by the communities they serve. Healing initiatives must not be time-limited and must include preventive approaches, including land-based and language initiatives that centre care for Elders and children, as well as knowledge "about harvesting and the use of Indigenous medicines" (ibid., Call 7.4, p. 189). Beyond Indigenous-led approaches to health and wellness, Western systems must provide adequate training and education for health service providers on the history of colonialism, oppression, and genocide of Indigenous Peoples. Funding, training, and recruitment

of Indigenous Peoples to train and work in health and wellness must be established by all governments and health service providers.

Analysis: Indigenous-led health and wellness services must incorporate land-based practices involving food harvesting, preparation, and care, as food is central to Indigenous wellness. One example of an Indigenous-led initiative focussed on land-based wellness, health, and healing is the "From the Ground Up" Toolkit for Indigenous Food Sovereignty Planning, curated by the Working Group on Indigenous Food Sovereignty (Morrison, 2024). The toolkit uses a trauma-informed approach to support Indigenous communities in planning Indigenous food sovereignty initiatives that can transform trauma by "upholding Indigenous rights and response-abilities to protect, conserve and regenerate the complex system of Indigenous biocultural heritage in the land and food system (Morrison, 2024, para. 2)."

Calls for police services: 9.1, 9.2

Summary: Importantly, these Calls begin with 9.1: "We call upon police services and justice system actors to acknowledge that the historical and current relationship between Indigenous women, girls, and 2SLGBTQQIA people and the justice system has largely been defined by colonialism, racism, bias, discrimination, and fundamental culture and societal differences" (NIMMIWG, 2019, Call 9.1, p. 190). All actors in the justice system must undertake appropriate training in trauma-informed approaches; establish working relationships that are territorially specific to the police's jurisdiction; and ensure Indigenous representation on "police service boards and oversight authorities" (ibid., Call 9.2 iii, p.190).

Analysis: These Calls extend to Indigenous Peoples and children trapped in social welfare and justice systems, whose rights to culturally appropriate food and medicines in correctional facilities are not honoured. These Calls are also especially relevant to the work of land defenders and other stewards, who experience industry-, societal-, and state-based violence while on the land (Lin, 2024; James & Mack, 2020). For example, there have been numerous instances of discrimination and racially charged violence by law enforcement officers against Indigenous land stewards who peacefully protest against resource extraction and industrial developments on their lands that were not approved by their Nations and which threaten to irreversibly contaminate vital foods and waters (Gobby & Everett, 2022; Powell, 2020). Land defenders have been asked to provide status cards, had guns drawn on them, been pepper-sprayed, and had their clothing torn off; Indigenous women land defenders have been called "orcs" and "ogres"—in the context of having red handprints painted on their faces to honour MMIWG—and unjustly singled out for arrest by the RCMP (Kilawna, 2020; Hermes, 2021; Lin, 2024; Lin & Robin, 2025; McKay, 2024; Sterritt, 2021; Mackin, 2025). The violence Indigenous land defenders, particularly women, face from law enforcement underscores the urgency of building respectful relationships between Indigenous Peoples and the justice system, as well as the need to revise policies and procedures to reduce the systemic racism experienced by Indigenous Peoples.

Educators: 11.1

Summary: All educational institutions, from elementary to post-secondary, must educate the public about missing and murdered Indigenous women, girls, and 2SLGBTQQIA people: "about the issues and root

causes of violence they experience" (NIMMIWG, 2019, Call 11.1, p.193). This education must be done in partnership with Indigenous Peoples and include (but not be limited to) Indigenous territories, law, practices, and histories, including the root causes of violence against Indigenous women, girls, and Two-Spirit people (NIMMIWG, 2018, p. 22).

Analysis: Many of the root causes of the violence faced by Indigenous women, girls, and Two-Spirit people are relevant to food studies (e.g., loss of Indigenous languages and cultures, loss of land, food and water insecurity, and more). In 2018, the NIMMIWG published a student and youth engagement guide as a "resource for educators at all levels to introduce the value of Indigenous women's and girls' lives into the classroom and into the minds and hearts of young people" and to "prepare educators to use a decolonizing pedagogy and a trauma-informed approach in their teaching" (ibid., p. iii). This guide can be adapted and applied to curricula across the country to challenge harmful stereotypes about Indigenous Peoples, raise awareness of MMIWG, incorporate Indigenous teachings on land and food, and provide settlers with tools to approach decolonization in education.

Social workers and those implicated in child welfare: 12.3, 12.4, 12.5, 12.6, 12.7, 12.12

Summary: Indigenous children are the foundation of Indigenous culture. Thus, many of these Calls are relevant, but for this analysis, we highlight a few. All governments and Indigenous organizations are called upon to develop and apply a definition of "best interests of the child" grounded in Indigenous needs, values, and worldviews, and to ensure that, if apprehension is "not avoidable", family and community members will assume care of the child and be supported to do so (NNIWWIG, 2019, Calls 12.3 & 12.6, p. 94-95). Indigenous children should not be apprehended on the basis of poverty or cultural bias. All governments must resolve issues of poverty, housing, and food and water insecurity so that all Indigenous families may succeed. All governments must also provide financial support and resources for children of missing and murdered Indigenous women, girls, and 2SLGBTQQIA people, including support for grief and loss, as well as specialized care for trauma.

Analysis: There is a long history of Indigenous children being apprehended through Residential Schools, the Sixties Scoop, and now the child welfare system. In all cases, the apprehension of children was intended to separate the next generation of Indigenous hunters, gatherers, and food providers from their families, foodways and cultural traditions, and land-based knowledge (including language), while advancing a settler agenda of land dispossession. During apprehension and institutionalization, Indigenous children have been subjected to colonial diets and nutritional experimentation, directly violating their right to food and dignity. This disruption also undermines the specific roles and responsibilities that Indigenous women, girls, and 2SLGBTQQIA people have in land-based stewardship, while continuing to socialize Indigenous girls, boys, and 2SLGBTQQIA youth according to Western gender and sexuality norms. By ensuring that Indigenous children and youth remain with their families and communities and have access to traditional foods while they are in systems of "care," there is an opportunity to promote healing through a connection to culture and identity.

Extractive and development industry: 13.1, 13.2, 13.3, 13.4, 13.5

Summary: Resource extraction and development industries must ensure the safety of Indigenous women, girls, and 2SLGBTQQIA people while also ensuring "equitable benefit from development" (ibid., Call 13.1, p. 196). Development industries must carry out "gender-based socio-economic impact assessments on all projects" (ibid., Call 13.2, p. 196) as an integral part of environmental impact assessments. Government must fund further inquiries and studies to "better understand the relationship between resource extraction and other development projects and violence against Indigenous women, girls, and 2SLGBTQQIA people" (ibid., Call 13.4, p. 196).

Analysis: This section specifically notes the need to address racialized sexual violence at hydroelectric projects in Northern Manitoba, where communities have been calling for support for decades. The effects of these projects have been well documented and have emerged in our own work in this context, ranging from the erosion of food sovereignty due to the pollution of traditional foods and medicines, to the harassment of Indigenous women working in the care and service economy (e.g., in kitchens and the food sector) (Amnesty International, 2020; Neckoway & Brownlie, n.d.). Therefore, efforts to reduce harmful resource-extraction development will contribute to the health and safety of traditional food systems and the women and girls who care for them.

Correctional Service Canada: 14.3, 14.6, 14.8, 14.10

Summary: Plans and services for mental health, addictions, and trauma support for incarcerated Indigenous women, girls, and 2SLGBTQQIA people must be needs-based and support reintegration into the community. Culturally safe, distinctions-based, and trauma-informed models of care must be prioritized to enhance the role of Elders in healing.

Analysis: In line with the Gladue Principles, our work with land defenders and in communities has emphasized that the overrepresentation of Indigenous Peoples in prisons and jails must be reduced. One pathway is to ensure that alternative approaches, such as healing lodges like the Eagle Women's Lodge, are consistently well-resourced (Indigenous Women's Healing Centre, 2022). These lodges provide trauma-informed spaces that support individuals who have been involved with the Correctional Service of Canada in accessing culturally appropriate care, food, and medicines as they work toward reintegration and healing. As mentioned in Sections 2, 3, 5, and 7, access to traditional foods—and the knowledge of how to harvest, prepare, and share them—is essential to Indigenous food sovereignty, wellbeing, health, and cultural revitalization.

Calls for Justice for all Canadians

All Canadians: 15.1, 15.2, 15.3, 15.4, 15.5, 15.6, 15.7, 15.8

Summary: These Calls include speaking out about violence against Indigenous women, girls, 2SLGBTQQIA people, and all people; confronting racism, sexism, ignorance, homophobia, and transphobia; learning Canada's true history; reading the NIMMIWG final report; working to become a strong

ally; respecting others' values; and committing to protecting and promoting the safety and well-being of 2SLGBTQQIA people, Indigenous women, and girls.

Analysis: We chose these Calls deliberately as entry points: Too often, there is a desire to look away from or not interrogate the relationship between food, sex, gender, patriarchy, and violence. However, the Calls for all Canadians recognize that "each person has a role to play in order to combat violence against Indigenous women, girls, and 2SLGBTQQIA people" (NIMMIWG, 2019, p. 199). In food studies, for example, there is an enormous opportunity for teachers and practitioners to teach about Canada's true history through a food systems lens, given how integral settler agricultural expansion was to dispossessing Indigenous Nations of their lands and to the formation of the Canadian nation-state (Carter, 1990; Kepkiewicz & Dale, 2018; Wittman & James, 2022). As Rotz (2017) points out, patriarchal norms ran through patterns of settler agriculture, where land rights were allocated to settler families that established patriarchal family farms. These patterns—which shape views of who belongs on the land and how—still reverberate across the Canadian agricultural landscape.

Distinctions-based Calls

The Distinctions-Based Calls articulate the diversity of Indigenous experiences across the country. These calls draw attention to the specific and intersecting forms of violence and oppression that Inuit, Métis, and 2SLGBTQQIA people experience because of their geographic locations, distinct histories of colonialism, and cultural, economic, and jurisdictional contexts. As a group, we debated whether to include all of these calls given their specificity and interdependence. Below, we present several strong examples and encourage readers to familiarize themselves with all Distinction-Based Calls.

Inuit-specific Calls for Justice: 16.1, 16.2, 16.3, 16.4, 16.5, 16.6, 16.7, 16.8, 16.9, 16.10, 16.11, 16.12, 16.13, 16.14, 16.15, 16.17, 16.18, 16.19, 16.20, 16.21, 16.25, 16.27, 16.28, 16.30, 16.37, 16.42, 16.44

Summary: Most Calls for Justice for Inuit are relevant to food studies. They include protecting and promoting Inuit culture and language by enhancing Inuktut service capacity; requiring government and service providers to learn about Inuit culture, laws, values, and history; supporting intergenerational knowledge transfer; providing culturally appropriate health services within each Inuit community; developing a long-term, sustainably funded Inuit Healing and Wellness Fund to support grassroots and community-led programs; developing a long-term, sustainable fund for Inuit artists to explore and promote healing; and respecting the rights of Inuit children in care, including those placed outside their homelands (which must be restricted), by providing safe, culturally appropriate housing given the links between the housing crisis and violence.

Analysis: Of particular relevance, number 16.20 calls for "all governments to support the establishment of programs and services designed to financially support and promote Inuit hunting and harvesting in all Inuit communities" (NIMMIWG, 2019, p. 205). One such

service we have experience with that aligns with this call is Siku, an app created by and for Inuit (and since expanded to other Indigenous Nations) that supports Indigenous-led environmental monitoring and territorial governance, as well as data sovereignty protocols. As noted in Section 4, safe, reliable transportation methods must be available to Indigenous women and girls to maintain access to food, and Siku provides such a service, enabling accessible monitoring, harvesting, and consumption of traditional foods.

Métis-specific Calls for Justice: 17.1, 17.2, 17.3, 17.4, 17.5, 17.6, 17.7, 17.8, 17.9, 17.10, 17.13, 17.15, 17.16, 17.17, 17.18, 17.19, 17.20, 17.21, 17.22, 17.23, 17.24, 17.25, 17.26, 17.27, 17.28

Summary: Similarly, many of the Métis-specific Calls for justice are relevant to food studies and require Métis participation, "including those with lived experience" (NIMMIWG, 2019, p. 210), to more fully realize the Calls. They include: Equitable representation of Métis voices in policy and programming; funding for Métis-specific programs and services, such as Métis health authorities; eliminating barriers to accessing Métis programs and services; developing Métis-specific cultural competencies, such as trauma-informed care and anti-racist training; funding to establish and maintain cultural programming for Métis children in foster care; funding for traditional healing programs and Métis-specific programs that address Métis well-being; and funding to support Métis cultural practices. Of particular relevance to food studies, 17.9 Calls for "all governments to provide safe transportation options, particularly in rural, remote, and northern communities, including 'safe ride' programs" (ibid., p. 211). This stems from many instances of sexual violence that Indigenous women and girls have faced when utilizing public transportation and taxicab services (Longman, 2016).

Analysis: This issue inspired the creation of several ride-sharing organizations for Indigenous women and girls, such as Ikwe Rides. This Indigenous, female-run group provides transportation to Indigenous women and girls on a by-donation basis and has a social media community of 16,500 members (Ikwe Safe Ride, n.d.). Their mission is "to provide a safe means of transportation for female members and children of our community through a volunteer-run initiative. [...] The safety of our volunteers and passengers is our number one priority" (Longman, 2016, para. 14). These services also support food sovereignty for Indigenous women, girls, and 2SLGBTQQIA people by providing safe transportation to access grocery stores, community food markets, and harvesting sites.

2SLGBTQQIA-specific Calls for Justice: 18.1, 18.2, 18.3, 18.4, 18.6, 18.7, 18.8, 18.10, 18.15, 18.16, 18.17, 18.18, 18.19, 18.22, 18.24, 18.25, 18.27, 18.28, 18.29, 18.31

Summary: During the NIMMIWG witness testimonies, the need for greater awareness of 2SLGBTQQIA people, their histories, roles, and their contemporary place within communities was highlighted as particularly important. Self-determined and culturally specific approaches are strongly featured and include: Consistent funding for 2SLGBTQQIA programming and services that are culturally safe and involve youth; inclusion of 2SLGBTQQIA perspectives in decision-making; provision of "safe and dedicated ceremony and cultural places and spaces for 2SLGBTQQIA youth and adults," and advocacy "for 2SLGBTQQIA inclusion in all cultural spaces and ceremonies." Calls directed at researchers and educators

are significant, and include: More precise data-collection measures that include non-binary gender options for reporting in all contexts, and research on pre-colonial knowledge and teachings about the roles, responsibilities, and place of 2SLGBTQQIA peoples within their communities.

Analysis: Many Two-Spirit People hold key roles and responsibilities within Indigenous food systems, including seed keeping and healing. These practices are threatened by colonialism, environmental harm, and the safety of Two-Spirit individuals responsible for seed keeping and healing work. If the safety of Two-Spirit people is not prioritized and ensured, these roles will remain threatened, weakening Indigenous health and food systems. Two-Spirit life must be affirmed to revitalize these roles and advance Indigenous food sovereignty.

For food studies scholars, improving health outcomes for 2SLGBTQQIA people can start with something as basic as collecting gender-disaggregated data that recognizes non-binary and Two-Spirit identities, thereby avoiding the replication of colonial binaries. Researchers can also engage more deliberately with scholarship on land and food systems produced by queer and Two-Spirit scholars, as well as with Indigenous feminist and queer theory that foregrounds the interconnections among land, body, and power (cf. Simpson, 2014, 2017; Hunt, 2025).

Conclusion

There is a danger in responding urgently to these Calls for Justice with simple, reactive solutions that are not conducive to long-term, systemic change. Indeed, addressing the MMIWG2SI crisis *is* urgent: Poverty, gendered violence, child apprehension, and resource extraction are urgent issues that deeply affect Indigenous life. Nonetheless, it is crucial to listen to and respond to community needs and priorities and to base responses on Indigenous ways of knowing, being, seeing, and doing. As demonstrated throughout this paper, Indigenous Peoples are responding to this crisis in countless ways.

In addressing colonial violence, Patty Krawec (2022) urges settlers towards kinship. She explains:

> [B]eing a settler or colonizer is not something you *are*; it is something you *do*. It describes your relationship to this land and the people in it. Remember that settlers come to impose a way of living on top of the existing people. Settler colonialism destroys to replace. If you are going to stop being a settler and start being a kin, that's where we start. With what you do (p. 178).

Kinship requires accountability. Holding the government accountable to the 231 Calls for Justice is an act of kinship. This paper focuses on Calls that extend to the work of food studies practitioners. Thus, it can be considered a call, or perhaps a plea. For Indigenous Peoples, food and the land are inherently political, and, as Tuck and Yang (2012) remind us, decolonization requires *work*. Felt theory guides our plea to food scholars and all Canadians because it humanizes Indigenous lives. This remembering is necessary to support settler engagement in political realms and to enhance learning, sharing, teaching, and classroom engagement with the 231 Calls for Justice.

Gendered violence is part of the colonial food system's history and should be taught as such.

The lack of accountability in natural resource extraction industries is a matter of injustice and a pressing issue that demands immediate attention. Across Turtle Island, Indigenous women, girls, and 2SLGBTQQIA people are often doubly victimized by industrial resource extraction projects that perpetuate violence against their traditional lands and their bodies. Governments must hold the operators of resource extraction sites accountable for the national crisis caused by man camps and the violence that perpetuates against bodily sovereignty. Indigenous traditional knowledge and foodways cannot be acknowledged without the perspectives of Indigenous women and 2SLGBTQQIA people.

In recognition of the racialized and gendered ways in which settler food systems, in particular, continue to impose on, disrupt, and perpetuate violence against Indigenous land and food systems, Indigenous and anti-colonial land and food scholars, activists, and organizers have increasingly looked to processes of rematriation (Ferreira et al., 2022; Gray, 2022; Kepkiewicz et al., 2023; Leonard et al., 2023; Hill et al., 2024; Herrighty & Hill, 2024; Eastern Woodlands Rematriation, n.d.). Initially coined by Lee Maracle (1988), the "Indigenous rematriation approach to food-related research affirms the relatedness among Indigenous food, bodies, and land" (Ferreira et al., 2022, p. 210) within an Indigenous feminist framework, involving "an embodied praxis of recovery and return…based on Indigenous values and ways of knowing, being, and doing" (Gray, 2022, p. 5). Specifically, rematriation initiatives:

> … connect Indigenous women, celebrate Indigenous womanhood, illuminate the leadership and labour of Indigenous women, recognize the sociopolitical power of women in matrilineal societies, and affirm women's authority in Indigenous governance systems. From these Indigenous feminist perspectives, decolonization cannot fully be realized without Indigenous women at the centre of our efforts. Grassroots Indigenous reclamation and revitalization efforts are most often led and sustained by women at the forefront and behind the scenes. Since Indigenous feminists are identifying the need for place-based cultural reclamation, and work to support the collective healing and resurgence of our nations, rematriation can also be described as an embodied praxis of recovery and return (Gray, 2022, p. 4).

By recognizing and replacing Indigenous women and 2SLGBTQQIA peoples' leadership, decision-making, and roles in caring for food and the land, rematriation can provide a pathway to healing from the heteropatriarchal and colonial violence at the root of the MMIWG crisis, which tells Indigenous women that their place is not on the land—that they are not welcome or safe. Rather, Indigenous women, girls, and 2SLGBTQQIA people are of the land. Their safety must be a priority.

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Vol. 13 No. 1, pp. 79–108 April 2026

Canadian Food Studies La Revue canadienne des études sur l'alimentation

Research Article

Assessing an innovative approach to school food programming: A process evaluation of the New Brunswick School Food Pilot Project

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Abstract

The New Brunswick School Food Pilot Project (NBSFPP) was developed to improve students' diet and academic outcomes. This process evaluation described the reach, effectiveness, adoption, implementation, and maintenance of the NBSFPP using the RE-AIM framework in eleven schools across the province of New Brunswick, Canada. Teacher and school questionnaires, administrative data, and the School Food Coordinator's notes provided quantitative and qualitative data. Descriptive statistics, paired t-test, and Wilcoxon signed-rank tests analyzed the quantitative data; qualitative data were thematically analyzed. On average, schools implemented three distinct food programs, including breakfast, lunch, snack, after-school, cooking cart, and school garden programs. They were delivered by school staff, volunteers, and sometimes students. Key facilitators to implementation included the NBSFPP grant and support from the School Food Coordinator. Key challenges included COVID-19-related restrictions, delays, and time constraints. Program sustainability was largely dependent on receiving funding. School administrators reported positive impacts of the NBSFPP on program optimization and satisfaction, student leadership skills, food literacy, and eating behaviours. However, no significant effect was found on teachers' perceptions of students' diet or academic outcomes. Findings suggest that the NBSFPP provided crucial support to schools in developing and implementing individualized school food programs that addressed schools' specific needs.

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DOI: 10.15353/cfs-rcea.v13i1.751
ISSN: 2292-3071

Keywords: Implementation monitoring; process evaluation; RE-AIM; school food program evaluation

Résumé

Le projet pilote d'alimentation scolaire du Nouveau-Brunswick (PPASNB) a été conçu pour améliorer l'alimentation des élèves et leurs résultats scolaires. Cette évaluation des processus au moyen du cadre RE-AIM décrit la portée, l'efficacité, l'adoption, la mise en œuvre et le maintien du PPASNB dans 11 écoles du Nouveau-Brunswick, au Canada. Les questionnaires remplis par les corps enseignants et les écoles, les données administratives et les notes de la personne coordonnatrice en alimentation scolaire ont fourni des données quantitatives et qualitatives. Des statistiques descriptives, des tests t pour données appariées et des tests de Wilcoxon ont permis d'analyser les données quantitatives ; quant aux données qualitatives, elles ont fait l'objet d'une analyse thématique. En moyenne, les écoles ont adopté trois types de programmes alimentaires, par exemple des programmes pour le déjeuner, le dîner, la collation, les activités parascolaires, avec une cuisine mobile, un potager scolaire. Leur fonctionnement reposait sur le personnel des écoles, des bénévoles et parfois des élèves. Parmi les facteurs favorables à leur mise en œuvre, notons la subvention du PPASNB et le soutien d'une personne coordonnatrice en alimentation scolaire. En revanche, les restrictions liées à la COVID-19, des retards et des contraintes de temps ont été les principales difficultés. La pérennité des programmes dépendait principalement du financement. Les administrations scolaires ont rapporté des effets positifs du PPASNB sur l'optimisation des programmes et la satisfaction, sur les capacités de leadership des élèves, la littératie alimentaire et les comportements alimentaires. Cependant, aucun effet significatif n'a été observé sur la perception qu'a le corps enseignant de l'alimentation des élèves ni sur les résultats scolaires. Les résultats suggèrent que le PPASNB a constitué un soutien primordial aux écoles pour la création et la mise en œuvre de programmes alimentaires adaptés aux besoins particuliers de chacune.

Introduction

The link between adequate nutrition and health is well established (World Health Organization, 2020). Diet-related chronic diseases, such as heart disease, diabetes, and certain cancers, are considered one of the leading causes of premature death in Canada (Health Canada, 2019). Since many eating behaviours are acquired early in life, adopting healthy eating behaviours in childhood could increase children's odds of maintaining them throughout their life (Birch et al., 2007; Black & Hurley, 2013). Moreover, adequate nutrition during childhood is crucial for optimal growth and development and reduces the risk of developing chronic diseases in adulthood (Black & Hurley, 2013; Jääskeläinen et al., 2012; Kaikkonen et al., 2013). Yet, unhealthy eating behaviours are common among Canadian school-aged children (Garriguet, 2004). In New Brunswick (NB), student wellness surveys have shown that students frequently consume ultra-processed foods and that fewer than 60% consume vegetables and fruit at least five times a day (New Brunswick Health Council, 2025). Breakfast

skipping is also common, with only 36 percent of students in grades 6 to 12 reporting eating breakfast every day (New Brunswick Health Council, 2025).

In addition to its health benefits, some studies have linked healthy eating behaviours with better academic performance in children (Centers for Disease Control and Prevention, 2014; Correa-Burrows et al., 2015; Florence et al., 2008; Northstone et al., 2012; Purtell & Gershoff, 2015). Consuming breakfast, for example, has been found to have positive effects on cognitive performance, with these effects more apparent among undernourished or nutritionally vulnerable children (Adolphus et al., 2016; Hoyland et al., 2009; Taras, 2005). In Canada, it is estimated that one in three (33 percent) children under 18 are impacted by food insecurity (PROOF, 2025). In NB, this percentage stands at 40 percent (PROOF, 2025). Students who come to school hungry experience greater difficulty concentrating and poorer problem-solving skills, negatively impacting their academic performance (Kleinman et al., 2002; Taras, 2005). Considering that NB students have among the lowest test scores in the country in reading, mathematics, and science (Elez et al., 2023), ensuring that they have access to healthy and nutritious food at school could help improve their academic outcomes and their health (Colley et al., 2019; Everitt et al,, 2020; Haines & Ruetz, 2019; Hernandez et al,, 2018).

Since Canadian children spend most of their waking time at school and consume approximately one-third of their daily calories during those hours (Tugault-Lafleur et al., 2017), schools are an ideal environment for promoting healthy eating (Food and Agriculture Organization of the United Nations, 2020; Haines & Ruetz, 2019). Many schools across Canada have implemented school food programs to improve their food environment, provide better access to healthy foods or promote food literacy (Colley et al., 2019; Everitt et al., 2020; Hernandez et al., 2018; Government of Alberta, 2017). Very few of these programs have undergone formal evaluations. However, among those that have, positive impacts on students' health and overall well-being have been reported, such as increased vegetable and fruit intake, improved nutrition and food knowledge and higher school attendance (Colley et al., 2019; Everitt et al., 2020; Haines & Ruetz, 2019; Ruetz & McKenna, 2021). Despite this growing evidence, in 2020, NB remained the only Canadian province without a provincially funded school food program (The Coalition for Healthy School Food, 2018). In response to this lack, the Heart and Stroke Foundation of New Brunswick, a non-profit provincial organization, conceptualized, developed, and later implemented the New Brunswick School Food Pilot Project (NBSFPP). The NBSFPP was subsequently funded by the government of New Brunswick and the New Brunswick Medical Society and piloted during the 2020-2021 school year. Specifically, this pilot project aimed to support schools and the health of their students by providing guidance, resources, and funding needed to implement customized school food programs that addressed each school's unique needs. The NBSFPP model was grounded in evidence-based best practices (Colley et al., 2019; Everitt et al., 2020; Haines & Ruetz, 2019; Hernandez et al., 2018) and consisted of five fundamental principles: ensuring universal access to healthy food, providing uniquely tailored programs, offering expert advice and ongoing support, promoting the development of food literacy, and encouraging partnership and community engagement.

Although school food programs are needed, it is also imperative that they be adequately evaluated. Outcome evaluation is most commonly used in program evaluation; however, focussing exclusively on effectiveness hinders one's ability to understand the broader context in which those outcomes were assessed

and the significance of the findings (Craig et al., 2008). Process evaluation helps stakeholders understand why a program outcome was or was not achieved by documenting how the program was implemented and providing insight into how it could be modified to achieve its desired outcomes (Glasgow et al., 2006). The RE-AIM framework is one of the most recognized and utilized frameworks for conducting process evaluations of school health-promoting programs (Dunton et al., 2009; Dunton et al., 2014; Larsen et al., 2017; Ruetz & McKenna, 2021; Thomas et al., 2016). This framework provides information on the Reach, Effectiveness, Adoption, Implementation, and Maintenance of programs relatively quickly and efficiently, increasing the speed at which research can be translated into practice (Glasgow et al., 1999). Therefore, the purpose of this study was to conduct a process evaluation of the NBSFPP using the RE-AIM framework, which included assessing its impact on teachers' perceptions of students' academic and diet-related outcomes.

Methodology

Description of the NBSFPP

Compared to traditional school food programs that have one specific objective (e.g. hot lunch programs that serve healthy meals to vulnerable students) (Bartfeld et al., 2020; Bauer et al., 2020; Frisvold, 2015; Robinson-O'Brien et al., 2010), the NBSFPP helped schools implement universal, tailored, individualized and comprehensive school food programs that address schools' and students' specific needs based on each school's priorities and available resources. This means that schools could implement a variety of programs, such as free breakfast, lunch, snack, or vegetable and fruit programs, school gardens, cooking carts or after-school food programs. Schools identified and developed relevant programs and implemented them with the help of a School Food Coordinator, a dietitian, who provided guidance and evidence-based nutrition recommendations to all schools. Further, the School Food Coordinator worked with schools to ensure that their proposed programs promote healthy eating, increase students' access to healthy foods, respect NB's school food policy and, when possible, promote food literacy. The School Food Coordinator also provided ongoing support to help schools overcome challenges they faced throughout the year.

In September 2020, schools that agreed to participate in the NBSFPP were asked to submit a School Background Form, which collected information on the number of students enrolled in the school, the estimated percentage of students who came to school hungry (based on personal observation), how schools planned to use the NBSFPP grant, the anticipated percentage of students who would be participating in their programs and information on any current school food programming. An in-person consultation with the School Food Coordinator and the school administrator was then held, and an action plan was developed to implement new or improve existing programs. Completing the action plan was followed by the release of the first portion (75 percent) of the NBSFPP grant. To receive the remaining 25 percent of their grant, schools were required to submit a mid-point report at the beginning of 2021 that described the food programs implemented or improved, along with the associated costs. Grants were allocated based on the school's size,

needs, and current infrastructure to ensure equity in resource distribution. Funding was re-evaluated throughout the year to ensure schools had the required financial support, and funds were redistributed when necessary.

Recruitment

A convenience sample of 19 schools was selected by the Heart and Stroke Foundation of New Brunswick to participate in the NBSFPP. Differences in school settings were prioritized throughout the sampling process. Factors that were considered included results of provincial school performance reports, which assess students' performance in math, reading, and science, and surveys of student perceptions of their school environment (Éducation et Développement de la petite enfance, n.d.; Department of Education and Early Childhood Development, n.d.), grades taught (elementary, middle, and high schools), location (urban and rural), quality of school infrastructure related to school food programming and degree of access to financial and community resources. Additionally, geographic and language considerations were taken into account, ensuring representation from each of the seven public school districts in NB (four Anglophone and three Francophone). This sampling approach enabled a deeper understanding of the potential outcomes of the NBSFPP across a range of contexts, an important factor in assessing scalability. Selected schools were contacted by the School Food Coordinator and invited to participate in the study. Of the 19 selected schools, 11 agreed to participate and provided informed, signed consent.

Teachers were recruited to assess the effectiveness of the NBSFPP. All Kindergarten to Grade 8 teachers in the recruited schools were eligible to participate in the study. High school teachers were excluded as students in grades 9-12 often have multiple teachers, and many leave school during breaks and lunch, thus making it difficult for teachers to observe and accurately report their students' behaviours (Chriqui et al., 2014). Solicitation letters and consent forms were emailed to all teachers by the school administrator. Teachers willing to participate in the study were asked to sign the consent form and send it directly to the School Food Coordinator to ensure their confidentiality from the school administrators. At the end of October 2021, a reminder was sent to teachers to encourage them to participate in the study. Ethics approval for this study was obtained from the Comité d'éthique de la recherche avec les êtres humains at the Université de Moncton (#2021-002).

Process and outcome evaluation

The RE-AIM framework (Glasgow et al., 1999) was used to guide the process evaluation. Elements of the framework, outcome indicators and data sources are presented in Table 1. As part of the *Effectiveness* element of the framework, a pre- and post-study design was used to assess the impact of the NBSFPP on student absenteeism and teachers' perceptions of students' in-class behaviours, attention, academic motivation and performance, vegetable and fruit consumption, and food insecurity.

Data sources and data collection

The *Reach* element of the framework was defined as the proportion and representativeness of schools, students, and partnerships involved in the NBSFPP (Table 1). Four data sources were used to assess the reach of the NBSFPP, including the School Background Form, publicly available geospatial data from the Community Information Database (Community Information

Database, 2016), the 2016 Census of Population data and the School Questionnaire.

The *Effectiveness* of the NBSFPP was assessed with a pre- and post online Teacher Assessment of Student Behaviours Questionnaire (Table 1). Since the evaluation was conducted during the pandemic, student-level data collection was not possible. Therefore, outcome variables were collected via teachers. The questionnaire was developed using previously validated questionnaires (Coladarci, 1986; Friedman, 1995; Hardré et al., 2008) and assessed teachers' perceptions of students' in-class disruptive behaviours, attention, academic motivation and ranking. Teachers' perception of classroom attention was measured using a subscale from Friedman's (1995) questionnaire, which showed good internal consistency ($\alpha = 0.85$). This question consisted of eight items scored from 0 (Never) to 5 (Always) for a maximum score of 40 points. These items assessed students' understanding of the course material, their ability to work independently, listen to one another, concentrate and work quietly, and their participation, interest, and enthusiasm in the classroom (Friedman, 1995). Teachers' perception of student disruptive behaviours was measured using a negative subscale of Friedman's (2015) questionnaire, which also showed good internal consistency ($\alpha = 0.87$). This question consisted of 11 items scored from 0 (Never) to 5 (Always) for a maximum score of 55 points. It assessed students' noncompliance with teachers' demands to be silent or to stop disrupting the class, students' disruptive interactions with each other, and students' disrespect towards the teacher, including talking back (Friedman, 1995). Teachers' perception of students' academic motivation was measured using a questionnaire by Hardré et al. (2008), which showed good concurrent validity ($r=0.49$, $p<0.01$) with overall student motivation from the Student Engagement and Effort Scale (Hardré et al., 2008). Specifically, teachers were asked to report how true five statements were for the students in their class on a scale from 0 (Not at all true) to 6 (Very much true) for a maximum score of 30 points. This question assessed students' effort and willingness to learn the course content and their attention, focus, and interest in class-related tasks (Hardré et al., 2008). Reliable data from student report cards were not available for baseline assessments. Therefore, one question was used to assess the academic ranking of students in teachers' classrooms (Coladarci, 1986). Specifically, teachers were asked to report the number of students they considered performing at grade level, one year below and one year above grade level (Coladarci, 1986). Compared to actual student test scores, Coladarci (1986) found that this question had a 62 percent agreement for students performing one year below grade level and 85 percent for students performing one year above grade level (Coladarci, 1986).

Since no current questionnaire exists to assess students' vegetable and fruit consumption, access to food at school or hunger when coming to school using teachers as proxies, four questions were developed to measure these outcomes. Specifically, teachers were asked to report the average number of students in their class that ate a vegetable or fruit at 1) snack and 2) at lunch on most days of the week. Teachers were also asked to estimate the number of students who came to school hungry or had no lunch on most days of the week. Results from a small validation study showed moderate correlations between teacher and student responses for vegetable and fruit consumption at snack ($r=0.50$) and lunch ($r=-0.36$), and moderate to good correlations for questions related to students coming to school hungry ($r=0.48$) and not having anything to eat ($r=0.69$) (data not published). These findings are similar to those of self-reported nutrition questionnaires

(Andersen et al., 2004; Bel-Serrat et al., 2014; Haraldsdóttir et al., 2005).

Administrative data on student absenteeism rates were collected over three weeks, before (September 21 to October 9, 2020) and after (May 17 to June 4, 2021) the NBSFPP. These periods were chosen because absenteeism rates were deemed less likely to be impacted by the back-to-school and end-of-school-year rush, flu season, weather and COVID-19-related school closures.

Adoption, Implementation, and *Maintenance* elements of the framework were primarily assessed using an online School Questionnaire, which school administrators completed in June 2021 (Table 1). The questionnaire was developed based on previous questions used in process evaluation studies that used the RE-AIM framework (Dunton et al., 2014; Larsen et al., 2017; Ward et al., 2018). Questions were written in English and back-translated into French (Brislin, 1970). Both copies of the questionnaires were piloted with elementary teachers from non-participating schools in August 2020. The questionnaire contained 36 items (multiple-choice, short, and long-answer questions). It was used to collect information about the school food programs, such as their type and frequency, cost and funding sources, facilitating factors and barriers, and schools' intention to offer their programs in the future. Notes from the School Food Coordinator and supporting documents were also collected throughout the year and used for data triangulation (Carter et al., 2014). Data from these notes and supporting documents were used to validate, supplement, or complete information obtained by school administrators and teachers and provide a more comprehensive understanding of the adoption and implementation of their school food programs.

Table 1. Elements of the RE-AIM framework, outcome indicators and data sources

Element	Outcome indicators	Data source
Reach	Number and % of schools located in Anglophone and Francophone school districts, in rural or urban areas, in low-, middle- or high-income areas and grades taught at each school. Number and percentage of students in each grade. Number and percentage of students who had access to the programs. Number and types of school partnerships.	Publicly available data (i.e., Community Information Database, 2016 Census of Population Profiles) School Background Form School Questionnaire
Effectiveness	Teachers' perception of: Students' attention in class Students' disruptive behaviours in class Students' academic motivation Students' academic ranking Average number of students who eat one vegetable or one fruit at snack time Average number of students who eat one vegetable or one fruit at lunch Average number of students who have no food at school most days of the week Average number of students who arrive at school hungry most days of the week Additional comments provided by teachers through an open-ended question. Average absenteeism rate over three weeks.	Teacher Assessment of Student Behaviours Questionnaire School administrative data
Adoption	Number and percentage of students who accessed the program. Number of students, staff and/or volunteers involved in the program's delivery. Number of other individuals or organizations that accessed the programs.	School Questionnaire School Food Coordinator's Notes and Supporting Documents

Implementation	Type and description of programs offered, program implementation versus what was planned, program cost and funding, additional funding received to run the program, barriers and facilitators to program implementation, frequency of contact with the School Food Project Coordinator, perceived impact of the School Food Project Coordinator and additional resources required to run the programs.	School Questionnaire School Food Coordinator's Notes and Supporting Documents
Maintenance	Number of schools that planned on offering the program the following school year. Aspects of the program that will be maintained or changed. Resources needed to maintain the programs.	School Questionnaire

Data analysis

Quantitative data analysis was conducted using the IBM SPSS Statistics 27 software. Frequencies and proportions were used to describe the participating schools, their students, and the community partners involved in the program. Paired t-tests and Wilcoxon signed-rank tests were used to analyze the program's effectiveness on teachers' perceptions of students' in-class behaviours, attention, academic motivation and performance, vegetable and fruit consumption and food insecurity, and student absenteeism.

All qualitative data obtained from open-ended questions in the school and teacher questionnaires and the School Food Coordinator's notes and supporting documents were thematically analyzed by two independent research assistants, who had an intercoder agreement of >90 percent. Short memos and codes were added beneath each open-ended question/item for each questionnaire/data source and then grouped to form broader themes (Creswell & Clark, 2017). Themes were then regrouped into larger categories to describe the NBSFPP according to each element of the RE-AIM conceptual framework.

Results

Reach

Of the 11 schools that participated in the evaluation of the NBSFPP, seven were anglophone (64 percent), and five were in an urban area (45 percent). Four schools (36 percent) taught grades from Kindergarten to Grade 5, five schools (46 percent) taught grades from Kindergarten to Grade 8, one school (9 percent) taught Grades 5 to 8, and one (9 percent) taught Grades 9 to 12. Eight of the 11 schools (73 percent) were situated in a medium-income area (median after-tax household income of $25,000 to $30,000). In contrast, two (18 percent) were located in higher-income areas (median after-tax household income of >$30,000) and one (9 percent) was situated in a low-income area (median after-tax household income of <$25,000). A total of 2,650 students attended the participating schools, with most (92 percent) of them being elementary (n=1,640 or 62 percent) or middle school students (n=807 or 30 percent). All students (100 percent) had access to one or more of their school's food programs.

Partnership and community engagement were fundamental principles of the NBSFPP. Overall, 64 percent of schools collaborated with at least one community partner to carry out their program, with 36 percent reporting that they had created at least one new partnership over the 2020-2021 school year. Further, 18 percent of schools reported collaborating with more than two community partners. Community partnerships included food banks (n=4 schools), community kitchens (n=2 schools), local shops or grocery stores (n=2 schools) and local or regional non-profit organizations (n=2 schools). Three of the 11 schools reported losing pre-existing community partnerships or could not create new ones due to the pandemic.

Table 2. Pre and post-scores for outcome variables assessed

Measured indicator	Baseline Mean (SD)	Endpoint Mean (SD)	P-value
Teachers' perception of students' behaviours and academic performance (n=12 teachers):			
Students' disruptive behaviours in class score (0 to 55 points, negative subscale)	37.58 (8.23)	37.25 (8.00)	0.86
Students' attention in class score (0 to 40 points)	28.75 (3.55)	30.25 (2.01)	0.09
Students' academic motivation score (0 to 42 points)	23.88 (3.86)	24.00 (2.89)	0.91
Students' academic ranking			
Students performing at school level	8.33 (3.75)	9.71 (3.56)	0.11
Students performing one year below	5.17 (3.43)	4.08 (3.26)	0.17
Students performing one year above	0.67 (1.16)	0.875 (1.60)	0.29
Teachers' perception of students' fruit and vegetable consumption and food insecurity (n=12 teachers):			
Average number of students who eat one vegetable or one fruit as a snack on most days	5.21 (3.09)	5.54 (2.39)	0.59
Average number of students who eat one vegetable or one fruit for lunch on most days	5.96 (3.78)	7.13 (2.36)	0.26
Average number of students who have nothing to eat for lunch on most days	0.25 (0.62)	0.67 (0.89)	0.19
Average number of students arriving hungry to school on most days	4.92 (5.35)	3.08 (1.68)	0.30
Student absenteeism rate (percentage) (n=9 schools)	7.01 (3.05)	7.19 (3.47)	0.69

Effectiveness

Of the 138 eligible teachers, only 20 (14 percent) agreed to participate and completed the pre-questionnaire. Despite reminder emails in May 2021, only 12 teachers completed the post-questionnaire. No statistically significant changes were observed for student absenteeism or between the pre- and post-scores for teachers' perceptions of students' in-class behaviours, attention, academic motivation and performance, vegetable and fruit consumption and food insecurity (Table 2).

Although no statistically significant effect was found, qualitative data from 12 teachers and nine school administrators suggest that the NBSFPP positively impacted the organization and overall

satisfaction of their school food programs and students' leadership skills, food literacy, and eating behaviours. For example, one school stated that the NBSFPP allowed them to "*improve the quality of the service offered*" (School administrator C, p.46). Some schools also reported that involving students in delivering their school food programs helped students develop their leadership skills.

The leadership development of our students has been one of the most significant gains of this program. Our students, under the guide of our coordinator, have ran the breakfast program, the mobile food cart, the backpack program, and all the snacks (School administrator J, p.57).

Despite not finding any significant impact on students' vegetable and fruit consumption, teachers and school administrators reported improvements in students' food literacy skills, including their enthusiasm and their ability to identify healthy foods, as well as their eating behaviours after implementing their programs.

If you offer our students yogurt and melon or a chocolate bar, we feel like they would pick the fruit now. It's amazing! [...] It was shocking to us to have seen so many children identify having cherries, pomegranates, etc., for the first time at school. (School administrator J, p.47)

One teacher (Teacher A) also reported that their lunch program was essential to ensuring that their students ate vegetables and fruit at school. This person also noted that while most (62 percent) of his students ate vegetables or fruit at lunch, less than a quarter (23 percent) brought those foods from home.

Adoption

Most administrators from elementary and middle schools (82 percent) reported that they perceived student participation in their school food programs to be high. Although only one high school was recruited for this study, the administrator noted low participation of Grade 9 to 12 students. In addition to students, school administrators reported that other individuals used their food programs. For example, staff accessed the reduced-priced lunch program offered in one school. In two schools, students' families received recipe kits and food through after-school food programs, and one school provided emergency food for students and families in need.

Most schools (64 percent) involved students in delivering their programs. They were involved in preparing food for meals and snacks (n=4 schools), distributing meals and snacks (n=2 schools), providing recipe ideas (n=1 school), managing food delivery and inventory (n=1 school), and implementing a student-led food program (n=1 school). Four schools reported that students could not be involved due to COVID-19 restrictions; however, three acknowledged that student involvement would have helped facilitate their programs.

Ten of the 11 schools reported receiving help from staff (i.e. teachers, administrators, cafeteria staff) and volunteers to deliver their school food programs. On average, four staff members were needed to provide the program daily. However, more than half of the schools (n=6) reported that they could not involve volunteers in delivering their programs due to COVID-19 restrictions. Of the schools that could, an average of eight volunteers were recruited, and three were needed daily.

Table 3. Description of school food programs implemented

Types of programs	Availability/Accessibility	Types of foods offered
Lunch Programs (81 percent of schools) Emergency lunch (n=5) Brown-bag lunch program, provided by external partners (n=3) Brown-lunch bag supplementation (n=2) Free lunch (n=1) Reduced-cost lunch (n=1)	Emergency lunch available at all times for any student without a lunch (n=4). Brown-bag lunch program offered to students in need approximately three times per week (n=3). Free hot lunch offered to all students twice per month (n=1). Reduced-cost lunch (-$1.00) available daily for all students (n=1).	Added sources of protein in brown-bag lunch, such as poultry and hummus (n=1). Larger servings of vegetables (n=1). Variety of healthy foods (n=7).
Breakfast Programs (73 percent of schools) "Grab and go" (n=1) Breakfast in the classroom (n=1) Before class (n=6)	All breakfast programs were offered daily for all students (n=8). Some special foods, such as pancakes or muffins, were offered approximately once per week (n=1).	Eggs, whole-grain products, homemade muffins, pancakes / waffles, smoothies, and fruits.

Snack/Fruit and Vegetable Programs (73 percent of schools) Free snack (n=7) Fruit platters (n=1) Special activities, such as "Fresh Fruit Friday" (n=1)	Snacks offered daily to all students (n=7). Various fruits offered on special occasions (once a week to once a month) to all students (n=2).	Variety of fruits, vegetables, protein-rich foods, and other healthy snacks (n=7).
Cooking Cart Programs (36 percent of schools) Cooking cart, including recipe demonstrations and taste-testing (n=3) Smoothie cart (n=1)	Carts are usually shared between classes so that each class can access them approximately once per month. All students had access to it over the year. (n=3).	Nutritious, easy, and culturally diverse foods (n=3).
School Garden Programs (18 percent of schools) Hydroponic garden (n=2) Small tabletop hydroponic garden for classrooms (n=1) Outdoor garden (n=1)	Indoor hydroponic garden available year-round (n=2).	Vegetables were used for lunch and snack programs (n=1).
After-School Food Programs (18 percent of schools) Backpack program/Take-home recipes (n=2)	Backpack program offered to students in need and their families every Friday (n=1). All students could bring a recipe with the ingredients home, at least once during the year (n=1).	All the ingredients needed to make the included recipes (n=2).

Table 4. Type of support provided to schools by the School Food Coordinator

Type of support	Percentage of schools	Examples
Evidence-based nutritional recommendations	100 percent	• Suggestions for increasing the variety of nutritious foods available and healthy recipe ideas for balanced meals and snacks. • Using healthier cooking methods (e.g., air fryer). • Ensuring compliance with Policy 711 (Department of Education and Early Childhood Development, 2018). • Adding a protein source to breakfast and lunches (brown-bag lunch program), if lacking. • Offering balanced snacks (source of carbohydrates + protein).
Purchasing or repairing equipment and kitchen renovations	91 percent	• Purchasing or repairing equipment (ranging from kitchen tools and small appliances to large industrial kitchen equipment). • Kitchen renovation for more cooking space.
Reorganizing programs for optimum efficiency	73 percent	• Increasing the availability of the program. • Planning and reorganizing the program's logistics. • Reviewing menus for lower costs (e.g., including plant-based protein). • Planning menus based on student satisfaction.
Implementing new programs/activities	64 percent	• Implementing various programs/initiatives based on the schools' resources and capabilities.
Ensuring food safety	55 percent	• Kitchen licensing (if not already in place). • Food safety training for staff and volunteers. • Additional recommendations for sanitary precautions related to COVID-19.
Recruitment and appreciation of volunteers	45 percent	• Encouraging schools to take steps to recruit volunteers through social media. • Encouraging schools to continue or initiate volunteer appreciation activities.

Implementation

Various school food programs were implemented during the 2020-2021 school year, with some schools offering multiple programs. These included breakfast, lunch and snack programs, school gardens, cooking cart programs and after-school food programs (Table 3). All schools reported offering at least one type of program daily to all their students. On average, schools delivered three different programs simultaneously and offered them for 33 weeks. All schools (100 percent) reported offering the food programs described in their action plan, and 82 percent said they were implemented as planned. Eighteen percent of schools mentioned that they modified the delivery of their program due to COVID-19-related restrictions (e.g. sanitary measures) and delays (i.e. delivery of equipment). Two schools reported implementing additional programs (one cooking cart program and one school garden) than initially planned.

The NBSFPP grant was the most significant funding source for schools (63 percent), totalling $80,000. Based on the schools' needs and resources, NBSFPP grants ranged from $4,500 to $11,500, averaging $7,300. Two schools required additional funds at the beginning of 2021 as they faced greater student participation than anticipated. On the other hand, three schools did not require the second part of their funding (the remaining 25 percent) due to donations, partnerships, and cancelling certain activities because of school closures. In addition to the NBSFPP grants, most schools (n=9) secured funds from other sources to deliver their program, including district funds ($15,758), fundraisers ($4,520) or sponsorships ($9,681) and other grant programs ($17,142). On average, each school spent $15,557 to implement and deliver its programs, with the median cost totalling $10,000. One school spent approximately $50,000 on their programs. However, they offered five different programs simultaneously (breakfast, lunch, snacks, cooking cart, and after-school programs) and secured additional funding (two other grant programs and district funding).

Providing ongoing support to schools was considered a fundamental element of the NBSFPP. Most schools (n=10) reported that the School Food Coordinator was very important to the overall success of their program by providing resources (n=9 schools), identifying best nutrition practices (n=7 schools), and optimizing their program's efficiency (n=7 schools). The School Food Coordinator provided various types of support to schools (Table 4). On average, each school received 15 hours of one-on-one support, and all schools reported that this amount of contact was adequate.

COVID-19 restrictions were reported as a major barrier to the delivery of many school food programs. These restrictions affected 64 percent of schools and included closures, restricted activities, limited sharing of equipment, limited volunteer and student involvement, late equipment delivery, and additional precautions and costs to ensure student safety. One school administrator mentioned its environmental concerns regarding their increased use of single-use plastics: *"COVID-19 made our single-use plastics go up. We are struggling with the single-use plastics and containers in which to get the food out there, but weighing the workload with reusable dishes"* (School K administrator, p.61)

Another major barrier to implementation was time constraints. One school (School administrator J) reported that some teachers did not have time to complete all planned activities due to their busy schedules. Another school (School administrator A) even noted that finding additional time to undergo food safety training was a struggle. Lack of space, higher food costs, and lack of human resources were also

reported by school administrators. Based on the School Food Coordinator's notes, student preferences were a barrier to the lunch program, as many students from one school disliked the canned tuna added to the brown-bag lunch.

More than half of schools (55 percent) stated that the funding and support received by the NBSFPP contributed significantly to the success of their school food program. Other facilitating factors that schools reported included having volunteers and community partnerships, promoting student implication, getting support from a school district employee, and ensuring proper program planning.

Due to our operational plan and students arriving to school and immediately coming into their classrooms (instead of playing on the playground), we were able to have more facetime with the students before class started. It was a great way to ensure that everyone ate breakfast and was ready for learning. (School K administrator, p.62)

Maintenance

Most schools (91 percent) reported that they intended to deliver their school food program during the 2021-2022 school year. Some schools noted that they hoped to enhance their existing programs by increasing students', parents', and community members' involvement, creating new initiatives, and adding some flexibility to their programming with the easing of COVID-19 restrictions.

When asked what resources schools would require in order to offer their program in the future, 82 percent of schools mentioned that funding was the most critical resource needed. One school reported that without funding, they would need to significantly reduce the scope of their programs and limit certain activities.

Funding is the biggest resource we would need... having the significant financial support from Heart and Stroke allowed us to offer a program that wasn't an event but a regular program in the school, which helped to increase healthy choice exposure and interest." (School J administrator, p.65)

One school even noted that they would not be able to offer their program at all if they didn't access sustainable funding to finance their program: "*It's really conditional on if we receive a grant or not. We hope to receive a similar amount from [NBSFPP] to allow us to offer the same program.*" (School C administrator, p.63).

Other than funding, two schools shared that access to more volunteers, better kitchen equipment, and additional educational resources for food-related activities would help with program maintenance.

Discussion

Findings from this study suggest that the NBSFPP provided crucial support to schools in developing, implementing, and delivering individualized school food programs that addressed each school's specific needs. With the help of the NBSFPP, schools were able to implement various food programs based on their context, available resources, and capabilities. Although the quantitative data did not show statistically significant improvements in academic and diet-related outcomes, qualitative data from teachers and school administrators suggest that the NBSFPP positively impacted program optimization and satisfaction, student leadership skills, food literacy and eating behaviours. This study also highlighted the key

facilitators and common challenges to school food program implementation, both of which revolve around acquiring adequate and sustainable funding.

Reach

Results showed that, regardless of socioeconomic status, all students had daily access to at least one of their school's food programs during the 2020-2021 school year. Programs that were universally accessible to students included emergency, reduced-cost and free hot lunch programs, breakfast programs, snack, fruit and vegetable programs, cooking carts, school gardens, and after-school take-home recipes. In contrast, only two programs were solely accessible to students in need: brown-bag lunch and after-school backpack programs. School food programs have traditionally targeted students affected by food insecurity. However, research has shown that these programs are often linked to increased stigmatization among students from lower-income families, which can discourage their participation (Leos-Urbel et al., 2013). Considering these potentially negative impacts and that most students, irrespective of socioeconomic status, have unhealthy diets and eating behaviours, there has been a push towards a universal approach to providing school food. Recent studies have suggested that universal school food programs can benefit all students by increasing student participation and acceptance, reducing the stigma associated with poverty, and addressing other reasons for skipping meals (Askelson et al., 2017; Haines & Ruetz, 2019; Leos-Urbel et al., 2013). Nevertheless, targeted school food programs can still be justified, particularly from an equity perspective. Therefore, a more nuanced approach may be to offer universal school food programs in conjunction with targeted ones and ensure that the latter are implemented in a stigma-free manner.

The NBSFPP strongly encouraged schools to create new or reinforce existing partnerships with their community. Although some schools reported having lost pre-existing community partnerships or stated they could not create new ones due to the pandemic, most had at least one community partner to help them carry out their programs. Collaboration with and involvement from community partners are often essential for the sustainability of school food programs (Colley et al., 2019; Everitt et al., 2020; Haines & Ruetz, 2019; Hernandez et al., 2018). Specifically, partnerships with local businesses and producers can help make certain foods more affordable while reducing the environmental impact of food production and transportation (Everitt et al., 2020). Yet, some schools may require assistance to identify and approach potential partners. In the context of the NBSFPP, this support was provided by the School Food Coordinator, who created an asset map for each school and encouraged them to partner with local businesses. Dietitians could also assist schools with identifying, reaching, and engaging community partners, as they are involved in helping communities create supportive and sustainable food environments (Dietitians of Canada, 2017).

Effectiveness

Our study found no statistically significant impact of the NBSFPP on student absenteeism or teachers' perceptions of students' classroom behaviours, attention, motivation, academic performance, vegetable and fruit consumption, or food insecurity. These findings could be due to several factors, including the small sample size (Creswell & Clark, 2017). Despite efforts to remind and encourage teachers to participate in the study, school administrators informed the School Food Coordinator that many teachers were reluctant to

engage in research due to high stress levels associated with the pandemic. This resulted in a sample size that was likely too small to detect any meaningful change. In addition, the duration of the study may have been too short to measure significant changes in behaviours. Similar results have been found in previous studies, which failed to observe significant impacts of school food programs on academic performance (Anzman-Frasca et al., 2015; Corcoran et al., 2016; Hearst et al., 2019), attendance (Bartfeld et al., 2020; McLaughlin et al., 2004), and dietary outcomes, including vegetable consumption (Coyle et al., 2009; Huys et al., 2019; Lohr et al., 2020; Morgan et al., 2010), over the course of a school year. In Bartfeld et al.'s (2020) study, improvement in attendance was only observed two years after implementing a universal school food program. Further, findings from short school food intervention studies may fail to represent the complexity behind food choice and maintenance of behaviour change (Everitt et al., 2020). Dietary and academic outcomes are influenced by multiple factors, including physical activity and screen time (Carson et al., 2016; Tremblay et al., 2011), weight stigma (Pont et al., 2017), racism and discrimination (Trent et al., 2019) and sleep quality and duration (Chaput et al., 2016). Furthermore, many social and environmental factors can influence children and adolescents' eating behaviours (Scaglioni et al., 2018), such as parental food habits (Zarychta et al., 2016), food exposures early in life (Hetherington et al., 2015), food advertising and media exposure (Norman et al., 2018) and household socioeconomic status (Non et al., 2016). Therefore, it is possible that any positive impact that the school food program may have had on students' dietary and academic outcomes was not enough to outweigh these external influences. Finally, it is worth noting that not all programs focussed on promoting vegetables and fruit, which could also explain why no significant changes in vegetable and fruit consumption were found.

Despite not finding significant quantitative changes, qualitative data obtained from teachers and school administrators suggest that the NBSFPP may have positively impacted the program's optimization and satisfaction, and some students' leadership skills, food literacy and eating behaviours. For example, some schools reported being surprised at the positive changes in students' food choices and enthusiasm for various healthy foods. These findings are similar to previous studies that reported increases in students' preferences for healthy foods (Colley et al., 2019; Coyle et al., 2009; Davis et al., 2015; Hernandez et al., 2018; Lohr et al., 2020; Morgan et al., 2010; Ohri-Vachaspati et al., 2018; Parmer et al., 2009), and improvements in their nutritional knowledge and dietary behaviours (Colley et al., 2019; Haines & Ruetz, 2019) following the implementation of school food initiatives. School food programs have also been found to improve students' food literacy skills, particularly when they combine experiential learning (e.g. cooking classes), nutrition education and healthy food provision (Gates et al., 2013; Morris & Zidenberg-Cherr, 2002; Saksvig et al., 2005). This is noteworthy since students with better cooking and food skills have better eating behaviours and consume more vegetables and fruit (LeBlanc et al., 2022).

Adoption

In this study, participation of elementary and middle school students was high, while participation was low among students in the only high school recruited for this study. This finding is not surprising, as the independence of older students has been identified as a barrier to school food program participation (Lopez-Neyman & Warren, 2016). High school students are

generally free to leave school grounds during lunch hours and are often engaged in school committees, sports teams, and other activities. Students might not be available or present to participate in food programs and activities. Therefore, school food programs in high schools may need to actively engage students in their implementation and delivery to increase participation. In fact, several elementary and middle schools reported including their students in their programs' management, preparation, and delivery. According to teachers and administrators, this involvement helped some students develop food literacy skills, such as cooking skills. Providing students with opportunities to develop their food literacy allows them to develop the skills and knowledge needed to make healthy food choices in complex food environments (Truman et al., 2017). In addition to developing their food literacy skills, engaging students in school food programming may also increase its acceptance. For example, a Canadian study found that students wanted to be involved in the selection and preparation of food at school and believed that their involvement was a factor that could contribute to the success of these programs (Colley et al., 2021). Therefore, age-appropriate student involvement in school food programs should be encouraged to benefit the program and the students.

This study also found that school staff (i.e. teachers, cafeteria workers) were essential to the adoption of most school food programs. Staff members' implication may have been particularly needed during the 2020-2021 school year since many schools could not involve volunteers due to COVID-19 restrictions. Since many Canadian school food programs rely highly on volunteers for program delivery, insufficient volunteers can lead to less frequent programming and, therefore, negatively impact the success and sustainability of those programs (Everitt et al., 2020; Ruetz & McKenna, 2021). Everitt et al. (2020) suggest that school food programs that are economically sustainable could allow schools and staff to focus on delivering high-quality programs instead of spending time and energy recruiting and training volunteers. Thus, universal programs that are sustainably funded by different levels of government, such as Canada's National School Food Program and NB's anticipated universal breakfast and pay-what-you-can lunch program, could solve this problem (Everitt et al., 2020; Ruetz & McKenna, 2021).

Implementation

Various school food programs were implemented during the 2020-2021 school year, with most schools offering multiple programs such as breakfast, lunch and snack programs, school gardens, cooking carts and after-school food programs. On average, schools delivered three different programs simultaneously and were accessible most of the school year. By providing more than one program, schools could offer a wider variety and quantity of food and food-related activities to address students' various needs. For example, most programs provided healthy foods to all students, some focussed on increasing students' food literacy, and others aimed to help students and families from food-insecure households.

Most schools' total costs for school food programs ranged between $6,000 and $15,500. Although funding was essential for program implementation and delivery, it was particularly needed for purchasing healthy foods. The NBSFPP grant was the most important funding source for schools. Without it, schools reported that their program would need to be considerably scaled down or discontinued. Funding is frequently recognized as a critical element for program implementation (Haines & Ruetz, 2019; Hernandez et al., 2018; Ruetz & McKenna, 2021). With the

NBSFPP, continuous evaluation of schools' needs helped determine appropriate and equitable funding for each school, highlighting the importance of evaluating their needs on an ongoing basis for better funding efficiency. Given the federal government's pledge to permanently fund a National School Food Program starting in 2029 (Prime Minister of Canada, 2025), implementing a process to continuously assess school needs should be considered to ensure equitable distribution of those funds.

Beyond funding, more than half of the schools reported that the support from the School Food Coordinator contributed significantly to the success of their food programs. The School Food Coordinator was seen as an asset, providing schools with the knowledge and resources needed to implement evidence-based, healthy and safe school food programs. It is suggested that nutrition experts, such as dietitians, should play a role in determining best practices and guidelines for school food programs to achieve better program delivery and outcomes (Godin et al., 2017; Haines & Ruetz, 2019). In NB, these dietitians could be employed by the Department of Education and Early Childhood Development to help support the implementation and sustainability of school food programs.

Unsurprisingly, COVID-19 restrictions were reported as a major barrier to the delivery of many school food programs. These restrictions affected 64 percent of schools and included closures, restricted activities, limited equipment sharing, delayed equipment delivery, and additional precautions and costs to ensure student safety. Another barrier to program implementation was time constraints. As commonly seen with other school-based initiatives (Dunton et al., 2014; Huys et al., 2019; Thomas et al., 2016), one administrator mentioned that some teachers did not have time to complete all planned activities due to their busy schedules. Similarly, Huys et al. (2019) noted that teachers were so busy with their current curriculum that they implemented, on average, 44 percent of all planned activities/lessons in the program's curriculum. Thomas et al. (2016) also noted that staff felt they lacked the energy to implement some of the activities that were part of their school food program in the long run. These findings emphasize the importance of considering teachers' and other school staff's busy schedules when planning the implementation and delivery of school food programs. Other barriers to implementation were reported by some schools, including higher food costs and a lack of human resources, both of which are well documented in previous studies (Colley et al., 2019; Hernandez et al., 2018). Addressing these issues by engaging families and increasing accessibility and affordability of healthy foods could improve program implementation and outcomes (Day et al., 2009; Triador et al., 2015).

Maintenance

Of all the barriers schools faced, access to funding was reported as the main challenge to the sustainability of school food programs. For some schools, the continuity of their program was conditional on the funding they received from the NBSFPP. The problem of sustainable funding is quite common, as several studies have identified financial constraints as an important issue for the implementation and maintenance of school food programs (Colley et al., 2019; Everitt et al., 2020; Haines & Ruetz, 2019; Ismail et al., 2021; Ruetz & McKenna, 2021). Banfield et al.'s (2015) process evaluation of a school health promotion program also found that access to annual grants was critical to offering the program from one year to the next (Banfield et al., 2015). School food programs vary significantly across Canada due to inconsistent and

inequitable funding from community groups, charities, and donations (Everitt et al., 2020; Haines & Ruetz, 2019; Ruetz & McKenna, 2021). Program sustainability is even more difficult for those relying heavily on the community and organizations for funding (Everitt et al., 2020; Ruetz & McKenna, 2021). To support schools and ensure that students have ongoing access to its programs, guaranteed provincial and federal funds are essential. Studies consistently show that universal, comprehensive, sufficiently funded, and regularly monitored/evaluated programs are recommended for effective and sustainable school food programming (Everitt et al., 2020; Haines & Ruetz, 2019; Hernandez et al., 2018; Oostindjer et al., 2017; Ruetz & McKenna, 2021). Luckily, the federal government has pledged to permanently fund the National School Food Program (Prime Minister of Canada, 2025), and the NB government has promised to provide free or low-cost foods to all schools across the province by 2026 (Lombard & Haggett, 2025). As the logistics of both programs continue to be refined, equitable distribution and plans for monitoring of these funds are strongly recommended.

Strengths and limitations

This study had several strengths, including the tailored and individualized approach to school food programming, the use of the RE-AIM framework to conduct the process evaluation, and the real-world context in which the study was conducted. However, limitations must be acknowledged. Recruiting teachers for the pre-post study was particularly difficult during the pandemic year. School administrators reported that extreme stress, anxiety, and uncertainty related to COVID-19 discouraged most teachers from participating in this study. This low participation rate resulted in a much smaller sample than planned, thus reducing the statistical power needed to detect meaningful changes in outcomes. Additionally, given that student-level data collection was not feasible due to pandemic-related constraints, teachers' perceptions served as a proxy, potentially leading to over- or underestimation of certain variables of interest. For example, teachers may not always be able to observe children eating at snack or lunch or notice what is included in their lunchbox. This may be especially true for older students who are more independent and need less supervision. Therefore, teachers' perceptions may not accurately reflect students' eating behaviours or whether they are truly affected by food insecurity. Although the tailored and individualized approach of the NBSFPP is a strength of the overall program, the heterogeneity of the specific school food programs implemented in schools may have limited our ability to measure significant changes in outcomes. Finally, since only one high school participated in this study, the findings may not be generalizable to other high schools. Future evaluations should ensure that more high schools are recruited to identify how older students can benefit from school food programs.

Lessons learned

Since this study was conducted during the COVID-19 pandemic, many traditional data collection methods were not feasible. For example, student report cards from the previous school year were unreliable and access to schools and students was restricted. Thus, collecting objective student-level data was not feasible. While using teachers as proxies has limitations, it also has advantages. For example, data from teacher questionnaires are easier and quicker to collect, reducing the need to adapt student questionnaires to different age groups and comprehension levels. While using student report cards is advisable in a post-

pandemic setting, developing validated data collection tools that use teachers as proxies is warranted, as these may help facilitate large-scale data collection in schools and reduce evaluation costs. There is also a need to develop tools that can help teachers adequately assess how many children in their classrooms come from food-insecure households. While some cases may be evident, other children in need of food assistance may go unnoticed. Collecting food insecurity data from student self-reports or parent surveys can be particularly difficult and subject to response biases (Tadesse et al., 2020), making it difficult to measure the effect of school food programs on food insecurity. Therefore, simple, age-appropriate, and non-stigmatizing screening tools are warranted.

Conclusion

When provided with adequate funding, human resources and expert support, schools were able to implement various food programs that met their students' needs, utilized existing resources and built new strategic partnerships. Providing schools with sustainable funding is critical to ensure that they can offer food programs to their students from one year to the next. Ideally, this funding should come from various levels of government (provincial and federal) and be distributed to schools equitably to acknowledge the inequalities in infrastructure and community resources. Finally, while targeted school food programs can help support vulnerable students, schools should be encouraged to implement universal food programs so that all children can access healthy foods at school and are ready to learn.

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Vol. 13 No. 1, pp. 109–130 April 2026

Canadian Food Studies La Revue canadienne des études sur l'alimentation

Research Article

Financing sustainable food transitions: Mapping the investment ecosystem in Nova Scotia

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Abstract

This paper examines how finance shapes sustainability transitions in food and agriculture, using Nova Scotia as a case study. While the role of finance is increasingly recognized in sustainability transitions scholarship, there is relatively little empirical work exploring how financial actors and instruments influence the directionality of agrifood system change. Drawing on semi-structured interviews with funders, investors, government officials, and food and agriculture entrepreneurs, as well as document analysis, the study maps the province's financing ecosystem and assesses how different types of capital support or constrain sustainability pathways. The findings reveal significant gaps in the availability, scale, and type of finance, particularly the need for patient, long-term capital. The paper argues that mission-oriented innovation approaches, including emerging work on mission-oriented agricultural innovation systems (MAIS), offer a useful framework for bringing greater coherence to sustainability efforts.

Keywords: Finance; Nova Scotia; sustainable food systems; sustainability transitions

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DOI: 10.15353/cfs-rcea.v13i1.741
ISSN: 2292-3071

Résumé

Cet article analyse la manière dont la finance façonne les transitions vers la durabilité dans les domaines de l'alimentation et de l'agriculture par une étude du cas de la Nouvelle-Écosse. Si la recherche reconnaît de plus en plus le rôle de la finance dans les transitions vers la durabilité, il existe relativement peu de travaux empiriques qui montrent comment les acteurs et les instruments de la finance influencent l'orientation des changements dans le système agroalimentaire. Sur la base d'entretiens semi-structurés avec des bailleurs de fonds, des investisseurs, des représentants gouvernementaux et des entrepreneurs agroalimentaires, ainsi que d'analyses documentaires, cette étude cartographie l'écosystème de financement de la province, et évalue comment divers types de capitaux soutiennent ou limitent les voies vers la durabilité. Les résultats révèlent des lacunes considérables dans la disponibilité, l'ampleur et le type de financement, particulièrement pour ce qui est du besoin de capitaux patients, à long terme. L'article soutient que les approches d'innovation axée sur la mission, incluant les travaux émergents sur les systèmes d'innovation axée sur la mission en agriculture, offrent un cadre utile pour apporter une plus grande cohérence aux efforts en faveur de la durabilité

Introduction

Sustainable food system transitions are critical for improving social and ecological outcomes, but there are competing visions for how this should unfold. For instance, some subscribe to an eco-modernist approach emphasizing innovations in digital technologies, while others prioritize low-tech approaches rooted in social justice and principles of agroecology (Anderson & Maughan, 2021). In addition to vision, sustainability transitions require capital (Havemann et al., 2020). The International Food Policy Research Institute estimates that U.S.$350 billion per year will be needed globally over the next five years for food systems to meet climate mitigation and adaptation targets as well as other UN Sustainable Development Goals (SDGs) ("Finance for Food Systems Transformation," 2023). Finance, of course, is not neutral: the availability and type of finance shape not only the pace but also the sustainability pathway or "directionality" of food systems. However, finance's influence on directionality often goes unnoticed amongst scholars and practitioners interested in systemic change (Mazzucato & Semieniuk, 2018). This study helps fill this gap by empirically examining how public, private, and non-profit actors invest in sustainable food systems, using Nova Scotia as a case study. Nova Scotia was selected as the case study because it illustrates how financing challenges and opportunities play out in small, mixed rural–urban economies with a strong agricultural base. Although Nova Scotia has unique characteristics, these findings are also relevant for other jurisdictions working to steer their food systems in a more sustainable direction.

While the need for sustainability investments is recognized globally, regional food systems face distinct financial and structural challenges. In Nova Scotia, these challenges are pressing on several fronts. Farms are facing declining profitability and net farm income has

consistently been negative over the last five years (Government of Canada, 2021a). Nova Scotia is losing farms and farm operators at an unsustainable rate; the province lost 21% of its farms between 2016 and 2021 alone (Government of Canada, 2012a). These farm losses are attributed to industry consolidation and declines in total farm acreage. Between 2011 and 2021, farm acreage in Nova Scotia declined by 29% (Government of Canada, 2012b). The rising cost of farmland is another significant barrier, as it has been steadily increasing over the last decade (Government of Canada, 2021b). Meanwhile, agriculture continues to receive a declining portion of the provincial budget and many banks have closed rural branches, effectively cutting off a key piece of infrastructure that was providing capital to entrepreneurs in the food system (Crossman,2023).

Climate change poses additional significant risks to the area. Nova Scotia is amongst the provinces that are predicted to be exposed to the highest rates of sea level rise in Canada by 2100, leaving vital regions, such as the Chignecto Isthmus, the only road and rail connecting Nova Scotia to the rest of Canada, at risk (Wade, 2022). If this connection were to be lost, Nova Scotians' access to food would be significantly challenged. Such a disruption could be catastrophic, as almost one third of Nova Scotians are already experiencing food insecurity (Cruz, 2024).

Rising levels of diet-associated chronic disease are also straining the overstretched healthcare system, which in 2024 accounted for 44% of the province's total budget (representing an increase of 36% compared to spending over the three previous years) (Canadian Press 2024). Despite this large investment of resources, the healthcare system is "in shambles", characterized by high levels of physician burn out, chronic shortage of nurses and historically long wait times (Barua and Whalen, 2023). Food and healthcare issues are not isolated, and experts maintain that increasing access to healthy local food will ease the burden of disease on the healthcare system (Rideout et al., 2015).

From a geopolitical perspective, recent economic threats associated with tariffs on agricultural products to and from the United States have added a new layer of vulnerability for the province (Hursh, 2025). Together these factors highlight the need for the province to transition to a more resilient and sustainable food system.

Despite these challenges, Nova Scotia has a vibrant local food sector, including the highest per capita number of farmers' markets in the country and a growing number of community-based food initiatives (Mughees, 2025). These dynamics make Nova Scotia an instructive case for exploring how financial mechanisms influence sustainable food transitions in regions characterized by structural vulnerabilities and strong local engagement.

In recent years, several funds and programs have developed to channel capital into Nova Scotia's food and agriculture sector to boost sustainability and resilience. The case study of Nova Scotia's sustainable food and agriculture financing ecosystem helps to contextualize sustainability transition theory and policy. Rather than adopting or endorsing a single definition of sustainability, this paper examines how different actors in Nova Scotia's food financing landscape interpret and operationalize the concept to illuminate the implications for the future of food for the province. Following scholars such as Leach et al. (2010), sustainability here is treated as a contested and evolving idea.

Role of finance in sustainability transitions

This paper engages with the interdisciplinary field of sustainability transitions which explores processes of large-scale systemic change towards more sustainable social, economic, and technological systems (Geels, 2010; Loorbach & Huffenreuter, 2013; Smith et al., 2010). Sustainability transitions scholarship focusses on the role of innovation, policy, and multi-level interactions between actors and institutions to shift away from unsustainable practices, emphasizing long-term structural transformations. It classifies finance as an essential resource and function within innovation systems for enabling long-term systems change (Farla et al., 2012). While sustainability transitions scholarship emphasizes the multiple pathways innovations can take, and the ways in which policies can influence sub-optimal outcomes or even lock-in, it has tended to ignore the how public and private finance influence the directionality of sustainability transitions to achieve societal missions (Mazzucato and Semieniuk, 2018).

However, aligning finance with positive social and environmental outcomes has a long history, with roots tracing back to the Quakers in the late 18th century when members prohibited participation in the slave trade (Reeder & Colantino, 2013). In Canada, early experiments in socially oriented finance include the Antigonish Movement of the 1930s and the work of Alphonse Desjardins in the early 1900s (Torgerson et al., 1998). The Antigonish Movement, rooted in Nova Scotia, combined adult education, co-operative development, and community organizing to address widespread rural poverty (Coady Institute, 2018). These Canadian initiatives laid important groundwork for today's socially and environmentally oriented investing.

Researchers have begun to explore how different types of financial actors influence the technologies and sectors that they are financing (Mazzucato & Semieniuk, 2018; Stephens, 2021). For instance, the role of public sector financing in creating new sectors like information and low carbon technologies has started to garner research interest (Mazzucato, 2013). As well, studies have considered the ways in which private banks invest in particular sectors like chemicals and agriculture (Mazzucato & Wray, 2015). Scholars have also explored how venture capital favours particular types of investments and sectors like IT and biotech, and more recently, agritech (Marquis, 2024). This work highlights something that is intuitively recognized but often only vaguely understood: the type of finance shapes which innovations are prioritized, and in turn, influences the direction of innovation processes such as sustainability transitions. As well, finance can take a variety of forms, which are in turn dependent on institutions and infrastructure (Mazzucato & Semieniuk, 2018; Steffen & Schmidt, 2021).

Recent work has called for more deliberate alignment between financial systems and sustainability goals through what Mazzucato (2018) describes as mission-oriented innovation policy (MIS). Applied to food systems, this approach has evolved into the idea of mission-oriented agricultural innovation systems (MAIS), which emphasize coordinated, cross-sectoral investment toward shared sustainability objectives (Klerkx & Begeman, 2020; Kok & Klerkx, 2023). While the literature on MAIS remains nascent, it provides a useful framework for understanding the importance of strategies for transitions and how finance can be mobilized not only to support innovation but to direct it toward socially and environmentally desirable outcomes.

History of agricultural investing in Canada

To understand how contemporary financing arrangements shape the directionality of agrifood transitions in Nova Scotia, it is necessary to situate current investment patterns within the broader historical evolution of agricultural finance in Canada. The mix of public, private, and cooperative investment has shifted substantially over time, influencing which forms of innovation have been prioritized. The following section outlines this history to foreground how historical financing structures continue to inform today's transition pathways.

Traditionally, in high income countries, the state was heavily involved in funding agricultural R&D and providing capital to producers. In Canada, throughout the 1980s up until 2015, public agriculture R&D spending has ranged from $400-$700 million, compared to private sector agriculture R&D spending during the same timeframe ranging from $10-$70 million (AIC, 2017). However, over time, the financing mix has shifted, particularly as demands for greater sustainability in food and agriculture have gained momentum. Venture capitalists' interest in agritech, for instance, rose 1600% globally between 2016 and 2021 (AgFunder, 2022). Venture Capital (VC) is a type of private equity that supports startups and early-stage companies by raising funds from funding partners, and often taking some form of ownership in these new companies (Silicon Valley Bank, 2025). Funding partners, also known as capital providers, can include government agencies, corporations or private individuals or other organizations (Marquis, 2024).

The Canadian Government has its own VC funding programs that invest in agtech, including a $194 million VC fund through Farm Credit Canada, and a $1 billion fund through the Business Development Bank of Canada (Remillard, 2017). Areas that received the most interest include bioenergy and biomaterials and farm robotics, and mechanization and equipment (AgFunder, 2024).

The Sustainable Canadian Agricultural Partnership (Sustainable CAP), an evolution of the previous Canadian Agricultural Partnership (CAP), is another primary funding tool of the federal government. The partnership involves cost-sharing between federal, provincial, and territorial governments to fund agricultural programs and activities aimed at "strengthen[ing] the competitiveness, innovation, and resiliency of the agriculture, agri-food and agri-based products sector" (Sustainable Canadian Agricultural Partnership, 2023). The current agreement has a budget of $3.5 billion over five years (April 2023-March 2028). In Nova Scotia, $46 million will be delivered through programs. At the time of this paper, the Nova Scotia Department of Agriculture has 21 funding programs in operation, including the Resilient Agricultural Landscape Program that supports the adoption of on-farm best management practices, along with market opportunities and diversification programs, labour bursaries, and business risk management programs (Government of Nova Scotia, 2025).

The province also has the Perennia Food & Agriculture Corporation, which is a provincial crown corporation aimed at supporting the growth, transformation and economic development of the sector. Currently, Perennia has four funding programs available for Nova Scotia agriculture, seafood, and food & beverage businesses, including an institutional procurement program, food safety program, and the On-Farm Climate Action Fund, the latter of which is another federal-provincial cost-share initiative (Perennia, 2025). Perennia offers some non-financial support through research and assessment services.

While traditional public sector spending such as Sustainable CAP and Perennia still exist, there has been a notable shift away from public towards private actors involved in financing the food and agriculture sector.

Since the 1980s, in high income countries there has been a general retreat of the state from treating agriculture as a public good, toward more neoliberal policies that prioritize profit, efficiency, and private goods (Beingessner et al, 2022). Reflecting this trend, expenditures in support of the agriculture and agri-food sector have been gradually declining both nationally and provincially in Canada. Increasingly, funds to support producers are aimed at managing risk and volatility rather than investing in new technologies (AIC, 2017). Producer support as a share of gross farm receipts was halved between 1986-88 to 2000-02, and halved again by the early 2010s, while total support for the agriculture sector represented 0.4% of Canada's GDP in 2019-21, a decrease of 1.6% from 1986-88 (OECD, 2022). At the same time, since the 1980s we have seen an increase in private agriculture R&D spending (Ibid). On a global level, private sector investments in agrifood technology have gone from $2.4 billion USD in 2013, up to $30.4 billion USD in 2022, with a peak up to $53.9 billion USD in 2021 (AgFunder, 2024).

Historically, however, the state has played a leading role in moving agricultural innovation forward. In 1886, the Federal Government of Canada established the Experimental Farm Branch, which led to the opening of five experimental farms across the country (Parks Canada, 2025). These farms laid the groundwork for agricultural research under government management to support crop development, pest control, and soil science, fostering growth in crop yields and quality. One of these farms, the Nappan Research Centre, was in Nova Scotia.

In Nova Scotia, the School of Agriculture was established in 1885, the Provincial Farm in 1889, and finally, the School of Horticulture in 1894. In 1905, these three agencies merged to form the College of Agriculture (Dalhousie University, 2025). Throughout this period, federal funds were used to encourage agriculture education and support farmers through programs such as extension services. These services, also prominent in the U.S., were provided in partnerships between agricultural colleges and Departments of Agriculture and developed and disseminated research and information on agriculture practices to communities (Bao et al., 2022).

After World War II, industrialized nations saw a shift to welfare-state approaches where the funding of research and innovation was aimed at supporting societal well-being (Glenna et al., 2015). Within the Keynesian economic framework, the state is responsible for addressing market failures and offering incentives for research investments that serve the public good, including agriculture and food production. During this time, Canada established government institutions and programs that provided state assistance to the farm sector, leading to a relatively stable and thriving sector (Beingessner et al., 2022).

The turn toward private sector involvement in the 1980s impacted the types of research that received funding. For instance, there is now much more funding available for research into genetic engineering, which delivers private profits, than for agroecological innovations, which provides more public goods shedding light on how different actors influence the directionality of food system pathways (Vanloqueren & Beret, 2009).Today, the presence of the private sector in the agrifood space continues to grow, with a growing shift towards venture capital (VC) investment. This type of investing in the agriculture sector became especially prominent in the early 2010s, following the

upswing and subsequent falter of VC investment into "cleantech" (Guthman & Fairbairn, 2024). Agrifood tech products that have been funded by VC include vertical farming, alternative proteins (ex. Impossible Burgers), and digital farming technologies, such as robotic harvesters (Ibid).

The influx of VC funding into the agriculture sector has raised compatibility questions (Fernandez-Vidal & Alarcon, 2025). VC investments inherently require near term profits to appease capital providers, and as Goldstein (2018) notes, this is often not compatible with the length of time needed to meaningfully address complex sector needs, particularly those with slow biological cycles like agriculture (Fernandez-Vidal & Alarcon, 2025). As stated earlier, the emphasis on profit impacts the types of research and innovation that gain support. Further, much of the new agtech is predicated on an under-analyzed assumption that traditional food production has failed, or is failing, raising compatibility questions for traditional producers seeking funding (Guthman & Fairbairn, 2024).

As this section outlines, the financing ecosystem for sustainable food and agriculture has undergone considerable shifts and is continuing to evolve. Knowing that the types of finance strongly dictate the direction of innovation, it is important to understand the contours of the financing mix as it relates to food and agricultural systems because it directly influences how sustainability transitions unfold.

Rural economic development and food activism in Nova Scotia

The financing shifts described above intersect with regional economic development challenges in distinctive ways. In Nova Scotia, and in many small, mixed rural-urban economies, the structure of investment has been shaped not only by federal policies but also by broader globalization dynamics, such as accelerating financial flows, capital mobility, and the resulting economic concentration and uneven geographies of inequality that contribute to regional disparities (Pike et al., 2017). Understanding this regional context is essential for interpreting the province's financing ecosystem, and scholarship on regional and rural economic development provides an important foundation for explaining the patterns observed in Nova Scotia.

Rural and regional economic development scholars have identified a persistent "finance gap" in regions outside of main city centres, and emphasize the social construction of markets. To design effective regional or rural economic development policy, the assemblages of people, objects, and activities must be carefully considered (Wray et al. 2017). This literature also highlights how limited access to capital and lack of long term planning have constrained innovation outside of major urban centres (Pike et al., 2017; Markey et al., 2005). Further, initiatives that prioritize rural-urban linkages and import substitution are promoted as ways to advance local and regional food systems as an economic development strategy (Jablonski et al., 2017).

This literature on rural development has blossomed in Europe largely as a result of the EU Common Agricultural Policy (CAP) second pillar, which is exclusively focussed on rural development. Since the early 2000s, this pillar has provided predictable, multi-year funding through multi-level governance; supported long-term, place-based rural economic

planning; and has funded innovation, diversification, infrastructure, local food systems, and social initiatives. It has also funded research to strengthen food systems across Europe. In contrast to the European context, Canada lacks an equivalent policy framework for sustained regional and rural investment. While there are federal initiatives aimed at increasing funding for rural development, including the Regional Economic Growth Through Innovation fund, Community Futures Program, and the Local Food Infrastructure Fund, Canada still lacks a coordinated, strategic approach like that of the EU. Funding remains fragmented and largely delivered through short-term, competitive programs.

Nova Scotia's food system reflects many of these broader dynamics of uneven regional development and fragmented support for food and agriculture. Nova Scotia has Canada's second smallest land base (approximately 55,284 sqkm) and its population hovers around one million inhabitants (Nova Scotia Department of Finance, 2024). Farming is dominated by small- and medium-scale enterprises producing dairy, poultry, fruit, vegetables, and wild blueberries. The fisheries sector remains a major economic driver, particularly through lobster, scallop, and groundfish exports (Government of Canada, 2022).

Cooperative traditions such as those associated with the Antigonish Movement helped establish a long-standing culture of mutual aid and community organization that continues to influence contemporary food activism and alternative food networks. Over the past two decades, groups like FarmWorks Investment Co-operative, the Ecology Action Centre, and the Halifax Food Policy Alliance have carried this legacy forward, linking food security, local food provisioning, and agroecological practices to broader struggles for sustainability and social justice (Andrée et al., 2016; Mount, 2012). Scholars note, however, that despite this strong base of civic engagement, Nova Scotia lacks a cohesive strategy that connects these grassroots efforts to long-term provincial policy for sustainable food and agriculture (Andrée et al., 2016).

The above context sets the stage for our empirical investigation by emphasizing the constructed nature of markets. Mapping Nova Scotia's financing ecosystem therefore offers a way to understand how it may influence the province's sustainability pathways. This paper asks: *What are the characteristics of the financing ecosystem for sustainable food and agriculture in the province?* And *how does this ecosystem shape sustainability trajectories in Nova Scotia?*

Methods

This study involved a combination of qualitative research methods including semi-structured interviews and document analysis with government employees, private investors, and non-profit actors. Purposive sampling was used to develop the sampling pool for this study (Palinkas et al., 2015). To begin identifying key players in Nova Scotia's financing ecosystem, the research team first relied on internet search by using terms such as "funding for sustainable agriculture and Nova Scotia"; "investing in food and agriculture Nova Scotia"; "venture capital for agtech in Nova Scotia". We initially prioritized funders and investors who are based in Nova Scotia and focus exclusively on supporting food and agricultural innovation in the province.

However, we broadened our search to include funders and investors that may also include other regions in their portfolios as long as their portfolios included companies in Nova Scotia. In the end we identified 25 funders and investors who met our criteria. We also spoke with four Nova Scotia based food and agriculture entrepreneurs to learn about their experiences and perception of the financing available for sustainable food and agricultural innovation in the province.

Through our interviews, we engaged in snowball sampling. In total, we interviewed all participants who responded to our request, resulting in 15 participants with interviews taking place between January and November 2024 (see Appendix A: Table 1). The semi-structured interviews lasted approximately 30 minutes to one hour in length, and the questions ranged from specific programming questions to broader themes around the financing ecosystem for sustainable food and agriculture in Nova Scotia. The interviews were recorded and transcribed in Otter.ai and a research assistant cleaned up the interview transcripts for any transcription errors. Next, the interviews were coded according to the principles of grounded theory (Saldana, 2009). The first round of coding involved a loose coding to identify broad themes and *invivo* codes. The second round involved organizing and synthesizing codes to identify specific categories and trends.

In total, we spoke with four government funders—one federal and two Nova Scotia Provincial, four private funders, one federal crown corporation, one NS Provincial Crown Corporation, and one private company which is not a funder but which has received financing. See Appendix A: Table 1 for a full breakdown of interview participants. Despite the research team's best efforts, there were certain programs and funds that were non-responsive or unwilling to be interviewed as part of this study. Some of these players like Perennia were considered critical in the financing and innovation ecosystems for food and agriculture in the province. In these cases, we gathered information about their programs from their websites to help determine their approach and role in the financing ecosystems for sustainable food and agriculture in the province. This document analysis involved searching these organizations' websites and coding any relevant reports or pages, which were informed by the thematic codes from the interview transcriptions.

Results and discussion

The findings below draw together interview insights and document analysis to characterize the structure of Nova Scotia's food and agriculture financing ecosystem. We present these results in relation to key themes identified in the sustainability transitions literature, particularly financing gaps, directionality of capital, and competing visions of sustainable futures.

A significant result of this study is a map of key actors in Nova Scotia's sustainable agriculture funding ecosystem. This map (Figure 1) is designed to be useful for policy- and decision-makers, funders, and those seeking funding. Currently no such resource is publicly available. The semi-structured interviews provided in-depth data on participant perspectives of the sustainable agriculture funding ecosystem in Nova Scotia. The semi-structured nature of the interviews allowed for more fulsome exploration of the research topic, helping to uncover nuances in perspectives and

experiences amongst funders and actors. We bring these findings together with insight from the literature on rural and regional economic development and sustainability transitions to advance recommendations on how the province might better support a thriving and sustainable regional food system.

Gaps in the food and agriculture funding ecosystem

According to interviewees, there are key gaps inhibiting the effectiveness of funding and financing targeting sustainable food and agriculture in the province. These include a lack of funds in general, insufficient support for mid-sized and growing businesses, and a mismatch in the type of capital required to finance a sustainable food transition.

Lack of capital

In general, the interviewees expressed that they perceive that there is insufficient capital in the province available to sustainable food and agriculture businesses, particularly as compared to other provinces.

> "If you're [an] early stage entrepreneur or trying to find some financing in Quebec, it's a whole different story, and in Ontario, those angel investors are writing quarter million- dollar cheques, not $25,000 cheques. So, it's hard to get the fundraising in that way here. We're just wired differently on the East Coast, I think. So, there's a gap there." (Participant #15)

Another interviewee described the small number of options for financing in this space in the region:

> "[T]he volume of options to capital and specifically in this sector are very few in Nova Scotia or Atlantic Canada, there [are a couple of public-private programs] and a bunch of family offices and that's it. Now it's not like you can't go out and look for the money and bring it back here. [...] But investment in early-stage developing companies is still a no because we don't have an extensive amount of expertise in the region around how to do it effectively." (Participant #8)

This fund manager, put it plainly:

> "There's absolutely not enough available capital to rebuild the food system in Nova Scotia." (Participant #2)

These quotes demonstrate the ways that interviewees consistently emphasized a significant gap in the availability and diversity of capital for sustainable food and agriculture businesses in Nova Scotia. They also tend to perceive Nova Scotia as lacking both the volume and scale of investment opportunities, particularly for early-stage ventures.

Goldilocks challenge

In addition to general funding shortages, interviewees identified a structural issue regarding which types of businesses are most likely to attract investment. This reinforces concerns in the literature about how financing models can privilege certain innovation pathways. Another challenge that was raised relates to the stages of business that tend to receive more or less funding in the province. One interviewee explained how the province [fails to] support slower growth companies with a regional, rather than global application. The support is available for companies demonstrating exponential growth with global impact

and also companies in pre-venue stages. But for those with steady growth, or post-revenue start-ups, there is a missing piece.

> "I think there's two things, if you have a truly global venture grade technology, VCs will find you and you will be investable. So, if you hit the mark and are truly disruptive and have a global market application targeting a $10 million TAM [total addressable market], we have built enough connections to get you invested. I think the challenge is not all companies are venture grade, so you may have a very good regional application…which is very innovative but it's not venture grade. And I think that's where there's a gap…I think it's a little bit of the Goldilocks: if you're this type of company, we can find your money. If you're really micro, there seems to be programs. But if you need $300,000 to $500,000 to build a company with good quadratic growth, I think that's where we have challenges." (Participant #14)

Another interviewee had a similar take on the orientation towards particular scales of business in the province,

> "I think we focus [here], in my opinion, a little bit too much on business attraction versus business incubation. So, we're happy to sign up with RBC to set up a big place in Bedford or we're happy to give John Bragg and Oxford a bunch of money to expand their blueberry operation, which is fair. But we're not doing a lot to fill the missing gaps, which is finding smaller companies that can grow and become those types of organizations." (Participant #15)

A program manager described the province's strengths—the pre-revenue startup phase. While this phase is critical for incubating niche innovations, there could be better support for post-revenue start-ups as they grow and expand their businesses.

> "There's a particular stage that we do very well here in Nova Scotia. We have a wonderful startup ecosystem…There's a lot of ecosystem alignment. We have a tremendous focus on pre revenue startups here. […] We have a well-defined continuum. We have a provincial government that's more focussed than the federal government." (Participant #14)

Our interviews highlighted a key challenge within Nova Scotia's financing landscape for sustainable food and agriculture which relates to the stages of business development that tend to receive support. While the province has cultivated a strong ecosystem for early-stage, pre-revenue startups, particularly those with technical innovations and high-growth potential, there is a notable gap in support for companies that are growing at a steady pace or have a primarily regional focus. Others noted that funding tends to favor business attraction over business incubation, with more emphasis placed on supporting large, established firms than on nurturing smaller enterprises with the potential to scale. As a result, many promising businesses that could contribute meaningfully to sustainable regional development struggle to secure the capital needed to grow.

Type of capital

Beyond quantity and scale, interviewees stressed that the *form* of capital matters, echoing sustainability transitions arguments that patient finance is essential for supporting long-term, mission-oriented change.

The type of capital available significantly influences the directionality of an investment. A Nova Scotia-based entrepreneur points out that the capital required for sustainable food and agriculture innovations needs to be patient. Patient capital involves investments in early-stage growth businesses with flexible terms, with longer time horizons for returns. It can be provided by private investors such as impact investors who prioritize social and environmental impacts alongside financial return, philanthropies, or governments. Patient capital

often serves to enable businesses to get to a point where commercial markets can invest.

We repeatedly heard through our interviews that the capital available for food and farming businesses in Nova Scotia is not patient enough. The protracted time frames characteristic of agriculture combined with the desire for social and ecological impacts, means that investors looking to turn a quick profit are unsuitable:

> "If you're going into sustainable future food, your capital has to have a long view. So then all of a sudden, you start to weed out a lot of players. In Nova Scotia, if we want sustainable food farms and production with the criteria that you could scale it and sell it to New York or wherever, but the other criteria is [that] it's got to benefit the province and our citizens, then the VCs tend to fall off the map." (Participant #1)

A fund manager echoes the need for capital with a protracted time frame in the province, if the goal is to build sustainable food systems:

> "We need patient capital, whether that's from philanthropic sources or whether that's from government sources or both. We also need different kinds of low-cost debt instruments, and we need equity and these different sources of capital will have to work in a more coordinated effort. And so, there's absolutely a shortage." (Participant #2)

Interviewees pointed to the inappropriate amount, scale, and type of capital as major barriers to achieving a more resilient and sustainable food system in Nova Scotia. The limited investments in the food and agriculture sector reflect the "retreat of the state" in agriculture that has swept through industrialized countries as neoliberalism gained momentum at the turn of the 21st century (Markey, 2005). A chronic funding gap for food and agriculture is a known trend amongst rural economic development scholars in both developed and developing contexts alike (Shucksmith, 2010). Nova Scotia is therefore not unique in facing diminished investment in the food system but several interviewees stressed the increasingly high risks of continuing to deprioritize food and agriculture in provincial and federal funding.

Our interviews emphasized that the capital flowing to food and agriculture enterprises in Nova Scotia currently tends to favour large, high growth businesses. This trend ultimately devalues smaller mid-sized operations, which are the backbone of resilient, sustainable food systems.

The current food system can be characterized as an hourglass—with consumers at one end and producers at the other, and farmers, processors, manufacturers and distributors, squeezed into an ever narrowing funnel in the middle (Howard, 2016). This "missing middle" is often used in sustainability transitions literature to describe the weakened infrastructure that serves mid-sized agriculture (Stahlbrand, 2016, 2017). Rebuilding the middle is essential for expanding alternatives to the industrial model. Investing in mid-sale infrastructure helps to widen markets for more sustainable, alternative food systems so that they can reach larger scales (Brownell, 2022).

Participants in our study reported significant gaps in capital availability, especially for projects that are outside of the purview of traditional production agriculture, leaving behind farmers and food entrepreneurs who do not fit the traditional mold, or who need patient capital to realize sustainable innovations. Addressing this financing gap will require deliberate policy and investment strategy shifts. Governments and public institutions have a critical role in providing patient, long-term finance targeted at societal missions (Mazzucato, 2018).

Nova Scotia is not unique in facing financing challenges when it comes to supporting agricultural innovation to enhance sustainability and food security.

Indeed, Fernandez-Vidal and Alacorn (2025) studied the ways in which agricultural innovation is financed across five continents and found that while traditional venture capital models dominate, they are ill-suited to supporting sustainable food systems. While venture capital has excelled in sectors that involve rapid iteration and digital scalability, agriculture requires "patience, lengthy product-validation cycles, and localized adaptation" (Fernandez-Vidal & Alacorn, 2025, p. 1). Therefore, innovation ecosystems must be aligned with the slower, biological cycles inherent in agriculture (Fernandez-Vidal & Alacarn, 2025). Funding horizons must be extended, and this could involve a combination of patient capital, blended finance, and public-private partnerships.

Enhancing partnerships in this way amongst various governance actors is in line with the ways in which the rural development literature has evolved, moving from an integrated to "dis-integrated" approach. This approach is characterized by a shift in the state's role, from directly delivering and directing services to acting more as a coordinator, facilitator, or overseer. It involves the creation of complex and overlapping governance arrangements and partnerships and brings new actors into decision-making, especially private organizations and community or non-profit groups (Shucksmith, 2010).

Mismatched or lack of coherent strategy

There is a clear need for greater coordination and a coherent provincial strategy if innovation ecosystems are to be better aligned with the slower, biological rhythms inherent in food and agriculture to achieve greater sustainability outcomes. However, several interviewees lamented the lack of an existing strategy. They identified that better partnerships between research, government, and businesses could better prepare the food and agriculture sector for the complex challenges it is facing.

An entrepreneur criticized the province for lacking a forward-thinking strategy, while it remains rooted in a traditional, conservative mindset:

> "if you look at financing sustainable food farms or food production, you've got this scattered map all over the province, and not only that, you don't have any strategy. The province has zero strategy. And it goes back to strategy and culture. And our culture in Nova Scotia is deeply rooted in what I call 'old ag' (agriculture)." (Participant #1)

This concern for a lack of strategy was echoed by another interviewee, stressing the need for stronger connections between research and the start-up ecosystem:

> "We need to do a better job taking ideas from universities and students and converting those people into entrepreneurs and then converting that idea into a business, because I think there's an active community here that [...] have good ideas all the time." (Participant #15)

Meanwhile, a fund manager explained how when there is a close connection between universities and start-ups, the province can benefit dramatically:

> "We have a lot of agricultural research and commercial activity in Nova Scotia that is very relevant. There was a company [...] that had a drone product that would look at crops and identify disease on those crops. That was really the marriage of Dalhousie, and 20 years of research on plant disease, married with a bunch of geeks who knew how to make drones and software. And so, those are things where really we get the best bang for our buck." (Participant #8)

Actors interested in local food systems specifically also noted the importance of strategy, and ensuring that government is directing the food system in a sustainable and resilient direction.

> "I think the problem is so big that there's never going to be a way to do this without a degree of government support. I would love to see a system of food hubs, perhaps strategically located within, for example, 50-kilometer radiuses. That is where we put our collective efforts into, rather than one-off, uncoordinated projects. Currently, food security work is all over the place." (Participant #12)

While there is strong agricultural research and innovation capacity within the province, it is not consistently leveraged or connected to entrepreneurial and commercial pathways. Interviewees noted that when these connections do occur, such as linking university research with start-ups, the benefits can be significant. There was also a call for government to take a more active role in shaping the direction of the food system by fostering collaboration, investing in infrastructure, and reducing reliance on under-resourced volunteer efforts. Without such strategic coordination and sustained support, the province risks missing opportunities to build a more resilient, equitable, and sustainable food future.

Taken together, these themes point to the need for frameworks that can help align diverse actors and innovation pathways. Agricultural innovation systems (AIS) are seen as prioritizing economic growth and productivity, while reinforcing unequal power dynamics and unsustainable patterns. Even when AIS focus on improving sustainability outcomes, they tend to favour tweaks to the industrial model which is characterized by monoculture productions and the heavy application of external inputs, as opposed to transitions towards alternative production systems. Mission-oriented agricultural innovation systems (MAIS) offer to remedy the shortcomings of AIS. MAIS are defined as, "the network of agents and set of institutions that contribute to the development and diffusion of innovative solutions with the aim to define, pursue and complete a societal mission" (Hekkert et al., 2020, 77).

The Netherlands stands out in terms of its approach to MAIS. In 2019 the government introduced mission-driven innovation policy for nine "Topsectors", which established 25 missions to reinforce the Dutch economy within the social themes energy transition & sustainability; agriculture, water & food; health & care and security (HSD Foundation, 2019). The Dutch agricultural knowledge and innovation system (AKSI) is defined by its "triple helix" or "golden triangle" model, whereby the government, private sector, and research institutions work closely together. The AKIS is comprised of, "vocational education systems, a three-tiered agricultural education structure, and active private sector involvement. These are supported by a proactive government that provides public services, funding, and defines innovation schemes in partnership with companies and research institutions" (OECD, 2023). The results of these efforts are noteworthy—the Netherlands is the second largest exporter of agricultural products in the world and remains and important agricultural producer despite its relatively small size and high population density (OECD, 2023).

Though the country has made impressive gains, more work remains to be done, particularly in sustainability. In an OECD report reviewing the progress made over the last decade, there is an identified need to "strengthen agricultural policy incentive for innovation and longer-term challenges, by developing a longer-term vision reconciling productivity growth and sustainability (OECD, 2023). By comparison, mission-orientation in food and agriculture systems remain nascent in Canada and Nova Scotia more specifically. Certainly, implementing MAIS in real-world settings is complex. Significant disagreements arise both across and within missions about the kinds of future agri-food systems they should advance, the technologies they rely on, the social and market arrangements they promote, and which missions policymakers and industry actors choose to prioritize, reflecting competing visions for how food systems ought to evolve (Klerkx & Rose, 2020; Montenegro De Wit & Canfield, 2024).

The multi-level perspective (MLP), a prominent transitions framework, highlights that transitions often unfold through multiple, parallel, and sometimes competing pathways that coexist for long periods before any clear direction emerges (El Bilali, 2019). In this sense, the diversity of visions and approaches we document is consistent with broader patterns observed in agri-food transitions internationally. Early transition stages are typically marked by experimentation, niche development, and a lack of alignment across actors.

Marsden (2013) applies the MLP to four scenarios for exploring possible transitions for food systems in the UK. His most optimistic scenario "into a new era" assumes that more of the "ecological 'externalities' are truly internalized into food production and consumption systems, and that a variety of socio-technical niches become mainstreamed and more institutionalized" (Marsden, 2013). To get there, what were once a fragmented set of niches, successfully scale-up to transform the incumbent regime towards sustainable food and rural development, at which point there becomes more path-interdependency between clusters of niches (Marsden, 2013). Regional and reflexive forms of governance are seen as an essential ingredient for this type of transition.

Given such theoretical perspectives from the sustainability transitions literature, the incoherence we identify should not necessarily be interpreted as policy failure, but rather as a characteristic of the current transition phase in Nova Scotia. At the same time, interviewees' concerns point to the need for mechanisms that can gradually foster greater coordination and directionality as innovations mature, which is required for a greater paradigmatic shift. Governance actors should also seek to embed reflexivity into their strategies in order to help pave transition pathways.

Competing sustainability visions

Interviewees expressed a wide range of views on what a sustainable food system should prioritize. While there is general agreement that the existing food system is unsustainable, funders and financiers have a range of opinions on what a sustainable pathway should look like, and this lack of coherent vision likely translates into an incoherent strategy for sustainable food and agriculture in the province.

This program manager speaks to the fundamentals of environmental sustainability:

> "That focus on the soil, the investment in the soil, and why that's so important now, because that's the long-term future." (Participant #3)

Another program manager, speaking from a young farmer's perspective added:

> "I see the environmental side of agriculture as being important, but I believe the social aspect is crucial and often overlooked…I believe that there are two essential areas of focus for sustainable agriculture. We need to ensure that underrepresented groups, such as young people, can get into agriculture and the family farm is viable. […] I want to support various scales of farming, whether its family farms selling directly to their communities or larger operations exporting outside of the continent." (Participant #7)

Others point to opportunities for economic sustainability in response to changing climates and food production needs:

> "We have regional disadvantages being the long end of the smokestack. Most of our food comes from California and Mexico, so we've got to get good at growing food locally and break that chain. So, even though vertical farms and indoor growing have faced significant headwinds, I think we'll see Nova Scotia and Atlantic Canada be one of the areas where perhaps it rebounds. […] We're never going to be a commodity producer. So, we have to look at higher value. So functional foods, natural products are going to be important things that aren't just low value commodities." (Participant #14)

> "I think if you look at some of the areas that are promising right now, I mean industrial, ag biotech…really provides a lot of opportunity for us to have a lot more strength in that area. There's a lot of discussion about creating more capacity on the fermentation side in Nova Scotia, which is desperately needed in Canada [and?] in general around the world." (Participant #8)

The variation in perspectives on sustainability outcomes reflects a wide range of priorities, from environmental stewardship to social equity and economic competitiveness. However, the absence of a shared vision makes it difficult to align investments and policy in a strategic way, ultimately contributing to fragmented efforts to transition to a more sustainable food system in the province.

Such divergent framings of sustainability are well documented in transitions scholarship, which observes that agri-food systems rarely converge on a single pathway early on; instead, multiple interpretations of desirable futures coexist and sometimes compete, shaping the iterative and non-linear character of transition processes (El Bilali, 2019). Although plurality and contestation are expected features of transitions, our findings indicate that certain forms of coordination, particularly around long-term investment planning and the provision of patient capital, remain underdeveloped in Nova Scotia. In other words, diversity of visions is not inherently problematic, but the absence of mechanisms to translate that diversity into complementary and mutually reinforcing actions limits the province's ability to move from experimentation toward more systemic change.

Conclusion

This study examined how sustainable food and agriculture initiatives in Nova Scotia are financed, and how these financial dynamics shape broader sustainability transitions. The findings reveal a financing ecosystem that is evolving but still marked by fragmentation, uneven access to capital, and uncertainty around long-term direction. Nova Scotia's experience reflects a broader pattern observed in many agri-food systems: while novel forms of innovation and investment are emerging, the overall landscape remains in an early, turbulent phase of transition (Klerkx et al., 2022). Interviewees consistently highlighted gaps in

capital availability, particularly for mid-scale and regionally focussed enterprises, and the prevalence of investment models that are poorly aligned with the slower biological and economic rhythms of agriculture.

The findings from this research point to a greater role for government in shaping research agendas, offering new, more stable sources of funding for longer-term sustainability challenges, and creating incentives for private investment into public goods. The need for more coherent policy in the form of a mission-oriented agricultural innovation system is clear.

The article reinforces that finance is not simply a background condition in sustainability transitions, it actively shapes which pathways gain momentum. In Nova Scotia, where climate risks, farm losses, food insecurity, and economic pressures are already acute, the need for forms of capital that match the rhythms and realities of food and agriculture is becoming increasingly clear. Although the province remains in an early and somewhat unsettled phase of transition, its existing strengths, robust agricultural research, long-standing civic food initiatives, and a growing set of funding efforts, offer some starting points for moving toward a more coordinated and resilient food system.

Acknowledgements: This research was generously funded by a McCall McBain Canadian Social Finance Network (CSFN) grant and supported by the Sustainable Finance Institute. Thank you to Abdullah Atiq and Twinkle Dev for supporting background research for this paper.

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Vol. 13 No. 1, pp. 131–149 April 2026

Canadian Food Studies La Revue canadienne des études sur l'alimentation

Research Article

A just transition for cellular dairy? Reflections from the Fraser Valley

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Abstract

Food systems globally are under growing pressure to transition in response to climate change, ecological degradation, shifting consumer expectations, and persistent social inequities. Emerging biotechnologies, including cellular agriculture, are increasingly positioned as part of these transitions, yet their social and political implications remain unclear. This study examines the potential emergence of cellular dairy in British Columbia's Fraser Valley, the centre of the province's dairy industry and a region shaped by intensifying climate risks, entrenched supply management structures, and the colonial dispossession of unceded agricultural lands. Through twenty semi-structured interviews with farmers, processors, policymakers, technology developers, and members of non-governmental organizations, we analyze how key actors understand the challenges facing conventional dairy, their expectations for cellular dairy, and whether they see it as potentially part of a just transition in agriculture. Participants identified possible environmental and animal welfare benefits but raised concerns about farmer livelihoods, regulatory ambiguity, and the potential for increased corporate consolidation. Their transition imaginaries emphasized stability and the protection of existing food systems structures. Largely absent from participants' discussions of a just transition were the perspectives of Indigenous nations and farmworkers. Using the 5R Framework for Reparative Just Transitions, we interpret

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DOI: 10.15353/cfs-rcea.v13i1.731
ISSN: 2292-3071

these omissions as evidence of an understanding of a just transition that overlooks deeper land and labour relations. We argue that a reparative lens helps broaden the scope of transition planning by foregrounding recognition, representation, redistribution, settler responsibility, and resurgence. Such an approach is needed if debates about cellular dairy are to contribute to more equitable and ecologically grounded food system futures in the Fraser Valley.

Keywords: Agricultural adaptations; cellular agriculture; climate change; dairy systems; just transitions; social implications of emerging technologies

Résumé

Les systèmes alimentaires mondiaux subissent une pression croissante pour opérer une transition face aux changements climatiques, aux perturbations écologiques, à l'évolution des exigences des consommateurs et aux inégalités sociales persistantes. Les biotechnologies émergentes, telles que l'agriculture cellulaire, sont de plus en plus considérées comme un maillon de cette transition. Or, leurs répercussions sociales et politiques demeurent indéterminées. Cette étude se penche sur l'émergence potentielle de la production laitière cellulaire dans la Fraser Valley, centre de l'industrie laitière de la Colombie-Britannique et région marquée par les risques climatiques en augmentation, des structures de gestion de l'offre bien établies et la dépossession coloniale de terres agricoles non cédées. À partir de 20 entretiens semi-structurés avec des agriculteurs, des transformateurs, des décideurs politiques, des concepteurs technologiques et des membres d'organisations non gouvernementales, nous analysons comment les acteurs clés comprennent les défis de l'industrie laitière conventionnelle, quelles sont leurs attentes quant aux produits laitiers cellulaires, et s'ils considèrent que ceux-ci peuvent contribuer à une transition juste en agriculture. Les participants ont mentionné des bienfaits possibles pour l'environnement et le bien-être animal, mais ont soulevé des préoccupations quant aux moyens de subsistance des agriculteurs, aux ambiguïtés dans la réglementation et au risque de consolidation des grandes entreprises. Leurs scénarios de transition mettaient l'accent sur la stabilité et la protection des structures existantes. Les perspectives autochtones et celles des ouvriers agricoles concernant une transition juste étaient notablement absentes des discussions des participants. En nous appuyant sur les 5R du Cadre pour des transitions justes et réparatrices, nous interprétons ces omissions comme des preuves que cette conception de ce qu'est une transition juste néglige les relations profondes autour du territoire et du travail. Nous affirmons qu'une perspective réparatrice élargira la portée de la transition prévue en mettant de l'avant la reconnaissance, la représentation, la redistribution, la responsabilité coloniale et la résurgence. Cette approche est nécessaire pour que les débats sur l'industrie laitière cellulaire contribuent à de futurs systèmes alimentaires plus équitables et écologiques dans la Fraser Valley.

Introduction

Emerging biotechnologies are reshaping how societies imagine the future of food. Among these, cellular dairy, or the production of milk proteins through microbial or cell-culture processes, has been promoted as a potential response to the environmental and ethical challenges of livestock agriculture. Yet technological transitions do not unfold in a vacuum. They are layered onto histories of land use, labour, and policy that determine who benefits from change and who bears its costs. This paper examines the emergence of cellular dairy in British Columbia's Fraser Valley as a test case for what a just transition in agriculture might entail, addressing not only emissions and efficiency but also the social and ecological legacies that continue to shape the region's food systems.

The Fraser Valley River District (FVRD) is home to over 70% of dairy farms in British Columbia (BC) (MNP LLP, 2020). It is the most intensive agricultural area in BC, generating a larger sum of farm receipts than any other region, and contains some of the most fertile and expensive farmland in Canada (British Columbia Agriculture & Food Climate Action Initiative, 2015; Farm Credit Canada, 2022). However, the region is vulnerable to climate-related risks. In 2021, for example, farmers in the FVRD faced a record-breaking heat dome, catastrophic floods, and extreme freezing temperatures—and some farmers are still recovering (CBC, 2024; Little, 2021; Olsen, 2023). The November 2021 flooding killed at least 428 dairy cows in the FVRD and destroyed shipping routes, forcing farmers in the region to dump 7.5 million litres of raw milk (Kennedy, 2021a, 2021b). While this flood broke records, it was not the first and is unlikely to be the last. Most of FVRD's agricultural land is within the floodplain of the Lower Fraser River, which runs from the mountains in the east to the Pacific Ocean, presenting escalating, seasonal flood risks.

Dairy farming has played a significant role in shaping Canada's agricultural landscape and rural economies since the early stages of European colonization in the 1600s (Barratt & Poulin, 2025). For thousands of years, the area now known as the Sumas Prairie, between the Sumas and Vedder mountains, comprised the large dynamic Semá:th (Sumas) lake and surrounding wetlands in the traditional and ancestral territories of the Sumas First Nation. In the 1920s, the BC Government erected a series of dykes, canals, dams, and pump houses to permanently drain the lake to clear land for agricultural production and settlements (Reimer, 2018; Thielmann, 2022). The Sumas First Nation peoples were forcibly removed from their unceded territory, and the local ecosystem was significantly altered. Following the 2021 flood, discussions on how to manage future flooding in the area are ongoing, with Sumas First Nation advocating for solutions that can see both an increase in ecological health and in their cultural authority within the region (Milne et al., 2024).

These overlapping ecological, economic, and historical tensions have intensified debates about how food systems in the region might adapt to future crises. In this context, technological innovation is often framed as a potential solution to the intertwined challenges facing agriculture today. Cellular agriculture is one such technology, which employs cellular biology to cultivate animal-derived proteins in two main ways: by engineering microorganisms to produce specific proteins through precision fermentation or by growing animal cells directly in bioreactors—offering an alternative to conventional animal agriculture. These technologies may also offer the potential to reduce the negative environmental impacts associated with traditional animal agriculture (Mattick et al., 2015; Tuomisto & Teixeira de Mattos, 2011), depending on supply chain

configurations, energy sources, and process efficiency. Research suggests that cellular agriculture may also be able to improve human health outcomes and food security, while reducing reliance on animals (Soice & Johnston, 2021; Stephens et al., 2018). "Animal-free" dairy has been sold in the US since 2019 and was approved for sale by Health Canada in 2023 (Brehaut, 2024). While no such product has hit the Canadian market to date, Health Canada's approval may mean that further changes are coming for the Canadian dairy sector.

This paper considers the potential emergence of cellular dairy in Canada through the lens of the just transition. The just transition framework was developed by labour movements to guide the shift toward low-carbon, sustainable futures, ensuring that the benefits and burdens of change are distributed fairly and that vulnerable groups are not left behind. Because the Canadian dairy sector reflects a historical pattern of ownership by wealthy, predominantly white producers, the potential disruptive nature of this technology could provide an opportunity for a just transition in the Canadian agri-food sector. We designed an interview study to answer the following questions: How do different interested groups in BC's dairy sector—and the FVRD in particular—perceive the challenges and opportunities for traditional dairy, pathways for cellular dairy, and their potential implications? Could cellular dairy be part of a just transition, and if so, what might it look like? Our discussion applies the "5R Framework" for reparative just transitions (Bowness et al., 2025). This framework critiques various approaches to just transition in settler colonial contexts, assessing the extent to which they: (1) recognize the historical and structural harms of colonial land development; (2) represent marginalized voices; (3) redistribute material benefits; (4) embrace relational settler responsibility, and (5) foreground Indigenous resurgence. Considering cellular dairy in the Fraser Valley through this lens raises questions about whether this technology is positioned to contribute to a just transition in British Columbia's Fraser Valley.

A just transition for livestock systems?

The just transition became a flashpoint in Canadian politics. In 2021, Natural Resources Canada released a "Discussion Paper" on just transition strategies as a platform for federal government public consultations to inform future policies and programs (Natural Resources Canada, 2021). But progress is slow. The Auditor General of Canada conducted an audit of the just transition process in 2022, finding that "Natural Resources Canada, working with Employment and Social Development Canada and partners on behalf of the federal government, was not prepared for a just transition to a low-carbon economy" (Office of the Auditor General of Canada Government of Canada, 2022). Then, Alberta Premier Danielle Smith denounced proposed federal Just Transition legislation as an "unconstitutional and existential threat" to Alberta's oil and gas economy in 2023 (Markusoff, 2023).

The just transition debate in Canada could be viewed as a microcosm for how it has played out on the global stage. Today, the just transition represents a substantial thread in global policy dialogues due to the

need to shift towards a low-carbon economy while balancing environmental imperatives with the protection of those likely to be negatively impacted by transition efforts. As articulated by the International Trade Union Confederation (2015), a just transition entails navigating the transition to a sustainable future in a way that maximizes the benefits of climate action while minimizing hardships for workers and their communities.

However, there is only nascent academic literature on just transition in food systems (Blattner, 2020; Dale, 2025; Ruder et al., 2022; Tribaldos & Kortetmäki, 2022; Verkuijl et al., 2023). Blattner (2020) contends that while coal and agriculture generate comparable levels of greenhouse gas emissions, only the former is subject to discontinuation measures. Despite contributing approximately 25 percent of global greenhouse gas emissions (IPCC, 2019), legislative and executive actions addressing emissions from agriculture remains disproportionately sparse compared to those addressing energy (Averchenkova, 2019 p. 22). This disparity highlights the urgent need to align agricultural policy frameworks with the principles of a *j*ust transition, taking into account the broader social and ecological context (Anderson, 2019; FAIRR, 2022; ProVeg International, 2022; Verkuijl et al., 2022, 2023).

Should cellular dairy become viable at scale, it could provide a critical test case for extending just transition principles beyond the energy sector into food systems. Although cellular agriculture has the potential to challenge the dairy industry's structural inequalities, many scholars argue that, in practice, it currently risks reinforcing existing power structures. Howard and others note the strong connections between cellular agriculture start-ups and major agribusinesses, suggesting that successful ventures may ultimately entrench the corporate food regime rather than reshape it (Howard, 2022; IPES-FOOD & Howard, 2022). Similarly, Broad and Chiles (2022) argue that cellular agriculture could replicate not only corporate structures but also broader inequitable social relations in the food system, underscoring the need to examine this emerging technology through the lenses of social equity and food justice.

Methods

We explore how key actors in the Fraser Valley Regional District (FVRD) and BC dairy industry view the future of traditional and cellular dairy. Between December 2021 and April 2022, we conducted 20 semi-structured virtual interviews with six farmers, five government officials/policymakers, four NGO representatives, four technology developers, two academic researchers, and two dairy processors. Some participants held more than one role, and one interview involved two participants at the same time. While all farmers were in the FVRD, a few other participants were from elsewhere in BC or Canada. We recruited participants by emailing local agri-food organizations to share our information with their members and colleagues. While Dairy Farmers of Canada and other Marketing Boards were unwilling to distribute the call, we received assistance from several other groups to include farmers and processors. We reached out to technology developers and government staff directly. We also used "snowball" sampling, where participants provided our information to others they

expected would be interested. All interviews were audio-recorded, transcribed using Otter.ai, and coded in NVivo. The interview guide is provided in Supplemental Information.

The results and discussion in the paper are the product of two complementary analytical approaches. First, we present the findings from inductive thematic analysis, summarizing participant views on the current state of the dairy industry, their perceptions of cellular dairy, and anticipations of possible transitions. To theorize how cellular dairy could be part of a just transition, we put the results in conversation with the 5R Framework for Reparative Just Transitions: Recognition, Representation, Redistribution, Settler-Responsibility, and Resurgence (Bowness et al., 2025). Reparative just transitions extend beyond mainstream labour-focussed and critical approaches by centering material and relational repair for harms caused by colonialism and capitalist expansion. Its focus on addressing food system inequities in settler-colonial contexts makes it particularly relevant for assessing transition pathways in the Fraser Valley.

Findings

We present the findings from the interviews in three parts: 1) a description of conventional dairy in the Fraser Valley; 2) the possibilities and perils of cellular dairy for this region and beyond; and 3) potential changes to the local dairy industry in response to cellular dairy.

Conventional dairy in the Fraser Valley

In the interviews, the defining characteristics of the conventional dairy sector were its political economic context and associated environmental issues.

Supply management and economic pressures

Across the country, the dairy sector is conditioned by shared political and economic factors. One distinguishing feature of Canadian dairy is its supply management system. Unlike traditional subsidy-based models, which can distort global markets and lead to overproduction, Canada's supply management system relies on a combination of tariffs, quotas, and marketing boards to match supply to anticipated demand. One farmer explained: "[supply management] takes out the competition between firms, which I fully support" (Participant 3, Farmer). Other farmers agreed, finding it was integral to preserving traditional, albeit less efficient, farming practices which could prioritize animal welfare and environmental stewardship over profitability. However, interviewees acknowledged negative aspects of the system as well. One government employee explained: "the price of milk is higher because of supply chain management [...] that's worse for poor Canadians and better for dairy farmers." (Participant 4, Gov). Participants suggested that supply management is related to the concentration of political power within the sector and results in high prices for consumers, but that the system is firmly entrenched.

Even so, neoliberalism may be eroding the strength of the supply management system. Whereas supply management involves regulating production, pricing, and imports to ensure stability and fair returns for domestic dairy producers, trade agreements affect this system by opening markets to foreign dairy products. For example, the Canada-United States-Mexico

Agreement (CUSMA), includes provisions that grant American dairy producers increased access to the Canadian market. Under CUSMA, Canada agreed to expand tariff-rate quotas for dairy products, allowing for greater imports of—often cheaper—American milk, cheese, and other dairy items. This increased competition can pose challenges for local dairy producers: "with each of these agreements, Canada has agreed to open up its market for a certain percentage of the domestic market [...] which does take away some of the potential [for farmers] to increase their herds and their revenue streams" (Participant 7, Gov). In response to trade-agreement-related losses, the Canadian government has agreed to compensate producers and processors, in supply-managed sectors, up to $4.8 billion CAD (Agriculture and Agri-Food Canada, 2022). Looking ahead, this pressure may intensify. CUSMA is scheduled for a joint review in July 2026, and supply management has been a point of contention in Canada US dairy relations, raising the prospect of renewed pressure for additional market access.

In addition to increased competition from outside producers, dairy farmers must also contend with the rising costs, labour shortages, an aging workforce, and declining demand amidst changing consumer expectations. One farmer expressed frustration about this topic:

> Society somehow thinks that cheap and plentiful food is an inherent right. Yeah, and somehow, we're [farmers] supposed to accommodate all that. You know, treat our animals ethically, take good care of the land, keep it green and beautiful, make it very appealing to everybody. But 'You want to actually earn some money? Hold on just a sec– we don't like that part.' (Participant 8, Farmer/Gov)

Dairy farmers as stewards of changing environments

Dairy farmers are dealing with increasingly challenging environmental conditions. Respondents, in 2022, reflected on the devastating impacts of extreme weather the year before:

> We had a 'heat dome' in the summer, and then we had a pretty prolonged kind of freezing 'winter freeze' that had some negative effects, and in between we had one of the worst floods in the history of modern farming in the area. (Participant 2, Farmer)

These extreme events left lasting impacts on the farmers and farmworkers, as well as the cows who survived. There are also concerns about the likelihood of more extreme weather events in the future. Even in the face of natural disasters, such as the intense flooding in 2021, one participant recounted how Fraser Valley farmers risked their own safety for their animals: "As we saw in the floods, [farmers] are obviously caring for their animals, and even swimming through toxic waters to save their animals. [...] I spend more time with these animals than I do my friends" (Participant 3, Farmer). Dairy farmers view themselves as stewards or caretakers of the land and animals. As another farmer noted with pride, "despite these challenges, it's something I wouldn't change for anything [...] my passion is the animals" (Participant 8, Farmer/Gov).

However, participants recognized that not all farmers have this type of relationship with their animals: "there's a lot of things that we, as an industry, could certainly improve on and should not ignore" (Participant 8, Farmer/Gov). Animal rights activists call attention to the harmful living conditions of dairy cows, such as forced separation from their calves, although the dairy representatives feel that some of the critiques are unwarranted:

> The industry has been under attack from so many angles. One that they've become so sensitive to is the unfair attacks by animal activists, I call them extremists. [...For the extremists], it's about eliminating animal agriculture. (Participant 7, Gov)

The dairy sector also faces critique for its ecological "hoofprint" (Weis, 2013). Conventional dairy is resource-intensive and releases large amounts of greenhouse gases (especially methane) into the atmosphere, as well as other pollutants into the surrounding ecosystems. An NGO organizer noted:

> Cows are a very large source of methane in Canada, and dairy is a big part of that. [...] But then there's land and water use, water contamination, topsoil erosion, you name it. [...] It doesn't make a lot of ecological sense. (Participant 9, NGO)

These pressing ecological challenges raise the question of whether cellular dairy could help reduce land and resource pressures by shifting production away from conventional livestock.

Possibilities and perils of cellular dairy

The interviews elicited a wide range of responses to the potential of cellular dairy in the Fraser Valley, with all participants simultaneously holding both positive and negative views of the technology. Interestingly, despite the controversial nature of the technology, interviewees often focused more on the potential benefits and opportunities than the risks and concerns. Farmers were the least optimistic about the potential benefits of cellular dairy but remained open-minded.

Opportunities: Climate and animal welfare

Advocates of cellular dairy promote the technology's potential to mitigate environmental challenges associated with conventional dairy production. An academic pointed to how cellular dairy "could be a more efficient process to produce milk, so you reduce the number of cows and the greenhouse gas emissions they produce, also perhaps the amount of land" (Participant 16, Academic). By cultivating dairy proteins in controlled environments, cellular dairy production can theoretically reduce land and water requirements, minimize methane emissions from livestock, and alleviate pressure on ecosystems threatened by agricultural expansion.

Others, including a technology developer, pointed out that localizing food production, by building cellular agriculture facilities near dense population centres, could reduce carbon emissions associated with the transportation of dairy products: "If we were to have a technology that could be located in every city or big cities, then we can have easier access to milk without having to ship it and having a bigger environmental footprint" (Participant 14, Developer).

The interviewees also thought cellular agriculture could have significant implications for animal welfare. At its core, this technology is positioned to produce meat and animal products directly from cells, without the need slaughter animals. This applies to the dairy cows themselves, and their calves, as described by one NGO representative:

> The day-to-day for a dairy cow is a life of boredom and frustration and pain. [...]. But there's also what happens to the calves that are born in the industry. To produce milk, you need calves being born. And that in turn translates into other industries like the veal industry [...]. This [cellular dairy] is a solution that poses a historic opportunity to bring that suffering to an end. (Participant 9, NGO)

Decreasing animal suffering is a motivation for some cellular agriculture developers, including one that we interviewed:

> We are able to make the same milk without the animal, so the animal is not necessary in this process. So, we want to remove the focus from the animals and stop breeding them for a food purpose. For me, it's all about animal welfare. (Participant 14, Developer)

One participant acknowledged the "animal welfare concerns—overbred cows, hyper-productive milking machines, calf-cow separation issues" and commented that farmers often take issue with this characterization of their farmers:

> You see it more and more in the media, that farmers give kind of a counter push against that, instead of exploiting their animals, they're saying, 'No, we do take good care of them. And they can roam freely, and they can be milked whenever they want.' (Participant 16, Academic)

Overall, farmers did not view cellular agriculture as a solution to animal welfare concerns in the sector, reinforcing their perceptions as stewards who take good care of their cows, although many participants agreed that cellular dairy could offer benefits for the environment and animal welfare.

Concerns: Farmer livelihoods, competition, and accessibility

Nearly all participants held a shared understanding that the cellular agriculture transition could be highly disruptive. Both government representatives and cellular agriculture developers were specifically concerned about the farmers: "I don't want them [farmers] to lose their livelihoods. I think there should be systems put in place to transition farmers from dairy farming to a kind of technology like this" (Participant 14, Developer). Beyond dairy farmers, one developer noted that technological development more broadly presents labour concerns across many sectors.

Another common concern can be distilled to a philosophical debate over what counts as "agriculture" or "dairy." Several interviewees questioned the use of the term "milk" to describe cellular dairy, which echoes questions about whether plant-based milk alternatives should be called "milk." Whether cellular dairy is deemed "agriculture" or "dairy" by regulators has specific implications for farmer incomes and where production can take place. This farmer went on to question where cellular agriculture production could be based given the agricultural land zoning in BC: "Does that [cellular agriculture] belong in ag[riculturally zoned] land? I don't believe it does" (Participant 8, Farmer/Gov). The supply management system and dairy quotas present additional political and economic complications if cellular dairy is produced and sold in Canada. If cellular dairy can be called "milk," farmers were also concerned that it could detract from the value they create in building a reputation for producing quality dairy products.

Many interviewees had concerns about the political economy of cellular agriculture. One developer noted that tech start-ups are the driving force of the industry, which influences who benefits most from the development and commercialization of cellular agriculture: "I worry about the wrong people getting the money" (Participant 19, Developer). An NGO representative cautioned that there are risks to food system resilience:

> We have an industry that, by definition, has to be centralized because of the massive investment that's required to scale. And with that, you're going to see the big protein companies around the world owning the technologies, setting up a centralized distribution model, which we know having come through the pandemic, does not really support food security in a way that we want it to. (Participant 9, NGO)

Another NGO representative also noted that the highly privatized nature of technology development firms can limit who will be able to access the technology:

> One of my biggest concerns is the accessibility of this technology. And I think in general in so far, we're seeing that a lot of investment is really private, and a lot of that knowledge is not being shared. (Participant 20, NGO)

A third NGO representative drew attention to the potential equity concerns related to the cost of cellular dairy products: "I would never want people to think that, if they can't [afford] this cellular agriculture product, then they shouldn't consume milk or dairy products at all; so food affordability would be a big concern in understanding how the average Canadian can access this product" (Participant 10, NGO).

Potential dairy transitions

> The transition won't happen in one week. It will happen over time. And, for us, it's important to support everyone [including farmers]. (Participant 14, Developer)

> ...if we were to only look at the benefits of cell ag, we would be remiss, and we wouldn't be doing our jobs well. [...] We have to do it in collaboration with food producers right now. (Participant 9, NGO)
> ...if you don't want to be forced into a new occupation, chances are you do what everybody does in a transition: You, you pivot and you, you make it work with what you're interested in. (Participant 3, Farmer)

In the context of the BC dairy sector's status quo and the anticipated challenges and opportunities for cellular dairy, we explore three potential transition scenarios.

Cellular dairy fizzles out

Participants did not think uptake of cellular dairy in BC was inevitable. Regulation, industry opposition, consumer acceptance, economic stability, and technological development are the matters of most concern.

Cellular dairy is still pre-commercial, which means there are several substantial hurdles it must overcome if it is going to assume some of the existing dairy market share. One developer pointed to subsidies and government support for conventional dairy as an obstacle for cellular dairy:

> Bovine dairy is a highly subsidized commodity. And in order for cellular agriculture to even approach price parity with milk, that's from a technical standpoint, I can tell you as a biologist that's going to be a very, very tall ask. (Participant 19, Developer)

Another issue relates to regulatory frameworks and uncertainty associated with new technologies and products entering the market: "The regulatory path is not clear, and there are a number of [...] adjacent regulatory issues that need to come up, like how do you regulate a kind of facility that doesn't exist yet in this country?" (Participant 9, NGO).

While there are already some precision fermentation products on the market in Canada, none of these products claim to be "dairy," while cellular dairy may make claims to this term. In the US, Perfect Day refers to its products as "animal-free dairy," which may cause substantial challenges in the context of supply management's impact on Canadian products.

Some participants expected insufficient consumer acceptance to squash cellular dairy transitions. While existing data on peoples' willingness to consume suggests there are reasons to believe that cellular dairy will be accepted by consumers if it reaches price and quality parity, there is the possibility that consumers may succumb to the "ick factor," or fears about the novelty of cellular agriculture products: "I think that's one of the biggest challenges, is a new phobia, the fear

of the foods, and 'robot' or 'alien foods'" (Participant 14, Developer). While the "ick factor" remains a prevalent concept in cultured meat discourse, its actual influence on consumer acceptance remains contested. Based on interviews with 19 taste testing event attendees, Gerber et al. (2025) suggest that allowing consumers to cook cultured products themselves may increase acceptance (p. 5), potentially attenuating the perceived impact of the ick factor. Hamlin et al. (2022) similarly argue that a food neophobia scale, which measures an individual's aversion to unfamiliar or novel foods, fails to capture the attitudes and emotions that shape responses to novel foods, proposing instead that attention to specific cultural values may better indicate alignment between such products and consumer identities (p. 3). Debate around the role of this "ick factor" is therefore likely to remain largely speculative until cellular dairy products are introduced to the market at greater scale.

Cellular dairy fully displaces conventional dairy

While perceived as an unlikely outcome, a few participants considered the possibility that cellular dairy could fully replace conventional systems. Developers, as well as government and NGO representatives, acknowledged the potential disruptions the cellular dairy may cause, drawing parallels to past instances of technological upheaval in other industries. An NGO representative notes:

> It might be something similar to [...] Uber, when they came in. Because they also are kind of in a quota system where they have to buy these licenses and they spend a lot of money, and then if the competition comes in that disrupts the market, then their investment is worth nothing. (Participant 6, NGO)

Similarly, the realization of cellular agriculture's potential could impose significant challenges for the dairy industry, prompting concerns about the livelihoods and historical investments of those involved. One government official acknowledged the complexities of managing such transitions:

> I think one is sympathetic to supporting farmers and supporting families through transitions. We don't always do that, though. [...] If you think of how Uber upended the medallion system for taxi drivers, we didn't support that supply-managed system through any kind of transition. (Participant 4, Gov)

Participants recognized that this transition would result in stranded assets, or infrastructure from the conventional dairy system that would no longer be usable in a new cellular dairy economy:

> Over time, you won't have to have all of that infrastructure around cows. So, all of the things that include feeding, the slaughterhouses, the farms, the dairy farmers, all of that has to be taken care of through the production of milk. [...] You diminish the number of people interacting in this process. (Participant 14, Developer)

Supply management is set up to account for fluctuations in consumer demand or external influences on supply, as with trade agreements—when demand drops, prices rise and farmers are compensated. A managed decline in demand, caused by a corresponding increase in demand for cellular dairy, could be balanced through the quota system. Another option would be to "buy out" some of the dairy farms:

> The average farm owns maybe 2.6 or 2.7 million dollars in quota. [...]. So, they'll either issue new quota and they'll actually sell to some people in the industry already or they'll buy some people out. [...] When you make milk, the money you get from processors by law will cover all your costs, whether you dump your milk or not, you're guaranteed to

> make money at the end of the year. (Participant 1, Academic)

Another NGO organizer noted that this transition would likely need to follow a slow process of phasing in new products and phasing out existing farming operations, which would need to consider the impact on the animals in the current dairy system. They compared the transition to the slow entry and growing presence of dairy alternatives on the market:

> I guess best case scenario would be to have it slowly phased in as a separate alternative to start with. So, have it come in kind of like almond milk or oat milk. [...] You're not going to get rid of conventional milk entirely, there's always going to be some market that wants that [...] giving dairy farmers the opportunity [...] to become involved in [cellular dairy] production so that they're able to maintain an income (Participant 5, NGO)

Cellular and conventional as complementary protein systems

Most participants believed that a most likely scenario is that the diffusion of cellular diary in Canada results in two separate and potentially complementary systems. A dairy processor stated, "it's not about substituting one for the other, it's about finding place for both, eventually," while maintaining that the change will "come at a cost" (Participant 18, Dairy processor). Another dairy processor felt that there would always be a market for the "feel-good" aspects of traditional dairy:

> As an organic public-facing farmer, it's a little bit easier because we have that connection with our consumers already [...]. I don't think that would change with the addition of cellular agriculture on the market. (Participant 12, Dairy processor)

Some participants suggested that the coexistence of cellular and conventional dairy could enhance the sector's resilience and sustainability. Given the increasing preoccupation with health risks in the food system, one developer noted that bringing bioreactor facilities onto farms could ostensibly make dairy less vulnerable to contamination: "bioreactor facilities are sterile in nature so the contamination risk is reduced" (Participant 17, Developer). Another possible benefit from the coexistence scenario could be to aid in the succession of dairy operations, attracting younger and new farmers, based on the assumption that they are more "interested in technology" (Participant 15, NGO).

However, the transition to cellular dairy is not possible without appropriate policy and supports for farmer experimentation and training. For example, an NGO representative explained:

> We cannot have a focus solely on the technology itself because it doesn't matter if we are able to develop and scale it up if we don't have the policies in place, or we don't have a process for implementing the technology. (Participant 20, NGO)

Another NGO participant suggested rethinking agricultural subsidies and allocations of "climate money" to incentivize adoption of cellular diary and "make that transition possible" (Participant 9, NGO). They also suggest that policy support for farmers should include "retraining initiatives" and the potential to license cellular dairy technologies (Participant 9, NGO). A developer similarly suggested "licensing these [cellular agriculture] technologies to dairy farmers so that they can continue to milk, just without cows anymore" (Participant 14, Developer).

Technology developers also noted that more needs to be done to ensure that farmers are involved in discussions about the direction of the technology. In addition to developers offering farmers "training [for] a

very different skillset," developers can learn from farmers:

> There's a lot of opportunity for harnessing the relevant subject matter knowledge from those communities and bringing it into these applications. And I would love to see more companies in our area doing more to work with the agricultural sector to figure out how to make this transition. (Participant 19, Developer)

One farmer thought that collaboration between conventional and cellular dairy could have benefits:

> I like this idea of trying to include the farmer as part of a solution. Again, I'm not sure how you go about that, [... as] there's a whole quandary of challenges, like land use policy and government, to get the farmer on board. (Participant 2, Farmer)

Nonetheless, most interviewees expected farmers to be resistant to participating in cellular dairy production. For example, a farmer expressed that adopting cellular dairy would be a step away from what they see as "farming" or "being a farmer" and their passion:

> Being in a production facility isn't really the passion of a lot of farmers. [They like] being outside [with] their animals and being in barns and feeding animals. And I don't know, if that's the transition that needs to happen [cellular agriculture], based on the survival of this planet, then yeah, I could see myself doing that. But I wouldn't be the first one to do it. (Participant 3, Farmer)

An NGO participant expressed a similar evaluation: "the majority of dairy farmers have been dairy farmers for their entire lives; they're not about to train to be a lawyer at this stage in their careers" (Participant 10, NGO). Collaboration between conventional and cellular dairy may require that farmers be willing to shift their production systems to adopt cellular technology.

Discussion

> I think with justice, it's also often about, like, trade-offs. Can you have it all? Can you have all kinds of injustices addressed? Will there never be somebody losing out? (Participant 16, Academic)

The interviews illuminate how participants in the Fraser Valley dairy sector understand both the pressures they face and the possibility of technological change. Farmers, processors, government staff, and NGOs described a sector shaped by rising costs, labour shortages, climate disruptions, and shifting consumer expectations. Many emphasized the stabilizing role of supply management and the importance of protecting existing livelihoods as conditions become more volatile. Across groups, participants positioned themselves as stewards of land and animals and expressed pride in their care practices, even as they recognized uneven standards across the industry. Views on cellular dairy were mixed but generally cautious. Participants saw potential for environmental and welfare benefits but also raised concerns about regulatory ambiguity, market acceptance, loss of farmer income, and the capacity of small producers to adapt to disruptive technologies.

These perspectives reflect the vantage points of those working within formal dairy institutions. When asked about cellular dairy, participants drew on their own experiences of environmental challenges, sectoral policy, and day-to-day farm realities. Their visions of transition tended to centre stability, incremental adaptation, and maintaining the viability of existing family farms. Even those who were open to cellular

dairy framed transition primarily in terms of managing risks to producers and ensuring that new technologies do not undermine sector cohesion. Taken together, these findings show that current transition imaginaries in the Fraser Valley are shaped by a desire to preserve core features of the existing system while responding to mounting pressures from climate change, markets, and public scrutiny.

What is notably absent from these narratives are perspectives from those who relate to the dairy system in fundamentally different ways. The interview sample did not include Indigenous peoples whose territories structure the geography of dairy production, nor farmworkers whose labour sustains the industry. Participants themselves largely did not raise these perspectives when discussing future transitions. This absence is analytically important not because participants failed to mention them, but because it reflects the limited set of actors who are conventionally recognized as stakeholders in agricultural change. Transition is thus imagined through the lens of those who hold land, quota, and institutional authority, rather than those whose relationships to land and labour fall outside the boundaries of formal sector governance. These omissions matter because they shape what kinds of transition are thinkable. Without Indigenous or worker perspectives, participants tended to define justice primarily through economic protection for current producers, rather than through broader questions of land access, ecological restoration, or labour conditions. The history of the drained Semá:th Lake or the reliance on precarious migrant labour did not surface in interviews, not because they are irrelevant, but because they sit outside the experiences and responsibilities of those positioned to speak. Recognizing these gaps helps clarify why a narrow, producer-centred understanding of "just transition" may be insufficient for addressing the deeper land and labour relations that structure the Fraser Valley dairy system.

The 5R framework for reparative just transitions (Bowness et al., 2025) offers a way to interpret these findings and understand what is needed for more expansive transition imaginaries to emerge. **Recognition** requires situating present-day vulnerabilities within the longer histories of land transformation that shape the region, yet interview participants understood flooding and climate risks as immediate environmental problems rather than as outcomes of the draining of Semá:th Lake or other colonial interventions that produced the agricultural landscape on which they depend. **Representation** concerns who is positioned to participate in shaping transition pathways, and the interviews reflected only those actors already recognized within formal dairy governance: farmers, processors, government, technology developers, and NGOs. Missing were Indigenous nations whose territories underlie the dairy economy and farmworkers whose labour sustains it, highlighting how existing governance structures narrow whose interests and relationships to land and labour enter discussions about future change. **Redistribution** raises questions about how benefits and burdens are allocated, yet interviewees focussed primarily on safeguarding the economic stability of current producers and did not consider redistribution of land, authority, or technological benefits to groups historically excluded from the sector. **Responsibility** was expressed in terms of environmental stewardship and animal care, but not in relation to repairing deeper harms connected to land dispossession, hydrological engineering, or precarious labour conditions, which suggests that accountability is currently understood within farm-level rather than structural terms. Finally, **resurgence** invites attention to Indigenous-led visions for ecological restoration and governance. As described

in the introduction to this paper, Sumas First Nation is working to restore ecological health and strengthen cultural authority in regional flood-management planning, yet these forms of leadership did not appear in participants' accounts of the future of dairy or cellular agriculture. Together, these patterns show that while participants identified real pressures and uncertainties facing the dairy sector, their visions of a just transition remain oriented toward protecting the existing system rather than addressing the broader land and labour relations that shape agricultural futures in the Fraser Valley.

Although participants diverged in their hopes for the future of dairy, their visions were all framed within the dominant land and consumption relations that structure food production in the Fraser Valley. Some imagined improving the current system, others replacing parts of it with new technologies, but none articulated changes that would fundamentally alter how land is governed, how labour is valued, or how consumption shapes agricultural priorities. A reparative just transition, by contrast, asks how these deeper relations might be reconfigured.

Conclusions, limitations, and future directions

This study examined how stakeholders in British Columbia's dairy sector understand cellular dairy and whether they see it as part of a just transition. The findings show that while participants recognize profound environmental, economic, and technological pressures facing the Fraser Valley, their visions for change remain shaped by existing relationships to land, production, and consumption. Even when participants imagined significant technological shifts, most framed transitions in ways that protected the priorities of established actors or responded primarily to concerns within the formal dairy system. Applying the 5R Framework for Reparative Just Transitions helped clarify how these narratives attend to immediate risks yet leave unaddressed the deeper land and labour relations that shape the region's food system.

This analysis is necessarily limited by the absence of perspectives from those most affected by these deeper relations, including Indigenous nations whose territories structure dairy production and the farmworkers whose labour sustains it. Their exclusion reflects both recruitment challenges and the early stage of cellular dairy development, but it also underscores structural dynamics that determine who is positioned to comment on agricultural futures. Future research must be grounded in collaboration with these groups, not only to understand their views on emerging biotechnologies, but to identify what forms of transition would genuinely support their wellbeing, authority, and ecological relationships.

Looking ahead, research on cellular agriculture should attend to more than technological feasibility or market acceptance. Neglecting social input in technological development risks deepening the disconnect between innovation and those most directly affected by it (Rao et al., 2023). Scholarship and policy work should therefore consider how governance, investment, and regulatory decisions can distribute risks and benefits more equitably; how transition planning might respect Indigenous sovereignty and strengthen ecological restoration; and how improved labour protections and worker representation could shape

emerging production systems. Integrating these perspectives would help ensure that cellular dairy, if it develops further in Canada, does not simply reproduce the inequities of the current food system.

While the future of cellular dairy remains uncertain, a reparative lens highlights that questions of justice cannot be resolved by technology alone. They depend on how transitions are imagined, who participates in shaping them, and what responsibilities are acknowledged. If attention is paid to these relational and historical dimensions, debates about cellular dairy can be situated within a broader conversation about what forms of transition are needed to address longstanding inequities in the region's food system.

Acknowledgements: We would like to thank the participants in this research who generously shared their time and insights for this study. This research was conducted on the traditional territory of the Stó:lō, and we support their efforts towards cultural resurgence and stewardship of these lands and waters. We also thank the two anonymous reviewers for their constructive and helpful feedback. This work was supported by funding from the Future Skills Centre (PI: Dr. Robert Newell), as well as the Social Sciences and Humanities Research Council of Canada and the Canada Research Chairs Program.

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Vol. 13 No. 1, pp. 150–168 April 2026

Canadian Food Studies La Revue canadienne des études sur l'alimentation

Research Article

Restaurant food waste reduction using nudge techniques at the customer level: An interventional study

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Abstract

Food waste is a critical global problem linked to food insecurity, environmental degradation, and economic losses. Food waste occurs across the supply chain, with a considerable portion generated at the consumer level, including restaurants. Food waste not only compromises global food security but also exacerbates environmental challenges such as greenhouse gas emissions, soil degradation, and water waste. Human behaviour significantly influences food waste, making it a crucial element in tackling this issue. This study explores the impact of behavioural nudges on reducing food waste at the customer level in a local restaurant in the downtown area of a Canadian city. Over four weeks, three nudges were implemented in the form of tent cards on tables and stickers on menus to assess their effectiveness in reducing food waste. In the baseline week (no nudges), the average leftover weight was 37.2 grams per order. The first nudge reduced this to 19.7 grams (a 47 percent reduction from the baseline). The second and third nudges resulted in an average leftover weight of 29.1 grams (a 21.8 percent reduction from the baseline). Additionally, the takeout box usage per 100 orders was 14.4, 11.4, and 3.4 boxes during nudges one, two, and three respectively. These findings demonstrate the potential of low-cost, customer-focussed behavioural nudges to reduce food waste in restaurant settings. By reducing the amount of edible food discarded at the consumption level, these

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DOI: 10.15353/cfs-rcea.v13i1.759
ISSN: 2292-3071

interventions can support broader food security goals while also contributing to environmental sustainability. Further research is recommended to examine the long-term impacts and scalability of these interventions across different food service contexts.

Keywords: Customer behaviour; food security; food waste; nudges; restaurant

Résumé

Le gaspillage alimentaire est un grave problème mondial qui va de pair avec l'insécurité alimentaire, la dégradation de l'environnement et des pertes économiques. Il survient tout au long de la chaîne d'approvisionnement, dont une portion considérable à l'étape de la consommation, ce qui comprend les restaurants. Non seulement le gaspillage alimentaire compromet la sécurité alimentaire mondiale, mais il amplifie aussi les problèmes environnementaux, tels que les émissions de gaz à effet de serre, la dégradation des sols et le gaspillage d'eau. Les comportements humains comptent pour une grande part dans les facteurs du gaspillage alimentaire, il s'agit ainsi d'un élément crucial à aborder pour faire face au problème. Cette recherche s'intéresse aux effets de certains incitatifs sur les comportements liés à la réduction du gaspillage alimentaire chez la clientèle d'un restaurant du centre-ville d'une ville canadienne. Pendant quatre semaines, trois mesures ont été mises en place sous la forme de fiches sur les tables et de collants sur les menus pour vérifier leur efficacité dans la réduction du gaspillage alimentaire. Durant la semaine de référence (sans incitatifs), le poids moyen des restes était de 37,2 grammes par commande. Le premier incitatif a permis de faire diminuer ce chiffre à 19,7 grammes (une réduction de 47 % par rapport à la valeur de référence). Avec les deuxième et troisième incitatifs, les restes représentaient 29,1 grammes (une réduction de 21,8 % par rapport à la référence). De plus, le taux de boîtes pour emporter utilisées a été de 14,4, 11,4 et 3,4 boîtes par 100 commandes pour les incitatifs un, deux et trois respectivement. Ces résultats démontrent le potentiel de mesures incitatives peu coûteuses tournées vers les comportements de la clientèle pour diminuer le gaspillage alimentaire dans le milieu de la restauration. De telles interventions, qui réduisent la quantité d'aliments comestibles jetés au niveau des consommateurs, peuvent contribuer aux objectifs plus larges de sécurité alimentaire, mais aussi de durabilité de l'environnement. Il est recommandé de mener d'autres recherches pour approfondir les effets à long terme et l'applicabilité de ces interventions dans divers contextes de services alimentaires.

Introduction

In 2022, an estimated 1.05 billion tonnes of food were wasted globally, which accounts for around 19 percent of all food available to consumers across retail, food service, and households, despite ongoing efforts to halve food waste by 2030 (UNEP, 2024). Food waste is linked to food security, as the resources used in producing wasted food could otherwise contribute to meeting the needs of the 830 million people worldwide who are undernourished (FAO, 2022). However, it is important to note that reducing food waste alone will not automatically resolve food insecurity, which is influenced by complex social and economic factors, such as income, access to food, and living wages. In Canada, food waste remains a significant concern, as nearly 46 percent of all food produced in Canada is wasted annually, with 41 percent of this waste deemed avoidable, valued at approximately $60 billion (Second Harvest, 2024). This avoidable food waste generates around 26 million metric tonnes of CO_2 emissions each year, equivalent to the carbon footprint of 253,000 flights between Toronto and Vancouver (4,400 km) (Second Harvest, 2024). Reducing food waste is essential for supporting both food security and environmental sustainability. In 2022, food loss and waste were responsible for roughly eight to ten percent of global greenhouse gas emissions, consumed significant freshwater resources, and occupied a substantial share of agricultural land, illustrating how minimizing waste can reduce environmental pressures while improving the efficiency of food systems (UNEP, 2024).

It is worth noting that more than 7 billion Canadian dollars worth of food is wasted annually in hotels, restaurants, and institutional settings like school cafeterias, accounting for approximately 13 percent of Canada's total food loss and waste (Second Harvest, 2020). Reducing food waste in restaurants can lower operational costs and enhance sustainability credentials (Principato et al., 2021). Some establishments in Europe address food waste by adopting innovative practices, such as offering customizable portion sizes (Kallbekken & Sælen, 2013).

Customer behaviour in restaurants significantly influences the generation of food waste (Coşkun & Yetkin Özbük, 2020; Li et al., 2024; Teng et al., 2022). Factors such as portion sizes, customer preferences, and cultural norms contribute to excessive leftovers (Kallbekken & Sælen, 2013). Buffet-style dining often contributes significantly to food waste, primarily because oversized portions and the abundance of options encourage diners to overfill their plates and take more than they can eat (Aloysius et al., 2023; Kallbekken & Sælen, 2013; Riis, 2014). Restaurants, as intermediaries between food production and consumption, are uniquely positioned to address this issue.

Behavioural economics is a discipline that combines psychology and economics to explore how cognitive biases, emotions, and social influences shape decision-making (Camerer & Loewenstein, 2004). Behavioural economics recognizes that individuals often make irrational choices due to limited information and cognitive biases (Ariely, 2008; Kahneman, 2011). This framework helps explain decision-making processes and create interventions to encourage better choices without restricting options. A key concept in this field is the "nudge": a subtle measure designed to influence behaviour by leveraging cognitive biases while maintaining individual autonomy (Thaler & Sunstein, 2008). Examples include simplifying decision-making processes and using social norms to promote desired behaviours.

Nudge theory has been successfully applied in various areas to encourage behavioural changes. For example,

default settings, such as opt-out organ donation systems, have significantly increased participation rates, as individuals tend to stick with the pre-set options rather than actively opting out of the service (Johnson & Goldstein, 2004). Similarly, positive social norm messaging, such as community recycling habits, effectively encourages sustainable practices (Schultz et al., 2007). While nudges have been widely used in policy and public health (Johnson & Goldstein, 2004; Schultz et al., 2007), their application in food waste reduction remains an evolving area. Restaurants, cafeterias, and institutional food services contribute substantially to food waste (Second Harvest, 2020), yet behavioural interventions in these settings requires more research. Behavioural interventions, such as portion size adjustments, reminder prompts, and visual cues, can help to reduce food waste in restaurant settings (Freedman & Brochado, 2010; Kallbekken & Sælen, 2013; Wansink & Van Ittersum, 2013). These strategies could be further adapted to other food service environments, including cafeterias, corporate dining halls, and institutional food services. For instance, universities and hospitals could implement menu redesigns that highlight low-waste options or use real-time feedback on plate waste to encourage mindful consumption. Similarly, buffet-style settings might benefit from serving smaller portions with the option for additional helpings, reducing unnecessary waste while preserving consumer choice (Kallbekken & Sælen, 2013; Kasavan et al., 2022).

In addressing food waste, nudging provides creative and practical solutions to promote sustainable consumption. Several studies have focussed specifically on restaurants and demonstrated the potential of nudges to reduce food waste. For instance, visual reminders targeted guests in hotel buffets to measure how simple interventions can influence food-related behaviours in hospitality environments in Norway. The results revealed that reducing the plate size lowered food waste by 20 percent. Adding signs that informed guests they could return for additional servings further reduced waste by 21 percent (Kallbekken & Sælen, 2013). Similarly, offering smaller plates or portion sizes in controlled experiments in the United States has proven effective in curbing over-serving and waste (Van Ittersum & Wansink, 2012). Pre-commitment strategies, where customers pledge to minimize waste, have also demonstrated significant reductions in plate waste (Thaler & Sunstein, 2008).

The impact of digital and physical nudges in restaurant environments was explored in a study of 628 diners in a Malaysian dining experiment. Positive reinforcement messages, such as "*Finish your food today, become a ZERO waste warrior*," were particularly effective in reducing food waste compared to negative reinforcement messages (Ong et al., 2023). In another study in the Netherlands, Victor tested digital green nudges through mobile applications with a sample size of 346 participants recruited via social media and university networks. While over 90 percent of participants expressed interest in reducing food waste, the study found that many users struggled with maintaining consistent engagement with the app over time. As a result, the study reported minimal measurable reductions in food waste, highlighting the challenges of translating interest into sustained behaviour changes through digital interventions (Victor, 2023).

Another study examined the use of social norms and default nudges in Italian restaurants, examining about 24,000 diners across 14 establishments. The findings showed that takeout box usage significantly increased when subtle prompts were introduced (Giaccherini et al., 2021). In a Swiss pizzeria, informational and normative prompts were compared to encourage diners to take leftovers home. The six-week study involved 54 diners and demonstrated that combining these prompts

increased the percentage of diners requesting takeout containers by at least 30 percent (Stöckli et al., 2018).

The reviewed studies reveal the potential of nudging strategies to mitigate food waste in restaurant settings. Visual and informational nudges, plate size adjustments, and digital tools (mobile applications) can all contribute to significant reductions in waste. While nudges have been widely studied as a strategy for food waste reduction, several key gaps remain. For instance, many existing studies focus on controlled or laboratory-based experiments, which may not fully capture the complexities of food waste behaviours in commercial food service environments (Liu et al., 2022; Van Ittersum & Wansink, 2012). Most food waste management studies in food service have used single interventions, such as plate size adjustments or static informational prompts (Jagau & Vyrastekova, 2017; Kallbekken & Sælen, 2013; Qi et al., 2022). Few studies have integrated multiple nudges within a single study to compare and assess their relative impact in restaurant settings (Stöckli et al., 2018). Additionally, the distinction between avoidable and unavoidable food waste is often overlooked, which is essential for more accurate waste reduction strategies. Lastly, few studies have incorporated non-participatory observation to capture human interactions and assess how consumers respond to nudges in practice.

In the province of Newfoundland and Labrador (NL), food insecurity is a major concern, affecting approximately 23 percent of households, one of the highest rates in Canada (Tarasuk et al., 2023). The province's reliance on food imports exacerbates this issue, with over 90 percent of its food sourced from outside the province. This dependency increases food costs, reduces access to fresh produce, and heightens vulnerability to supply chain disruptions (Food First NL, 2015). As of October 1, 2024, the population of NL stood at 550,000, representing approximately 1.33 percent of Canada's total population of 40 million (Department of Finance, 2025). This study therefore examines the impacts of three behavioural nudges on customer food waste in a restaurant with the underlying assumption that reductions in edible food waste, even at a small scale, contribute to broader food system efficiency and food security.

Materials and methods

This study was carried out over four weeks in a local restaurant bar in St. John's. The study was conducted from September 23 to October 26, 2024, excluding a week that contained a holiday to reduce the impact of the holiday on the study. The first week served as a baseline, during which customer behaviour and food waste measurements were recorded without any interventions. During the subsequent three weeks, one distinct behavioural nudge was implemented per week. Each nudge was introduced independently and replaced the previous nudge, rather than being added cumulatively. The nudges consisted of environmental messages delivered through tent cards placed on tables and stickers positioned on the back of menu cards, with the content of the message changing each week. All other study conditions remained consistent across weeks. These messages were designed to encourage waste reduction behaviours. The study took place from Monday to Saturday each week, with observation periods occurring during peak hours, from 12:00–2:00 p.m. and 6:00–8:00 p.m., resulting in a total of 96 hours of non-participatory observation. Measurements

included the daily weighing of leftovers (in grams) including avoidable and unavoidable and the number of takeout boxes requested by customers.

Implementation of nudges

To encourage food waste reduction, three environmental nudges were developed and implemented in the form of tent cards placed on tables (Figure 1) and stickers (Figure 2) attached to the back of menu cards. These nudges were set up by the researcher every Monday morning before the restaurant opened (Figure 3). Successful implementation of the intervention required a one-hour training session for restaurant staff on separating food waste from non-food items and assisting with repeated measurements of leftovers. Staff cooperation and positive attitudes were crucial for ensuring accurate and reliable data collection. The bar owner's support facilitated the smooth integration of the nudges into regular restaurant operations. Staff ensured that tent cards were prominently displayed on every table and that menus with stickers were provided to customers as they placed their orders, maintaining consistent exposure to the nudges throughout the week. These procedures helped to standardize data collection while minimizing disruption to routine services. The nudges aimed to subtly influence customer behaviour, without direct interaction or interference. This study was conducted in accordance with institutional guidelines for research involving human participants. As the observations were non-participatory, anonymous, and did not collect identifiable personal data, the research was deemed exempt from formal ethics approval by the institutional ethics committee of Memorial University.

Figure 1: Tent cards used as nudges to promote food waste reduction

Figure 2: Stickers used on the menu cards

Figure 3: Nudge signage setting in the restaurant

The text of the nudges was made based on the principles of behavioural economics, particularly nudge theory, which suggests that subtle prompts in the environment can influence decision-making without restricting choice. The wording was designed to be simple, positive, and action oriented. The three nudges, shown in Figure 1 (left to right), were designed with varying lengths and focus areas:

1. *Nudge one:* This nudge featured a short message encouraging customers to enjoy their food ("*Savour Every Bite*") while emphasizing the importance of reducing food waste in the second week of the study. Its goal was to create an emotional connection with the act of eating.
2. *Nudge two:* This nudge specifically focussed on encouraging customers to take their leftovers home by requesting a takeout box ("*Love Your Leftovers: Take Them Home for Round Two*") in the third week.
3. *Nudge three:* In the final week, this nudge combined an informational prompt with an encouragement to ask for a takeout box. It included a statistic about avoidable food waste in Canada ("32percent of all food produced is avoidable waste, enough to feed every Canadian for three and a half months") to raise awareness and motivate action.

Each day during the study period, the restaurant staff and the researcher checked to ensure that the tent cards were present on all tables and replaced any missing or damaged cards as necessary. These nudges were visible to customers throughout the day, and their placement was designed to unobtrusively influence behaviour while customers dined. The implementation of nudges was a critical part of assessing the impact of behavioural interventions on food waste reduction.

Equipment and calibration

A digital hanging scale was used for measurements in this study (Figure 4). The scale used for measuring food waste had a minimum detectable weight of 20 grams and was calibrated using a kitchen scale with an accuracy of 1 gram. This calibration ensured precision in quantifying leftover waste.

Waste collection procedure

Restaurant staff were trained to scrape leftover food from their plates into a designated bin for measurement. Non-food items, such as napkins and condiment packaging, were separated from the leftover food before placing them in the bin by staff to maintain data accuracy. Plates and cutlery were reusable, ensuring that no additional disposable materials were included in the bins. After the food was collected, the researcher did a secondary inspection of the bin to ensure that only food waste was included. All leftover measurements were taken nightly after all customers had finished dining (Figure 5). To ensure reliability, each measurement was repeated three times, and the average of the three weights was used as the final leftover weight. Additionally, the weight of the garbage bags was deducted from all measurements. The average weight of the garbage bags was calculated from three samples (43 grams) and was used as a reference. Furthermore, the number of daily orders and the types of food ordered by customers were provided by the restaurant owners. These data were extracted from the restaurant's digital ordering system, which recorded every ordered item and made the data available at the end of Week Four.

Figure 4: Digital scale

Figure 5: Food waste measurement

Calculation of avoidable waste

The primary focus of this study was that of avoidable waste. Food waste is categorized into two types:

1. **Avoidable waste**: Food that could have been consumed but was discarded, such as uneaten portions of meals or unused ingredients.
2. **Unavoidable waste**: Inedible parts of food that cannot be consumed, such as bones, peels, or other non-consumable components.

Chicken wings, one of the most frequently ordered items in the restaurant, produced bones as a significant component of the leftovers. These bones were categorized as unavoidable waste and excluded from avoidable waste measurements. Each plate of chicken wings consisted of eight pieces, with the bones weighing approximately 80 grams per plate. To calculate avoidable waste, the weight of chicken bones was deducted from the total leftover weight using the following formula:

Avoidable Waste
= Total Weight of Leftover
− (Weight of Chicken Bones
× Number of Chicken Wing Orders)

Non-participatory observation procedure

Non-participatory observations were conducted to qualitatively assess customer behaviours related to food waste and dish-specific waste patterns. The observations were carried out over a total of 96 hours, during peak dining periods from 12:00–2:00 p.m. and 6:00–8:00 p.m., Monday to Saturday, throughout the study period. The selection of these time frames was based on the highest customer volume to ensure a representative understanding of food consumption and waste behaviours in the restaurant setting. Observations were conducted by a single trained researcher using a standardized observation protocol, an approach commonly applied in qualitative observational studies when consistency and systematic procedures are ensured (Angrosino, 2007; Patton, 2015).

To minimize observer influence and maintain the authenticity of customer behaviour, observations were conducted without customers being informed that they

were being observed. Furthermore, there was no direct interaction between the researcher and customers at any stage of the study. This approach ensured that the presence of the researcher did not alter customer decision-making, particularly in relation to food consumption and takeout box requests. Observations were conducted from a distance, with data recorded in real time.

Detailed field notes were taken that focussed on key behavioural patterns, including the types of dishes that consistently resulted in leftovers, the frequency and context in which customers requested takeout boxes, and observable patterns in waste generation related to group size, meal type, or dining habits.

Data analysis

To evaluate the effectiveness of behavioural nudges in reducing food waste, a combination of descriptive analysis and statistical testing was employed. Descriptive statistics were used to compare the weekly average leftover weight and takeout box requests across the intervention period. Changes in average food waste were assessed by examining trends across the baseline and intervention weeks.

For the daily leftover weight data, an independent t-test was conducted to compare the mean food waste between the baseline and each intervention week. This statistical test was used to determine whether the differences observed in food waste were statistically significant. Additionally, confidence intervals were calculated to assess the variability in food waste reduction. In cases where chicken wings were ordered, the total weight of leftovers was adjusted by deducting the estimated weight of bones to accurately quantify avoidable food waste. All weight measurements were repeated three times, and the average value was used for analysis.

Results

The results of this study are divided into two primary components: measurement analysis and non-participatory observations. The measurement analysis examines the quantitative impacts of nudges on food waste, while the non-participatory observations provide qualitative insights into customer behaviours and dish-specific waste patterns.

Measurement analysis

The findings of this study demonstrate the impact of behavioural nudges on reducing restaurant food waste, with each intervention week compared to the baseline data from Week one. The weekly average leftover weight significantly decreased following the implementation of the first nudge (Table 1). During the baseline week, the average leftover weight per order was 37.2 grams. Takeout box usage was recorded at 7.8 boxes per 100 orders. In Week two, following the introduction of the first nudge, the average leftover weight per order decreased to 19.7 grams, representing a 47percent reduction compared to the baseline. Takeout box usage significantly increased to 14.4 boxes per 100 orders. The second nudge, implemented in Week three, resulted in an average leftover weight of 29.1 grams per order, a 21.8percent reduction from the baseline; however, takeout box usage declined to 11.4 boxes per 100 orders. By Week four, the third nudge maintained the average leftover weight at 29.1 grams per order, consistent with the second nudge and a 21.8percent

reduction from the baseline. Takeout box usage dropped to 3.4 boxes per 100 orders. The results of the independent t-tests demonstrate that the behavioural nudges implemented during the study did not lead to statistically significant reductions in daily leftover weights compared to the baseline period. While the mean weights during Nudge one and Nudge two were lower than the baseline, the differences failed to reach significance due to high variability and overlapping confidence intervals (**$p > 0.05$**). The observed increase in leftover weight during Nudge three also lacked statistical significance. The results of the t-test are summarized in Table 2.

These findings demonstrate the challenges of achieving consistent and statistically significant reductions in food waste using behavioural nudges in a short-term period. Despite the lack of statistical significance, the observed trends in mean reductions during Nudges one and two suggest the potential for further exploration with larger sample sizes and reduced variability.

Non-participatory observations

Non-participatory observations revealed detailed insights into food waste patterns associated with specific dishes and customer behaviours (Table 3). Among soups, turkey soup was particularly popular on rainy days and rarely resulted in leftovers. French onion soup, however, had minor leftovers due to cheese sticking to the bowl. Soups were sometimes accompanied by grilled cheese sandwiches or side salads, which were mostly consumed.

Salads generally produced minimal waste, with garden salads occasionally leaving small amounts of bacon bits, lettuce, and dressing uneaten. The portion size of garden salads was observed to be large but manageable, whereas side salads, such as Caesar and blackberry feta, were served in smaller bowls and were typically finished.

Among sandwiches, the hot turkey sandwich was the most ordered and often resulted in leftovers such as bread crusts. Customers frequently requested takeout boxes for this dish. Other sandwiches, including the clubhouse and pesto chicken, produced less waste. Pizza, particularly veggie pizza, was popular as a lunch option and occasionally had leftovers in the form of uneaten crusts or slices. Customers often requested boxes for leftover pizza.

Nachos were one of the most frequently ordered dishes but often resulted in significant waste, including leftover cheese, condiments, and nacho chips. This pattern was observed even when the dish was shared. Similarly, NL poutine and butter chicken poutine frequently produced leftovers, with approximately one-quarter to one-third of the dish left uneaten. These items were rarely taken home in boxes, as customers reported feeling full due to the large portions and the heavy use of gravy.

Pub grub items like chicken wings created the most waste due to bones and unused condiments. Dishes such as mozzarella sticks and quesadillas typically had minimal leftovers. Other notable observations included private events where dips, such as buffalo chicken and spinach dip, were left largely untouched in some instances.

The results show that the first nudge resulted in the most noticeable reductions in both leftover weight and avoidable waste, with diminishing effects observed in subsequent weeks. While the second and third nudges still showed reductions in leftover weight compared to the baseline, their impact on avoidable waste was less pronounced, particularly in the final week. In addition, takeout box usage trends suggest initial customer interest in preserving leftovers, which diminished as the intervention progressed. However, the day-by-day

statistical analysis revealed no significant differences, which reflects variability in daily outcomes. Non-participatory observations provided valuable qualitative insights that identified high-waste dishes such as nachos, poutines, and chicken wings, and specific customer behaviours, such as requesting boxes for sandwiches and pizza. These findings show that while behavioural nudges have potential, targeted interventions tailored to high-waste dishes may be necessary to achieve consistent and sustainable reductions in food waste.

Table 1: Weekly food waste reduction metrics and takeout box usage during nudge interventions

	Week 1	Week 2	Week 3	Week 4
Orders	127	146	114	176
Total waste (grams)	5682	4002	4122	6802
Total avoidable waste (grams)	4722	2882	3322	5122
Total avoidable waste (grams per item)	37.2	19.7 (47%)*	29.1 (21.8%)	29.1 (21.8%)
Boxes	7.8 /100	14.4/100	11.4/100	3.4/100

* The percentages shown in parentheses represent the reduction in avoidable waste compared to the baseline week (Week 1).

Table 2: T-test results comparing baseline and nudge groups for daily leftover weight

Group	Mean (M)	SD	n	t	df	P value	CI (95%)	
Baseline	787	314.643	6	1.742	10	0.678	-85.58	698.915
Nudge 1	480.33	294.867	6	1.742	9.958		-85.81	699.138
Baseline	787	314.643	6	0.867	10	0.072	-366.7	833.324
Nudge2	553.67	579.713	6	0.867	7.711		-391.7	858.372
Baseline	787	314.643	6	-0.33	10	0.741	-517.2	383.861
Nudge 3	853.67	382.501	6	-0.33	9.641		-519.5	386.142

Table 3: Menu items and observed waste patterns

Category	Menu item	Observed waste patterns
Soups	Turkey soup	Popular on rainy days, with minimal waste.
	French onion soup	Leftovers often consist of cheese sticking to the bowl.
	Soup of the week	Waste depends on the soup type but is generally minimal.
Salads	Garden salad	Small leftover bits of bacon, lettuce, and dressing are common. The portion size is large but manageable for most customers.
	Caesar salad	Minimal waste; leftover dressing is most common.
	Blackberry and feta	Typically, fully consumed, with little to no waste.
Sandwiches	Hot turkey sandwich	Often served with gravy; leftovers sometimes include bread crusts. Customers frequently request takeout boxes.
	Clubhouse sandwich	Generally consumed with minimal waste.
	Beef melt with au jus	Often fully consumed, with occasional leftovers from side dishes.
	Pesto chicken sandwich	Minimal waste observed.
	Veggie and spinach dip	Generally well-received, with little waste.
	Chicken caesar wrap	Occasionally has small leftovers but is usually fully consumed.
	Turkey bacon ranch wrap	Produces minimal waste.
Pizza	Veggie pizza	Commonly ordered at lunch. Sometimes crusts are left uneaten (~30% of the time). Customers often request boxes for unfinished slices.
	Pepperoni pizza	Similar waste patterns to veggie pizza, with crusts and occasional slices left.
	Meat Lovers pizza	Often finished, but leftovers can include crusts or slices.
	Spinach Dip pizza	Occasionally has leftover crusts or portions of toppings.
	Pizza of the week	Waste patterns depend on the pizza type, but crusts and slices are the most common leftovers.
	Garlic fingers (cheese and bacon)	Frequently ordered, with occasional leftover slices or crusts.
Nachos	Veggie nachos	Popular but often results in significant leftovers, including cheese, condiments, and chips, even when shared.
	Chicken/beef nachos	Similar to veggie nachos, with leftovers including cheese, chips, and condiments.
	Braised beef nachos	Often produces waste in the form of toppings and chips.
Pub Grub	Mozzarella sticks	Generally, fully consumed with minimal waste.
	Quesadillas (veggie/chicken/beef)	Minimal waste observed.
	Chicken wings	Creates the most waste due to bones and leftover condiments.
	Popper burger	Small burger with sides like fries or salad; waste is typically limited to leftover fries.
	Buffalo chicken tacos	Minimal waste observed, except for some leftover veggies such as bell peppers.
	Cajun chicken pasta	Sometimes has leftovers, mostly sauce. Takeout boxes are rarely requested.
	Mac and cheese	Occasionally has leftovers, primarily cheese or sauce. The portion size is manageable.
	NL poutine	Creates significant waste, with about one-third to one-fourth of the fries often left uneaten. Customers rarely request boxes.
	Butter chicken poutine	Similar to NL Poutine, with significant leftovers, including fries and gravy.

Buffalo chicken dip	Leftovers are common, especially during private events. For example, in Week 2, two bowls were nearly untouched.
Spinach dip	Similar to buffalo chicken dip, with occasional leftovers observed, particularly during private events.

Discussion

This study aimed to evaluate the effectiveness of behavioural nudges in reducing food waste in a restaurant setting. Over a four-week period, three different nudges were implemented, and changes in leftover food weight and takeout box requests were assessed. The results indicated that while all nudges contributed to a reduction in food waste compared to the baseline, the most substantial decrease was observed during Nudge one; however, the effects diminished in the following weeks. Although the overall trend suggested a decline in food waste, day-to-day comparisons were not statistically significant. Results from the current study align closely with prior research and reinforce the efficacy of behavioural economics in addressing food waste challenges. The results of this study indicate that well-designed nudges can significantly reduce food waste in restaurant settings. Similar to findings by Kallbekken et al., who demonstrated a 20percent reduction in food waste through plate size manipulation and visual prompts, our interventions effectively influenced customer behaviour (Kallbekken & Sælen, 2013). However, the significant reduction during the first nudge followed by diminishing returns in later weeks indicate the need for novelty and diversity in the intervention design (Giaccherini et al., 2021).

Danyi Qi et al. show that nudges, such as plate size changes and informational prompts about food waste and nutrition, influence food intake but achieve limited success in reducing waste (Qi et al., 2022). Their study, conducted in a controlled cafeteria setting with 488 participants, involved varying plate sizes, material types (plastic versus compostable), and informational treatments to examine their effects on food selection, consumption, and waste. While smaller plate sizes encouraged reduced portion sizes, and informational prompts increased awareness about food waste, the interventions did not consistently translate into measurable reductions in avoidable waste. These results show the need to tailor nudges to specific contexts for greater effectiveness.

Additionally, Henrik Luis Jagau et al. (2017) examined the impact of informational posters on food waste reduction in a university cafeteria. Over 14 days, approximately 2,500 meals were served, and two types of posters were displayed. The first poster encouraged customers to consider their appetite by asking reflective questions and offering portion-sizing tips. The second used a sad face alongside information about the environmental harm caused by food waste. Although the posters successfully doubled the proportion of customers requesting smaller portions (from 2.5percent to 5percent), they did not result in a significant reduction in the overall amount of food wasted. These results suggest that while static informational methods like posters can influence intentions (e.g., requesting smaller portions), they may be insufficient on their own to produce measurable changes in actual food waste behaviour (Jagau & Vyrastekova, 2017). Nina Langen et al. highlight how labelling and descriptive food names encourage sustainable food choices. Counter-

position nudges successfully increased the selection of sustainable dishes, which aligns with our observation that strategic messaging effectively guides customer behaviour (Langen et al., 2022).
Furthermore, the inclusion of messages promoting takeout containers aligns with Stöckli et al., who found that combining informational and normative prompts increased the percentage of diners requesting takeout containers (Stöckli et al., 2018). Our study's peak in takeout box usage during the first intervention week reinforces the utility of such prompts, though the later decline suggests the necessity of sustaining engagement through incentives or additional reminders.

Study strengths

Our study builds on previous research by incorporating additional elements. Specifically, this is one of the few studies in the food service sector to test multiple nudges within a single study to assess their effectiveness in reducing food waste. For a policy-level change, it is essential to determine which types of messages are most effective in influencing human behaviour. Moreover, while similar research has been conducted in various countries with diverse cultural and socioeconomic backgrounds, it is crucial to understand what strategies are most effective within the Canadian context. To address this, our study included a range of message types, from simple encouragement (e.g., prompting individuals to enjoy their meal and be mindful of waste) to a behavioural direction (e.g., suggesting that customers request a takeout box) and informational messages highlighting the environmental impact of food waste.

By training restaurant staff to separate food waste from non-food items and conducting secondary inspections as well as repeated weight measurements of food waste, our research ensured that data collection was accurate and reliable. Additionally, the exclusion of unavoidable waste, such as chicken bones, allowed for a more accurate assessment of avoidable food waste. The small restaurant setting facilitated precise measurements and strict control over study conditions. The successful implementation also relied on staff training, their receptivity and attitudes, and the support of the bar owner, highlighting the importance of engagement and cooperation for accurate data collection. Moreover, the intervention was highly cost-effective and required minimal resources, which makes it scalable for various food service settings.

In addition, our study is unique in that it included direct non-participatory observation of customer food waste behaviour during the intervention. Through this observation, we captured human responses to the nudges. This approach allowed us to observe verbal and non-verbal cues, such as the way participants discussed food waste, their willingness to adopt suggested behaviours (e.g., requesting a takeout box), and any resistance or skepticism toward the messages. Furthermore, our study distinguished between avoidable and unavoidable food waste, an aspect that is not included in many previous studies. Understanding this difference is essential for developing food waste reduction strategies that focus on minimizing avoidable waste while acknowledging the limitations of unavoidable waste. Another key distinction of this research is the detailed identification of the types of food that contribute most significantly to waste. This information provides practical, affordable, and effective strategies that restaurant managers can use to optimize portion sizes, refine menu designs, and reduce food waste.

Study limitations

Despite promising findings, this study had several limitations. The interventions, especially during Week

two, might have overlapped in ways that influenced customer behaviour in Weeks three and four, making it difficult to evaluate the effectiveness of each nudge individually. This overlap was likely because regular customers, who frequented the restaurant weekly, may have seen the signage multiple times, complicating the process of isolating the effects of each week's intervention. The limited number of orders and customers possibly could cause fluctuations in results. The lack of direct interaction with participants restricted the understanding of their motivations and perceptions. Interviews with customers could reveal how these messages impacted their feelings towards food waste and decision-making and whether they are likely to maintain these sustainable behaviours. The study also faced variability in waste measurements due to the inclusion of different menu items. Measuring the total waste instead of individual plate waste could reduce the level of accuracy. Additionally, the research's scope was constrained by a lack of ethnic diversity, as it was conducted in a local restaurant with limited cuisine types and ethnic groups, which affects its generalizability. While the intervention required minimal financial resources, successful implementation depended on the investment of time, training, and cooperation from the restaurant staff and owner, which may represent a challenge for scaling or replicating this design in other settings.

Finally, while our study focussed on reducing food waste, it is possible that behavioural nudges could influence portion consumption in ways not intended. For example, nudges that encourage finishing meals might prompt some customers to eat more than they would have otherwise. Although we did not observe or measure this effect directly, future research could examine potential trade-offs between reducing plate waste and promoting healthy eating behaviours to ensure interventions support both sustainability and public health goals.

Implications for future research

Addressing these limitations in future research could enhance our comprehension of effective strategies for reducing food waste. Longitudinal studies with larger, more diverse samples could provide deeper knowledge. Incorporating digital tools, as suggested by Victor (Victor, 2023), may improve customer engagement, resulting in lasting behavioural changes. Investigating cultural and demographic differences in receptivity to nudges might reveal tailored approaches suited to varied contexts. Additionally, future studies could explore the role of social norms and peer influence, such as highlighting behaviours of higher-achieving peers or using social comparison strategies, which have been shown to affect food waste behaviours in other contexts (Al Mamun et al., 2024; Venit, 2017). Although this study was conducted in a single, small-scale restaurant, the findings suggest broader implications for food waste reduction efforts in the food service sector. If the most effective nudge identified in this study were implemented consistently over an extended period (e.g., 52 weeks) and adopted across multiple restaurants, the cumulative reduction in edible food waste could be substantial. At the individual level, reduced plate waste may contribute to improved food utilization, as customers consume a greater proportion of the meals they order. Over time, this behavioural shift could also support household food budgets by decreasing the need for additional food purchases, thereby offering an indirect pathway through which food waste reduction interventions may contribute to food security. While these impacts are hypothetical and require further empirical investigation, they underscore the potential

scalability and system-level relevance of low-cost behavioural nudges in restaurant settings.

Conclusion

This study makes a meaningful contribution to the research on food waste reduction. The results demonstrate that while all nudges led to a reduction in food waste compared to the baseline, the day-to-day comparisons were not statistically significant. The first nudge resulted in the most noticeable decline in leftover weight, but the effect diminished in the later weeks. While behavioural nudges offer restaurants a practical and cost-efficient tool for tackling food waste, further research is essential to overcome the current limitations and maximize the impact of these interventions.

Acknowledgements: This research was supported by funding from the Natural Sciences and Engineering Research Council of Canada (NSERC) with the project number 528169.

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Vol. 13 No. 1, pp. 169–192 April 2026

Canadian Food Studies La Revue canadienne des études sur l'alimentation

Research Article

Plural pathways to food systems change: A comparative analysis of Alberta's Alternative Food Networks

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Abstract

This research contributes to ongoing, multi-faceted, and much-needed discussions about food systems change amidst rising rates of food insecurity in Canada (and globally). It does so by providing a comparative content analysis of 141 alternative food networks (AFNs) in Alberta. AFN is an umbrella term for food systems that differ from conventional food distributions like grocery stores and emerge in response to the many problems associated with industrialized food systems (Allaire, 2025; Misleh, 2022; Tregear, 2011). AFNs can include but are not limited to farmers' markets, community gardens, seed libraries, community supported agriculture (CSAs), food forests, and co-ops. AFNs were selected because they continue to persist alongside globalized food systems and aim to operationalize key principles of food sovereignty. AFNs are tangible expressions of food sovereignty movements, even if they are partial and incomplete. There are extensive debates in the literature about the degree to which AFNs can instil food systems change. This research contributes to those debates by examining specific programming and initiatives of Alberta AFNs and analysing the degree to which they provide narrow versus more holistic food systems change. Following Misleh (2022), we argue that AFNs are not a single social phenomenon and should be analyzed in terms of "hybridity, complexity, and diversity" (p. 1029). Moving beyond binary understandings of AFNs as "alternative" or "not" (i.e., the dominant framing in food studies literature), our analysis offers a "more open-ended, nuanced and plural understanding of AFNs and their transformational potential" (Misleh, 2022, p. 1041) by offering comparative content analysis of specific programming taking place.

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DOI: 10.15353/cfs-rcea.v13i1.723
ISSN: 2292-3071

Keywords: Alternative food networks; community-based food systems; food movements; food security; healthy populations

Résumé

Cette recherche s'inscrit dans les indispensables discussions multidimensionnelles en cours concernant la transformation des systèmes alimentaires, en pleine hausse de l'insécurité alimentaire au Canada (et dans le monde). Il s'agit ici d'offrir une analyse comparative de contenu de 141 réseaux alimentaires alternatifs (RAA) en Alberta. RAA est un terme parapluie pour désigner les systèmes alimentaires qui diffèrent des réseaux de distribution conventionnels des aliments, comme les supermarchés, et qui voient le jour en réponse aux nombreux problèmes liés aux systèmes alimentaires industriels (Allaire, 2025 ; Misleh, 2022 ; Tregear, 2011). Les RAA peuvent inclure, entre autres, les marchés fermiers, les jardins communautaires, les banques de semences, l'agriculture soutenue par la communauté (ASC), les forêts nourricières, les coopératives. Les RAA examinés ont été sélectionnés parce qu'ils continuent à exister aux côtés des systèmes alimentaires mondialisés et visent à mettre en pratique des principes clés de la souveraineté alimentaire. Les RAA sont l'expression concrète des mouvements pour la souveraineté alimentaire, même s'ils sont partiels et incomplets. La littérature comprend de vastes débats sur le degré auquel les RAA peuvent instiller du changement dans les systèmes alimentaires. Cette recherche contribue à ces débats en examinant certains programmes et projets des RAA d'Alberta, et en analysant dans quelle mesure ils entraînent des transformations – qu'elles soient restreintes ou holistiques – dans les systèmes alimentaires. En nous appuyant sur Misleh (2022), nous soutenons que les RAA ne sont pas un simple phénomène social et devraient être analysés sous les angles de l'« hybridité, de la complexité et de la diversité » (p. 1029). Allant au-delà de la compréhension binaire des RAA comme étant « vraiment alternatifs ou pas » (ce qui constitue le cadre dominant dans la littérature des études sur l'alimentation), notre analyse propose une « compréhension plus ouverte, nuancée et plurielle des RAA et de leur potentiel transformateur » (Misleh, 2022, p. 1041) grâce à un examen comparatif du contenu des programmes qui sont mis en œuvre.

Introduction

The many and deepening pitfalls of neoliberal, globalized food systems are not new to critical food studies scholars. In the last two decades alone, there has been an increase in supply chain disruptions, a loss of biodiversity from mono cropping practices, and an increase in global food insecurity, despite an increase in global food production (Clapp, 2024; Lawrence & Grice, 2013; United Nations Environment Programme, 2021). From the burning of fossil fuels needed to transport food thousands of kilometres daily, to the centralization of corporate control, ownership, and profit, to the loss of traditional food systems and knowledge, and the cumulative effects these have on human, plant, and animal life and wellbeing, the shortcomings of industrialized food systems are all too abundant (Lappé, 2017; Leahy, 2017; Parizeau & von Massow, 2021; Wiebe, 2021). For those of us paying attention, "it has become increasingly apparent that the current Global food order has led us into a rather perilous place" (Sage et al., 2023, p. 1). This perilousness is not only getting worse but also becoming more apparent in the Global North, even as the Global South has borne the brunt of the downfall of the industrialized food system for far longer and to far deeper effects (Crush & Si, 2021).

As one way to counter some of the detrimental effects of the global industrial food system, critical food studies scholars have long been interested in alternative food networks (AFNs), alternatively referred to as community-based food systems, alternative agrifood movements, shortened food chains, community food, local food movements and grassroots food movements, for their capacities to re-localize food systems, address food injustice, build food sovereignty, and increase food security (Constance et al., 2014; Edwards, 2016; Goodman et al., 2012; Knezevic et al., 2017). While AFNs have long persisted alongside and at the fringes of industrialized food systems, their promises and gains are also not without limitations. There have been warranted criticisms that AFNs focus too much on individual—as opposed to systemic—change (Allen & Guthman, 2006; Guthman, 2008; Levkoe & Wilson, 2019), and that many AFNs fail to affect those most impacted by food injustice and food insecurity (Edwards, 2016; Guthman, 2008; Maye, 2013). The following research adds to growing Canadian scholarship on alternative food networks, community-based food systems, and grassroots food movements by offering a content analysis of 141 AFNs in Alberta. The most recent western- or Alberta-specific data on AFNs were from 2012 (Beckie et al., 2012). This research aims to analyze specific programs and initiatives taking place, while also investigating similarities and differences between what these programs offer. While AFNs are largely limited in their ability to provide large-scale, systemic changes to our current industrialized food systems, they persist within academic and community contexts as ways to partially re-balance our food systems and chip away at the larger systems and structures of power and inequality, particularly as they build local food systems, create community connections, and shorten supply chains.

Our research into Alberta AFNs began with two relatively simple questions: how many and what types of AFNs existed in Alberta? These questions arose in the context of both rising and unprecedented levels of food insecurity in Canada and in Alberta. In 2023, an average of 22.9 percent of people in the ten provinces lived in a food-insecure household, up roughly ten percent from 2020 (PROOF, 2024). A recent study conducted by the University of Toronto's PROOF research program found that Alberta had the highest rate of food insecurity among all provinces in 2021, at 20.3 percent

(Tarasuk et al., 2022). Additionally, Alberta had the highest prevalence of severe food insecurity in that same year at 6.3 percent (Tarasuk et al., 2022). Since then, Alberta's rate of food insecurity has risen to 27.4 percent, coming fourth behind Nova Scotia (28.8 percent), Prince Edward Island (28.6 percent), and Saskatchewan (28 percent), not including Canada's north (PROOF, 2024). Household food insecurity has reached record highs in every province. While Alberta is currently the fourth most food-insecure province, it has maintained the highest rate of severe food insecurity among the inland and prairie provinces.

Food insecurity in Canada affects Indigenous families, racialized communities, and immigrant families in greater numbers than their non-Indigenous, white, and non-immigrant counterparts (Uppal, 2023). Other marginalized groups disproportionately affected by food insecurity include those on social assistance, newcomers, children, disabled populations, seniors, and those who are single (Food Banks Canada, n.d.). Food bank use in Canada is also rising to previously unseen levels, with a 32 percent increase from 2022 (Food Banks Canada, n.d.). With another year of rising food insecurity, the percentage of people affected is at a new record high, and these rates have been exacerbated by rising retail food inflation. According to Food Banks Canada (n.d.), food bank visits have nearly doubled over the past five years and have hit record-breaking rates. Their Hunger Report states that, in March 2024, there were over two million visits to food banks across the country, the highest recorded number in history (Food Banks Canada, n.d.).

With dual concerns of rising rates of food insecurity combined with the mounting issues of industrialized food systems, this research was borne out of a hopeful curiosity that there are better alternatives to the "business as usual" of our current food system. We sought to map the types and numbers of AFNs that existed in Alberta, what programming features they shared, and what gaps in offerings were missing. Existing literature on AFNs has documented their widespread benefits, including offering access to healthier food, mitigating food insecurity, re-localising food systems, connecting consumers and producers, developing food skills and knowledge, protecting local ecosystems, and, when working with marginalized populations, contributing to social justice and equity movements (Constance et al., 2014; Goodman et al., 2012; Tregear, 2011). Guided by our initial questions, we undertook a comparative content analysis of AFNs in the five major cities in Alberta—Fort McMurray, Edmonton, Red Deer, Calgary, and Lethbridge. We also paired this research with a publicly available podcast on AFNs in Alberta, *The Ground Up?* (Rossiter & Overend, 2024-Present), to raise awareness, bolster conversation, and support local food networks. The research component we present below maps AFNs in Alberta to help inform food policy, serve as a comparator for cross-Canadian AFNs, and analyze narrow versus holistic AFN offerings. Following Misleh (2022), we argue that AFNs are not a single social phenomenon and should be analyzed in terms of "hybridity, complexity, and diversity" (p. 1029). Moving beyond binary understandings of AFNs as "alternative" or "not" (i.e., the dominant framing in food studies literature), our analysis offers a "more open-ended, nuanced and plural understanding of AFNs and their transformational potential" (Misleh, 2022, p. 1041) by offering comparative content analysis of specific programming taking place.

Alternative food networks (AFNs)

AFNs, which operationalize the principles of food sovereignty, persist as a critical area of study in the context of addressing the environmental, economic, and social impacts of industrialized food systems (Edwards, 2016; Rivera, Diaz de Léon & del Rosario Pérez-Salazar, 2024; Wittman, 2023). AFNs include local food movements, community gardens, food co-operatives, urban food forests, community-supported agriculture (CSAs), and farmers' markets (as well as other related initiatives) and seek to reconnect producers and consumers through practices that emphasise sustainability, social justice, and localism (Maye, 2013; Rivera et al., 2024). As environmental and social challenges associated with conventional agriculture continue to grow, understanding the potential of AFNs to foster sustainable food systems has become increasingly important. Existing literature on AFNs covers alternative systems of food production, food policy, and consumption that aim to create more sustainable, ethical, and community-oriented food systems. AFNs typically prioritise local, sustainable food production and distribution and continue to persist as viable responses to the challenges posed by industrial agriculture and globalized food systems (Constance et al., 2014; Levkoe, 2022; Sage et al., 2023).

While informal, local food systems have always existed, the formal emergence of AFNs in North America can be traced back to the counter-culture movements of the 1960s and 1970s, where scholars, activists, and local communities collectively sought solutions outside the dangers of the industrial food system (Edwards, 2016). This led to an influx of CSAs and farmers' markets through the 1980s and 1990s, enabling consumers to purchase farm-fresh food directly from producers, cutting out profit-driven supermarkets, and shortening the distance between farm and table. Building on the counter-cultural food movements of the last two decades, notably in the face of increased food insecurity and widespread environmental devastation caused by the globalisation of food systems, the 2000s and 2010s experienced an increase in food sovereignty and food sustainability initiatives and policies (Misleh, 2022). Recently, in 2019, Canada developed its first ever food policy advisory council, guiding the nation-wide adoption and implementation of key principles of food sovereignty (Food Secure Canada, 2025). AFNs also experienced a resurgence through the COVID-19 pandemic and widespread food inflation that followed, once again highlighting the risks and vulnerabilities associated with global food supply chains and leading to increased interest in local food systems (Clapp & Moseley, 2020; James et al., 2021).

AFNs are often characterized by several key attributes: locality, trust, transparency, and direct producer-consumer relationships. These networks distinguish themselves from conventional food systems through shorter supply chains, lower environmental impacts, and a focus on ethical consumption (Edwards, 2016; Rivera et al., 2024). Values and practices that underpin AFNs include food sovereignty, which emphasizes local control over food systems; agroecology, which looks to balance the science, practice, and social movement of sustainable farming; and civic agriculture, which supports community-centred food production. Various studies (e.g., Desmarais, 2022; Goodman et al., 2011; Levkoe, 2022) have pointed out that AFNs often challenge the traditional economic model by prioritizing social values over profit. In doing so, they also aim to challenge neoliberalized power structures and work towards decolonizing efforts (Guinto et al., 2024). Scholars

further argue that these networks aim to enhance consumer awareness of food origins and production processes, fostering more informed and sustainable food consumption habits. Consumer motivations for engaging in AFNs typically include concerns about health, environment, and social justice (Classens, 2014; McInnes & Mount, 2017; Zutter & Stoltz, 2023). AFNs often provide fresher, higher-quality food, often produced with fewer chemicals and lower environmental impacts than conventional food products, depending on specific farming practices used (Enthoven & Van den Broeck, 2021; McCurdy, 2022).

Environmental and social considerations also drive AFN participation and popularity. Environmental sustainability is a central goal of many AFNs, with research suggesting that they can significantly reduce carbon emissions associated with food production and transportation, often contributing to lower greenhouse gas emissions (Leahy, 2017; Wittman, 2023). Similarly, organic practices commonly associated with AFNs minimise the use of synthetic fertilisers and pesticides, promoting biodiversity and healthier soils (Kristiansen & Merfield, 2006; Leahy, 2017). Socially, AFNs can foster community resilience and cohesion by connecting producers and consumers through shared goals and values. Studies on CSA reveal that these networks can empower consumers by giving them a role in the food system, fostering a sense of responsibility toward food sustainability (Galt et al., 2012; Jarosz, 2008).

Critiques and limitations

AFNs are not without limitations. Economic barriers limit participation, as locally produced foods are often more expensive than conventional options. As DuPuis and Goodman (2005) point out, AFNs privilege who can participate in "alternative" and "local" food movements. Many conventional AFNs such as farmers' markets struggle to compete with the price and convenience of globalized food systems, often excluding lower-income consumers from participation (Jarosz, 2008). As Fourat et al. (2020) and Reynolds and Cohen (2016) argue, many AFNs perpetuate inequalities by catering primarily to affluent, urban consumers who can afford premium prices for organic and/or local products. In addition to cost barriers, logistical challenges such as seasonality and limited supply can hinder the scalability of many AFNs. Without a broader and/or more intentional focus on scaling up and out, as well as economic and time accessibility, many AFNs fail to significantly impact the larger food system. As Pratley and Dodson (2014) note, AFNs are largely marginal, having positive impacts on a small group of people with limited capacity to expand their base. While AFNs may be effective at local or regional levels, it remains uncertain whether AFNs can meet the demands of a growing global population. Scholars argue that, while practices such as food co-ops, CSAs, and food forests promote sustainable practices, they may not have the structural capacity to replace conventional food systems entirely, leading some to view them as complementary rather than alternative (Tregear, 2011).

In her decades of important work on food systems change, Julie Guthman (2008, 2011, 2014, 2019, & 2024) raises critical cautions against romanticizing local and alternative food systems. First and foremost, she highlights the ways in which AFNs overwhelmingly individualize food systems change, placing the responsibility on individual consumers rather than on systemic and structural policy changes (Allen & Guthman, 2006; Guthman, 2008). Guided by rhetorics of consumer choice, localism, entrepreneurialism, and self-improvement, AFNs can reproduce and perpetuate dominant neoliberal and capitalist values rather than working against them (Guthman, 2008, 2014). While well-intentioned, without engaging systemic or

structural changes, many AFNs exclude the most marginalized. The elitism of many AFNs is evident in "the unbearable whiteness" of alternative food practices (Guthman, 2011, p. 263). Beyond the heightened, problematic focus on selective, elite individualism, she further points out that many other politics of alternative food systems are not alternative. In her book *Agrarian Dreams: The Paradox of Organic Farming in California* (Guthman, 2014), she critiques the idea that organic farming automatically offers a radical alternative to industrial agriculture by showing how the organic sector in California is shaped by existing agrarian relations, including poor pay and working conditions for migrant labourers. In her recent work, Guthman (2019 & 2024) critiques the dominance of techno-optimism in food and agriculture—namely the belief that new technologies or alternative proteins will fix the food system.

In a recent study of food movements in Canada, Wilson and Levkoe (2022) interviewed twenty-six long-standing food movement actors across Canada. From these in-depth interviews, they documented the following two prominent tensions: 1) balancing breadth and depth and 2) nurturing consensus alongside difference in food movement in Canada. A few of their respondents questioned whether an increase in awareness of alternative food systems leads to an increase in impact. The second prominent tension highlights the struggles of nurturing consensus and shared values of food movements alongside valuing differences in scope and approaches. Given that food movements span a range of social, community, economic, policy, and political practices, some of their respondents argued for the strength of these multifaceted approaches. Some of their respondents also lamented a lack of shared goals and visions for food movements more broadly. As one of their participants notes, "it's always felt to me like there's been this bifurcation of interests in social justice parts of food" (Wilson & Levkoe, 2022, p. 112). There was ongoing tension among their respondents about who benefited most from AFNs and the idea that, to have widespread food systems change, links to other social justice initiatives and policy advocacy for structural change, such as affordable housing and basic income, are required (Levkoe & Wilson, 2022).

How "alternative" are AFNs?

The debates over the degree of alterity in AFNs are far from new or finalized. Misleh (2022) traces conceptualizations of "alternative" in unconventional systems of food provision through three phases of AFNs: 1) the over-territorialization of alterity (late 1990s to early 2000s), 2) AFNs and neoliberalism (2005 to 2010), and 3) from alterity to diversity (2010 to date). Her analysis unpacks the dualism that has been created in the literature (and by extension in academic framings) of AFNs. On the one hand, AFNs are upheld as alternative for their capacity to create sites of embeddedness, economic diversity, and close meaningful relationships with land, food, and community. One the other hand, AFNs are co-opted by market and neoliberal mechanisms, particularly through their dependence on consumer choice, commodification, and social change through purchasing power. Arguing for a "dialectical relationality of alternatives" (p. 1038) and moving beyond a binary understanding of alterity in AFNs, Misleh (2022) contends that a more nuanced approach to evaluating food systems alternatives may better reflect the work of AFNs today, marked by a diversity of approaches, aims, and ends. To move past binary framings of alterity in AFNs, Misleh (2022) advocates for an analysis of "AFNs as part of an ongoing struggle [that] requires bringing together the different dimensions that constitute them, even when they are

seen in tension" (p. 1038). Operationalizing Misleh's (2022) call for "a more open-ended, nuanced and plural understanding of AFNs and their transformational potential" (p. 1041), our analysis of Alberta AFNs aims to provide just that. The content analysis data we present does not uphold one side of the AFN debate over the other but rather analyzes specific aspects of AFNs that are (and are not) being implemented. While AFNs are not a complete solution, they have existed alongside industrialized food systems for over half a century and continue to draw attention and enthusiasm from grassroots movements, scholars, policy makers, and eaters alike. As such, their continued presence, benefits, and shortcomings warrant further research and analysis, notably amidst a growing global food crisis, to better understand what is and is not being done when it comes to possibilities for local food systems change.

Methods

To create an index of Alberta AFNs and to explore similarities and differences among them, we undertook a content and comparative analysis organized by city. The five largest provincial cities and regions were selected due to their population size and geographical distribution across the province. Fort McMurray is an urban service centre region in northern Alberta with a 2021 population of 68,002 (Statistics Canada, 2022). Edmonton is the province's capital, located north-centrally with a 2021 population of 1,010,899 (Statistics Canada, 2022). Red Deer is a central Alberta city with a 2021 population of 100,844 (Statistics Canada, 2022). Calgary is the largest and most central Alberta city, with a 2021 population of 1,306,784 (Statistics Canada, 2022). Lastly, Lethbridge is in southern Alberta and, as of 2021, had a population of 106,550 (Statistics Canada, 2022). Comparative content analysis data were collected for each city or region through Google searches, social media searches, and government program searches. Based on common terminology used in the wider study and practices of AFNs, the following search terms were used: "alternative food network," "urban food solutions," "local food solutions," "community food movements," "sustainable food initiatives," "community agriculture," "community gardens," "food forests," and "food co-operatives." These keywords were used for each of the five cities we studied.

Inclusion and exclusion criteria

Amalgamating key facets of food sovereignty and food security from within the existing food studies literature, we developed a ten-item list of criteria used for inclusion and exclusion of AFNs in our study as well as for analysis, as discussed below. Given that food insecurity is more complicated than simply having access to food, AFNs that operate across multiple channels and address multiple criteria have more potential to affect systemic change. The following criteria were frequently discussed in the existing food studies literature and provided us a focus by which to analyze the breadth of Alberta AFNs. For each AFN, we analyzed whether its programming and initiatives do two or more of the following:

- 1) *Provide access to healthy eating* (i.e., does the AFN offer access to whole, relatively unprocessed fruits, vegetables, and meat products?)
- 2) *Offer food charity* (i.e., does the AFN offer free or affordable access to food through programs such as market vouchers, community orchards, pantries, and gardens?)
- 3) *Contribute to social justice* (i.e., does the AFN

aim to effect food systems change for marginalized and equity-deserving groups? Does it aim to instil food systems change at the policy level?)
- 4) *Focus on Indigenous food sovereignty* (i.e., does the AFN have an explicit Indigenous food system focus? Does it work with Indigenous communities? Does it centre traditional Indigenous foods and knowledge systems?)
- 5) *Centre other cultural aspects of food* (i.e., does the AFN have an explicit cultural component? Does it work with specific cultural communities? Does it centre traditional cultural foods or programs?)
- 6) *Connect consumers and producers* (i.e., does the AFN facilitate a connection between consumers and food producers? Does the AFN reduce the need for intermediaries like grocery stores, placing consumers closer to the production and harvesting of food?)
- 7) *Promote community engagement* (i.e., does the AFN encourage community connections such as meeting other members, connecting with local land, and participating in growing, harvesting, and sharing food?)
- 8) *Build local food networks* (i.e., does the AFN promote the development of local, rather than global, food production?)
- 9) *Develop food skills and knowledge* (i.e., does the AFN advance food skills and knowledge including food literacy, growing, cooking, and plant identification?)
- 10) *Work with/protect nature* (i.e., does the AFN uphold nature-based food systems? Is food produced with sustainable growing practices? Does the AFN have an explicit statement about working with and protecting the environment?)

While mitigating food waste is also a key component of food sovereignty approaches, we omitted this from our study as it was too difficult to gauge waste management practices based on online content alone. For example, many community gardens very likely engage in active composting practices, but they seldom (if ever) refer to them on their websites or social media platforms. Due to obvious time constraints, we could not visit 141 AFNs across the province. By omitting food waste considerations, we were able to limit our analysis criteria to an even number of ten, enabling straightforward comparisons across Alberta AFNs and giving numeric scores out of ten, which will be discussed in the results section below.

To be included in our study, AFNs had to have a minimum of two of the above outlined ten criteria. Heeding critiques that some AFNs are too narrowly focussed on food systems change (McInnes & Mount, 2017), we kept our minimum inclusion criteria to two in order to avoid commercial AFNs that may provide access to healthy food (such as a roadside fruit stand or an independent grocery store) but do little, if anything, else to promote food security and food sovereignty efforts. Thus, to be considered an AFN for the purposes of our study, they needed to do more than sell healthy food. We included rural AFNs if they fell within an approximately fifty-kilometre radius of one of our five selected cities and catered to those cities through farm delivery, food sales, and/or farm tours. We excluded food recovery and emergency food services, such as food rescue programs and food banks, since their aims and scopes are divergent to those of AFNs. While food recovery and emergency services are a key aspect of food security for a growing number of Canadians, they are reactive solutions to food insecurity rather than long-term sustainable solutions (Möller, 2021). As such, we wanted to keep our focus on proactive sustainable food solutions. We also excluded AFNs that worked within school systems, unless they were also available to the public. Lastly, we excluded AFNs that did not appear active based on updated posts, photos, dates, events, and content in the preceding six months. In total, we coded and analyzed 141 AFNs across five cities in the province of Alberta: Fort McMurray (FM) N= 6, Edmonton (Edm) N = 45, Red Deer (RD) N = 15, Calgary (Cal) N = 60, and Lethbridge (Leth) N= 15.

Coding and analysis

We also used the same ten-item criteria described above to code and analyze our data. All the research was gathered from online sources. We relied on AFNs' own statements about themselves and assumed they were accurate at the time of data collection. While it is possible that some AFNs, perhaps especially those selling products to a consumer base, may overstate their impacts and understate their limitations, we did corroborate AFNs' stated goals and objectives through their programs, resources, and events offerings. For example, many CSAs tout social responsibility on their websites or social media platforms, but if they did not also offer food charity, community farm days, or other social-based initiatives then they would not meet the coding criteria for that section. Without being able to visit all 141 AFNs in the province, we were only able rely on AFNs' web and social media content; however, this content is also what consumers engage with most, making it relevant for our analysis. As noted above, we omitted data that hadn't been updated in the preceding six months. Using publicly available website and social media content, including mission and value statements, event postings and notifications, public programming descriptions, and any other materials posted, such as bylaws, we undertook a content analysis of our data. All three researchers coded the data, ensuring inter-rater reliability (McDonald et al., 2019). For each AFN we analyzed, we assigned a value of one or zero for each of our above-outlined criteria, depending on whether they met the criterion or not. For example, if an AFN mentioned a canning and preserving workshop, it would get a one for "developing food skills and knowledge."

We used a binary (i.e. one/zero) coding system which assessed whether the AFN met specific criteria, instead of using a multi-point scale (e.g., zero to three) which can assess the degree to which they met the specific criteria (Neuendorf, 2017). Given that we were analysing online content alone, a multi-point scale would have been difficult to gauge and implement. Using a one/zero coding system also enabled us to assign numeric totals out of ten for each AFN, making comparisons and analyses between them more straightforward. Numeric totals were helpful in identifying broadly focussed, moderately focussed, and narrowly focussed AFNs across Alberta. The numeric totals are not intended to indicate the effectiveness of each AFN studied. This would not be possible given our research design, nor was it within our research interests. Rather, the numeric totals help us to report on how broadly AFNs work *across* food security and food sovereignty categories. These data and analysis add new layers to the already existing literature on AFNs.

Limitations

While the data we present below provide a comprehensive account of existing AFNs in Alberta, they are not—and cannot be—exhaustive. Our searches were only conducted in English and therefore excluded AFNs operating and/or communicating in French, Cree, and other languages. Our data collection could not include informal AFNs such as personal gardens and foraging practices, community gardens or co-ops without a web or social media presence, urban gleaning practices such as foraging edible foods from grocery store dumpsters, and/or food and seed sharing common among families, friends, and neighbours. The other limitation of our study entails the sporadic, temporary nature of some grassroots AFNs that are dependent on funding, volunteers, and community engagement, which may or may not last longer than a year. By the time this study is in print, some of the AFNs in our study may no longer be active, and other new ones may have emerged. Despite these outlined limitations, the data collected remain an important contribution to

wider research fostering local food systems and exploring possibilities to mitigate widespread food insecurity as they provide as comprehensive a picture as possible of AFNs in Alberta. They also yield relevant analysis in terms of AFN programming that could prove helpful to future studies, grassroots and activist activities, and policy initiatives.

Results and discussion

In total, we analyzed 141 AFNs across five cities in the province of Alberta: Fort McMurray (FM) N= 6, Edmonton (Edm) N = 45, Red Deer (RD) N = 15, Calgary (Cal) N = 60, and Lethbridge (Leth) N= 15. Our results are summarized in Table 1.

Table 1: AFNs in Alberta

Criteria	**FM (N = 6)**	**Edm (N = 45)**	**RD (N = 15)**	**Cal (N = 60)**	**Leth (N= 15)**
Access to healthy food	6 (100%)	45 (97.7%)	15 (100%)	57 (95%)	15 (100%)
Offer food charity	1 (16.6%)	22 (48.8%)	6 (40%)	30 (50%)	4 (26.6%)
Contribute to social justice	1 (16.6%)	9 (20%)	3 (20%)	15 (25%)	2 (13.3%)
Indigenous focus	2 (33.3%)	2 (4.4%)	2 (13.3%)	2 (3.3%)	1 (6.6%)
Other cultural focus	0 (0%)	4 (8.8%)	0 (0%)	2 (3.3%)	1 (6.6%)
Connect producers and consumers	5 (83.3%)	29 (64.4%)	14 (93.3%)	33 (55%)	14 (93.3%)
Promote community connections	4 (66.6%)	41 (89.3%)	14 (91.1%)	42 (70%)	14 (93.3%)
Build local food networks	6 (100%)	40 (88.8%)	12 (80%)	53 (88.3%)	15 (100%)
Develop food skills and knowledge	3 (50%)	15 (33.3%)	6 (40%)	20 (33.3%)	7 (46.6%)
Work with nature	6 (100%)	31 (68.8%)	15 (100%)	38 (63.3%)	14 (93.3%)

AFNs in Alberta scored well, with scores consistently over sixty percent, in three areas: 1) providing access to healthy food, 2) promoting social and community connections, and 3) building local food networks.

AFNs in Alberta scored inconsistently well in connecting producers and consumers and in working with nature, with three of the five cities having scores consistently over sixty percent and two of the five cities having scores under sixty percent. The AFNs analyzed scored poorly, with percentages consistently under thirty percent, in three areas: 1) Indigenous food focus, 2) cultural food components, and 3) addressing social justice and social equity. Lastly, Alberta AFNs produced moderate scores between thirty and sixty percent in two areas: 1) developing food knowledge and skills and 2) offering food charity. These numeric scores confirm that AFNs uphold some aspects of food sovereignty well but are lacking in others, echoing the wider debates about AFNs' incomplete transformational potential. Based on our sample size of 141, Alberta AFNs are providing access to healthy food through local food systems, outside of conventional grocery stores, and they are promoting and developing social and community connections through community gardens, community meals, and cooking classes. However, they are also very clearly lacking in the systemic and structural aspects of food systems change—namely advocating for food policy changes and targeting food insecure populations through access and programming. The lowest scores overall were for food culture. There were a few AFNs that offered an explicit cultural food focus, such as New Grocery Movement's cooking 4 community cultural dish night and their cultural grocery store passport, but, overall, this facet of AFNs was lacking. It is also possible that some Alberta AFNs had an invisible or implied cultural food focus, such as Polish or Ukrainian vegetables and herbs grown in community gardens, but that these practices were unspoken and/or lacked an explicit online presence.

Based on our ten-item scoring, AFNs that scored above an eight out of ten total were considered broadly focussed because they offered more holistic and integrated solutions to food insecurity. The numeric totals are not intended to indicate an overall value of effectiveness as some AFNs who scored lower than an eight are still contributing important facets of food sovereignty to their respective communities. However, more holistic AFNs, with scores over eight, may act as models for more inclusive programming. Of the AFNs we studied, eleven of 141 (or just under eight percent) had eight or above out of our ten criteria. There was only one AFN in the entire province—The Land of Dreams in Calgary—that had all ten. The Land of Dreams is a thirty-acre community garden in Treaty Seven territory in Mohkinstsis (Calgary) that brings together refugee and newcomer communities with local Indigenous communities to collectively build food security, food knowledge, and community. They offer teepee raising and pipe ceremonies alongside year-round programming in regenerative farming and community connections guided by the knowledge of Blackfoot Elder Herman Many Guns. They also offer language, education, and training in partnership with other nonprofits (Calgary Catholic Immigration Society, 2025). Other examples of broadly focussed Alberta AFNs are listed in Appendix A, along with descriptions and website information. The majority of these were either community/not-for-profit AFNs or AFNs organized by the city/government. Notably, AFNs that had an Indigenous and/or other cultural focus tended to also be more holistic in other areas, reflecting the interrelated aspects of mitigating food insecurity and highlighting the importance of building cultural initiatives into AFN programming. The other ways these broadly focussed AFNs reflected multi-channel offerings was in their focus on marginalized communities and in linking to other food- and non-food related programming, serving as models for other AFN initiatives.

AFNs that scored a four or lower overall were considered more narrowly focussed, even though they provide valuable aspects of alternative food systems such as building local food systems. Of the 141 AFNs studied, narrowly focussed AFNs comprised thirty-eight (27 percent) AFNs in our sample. Narrowly focussed AFNs typically included those with selective offerings, such as the Edmonton Urban Hen Program and some CSA programs (e.g., those that simply sold health food), and they tended to be found in small-scale for-profit sectors as opposed to community or government sectors. Initiatives such as these may help build partial food security for a selective few (typically those with more disposable time and income), but they do not sufficiently affect systemic and structural change in local food systems. Narrow AFNs are examples of what McInnes and Mount (2017) refer to as "transition strategies" to food systems change. These are strategies that are implemented at the individual level, that enable a select few to opt out of some aspects of the industrial food system, and that aim to shorten supply chains by connecting producers and consumers. While they may be a starting place for some, they can further exacerbate already-existing health and food inequalities and tend to be fragmented and isolated as opposed to broad-based (McInnes & Mount, 2017).

AFNs in our study that scored between five and eight were considered moderate in breadth and focus. There were ninety-two AFNs (65 percent) that fell in this range and comprised most of the AFNs in Alberta. AFNs in the moderately-focussed category included programs and initiatives such as farmers' markets, some CSAs that did more than simply sell food, and food forests. They did more than simply offer some consumers access to local foods. Many of them also aimed to develop food skills and knowledge (such as farm tours or canning and preserving tips) and promote community connections through formal and informal processes (such as offering spaces for people to gather, speaking with a vendor, cooking classes, and/or identifying edible wild foods). As noted above, they typically fell short when it came to addressing social, cultural, and economic justice aspects within their programming. We believe that these AFNs have the most potential for diversification of offerings. By providing low-income or sliding-scale discounts or connecting more intentionally with marginalized communities, who are frequently among the food insecure, these AFNs can effect small changes for a select few. As Wilson and Levkoe (2022) point out, "good food without good politics will likely only tinker at the edges of the dominant food system" (p. 116). Because of their dominance as the most common types of AFNs, as well as their programming that already goes beyond more than simply offering good food, moderate AFNs have the most possibility for growth, especially as they align with broader and more holistic programming of the multi-faceted AFNs identified.

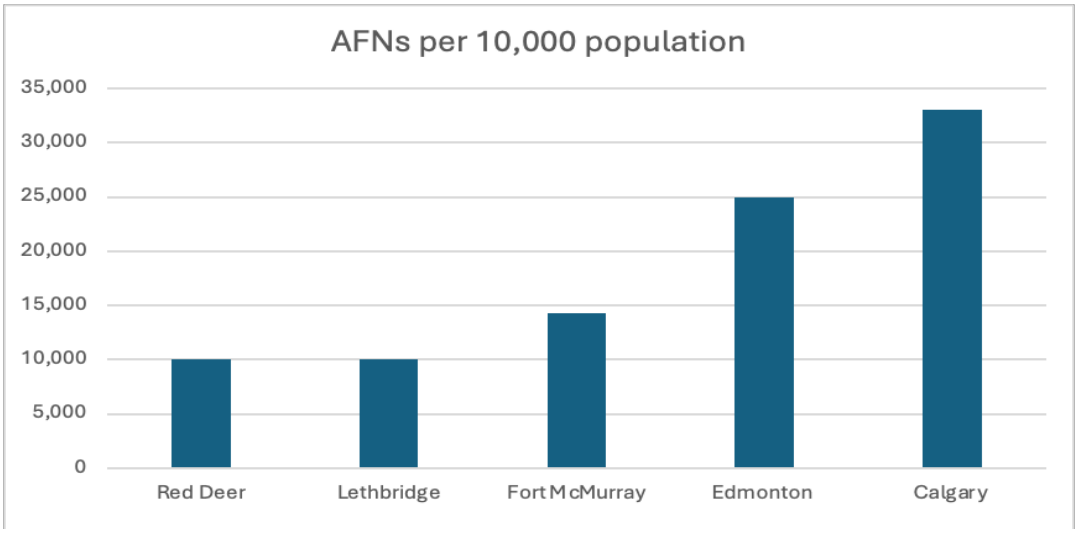
The division of AFNS into more and less holistic categories became even more acute when we subdivided AFNs by sector type: 1) community/not-for-profit organizations (N=50), 2) city/government initiatives (N=28), and 3) small-scale, for-profit initiatives (N=63). Community/not-for-profit organizations represented the second most common sector, included organizations run by volunteers, and had an average score across all five cities of 6.39 out of ten. City/government initiatives were the least common sector represented, included those that were run by, or partnered with, the city or province in question, and had an average score across all five cities of 6.31 out of ten. Small-scale, for-profit initiatives were the most common sector represented and had an average score across five cities of 4.9 out of ten. Notably, the sector with the highest total number of AFNs had the lowest overall scores. These data support literature that

cautions against overly market-based solutions to food insecurity (Allen & Guthman, 2006; Guthman, 2008) and supports community-based initiatives towards food security and sovereignty (Regnier-Davies et al., 2022).

Inter-city comparison

The data on inter-city comparison are complex and somewhat contradictory. At first glance, the bigger the city, the more AFNs were present, with Calgary having sixty, Edmonton forty-five, Red Deer and Lethbridge each having fifteen, and Fort McMurray with only six. However, when comparing the total number of AFNs by population density, Red Deer and Lethbridge had the most access to AFNs, with roughly one AFN per 10,000 people. In contrast, Fort McMurray had roughly one AFN per 14, 286 people, and Edmonton and Calgary had roughly one AFN per 25,000 and 33,333 population respectively, represented in Table 2.

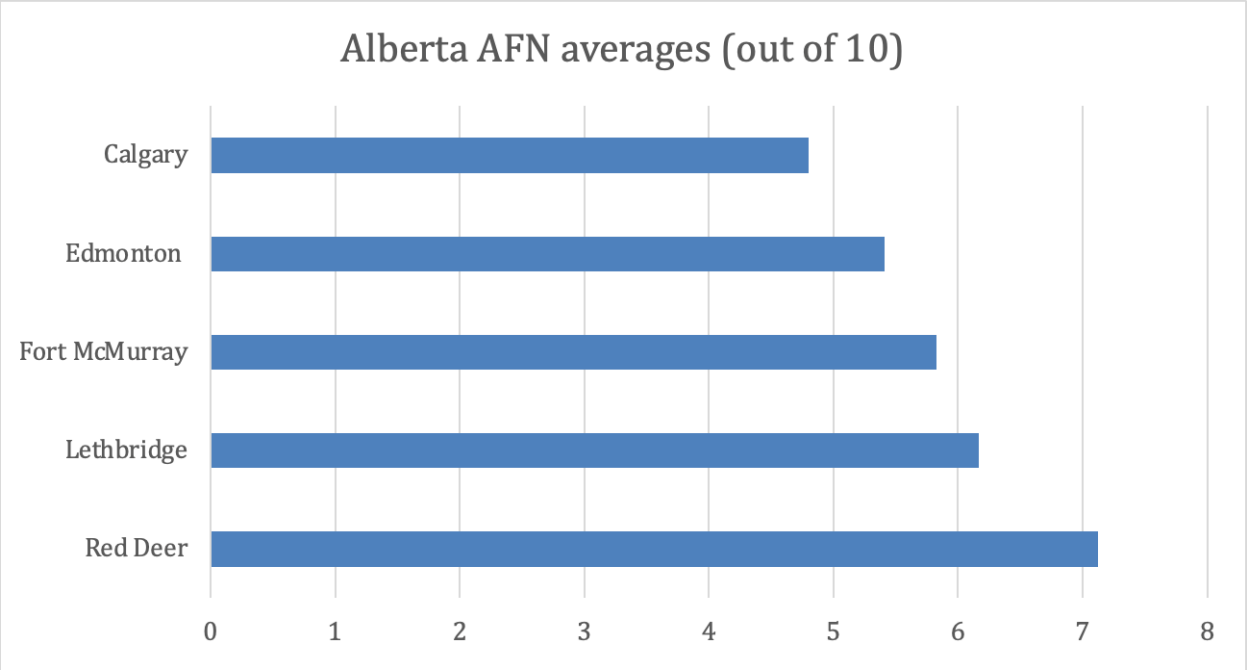
Table 2: Alberta AFNs by city per 10,000 population



These findings point to challenges of food security and sustainability in larger cities and map onto the higher health risks of bigger city living, including diet-related diseases (Nancarrow Clarke, 2021). While AFNs like CSAs are growing in popularity (Statistics Canada, 2023) and may seem abundant in some areas, they still serve a very small percentage of urban populations, confirming some of the critiques in food studies literature about scalability.

The overall average numbers of AFNs per city were also (more or less) inversely related to population size, apart from Fort McMurray, as depicted in Table 3.

Table 3: Alberta AFN overall average scores per city



Across Alberta, the overall city average scores ranged between 4.8 in Calgary and 7.12 in Red Deer. Red Deer had a small sample size of fifteen AFNs, and three of these AFNs scored eight and over (please see Appendix A below), raising its overall city average over seven. Calgary, by contrast, had a larger sample size of sixty, with four organizations scoring eight or higher but also many AFNs scoring four and under, lowering their city average to under five. Similar patterns were observed for Lethbridge and Edmonton, where Lethbridge has a smaller sample size of fifteen but two organizations scoring eight and over and Edmonton having a larger sample size of forty-five with two organizations scoring an eight and many others (predominantly CSAs) scoring under five. These totals point again to areas of AFNs that can be rendered more holistic. Many Alberta AFNs were lacking in Indigenous food focus, cultural food components, and addressing social justice and social equity, arguably most critically in Edmonton and Calgary, which house greater proportions of marginalized populations.

In addition to population and differences in overall average scores, the abilities of AFNs to work across a broad range of criteria may also be contingent on city-specific rates of food insecurity. It is possible that, as rates of food insecurity increase, so too does the development of local AFNs. While we were able to find city-specific rates of food bank use for 2024, we could not find city-specific rates of food insecurity for all five of our cities studied. Food insecurity rates tend to be measured by province (for example, Tarasuk et al., 2022), making inter-city comparisons within a single province difficult. While foodbank use is not synonymous with food security, it does provide an indication of need. Consistent with cross-Canadian rates, all the cities surveyed in our study reported increased food bank usage. Edmonton's Food Bank's hamper program experienced a 37percent increase from 2023 to 2024 (Tran, 2024). Red Deer Food Bank witnessed an 81percent increase in usage from 2019 to 2024 (Red Deer Food Bank, 2024). The Lethbridge Food Bank reported a 34percent increase from 2023 to

2024 (Keenan, 2024). The Calgary Food Bank has seen a staggering 200 percent increase from 2019 to 2024 (Wilhelm, 2024). Similarly, Fort McMurray's Wood Buffalo Food Bank experienced an 11percent increase in usage and a 20percent rise in hamper requests from 2023 to 2024 (Wood Buffalo Food Bank, 2024).

According to these data, food bank use was highest in Calgary, where there was also the lowest number of AFNs per population. However, it was also high in Red Deer where there was the highest number of AFNs per population. Food bank use was lowest in Fort MacMurray, which also had the lowest number of AFNs. However, given that food insecurity is more complex than simply a lack of food, other systemic factors need to be considered, such as household income. According to Food Banks Canada, the average household income in the Wood Buffalo region is higher than other cities in the province, with the median household income is $60,000 higher than that of provincial averages (Food Banks Canada, 2024). Food studies scholars have consistently identified household income as the strongest single predictor of food insecurity (Tarasuk et al. 2016), helping to explain some of Fort McMurray's low rates of food insecurity and lower numbers of AFNs in the region. However, as the incomes of working Canadians have failed to keep pace with rising food costs and inflation more broadly (Edmonton Community Foundation, 2023), more research is needed to understand the connections between food insecurity and AFN prevalence.

Conclusions and future research

Despite their incompleteness, AFNs remain part of the fabric of food movements in Canada and globally (Edwards, 2016). As such, they are deserving of continued academic attention and insight as well as public and policy support. Our research provides data on the number and type of AFNs that exist in Alberta, as well as an indexing of their overall breadth. Upholding characteristics of food sovereignty, championed, multi-channel AFNs are better equipped to effect change within existing food systems, especially as they address access to food charity, food equity, and a focus on marginalized populations. Our findings confirm that more holistic AFNs were found in community/grassroots organizations than were found in city/government initiatives or in for-profit exchanges like CSAs, which could serve to inform future funding decisions. Our findings also confirm some areas of improvement needed for many AFNs—namely the need for changes that go beyond niche or privileged consumers (Edwards, 2016; Levkoe et al., 2019; Matacena, 2016; Maye, 2013; Wilson & Levkoe, 2022). Following Misleh (2022), our research does not aim to uphold binary understandings of AFNs' alterity. Rather, by offering data on what Alberta AFNs are doing (and not doing), we aim to contribute to a more nuanced understanding of their programming and offerings.

A renewed interest in AFNs during the COVID-19 pandemic, combined with food inflation rates and rising food insecurity rates both in Alberta and across Canada, provide an opportunity to better understand and utilise the role of AFNs in offering some (even if fragmented and partial) resistance to global, industrialized food systems. Our research, in conversation with other recent research on AFNs, provides a building block in this increasingly critical aim. Wider data collection is needed to compare results with other cities and provinces. We plan to undertake the next phase of this work by comparing Alberta AFNs to other AFNs across Canada. Of particular

interest will be any correlations between provincial levels of food insecurity and provincial AFN density. Our future research will also ask whether any holistic models of AFNs provide distinctive ways to mitigate some of the critiques to which AFNs have been subject. Working alongside community partners, we also plan to further disseminate this research through our podcast, *The Ground Up?*, and other digital storytelling methods to bring greater visibility to AFNs among the public (Rossiter & Overend, 2024).

Overall, we uphold that AFNs continue to play a role in equitable food systems, while also concurring with wider critiques that AFNs alone cannot mitigate the complex problems caused by neoliberalism—increase in corporate control, growing gaps between rich and poor, and the many environmental problems caused by our global food systems (Sage et al., 2023). AFNs need to be combined with broader social change movements, including but not limited to widespread adoption of Universal Basic Income, housing security, affordable childcare, increases in liveable wages, and Land Back initiatives, to have long-standing, systemic effects on peoples' qualities of life. There are no doubt limits to what many of these small, local, often volunteer-run, and grassroots initiatives can accomplish. However, in focussing on their limits, we risk overlooking their merits. Echoed in broader research on AFNs, our study confirms that AFNs in Alberta consistently provide access to local, healthy food, shorten supply chains, build local food security, and promote social and community connections among members. Amidst rising food insecurity, food inflation, and food industrialization, these benefits may not be revolutionary, but they are also not without value. While AFNs are far from complete solutions to the growing issues of food security, justice, and sovereignty, they persist in imperfect ways. Rather than dismiss them as incomplete, we aim to better understand their pieces.

Acknowledgements: This research was supported by the Social Sciences and Humanities Research Council of Canada through a SSHRC Institutional Grant at MacEwan University.

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Appendix A – Broadly focussed AFNs in Alberta

AFN	Description	Website
Red Deer (3		
Green Iglu	Green Iglu is a registered charity that enhances food security in remote and Indigenous communities. They achieve this by constructing multi-season greenhouses that cultivate fresh produce and culturally significant plants.	https://www.greeniglu.com/
Red Deer Dream Centre/Nu Leaf Harvest Wall	A harvest wall not only reduces overall food costs, freeing up resources for other essential services, but also fosters community engagement by involving members in food-growing activities, providing a sense of connection and purpose. Moreover, members acquire valuable transferable skills that can support their post-treatment work pursuits, an impact that extends beyond the RDDC.	https://nuleaffarms.ca/growing-farmers/community-development/projects/red-deer-dream-centre/
Common Ground Garden Project	In collaboration with the City of Red Deer, this urban farming project aims to enhance local food security by creating accessible gardening spaces for the community.	https://rethinkreddeer.ca/commonground
Edmonton (2)		
New Grocery Movement	With its home base in Edmonton, this non-profit organization is committed to educating and engaging communities across Canada to enhance local food security. They offer a range of workshops to empower individuals with the skills and knowledge to grow their own food and adopt sustainable practices. In	https://newgrocerymovement.com/

	addition to their nationwide efforts, they run city-specific initiatives such as the Garden Club in Edmonton, which unites residents to learn about urban gardening.	
Micro Habitat	This predominantly Edmonton-based organization supports urban farming in and around Edmonton. They install urban farms at local businesses, offer educational workshops on urban agriculture, host recreational workshops and information booths, and provide take-home urban farming kits for schools.	https://microhabitat.ca/en
Calgary (4)		
Dalhousie Community Garden and Food Forest	The Dalhousie Community Association's initiative fosters a sense of community by encouraging residents to care for and maintain a shared garden and edible food forest. This initiative also hosts harvest potlucks, a seed library, and various social events to connect community members.	https://www.dalhousiecalgary.ca/community-garden-dalhousie/
Land of Dreams	This is an urban farming initiative in partnership with the Calgary Catholic Immigration Society, designed to integrate newcomers and refugees while fostering connections with Indigenous communities. Participants maintain a community garden and engage in educational programs that share Indigenous history and farming practices.	https://ccisab.ca/land-of-dreams/
Calgary EATS!	The City of Calgary's food action plan supports various community-led programs, including urban hen keeping, beekeeping, indoor farming, growing spaces, and circular food economy initiatives,	https://bit.ly/42jZRhz

	in partnership with local organizations.	
Fresh Routes	Fresh Routes operates a Mobile Grocery Store that brings convenient, nutritious, fresh, and budget-friendly food to communities in Calgary. In collaboration with Stoney Nakoda Nations, Fresh Routes began partnering with Indigenous communities, their nutritionists, and dieticians to bring healthy food to First Nation communities. At Fresh Routes, we believe in dignified food access for everyone.	https://freshroutes.ca/inclusive-community-markets/
Lethbridge (2)		
Interfaith Chinook Kitchen	In collaboration with Lethbridge's Family Centre, this initiative provides a community kitchen offering free cooking classes for adults and children. Additionally, it supports other organizations in establishing their own kitchen programs.	https://interfaithfoodbank.ca/programs-services/community-kitchen/
Seed Library	Lethbridge's Public Library hosts a free community seed initiative allowing residents to borrow seeds to grow their produce. While returning seeds is not required, gardeners are encouraged to donate their harvested seeds to sustain and grow the library's collection (Jarvie, 2023). The library provided just under 3,000 packages of seeds to the Lethbridge community in 2023 (Ashbee, 2024).	https://www.seedysaturdayyql.com/

Vol. 13 No. 1, pp. 193–194 April 2026

Canadian Food Studies La Revue canadienne des études sur l'alimentation

Choux Questionnaire: Ian Mosby

A riff on the well-riffed Proust Questionnaire, the CFS Choux Questionnaire is meant to elicit a tasty and perhaps surprising experience, framed within a seemingly humble exterior. (And yes, some questions have a bit more craquelin than others.) Straightforward on their own, the queries combined start to form a celebratory pyramid of extravagance. How that composite croquembouche is assembled and taken apart, however, is up to the respondents and readers to determine. Respondents are invited to answer as many questions as they choose.

The final question posed—*What question would you add to this questionnaire?*—prompts each respondent to incorporate their own inquisitive biome into the mix, feeding a forever renewed starter culture for future participants.

Our Choux Questionnaire respondent for this issue is Ian Mosby. He is a historian at Toronto Metropolitan University whose work spans food, Indigenous health, and the politics of settler colonialism. His first book, *Food Will Win the War: The Politics, Culture and Science of Food on Canada's Home Front,* won the Canadian Historical Association's 2015 Political History Book Prize, and he has written extensively on numerous other subjects, ranging from the history of monosodium glutamate and anti-Chinese racism to the long-term impacts of hunger and malnutrition in residential schools.

What is your most powerful sense?

I have a disturbingly sensitive nose. It means that my feelings of pleasure or disgust while I'm around food tend to be magnified, for better or worse. Some of my best memories are smells, especially the smell of freshly made bread slathered with butter at my grandmother's house, accompanied with the metallic tang of frozen-concentrated orange juice that she always had at the ready. To this day, opening the door to the smell of onions and garlic being fried bring a feeling of total, uninhibited joy.

On the other side, a single off smell can ruin an entire mood or meal. Since childhood, for instance, the smell of canned corn has made me nauseous for reasons I can't really understand. I have memories of sitting at the table long after everyone else left until I ate all my vegetables, feeling genuinely ill but unable to communicate why. It also means that I can't have certain smells in the house. I know for a fact that I love the flavour profile of asafoetida in cooking but, if it's in the house, it's basically all I can smell, no matter how well I seal the container or how far I shove it back in the cupboard.

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DOI: 10.15353/cfs-rcea.v13i1.794
ISSN: 2292-3071

On the plus side, being extremely sensitive to the smell of spoiled meat, black mold, rodents, rancid oil, and other nasty things has probably saved me from quite a few unpleasant meals.

With which cuisine do you most identify?

My maternal grandparents were Doukhobors and some of my best childhood memories are of eating my grandmother's freshly made Doukhobor dishes like cottage-cheese stuffed pyrahi. Doukhobor borscht, in particular, is such a wonderful and strange food. Unlike most borscht, beets are used mostly for colour (the soup is pale pink) and are actually taken out of the soup before it's finished. Instead, the base of Doukhobor borscht is cream, cabbage, potatoes, dill and butter and it's simultaneously so simple yet so rich and extravagant.

In terms of my actual everyday food consumption, though, I don't eat much in the way of Doukhobor cuisine. While I try to mostly eat plant-based foods, I've never managed to become a full vegetarian like my Doukhobor kin. I also like my food spicy and heavily spiced and... that's not really a Doukhobor flavour profile. I love beans more than anything and am at my best when cooking things like hearty soups, stews, curries, and ragouts—anything cooked slowly over the course of the day at low heat. But I hate cooking on weeknights. It's such a slog but one that I have to do anyway.

What is your most treasured kitchen implement?

The first truly nice piece of kitchen equipment I ever splurged on was a cherry-red Staub Dutch oven that I found on sale at a local shop on the Danforth in Toronto. I've used it nearly every week since and it works just as well as the day I purchased it twenty-some-odd years ago. It's both a beautiful object and just a ridiculously functional piece of equipment. The platonic ideal of a pot, I think, and I suspect it'll outlive us all.

What is your idea of a perfect food?

Perfection is the enemy of the good, for the most part, but I'm struggling to find a single critical thing to say about split red lentils. From the unexpectedly peppery smell they give off when you start cooking them to the fact that they're ready in nearly an instant and are nearly impossible to overcook, I can't say enough nice things about these precious legumes.

Of what food or food context are you afraid?

Watching hunger being used as a tool of genocide in Gaza, watching the nearly unchecked rise of global fascism, watching unhoused and hungry people brutalized all around us, all while new pipelines getting forced through Indigenous lands while the climate changes and the world burns. Our collective futures are at stake, yet our food system continues to be controlled by some of the worst global actors—people who are both contributing to and profiting handsomely from all of this. It's terrifying and enraging and clarifying.

What question would you add to this questionnaire?

What sustains you through the hard times?

Canadian Food Studies

La Revue canadienne des études sur l'alimentation

c/o Department of Health Sciences
Lakehead University
955 Oliver Road
Thunder Bay (ON) P7B 5E1

ISSN: 2292-3071

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