National Collaborating Centre
for Determinants of Health

Centre de collaboration nationale
des déterminants de la santé

FOOD SYSTEMS
ISSUE BRIEF

PART OF THE **DETERMINING HEALTH** SERIES

National Collaborating Centre
for Determinants of Health

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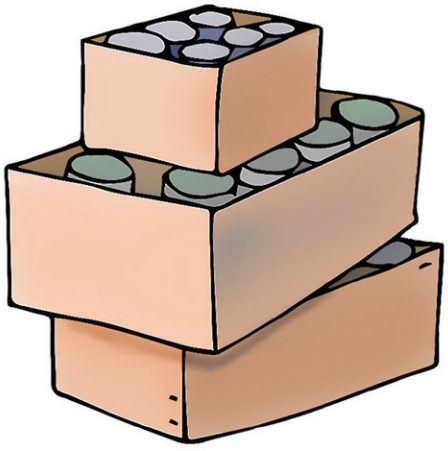


EXECUTIVE SUMMARY

Food systems include the activities, people, institutions and processes involved in feeding people in communities, countries and the world. Understanding how food systems drive inequities for people and communities differently based on the structural and social determinants of health is critical to advancing healthier, more sustainable and just alternatives.

Industrial food systems are the dominant type of food system in Canada, relying on fossil fuels and controlled by large corporations. Food systems consist of several major components: the food supply chain, people and institutions, and food system drivers and outcomes. The food supply chain consists of various stages including production, processing, distribution, food retail/service, consumption and waste/disposal. People and institutions include input suppliers, farm workers, processors, distributors, retailers, food service workers, consumers and waste management companies. Food system drivers — including urbanization, trade, technology, politics, climate change, economics, infrastructure, globalization and food policies — shape how the food supply chain functions. These drivers are interrelated with physical, mental and environmental health outcomes and inequities that result from food systems.

Just food systems sustain life, connect us with each other and our environments, and promote health and dignity for all. However, food systems threaten our health and well-being when workers are treated poorly, food is produced in unsustainable ways and unhealthy food environments are created. Policies, practices and characteristics across the current industrial food system contribute to health inequities when people and communities made vulnerable by systemic oppression are disproportionately affected by negative health outcomes.

Various interconnected pathways connect food systems to health inequities in the Canadian context. These pathways include:

1. Precarious employment and working conditions for workers at various points of the food system, including income insecurity as well as chemical, biological, physical and psychosocial hazards.
2. Climate change, including long-term shifts in weather and precipitation patterns and extreme weather events, both influences and is affected by food system activities.
3. Disruption of Indigenous food systems due to food system policies and practices that interfere with the ability of Indigenous Peoples to control, reclaim and safeguard their own food systems.
4. Food policies that shape food environments, which govern the physical, social, economic and cultural contexts that influence food intake, quality of foods and nutrition-related health outcomes.
5. Food advertising and marketing that promotes the sale and consumption of food that is often high in sugar, fat and/or salt, contributing to poor nutritional health.

A food systems approach, rather than focusing on what contributes to individual food behaviours, provides a powerful opportunity to recognize the complexity of drivers within food systems that intersect with population health. Food justice works to ensure that the benefits and risks of food systems are shared fairly, and to restructure dominant food systems with a focus on equity. Public health practitioners, leaders and organizations in Canada are in key positions to facilitate collaborative approaches across systems, sectors and professions, and can therefore play a key role in food system transformation.

INTRODUCTION

"From unjust treatment of farm workers to international trade agreements, and from food and agriculture policies and legislation to corporate power, our current food systems are deeply inequitable."[1]

Food systems are the webs of activities, people, institutions and processes that bring food from the fields, forests and waters to our plates, and beyond.[2] Food systems are essentially everything and everyone involved in feeding a population.[3–5] Ideally, food systems would provide nourishing food for all in culturally relevant and dignified ways. But the benefits and burdens of our food systems are unjustly distributed, producing significant health inequities.[6–7]

Public health practitioners, decision-makers, policy-makers and organizations can play a critical role in advancing better food systems that promote health equity and justice. Understanding how food systems drive inequities for people and communities differently based on the structural and social determinants of health is critical to advancing healthier, more sustainable and just alternatives.

This issue brief explores the relationship between food systems and health inequities, with a focus on industrial food systems, the dominant type of food system in Canada. It will be followed by a practice brief outlining how public health practitioners and organizations can challenge current food systems through attention to food justice. Together, these resources aim to support understanding of the public health relevance of food systems and identify public health actions to transform them and address health inequities.

The document is divided into four sections:

- **SECTION 1** introduces food systems and their major components.
- **SECTION 2** highlights why food systems matter for public health policy and practice.
- **SECTION 3** summarizes literature on how food systems generate health inequities.
- **SECTION 4** concludes the document and previews the practice brief on food justice.

1.0

WHAT IS A FOOD SYSTEM?

Food systems are the webs of activities, people, institutions and processes that bring food from the fields, forests and waters to our plates, and beyond.[2] This document uses both the terms *food system* and *food systems*. This is to recognize that what is known as the global food system is in reality a "system of systems".[8(p735)] This means there are various types of food systems around the world that operate at different scales, from the local to the global level.[9] For example, there are food systems in Halifax, Vancouver and Port Hope that are part of a broader Canadian food system, which interconnects with other systems in different parts of the world. Baked bread with almonds at a Halifax bakery may rely on local eggs from a nearby farm, flour from Ontario and almonds grown at an industrial scale in California, illustrating how different food systems at different scales intersect.

Food systems also vary both within and between countries in terms of their priorities, goals, actors, ways of producing food and for what purposes, among other characteristics. For example, in Canada, there are different types of food systems, including Indigenous food systems, and an industrial food system, which refers to the large-scale production of food using heavy machinery, advanced technology, and chemical pesticides and fertilizers.[10–11]

COMPONENTS OF FOOD SYSTEMS

Food systems consist of three major components: (1) the food supply chain, (2) the people and institutions involved in food systems, and (3) food system drivers and outcomes.[4]

1 Food supply chain

The food supply chain refers to the different stages through which food journeys from production to waste. It includes processes related to growing, harvesting, storage, processing, distribution, retailing, consumption and disposal.

Supply chains can be long or short. A short food supply chain means that food travels a relatively short distance or involves few intermediaries (i.e., "middlemen") in its journey from production to waste.[4] A farmers' market relying on the sale of local produce by farmers directly to consumers is an example of a short supply chain. With long supply chains,

food travels long distances and engages many intermediaries, as can be seen with complex industrial global food supply chains. Supermarkets relying on global imports of bananas is an example of a long supply chain.

2 People and institutions

In moving food from production to waste, food supply chains, depending on their length and complexity, will engage different entities, institutions and groups of people both directly and indirectly.[4] These can include:

- input suppliers who sell inputs for use in agricultural production such as machinery, seeds, fertilizers and pesticides;
- farmers, farm workers and labourers who grow and harvest food;
- processors who transform agricultural products (e.g., wheat, meat) into food ingredients and processed food products;
- distributors who handle the trade and transportation of food from suppliers to consumers, including wholesalers, importers and exporters;
- retailers and food services (e.g., supermarkets, markets, restaurants) that sell and provide food to consumers;
- consumers who purchase and eat food; and
- waste management companies that handle food waste.

Other groups of people include policy-makers who make food policy decisions that shape supply chains at different scales (e.g., ban on artificial trans-fats) and advertisers who market and advertise food products. Ultimately, because "everyone needs to eat, we are all part of the food system."[4(p2)]

3 Drivers and outcomes

Food systems also consist of interrelated drivers and outcomes. **Drivers** are the factors or forces that shape how food supply chains are organized and implemented and how they function. These include factors related to the physical environment, technology, infrastructure, politics, economics, climate change, globalization, trade, food policies, urbanization and various others. These factors work together to influence how food systems operate.[12]

Outcomes are the effects or impacts of food systems. These include eating behaviours, food (in)security, hunger and malnutrition, and a range of health outcomes and inequities in these outcomes. A driver can be an outcome, and an outcome can be a driver. For example, climate change (a driver) can affect how much food is produced. Climate change is also a food system outcome because industrial agriculture is a significant contributor to greenhouse gas emissions and thus global warming.[4]

These three components of food systems — food supply chains, people and institutions, drivers and outcomes — are interconnected and influence one another.

Figure 1 illustrates these interconnections. Table 1 defines key terms related to food systems used in this document.

FIGURE 1: INTERCONNECTIONS
WITHIN FOOD SYSTEMS

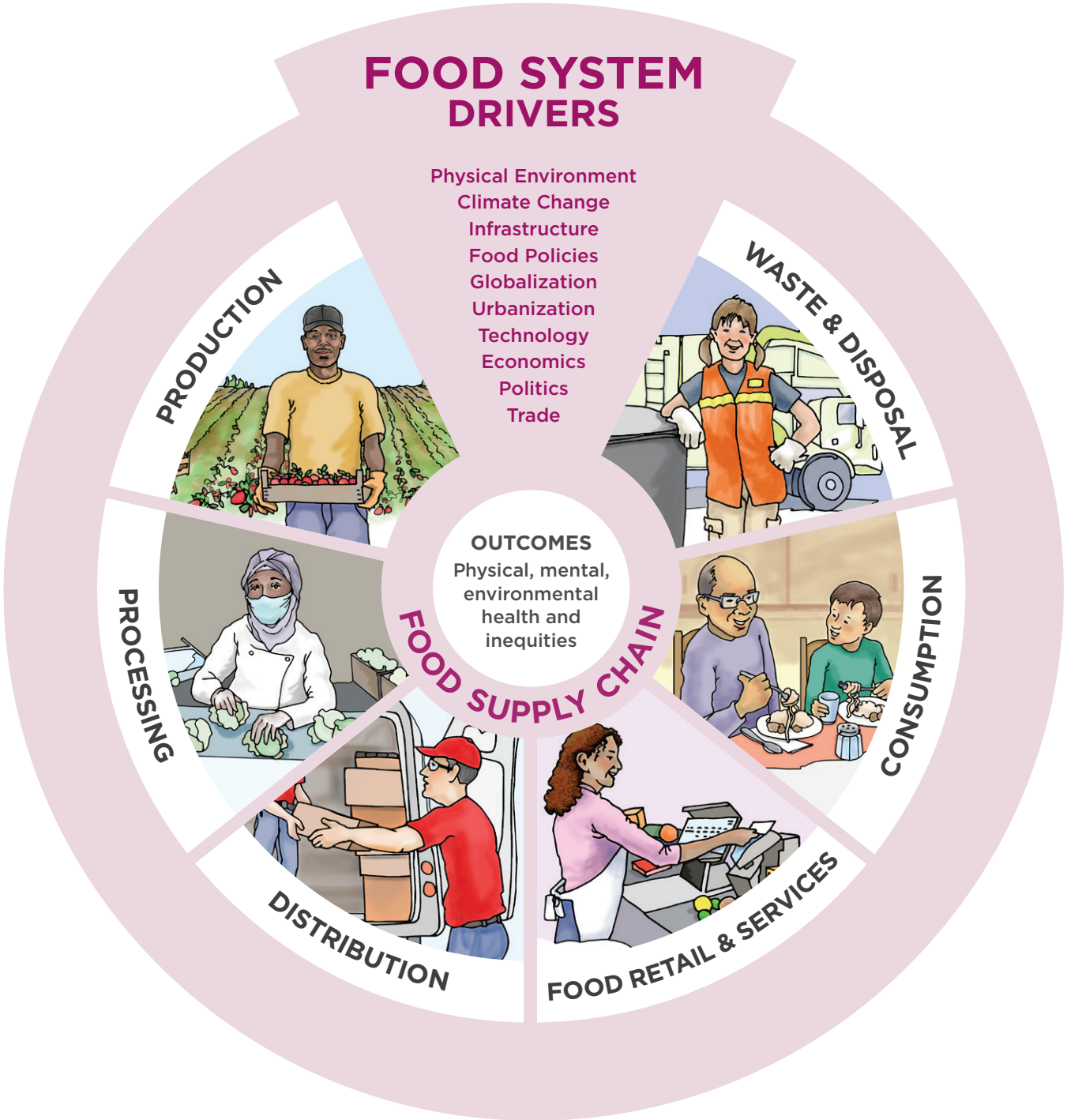


TABLE 1: KEY FOOD SYSTEM TERMS

Term	Description
Food apartheid	Food apartheid refers to racist and oppressive structures, policies, systems and institutions that limit communities' access to nourishing, affordable and culturally appropriate food.[13–15]
Food desert	Food desert is an outdated term used to describe a geographical area, such as a neighbourhood that lacks access to affordable and nutritious food.[13,16]
Food environment	Food environments are created by built and social environments. They refer to what and to whom foods are made available, accessible, affordable and desirable in particular settings as well as the physical, economic, political and cultural factors that shape these contexts.[17]
Food insecurity	Broadly, food insecurity refers to the inability to meet the 5As of food security described below. In Canada, household-level food insecurity is described as inadequate or insecure access to food due to a lack of financial resources.[18]
Food justice	Food justice represents efforts to ensure that the benefits and risks of food system activities are distributed and shared fairly, and to restructure dominant food systems with a core focus on equity and linkages to other social justice activities.[19]
Food loss and waste	Food loss and waste refer to food and beverages that are discarded or rejected during multiple food system activities. Food loss typically refers to food that is rejected or thrown away during production and processing. Food waste generally refers to food that is discarded during distribution, retail and consumption. Food loss and waste occur at both system and individual levels and include food resources that are purposely wasted as well as those that spoil or are ruined by contamination.[21]
Food security	Food security is a multidimensional concept that can be thought of as the 5As: 1. Available (sufficient) 2. Accessible (physical and economic access) 3. Adequate (nutritious, safe, sustainably produced) 4. Acceptable (culturally appropriate and dignified) 5. Agency (policies and processes)[20]
Food swamp	Food swamp refers to a neighbourhood or community — usually also experiencing low social and economic resources — with a disproportionately high concentration of food options considered harmful to health, including fast food.[17]
Health inequities	Health inequities are differences in health associated with structural and social disadvantage that are systemic, modifiable, avoidable and unfair. They are rooted in social, economic, environmental and power imbalances that put groups who already experience disadvantage at further risk of poor health outcomes.[22]
Indigenous food systems	Indigenous food systems are "specific collective capacities of particular Indigenous peoples to cultivate and tend, produce, distribute, and consume their own foods, recirculate refuse, and acquire trusted foods and ingredients from other populations."[23(p150)]
Malnutrition	Malnutrition refers to deficiencies, excesses or imbalances in the consumption of fats, proteins, carbohydrates, vitamins or minerals.[24]

THE INDUSTRIAL FOOD SYSTEM IN CANADA

Canada's industrial food system relies on fossil fuels to maximize food production, and it is controlled by a handful of giant corporations that dominate core food system activities from food production to waste. For example, the top five grocery chains in Canada (i.e., Walmart, Costco, Metro, Sobeys, Loblaw) sell us 74% of our groceries.[25] What's more, the industrial food system creates an illusion of choice within supermarkets. For instance, despite supermarket shelves boasting hundreds of cereal varieties, most cereal brands are owned by just a handful of corporations.[26,27]

Embedded within a broader system of capitalism, the industrial food system prioritizes high profit margins for large corporations (e.g., Cargill, Saputo, Loblaw) and their shareholders, often at the expense of planetary and human health and well-being.[8] See Figure 2 for facts and figures on Canada's industrial food system, and Let's Talk: Redistributing power to advance health equity[28] on the relationship between power and health equity.

The history of Canada's industrial food system and its antecedents intertwines with legacies of dispossession, oppression and exploitation, including the use of enslaved and indentured labour.[29,30] This legacy persists today, resulting in uneven environmental, health and social impacts. Throughout this issue brief, we highlight these various impacts to underscore the need for food systems transformation and the roles of public health practitioners and organizations in these efforts. The following illustrative example — focusing on the strawberry food supply chain — shows how different components of Canada's industrial food system work together to generate social and health inequities.

FIGURE 2: CANADA'S INDUSTRIAL FOOD SYSTEM FACTS AND FIGURES

$600 million

Spent on food and beverage advertising annually, contributing to increased consumption of ultra-processed foods and growth in chronic diseases[31]

60%

Of food (about 35.5 million tonnes) lost or wasted every year in Canada, leading to significant climate-impacting greenhouse gas emissions[21,32]

$6 billion

Record profits for Canada's top grocery stores in 2023 — while food prices for consumers continue to rise, compromising food security[33,34]

↑ rates of food insecurity

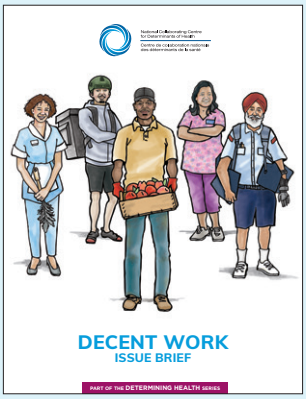
For food system workers (e.g., farm and food service workers) who are often paid less than a living wage as Canada's food system relies heavily on a racialized, underpaid workforce to keep costs of production low and maximize profits[35]

ILLUSTRATIVE EXAMPLE: STRAWBERRIES

The strawberry food supply chain illustrates how various factors work together to shape Canada's industrial food system and generate social and health inequities.

Strawberries are one of the most widely consumed fruits in Canada. Strawberries are grown commercially in all 10 provinces, with Quebec accounting for about 50% of the strawberries produced each year by weight (over 13,000 tonnes in 2021).[36] The peak season for strawberries tends to be in June and July, but **drivers** such as climate change and erratic weather patterns are leading to less predictable growing seasons and yields.[37,38]

The **inputs** used for conventionally grown (non-organic) strawberries include large amounts of chemical pesticides to prevent insect infestation. Strawberries absorb pesticides more readily than other fruits due to their soft and porous texture. More than 95% of strawberries have tested positive for residue of pesticides and other contaminants.[39] Although knowledge gaps remain on the health risks of pesticides to consumers, they are a known occupational hazard for workers and linked to **poor health outcomes**. **Farmers** and **farm workers**, and other people exposed to pesticides through their work, are at an elevated risk of various types of cancer, including prostate, kidney and lung cancers.[40]



Learn more about the health harms of precarious employment and hazardous working conditions, and the importance of decent work in *Determining Health: Decent work issue brief*.[50]

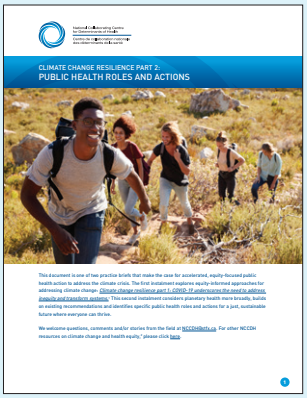
Many of the workers labouring in strawberry fields across the country are migrant farm workers who have come to Canada through programs such as the Seasonal Agricultural Worker Program (SAWP). The SAWP, created by the **Government of Canada** in 1966, allows Canadian farm employers to hire workers from Mexico, Jamaica and other Caribbean countries on temporary visas to work in agriculture.[41,42] The program offers farm workers few employment protections. It also denies workers a pathway to apply for permanent residency status, compromising their access to basic labour rights, health care and income supports. High physical demands of agricultural work combined with precarious employment conditions and a lack of protection to support worker safety, health and well-being drive the food system-related social and health inequities that these workers experience.[43]

Due to the year-round demand for strawberries, over 100,000 metric tonnes of the fruit are also imported into Canada each year. The United States is the largest supplier of imported strawberries, followed by Mexico.[44] The global **distribution** of strawberries means the popular fruit is available year-round in Canada, but it also means competition for local growers and concerns about the environmental impacts of importation (e.g., fossil fuel consumption due to transportation). Reliance on imports also makes the availability of strawberries and other produce within the country vulnerable to global shortages and fluctuations in prices,[45] vulnerabilities made especially evident by the COVID-19 pandemic.

Retail prices for food, including strawberries and other fruits and vegetables, have been rising sharply since 2020. Factors driving price increases include inflation, pandemic-related disruptions to the global supply chain, the effects of climate change, soaring energy costs[46,47] and the absence of corrective public policies. Higher prices make nutrient-dense foods more unaffordable for consumers and increase the risk of food insecurity among low-income households, a key determinant of health.

Meanwhile, an estimated 8 million metric tonnes of produce, including fresh fruits and vegetables, is **lost** or **wasted** per year along the food supply chain.[21] This includes produce left to rot in fields and warehouses, produce rejected by retailers for not meeting appearance standards, and household food waste.[21,48] Decaying fruits and vegetables in landfills release methane gas, taking a toll on the climate,[49] consequences of which are not borne equally across population groups.

Listen to our podcast episode "Disrupting migrant work"[51] to learn more about injustices migrant farm workers face and the specific challenges of work in strawberry fields.



Read our practice brief *Climate change resilience Part 2: Public health roles and actions*[52] to learn more about the relevance of climate change to public health.

2.0

WHY FOOD SYSTEMS MATTER FOR PUBLIC HEALTH

"If food systems are transformed, they can become a powerful driving force towards ending hunger, food insecurity and malnutrition in all its forms."[53(p1)]

Food is life-sustaining. It provides us with the nutrients our bodies need to stay healthy. It also connects us with each other and our cultures and fosters social connectedness, an important determinant of health. A healthy, sustainable and just food system promotes health and dignity for the entire population. It meets the nutritional needs of individuals, families and populations, and respects and protects ecological resources that contribute to the sustainability of life. It also operates in ways that uphold the human rights of consumers, workers and growers; enables self-determination within communities; and provides equitable access to nourishing, culturally safe and appropriate food for all.[9]

Food systems threaten our health and well-being when they treat workers poorly, produce food in unsustainable ways and flood our food environments with ultra-processed foods, compounding the problem of rising prices for nutrient-dense foods. Today, there are several significant and complex challenges that have deep connections to food systems and are woven into the foundations of public and planetary health.[54] These challenges include climate change, income inequality, environmental degradation, malnutrition and structural inequities.

The current industrial food system is neither healthy, sustainable nor just. For example, this is seen in rising levels of food insecurity that disproportionately affect racialized communities and people with disabilities due to oppressive systems such as anti-Black racism and ableism.[55,56] Food insecurity increases vulnerability to conditions such as poor oral health,[57] various infectious and chronic diseases, depression and anxiety, making it a significant public health issue.[58]

Moreover, policies and practices at multiple points of the industrial food system, including processing, storage, packaging, marketing and transportation, pose concerns for health and well-being.[59] These include compromises in food safety,[60,61] the exposure of workers to occupational hazards and poor working conditions,[60] and the perpetuation of structural racism.[62] From an equity perspective, "the health impacts of food systems disproportionately affect the most vulnerable in our communities, and are compounded by climate change, poverty, inequality, poor sanitation, and the prevalent disconnect between food production and consumption."[60(p1)]

Recognizing these challenges, actions to promote better food systems that go "beyond the individual responsibility of eaters … to consider the numerous drivers that impact all sectors of the food system"[61(p226)] are sorely needed. As an initial step, understanding the relationships between food systems and health and well-being is essential for all levels of public health.[63] To this aim, we undertook a literature search to support an understanding of the impacts of food systems on health inequities in Canada.

3.0

IMPACTS OF INDUSTRIAL FOOD SYSTEMS ON HEALTH INEQUITIES

This section summarizes peer-reviewed and grey literature about how industrial food systems impact health inequities. The question used to guide all stages of the evidence search, analysis and writing of this section was: How do food systems contribute to health inequities in the Canadian context?

A previous review conducted in 2015 by Weiler et al.[64] on the connections between food security, food sovereignty and health equity helped inform the review question and scope for our review. In contrast to that review, this issue brief focuses on applications to the Canadian context and draws on literature published in the last 10 years.

See Appendix A for an overview of our review methods. Appendix B contains the full list of included sources (42 in total) and their key findings.

Using thematic analysis, we identified pathways connecting food systems to health inequities and their application to the Canadian context. Examples of how industrial food systems can drive health inequities in Canada are grouped into five interconnected pathways: (1) precarious employment and hazardous working conditions, (2) climate change, (3) disruption of Indigenous food systems, (4) food policies shaping food environments, and (5) food advertising. Table 2 provides an overview of these pathways, which are discussed in more detail below. The pathways outlined in this section are not exhaustive.

TABLE 2: OVERVIEW OF PATHWAYS CONNECTING FOOD SYSTEMS TO HEALTH INEQUITIES IN CANADA

Pathway	Description	Key messages	Sources
1 **Precarious employment and hazardous working conditions**	Employment conditions associated with income instability and insecurity, and many different types of hazards and exposures experienced in the workplace (including, chemical, biological, physical and psychosocial hazards)	• Migrant farm workers are made especially vulnerable to ill health due to unsafe occupational hazards and exposures associated with their work and employment conditions. • The SAWP devalues the lives of migrant farm workers by subjecting them to unsafe working conditions, compounding the impacts of oppression and marginalization. • Precarious employment and hazardous working conditions also compromise the health of workers in other parts of the food supply chain, including food processing and food services.	Arnold et al.[65], Basok et al.[66], Castillo et al.[67], Caxaj et al.[68], Cohen & Caxaj[69], Colindres et al.[70], Curl et al.[71], Goldman et al.[72], Kearney et al.[73], Kugel & Seda[74], Lee et al.[75], Migrant Workers Alliance for Change[43], National Collaborating Centre for Determinants of Health[76], Pagan-Santana et al.[77], Svensson et al.[78], Worker Solidarity Network[79]
2 **Climate change**	Long-term shifts in temperatures and weather patterns	• Climate change drives health inequities by disrupting food security. • It functions as a threat multiplier, working with other systems and structures to amplify inequities. • Exposure to climate change-related health risks is not uniformly distributed; communities already facing inequities are most impacted.	Agostoni et al.[80], Alderhill Planning Inc.[81], Bradbear & Friel[82], Bremer & Raiten[3], Chan et al.[83], Myers et al.[84], Schnitter & Berry[85], Schnitter et al.[86], Weiler et al.[64]
3 **Disruption of Indigenous food systems**	Food system policies and practices that disrupt the ability of Indigenous Peoples to control, reclaim and safeguard their own food systems	• Industrial food systems disrupt Indigenous food systems and impact health through biodiversity loss due to industrial production practices, hydroelectric megaprojects (which can be used for irrigation) on Indigenous lands and territories, water pollution from agricultural waste, and climate change, among other mechanisms.	Alabi & Robin[87], Alderhill Planning Inc.[81], Calderon Farfan et al.[88], Chan et al.[83], Coté[89], Galloway[90], Whyte[23]

Note. SAWP = Seasonal Agricultural Worker Program.

4 **Food policies shaping food environments**	Public policies governing the physical, social, economic and cultural contexts in which consumers interact with the food system	• Food policies are failing to protect and promote the health of all people in Canada. • Food policies favour large food companies with detrimental consequences for health and well-being.	Chen & Gregg[16], Freudenberg[91], Friel et al.[92], Pineda et al.[93], Rideout et al.[17], Vandenbrink et al.[94]
5 **Food advertising**	Marketing that promotes the sale and consumption of certain types of food	• Food companies expose children and youth to marketing for sugary and ultra-processed food and beverages daily. • Different levels of exposure to food marketing across ethno-racial and income groups can drive differences in consumption patterns and generate health inequities.	Acton et al.[95], Adeigbe et al.[96], Barnhill et al.[97], Harris et al.[98], Potvin Kent et al.[31], Potvin Kent et al.[99]

SUMMARY OF REVIEWED LITERATURE

Five main pathways were identified in the literature linking industrial food systems and health inequities that can be applied to the Canadian context.

1 Precarious employment and hazardous working conditions for workers

Food production exposes workers to a range of occupational hazards, including biological, chemical, physical and psychosocial hazards, elevating their risk for occupational injury and illness[67] (see Table 3).

Migrant farm workers are made especially vulnerable to work-related health issues due to the unique structural barriers they face regarding their health, social and legal status.[69] Structural and social factors, such as precarious employment conditions, unsafe working conditions, limited safety regulations, substandard housing, exposure to pesticides and limited access to health care, contribute to health inequities for migrant farm workers.[67–71,73–75,77] For example, data from the United States and Europe indicate that migrant farm workers experience higher injury and fatality rates than U.S.- or Europe-born populations.[78] Canada lacks this type of comparative data; however, the inequities seen in other places are also likely present in the Canadian context.[100]

Migrant farm workers are essential to industrial food systems. Despite this, migrant farm workers continue to be exposed to dangerous agricultural work and lack power over their employment and working conditions. Many migrant farm workers avoid speaking out about poor working conditions for fear of retaliation, including but not limited to the termination of their contracts and deportation.[74] These factors drive significant health inequities.

In Canada, the federal government's exemption of agricultural workers from an entry ban on foreign travellers in the early months of the COVID-19 pandemic underscored the importance of migrant workers to food systems.[70,75] In 2022 alone, there were 70,365 temporary foreign agricultural workers in the country, a record high.[101] Yet migrant farm workers continue to be denied rights and protections to safeguard their health.[43,66,68,75] For instance, the SAWP denies workers the ability to apply for permanent residency status, making them more vulnerable to exploitation. The employer-specific entry visas granted under the SAWP mean that workers cannot change jobs easily and, in the face of hazardous working conditions, risk serious injury, illness and death.[43,66] SAWP workers have reported poor housing conditions, denial of medical care, inadequate training and protective equipment, and racial discrimination, among other concerns, compromising their health and well-being.[43,75]

Beyond food production, precarious employment and hazardous working conditions compromise the health of workers in other parts of the food supply chain, including food processing and food retail and services. For example, in the early days of the COVID-19 pandemic, an outbreak at a Cargill meat processing plant exposed the health ramifications of precarious working and employment conditions. Virus transmission among workers increased due to factors such as low wages and lack of paid sick days, which meant many workers could not afford to take time off despite exposure to, or testing positive for, COVID-19.[76]

TABLE 3: OCCUPATIONAL HAZARDS FOR MIGRANT FARM WORKERS AND RELATED HEALTH RISKS

Type of hazard	Example	Examples of health risks
Chemical	Pesticides	Possible increased risk of cancer, including kidney, brain, blood and skin cancers[67,74,78]
Biological	COVID-19	Serious illness and death[67,75]
Environmental	Excessive heat	Heat-related illnesses (heat cramps, heat syncope, heat exhaustion, etc.) and heatstroke[65,67,72,75,78]
Physical	Repetitive motions	Musculoskeletal disorders[67,72,75,78]
Psychosocial	Fear of termination and deportation	Stress, depression and anxiety[67,72,78]
Racial violence	Racial slurs	Mental health disorders, chronic diseases due to increased allostatic load[102]

Due to precarious employment and hazardous working conditions, food service workers, who tend to be poorly paid and racialized, have been found to be disproportionately impacted by extreme weather events, including heatwaves, floods and environmental disasters. Factors such as lack of employment contracts, inadequate protective measures (e.g., air cooling, hydration breaks), low wages and lack of paid sick days compromise the health and well-being of food service workers. Additional factors include discomfort with refusing unsafe work, little or no health benefits, and heightened physical and mental health concerns during extreme weather events.[79]

2 Climate change

Climate impacts on food systems are likely to intensify in the coming decades, both generating and deepening health inequities. The relationship between climate change and food systems is bidirectional. Food systems drive climate change and are also sensitive to its effects.[85] Effects such as rises in temperature, changes in precipitation patterns, and increased frequency and intensity of extreme weather events will impact all components of food supply chains and compromise the availability, accessibility, safety and nutritional value of food[80,82,84,85] (see Table 4). In this way, climate change is likely to increase the prevalence of food insecurity, which is linked to negative health outcomes (e.g., infectious and chronic diseases, depression, anxiety disorders).[58]

TABLE 4: HOW CLIMATE CHANGE AFFECTS FOOD SYSTEM ACTIVITIES[84,85]

Food system activity	Possible effects
Production	• Damaged agricultural lands and crops, reduced yields and limited water availability
Processing	• Food spoilage and contamination • Disrupted traditional food storage practices (e.g., in-ground freezers) used by Indigenous communities in the Canadian North
Distribution	• Compromised integrity of air, sea, rail and road food transportation infrastructure
Retail	• Increased retail food prices
Consumption	• Increased risks of food-borne illness • Emergence of new pathogens affecting industrial and Indigenous food systems • Decreased concentrations of key macro- and micronutrients (e.g., protein, iron, zinc, key minerals) in foods due to rising atmospheric carbon dioxide (CO_2)

The harms of climate-driven food system impacts will not be uniformly distributed. Structural and social determinants of health, such as income and living and working conditions, interact with oppressive systems (e.g., racism and colonialism) to make certain groups and communities more vulnerable to climate change than others. For example, as food prices increase due to global warming, structural barriers may limit the adaptive capacity of low-income households to meet their nutritional needs. Resulting shifts towards less expensive, nutrient-poor foods can widen income-driven health inequities.[82] For Indigenous Peoples, there is evidence climate change is already negatively affecting access to traditional foods, for example, through declining moose populations.[81,83] Climate change can be understood as a threat multiplier that works with other systems, structures and determinants to amplify inequities.[86]

3 Disruption of Indigenous food systems

"The separation of [Indigenous Peoples] from their historic food systems and land is not a side effect of colonialism but a function of it."[103]

Indigenous food systems are inextricably linked to the land and represent a source of physical, social, spiritual and cultural well-being. Industrial food policies and practices are rooted in settler colonialism, and have changed how food is preserved, prepared and consumed, breaking the linkages between the "cultural practices of Indigenous food systems and the land."[88(p2)]

In Canada, policies and practices that have deepened the industrial food system have simultaneously threatened Indigenous food systems. For example, the environmental degradation and climatic impacts perpetuated by the industrial food system negatively impact access to traditional foods harvested from the land and water, including wild game, seafood, berries, and other wild fruits and vegetables.[81,83] Biodiversity loss due to industrial production practices, hydroelectric megaprojects (which can be used for irrigation) on Indigenous lands and territories, water pollution from agricultural waste, and climate change have all disrupted Indigenous food systems.[81,83,88,89]

These harmful processes that are underpinned by colonialism and anti-Indigenous racism have created dependency on industrial food chains while increasing the burden of food insecurity, hunger and nutrition-related diseases among First Nations, Métis and Inuit Peoples. Governmental programs such as Nutrition North Canada have failed to address these challenges. Intended to improve food access in northern communities, Nutrition North Canada has been criticized for benefiting large food companies and perpetuating colonialism rather than allowing Indigenous Peoples to reclaim, restore and uphold control over their own food systems.[87,90,103]

4 Food policies shaping food environments

Local and national food policies interact with global factors to shape food environments. Food environments relate to questions like where grocery stores are located, what their density is in different neighbourhoods and how accessible they are to different groups of people. Food environments also encompass the types of foods available in particular places, how much they cost, and how they are advertised and marketed.[17] Food environments affect people's health by influencing food-intake behaviours, the overall quality of the foods they eat and health outcomes.[17]

Food policies determine whether food environments promote health and justice and for whom. These policies affect the types, quantities and prices of foods available in both direct and indirect ways. For example, policies may incentivize the production, distribution and consumption of processed foods through subsidies and other price supports. Food policies that favour specific food and agricultural sectors (e.g., the dairy industry in Canada) alter the affordability of these items compared to others.[92] Table 5 provides examples of how food policies shape food environments.

TABLE 5: POLICIES AFFECTING FOOD ENVIRONMENTS[92,93,104]

Policy domain	Focus	Examples
Food composition	Nutrient content of foods	Ban on artificial trans-fats
Food labelling	Food packaging and menu labelling	Traffic light nutrition labels
Food advertising	Exposure to advertising	Restriction of advertising to children and youth
Food prices	Taxes and subsidies applied to foods	Taxes on sugar-sweetened beverages
Food retail	Types of foods available in retail outlets (e.g., grocery stores)	Policies related to food signage and in-store promotions
Food trade	Trade and investment agreements related to food distribution	Canada-United States-Mexico Agreement
Food provision	Policies in government-funded settings	Healthy school food programs

Even though rates of chronic disease are rising in Canada, food policies continue to privilege the interests of large food companies. As a result, these companies are able to flood food environments with nutrient-poor foods while stressing personal responsibility for food choices.[91,94] The food and beverage industry exerts significant influence over the Canadian food policy agenda (see Table 6).

TABLE 6: HOW THE FOOD AND BEVERAGE INDUSTRY INFLUENCES FOOD POLICIES IN CANADA[94]

Industry strategy	Examples
Information and messaging	• Frame debates and understandings of the connections between food and public health issues • Accentuate the nutritional value of industry products • Emphasize the role of individual responsibility related to food choices and downplay the influence of the food and beverage industry in shaping these choices
Policy substitution	• Develop and promote alternatives to policies that would harm the industry's bottom line (e.g., push for voluntary instead of mandatory initiatives related to the sale of sugar-sweetened beverages in schools)
Other	• Establish relationships with health organizations • Influence trade and investment agreements

The influence of food companies driven by a profit motive coupled with a lack of appropriate policies to safeguard the health of all people in Canada drive poor health outcomes and health inequities among groups already facing structural inequities. For example, areas with a high density of food retail outlets selling nutrient-poor foods — often referred to as food swamps (a term some note as problematic, e.g., see Elton[105]) — are common in lower-income neighbourhoods.[16] As an alternative, the term food apartheid can be used to point to the structural injustices that underlie inequitable access to good quality, nutritious food.[13]

The relative influence of different features of food environments on health outcomes remains understudied.[17] For example, it is unknown whether density of or proximity to outlets selling nutrient-poor foods has more influence on food choices.[16]

FOOD DESERT, FOOD SWAMP OR FOOD APARTHEID?

Food desert, food swamp and food apartheid are three terms used to describe inequitable access to nutritious food in particular neighbourhoods or communities.

Historically, **food desert** has been the most common of these terms, describing a low-income neighbourhood where people lack access to affordable, nourishing food options. However, this term has come under increasing scrutiny for several reasons.[13,106] For one, the term does not speak to the structural causes at the root of the issue. Further, the word desert implies these areas are naturally occurring and not the result of harmful policies and practices.[106,107] What's more, interventions to address food deserts often focus on increasing the number of grocery stores in neighbourhoods rather than addressing structural inequities.[107] And lastly, food deserts, as per the criteria used to identify them, are more of an American phenomenon and less widespread in Canada.[16,105]

For this last reason, some scholars suggest the term **food swamp** is more appropriate in the Canadian context to describe a more common type of food environment where there is an overabundance of retail outlets considered harmful to health (e.g., fast food).[16] But this term has been critiqued as being misleading and inaccurate because swamps are wetlands, rich in nutrients and important to healthy ecosystems.[105]

Food justice advocates are increasingly using the term **food apartheid** to indicate how various forms of oppression work together to create neighbourhoods where people are denied access to nourishing, culturally appropriate and affordable food.[13]

5 Food advertising

Food advertising contributes to the development of malnutrition, cardiovascular disease and diabetes, among other conditions, by influencing food preferences and intake, especially for children and youth.[99] Food advertising is big business. In Canada, food companies spend over $600 million a year on advertising.[31] Most advertising geared towards children and youth promotes ultra-processed foods that are high in sugar, saturated fat and/or salt, like fast foods, salty snacks and sugar-sweetened beverages and cereals.[31] Every day, children and youth are exposed to high levels of food advertising through both digital and non-digital media and in a range of settings, including home, school and recreational settings.[95]

Food companies use a variety of tactics to appeal to young people, including celebrity endorsements and cartoon characters. Because not all groups of children and youth are exposed to food advertising at the same rate, the extent to which they are made vulnerable to nutrition-related diseases also differs across subgroups. For example, Black and Latinx children and youth in the United States experience disproportionately high rates of exposure to food-related ads because food companies target them in their marketing efforts.[96–98]

Food companies, driven by a profit motive, are incentivized to market nutrient-poor foods and drinks to racialized communities. These practices are reinforced by processes of structural racism (e.g., redlining and segregation) that influence food environments, working together to produce health inequities.[98]

Different rates of exposure to food-related ads are also seen in the Canadian context. South Asian, Black and Indigenous children and youth, and young people from lower-income households experience the highest rates of exposure to food advertising. It is not known whether racialized and income-based differences in Canada relate to variations in media consumption patterns across groups or result from food companies' targeted marketing practices.[95] Regardless, these disparities can exacerbate health inequities among sociodemographic groups that can persist across the life course.

In Canada, as of February 2024, legislation is pending that would restrict advertising of foods high in sugar, saturated fat and/or salt to children under the age of 13.[108]

SUMMARY OF KNOWLEDGE GAPS

The five pathways outlined above provide examples of how food system drivers and activities generate health inequities, applicable to the Canadian context. Substantial knowledge gaps remain about the health implications of food systems in Canada. For example, there is a need for more evidence in the following areas:

- effects of pesticide exposure through food intake on human health,[109]
- ways that targeted food marketing practices toward racialized communities[95] produce and worsen health inequities,
- influence of structural and systemic racism on food environments,
- corporate influence on food policies related to ultra-processed foods,
- risk of injury and fatality among migrant farm workers compared to other categories of workers and the underlying causes of these disparities, and
- impacts of altered nutrient intakes due to climate change on overall health.[84]

4.0

CONCLUSION – FOOD SYSTEMS APPROACH TO ADDRESS HEALTH INEQUITIES

"Food systems advocates and public health advocates seeking to address health disparities must join forces with those working to address underlying social inequities, including poverty and racism that interact with food system factors to influence disease risk."[7(p304)]

A food systems approach, rather than focusing on what contributes to individual food behaviours, provides a powerful opportunity to recognize the complexity of drivers within food systems that intersect with population health. Food justice works to ensure that the benefits and risks of food system activities are distributed and shared fairly, and to restructure dominant food systems with a core focus on equity and linkages to other social justice activities.[19] Many opportunities exist to transform Canada's industrial food system to better meet the demand for nutritious, safe, affordable, accessible, culturally relevant and sustainable ways of eating,[110,111] oriented towards food justice.

Public health practitioners and organizations across the country have scopes of work that intersect with food systems and therefore can play key roles in their transformation.

The nature of interconnected drivers, impacts and health outcomes necessitates a collaborative systems approach across multiple sectors including public health.[112] Public health practitioners and leaders are in key positions to facilitate collaborative approaches across systems, sectors and professions. They play an important role in promoting evidence and strategies in food systems approaches that impact public health goals.[54]

Building on this issue brief, the National Collaborating Centre for Determinants of Health will develop a practice brief exploring food justice as a strategy to address food system inequities and ways for public health policy-makers, educators, practitioners and leaders to take action.

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APPENDIX A – EVIDENCE REVIEW METHODS AND APPROACH

Review question

The question used to guide all stages of the evidence search, analysis and writing of this issue brief was: How do food systems contribute to health inequities in the Canadian context?

A previous review conducted by Weiler et al. (2015) on the connections between food security, food sovereignty and health equity helped inform the review question and scope for the issue brief. In contrast to that review, this brief focuses on applications to the Canadian context and draws on literature published in the last 10 years.

Search method

We designed the literature search in consultation with a professional librarian who then searched for academic literature in PubMed, CINAHL, Scopus, Web of Science and ProQuest. We conducted grey literature searches in Google and hand searched the following journals: *Global Public Health; Agriculture and Human Values; Public Health Nutrition; Journal of Agriculture, Food Systems, and Community Development; Food Policy; and International Journal for Equity in Health*.

Search terms included key concepts related to food systems and health equity. The full list of search terms can be made available upon request.

Selection process

We screened results based on the eligibility criteria described in Table A1. Screening of titles and abstracts was done first, followed by an additional level of full-text screening of all peer-reviewed and grey literature sources.

A subset of sources eligible for further analysis and data extraction was identified using an adapted purposive sampling framework[113] to select articles with rich in-depth information, representing geographic spread across Canada, covering both rural and urban contexts, covering a range of food system drivers, and prioritizing empirical studies. A subset of articles focusing on racial health equity in relation to food systems was also prioritized. A total of 42 publications were selected for inclusion in the issue brief.

TABLE A1: ELIGIBILITY CRITERIA FOR SCREENING

Include
Published between 2013 and 2023
Published in English, French or Spanish
Focus on the global context (non-specific) or population in countries classified as high-income countries by the World Bank
Central focus on one or more aspect of food systems
Discusses connections between food systems and health (in)equities
Exclude
Published before 2013
Not published in English, French or Spanish
Full text is inaccessible through St. Francis Xavier University and University of Toronto library services
Conference posters, conference papers or abstracts
Focus on individual-level food behaviours without connection to larger social/structural food system-related factors

Data extraction and thematic analysis

The following data were extracted from the selected sources by the primary author of this issue brief:

- author(s)
- year of publication
- publication type (review, technical report, etc.)
- geographic focus (e.g., country, region, city)
- objectives of article
- definition of food system
- definition of health inequities
- key findings related to food systems and their connections to health (in)equities

Thematic analysis was conducted to identify pathways connecting food systems to health inequities and their application to the Canadian context.

APPENDIX B – REVIEWED LITERATURE

Author (Date)	Title	Publication type	Geographic focus	Objective	Key findings
Acton et al.[95] (2023)	Examining differences in children and adolescents' exposure to food and beverage marketing in Canada by sociodemographic characteristics: Findings from the International Food Policy Study Youth Survey, 2020	Original research	Canada	Examine associations between exposure to food and beverage marketing in Canada and sociodemographic characteristics	Racialized children and youth, and young people from lower-income households experience greater rates of exposure to food advertising compared to White and higher-income young people.
Adeigbe et al.[96] (2015)	Food and beverage marketing to Latinos: A systematic literature review	Review	United States	Identify food and beverage marketing strategies used to influence food environments for Latinx versus non-Latinx consumers	Latinx consumers are at a disadvantage when it comes to exposure to health-lifestyle messaging and availability of nutrient dense foods in their neighbourhoods.
Agostini et al.[80] (2023)	Interlinkages between climate change and food systems: The impact on child malnutrition—Narrative review	Review	Global	Review the key issues relating to child malnutrition with a particular focus on climate change and food systems	Climate change is likely to worsen child malnutrition through impacts on household food security, dietary diversity, nutrient quality and access to maternal and child health.
Alabi & Robin[87] (2023)	Food insecurities and dependencies: Indigenous food responses to COVID-19	Commentary/ Perspective	Canada	Discuss food insecurity in Indigenous communities in Canada	Indigenous Peoples experience higher rates of food insecurity compared to other groups in Canada. Programs such as Nutrition North Canada have failed to address the issue of food insecurity. Support for Indigenous food sovereignty offers an opportunity to address food insecurity among Indigenous Peoples.

APPENDIX B – REVIEWED LITERATURE - CONT.

Author (Date)	Title	Publication type	Geographic focus	Objective	Key findings
Alderhill Planning Inc.[81] (2022)	Indigenous food sovereignty and food security in a changing climate: What was heard from Indigenous engagements	Report	Canada	Explore stories of Indigenous food security and food sovereignty in the face of climate change	Indigenous food sovereignty and food security are intimately connected to access to land and self-determination.
Arnold et al.[65] (2020)	Heat-related illness among Latinx child farmworkers in North Carolina: A mixed-methods study	Original research	United States	Describe how Latinx children perceive heat hazards, report the frequencies of heat-related illness among a sample of Latinx child farm workers, and examine the associations between personal characteristics and experiences of heat-related illness	Heat-related illness is common among child farm workers in North Carolina. There are limited workplace protections safeguarding children from heat-related illness.
Barnhill et al.[97] (2022)	The racialized marketing of unhealthy foods and beverages: Perspectives and potential remedies	Commentary/ Perspective	United States	Present a conceptual model that illustrates patterns of racialized food marketing and its contributions to health inequities	Marketing of foods and beverages to Black and Latinx consumers is rooted in a business model in which profits come from marketing a mix of products high in sugar, fat and/or salt, standard targeted marketing strategies, and societal forces of structural racism, which contribute to health inequities.

APPENDIX B – REVIEWED LITERATURE - CONT.

Author (Date)	Title	Publication type	Geographic focus	Objective	Key findings
Basok et al.[66] (2023)	The 'contract' and its discontents: Can it address protection gaps for migrant agricultural workers in Canada?	Commentary/ Perspective	Canada	Discuss structural contexts constraining opportunities to ensure agreements related to the Seasonal Agricultural Worker Program address the range of vulnerabilities migrant agricultural workers face	Sending states (Global South countries) are at a disadvantage in negotiating agreements with receiving states regarding migrant agricultural work due to global racialized capitalism. State representatives are hesitant to push for demands that would help ensure employers meet their labour requirements. As a result, migrant agricultural workers are at an unequal position related to their Canadian employers.
Bradbear & Friel[82] (2013)	Integrating climate change, food prices and population health	Review	High-income countries	Examine how climate change is likely to affect food prices	Climate change is likely to impact food prices through multiple pathways, including changes in agricultural yields, prices of inputs and changes in consumer demand.
Bremer & Raiten[3] (2023)	The reciprocal relationship between climate and environmental changes and food systems and its impact on food/ nutrition security and health	Commentary/ Perspective	United States	Describe the interactions between climate and environmental change, food systems, food/ nutrition security and health	The relationship between climate and environmental changes and food systems is bidirectional with implications for nutrition and health.
Calderon Farfan et al.[88] (2023)	Food sovereignty and autonomy for indigenous health as resistance to food globalization: Scoping review	Review	Global	Summarize the literature on Indigenous food sovereignty and autonomy in the context of food globalization	Indigenous food sovereignty and food autonomy practices pose resistance to the policies of the agri-food industry rooted in neoliberal globalization.
Castillo et al.[67] (2021)	Environmental health threats to Latino migrant farmworkers	Review	United States	Summarize the effects of hazards for Latinx migrant farm workers	Environmental, occupational and social hazards can exacerbate existing health inequities among Latinx migrant farm workers.

APPENDIX B – REVIEWED LITERATURE - CONT.

Author (Date)	Title	Publication type	Geographic focus	Objective	Key findings
Caxaj et al.[68] (2020)	Borders and boundaries in the lives of migrant agricultural workers: Towards a more equitable health services approach	Commentary/ Perspective	Canada	Examine the structural exclusion faced by migrant agricultural labourers participating in the Seasonal Agricultural Worker Program	Migrant farm workers face various forms of exclusion related to border politics, and everyday exclusionary practices due to geographic, linguistic and workplace restrictions.
Chan et al.[83] (2021)	FNFNES final report for eight Assembly of First Nations regions: Comprehensive technical report	Report	Canada	Examine the nutritional adequacy, quality and safety of traditional foods with the Assembly of First Nations regions, and assess the food security and well-being of First Nations communities	Traditional foods continue to be very important for First Nations, but current access to these foods do not meet needs. First Nations are experiencing a dietary transition away from traditional foods due to various factors including climate change, pollution, and governmental regulations related to traditional food practices.
Chen & Gregg[16] (2017)	Food deserts and food swamps: A primer	Primer	Canada	Introduce the concept of food environments and discuss their related health implications	Food environments are an important determinant of health through their influence on food choices.
Cohen & Caxaj[69] (2023)	A lifeline in troubled waters: A support intervention for migrant farm workers	Original research	Canada	Report on the evaluation of a support intervention for migrant agricultural workers	A service delivery intervention holds the potential to address challenges faced by migrant agricultural workers. The wider constraints these workers experience related to their precarious status compromise their health, and greater policy action is urgently needed.

APPENDIX B – REVIEWED LITERATURE - CONT.

Author (Date)	Title	Publication type	Geographic focus	Objective	Key findings
Colindres et al.[70] (2021)	Migrant agricultural workers' health, safety and access to protections: A descriptive survey identifying structural gaps and vulnerabilities in the Interior of British Columbia, Canada	Original research	Canada	Characterize the health, safety and social care environment of migrant agricultural workers in British Columbia	Migrant agricultural workers experience various health and social challenges across multiple domains, including living and working conditions; barriers to rights, health and safety advocacy and reporting; and accessibility of health and social services.
Coté[89] (2016)	"Indigenizing" food sovereignty. Revitalizing Indigenous food practices and ecological knowledges in Canada and the United States	Commentary/ Perspective	Canada	Analyze the concept of food sovereignty in terms of its potential to inform the revitalization of Indigenous food practices and ecological knowledge	Globalization and neoliberal food production practices have impoverished Indigenous Peoples by displacing them from the land. A focus on Indigenous food sovereignty holds potential to nurture individual and community health and foster healthy relationships — weakened by colonialism, neoliberalism, displacement and capitalism — between Indigenous Peoples and the natural world.
Curl et al.[71] (2021)	Understanding challenges to well-being among Latina farmworkers in rural Idaho using in an interdisciplinary, mixed-methods approach	Original research	United States	Identify social, cultural and workplace-related risk factors affecting well-being among Latinx farm workers in rural Idaho	Long work hours, concerns about pesticide exposure and lack of enforcement of regulatory protections contribute to health inequities among farm workers in rural Idaho.
Freudenberg[91] (2016)	Healthy-food procurement: Using the public plate to reduce food insecurity and diet-related diseases	Commentary/ Perspective	Global	Discuss the role of government public food procurement strategies in reducing food insecurity and nutrition-related diseases	Governments can use state food procurement practices to counteract the influence of the global food industry whose ultra-processed foods dominate the global food supply and contribute to increasing burdens of nutrition-related diseases.

APPENDIX B – REVIEWED LITERATURE - CONT.

Author (Date)	Title	Publication type	Geographic focus	Objective	Key findings
Friel et al.[92] (2015)	Evidence review: Addressing the social determinants of inequities in healthy eating	Review	Australia	Review the evidence base on the social determinants of inequities in healthy eating and identify promising evidence-based approaches for promoting equity in healthy eating	Various structural determinants of inequities related to healthy eating — including governance, food environment-related policies, economic policies, and cultural and societal norms and values — intersect with daily living conditions to produce health inequities. Promising approaches include nutrition-specific and nutrition-sensitive policies, regulatory controls, and targeted food relief programs.
Galloway[90] (2017)	Canada's northern food subsidy Nutrition North Canada: A comprehensive program evaluation	Original research	Canada	Evaluate the extent to which Nutrition North Canada is meeting its goals related to improving access to perishable nutritious food	Nutrition North Canada is not ensuring that northern communities have access to affordable perishable nutritious food.
Goldman et al.[72] (2021)	Essential and in crisis: A review of the public health threats facing farmworkers in the US	Report	United States	Review the public health threats faced by farm workers in the United States	Factors such as discrimination, substandard housing, strained social support networks and limited access to care contribute to poor health outcomes among farm workers.
Harris et al.[98] (2022)	Targeted food and beverage advertising to Black and Hispanic consumers: 2022 update	Report	United States	Examine racially targeted food advertising trends and practices	There have been overall declines in Black and Latinx consumers' exposure to TV food ads. However, food and beverage advertising continues to target Black and Latinx people, and primarily promote high calorie, low-nutrient food and beverages.

APPENDIX B – REVIEWED LITERATURE - CONT.

Author (Date)	Title	Publication type	Geographic focus	Objective	Key findings
Kearney et al.[73] (2020)	Respiratory health and suspected asthma among hired Latinx child farmworkers in rural North Carolina	Original research	United States	Assess respiratory health problems among Latinx child farm workers in North Carolina	Close to one third of child farm workers had at least one breathing problem; more than 30% had asthma.
Kugel & Seda[74] (2021)	Migrant and seasonal farmworkers: Cancer risks, barriers to care, and ways to overcome them	Commentary/ Perspective	United States	Explore factors contributing to increased risk of cancer among migrant and seasonal farm workers	Migrant and seasonal farm workers experience numerous barriers that increase their cancer risk, related to access to health care, economic, cultural, linguistic and logistical challenges.
Lee et al.[75] (2022)	COVID-19 violence and the structural determinants of death: Canada's seasonal agricultural worker programme	Commentary/ Perspective	Canada	Discuss the relationships between the Seasonal Agricultural Worker Program and structural determinants of death	The Seasonal Agricultural Worker Program increases farm workers' vulnerability to illness and death through poor working conditions, substandard housing, limited access to health care, separation from family and denial of permanent residency.
Migrant Workers Alliance for Change[43] (2020)	Unheeded warnings: COVID-19 & migrant workers in Canada	Report	Canada	Describe the injustices that underlie Canada's food system that contribute to the challenges faced by migrant farm workers	Migrant farm workers face several challenges that compromise their health and well-being and increase their vulnerability to COVID-19. These include lack of access to permanent residency status, poor housing conditions, and interpersonal and systemic racism.
Myers et al.[84] (2017)	Climate change and global food systems: Potential impacts on food security and undernutrition	Review	Global	Review the main pathways through which climate change can influence the food system and impact food security and health	Climate change will impact the quality and quantity of food produced and its distribution, with disproportionate impacts on low-income populations.

APPENDIX B – REVIEWED LITERATURE - CONT.

Author (Date)	Title	Publication type	Geographic focus	Objective	Key findings
National Collaborating Centre for Determinants of Health[76] (2023)	Learning from Practice: Joint Action for Equity – Community-centred collaboration responds to Cargill outbreak	Report	Canada	Examine how public health, primary care and community organizations responded to a COVID-19 outbreak at a Cargill meat processing plant in rural Alberta	Transmission of COVID-19 at the plant was influenced by multiple factors, including precarious employment conditions and crowded housing conditions. Public health, primary care and community partners worked together to respond to the outbreak.
Pagan-Santana et al.[77] (2023)	Deepening the divide: Health inequities and climate change among farmworkers	Commentary/ Perspective	United States	Introduce a framework to assess the climate crisis and its impact on farm workers	Farm workers, particularly migrant farm workers, are made more vulnerable to the health effects of climate change due to substandard housing and poor working conditions.
Pineda et al.[93] (2022)	Policy implementation and priorities to create healthy food environments using the Healthy Food Environment Policy Index (Food-EPI): A pooled level analysis across eleven European countries	Original research	Europe	Evaluate the implementation of policies for healthy food environments in European countries	The proportion of policy implementation varied across country contexts. There is an opportunity to improve policy implementation to tackle the burden of non-communicable diseases.
Potvin Kent et al.[31] (2022)	Food and beverage advertising expenditures in Canada in 2016 and 2019 across media	Original research	Canada	Estimate the expenditures on food and beverage advertising in Canada by food type between 2016 and 2019	Over $600 million was spent on food and beverage advertising in Canada in 2019, over 85% of which was spent on products classified as unhealthy.
Potvin Kent et al.[99] (2023)	Differences in child and adolescent exposure to unhealthy food and beverage advertising on television in a self-regulatory environment	Original research	Canada	Compare children and adolescents' exposure to food advertising on television in Canada	Adolescents had higher rates of exposure to advertising of food and beverages high in sugar, fat and/or salt compared to children.

APPENDIX B – REVIEWED LITERATURE - CONT.

Author (Date)	Title	Publication type	Geographic focus	Objective	Key findings
Rideout et al.[17] (2015)	Food environments: An introduction for public health practice	Primer	Canada	Introduce the concept of food environments and outline their connections to health	Food environments affect food purchasing, eating choices, the quality of food people eat and nutrition-related health outcomes.
Schnitter & Berry[85] (2019)	The climate change, food security and human health nexus in Canada: A framework to protect population health	Review	Canada	Introduce an analytical framework that outlines the connections between climate change, food security and human health	Climate change, food security and human health are interrelated.
Schnitter et al.[86] (2022)	Climate change and health equity (In: Health of Canadians in a changing climate: Advancing our knowledge for action)	Book chapter	Canada	Examine the connections between climate change and health equity	Climate change is already negatively impacting the health of Canadians and will amplify health inequities. People disproportionately affected by climate change include children; pregnant people; First Nations, Inuit and Métis Peoples; people with chronic illnesses; outdoor workers; individuals with low income; and people with disabilities.
Svensson et al.[78] (2013)	Migrant agricultural workers and their socio-economic, occupational and health conditions – A literature review	Review	Global	Summarize current knowledge about migrant work in agriculture	Migrant farm workers experience poor working conditions and face numerous hazards detrimental to their health such as occupational, chemical and ergonomic hazards.

APPENDIX B – REVIEWED LITERATURE - CONT.

Author (Date)	Title	Publication type	Geographic focus	Objective	Key findings
Vandenbrink et al.[94] (2020)	Strategies used by the Canadian food and beverage industry to influence food and nutrition policies	Original research	Canada	Identify strategies used by food industry and non-industry groups to influence food and nutrition policy in Canada	Industry groups employ a wide variety of strategies to influence policy, including those related to framing discourses around food and public health, shaping the evidence base, and developing alternatives to proposed policies.
Weiler et al.[64] (2015)	Food sovereignty, food security and health equity: A meta-narrative mapping exercise	Review	Global	Synthesize evidence on pathways through which global food systems impact health equity	Eight pathways to health (in)equity through food systems were identified.
Whyte[23] (2015)	Indigenous food systems, environmental justice, and settler-industrial states (In: Global food, global justice: Essays on eating under globalization)	Book chapter	Global	Discuss how environmental injustice disrupts Indigenous food systems in settler-industrial states	Environmental injustice targets Indigenous food systems and creates conditions to which Indigenous Peoples cannot adapt without having their food systems erased. Indigenous environmental justice advocacy focuses on resistance to settler-industrial food systems and on the revitalization of Indigenous food systems.
Worker Solidarity Network[79] (2023)	Can't stand the heat? Get out of the kitchen! The impact of extreme weather events on food service workers in British Columbia	Report	Canada	Explore the impact of extreme weather events on food service workers in British Columbia	B.C. food workers face a variety of issues that make them particularly vulnerable to the impacts of climate change, including poor wages, mistreatment and lack of protection from extreme weather events.