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2014

Faculty of Social Sciences

Faculty Publications

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Original citation:

Weiler, A. M., Hergesheimer, C., Brisbois, B., Wittman, H., Yassi, A., & Spiegel, J. M. (2014). Food sovereignty, food security and health equity: a meta-narrative mapping exercise. *Health Policy and Planning*, 30(8), 1078–1092.

<https://doi.org/10.1093/heapol/czu109>

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REVIEW

Food sovereignty, food security and health equity: a meta-narrative mapping exercise

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Accepted 29 August 2014

There has been growing policy interest in social justice issues related to both health and food. We sought to understand the state of knowledge on relationships between health equity—i.e. health inequalities that are socially produced—and food systems, where the concepts of ‘food security’ and ‘food sovereignty’ are prominent. We undertook exploratory scoping and mapping stages of a ‘meta-narrative synthesis’ on pathways from global food systems to health equity outcomes. The review was oriented by a conceptual framework delineating eight pathways to health (in)equity through the food system: 1—Multi-Scalar Environmental, Social Context; 2—Occupational Exposures; 3—Environmental Change; 4—Traditional Livelihoods, Cultural Continuity; 5—Intake of Contaminants; 6—Nutrition; 7—Social Determinants of Health and 8—Political, Economic and Regulatory context. The terms ‘food security’ and ‘food sovereignty’ were, respectively, paired with a series of health equity-related terms. Combinations of *health equity* and *food security* (1414 citations) greatly outnumbered pairings with *food sovereignty* (18 citations). Prominent crosscutting themes that were observed included climate change, biotechnology, gender, racialization, indigeneity, poverty, citizenship and HIV as well as institutional barriers to reducing health inequities in the food system. The literature indicates that food sovereignty-based approaches to health in specific contexts, such as advancing healthy school food systems, promoting soil fertility, gender equity and nutrition, and addressing structural racism, can complement the longer-term socio-political restructuring processes that health equity requires. Our conceptual model offers a useful starting point for identifying interventions with strong potential to promote health equity. A research agenda to explore project-based interventions in the food system along these pathways can support the identification of ways to strengthen both food sovereignty and health equity.

Keywords Food security, food sovereignty, health equity, meta-narrative, social determinants, social justice

KEY MESSAGES

- Crosscutting themes in English-language literature on food security and health equity include climate change, biotechnology, gender, racialization, indigeneity, poverty, citizenship and HIV as well as institutional barriers to reducing health inequities in the food system.
- The concept of food sovereignty has important but largely unexplored affinities with health equity.
- Food sovereignty-based approaches such as advancing healthy school food systems, promoting soil fertility, gender equity and nutrition, and addressing structural racism, can complement the longer-term socio-political restructuring processes that health equity occasions.

Introduction

Food systems and health equity

Social justice considerations are gaining currency in contemporary discourses on both food systems and public health. As the United Nations Special Rapporteur on the Right to Food observed, 'Measured against the requirement that they should contribute to the realization of the right to food, the food systems we have inherited from the twentieth century have failed' (De Schutter 2014, p. 4). Within the public health domain, there has been a marked surge in attention over the past decade towards the concept of 'health equity,' which Braveman *et al.* (2011) characterize as 'social justice in health' (p. 150). Health equity involves identifying and equalizing the spread of social and economic factors that shape human health (Marmot and Wilkinson, 2006; Dahlgren and Whitehead 2006; Exworthy *et al.* 2006; Exworthy 2008; Raphael *et al.* 2008; Navarro 2009). Normative theories of health equity have specified that unfair health inequalities are those 'that are amenable to positive human interventions' (Norheim and Asada 2009), and that improving health equity should not lead to unacceptable sacrifices in the health of the population at large or other values.

A dominant theme in research, policy and activism focused on food systems has been the concept of 'food security.' Food security is commonly defined as existing 'when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life' (FAO 2006). Food security is a useful heuristic for understanding food-related health concerns at overlapping scales. However, after providing a closer overview of the history and application of food security, we explore the emerging concept of *food sovereignty* (Wittman 2011; Patel 2012), which has important yet largely unexplored affinities with the goals of health equity. Food sovereignty involves a broader vision than food security, asserting communities' power to democratically manage productive food system resources such as land, water and seeds, and to engage in trade on their own terms rather than being subjected to speculation through international commodity markets (Desmarais 2007; Wittman 2011).

For instance, a food sovereignty lens is attentive to the ways in which the concentration of corporate power in the food system has generated contemporary health crises (Plahe *et al.* 2013). Such crises include the chronic hunger experienced by one in eight people worldwide, the majority of whom live in 'developing' countries (FAO 2013), the growing prevalence of

non-communicable diseases associated with the spread of unhealthy western diets (Cordain *et al.* 2005; Sherwood *et al.* 2013), as well as the health impacts of intensive pesticide use and agro-industrial production technologies on agricultural producers and affected communities (Wesseling *et al.* 1997; Alavanja *et al.* 2004; London 2009). While it has been tempting for many organizations to simply adopt the language of food sovereignty as a 'name check' (Fairbairn 2011, p. 224), meaningfully bringing food sovereignty principles to bear on health equity research and practice nonetheless offers transformative potential in realizing health equity through the food system.

Tracing the roots of food security and food sovereignty

Since it was introduced at the 1974 World Food Conference and became popularized in the 1980s, the concept of food security has circulated widely in scholarly theorizing and as a guide for many state health-related interventions (Jarosz 2011). In the 1980s, suprastate institutions such as the World Bank and World Trade Organization began appealing to food security discourse as a way to justify neoliberal trade liberalization projects (Otero *et al.* 2013). This is consistent with the understanding of the term 'neoliberalism' as an economic and political doctrine that advocates privatizing and reducing government spending on public services, removing regulations that constrain markets and eliminating trade tariffs in order to promote economic growth (Harvey 2005; Alkon and Mares 2012). Neoliberal discourse has rationalized health disparities generated by political and economic restructuring on the basis that liberalized markets have not yet been sufficiently liberalized. The period of the neoliberal turn in the 1980s witnessed a shift away from the prevailing paradigm of food self-sufficiency, which involved provisioning for domestic markets and trading surplus food. In its place came an imperative to ensure adequate food availability through the logics of free trade, 'comparative advantage' and international aid (FAO 2003, 2006; McIntyre 2003; Labonte and Schrecker 2006; Caraher and Coveney 2004; Lee 2013; Otero *et al.* 2013).

The food security concept has been reframed in various ways since its initial focus on providing a sufficient aggregate food supply for the nation-state (Fairbairn 2011). For example, North American anti-poverty advocates, nutritionists and scholars have mobilized around 'community' food security as an alternative to individualized and charity-based approaches to hunger (Winne *et al.* 1997; Riches 1999; Mundel 2013). Community food security contrasts with the Food and

Agriculture Organization of the United Nations (FAO) food security definition in its emphasis on sustainability, social justice and self-reliance at the community scale (Hamm and Bellows 2003). Generally speaking, however, community food security shares with its FAO antecedent an inclination towards technical market-based options, such as farmers' markets and community-supported agriculture, without necessarily probing causative factors that generate health inequity.

Both food security and community food security have been readily adopted as part of public health programmes led by non-governmental bodies, civil society organizations, scholars and governments responding to growing food insecurity among marginalized populations (Koc *et al.* 2008; Ashe and Sonnino 2012; van Elsland *et al.* 2012). Such public health initiatives often face institutional pressures to measure programmatic success based on individual human health outcomes (Seed *et al.* 2013). Accordingly, community food security initiatives often correspond in disconcerting ways to neoliberal injunctions for individuals to become 'rational' economic actors who are responsible for their own health (Allen 2004; Janes 2004). For example, a focus on developing people's cooking skills and food literacy through projects such as community kitchens tends to neglect the root causes of poverty and income inequality (Tarasuk 2001; McCullum *et al.* 2004; Engler-Stringer 2011).

This individualizing approach shifts the responsibility for health provisioning away from the state, a trend also documented with respect to health systems (Navarro 2009; Masuda *et al.* 2012). It also tends to de-emphasize the socio-political contexts that structure individual health outcomes, such as colonialism (Mundel and Chapman 2010), age and gender-related inequalities (Foley 2008), and child-targeted food advertising (Nestle 2013). Further, as Fairbairn (2011) contends, a local grassroots foundation is one of the strengths of community food security activism. However, an inflexibly localist approach would likely limit the capacity of this movement to move beyond minor reform as a way to grapple with globalized corporate control of the food chain and broader food system transformation (Hinrichs 2003; Johnston and Baker 2005; Fairbairn 2011).

Food sovereignty and human health

Unlike food security, food sovereignty has faced challenges entering the public and policy realm (Hospes 2013). Small-scale farmers belonging to the international peasant movement 'La Via Campesina,' which has largely been based in the Global South, officially defined the term in 1993 (Torrez 2011). The definition continues to evolve, but it can be broadly understood as a call for people to have a greater capacity to ensure that farming, fishing, labour and land policies are appropriate to the diverse social and ecological contexts in which they occur (Wittman 2011). Grounded in these roots, food sovereignty is explicitly critical of the dominant neoliberal economic system (Holt-Giménez and Shattuck 2011). It envisions democratic ownership of food resources and policies at all scales, and not merely the local level or even the nation-state (Windfuhr and Jonsén 2005; Patel 2010; Gurcan 2014). From a social justice perspective, it is attentive to equalizing power in the food system, and it places particular weight on gender equity (Patel 2009, 2012). Some of the food sovereignty movement's more

prominent demands include agrarian reform for landless peasants (Rosset 2011), struggles against the control of seeds by transnational agribusiness corporations (Bezner Kerr 2013), and indigenous self-determination to engage in traditional foodways and adaptive land management (Bell-Sheetter 2004; Morrison 2011; Rocha and Liberato 2013).

The relationship between food sovereignty and health equity figures especially prominently in many indigenous food sovereignty frameworks. In light of the disproportionate burden of diet-related ill health affecting indigenous peoples, and the role of food and relations to land in cultural identity, many advocates have rallied around legal policy reform in areas such as health programming to promote indigenous food sovereignty (Woodley *et al.* 2009; Desmarais and Wittman 2014). Indigenous food sovereignty describes diverse indigenous communities' ability to make decisions about their own consumption of healthful, culturally adapted indigenous foods, as well as their harvesting practices and relationships with the land (Morrison 2011; Thompson *et al.* 2012; Rocha and Liberato 2013; Meyer 2014). Some indigenous food sovereignty movements have underscored how other forms of food sovereignty can be state- and agriculture-centric (Desmarais and Wittman 2014). These indigenous movements thus provide a critical counterpoint for non-indigenous food sovereignty allies.

Within Euro-North American health equity literature and practice, however, food sovereignty has not yet been widely adopted. This is likely in part due to the conceptual complexity entailed by food sovereignty, the deep challenges it poses to existing societal structures, and the ways in which its historical use in debates with public authorities has often been polarized rather than progressive (Hospes 2013). Compared with food security, food sovereignty does not conform as readily to prevailing institutions of health governance. Food sovereignty's priority of deepening civic participation in the governance of the food system is a long-term project (Pimbert 2010). As such, food sovereignty is often less amenable to the 'quicker-fix' temporal framework necessitated by government and charity-based health funding cycles. What is more, food sovereignty movements are often critical of the state-based entities that administer health services. Prevailing state health institutions are frequently governed by relatively narrow mandates such as preventing illness and reducing health care costs. These mandates generate pressures around the types of health initiatives that are prioritized and the way they are evaluated; the biomedical indicators that are used to evaluate food-related health projects often fail to account for the deepening of democracy called for by food sovereignty (Mundel 2013).

Within non-indigenous food sovereignty efforts, linkages drawn between food sovereignty and human health often draw attention to the health benefits that food sovereignty offers to consumers. This echoes the focus on individual health in many community food security efforts, and contrasts notably with 'La Via Campesina's' early foregrounding of the interests of producers (Fairbairn 2011). However, in response to growing concerns over the global food industry's aggressive promotion of processed foods, attentiveness to personal health is one of the arenas in which the food sovereignty and health equity agenda are increasingly aligning. The challenge will be to cultivate inclusive political projects between urban-based

consumer movements, which emphasize personal health and consumption, and food sovereignty’s producer base concentrating on sustainable agro-ecological production systems. Further challenges lie in pursuing projects that are amenable to scaling up and inspire linkages with initiatives elsewhere (Desmarais and Wittman 2014), and that do not simply replicate the vital but distinct work of community food security.

In addressing this set of challenges, food sovereignty and health equity share a normative and analytical orientation towards equalizing access to power and flows of goods through food systems in order to promote human thriving. To this point, however, food sovereignty and health equity have been discussed in separate academic traditions. In this study, therefore, we sought to better understand the specific pathways whereby ‘food systems’ affect health equity, so that we can consider fruitful ways to intervene and create improvements. Our specific objectives in this article are as follows: (1) to map key narratives from scholarly research on intersections between food security and health equity and (2) to identify evidence of how food sovereignty interventions can be implemented to promote health equity.

Methods

Narrative synthesis and food system pathways

In order to appreciate how prevailing scholarly research has framed the relationship between health and equity and food systems, and especially to take stock of any gaps, we undertook an extensive multidisciplinary literature review. Specifically, the terms ‘food security’ and ‘food sovereignty’ were, respectively, paired with a series of health equity-related terms, outlined below in Table 1. This review represents the exploratory scoping and mapping stages of a ‘meta-narrative synthesis’ (Greenhalgh *et al.* 2005; Masuda *et al.* 2008) on pathways from global food system functioning to health equity outcomes. Meta-narrative synthesis is a methodology for synthesizing evidence coming from multiple academic traditions, typically used in complex situations where the restrictive inclusion criteria of a traditional epidemiologic systematic review would eliminate evidence of relevance to decision-making (Greenhalgh *et al.* 2005). The account we present here conforms to the RAMESES (Realist And MEta-narrative Evidence Syntheses: Evolving Standards) guidelines for reporting meta-narrative reviews (Wong *et al.* 2013), as appropriate for this undertaking. This critical literature review of the English-language literature informs our 5-year research programme, ‘Food systems and health equity in an era of globalization: Think, Eat and Grow Green Globally,’ along with the community-university research partnerships focused on health equity that we are continuing to cultivate. The programme includes research partners from Canada and Ecuador with diverse disciplinary specialties such as epidemiology, toxicology, nutrition, public health and rural sociology (GHRP 2011; Spiegel *et al.* 2011). A Spanish-language review is simultaneously being conducted, with a plan for a synthesis to be prepared at a later stage with deeper consideration of epistemological influences in different settings, along with the ways in which cultural-linguistic contexts affect discourse.

We had initially intended to conduct a full meta-narrative synthesis of both food security and food sovereignty literature in relation to health equity. However, our objectives evolved

Table 1 Keyword combinations for ‘food sovereignty,’ ‘food security’ and ‘health equity’

Combo No.	Keyword combo	
	Food	Health
1	(Food insecure* OR food security)	(health equit* OR health status disparit* OR international health problem* OR world health OR health inequit* OR public health OR healthcare disparities OR health equity OR health inequalit* OR health disparit* OR determinants of health OR social determinants of health OR health status disparities OR socioeconomic determinants of health)
2	(food sovereignty)	

upon finding that there was a considerable lack of intervention-based studies, and an outright absence of theoretical literature, at the intersection of food sovereignty and health equity. We therefore limited the meta-narrative mapping process to literature dealing with intersecting health equity and food ‘security’ concerns. For health equity and food ‘sovereignty’, in contrast, we adjusted our methodology to focus on identifying a smaller number of existing interventions. We use these examples as a basis for proposing a research agenda for strengthening the evidence base in this area, along with a preliminary conceptual framework for pursuing such interventions.

Conceptual framework

The conceptual framework in Figure 1 was developed by members of our interdisciplinary team of researchers and knowledge users at an early stage using ‘intuition, informal networking and “browsing”’ (Greenhalgh *et al.* 2005, p. 420) of literature on food systems, health, and intersections between the two. It shows the pathways being examined, delineating eight unique routes to health (in)equity through the food system. Pathway 1 (Multi-Scalar Environmental and Social Context) takes into account literature on micro- and macro-level social and ecological factors that tend to be explored in trans-disciplinary fields such as human geography, development studies and urban/rural planning. Pathway 2 (Occupational Exposures) includes the impact of food and agriculture workers’ vulnerability to biophysical factors (e.g. pesticide exposure) as well as qualitative aspects (e.g. weak employment standards protections). The third pathway (Environmental Change) considers how ecological change affects health equity, such as the impact of fisheries depletion on coastal communities. Aboriginal Health Studies and Health Geography are particularly relevant sub-disciplines for both Pathways 3 and 4 (Traditional Livelihoods and Cultural Continuity). This latter pathway mainly focuses on threats to and the revival of traditional food producer livelihoods and cultural foodways. Pathway 5 (Intake of Contaminants) investigates how food-related illness disproportionately impacts certain groups of people, either directly through human consumption or indirectly through effects on livestock. The sixth pathway (Nutrition) is perhaps the most intuitively understandable route through which the food system leads to health (in)equity. Research on household food access and the

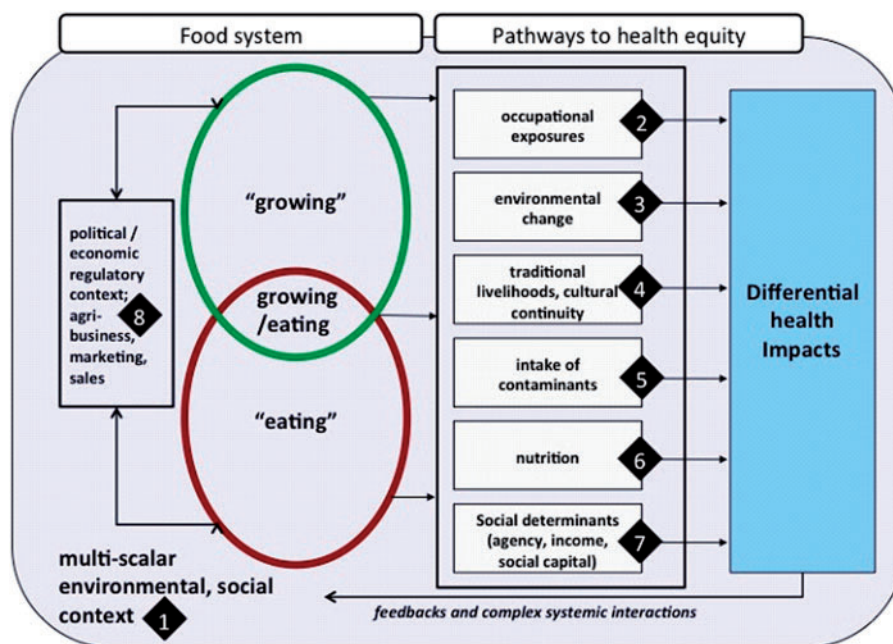


Figure 1 Pathways from food system processes to health equity. 1—Micro- and macro-level social and ecological factors (e.g. global environmental change, cultural change). 2—Vulnerability to occupational hazards (e.g. pesticide exposure, musculoskeletal injuries due to factors such as weak employment standards protections). 3—Effects of ecological change on health equity (e.g. impact of fisheries depletion on coastal communities). 4—Threats to and revival of traditional food producer livelihoods and cultural foodways (e.g. with implications for a range of health determinants). 5—Ingestion of chemical or biological contaminants (e.g. either directly through human consumption or indirectly through effects on livestock). 6—Household food access and nutritional interventions (e.g. among impoverished communities). 7—Interactions with income and other social determinants of health (e.g. uneven effects of agricultural production and retailing). 8—Macro-level processes (e.g. trade liberalization, state welfare policies, foreign aid that affect agricultural production and food access).

effectiveness of nutritional interventions among impoverished communities is particularly germane to Pathway 6. Pathway 7 (Social Determinants) considers how crosscutting factors such as gender, racialization and income shape inequities in access to health through the food system. Finally, Pathway 8 (Political/Economic/Regulatory Context) explores the role of macro-level processes such as trade liberalization, state welfare policies and foreign aid on agricultural production and food access.

Recognizing the presence of interactions among determinants and between different scales, our team of investigators endeavoured to amplify understandings of food system pathways and interventions. By applying a systems approach, we aimed to distinguish how the different ways that food is produced, distributed, eaten and disposed of/recycled can generate health (in)equities. Our conceptual framework enabled us to identify the relative attention each pathway has received through scholarly research, the thematic narratives present in this research, and the evidence regarding the kinds of interventions that have been developed to address health inequities in particular food system pathways.

Search strategy

Through successive rounds of testing and refinement and in consultation with a health sciences reference librarian, we developed a strategic selection of keyword combinations and relevant databases. Health sciences databases were Medline (OvidSP), EMBASE and Web of Science (including Social Sciences Citation Index), while social science databases included Agricola, CAB Direct, Sociological Abstracts and EconLit. Table 1 provides information on keyword combinations.

We compiled a preliminary dataset by retrieving and organizing search results from our selected databases (Shaw *et al.* 2013). Using Zotero reference management software, we directly imported text-only versions of all citations that resulted from our keyword searches, while documenting every search in a standardized search log. Zotero allowed our multiple research assistants and investigators to collaboratively access a large volume of data. In order to maintain methodological consistency during the citation retrieval and management process, we did not apply inclusion or exclusion criteria to our search results and citation imports. The end date for running searches and importing citations was mid-July, 2013. Subsequently, we imported all of the citations (including abstracts) to Zotero and merged all duplicate citations. To more feasibly ensure consistency across time and space, however, we restricted our consideration of ‘knowledge’ to scholarship that met generally recognized scientific norms, with the idea of later reflecting on this from the perspective of other knowledge lenses. We thus considered only peer-reviewed journal articles in the subsequent coding stage. The choice to exclude ‘grey’ literature at this stage was also for the sake of maintaining comparability between literature types (e.g. those with and without abstracts) and ensuring the manageability of coding a large volume of search hits.

Coding and analysis

The food system pathways in Figure 1 provided codes for our qualitative coding scheme for all imported citations. Recognizing that many pathways overlap in both their

methodologies and disciplinary approaches, we encouraged the first set of reviewers to be liberal in their application of codes and inclusion or exclusion of citations that they deemed relevant to the eight categories. Any single citation could be coded with up to eight codes, but usually only one or two codes were relevant.

From the body of literature falling under each code, we synthesized the most prominent narratives that characterized a particular pathway. Narrative synthesis uses textual data as a way to ‘tell a convincing story’ (Popay *et al.* 2006, p. 5) from the synthesized findings. Reviewers who were responsible for compiling a narrative synthesis for a given pathway read all of the abstracts associated with that tag/pathway, summarized the narrative themes from key articles included as part of that tag/pathway, and highlighted exemplar articles for each theme.

Results and Discussion

The majority of our citations fell under the combination of ‘food security+health equity’ (1414 citations), whereas only 18 search hits were generated from the combination of ‘food sovereignty+health equity’. Of the former 1414 citations, 218 were subsequently excluded based on insufficient relevance to pathways from food systems to health equity or citation formats other than peer-reviewed journal articles. The results that follow are therefore based on a final sample of 1196 citations. The much larger number of food security-related search results is, in part, a reflection of the greater length of time that this term has been in usage compared with food sovereignty. Scholarly contributions on the intersection of food sovereignty and health equity remain highly underdeveloped. Accordingly, we synthesize and critically analyze some of the overarching narratives from the body of literature on food ‘security’ and health equity, including articles focused on theoretical analyses, empirical evidence for health inequities, and evaluations of health interventions. We then present examples of health interventions at key nodes throughout the food system that promote both food ‘sovereignty’ and health equity.

Table 2 provides details on search results, organized according to the pathways in Figure 1. Each percentage reflects the proportion of citations in a given pathway relative to the total number of citations. The numbers of pathway codes sum to more than the total number of included citations because more than one code could be applied to a given citation. Although all of the eight pathways encompass literature on both biophysical and sociocultural aspects of the food system, this bridging of disciplines is most explicit in Pathway 1 (Multi-Scalar Environmental and Social Context). As indicated in Table 2, the majority of citations fell under Social Determinants of Health (Pathway 7); Nutrition (Pathway 6) or Political, Economic and Regulatory Context (Pathway 8). Among the wide range of themes in our narrative mapping, several crosscutting themes were observed in sources from a variety of pathways. Climate change is especially prominent and overlaps across numerous pathways, particularly Pathways 1 and 3 (Environmental change). Many articles outline how climate change will likely exacerbate existing health inequities through negative impacts on food security, traditional

livelihoods and infectious disease (e.g. Rosegrant and Cline 2003; Friel *et al.* 2008; Laaksonen *et al.* 2010; Lake *et al.* 2012). Governments and citizens are largely deemed ill-equipped to manage the predicted effects of climate change, and significant regional and intra-regional variations in climate impacts and adaptive capacity exemplify the ineffectiveness of a ‘one-size-fits’ all approach (e.g. Janes 2010; Myers *et al.* 2011; Saroar and Routray 2011). Many articles contend that divisions between government bodies, academic disciplines and industry sectors are major barriers to progress on equalizing health inequities in the food system (Levitt *et al.* 2009; Seimenis 2010; Naylor 2011; Rawlani and Sovacool 2011).

Another prominent theme observed across Pathways 1, 3, 4, 5, 6 and 8 involves the health equity implications of biotechnology. The extensive body of research on genetically engineered food is varied regarding the impacts of biotechnology on health equity. Numerous authors present endorsements of the potential benefits of biotechnology for human health, environmental well-being and food security (e.g. Gilani and Nasim 2007; Soetan 2008; Chassy 2010; Qaim 2010; Hera and Popescu 2011; Hoekenga *et al.* 2011; Kim 2012). However, others highlight the tensions between biotechnology corporations’ profit motive and the goal of public health (Prudham and Morris 2006), along with ethical concerns (Hulse 2002). Some argue that the foremost beneficiaries of biotechnology are corporations owning that technology (Gilmore 2000; Francescon 2006). Still others highlight the need for more productive, informed dialogue on the role of biotechnology in contemporary food and agriculture (Wilkins *et al.* 2001; McCullum *et al.* 2003).

Throughout the eight pathways, in addition, articles underscore how social determinants such as gender, racialization, indigeneity, poverty, citizenship and HIV status tend to exacerbate or qualitatively alter people’s experience of health inequities in the food system (e.g. Akinboade 2008; Metallinos-Katsaras *et al.* 2009; Scharoun-Lee *et al.* 2009; Hill *et al.* 2011; Skinner *et al.* 2013). For instance, the much-emphasized ‘double burden’ of over-nutrition and under-nutrition worldwide has particularly adverse effects for children, low-income nations where western diets are taking hold, and for Inuit communities in the Arctic (e.g. Galloway *et al.* 2012; Huet *et al.* 2012; Prakash 2012; Kimani-Murage 2013). Numerous articles raise concerns about the non-communicable diseases associated with overweight and obesity (e.g. Henry 2011) and advocate nutrition education for consumers (Suryanarayana and Silva 2007). Numerous articles also focus on the socio-economic, geographic, cultural and policy environments that structure dietary patterns (e.g. Lang 2005; Sekhobo and Berney 2008; Mah 2010; Caraher *et al.* 2010; Friel *et al.* 2013). Of particular concern in this regard is the role of corporate food entities in influencing food policy and promoting unhealthy dietary patterns among vulnerable populations, including children (Herrick 2009; Diller 2013).

Research on the effectiveness of efforts to address food security involves critical appraisals of charity-based, community-based initiatives, multilateral organizations, and multi-sectoral programs such as Bolivia’s Zero Malnutrition Programme (e.g. Dowler and Caraher 2003; Rock 2006; Kirkpatrick and Tarasuk 2009; Hoey and Pelletier 2011;

Table 2 Narrative synthesis of *food security + health equity* literature

1—Multi-Scalar Environmental, Social Context

24% of citations (n = 340)

- Spatial inequality in community food access can interact with economic and racial inequality to generate food insecurity and obesogenic environments
- Climate change may exacerbate the spread of infectious disease through the food system (e.g. malaria, cholera and filiarisis)
- Persistent divisions between institutions and academic disciplines present a barrier to effective solutions for interrelated issues of food insecurity, infectious disease, poverty, climate change, land access and deforestation
- Market development policies, a retreating state presence and resource depletion have encouraged global trends of rapid migration to peri-urban areas as well as sedentarization of many previously pastoral communities. This has led to emerging health issues such as malnutrition, livelihood insecurity and cholera outbreaks. Climate change and trade liberalization may exacerbate this form of urbanization.

2—Occupational exposures

>1% of citations (n = 24)

- Food producers who are economically marginalized often face pressures to pursue farming strategies and employment opportunities that elevate their risk of exposure to unhealthy environments.
- In some cases of urban food production (e.g. Kenya), food producers feel that benefits such as increased personal food security are worth the risk of becoming ill. The food safety risks they perceive (e.g. biological contamination) may be less than more severe risks they do not perceive (e.g. heavy metals).
- Market pressures to specialize and a lack of training in integrated pest management techniques have been associated with producers' exposure to highly hazardous pesticides and severe, chronic deterioration in their neurological performance (e.g. potato production in Ecuador).

3—Environmental change

17% of citations (n = 241)

- Millions of people in low-income countries worldwide subsist on 'climate-sensitive' sectors such as agriculture (particularly rice crops), fisheries and natural resources. As such, an increased frequency and intensity of flood and drought disasters would impact them heavily, and governments are currently unable to manage such disasters.
- The cascade of climate change effects will vary regionally, but may exacerbate health inequalities, food insecurity and obesity by increasing food prices. It may also lead to emerging pathogens and new contamination mechanisms between the environment and food.
- While indigenous communities in Australia and the Arctic have a significant degree of adaptive capacity to climate-related health risks, non-climatic stresses such as land dispossession, poverty and globalization impair their adaptive capacity.

4—Traditional livelihoods, cultural continuity

11% of citations (n = 155)

- Efforts to intensify agricultural production in Africa through technological packages focused on pesticides and biotechnology may exacerbate social inequalities between small-scale rural farmers, the urban poor and transnational agribusiness corporations while aggravating environmental degradation and health disparities.
- A high prevalence of HIV/AIDS in some African countries may erode livelihoods and make communities less resilient to drought, particularly in areas of low rainfall and high ratios of land-to-labour.
- Climatic drivers, pollution and socioeconomic pressures are widely undermining health and traditional livelihoods based on wild foods, which are based on diverse indigenous conceptions of food security and health determinants.
- Newcomers to the USA and Canada often face material hardship and 'Westernization' of diets and physical activity. They may draw upon innovative cultural and technological strategies to manage food insecurity.

5—Intake of contaminants

5% of citations (n = 143)

- Alongside existing zoonotic 'neglected diseases,' emerging global zoonoses like highly pathogenic avian influenza and antimicrobial resistant salmonella pose potential threats to human public health and food security.
- Mould, arsenic, heavy metal and pesticide contamination of foods remains problematic for public health and crop yield in many low-income countries.
- Involving diverse stakeholders in addressing foodborne disease and avian influenza. Strategies include accurate risk surveillance, timely communication, financial incentives/penalties for food producers and capacity-building among veterinary professionals.
- Meeting the growing global demand for meat-intensive diets through industrial animal production presents public health concerns (e.g. occupational health risks, concerns for surrounding communities, feed formulations containing antibiotics, arsenic and animal tissues).

6—Nutrition

43% of citations (n = 604)

- The 'double burden' of under-nutrition and over-nutrition has particularly adverse public health implications for children, 'developing' nations where western diets are rapidly replacing traditional diets, and marginalized populations in higher-income countries (e.g. refugee populations).
- Globally, people with HIV/AIDS are often chronically food insecure. Malnutrition can hasten disease progression, and food insecurity can negatively affect anti-retroviral compliance. Culturally relevant nutrition education has been shown to improve health outcomes and quality of life.
- The low cost of calorically dense foods along with the high palatability of sweets and fats may mediate the association between poverty and obesity.
- Obesity prevention is critical for managing non-communicable diseases. A shift is needed away from medicalizing and impugning individuals with personal responsibility for making unhealthy food choices, and towards structural and policy changes to the food environment (e.g. access to affordable fresh fruits and vegetables).

(continued)

Table 2 Continued

7—Social determinants of health

53% of citations (*n* = 746)

- Populations that are particularly at risk of food insecurity, poor nutrition, hunger and/or obesity include urban ethnic minority groups, recent immigrants, undocumented migrants and aboriginal peoples, often with important intra-population gender differences. Their increased level of vulnerability is often associated with unemployment, inadequate income/income assistance, having children and recent homelessness
- Environmental predictors of food insecurity in 'developed' nations include high social deprivation, an unhealthy urban food retail environment, limited transportation access and living in a remote rural location
- In higher-income nations, human factors that may strengthen household food security include parenting practices to promote fruit and vegetable consumption, access to education (including cooking and financial management skills), traditional foodways among Aboriginal communities, and innovative cultural repertoires among recent immigrant communities
- In 'developing' nations, high levels of maternal and child under-nutrition could be ameliorated through improving female literacy, livelihoods, gender equity, as well as hygiene and sanitation

8—Political, economic and regulatory context

41% of citations (*n* = 577)

- Trade liberalization, wealth inequality and the consolidation of corporate power since the 1980s have broadly undermined individual agency over food-related non-communicable diseases (e.g. the promotion of high-calorie and low-nutrition foods)
- In higher-income countries, a healthy diet is widely unaffordable or inaccessible to many people on low incomes or income assistance
- Based on an evaluation of health and equity outcomes, it may be beneficial to shift from local, community-based and charitable food initiatives towards advocacy for the state to promote public health
- Scientific debate on genetically engineered food is often polarized. Some celebrate its potential benefits for food security, sustainability and health. Others argue that corporations are its main beneficiaries, and that it exacerbates food insecurity and environmental harm

Schrecker 2012). Other articles highlight examples of such interventions with positive outcomes on health for vulnerable populations (e.g. Bartfield and Duniform 2006; Sidaner *et al.* 2012; Gundersen 2013; Mogues 2013). A number of articles argue for the importance of improving economic growth, agricultural production and social protection as a way to address food insecurity (e.g. Gabriele and Schettino 2008; McGuire 2013; People 2013). Some authors are highly circumspect about the role of trade liberalization in reducing inequality within the context of increasingly concentrated agribusiness power (e.g. Rocha 2007; Blouin and Chopra 2009; Offer *et al.* 2010; Baum and Sanders 2011; Sarkar *et al.* 2011).

Research agenda: interventions in the food system to promote food sovereignty and health equity

Having identified many of the challenges to realizing health equity in the food system through our critical 'food security+health equity' literature review, we turn to research on food 'sovereignty' for promising interventions to address these challenges. Below we outline examples of food sovereignty and health equity interventions, along each of the eight food system pathways outlined in Figure 1. We have categorized each intervention by the pathway(s) from Figure 1 on which it primarily focuses (e.g. PW2 and PW8). Our aim was to highlight some of the diverse actors and nodes in the food chain at which interventions can occur.

Given that food sovereignty operates at the junction of agricultural policy and practice, as well as social and political mobilization, the examples we provide are by no means exhaustive. In practice, there is often overlap between discourses of food sovereignty and food security (Jarosz 2014; Lyons 2014), no doubt indicating some commonalities in intervention approaches. For the sake of more clearly illustrating their relevance to health equity concerns, we focus here on interventions explicitly invoking the concept of food sovereignty, and which in practice undertake activities that reduce

health inequities. Rather than viewing these interventions as strict 'models' to be emulated, we suggest regarding them as experiments in navigating how an integrated food sovereignty and health equity research agenda can be developed and refined. We selected the following five cases in part because they demonstrate some positive outcomes and, in certain cases, challenges from which useful lessons can be derived. However, unlike in the food security and health equity literature, there is a general lack of critical research evaluating the effectiveness of food sovereignty interventions in addressing health objectives. Our discussion of interventions here is cognizant of these weaknesses and presents these examples as a starting point from which to establish a robust research agenda. A more comprehensive understanding of the strengths and weaknesses of projects designed to jointly improve food sovereignty and health equity would provide needed empirical evidence to assess the claims of food sovereignty skeptics (Beuchelt and Virchow 2012; Bernstein 2013) and proponents alike.

Promoting food literacy and climate change mitigation through the school system

[PW1, PW3, PW6]

Think&EatGreen@School is a community-based action research project situated in Vancouver, Canada. In order to tackle the multi-scalar and multi-level impacts of the food system on both human and environmental health, it aims to build capacity among students, teachers and policy makers to implement healthy and sustainable public school food systems. Some of Think&EatGreen@School's initiatives include school food gardens and composting systems, teaching cooking skills, farm-to-school fresh food programmes and developing policy recommendations to mitigate ecological harms from school food institutions. This project specifically ties food sovereignty to food literacy in children. As Rojas *et al.* (2011) contend, responding to food systems crises such as climate change necessitates 'a profound change in the cultural fabric of our

society, and it is natural that the educational system, as one of the most powerful agencies of socialization, be considered a key avenue through which such change can be spearheaded' (p. 766).

Addressing structural inequality and pesticide exposure for migrant farm workers

[PW2, PW7, PW8]

In the USA–Mexico border region, the Border Agricultural Workers Project (BAWP) is engaged in organizing farm workers and their communities on both sides of the border to advocate for better health, housing, wages and working conditions. Many of these farm workers are very poor, and their poverty is often compounded by precarious legal status in the USA. One of the BAWP's major campaigns underscores farm workers' high risk of exposure to acutely toxic pesticides in the chilli industry. Its approach to organizing is based on the principle that farm workers themselves must take the lead in setting priorities, representing their interests, and engaging in collective pressure to improve their lives and working conditions (Farmworkers n.d.). As a North American member of 'La Via Campesina' (Fairbairn 2011), the BAWP envisions food sovereignty as a way to 'address the issues of oppression of farm workers and the climate crisis, as a way of promoting a new model of food production and consumption' (TED n.d.).

Promoting agrobiodiversity conservation, gender equity and food security

[PW2, PW3, PW4, PW5, PW6, PW8]

Founded in 1971, the International Potato Center is a research-for-development institution that operates in 30 developing countries to advance gender equity, human health and natural resource conservation in root and tuber farming systems (CGIAR n.d.). The Potato Park, one of the Center's projects, is based in Písaq in the Sacred Valley of Peru. Six Peruvian Quechua communities live in the Park and collaboratively manage approximately 600 varieties of native potato to ensure the region's food sovereignty by conserving its agrobiodiversity and traditional farming systems (CIP n.d.). For a decade, the Park has aimed to 'identify traditional and scientific practices for food security and self-sustaining development, particularly in light of climate change' (CIP n.d.). A related CIP research programme, funded by international donors including Canada's International Development Research Centre, focused in its early stages (*Ecosalud I*) on exposure to highly toxic pesticides among Ecuadorian potato farmers, with an additional focus on environmental sustainability and integrated pest management. Findings of dermatological and neurobehavioural impairment motivated efforts at improving pesticide-control policies in Ecuador. This prompted acknowledgement that efforts to improve farmer health in Ecuador should engage with 'equity, globalization and international markets' (Cole *et al.* 2006, p. 13) and the political power of the global pesticide industry. Subsequent CIP action-research projects broadened their scope to include both Peruvian farmers and a concurrent focus on nutrition (Cole *et al.* 2011a). Outputs of this research programme explicitly target goals of health equity (Cole *et al.* 2011b), as well as the empowerment of farm families, alliances

with social movements and the promotion of food sovereignty (Terán and Cole 2011).

Reviving traditional land-based livelihoods

[PW4, PW7]

The O-Pipon-Na-Piwin Cree Nation (OPCN) in Northern Manitoba, Canada, has faced severe food insecurity and chronic health disparities since the 1970s. Flooding from large-scale hydroelectric dam activities and accompanied resettlement was devastating to traditional procurement of wild foods for the OPCN, with impacts on both health and culture (Kamal and Thompson 2013). Kamal and Thompson (2013) note, 'Country food eating and sharing is considered mandatory for cultural survival and important for spiritual fulfillment' (p. 5). The OPCN-led Food from the Land Programme is re-establishing vital bonds between food, health and Cree and Métis cultures (Thompson *et al.* 2012; Kamal and Thompson 2013). This programme supports community elders in passing their knowledge of traditional land-based livelihoods to youth to ensure both cultural continuity and access to a healthy diet, training youth in hunting, fishing, community food-sharing, and other traditional skills. Simultaneously, the programme pursues larger struggles for decolonization, self-reliance, participatory decision-making and sustainable community economic development.

Strengthening nutrition through soil management and feminist research

[PW1, PW3, PW4, PW6, PW7]

In 2000, the Soils, Food and Healthy Communities (SFHC) project was initiated in northern Malawi by the Ekwendeni Hospital staff, Malawian and Canadian scientists. The SFHC used an interdisciplinary, participatory approach to assess whether legume inter-cropping could simultaneously improve soil fertility, preserve the cultural significance of local seed varieties and strengthen food security and child nutrition. Controlled research supports this hypothesized linkage between soil fertility, food security and nutrition. In line with food sovereignty principles, SFHC research demonstrates that 'interventions' in agricultural production techniques necessitate simultaneously addressing a host of prevalent issues within the local context. These include unequal land distribution, gender discrimination, stigma regarding HIV/AIDS, levels of inclusion and involvement among stakeholders, and nutrition education (Bezner Kerr 2013; SFHC n.d.). While research on the project indicates positive outcomes, it also highlights the usefulness of a feminist approach in grounding concepts of food sovereignty and health equity in the challenging and complex, daily-lived experiences of smallholder food producer families (Bezner Kerr *et al.* 2013).

Tackling urban structural racism and economic inequality

[PW1, PW6, PW7, PW8]

Neighbourhood access to fresh, healthy food in Chicago tends to be starkly divided based on income and racialization. Low-income, predominantly minority areas often have significantly higher rates of child poverty, homicide and environmental

exposure to lead. These areas are also frequently underserved by full-service supermarkets (Block *et al.* 2011). Growing Power, a national US non-profit, uses food access as a rallying point to address health disparities in Chicago's low-income communities that accrue to structural racism as well as unequal economic and political power. Its work in Chicago includes community-driven urban agriculture initiatives, public school gardens, life skills programmes for youth and adults, policy advocacy at the city, state and national level, and deliveries of fresh produce baskets throughout the city. Block *et al.* (2011) assert that Growing Power shares many of the same principles as peasant-driven food sovereignty movements: 'The focus of residents on the poor retail food choices within their communities, and the issues of lack of control and concentration of capital that those within the food sovereignty movement concentrate on are not that far apart. Both are spatial expressions of inequities within the global food system seen from a local level' (p. 213).

Conclusion

This review has identified key concentrations and themes in literature at the intersection of food systems and health equity. We found that literature focuses on nutrition, social determinants of health, and political/economic/regulatory contexts. Prominent crosscutting themes include climate change, biotechnology and divisions between government bodies, academic disciplines and industry as barriers to progress on reducing health inequities in the food system. The review also highlighted crosscutting social determinants such as gender, racialization, indigeneity, poverty, citizenship and HIV status in exacerbating or qualitatively altering people's experience of health inequities in the food system. These themes correspond closely with similar recent research on the relationship between food systems and health inequities (Dixon *et al.* 2007; Friel *et al.* 2011), which tend to call for public health interventions that 'integrate systemic, structural and environmental with behavioural approaches' (Ashe and Sonnino 2012).

Many contemporary health inequities worldwide are situated within deep imbalances of political, economic and social power in the food system. Because these food-related health inequities are socially situated, dismantling barriers that prevent certain people from accessing the means to lead flourishing lives also rests in socially created solutions (Allen 2008). Our conceptual model of pathways to health (in)equity through the food system offers an opportune starting point for identifying and disentangling some of these barriers. To address these barriers, we propose that interventions based on food sovereignty should be considered in an effort to reduce inequities that shape human health through the food system.

Another key finding of the review was the presence of several promising food sovereignty-focused interventions. These interventions target numerous pathways from food system functioning to health equity. Food sovereignty and health equity share core commitments to long-term, systemic change, democratic participation, redressing power imbalances, and equalizing access to material well-being. Evidence from food sovereignty-based approaches to health, such as advancing healthy school food systems through Canadian action research, promoting soil fertility, gender equity and nutrition through

Malawian participatory research and addressing structural racism through Chicagoan urban agriculture, indicates an intimate alignment between food sovereignty and the longer-term socio-political restructuring processes that health equity occasions. As a caveat, however, it should be noted that the primary scalar focus of the interventions we reviewed was on local-level actions, notwithstanding large-scale goals such as 'profound change in the cultural fabric of our society' (Rojas *et al.* 2011, p. 766), decolonization (Kamal and Thompson 2013) and engagement with 'equity, globalization and international markets' (Cole *et al.* 2006, p. 13). Linking place-based food sovereignty efforts to high-level changes in the food system therefore appears to represent a pressing challenge, bearing in mind the important potential role of health systems and researchers. This evokes Escobar's (2001) discussion, referring specifically to marginalized place-based social movements, of the need 'to create the networks on which manifold forms of the local can rely in their encounter with the multiple manifestations of the global' (p. 171). Emerging literature on transition theory (e.g. Lutz and Schachinger 2013) and other theoretical approaches to bridging localized, place-based food initiatives with systemic change may offer further insights in this regard.

The conceptual model we present here is broadly consistent with, though more comprehensive and multi-dimensional than, existing models of food-health linkages (e.g. Dixon *et al.* 2007; Neff *et al.* 2009; Thow 2009; Hammond and Dube 2012). It extends this previous work by engaging with existing disciplinary perspectives related to the multiple pathways from food system functioning to health equity, and also by relating these specific contexts to the complex dynamics of the food system at the macro-level. In addition to the largely localized interventions profiled above, therefore, our results highlight the need to simultaneously focus on the local contexts in which health equity implications of the food system are experienced, and the large-scale forces and players leading to common outcomes in diverse contexts. This joint consideration of 'local' and 'big-picture' pathways underscores the applicability of transdisciplinary approaches, such as meta-narrative synthesis, that are capable of bringing multiple disciplinary perspectives to bear on complex, real-world problems. In the case of the food system, this enables simultaneous consideration of the very small (e.g. toxicological interactions of chemicals and human cells), the very large (global economic and environmental change and their effects on health equity), and the complex relationships between them. Filling in the details of these inter-scalar pathways in particular contexts and designing appropriate interventions—while simultaneously addressing the larger picture creating commonalities between contexts—represents a pressing challenge.

One limitation of the approach we took in this article is its exclusive focus on English-language sources. Indeed, a brief scan of English- and Spanish-language sources indicated that the ratio of food security (*seguridad*) to food sovereignty (*soberanía*) references is much higher in English than in Spanish. Our research programme includes a team of researchers and knowledge users in Ecuador (Breilh 2011) who have prioritized an epistemology focusing on the critical processes that influence the social determination of health,

more so than on the pathways where various social determinants can be observed (Breilh 2008, 2011; Breilh *et al.* 2014). A comparative analysis of the English- and Spanish-language literatures is currently underway and will be the subject of a separate paper, enabling intercultural South–North consideration of food systems that are increasingly globalized and interconnected. Another limitation is the exclusive focus on peer-reviewed articles. Including books and grey literature would likely yield a broader set of interventions by, for example, drawing on the large civil society literature on food sovereignty. Civil society experiences and conceptualizations will be incorporated into the analysis as this 5-year project proceeds, working in collaboration with English- and Spanish-language civil society partner organizations.

In this article, we have highlighted the extensive and growing academic literature that considers the intersection of food security and health. The results of our review support the argument for a distinct research agenda to explore project-based interventions in the food system that have the potential to strengthen both food sovereignty and health equity. By investigating further interventions at various points along the complex pathways between food systems and health, preferably in concert with knowledge users such as civil society organizations and policymakers who are directly involved in particular settings, researchers can expand the evidence base to identify which kinds of projects advance the shared, transformative vision of food sovereignty and health equity.

Acknowledgements

The authors thank Julia Russell and Sally McBride for their research assistance.

Funding

The authors are funded by the Canadian Institutes of Health Research. This work was supported by the Canadian Institutes of Health Research (CIHR) under grant ROH-115207, “Food systems and health equity in an era of globalization: Think, eat and grow green globally (TEG3)”.

Conflict of interest statement. None declared.

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