



## Review Article

**Can we eat our way to a healthy and ecologically sustainable food system?**Barbara Seed<sup>a\*</sup> and Cecilia Rocha<sup>b</sup><sup>a</sup> Food and nutrition policy consultant<sup>b</sup> School of Nutrition, Ryerson University

## Abstract

The food system is a major contributor to climate change, biodiversity loss, eutrophication and deforestation. This article examines national dietary guidelines as a way to shift dietary patterns in the population toward diets that continue to promote health while being more ecologically sustainable. While some sustainability principles may be inherent in the 2007 Canada's Food Guide (e.g., an emphasis on plant-based foods), these were not made explicit. As Health Canada undertakes a revision of its national dietary guidance, a unique opportunity exists to situate dietary guidelines within the broader context of Canada's first-ever national food policy. Coherence between these two policies has the potential to position the role of diets as a core link between food systems and both human and ecological health. This paper explores the possibilities of advancing sustainability principles within Canadian national dietary guidelines by drawing on evidence-based literature and key sustainability messages within dietary guidelines from four countries that have integrated many of these principles. Lessons and perspectives from international experiences on incorporating environmental sustainability into dietary guidelines are described including: influence of the food industry; cross-sector collaboration and alliances; civil society participation; and "win-win" messages. Application of these lessons to Canada, followed by opportunities to advance the incorporation of sustainability principles within the country's national dietary guidelines are then proposed.

**Keywords:** sustainable diets; Canada's dietary guidelines; policy; Canada's Food Guide

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## Introduction

“Changing what we eat, how we eat and how much we eat is essential for sustainability” Food and Agriculture Organization (FAO) Director (Jose Graziano da Silva, 2013)

Our food system is a major contributor to climate change (UNEP Division of Early Warning and Assessment, 2012), biodiversity loss (Lambin & Meyfroidt, 2011; Turner, Lambin, & Reenberg, 2007; UNEP Division of Early Warning and Assessment, 2012), eutrophication (Gephart et al., 2016) and deforestation (Garnett, 2014; Kissinger, Herold, & de Sy, 2012; UNEP Division of Early Warning and Assessment, 2012); these are areas where “planetary boundaries” researchers posit that we have moved beyond the earth’s limits (Rockström et al., 2009; Steffen et al., 2015). We are only beginning to understand the ramifications of this to our health, culture and socio-economic systems. For example, biodiversity is essential for food production, ensuring the sustainable productivity of soils and providing genetic resources for crops, livestock, and marine species harvested for food (World Health Organization, 2017). The Food and Agriculture Organization of the United Nations (FAO) suggests that “the alarming pace of food biodiversity loss and ecosystem degradation, and their impact on poverty and health makes a compelling case for re-examining food-agricultural systems and diets” (He, 2010, p. 13). A key international response to this crisis is the sustainable diets agenda. The FAO has been a strategic driver of this agenda, and has defined sustainable diets as:

Diets with low environmental impacts which contribute to food and nutrition security and to healthy life for present and future generations. Sustainable diets are protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy; while optimizing natural and human resources (FAO, 2010, p. 1).

This international definition of sustainable diets is intended to address many dimensions, including—but not limited to—ecosystems, human health, and social justice. While dimensions outside of environmental aspects of sustainable diets are beyond the scope of this article, it is important to note that different facets of the definition are not mutually exclusive. For example, biodiversity loss is seen as a contributor to poverty in the developing world (Burlingame & Dernini, 2012). The World Health Organization (WHO) states:

...intensified and enhanced food production through irrigation, use of fertilizer, pesticides (water and land, sterilization of soils), clearing land/ habitat, introduction of crop varieties and cropping patterns affect biodiversity, and thus impact global nutritional status and human health (2017, p.1).

This statement reflects the recognition that “the health of human beings cannot be isolated from the health of ecosystems” (Johnston, 2014, p. 419); it also reflects the link between our food supply, social justice and the environment. Perhaps in Canada, the most evident links can be seen with Indigenous communities. Their access to traditional foods is an integral part of cultural resurgence, reflecting values such as sharing, sovereignty, and inter-generational knowledge transfer; access, however, is not possible without a healthy ecosystem and access to land.

Johnston et al. (2014) contend that “sustainable diets highlight how food production and food consumption are interconnected and ecosystem dependent” (p. 427). This article centres on food consumption, in particular, examining national dietary guidelines as a way to shift dietary patterns of the population and impact consumption. Shifting dietary patterns is one of four approaches identified by Garnett (2013) for moving toward food sustainability (others include reduction of food waste, changing agricultural production practices to reduce ecological effects and conserve resources, and more equitable distribution of resources). In fact, changes in food consumption have been identified as effective in decreasing greenhouse gas emissions (GHGe)(Kiff, 2016) and even as having more potential for decreasing GHGe than agricultural technological mitigation options (Brunelle, Coat, & Viguié, 2017; Popp, Lotze-Campen, & Bodirsky, 2010).

The inclusion of environmental sustainability principles within dietary guidelines was broached as early as 1986 by Gussow and Clancy (1986). In 1996, the joint FAO/WHO publication “Preparation and Use of Food Based Dietary Guidelines” suggested that the question of “are the guidelines environmentally sustainable?” be considered (1996). Only now are some countries attempting to shift dietary patterns by integrating sustainability principles within their official national dietary guidelines.

As well as guiding individual behaviour change, national dietary guidelines are the foundation for nutrition policy and guidelines at national, provincial, regional, local and organizational levels. Nutrition policy also provides a foundation for the development of educational curricula and promotional materials, and for measurement and monitoring of food consumption and nutritional intake. While the gap between nutrition policy and consumption behaviour has become increasingly conspicuous due to increasing population health concerns (e.g., cardiovascular disease, diabetes), the need for effective policy remains.

In Canada, dietary guidelines (including the Canada’s Food Guide) have not traditionally included ecological sustainability considerations in their recommendations. While some sustainability principles may be inherent in the 2007 Canada’s Food Guide (e.g., an emphasis on plant-based foods), these were not made explicit. As Health Canada undertakes a revision of its national dietary guidance, a unique opportunity exists to situate dietary guidelines within the broader context of Canada’s first-ever national food policy. While Health Canada has identified “environment” as a “consideration” in the guiding principles for the development of the guidelines, it remains to be seen how this “consideration” will be interpreted and applied (Government of Canada, 2017). At the same time, climate change and environmental

sustainability have been identified as priorities of the Government of Canada (Trudeau, undated). Coherence between these policies has the potential to position the role of diets as a core link between food systems and both human and ecological health.

This paper explores the possibilities of advancing sustainability principles within Canadian national dietary guidelines by drawing on evidence-based literature and key sustainability messages within dietary guidelines from countries, which have integrated many of these principles. Lessons and perspectives from international experiences on incorporating environmental sustainability into dietary guidelines are then described, followed by a brief examination of how these lessons are applicable to Canada. Finally, opportunities to advance the incorporation of sustainability principles within national dietary guidelines in Canada are proposed. A brief review on assessing the impact of food on the environment is first presented.

## What is the impact of the food we eat on the environment?

Assessing the impact of food on the environment is complex and research is emergent. Many studies to date measure (1) the impact of individual foods on environmental indicators, and/ or (2) the impact of diets and dietary patterns on environmental indicators. Prior to examining these studies, it is important to understand which environmental indicators are assessed in considering the impact of food on the environment. Greenhouse gas emissions (GHGe) are by far the most frequent indicator used to measure the impact of the food system/food life cycle on the environment. Land use is the next most frequent, followed by water and energy use (Jones et al., 2016; Nelson, Hamm, Hu, Abrams, & Griffin, 2016). Nitrogen release into the environment is commonly measured (Jones et al., 2016), while biodiversity appears rarely assessed.

Research by Dernini et al. (2013) as well as “planetary boundaries” research suggests, however, that biodiversity should also be a priority for research in sustainable diets (Rockström et al., 2009; Steffen et al., 2015). The global food system is the largest contributor to the loss of biodiversity (UNEP Division of Early Warning and Assessment, 2012). Finally, waste is not generally considered as an environmental indicator. Nonetheless, food waste depletes natural resources across the food chain (production, processing, distribution, and consumption), and contributes to the accumulation of harmful substances in the ecosystem. Thus, food waste has the potential to impact all of the environmental indicators listed above.

Looking first to the impact of individual foods on environmental indicators, evidence from systematic reviews is consistent that animal based foods have a higher impact on the environment in relation to GHGe (Aleksandrowicz, Green, Joy, Smith, & Haines, 2016; Clune, Crossin, & Verghese, 2016; Nelson et al., 2016; Wickramasinghe, Scarborough, Goldacre, & Rayner, 2013), land use (Aleksandrowicz et al., 2016; Hallström, Carlsson-Kanyama, & Börjesson, 2015; Nelson et al., 2016), and water use (Aleksandrowicz et al., 2016; Nelson et al., 2016). Ruminant livestock (e.g., cows, sheep, goats) have the greatest impact on these indicators. UN reports suggest harmful environmental impacts of intensive livestock production also include

water pollution, soil degradation, eutrophication, and the degeneration of coral reefs, as well as human health risks such as antibiotic resistance (United Nations, 2011, 2013; World Health Organization and the Secretariat of the Convention on Biological Diversity, 2015).

There is also a hierarchy of GHGe across food categories (from lowest to highest CO<sub>2</sub> emissions): root vegetables, field-grown vegetables, field-grown fruit, cereals (except rice), legumes and pulses, tree nuts and seeds, fruit and vegetables from heated greenhouses, rice, dairy milk and yogurt, non-ruminant livestock (including fish), cheese, and ruminant livestock (Aleksandrowicz et al., 2016; Clune et al., 2016; Wickramasinghe et al., 2013). Variations in this hierarchy can occur due to location (e.g., country, type of land), how food is produced (e.g., pasture-fed versus feedlot), and how it is distributed (local versus air transported produce) (Aleksandrowicz et al., 2016; Peters, 2016).

In addition to the impact of individual foods on the environment, the evidence is also clear that dietary patterns which are lower in animal-based foods have a lesser impact on the environment in relation to GHGe (Aleksandrowicz et al., 2016; Clune et al., 2016; Joyce, Hallett, Hannelly, & Carey, 2014; Nelson et al., 2016), land use (Aleksandrowicz et al., 2016; Hallström et al., 2015; Nelson et al., 2016), and water use (Aleksandrowicz et al., 2016).

The WWF modelled sustainable diet patterns based on typical eating habits in France, Spain, and Sweden. They showed that a sustainable diet in these countries decreases GHGe by 25 percent from the current average diet, costs no more than the current dietary patterns, complies strictly with national nutritional requirements, and closely resembles the current dietary patterns (WWF: LiveWell for LIFE, 2012). The Carbon Trust in the UK—on request from Public Health England analyzed the UK Eatwell guide for its environmental impact. They found that the Eatwell Guide shows a substantially lower environmental impact than what is currently consumed in the UK. While the UK dietary guide is not designed as a sustainable diet, this research suggests that it is still more sustainable than the less healthy, actual intake of the UK population.

In consideration of other elements of dietary patterns and sustainability, it has also been proposed that minimizing the overconsumption of calories (or simply, food) will reduce the environmental impact on the food system (Australian National Health and Medical Research Council, 2013; Garnett, 2011; Ranganathan et al., 2016). While this may hold true, the authors caution against how this argument is used, as we do not want to contribute to an already pervasive societal problem of disordered eating and “fat-shaming”.

## Integrating sustainable diets into dietary guidelines

In addition to research completed by academics, work on sustainable diets in relation to dietary guidelines has been undertaken over the last decade in multiple ways. First, dietary pattern analysis has been undertaken (e.g., Carbon Trust analysis of UK Eatwell Guide 2016 (2016), World Wildlife Federation: LiveWell for LIFE (2012)). Second, evidence reviews have been

completed by countries (e.g., UK Sustainable Development Commission (2009), Australian National Health and Medical Research Council (2011), Health Council of the Netherlands (2011) US Dietary Guidelines Advisory Committee Scientific Report (2015)). Finally, unofficial guidelines from groups that have been forerunners in bringing this issue to public attention have been developed. These include guidelines from LiveWell (World Wildlife Foundation), Barilla double pyramid (Italian pasta company), and Food and Climate Research Network - FCRN (global research network). Collaborative research at the international level in the advancement of sustainable diets is burgeoning. These include, but are not limited to, the Global Alliance for the Future of Food, the International Panel of Experts on Sustainable Food Systems, and the Nordic EAT Forum (and their collaboration with the Lancet in launching the EAT - Lancet Commission on Healthy Diets from Sustainable Food Systems). Many Canadian scholars are involved in this international research and/or are also working to advance research in sustainable food systems.

This work has laid the foundation for attempts toward and the inclusion of sustainability principles within several national dietary guidelines. A comprehensive review of countries where the inclusion of sustainability was recommended or achieved, called “Plates, Pyramids and Planets”, was completed by the Food and Climate Research Foundation and the FAO (Fischer & Garnett, 2016). The review details countries where sustainability principles were considered but ultimately not included (Australia, United States) and countries that have incorporated sustainability within national dietary guidelines (Brazil, Germany, Qatar, Sweden). Countries that have quasi-official guidelines with sustainability considerations were also described (Netherlands, Nordic Nutrition Recommendations, Estonia, France).

Key messages related to sustainability within dietary guidelines from the countries identified in the study who incorporated sustainability principles into dietary guidelines (Sweden, Brazil, Germany, and Qatar) are briefly outlined below.

### *Sweden*

The Swedish National Food Agency published a revised version of their national dietary guidelines in 2015 (Livmedelsverket Sweden National Food Agency, 2015) which integrated the 2012 Nordic Nutrition Recommendations (Nordic Council of Ministers, 2014). Evidence for each of the recommendations was provided through a risk and benefit management report (Konde et al., 2015). The focus of the guidelines is on both the health and environmental consequences of specific foods (Bjørkdahl, Björklund, & Bignet, 2015). Sustainability is explicitly addressed in the title: “Find *your* Way to eat greener, not too much and be active”. The first section of the guidelines, entitled “Sustainable Big Picture”, encourages a holistic approach to eating which benefits to both human and environmental health (Livmedelsverket Sweden National Food Agency, 2015, p.3).

Foods are grouped into three categories: (1) *More*: vegetables, fruit and berries, fish and shellfish, nuts and seeds; (2) *Switch to*: wholegrain, healthy fats, low-fat dairy products; and (3) *Less*: red and processed meat, salt, sugar, alcohol.

Sub-categories are then either ranked for environmental impact. For example, wholegrain is ranked as low environmental impact, whereas dairy is more nuanced as “good and bad for the environment”, which outlines negative environmental impacts of dairy, while noting the benefits of grazing animals on natural pastures (Livmedelsverket Sweden National Food Agency, 2015, p. 12). In addition, eco-friendly ideas and information is provided (e.g., choose sustainable seafood products or enjoying seasonal fruit and vegetables).

### *Germany*

In 2013, the German Nutrition Society (2014) published the most recent version of the “Ten guidelines of the German Nutrition Society (DGE) for a wholesome diet”. While communication about the launch of the guidelines highlighted sustainability, it is not a focus of the higher-level messaging of the guidelines (Fischer & Garnett, 2016). Five out of the ten main messages have explicit sustainability messages accompanying them. These include:

- #1. “Enjoy the diversity of foods available... They have a health-promoting effect and foster a sustainable diet”.
  - #3. “Fruit and vegetables - take ‘5 a day’... Rather favour seasonal products”.
  - #4. “Milk and dairy products daily; fish once to twice a week; meat, sausages and eggs in moderation... Choose fish products from recognised sustainable sources”.
  - #8. “Prepare carefully cooked dishes... Use fresh ingredients whenever possible. This helps to reduce unnecessary packaging waste”.
  - #10. “Watch your weight and stay active. This protects the environment and promotes your health [walk or take the bicycle from time to time]”.
- (The German Nutrition Society, 2014, p.1).

Most recently, Germany has also become known for banning meat at official government functions, citing environmental concerns (Mosbergen, 2017).

### *Qatar*

Qatar released its first dietary guidelines in 2015. While there is no over-arching message regarding sustainability, one (of eight) sections of the guidelines is entitled “eat healthy while protecting the environment”. The six points within this section focus on: emphasizing a plant-

based diet, reducing leftovers and waste, consuming locally and regionally produced foods, choosing fresh, home-made foods over highly processed foods and fast foods, conserving water, and breastfeeding (versus natural resources and waste generated through the use of infant formula). The authors of the guide also suggest that sustainability messages cut across the overall recommendations in the guidelines (e.g., emphasis on plant-based foods or inclusion of legumes as a food group) (Seed, 2014).

### *Brazil*

Brazil has become renowned for its 2014 dietary guidelines, which moved beyond a traditional “what to eat” approach, toward more holistic considerations (Ministry of Health of Brazil, 2014). Brazil’s guidelines differ from nutrient-based guidelines, as they consider cultural, socioeconomic, environmental, biological, and behavioural dimensions of food consumption (Monteiro et al., 2015). Both environmental and social sustainability are explicitly considered under the guiding principle that “healthy diets derive from socially and environmentally sustainable food systems”(Ministry of Health of Brazil, 2014, p. 18).

Probably the most impactful feature of the Brazilian Food Guide is its classification of foods according to their levels of processing and the recommendations on their consumption. The guideline’s overarching “Golden Rule”, namely, “always prefer natural or minimally processed foods and freshly made dishes and meals to ultra processed products” (Ministry of Health of Brazil, 2014, p. 25) , is justified in terms of health, social, and environmental considerations (Ministry of Health of Brazil, 2014). The guidelines describe multiple social and environmental rationales for this statement. They also discuss many ecosystem concerns related to the production of animal foods.

### **Combining sustainability messages from dietary guidelines and evidence reviews**

**Table 1:** Key dietary sustainability messages emerging from evidence and dietary guidelines

<ul style="list-style-type: none"><li>• Consuming a primarily plant-based diet</li><li>• Reducing meat consumption (especially ruminant meat)</li><li>• Consuming seasonal, field grown fruit and vegetables</li><li>• Reducing waste</li><li>• Choosing certified food (e.g. sustainably certified fish)</li><li>• Breastfeeding</li><li>• Limit consumption of processed foods/ Avoid consumption of ultra-processed foods</li></ul>
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Table 1 outlines key sustainability messages which have emerged from both evidence reviews and the guidelines noted above. The first two messages are consistently demonstrated through systematic reviews (Clune et al., 2016; Hallström et al., 2015; Joyce et al., 2014; Nelson



et al., 2016; Wickramasinghe et al., 2013). Consuming seasonal, field grown fruit and vegetables is supported in systematic (Clune et al., 2016) and other reviews (Sustainable Development Commission, 2009). Reducing waste is supported in reviews by Garnett (2013), Nelson, et al. (2016), Food and Agriculture Organization (2013), Sustainable Development Commission reviews (2009) and the Australian National Health and Medical Research Council (2013).

Choosing sustainably certified fish is included in multiple reviews (Bradbear, 2011; Ranganathan et al., 2016) and choosing sustainably certified food and/or fish is included in messages in the Swedish, German, and Qatar dietary guidelines. While most messages originate from both the evidence noted above, and countries who have included sustainability principles within dietary guidelines, the last two messages are reflected only within dietary guidelines. Breastfeeding is included in Qatar Dietary Guidelines, reflecting the loss of resources required to produce infant formula (e.g. water or soya), and the resultant waste generated. Limited consumption of processed and/or cooking using fresh ingredients food originates from dietary guidelines from Brazil, Germany and Qatar.

## Learning from international experiences

Multiple international experiences can be considered for application to the Canadian context. This includes the four cases reviewed above, as well as experiences from other countries who were not successful in incorporating sustainability principles into dietary guidelines. Key areas to consider that can influence the success of integrating sustainability messages are discussed below and include: the influence of food industry; intra-government collaboration and cross-sectoral alliances; civil society participation; “win-win” messages; and food waste. These are summarized as “lessons” in Table 2.

### *Influence of food industry*

Observers of the US process of examining the inclusion of sustainability principles within the US dietary guidelines suggested that the lack of inclusion of sustainability considerations was the result of intense lobbying by the food industry, and in particular by meat producers (Bjørkdahl et al., 2015; Fischer & Garnett, 2016; Jelsøe, 2015; Merrigan et al., 2015). In Sweden, on the other hand, the meat and dairy industries appear to have in principle supported the integration of environmental sustainability into the guidelines (Bjørkdahl et al., 2015; Fischer & Garnett, 2016). Fisher and Garnett. (2016) also note that—on the counsel of dairy representatives—the Swedish guidelines highlight the importance of grazing animals for biodiversity conservation in Swedish pastures. In Qatar, a small domestic food industry who had limited participation in the creation of the guidelines coupled with the authority of the Emirate government over policy decisions helped contribute to the incorporation of sustainability principles within the dietary guidelines (Seed, 2014).

The Brazilian case offers some interesting lessons in terms of the influence of the food industry in the process of developing its latest food guide. The main opposition came from representatives of the Brazilian Food Industry Association (ABIA), but centred on the use of the classification of foods based on processing levels (Fischer & Garnett, 2016; Merrigan et al., 2015). This opposition, however, became explicit only after the initial draft of the guidelines were made available for public consultation, since, given the active role that big business has played in increasing consumption of “junk food” by Brazilians (Jacobs & Richtel, 2017), representatives from the food industry were not invited to participate in the elaboration of the guidelines (Carvalho, 2017). By then (during the public consultation phase with a final draft of the guideline), the view of a new dietary guideline based on social and environmental principles, and with recommendations about the consumption of foods according to their level of processing, had already achieved wide public support, particularly among public health and environmental groups. And despite last minute direct industry lobbying of the Ministry of Health to prevent the launching of the new guidelines, food industry opposition was not enough to turn the tide against the change.

Lobbying and pressure from the food industry in the development of dietary guidelines has long occurred (Jelsøe, 2015; Nestle, 2002). The High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security (2017, p.8) states that “power struggles present challenges as transnational food corporations use their economic power to hinder political action to improve food systems and diets” and also suggest that educating a new generation of food system professionals on nutrition could advance a nutrition-focused food system approach.

### *Intra-governmental collaboration and cross-sector alliances*

It is notable that in Sweden, the Food Agency liaised with the Public Health Agency and the Swedish Board of Agriculture in leading the development of the guidelines (Fischer & Garnett, 2016). In Brazil, at the government level, collaboration between the Ministry of Health and the Ministry of Agrarian Development (with a mandate to support family farmers) effectively counterbalanced the opposition to the new guidelines coming from the Ministry of Development, Industry, and Foreign Trade and the Ministry of Agriculture (which supports agri-business interests) (Carvalho, 2017).

Cross-sectoral alliances may be helpful where governments feel politically constrained to include sustainability principles into dietary guidelines. It has been suggested that a focus on ultra-processed foods in Brazil broke down traditional coalitions between farmers (at least, family farmers) and agri-business, resulting in farmer support for the guidelines (Merrigan et al., 2015). While sustainability principles were not integrated in the US, Merrigan et al. (2015) argue that the process of guideline development aligned public health and sustainability advocates.

Fischer and Garnett (2016) suggest that the lack of inclusion of sustainability principles in the US and Australian dietary guidelines illustrated a lack of government support, or where governments prioritised other concerns. This occurred despite both countries having developed detailed evidence reports (Australian National Health and Medical Research Council, 2013; US Dietary Guidelines Advisory Committee, 2015). In both countries, it was argued that sustainability was outside the scope of the legal mandate for the committee developing the guidelines (which in the US one legal analysis later found to be false) (Fischer & Garnett, 2016). This suggests that evidence, while important, needs to be reinforced with support from cross-sectoral alliances in order to counter-balance competing interests influencing government decisions. As outlined in the next section, civil society involvement is also key in counter-balancing these interests.

Cross-sectoral alliances may also be helpful in leading the way through the creation of informal guidelines. For example, in France and Germany, arms-length or quasi-government institutions (e.g., German Council for Sustainable Development, French Agency for the Environment and Energy) set up complementary “shopping” guides which incorporated sustainability principles well before sustainability within dietary guidelines was considered (Fischer & Garnett, 2016).

### *Civil society participation*

The development of the Brazilian guidelines is known for having a highly “participatory” process which included a wide range of stakeholders (Food and Agriculture Organization, 2014). However, there was a “controlled access” process, under which, before the elaboration of the draft for public consultation, some key stakeholders (notably, the food industry) were not invited to participate (Carvalho, 2017). The process and draft of the guidelines were led by a group of academics at the University of São Paulo and technical staff at the Ministry of Health. The version that was put for public consultation had inputs received during two workshops, which had the participation of experts in the areas of health, education, social work, and agriculture (but not environment).

These workshops were dominated by representatives from national and state governments, academia, professional associations (particularly nutritionists and public health practitioners), and NGOs operating in the areas of consumer advocacy, health, and food security. Consultations also occurred with the National Council for Food and Nutrition Security and the National Council for Health, which were both dominated by civil society representatives. Broader participation was solicited only at the public consultation stage, where people were invited to comment on a draft of the guidelines. Contributions from the food industry, opposing the draft, were mostly in the form of letters sent directly to the Ministry of Health rather than as comments on the online platform (Carvalho, 2017).

### *“Win-win” messages*

In general, Nelson et al. (2016) concluded that dietary patterns which promote health also improve environmental sustainability indicators. Modest reductions in mortality rates and risks resulting from a shift from typical western diets to sustainable dietary patterns have been observed (Aleksandrowicz et al., 2016). Both the Sustainable Development Commission in the UK (Sustainable Development Commission, 2009), and the Health Council of the Netherlands (Health Council of the Netherlands, 2011) utilized the notion of “win-win” messages (for both nutritional and ecosystem health) when presenting advice to their national governments on sustainable diets. “Win-win” messages can satisfy agendas of different sectors (e.g., Health, Environment) and can also help to avoid messages that will result in trade-offs between health and the environment or have unintended adverse consequences (Garnett, 2014; Garnett, Mathewson, Angelides, & Borthwick, 2015; Sustainable Development Commission, 2009). For example, the frequent health recommendation to eat fish more often is problematic given dwindling global fish stocks and ecological concerns regarding some farmed fish. This raises the importance of policy analysis of potential recommendations in identifying win-win messages.

In the Brazilian dietary guideline, environmental groups complained of the lack of explicit condemnation of the high use of chemicals in agricultural production in the country, a major problem in Brazil. Step #6 of the “10 Steps to Healthy Diets” of the guideline states that people should “whenever possible, buy organic and agroecological based foods, preferably directly from the producers” (Ministry of Health of Brazil, 2014, p. 127), but that was considered too mild by these environmental groups (Carvalho, 2017). However, the very classification of food by level of processing and the recommendation to “avoid ultra-processed foods” can be seen as a “win-win” message for promoting better health and environmental sustainability just by the expected reduction of resources used in processing and transportation (e.g., energy), reduction in emissions to the atmosphere that occur through the production of heat in food processing, and the reduction in the use of wasteful packaging (Monteiro et al., 2015; Notarnicola, Tassielli, Renzulli, Castellani, & Sala, 2017).

### *Food Waste*

Much international attention is focused on food waste. The Food Wastage Footprint report concludes that food loss and waste harms climate, water, land, and biodiversity (Food and Agriculture Organization, 2013). Food waste depletes natural resources across the food chain and highlights a lost opportunity to feed hungry populations. Most guidelines that include sustainability principles refer to the issue of food waste, with the rationale of a loss of resources. Food waste was the environmental issue that resonated most strongly with stakeholders in Qatar (Seed, 2014), as it is seen as unlawful (haram) to waste good food (Zaufishan, 2011). As the

issue of food waste has such interest and attention, it may be a key point in leveraging the incorporation of sustainability into dietary guidelines.

### *Applying international lessons to Canada*

As noted above, involvement of the food industry—particularly early in the process of guideline development—can hinder the incorporation of sustainability principles. While the previous Canada Food Guide was criticized for influence by industry, Health Canada stated their intent to minimize influence in its more recent iteration (Kirkup, 2017). Dr. Hasan Hutchinson, Director General for Health Canada’s Nutrition Policy and Promotion stated “We will not meet with industry during the development of our policy around the food guide, but they will be able to input in the formal [online] consultation process”(Johnson, 2016). Nonetheless, Canada’s socio-political climate may be most similar to the US and Australia, where observers suggested that a lack of inclusion of sustainability principles occurred as a result of lobbying from food industry (Bjørkdahl et al., 2015; Fischer & Garnett, 2016; Jelsøe, 2015; Merrigan et al., 2015).

The development of the dietary guidelines in Canada is led by Health Canada. The development of more holistic dietary guidelines, however, could be fostered through intra-governmental collaboration with the Ministry of Agriculture and Agri-food Canada, along with the Ministry of the Environment and Climate Change. Likewise, if the country’s first national food policy—the development of which is being led by the Ministry of Agriculture and Agri-food—is truly representative of the vast number of stakeholders that have participated in consultation surrounding it, this process could forge the path for both intra-governmental and cross-sector collaboration in all types of food and nutrition policy in Canada.

As noted above, cross sector alliances can provide a counter balance to food industry, supporting governments who feel politically restrained in integrating sustainability principles into dietary guidelines. In their Phase I consultations, Health Canada asked respondents to rate the importance of various concepts, including the “Impact of eating habits on the environment”(Ipsos Public Affairs, 2017). Details of the feedback about this was not made available. However, the fact that Health Canada has identified “environment” as a “consideration” for the development of the next iteration of the dietary guidelines (Health Canada, 2017) may reflect interest expressed by respondents (which included predominantly the general public and professionals). This may also suggest that Health Canada may deem considerations with environmental sustainability within the scope of dietary guidelines (unlike the US and Australia).

Civil society showed substantial interest in the latest revision of the Canada’s Food Guide during the phase 1 consultations, where almost 20,000 submissions were made, with almost 15,000 coming from the “general public” (Ipsos Public Affairs, 2017). In phase 2 consultations, the largest number of submissions also came from “members of the public”(Health Canada, 2018). In parallel, growing attention to food issues by Canadians is demonstrated in many ways,

including municipalities taking a role in food policy and through the creation of food policy councils, food charters, and food procurement policy. Experiences in Brazil and Sweden suggest that civil society support could be instrumental in advancing the case for including sustainability principles within dietary guidelines. In the US, Merrigan et al. (2015) posited that the process “awakened civil society to the potential influence on dietary guidelines beyond food consumption” (p. 166). Lang (2017), however, stresses the need to engage diverse cultural groups to avoid rejection of sustainability principles on the basis of ethical, religious, ethnic, and national differences.

“Win-win” messages will be important in Canada, especially where health risks may trump the interests of the food industry. For example, Health Canada’s 2015 evidence review links the intake of red meat to colorectal cancer (Government of Canada, 2016). Messages with multiple benefits—for human and environmental health, as well as cultural, social and economic benefits—may be best received. Indeed, Health Canada’s 2017 “Guiding Principles” for the development of the dietary guidelines, propose a “shift towards a high proportion of plant-based foods”(Health Canada, 2017). This is a clear example of a “win-win” message for both human and environmental health.

Finally, akin to Qatar, the high profile of the issue of food waste could be used to leverage public interest in sustainable diets in Canada. Indeed, Health Canada has referenced the issue of “food waste” when describing the “consideration” of environment in their Phase 2 Consultation report (Health Canada, 2018).

**Table 2:** Summary of lessons from international experiences for incorporating sustainability principles into Canadian dietary guidelines

- Involve food industry later in the process of guideline development.
- Intra-government collaboration and cross-sector alliances can support governments who may otherwise feel constrained to act.
- The mandate of dietary guidelines must include sustainability concerns.
- Civil society can be strong advocates.
- “Win-win” messages (for human and ecological health) can satisfy agendas of different sectors.
- Attention to the issue of food waste can act as a lever.

## Opportunities to advance the integration of sustainability principles into dietary guidance in Canada

Beyond the lessons derived from international experiences, opportunities exist to advance the case for the incorporation of sustainability principles within national dietary guidelines in Canada. These include: escalating concern regarding climate change and environmental degradation, increased awareness of externalized costs of food system to health care and

ecosystem, growth of Indigenous food sovereignty movements, and national and international interest in policy coherence.

### *Escalating concern regarding climate change and environmental degradation*

Canada has shown a renewed interest in climate change with the new government elected in 2015, as demonstrated by the retitling of the Ministry of Environment and Climate Change. Concern over the significant impact that our food system has on climate change and environmental degradation underpins all of the research, policy, and practice related to sustainable diets. Research is also emerging on the different ways that climate change, in turn, impacts our food system. Crop losses due to more frequent and more severe floods and droughts, reduced nutritional values of important crops, and increased risks due to natural disasters are all examples of how climate change and environmental degradation may affect the food system (IPES-Food, 2017).

Related to these concerns, there is also increased recognition of the need for local and regional food systems that are resilient in emergencies and disturbances (increasing as a result of climate change). Tendell et al. (2015) describe resilience and sustainability as complementary concepts, where “sustainability is the measure of food system performance, whereas resilience can be seen as a means to achieve it... during times of disturbance” (p.18).

### *Increased awareness of externalized costs of food system to health care and ecosystem*

Calculating and capturing the externalized costs of the current food system on health care and the ecosystem can help to give a clearer picture of the true costs of our food system to the public. Currently the negative externalities of our food system are not covered in the cost of food (Godfray et al., 2010), often resulting in the need for the public sector and other sectors of the economy to absorb these costs. In its 2017 report, “Unravelling the Food-Health Nexus”, the International Panel of Experts on Sustainable Food Systems (IPES-Food) identified five key channels through which food systems are making people sick. People get sick because: (1) they work under unhealthy conditions, (2) they are affected by contaminants in water, soil, or air, (3) they eat foods that are unsafe for consumption, (4) they have unhealthy diets, and (5) they are food insecure and can not access adequate, acceptable foods at all times (IPES-Food, 2017).

One major concern of a health impact transiting through the environment is the spread of antimicrobial resistant bacteria due to heavy (nontherapeutic) use of antibiotics in intensive livestock farms, which threatens the effectiveness of antibiotics for human medicine. In this case, the private sector is beginning to show interest in managing the financial risks associated with this negative externality. The Farm Animal Investment Risk & Return (FAIRR) Initiative draws attention to antibiotic overuse and poor environmental management for global investors as

“sustainability risks likely to affect value and viability in the global food supply chain” (Coller, 2017, p.1).

### *Growth of Indigenous food sovereignty movements*

Food sovereignty and Indigenous food sovereignty movements in Canada have a foundation in international movements such as Via Campesina (Food First News & Views, 2005; Via Campesina, 2011). Food sovereignty contends that “the people who produce, distribute, and consume food should control the mechanisms and policies of food production and distribution, rather than the corporations and market institutions they believe have come to dominate the global food system” (Food First News & Views, 2005, p.2). The Indigenous food sovereignty movement has since grown in Canada (Centre for Sustainable Food Systems & Land and Food Systems, 2017; Food Secure Canada, undated-b). These movements have the potential to gain more momentum in Canada given national attention to the Truth and Reconciliation Commission report recommendations, which include increasing self-governance by Indigenous communities, and cultural resurgence (Truth and Reconciliation Commission of Canada, 2015).

### *Greater national and international interest in policy coherence*

Interest in policy coherence at international and national levels provides an opportunity to advance the integration of sustainable diets into national dietary guidance. A recent UN System Standing Committee on Nutrition report suggests that the UN Decade of Action on Nutrition (2016 – 2025) is positioned as an “opportunity to transform our current food system into one that is sustainable, resilient, and provides healthy diets for all” (UN System Standing Committee on Nutrition, 2017, p. 15). The High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security (2017) situates the “role of diets as a core link between food systems and their health and nutrition outcomes” (p. 2), recommending the integration of nutrition within national policies, programmes and budgets. This includes fostering policy coherence across sectors such as agriculture, environment, energy, water, health, education and finance.

Policy coherence is urgently needed in the case of trade agreement negotiations. In fact, addressing “the impacts of trade and investment agreements on food environments and diets” is an overarching recommendation of the 2017 High Level Panel of Experts on Food Security and Nutrition (2017, p.8), suggesting that “states and inter-governmental organizations should... ensure that multilateral and bilateral trade and investment agreements are consistent with nutrition policies and favour the transition towards more sustainable food systems.”

Negotiating agreements that are more responsive to environmental and human health promotion and protection is essential so that proposals put forward in dietary guidelines are not challenged in international trade courts. Moving forward, given the escalating concern regarding



climate change and environmental degradation as well as increased awareness of external environmental and health costs of food systems, there could be an opportunity not only to add sustainability-linked recommendations to dietary guidelines, but also for those recommendations to be protected in trade agreement negotiations.

In 2017, the Government of Canada initiated the development of its first-ever national food policy, led by the Department of Agriculture and Agri-Food Canada. As noted above, Canada has a unique opportunity to advance policy coherence that includes and synchronizes the areas of health, the food system, and the environment by developing its national dietary guidelines within the context of this broader food strategy and within the Government of Canada's priorities of climate change and environmental sustainability. Canadian scholars, organizations, municipal food policy councils, and professional and citizen groups have been advocating for joined-up food policy in Canada since the 1990s (Heart Health Coalition of British Columbia, 1997; MacRae, 1999); this interest continues to grow (Food Secure Canada, undated-a; MacRae, 2011; Rideout, Riches, Ostry, Buckingham, & MacRae, 2007). Building on this interest, integration of sustainable diets into Canadian national dietary guidance can advance policy coherence by positioning the role of diets as a core link between food systems and both human and ecological health.

**Table 3:** Opportunities to advance the integration of sustainability principles into dietary guidance in Canada

- Escalating concern regarding climate change and environmental degradation
- Increasing awareness of externalized costs of food system to health care and ecosystem
- Growth of Indigenous food sovereignty movements
- Greater national and international interest in policy coherence

## Conclusion

The marriage of human health and agriculture was first proposed by the League of Nations in the 1930's (1937). Building on this notion, MacRae (1999) recommended the creation of a coherent food policy having “optimal nourishment of the population as its highest purpose, making agricultural production and distribution a servant of that purpose, and ensuring the food system is financially and environmentally sustainable” (p.182). Due to escalating concerns regarding climate change and environmental degradation, it is imperative that we address the environmental consequences of our food system. While dimensions of sustainable diets beyond environmental aspects are outside the scope of this article, it is important to acknowledge that different facets of the definition of sustainable diets are not mutually exclusive. Emerging evidence reflects the link between our food supply, social justice, human health, and the environment.

Incorporating sustainability principles into national dietary guidelines is identified through the international “sustainable diets” agenda as one of many composite approaches required for the ecological health of the planet. The Canada Food Guide is a strategic tool for communicating dietary guidance to the general public, to health professionals, and to industry. Dietary guidelines are also the foundation for nutrition education, meal planning, and other nutrition policy across all levels of government and sectors of society. As noted above, environment is listed as one of three “considerations” under “Guiding Principles and Recommendations” for the next iteration of the Canada Food Guide (Government of Canada, 2017). How this “consideration” will be expressed in the next version of the national dietary guidelines is yet to be determined.

Canada has a unique opportunity to advance policy coherence across health, the food system, and the environment due to the 2017 concurrent launches of the revision of national dietary guidance and the formation of a national food policy. Policy coherence between sectors including fiscal, health, agricultural, and environmental does not need to occur at the expense of health. In fact, positioning the role of diets as a core link between food systems, human health, and ecological health could potentially help to identify, and in theory, address public health care costs associated with the current food system. Coordination between government departments that house disparate pieces of food policy has become crucial as Canadian society grapples with complex, interconnected issues such as climate change, ecosystem degradation, and escalating chronic disease, and their associated costs.

Shifting the objectives of the food system toward human and ecological health is ideal. At minimum, cross-ministry policies can be created to merge human and ecosystem health objectives with food and agricultural system policy and practices, including the incorporation of sustainability principles into dietary guidelines. Specific recommendations from the literature and the experiences and perspectives from other countries can be used as lessons for building the case for integrating sustainability principles in the Canadian dietary guidelines. This case is further strengthened through opportunities that exist for Canada to leverage this integration such as: escalating concern regarding climate change and environmental degradation, increasing awareness of externalized costs of food systems to health care and ecosystems, growth of Indigenous food sovereignty movements, and greater national and international interest in policy coherence.

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