



Review Article

How to enhance the health and well-being of Canadians: Effective food and meal-based guidelines and policies that fit the facts and face the future

Jean-Claude Moubarac^{a*}, Jane Y. Polsky^b, Milena Nardocci^a, and Geoffrey Cannon^c

^a l'Université de Montréal

^b St. Michael's Hospital

^c University of São Paulo

Abstract

Diet-related diseases and disorders in Canada are a national public health emergency, now and as projected. One main reason is that the national food supply has become increasingly dominated by ultra-processed food and drink products, mostly snacks, that displace dietary patterns based on fresh meals. Policies and practices that will enhance the good health and well-being of Canadians of all ages, regions, classes, and social and ethnic groups, and that will benefit society, the economy, and the environment forever, are immediate and imperative priorities. Current programs, including the 2019 *Canada's Food Guide*, are moving in the right direction, but are too slow and have notable limitations. Compelling and consistent evidence from studies conducted in Canada and by independent research teams all over the world shows that the main issue with food, nutrition, and health is not nutrients, as has been assumed, but the nature, purpose, and degree of food processing. This is already recognized by UN agencies and an increasing number of national governments. This review examines the evidence on the impact of diets high in ultra-processed food on human and planetary health. It also comments on recent Canadian food guidance. It then introduces the NOVA classification, which takes food processing into account, and analyzes the recent Canadian diet in terms of food processing. Finally, this review proposes healthy eating and policy recommendations that strengthen the

*Corresponding author: jc.moubarac@umontreal.ca

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2019 *Food Guide*, so as to reduce the burden of diet-related disease and enhance the health and well-being of the Canadian people.

Keywords: Food guidance; food processing; ultra-processed foods; diet and nutrition; food policy

Introduction

Unhealthy food systems and resulting dietary patterns are a major cause of chronic non-communicable diseases and premature death in Canada and worldwide (Alam et al., 2019; Branca et al., 2019; GBD 2017 Risk Factor Collaborators, 2018; Swinburn et al., 2019). They also degrade the environment and are damaging socially, culturally, and economically (Seferidi et al., 2020; Gonzalez Fischer & Garnett, 2016). Modern industrialized societies will become increasingly damaged unless food systems are transformed to become healthy and sustainable. National dietary guidelines can serve both as a beacon of trusted food guidance and a facilitator of transformative societal changes. This is evident in the new 2019 *Canada's Food Guide*, which emphasizes healthy food patterns and meals, and the need for sustainable dietary patterns (Health Canada, 2019).

We here propose further steps forward. These are based on what is now consistent and compelling evidence that the main driver of unhealthy diets and thus of related chronic diseases and disorders is not just foods or nutrients, individually or in combination. Rather, it is the displacement of freshly prepared dishes and meals, most notably since the 1980s, by ready-to-consume ultra-processed food and drink products that consist mostly or even solely of industrially manufactured ingredients and additives (Monteiro, 2009; Monteiro et al., 2013, 2017).

In Canada and other fully industrialized countries such as the U.S., the U.K., Australia and New Zealand, on average up to half or even more of all dietary energy consumed now comes from ultra-processed foods and drinks (Elizabeth et al., 2020). Despite this, food processing has been largely overlooked and neglected in epidemiological and nutritional studies, and also in public policy recommendations and actions. The 2019 *Canada's Food Guide* does address food processing, but incompletely.

In this narrative review, we provide an overview of the health, social, cultural, and environmental impacts of industrialized diets high in ultra-processed foods. We state that the nature, purpose, and degree of food processing requires far more attention in dietary guidance and across government and civil society. We begin by outlining the nature of industrialized diets and by discussing past food guidance, the current 2019 *Canada's Food Guide*, and Brazil's 2014 *Dietary Guidelines*. We then define and explain the NOVA food classification, which takes food processing into account (Monteiro, 2009; Monteiro et al., 2017), and outline the Canadian diet

according to the NOVA classification. We conclude by making universal dietary recommendations that reinforce and build on the current Canadian *Food Guide*.

The intolerable burden of industrialized diets

Unhealthy diets have become the biggest food-related driver of disease and premature death around the world (Branca et al., 2019; Swinburn et al., 2019). They are major causes of obesity, diabetes, and other chronic non-communicable diseases such as stroke, heart disease, and metabolic syndrome (Branca et al., 2019; GBD 2017 Risk Factor Collaborators, 2018). In Canada, the prevalence of adult obesity increased from 9.7 percent in 1970–1972 to 14.9 percent in 1998, and by 2009, one in four Canadians had obesity, a figure that has remained practically unchanged (Katzmarzyk, 2002; Statistics Canada, 2020). As of 2015, one in four Canadians (25.1 percent) aged over 20 years have been diagnosed with hypertension, and nearly one in ten (8.5 percent) with ischaemic heart disease (CCDI, 2017). Nearly one in ten Canadians (9 percent) are now living with diabetes (Diabetes Canada, 2019).

Chronic diseases reduce quality of life, lower levels of productivity, and increase levels of disability and in some cases premature death. The cost of treating and managing such diseases, sometimes life-long, places an intolerable burden on Canada's healthcare system, jeopardizing its stability and the well-being and economic prosperity of Canadians (Canadian Diabetes Association, 2009; Canadian Standing Senate Committee on Social Affairs, Science and Technology, 2016).

Predominantly industrialized diets are a product of industrialized food systems dominated by transnational and other huge food corporations (Moodie et al., 2013; Swinburn et al., 2019). Such food systems also have a disastrous effect on planetary health and thus future human prospects (Nesheim et al., 2015; Seferidi et al., 2020; Gonzalez Fischer & Garnett, 2016). Examples include intensive exploitation of soil, heavy use of chemicals, and the vast amounts of water and energy required for industrial food production and processing. Many industrial food products contain reconstituted meats coming from the highly polluting, intensive rearing of cattle (Herrero et al., 2013; Ripple et al., 2014). Their plastic packaging despoils land and oceans (Andrades et al., 2016; Seferidi et al., 2020). The industrial food system causes between 20 and 30 percent of greenhouse gas emissions globally (Vermeulen et al., 2012).

Despite the destructive consequences of the modern industrial food system on health and the environment, there have been only a few public policies and systematic actions in Canada designed to improve the food system and thus dietary patterns (Vanderlee et al., 2019). In addition, over the last few decades, there has been little to no improvement in the overall state of diet or health of Canadians (Polsky et al., 2020; Polsky & Garriguet, 2020; PHAC, 2018; Tugault-Lafleur & Black, 2019). Globally, no country has yet reversed its obesity epidemic (Roberto et al., 2015).

Flaws in previous Canadian food guidance

Prior to the current 2019 *Canada's Food Guide*, the national Canadian dietary recommendations were those in the 2007 *Eating Well with Canada's Food Guide* (Health Canada, 2011). They made recommendations for amounts of foods (“servings”) to consume from among four “food groups” in order to ensure adequate intakes of various macro- and micronutrients. In 2014, Health Canada released a *Surveillance Tool* to compare actual food consumption with the recommendations in the 2007 *Food Guide* (Health Canada, 2014). This was based on a technique of “nutrient profiling” where all foods were classified based on their content of four nutrients and dietary constituents: total fat, saturated fat, sugars, and sodium.

Food systems have evolved dramatically over the last century. Yet nutritional science and food guidance have been, and in most countries largely still are, conceived and defined in terms of the early twentieth century focus on micronutrients and deficiency diseases, such as scurvy and rickets, as well as a focus on food quantity measured in calories (Mozaffarian et al., 2018; Scrinis, 2013). Beginning in the second half of the twentieth century, food guides switched attention to the prevention of chronic non-communicable diseases, but remained focussed on nutrient content, and have identified health merely as the presence or absence of physical diseases caused by too little or too much of one or more nutrients—an approach known as ‘nutritionism’ (Mozaffarian et al., 2018; Scrinis, 2013).

But food is more than its nutrient constituents. The risk of common diet-related chronic diseases is largely determined by diet as a whole. The effect of diets and foods on health are due to their synergistic effect—their concerted action (Jacobs et al., 2009). Fresh and minimally processed foods are mostly prepared and consumed in combination, as dishes and meals. The effect of specific types of nutrients and food on the risk of diseases and also on good health and well-being should therefore be studied within the context of dietary patterns as a whole (Jacobs et al., 2009; Mozaffarian, 2017; Vandevijvere et al., 2013).

Also, until recently, dietary guidelines have failed to address sustainability. They have been designed to help prevent disease among those who use them, while ignoring future generations and the relationship of food with society, culture, economies, and the environment (Gonzalez Fischer & Garnett, 2016).

The 2019 *Canada's Food Guide*

In 2015 Health Canada’s Office of Nutrition Policy and Promotion began the process of revising the 2007 *Canada's Food Guide*, beginning with a review of the literature and discussions with experts in public health and nutrition, and two public consultations. Officials from Health

Canada stated that they would not meet with representatives of food and drink corporations (Health Canada, 2016).

In 2016, a Canadian Senate Committee published *Obesity in Canada: A Whole-of-Society Approach for a Healthier Canada* (Canadian Standing Senate Committee on Social Affairs, Science and Technology, 2016). Witnesses who informed the report stated that the ever-increasing marketing and availability of processed and ready-to-eat foods had contributed to a sharp decrease in consumption of whole foods and a corresponding increase in consumption of ultra-processed foods (Canadian Standing Senate Committee on Social Affairs, Science and Technology, 2016, p. 10). Canadians were still consuming too much energy-dense and nutrient-poor foods. The Senate report recommended important revisions to the 2007 *Guide*, as part of a multi-pronged approach (twenty-one recommendations) to prevent obesity.

In late January 2019, the newly revised *Canada's Food Guide* (Health Canada, 2019) was published, laying out general healthy eating recommendations for Canadians. In the coming years, Health Canada intends to release tools to help researchers and health professionals gauge adherence to the *Food Guide's* recommendations about “what to eat” and “how to eat” (CIHR, 2020).

The 2019 *Food Guide* addresses most of the issues outlined above and responds to the 2016 Senate report. The new *Food Guide* gives general advice on healthy foods. On the *Food Guide Snapshot*, these are shown on a plate with recommendations: “have plenty of vegetables and fruits” (one-half of the plate), “eat protein foods” (one-quarter), “choose whole grain foods” (one-quarter), and “make water your drink of choice” (Health Canada, 2019). This moves away from specified servings and food groups. Milk and dairy products, a specific food group throughout the history of Canadian dietary guides, are now put within “protein foods.”

The 2019 *Food Guide* has garnered wide acclaim (CMA, 2019; Dietitians of Canada, 2019; Heart and Stroke Foundation of Canada, 2019; Webster, 2019). Prominent Canadian obesity expert Yoni Freedhoff said that it “is incredibly different from all of its predecessors. Gone is dairy as its own food group...gone is wishy-washy language that excused refined grains, gone are explicit recommendations to consume two glasses of milk and two to three tablespoons of vegetable oils daily, gone is overarching fat-phobia, gone is juice being a fruit and vegetable equivalent, gone is the notion that sugar-sweetened milk is a health food, and gone is an antiquated nutrient-focussed approach” (Freedhoff, 2019).

The 2019 *Food Guide* steps away from a predominantly nutrient-based approach and towards a more holistic approach to food and health. Recommendations include cooking more often, taking time to eat and share meals, and being aware of food marketing. They address what to eat, and also how to eat, and so include the family and community, society and the environment (Health Canada, 2019). The guide also recommends favouring plant-based diets, and eating less meat and milk and dairy products.

These are all important and welcome developments. However, the *Food Guide* does have shortcomings. One of these is the omission of recommendations to eat locally produced food. Further, one of the guide's recommendations remains nutrient-based: “protein food” puts

together all foods high in protein, whether of plant origin, such as beans, nuts, and seeds, or of animal origin, such as meat, fish, milk, and dairy products. This emphasis on protein is liable to lead consumers to favour foods high in protein rather than overall food quality, and to encourage industry to “fortify” ultra-processed foods (Scrini, 2013, 2016) with sources of protein, such as “high-protein” versions of mass-produced packaged breads, or “veggie” burgers high in plant-based protein substances and other additives.

The *Food Guide* also identifies unhealthy foods as “highly processed products,” defining these as “processed or prepared foods and beverages that contribute to excess sodium, free sugars, or saturated fat” (Health Canada, 2019). Processed meat, deep-fried foods, sugary breakfast cereals, biscuits and cakes, confectionery, sugary drinks, and many ready-to-heat packaged dishes are given as examples. But this overlooks the big issue with ultra-processed food products, which is not just nutrients, but the ways in which they are processed, and the use of cosmetic and other additives that make these products artificially palatable and often quasi-addictive (Monteiro et al., 2013; Moodie et al., 2013; Moubarac et al., 2014a; Zinöcker & Lindseth, 2018).

Consistent and compelling evidence now shows that dietary patterns and dietary quality are shaped by the nature, extent and purpose of food processing (Batal et al., 2018; Crovetto et al., 2014; Fardet, 2016; Julia et al., 2017; Louzada et al., 2017; Luiten et al., 2016; Marrón-Ponce et al., 2018; Moreira et al., 2015; Moubarac et al., 2017; Poti et al., 2015; Steele et al., 2017; Wahlqvist, 2016). In 2020 alone, at least six reviews and meta-analyses of existing evidence concluded that diets high in ultra-processed foods are associated with increased risk of a range of diet-related outcomes including overweight, obesity and cardiometabolic conditions and disorders (Askari et al., 2020; Chen et al., 2020; Elizabeth et al., 2020; Meneguelli et al., 2020; Pagliai et al., 2021; Santos et al., 2020).

The Brazilian *Guidelines*

During the process of revision of the 2007 Canada’s *Food Guide*, the 2014 national official Brazilian *Dietary Guidelines* (Brazilian Ministry of Health, 2014) were often cited as a model for Canada. (Canadian Standing Senate Committee on Social Affairs, Science and Technology, 2016). Although the 2019 *Food Guide* has indeed adapted much of the approach of the Brazilian *Guidelines*, these do have features not found in the Canadian guide.

The Brazilian *Guidelines* address the principles and recommendations for healthy eating for everybody. They were formulated as required by the federal Ministry of Health by a team at the University of São Paulo led by Carlos Monteiro, of which two of the authors of this paper were members. These *Guidelines* use a holistic approach. They take into account food processing, cooking practices, the contexts of eating, the food environment and sustainability. They specify the ways in which foods are processed, prepared, and eaten. They recommend

eating regularly and carefully, eating in appropriate environments with little or no distractions, and when possible, eating in company (Brazilian Ministry of Health, 2014). In particular, unlike the 2019 *Canada's Food Guide*, the *Brazilian Guidelines* explicitly recommend avoidance of ultra-processed foods because of their damaging effects on health and on culture, social life, and the environment.

The *Brazilian Guidelines* are based on an explicitly stated set of principles (Box 1). First among these is that diet is more than the intake of nutrients. Diet refers not only to foods and meals, but also to the cultural and social dimensions of food choices, food preparation and modes of eating. All of these shape health and wellbeing.

Food guidance based on select nutrients and dietary energy is thus inadequate. The effects of food come not from individual nutrients or substances found in these foods, but more so from their combinations or interactions within the food matrix. The context of food consumption, such as eating alone or in front of a screen, can also affect which foods are consumed and their quantities.

Box 1

The five principles of the *Dietary Guidelines for the Brazilian Population*

- 1- Diet is more than intake of nutrients
- 2- Dietary recommendations need to be tuned to their times
- 3- Healthy diets derive from socially and environmentally sustainable food systems
- 4- Different sources of knowledge inform sound dietary advice
- 5- Dietary guidelines broaden autonomy in food choices

The *Guidelines* also aim to broaden people's food choices by promoting autonomy and critical thinking. They do not recommend amounts or portion sizes of food. Instead, they promote long established dietary patterns, with guidance on how to choose foods and prepare dishes made from fresh and minimally processed foods in combination with processed culinary ingredients (largely oils, sugar, and salt). Another principle stated in the *Guidelines* is that healthy diets derive from socially and environmentally sustainable food systems, where the means of production and distribution of food promote social justice and environmental integrity.

Features such as these make the *Brazilian Guidelines* a breakthrough in thinking about food and well-being, positive health, and avoidance of disease. Their recommendations are based on many diverse sources of knowledge, including clinical, experimental, population and social studies, and also on food cultures and customs that have evolved over many generations. They are designed, when suitably adapted, to be universal.

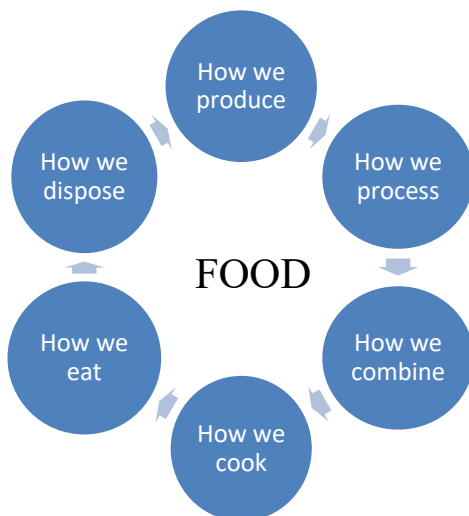
The NOVA food classification

The Brazilian *Guidelines* feature the NOVA food classification. This is based on the nature, extent, and purpose of food processing. Its method was proposed early this century (Monteiro, 2009), and has now been tested, developed and refined by independent teams from many countries, including Canada, the U.S., the U.K., France, Spain, Norway, Australia, New Zealand, Brazil, Mexico, Colombia, and Chile (Monteiro et al., 2017; Elizabeth et al., 2020).

Almost all food is processed in some way. Food is not healthy or unhealthy simply because it is “processed.” Precise distinctions need to be made according to the nature, extent and purpose of processing, with examination of the impact that different types of food processing have on well-being, health, and disease (Moubarac et al., 2014b).

Food processing, as specified by NOVA, includes physical, biological, and chemical processes used on foods after their separation from nature and before they are prepared for cooking and consumption (Monteiro et al., 2017, 2019). NOVA thus identifies food processing as a powerful influence on the quality of diets. Other relevant food practices, aside from processing, are also fundamental to understanding the relationship between technology, diet and health, since human diets are inherently anthropogenic (Ludwig, 2011; Wrangham, 2010). Figure 1 depicts the process of how food is produced (for example, by intensive or agroecological agriculture), how it is cooked (for example, types of oils and methods of cooking used) and how it is consumed (for example, alone in front of the television or with others), and other relevant practices influencing the quality of diets.

Figure 1: Six food practices relevant to the quality of diets and health.



NOVA emphasizes the personal, social, cultural, economic, and environmental value of freshly prepared dishes and meals. It enables the study of food systems, food supplies and dietary patterns, within and between countries and over time. It also enables analysis of food groups,

foods and nutrients (Pan American Health Organization, 2016). NOVA classifies all foods and drinks into four distinct groups, as follows (Monteiro et al., 2017, 2019):

- unprocessed and minimally processed foods
- processed culinary ingredients
- processed foods
- ultra-processed foods

Unprocessed and minimally processed foods

Unprocessed (or “fresh” or “whole”) foods come from plants or animals without industrial processing. Minimally processed foods are unprocessed foods altered in ways that do not add or introduce any new substance, but which often involve the removal of parts of food. They include fresh, dry, or frozen vegetables, tubers, grains and legumes, plain tofu, fruits and nuts, and meats, fish, seafood, eggs, and milk. Minimal processing techniques typically preserve the food, aid its use, preparation, and cooking, and improves its palatability (Monteiro et al., 2017, 2019).

Processed culinary ingredients

Processed culinary ingredients are mostly fats, oils, sugars, and salt. These are rarely, if ever, consumed alone. They are used in the preparation and cooking of foods, to make palatable, diverse, nourishing and enjoyable dishes and meals (Monteiro et al., 2017, 2019).

Processed foods

Processed foods are made by adding fats, oils, sugars, salt, and other culinary ingredients to minimally processed foods to make them more durable and often more palatable by various methods of preservation. They include salted, pickled, or cured meats, fish, and seafood; vegetables, legumes, fruits, and animal foods preserved in oil, brine, or syrup; and simple breads and cheeses. In moderation these foods are part of healthy diets (Box 2) (Monteiro et al., 2017, 2019).

Box 2

Fresh dishes and meals

Unprocessed or minimally processed foods, prepared with modest amounts of processed culinary ingredients and processed foods, make freshly prepared dishes and meals. When made from a variety of foods mostly of plant origin, these types of foods promote well-being and good health, and protect against disease (Monteiro et al., 2015).

The 2014 Brazilian *Guidelines* recommend mostly plant-based diets based on freshly prepared dishes and meals (Brazilian Ministry of Health, 2014). The value of unprocessed and minimally processed foods is also stressed in guidelines issued in Australia (Australian National Health and Medical Research Council, 2013), Sweden (Swedish National Food Agency, 2015), Nordic countries (Mithril et al., 2012), Mediterranean countries (Romagnolo & Selmin, 2017), Uruguay (Uruguayan Ministry of Health, 2016) and France (Santé Publique France, 2019).

Ultra-processed foods

Ultra-processed food products are not modified foods. They are formulations of industrial ingredients and other substances derived from foods, plus cosmetic additives. They contain little or even no intact food. The purpose of ultra-processing is to create products that are convenient (durable, ready to consume or to heat), attractive (hyper-palatable), and profitable (low-cost ingredients). Their effect worldwide is to displace all other food groups. They are usually branded assertively, packaged attractively, and marketed intensively (Monteiro et al., 2017, 2019).

Some substances used to make ultra-processed foods, such as fats, oils, starches, and sugars, come from foods in the raw or unprocessed state (Monteiro et al., 2017, 2019). For example, starches may come from the cracking of corn or wheat. But ultra-processed food products also include substances not normally used in culinary preparations. Some are directly extracted from foods, such as casein, lactose, whey, and gluten. Many come from further processing of food constituents, such as partial hydrogenation of oils (which generates toxic *trans* fats), or interesterified oils, “purified” starches, invert sugar, high fructose corn syrup, and hydrolysed proteins.

Series of processes are used to combine the ingredients and to create the final product (hence “ultra-processed”) (Monteiro et al., 2017, 2019). These include several with no domestic equivalents, such as hydrogenation, hydrolysis, and extrusion. Additives in ultra-processed foods include preservatives and antioxidants. Additives only found in ultra-processed foods often imitate or enhance the sensory qualities of foods or disguise unpalatability. These include dyes and other colours, colour stabilizers, flavours, non-sugar sweeteners, and processing aids. Ultra-processed foods are often bulked with air or water. Synthetic micronutrients may be added to “fortify” them.

Ultra-processed foods include carbonated and other soft drinks; packaged sweetened juices and drinks; sugared, fatty or salty packaged snacks; chocolate and candies; industrialized breads, cakes, biscuits, pastries, desserts and ice-cream; sweetened breakfast cereals; sweetened and flavoured yogurts and other milk-based drinks; packaged soups and noodles; margarine; burgers, hot dogs, poultry and fish “nuggets” or “sticks”; pre-prepared “ready meals” such as pizza and pasta dishes; French fries; and infant formula, sweetened follow-on milks and various “baby” products (Monteiro et al., 2017, 2019).

The trouble with ultra-processing

Ultra-processed foods are unhealthy by their very nature. Overall, they are energy-dense, high in salt, free sugars and saturated fats, and low in protein, fibre, vitamins and minerals (Moubarac, 2017). Analyses of nationally representative dietary surveys from Canada (Moubarac, 2017; Moubarac et al., 2017), the U.S. (Poti et al., 2015; Steele et al., 2017), the U.K. (Adams & White, 2015), France (Julia et al., 2017), Brazil (Louzada et al., 2017), Mexico (Marrón-Ponce et al., 2018), and Chile (Crovetto et al., 2014) invariably show that ultra-processed foods have low nutritional quality and that the more they are consumed, the greater the degradation of diets. This is also shown by dietary surveys of Indigenous peoples in British Columbia, Alberta, Manitoba and Ontario (Batal et al., 2018). As a group, ultra-processed food products are also less satiating and more hyperglycaemic than minimally processed foods (Fardet, 2016; Hall et al., 2019).

Such evidence has led the international INFORMAS research network to propose that the share of ultra-processed foods in diets predicts population diet quality (Vandevijvere et al., 2013). This proposal is endorsed by the WHO Pan American Health Organization (Pan American Health Organization, 2015) and the UN Food and Agriculture Organization (2015), and supported in leading journals (Kelly & Jacoby, 2018; Potvin, 2019).

Habitual consumption of substantial amounts of ultra-processed foods is consistently associated with overweight, obesity and related chronic diseases (Askari et al., 2020; Chen et al., 2020; Costa de Miranda et al., 2021; Lane et al., 2021; Meneguelli et al., 2020; Pagliai et al., 2021). For example, in the first randomized controlled study on the effect of ultra-processed foods on energy intake, participants in the US were randomly assigned to eat either ultra-processed or unprocessed meals for two weeks, and then switch to the other diet (and they could eat as much or as little as desired). Both types of meals provided the same amounts of calories per volume of food, and the same content of macronutrients, sugar, sodium, and fiber. When participants ate the ultra-processed meals, they went on to consume about 500 more calories per day and increased weight by just over two pounds, on average. In contrast, when the same participants ate unprocessed or minimally processed meals, they typically consumed fewer calories and decreased weight (Hall et al., 2019).

The ill-effects of ultra-processed foods extend well beyond weight gain. Compelling evidence from cross-sectional, prospective and longitudinal studies across the globe shows that high consumption of ultra-processed foods elevates the risk of a number of diseases and disorders, and increases risk of early death (Askari et al., 2020; Chen et al., 2020; Costa de Miranda et al., 2021; Elizabeth et al., 2020; Lane et al., 2021; Meneguelli et al., 2020; Pagliai et al., 2021). For example, prospective observational studies of adults from Spain and France show that consuming a diet high in ultra-processed foods increased the risk of obesity (Mendonça et al., 2016), hypertension (Mendonça et al., 2016), cancer (Fiolet et al., 2018), cardiovascular disease (Srouf et al., 2019), gastrointestinal disorders (Schnabel et al., 2018), depression (Adjibade et al., 2019; Gómez-Donoso et al., 2020) and all-cause mortality (Rico-Campà et al., 2019; Schnabel et al., 2019).

In Canada, eating large amounts of ultra-processed foods was significantly associated with several diet-related chronic diseases and disorders. Adults consuming the highest amounts of ultra-processed foods as a proportion of their daily energy intake had 31 percent higher odds of obesity, 37 percent higher odds of diabetes and 60 percent higher odds of high blood pressure, compared with those consuming the least amounts (Nardocci et al., 2020).

All together these examples show that high consumption of ultra-processed foods damages health and causes disease. Advice to limit “highly processed foods” high in various “nutrients of concern” such as salt, sugar, and fat, is inadequate. Indeed, there is now mounting evidence that additives and substances of non-culinary use, such as types of artificial sweeteners and emulsifiers contained in many ultra-processed foods, may cause disease by disrupting metabolic pathways and the gut microbiome (Fiolet et al., 2018; Roca-Saavedra et al., 2018; Zinöcker & Lindseth, 2018).

The problems with the Canadian diet today, as in most other countries, therefore go beyond high consumption of sugar, saturated fat, and salt. By displacing long-established customs and practices of acquiring, preparing and cooking food, the high availability of ultra-processed food products erodes culinary cultures everywhere, not only in industrialized countries and settings but also throughout lower-income countries and communities, including within Indigenous populations all over the world (Kuhnlein et al., 2009). Ultra-processed food products promote “synthetic identities,” devoid of traditional meaning, rootless, and often drawn to overconsumption (Moss, 2014).

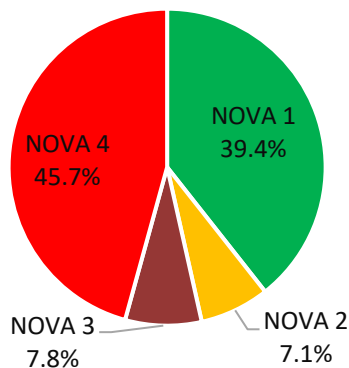
Consumption of ultra-processed foods in Canada

Between 1938 and 2001, Canadians’ food purchases show that home cooking, based on unprocessed or minimally processed foods and culinary ingredients, was largely displaced by ready-to-consume ultra-processed foods. In this period, the dietary energy share of ultra-

processed products purchased from stores increased from 24 to 54 percent (Moubarac et al., 2014a). Such trends, which continue, are documented in other countries (Baker & Friel, 2016; Juul & Hemmingsson, 2015; Monteiro et al., 2011, 2013; Moodie et al., 2013; Pan American Health Organization, 2015). Canadians are now the second largest buyers of ultra-processed foods and drinks in the world (after the U.S.), averaging at least 230 kilograms per person per year (Pan American Health Organization, 2015). In 2004, practically half (47.7 percent) of all dietary energy consumed in Canada was estimated to come from ultra-processed foods and drinks (Moubarac et al., 2017).

Recently, data from the most recent nationally representative dietary survey of Canadians—Statistic Canada’s 2015 Canadian Community Health Survey (CCHS)—Nutrition—were analyzed to estimate the consumption of ultra-processed foods in Canada (Polsky et al., 2020). Respondents reported everything they ate or drank at home or outside the home within the previous twenty-four hours. Results showed that similar to 2004, ultra-processed food products (NOVA group four) still made up close to half (45.7 percent) of all daily energy intake in 2015 (Figure 2). Consumption of some ultra-processed food products decreased, particularly ultra-processed beverages. On the other hand, the relative share of dietary energy from ultra-processed breads increased.

Figure 2: Mean energy contribution (percent of total daily energy) by NOVA food group, Canadian population aged 2 years or older, 2015.



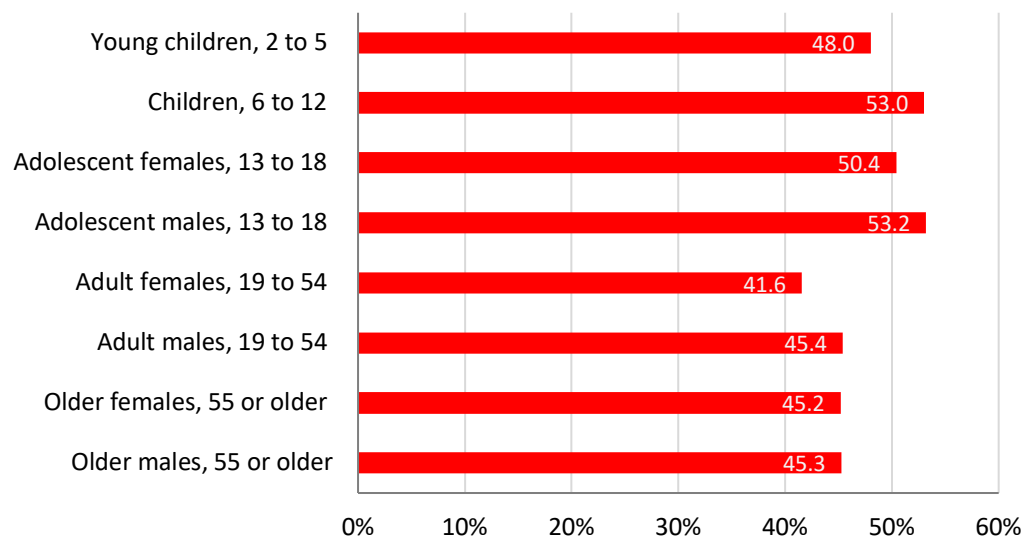
NOTES:

NOVA 1 are unprocessed or minimally processed foods; NOVA 2 are processed culinary ingredients; NOVA 3 are processed foods; and NOVA 4 are ultra-processed foods.

Data source: Statistics Canada, 2015 CCHS – Nutrition. Figure adapted from Polsky, Moubarac, and Garriguet (2020).

In 2015, consumption of ultra-processed foods tended to be lower with increasing age (Figure 3). Children and adolescents consumed the most ultra-processed food and drink products—at least half of their total daily dietary energy, on average, came from these products.

Figure 3: Mean consumption of ultra-processed food and drink products (percent of total daily energy) by age-sex group, Canadian population aged 2 years or older, 2015.



Data source: Statistics Canada, 2015 CCHS – Nutrition. Figure adapted from Polsky, Moubarac, and Garriguet (2020).

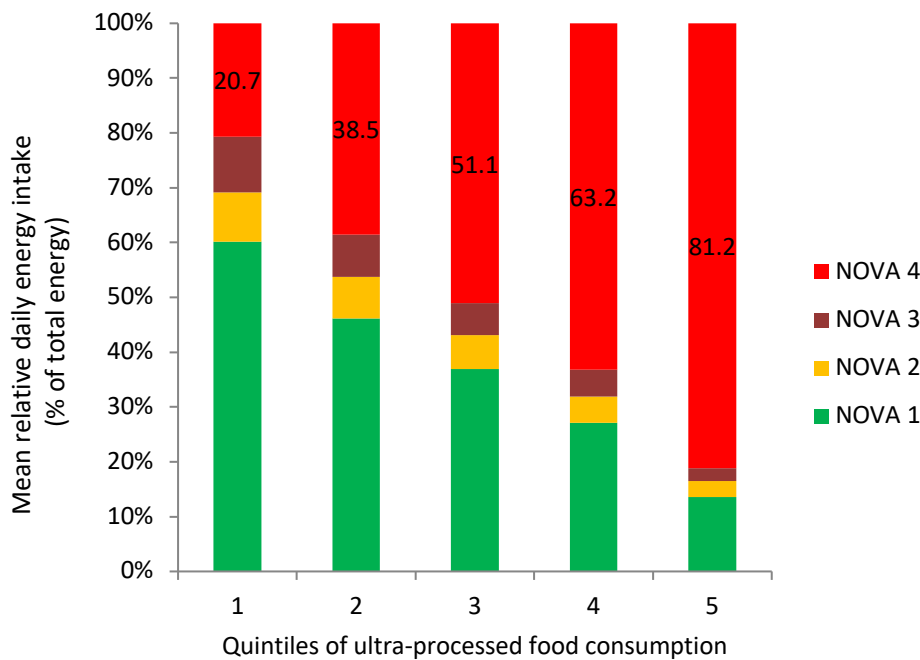
Another analysis prepared for the Heart and Stroke Foundation of Canada showed that in Canada, from 2004 to 2015, the consumption of some unhealthy products such as soft drinks and fruit juices and fruit drinks decreased, but more chocolate milk and sweetened yogurts were consumed (Moubarac, 2017). More nuts, mostly salted or barbecued, were eaten in 2015. Less fresh meat and milk but more reconstituted meats were consumed in 2015.

In 2015, consumption of ultra-processed foods was slightly lower among Canadians with higher levels of education and those living in rural areas (Moubarac, 2017). No association was found with household income (Moubarac, 2017). Recent immigrants to Canada are among the lowest consumers of ultra-processed food products, but in time their dietary habits increasingly resemble those of the general Canadian population (Sanou et al., 2014).

The study also examined relative intakes of ultra-processed food. In Figure 4, the Canadian population is divided into five groups of equal population size (quintiles) ordered according to intake of ultra-processed foods. Thus, the first quintile is of the 20 percent who consumed least (20.7 percent of dietary energy) ultra-processed food products, and the fifth quintile is of the 20 percent who consumed most (81.2 percent of dietary energy). The higher the

consumption of ultra-processed foods (NOVA group four), the lower the consumption of fresh and minimally processed foods and processed culinary ingredients (NOVA groups one and two), and of processed foods (NOVA 3). These results do show, though, that a fifth of the Canadian population still consume relatively healthy diets.

Figure 4: Mean relative energy intake of NOVA food groups (percent of total daily energy intake) by level of ultra-processed food consumption, Canadian population aged 2 years or older, 2015



NOTES:

NOVA 1 are unprocessed or minimally processed foods; NOVA 2 are processed culinary ingredients; NOVA 3 are processed foods; and NOVA 4 are ultra-processed foods.

Data source: Statistics Canada, 2015 CCHS – Nutrition in Moubarac et al. (2017).

Recommendations for all Canadians

Informed by the mounting national and international evidence on the harmful impacts of ultra-processed foods on diet and health, we make recommendations for all Canadians to achieve healthy and sustainable diets. These endorse or build on the 2019 Canadian *Food Guide* and the Brazilian *Guidelines* (Box 3).

Box 3

Universal dietary guidelines

The overall “golden rule” is

Always choose fresh or minimally processed foods and freshly made dishes and meals, and avoid ultra-processed food products.

- 1 Make fresh or minimally processed foods the basis of your diet. Prefer plant-based foods and locally produced foods whenever possible.
- 2 Use processed culinary ingredients in modest amounts to make fresh dishes and meals.
- 3 Enjoy processed foods in modest amounts, preferably as part of fresh dishes and meals.
- 4 Avoid ultra-processed food products.

Food and its preparation, cooking and enjoyment are vital in personal, family, and social life. Thus:

- 5 Eat mindfully, in pleasant environments, together with others wherever possible.
- 6 Develop, maintain, and share skills in food acquisition, preparation, cooking and presentation.
- 7 Plan time to make food and eating important.
- 8 Try to shop in places that offer plenty of varied fresh and minimally processed foods.
- 9 When eating out, eat at places that serve freshly prepared meals. Avoid fast-food outlets.
- 10 Be wary of all forms of food product advertising and marketing. Protect children from unhealthy food and drink advertising.

Adapted from: Brazilian Ministry of Health (2014), Monteiro et al. (2015)

Supported by the 2019 *Canada’s Food Guide*, plus the additional recommendations made in this paper, a bold and comprehensive set of policies and initiatives, led by governments at federal, provincial, and municipal levels, is urgently required. These should be designed to transform Canada’s food system and supplies, and personal, family, communal, provincial, and national dietary patterns. Broadening the concept of unhealthy foods to include food processing in relevant public health policies and programs would represent a significant step forward in this endeavor.

The recently launched first-ever Food Policy for Canada, suitably revised and updated, can serve as a platform for coordinated food-related policies and programs in order create a “better food system for all” (Agriculture and Agri-Food Canada, 2020). Its aim to ensure that all Canadians have access to nutritious foods sourced from environmentally sustainable food systems and supplies is commendable.

The lead must now come from government at all levels, working in partnership with the farmers, growers, makers, suppliers and sellers of healthy foods, health professionals, public interest organizations and citizen action groups. New statutory (including fiscal) policies and actions are needed to make healthy food more available and affordable, and to restrict access and exposure to ultra-processed food products.

For example, a vital addition to the current national Healthy Eating Strategy (Health Canada, 2021) (which generated the 2019 *Food Guide*) is a focus on school food environments. Transforming the school food environments could take the shape of introducing requirements to include food literacy and culinary skills in school curricula, to improve school foods, and to enact policies to restrict and avoid ultra-processed foods and drinks.

It is also essential to persist with efforts to implement strong and effective national restrictions on the marketing of unhealthy foods and drinks to children. Regulating food marketing and updating food labelling, both focal areas of action within the current Healthy Eating Strategy, are important but somewhat limited in their current nutrient-centred scope. An important step forward would be to broaden the concept of unhealthy foods to include processing—and thus ultra-processing. Integrating the concept of food processing into national policies, like Switzerland, Canada could impose a tax on ultra-processed drinks and design a logo that would identify and promote restaurants that serve freshly prepared dishes (Promotion du Fait Maison, n.d.).

The fact that ultra-processed food is driving the growing epidemic of diet-related conditions and disorders needs to be emphasized. Healthy and sustainable dietary practices, based predominantly on fresh and minimally processed foods and freshly prepared dishes and meals, need to be identified, validated, supported, and promoted, as do all those who produce, distribute, and sell healthy food. Canada as a nation cannot afford its burden of diet-related diseases and disorders. Healthy diets enhance well-being and good health, as well as protect against disease, now and in the future, and are vital for families and culturally, socially, economically, and environmentally.

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