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The time for an updated Canadian Food Guide has arrived

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Abstract: Canada has published food guides since 1942 and the latest version, *Eating Well with Canada's Food Guide* (EWCFG), was released in 2007. The EWCFG is largely based on meeting nutrient requirements, while we are now in need of a food guide with strong guidance on the role of diet in the prevention of chronic diseases. This article systematically analyses the process and assumptions behind the EWCFG and presents suggestions for needed revisions to the next food guide.

Key words: Eating Well with Canada's Food Guide 2007, critical evaluation, food-based dietary guidelines, Canada.

Résumé : Le Canada publie des guides alimentaires depuis 1942; sa dernière édition *Bien manger avec le Guide alimentaire canadien* (BMGAC) remonte à 2007. Le BMGAC est surtout axé sur la conformité aux besoins en nutriments alors que maintenant il nous faut un guide alimentaire insistant grandement sur le rôle du régime alimentaire dans la prévention des maladies chroniques. Cet article analyse systématiquement le processus et les postulats à l'appui du BMGAC et présente des suggestions pour une révision attendue du prochain guide alimentaire. [Traduit par la Rédaction]

Mots-clés : Bien manger avec le Guide alimentaire canadien 2007, évaluation critique, directives nutritionnelles basées sur des aliments, Canada.

Introduction

Since 2007, *Eating Well with Canada's Food Guide* (EWCFG 2007; Health Canada 2007) has been the foundation for federal nutrition policy and programs to translate current nutritional science into a practical food-based dietary guidance for enhancing the overall health of Canadians (Katamay et al. 2007). The EWCFG 2007 is highly accessible to all Canadians and was developed to help consumers make healthy food choices. However, since its release, EWCFG 2007 has received mixed reviews and harsh criticisms by some researchers calling it "obesogenic" (Kondro 2006; Corby 2007). Given a number of limitations in its development, recent advances in dietary guideline development methodology, availability of Canadian national nutrition surveys, and changes in food supply, this key fundamental piece of Canadian nutrition policy is in need of updating. This paper analyses each of the steps in the development process, and directional statements used in the EWCFG 2007, and makes recommendations for updating the food guide based on the latest methodology and science.

Development of the EWCFG 2007

In this paper, each step in the development of the EWCFG 2007 (Katamay et al. 2007) was reviewed for strengths and weaknesses. Briefly, a 2-step modelling process was used for development of the EWCFG 2007 to create a food intake pattern (Supplementary Fig. S1[1]). In the first step, food composites were developed and manipulated until a food intake pattern with satisfactory nutrient levels was identified for each of the age and sex groups. In the second step, 500 simulated diets were created for each of these age and sex groups from the food intake patterns of the first step. Nutrient distributions from the simulated diets were then compared against the Dietary Reference Intake (DRI) values. The modelling was cycled between steps 1 and 2 to yield food intake patterns that met the target DRI nutrient requirements. The final food intake pattern was then adjusted to reflect additional input received during consultations and review of diet–disease relationships (cardiovascular disease, cancer, and osteoporosis) (Katamay et al. 2007).

Limitations

Development process

This section analyses each stage in development of EWCFG 2007 as outlined in Supplementary Fig. S1.[1]

Phase 1: Food grouping

As a starting point, the 1992 food guide groups (4 main groups) and directional statements were used to categorize foods for food intake pattern development. Additional food subgroups were also developed to evaluate the impact of recommending different foods on nutrient content of diets.

Phase 2: Data sources and choice of foods

In phases 1 and 2 of the modelling process, the following 2 datasets were used: *2001 Food Expenditure Survey* (FoodEx), which provides estimated quantities of purchased foods, and *Provincial Nutrition Surveys* conducted in the 1990s, as they were the only sources of information on Canadians' diets at the time (Katamay et al. 2007). For estimating energy and nutrient values of foods, the Canadian Nutrient File (CNF) 1997 was used.

The approach taken in EWCFG 2007 modelling was to use composite foods based on food choices of Canadians (*Provincial Nutrition Surveys*) and food popularity (*FoodEx*), which can have advantages in terms of being practical, realistic, and easy to adopt (National Health and Medical Research Council 2011). However, Canadians' eating habits deviate significantly from a healthy diet, with the mean Healthy Eating Index-Canada (HEI-C) score being 58.8/100 (Garriguet 2009). This, in essence, sets dietary recommendations based on the then current food choices, which may not be

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ideal when compared with the scientific graded evidence regarding the role of diet in chronic diseases.

One further limitation of using the then current food choices is the age and methodological shortcomings of datasets used. Health Canada is now better positioned for developing a revised EWCFG, given the availability of national nutrition datasets (Canadian Community Health Survey – Nutrition (CCHS) 2.2 and the upcoming CCHS 2015 (Statistics Canada 2015). In addition, significant updates have been made in the CNF 2010 Health Canada 2010 (serving sizes, calories, and nutrient values) as a result of changes in food supply and database updates, which provides the opportunity for more accurate estimation of energy and nutrients for the next EWCFG.

However, it is important to note that Canada is still in need of a national multiethnic nutrition survey to be able to capture the different eating habits of ethnic minorities and reflect them in development of culturally-relevant food patterns. In doing so, a similar approach to that taken in *Australian Dietary Guidelines* (ADG) and the *Dietary Guidelines for Americans* (DGA) can be adopted where several alternative food patterns (e.g., omnivore, rice-based, pasta-based, lacto-ovo-vegetarian, and Mediterranean) are recommended to accommodate cultural preferences of multiethnic groups (National Health and Medical Research Council 2013; US Department of Agriculture (USDA) 2015). This approach supports the growing evidence that there is more than 1 strategy for healthy eating and foods can be combined in different ways to achieve healthy dietary patterns (National Health and Medical Research Council 2011). This is especially important in Canada since in 2011, 1 in every 5 Canadians was a visible minority, which is higher than any other G8 country (Statistics Canada 2011).

Phase 3: Food composites/popularity

For each modelling group, food composites were created based on the relative importance of each FoodEx food in the modelling group and this information was used to identify the relative nutrient content of foods. For instance, if 50% of total purchased fruits was oranges and 25% was apples, then 50% of the nutrient content of the fruit composite was based on the nutrients in 1 serving of oranges and 25% was based on nutrients in 1 serving of apples (Katamay et al. 2007).

The limitation of this step is that the food composites created for modelling groups were based on a probability sampling that reflected the popularity of particular foods for a given age and sex group. This approach resulted in potatoes (which have a lower nutrient density) to represent the majority of vegetables modelled because of their high consumption among Canadians. This problem has been addressed by guidelines such as the DGA and the ADG, which categorize potatoes as starchy vegetables and set a weekly limit for their consumption (National Health and Medical Research Council 2013; USDA 2015). In addition, only 1 representative food composite was created in EWCFG for each age and sex group, neglecting the variability due to individual food selection.

Phase 4: Modelling

In this phase, the amounts of food composites were determined to develop a food intake pattern for each DRI age and sex group. For each group, the number of food guide servings was manipulated to reach a satisfactory average nutrient intake level (Katamay et al. 2007). This food pattern was then used for developing simulated diets in step 2.

Unfortunately, only selected nutrients available in the CNF 1997 database were modelled during the EWCFG 2007 development process. Notably absent were added sugars and *trans* fat. Another limitation of this step is lack of consideration of physical activity levels and energy requirements for estimating the required number of servings for different groups (see below).

Phase 5: DRI modelling targets used

In step 2 of the modelling, food intake patterns in step 1 were used to create 500 simulated diets for each age and sex group to estimate nutrient distributions. As mentioned above, individual foods were selected from the modelling groups with a selection probability based on the relative popularity of foods in *FoodEx* and *Provincial Nutrition Surveys*, and were revised based on review of diet–disease relationships. Distribution of energy and nutrients of simulated diets were compared with the DRIs to inform further adjustments to food intake patterns (Katamay et al. 2007).

The major limitation of this stage is that many deviations from DRI recommendations were accepted so that in over 10% of simulated diets, magnesium among males aged >71 years, vitamin A among females aged 14–18 years, and zinc in females aged 9–13 years were below the Estimated Average Requirements (Katamay et al. 2007). Most importantly, the median sodium content of all final simulated diets exceeded the tolerable upper intake level (UL) for those >8 years of age. In addition, vitamin D in the simulated diets of individuals over 50 years of age did not meet the Adequate Intakes at the time, which was addressed by Health Canada through inclusion of a recommendation for this age group to take a daily supplement of 400 IU vitamin D (Katamay et al. 2007). This deficit is now even larger since the Recommended Daily Allowances for individuals aged 1–70 years and >70 years recently increased to 600 IU/day and 800 IU/day, respectively (Institute of Medicine (IOM) 2011). These changes in vitamin D recommendations have been reflected in the DGA 2015 and the MyPlate, which recommend 3 cups/day of milk and alternatives (including fortified soy beverages) for individuals ≥9 years of age and 2.5 cups for those 4–8 years of age, which is higher than the EWCFG recommendations, despite Canada's more northern latitude (USDA 2011, 2015). Other nutrients with inadequacies in the final simulated diets included fibre (especially in children), potassium, and linoleic acid (Katamay et al. 2007).

Most importantly, simulated diets for females of all age groups and males of all age groups except for those aged 4–8 years and 31–50 years had higher calories than the estimated energy requirements (EER), even though only low-fat varieties of meat and milk and alternatives were modelled in an attempt to stay within the calorie limits. As a result, following the EWCFG 2007 can lead to overconsumption of energy intakes. Compounding this calorie excess, calories from "other foods" (e.g., high-fat and sugary products) were not considered in the final food patterns, since the sum of calories from recommended amounts of 4 food groups and oils ("essential calories") was higher than the EER for the simulated diets, leaving no room for assigning the remaining calories to solid fats and added sugars. This is in contrast with the DGA 2015 and the ADG, which derived dietary patterns with adequate nutrient levels and minimal calories, allowing them to allocate the remaining calories up to the calorie limit (EER) to set a limit for calories from solid fats and added sugars for each age and sex group (National Health and Medical Research Council 2013; USDA 2015). Neglecting other foods is especially problematic as they contribute over 25% of total calories and fat intakes in the Canadian diet (600–800 kcal) (Garriguet 2009) and could result in even higher overconsumption of calories when consumed.

Phase 6: Consultation

Stakeholders were consulted several times during the revision process and were consistently updated about the proposed directions of the EWCFG. Health Canada also presented the draft version of EWCFG 2007 to stakeholders for their feedback (Katamay et al. 2007). The main concern about these consultations is that one-third of all stakeholders were from the food industry. Concerns have been raised by some groups that this provided industry with opportunities for lobbying and cobranding with Health Canada (Freedhoff 2014).

Directional statements

Directional statements are included in EWCFG 2007 beside the recommendations for each food group and are statements that guide food selection (e.g., choose lower fat meat). Limitations regarding the directional statements are presented below.

Grain products

The EWCFG 2007 recommends at least 50% of grain products to be whole (Katamay et al. 2007). The justification for this recommendation was that only white flour in Canada is fortified with folate (150 μg/100 g) for neural tube defect prevention. Considering the low dietary fibre intake in Canada, more emphasis on whole grains intake is necessary, such as the earlier proposal by Health Canada to permit folic acid fortification of whole grains (Health Canada 2006*a*). However, with the recent decision to not approve a health claim for whole grains (Health Canada 2012*b*), further changes would seem unlikely.

Vegetables and fruits

The EWCFG 2007 recommends consumption of 1 green and 1 orange vegetable daily but does not set limits for juice intake, despite its potential for overconsumption and limited fibre contribution. In addition, the EWCFG 2007 does not set limits for starchy vegetables (e.g., potatoes, corn). However, when Health Canada approved the health claim for fruits and vegetables in reducing the risk of some cancers, starchy vegetables, including "potatoes, yams, cassava, plantain, corn, mushrooms, mature legumes, and their juices", were explicitly excluded from carrying this health claim (Minister of Justice 2014).

Meat and alternatives

Directional statements do not specify how often meats versus alternatives (e.g., legumes, nuts, and seeds) should be consumed, and do not differentiate between red, white, and processed meats, which may imply the nutritional equivalency of these foods to consumers (Kondro 2006). This is inconsistent with the World Cancer Research Fund report, which suggests a strong role for processed meat in the etiology of colorectal cancer (World Cancer Research Fund/American Institute for Cancer Research 2007).

Fats and oils

The EWCFG 2007 does not recommend avoiding *trans* fat and only advises that individuals limit their intakes, yet Health Canada's Trans-Fat Task Force recommended elimination of *trans* fats (Health Canada 2006*b*) and the IOM Macronutrients report did not set a UL for *trans* fat, as increased risk exists at levels above zero (IOM 2005). Most importantly, EWCFG 2007 recommends 2–3 tablespoons per day of oils and fats for all age and sex groups (240–360 additional calories), which is higher than the energy-based recommended amounts in DGA 2015, except for those who require over 2400 kcal/day.

Energy

No directional statements were provided to target calorie intakes, with the underlying assumption that "healthy diets" are equivalent to "low-calorie" diets. A major limitation of the EWCFG 2007 with respect to energy is that eating patterns are recommended for different age and sex groups, without consideration of the differing energy requirements based on physical activity levels. More recent dietary guideline methodology, such as that used in the DGA 2015, sets 12 different dietary patterns for 12 different levels of energy requirements based on age, sex, and physical activity levels (USDA 2015).

Summary

EWCFG has evolved significantly over the past 70 years. Although current at the time, one of the main problems with the EWCFG 2007 is its primary focus on meeting nutrient DRI requirements rather than ensuring energy balance and focusing on the types of foods associated with maintaining a healthy body weight and preventing chronic diseases. This is concerning since inadequate micronutrient intakes are only seen for a few nutrients, yet 5 in 10 women and 7 in 10 men over-consume calories and 25% of males and 23% of females consume fat above the Adequate Macronutrient Distribution Range (Health Canada 2012*a*).

In the next revision, it would also be essential to model food intake patterns based on foods associated with decreased chronic disease risk and less on nutrient deficiencies, focusing on foods to encourage (e.g., fruits, vegetables, legumes, fish, and nuts) and foods to limit (e.g., added sugar, refined grains, red and processed meats, and unhealthy oils), to be able to reorient the modelling steps based on "healthy food" selections in each food group. In addition, elimination of other foods and discretionary calories from the modelling phases suggests that the "real-world" application of EWCFG recommendations, in which the population consumes a further one-quarter of energy intake as other foods, is likely to be obesogenic. Focusing on development of "total diets" rather than a "foundation diet" (National Health and Medical Research Council 2011) for Canadian population would encompass goals for moderation and can help shape appropriate educational messages for healthy weight. In addition, the next revision should acknowledge the dynamic interplay among individual lifestyle behaviours and environmental contexts by taking a socio-ecological evidence-based approach, such as that taken in the DGA 2015 (USDA 2015).

Furthermore, advancing evidence-based nutrition for developing dietary guidelines requires nutrition research that goes beyond randomized controlled trials due to the complexity of nutrient interactions and eating patterns (Blumberg et al. 2010). Dietary pattern modelling and linkage with health outcomes offer great potential for development of evidence-based comprehensive dietary guidelines for decreasing the risk of obesity and other chronic diseases in Canada.

Conflict of interest statement

Authors have no financial or competing conflicts of interest.

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