

**Analysis of Ontario sample in Cycle 2.2 of the Canadian Community
Health Survey (2004)**

Executive Summary

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1 Introduction

Conducted in 2004, the Canadian Community Health Survey, Cycle 2.2 (CCHS 2.2) is the first survey to provide national nutrition data since the Nutrition Canada Survey was carried out over 30 years ago. The main objective of CCHS 2.2 was to gather information at the provincial level on the overall nutritional status of the Canadian population. Specifically, the survey was designed to yield estimates of the distribution of usual dietary intake in terms of foods, food groups, dietary supplements, nutrients and eating patterns among a representative sample of Canadians at national and provincial levels using a 24-hour dietary recall; physical measurements for accurate body height and weight assessment; measurement of the prevalence of household food insecurity; and data on selected health conditions and socio-economic and demographic characteristics of respondents. The primary goal of this survey is to provide reliable, timely information about dietary intake, nutritional well-being and their key determinants to inform and guide programs, policies and activities of federal and provincial governments and local health agencies.

This report presents the results of data analysis for the Ontario sample included in the CCHS 2.2. The analysis includes an examination of adults' and children's nutrient and energy intakes, body weight status, and household food security status. The Ontario Share File of the CCHS, Cycle 2.2, was the source of data analyzed. Thus all analyses have been restricted to the 96.3% of Ontario respondents who gave permission to share their information. For the nutrient intake analyses, this includes over 10,500 individuals 1 year of age and older, living in Ontario in 2004. The analyses of weight status and of food security were restricted to individuals 2 years of age and older, living in Ontario in 2004.

The data from CCHS 2.2 are important because this marks the first rigorous, comprehensive, population-level assessment of Ontario adults' and children's dietary intakes in more than 30 years. Although the food intake data collected in CCHS 2.2 were not available to us for analysis, we have conducted an extensive examination of energy and nutrient intakes. The survey also provides much needed data on problems of overweight and obesity and household food insecurity in Ontario. The strengths of the survey lie in the size and representativeness of the sample and in the calibre of the study measurements. Although measurements of height and weight were available for only part of the sample, given the biases associated with self-reported height and weight data, the results from this survey are invaluable. Furthermore, with CCHS 2.2 we have, for the first time, a measure of household food insecurity based on a standardized, multi-item questionnaire with known measurement properties. Thus CCHS 2.2 provides a broad spectrum of high quality data on the nutritional health of Ontarians upon which to develop program and policy interventions. It also provides a model for nutrition monitoring and surveillance in the future.

This work is not without limitations, however, and there are some additional analyses that should be conducted to further extend our understanding of population health nutrition concerns in the province. All of the nutrient analyses presented in this report are based on nutrient intakes from food, but the consumption of vitamin and

mineral supplements is widespread in our population. When the data on supplement intakes in CCHS 2.2 become available to the province, we strongly recommend that the prevalences of nutrient inadequacies reported here be re-assessed, taking into account nutrient intakes from vitamin and minerals supplements. This analysis should be conducted before any nutrient-specific interventions are discussed to address inadequacies.

What follows is a summary of key findings from this project, a discussion of the findings and list of implications for public health and for policy makers that emanate from this analysis. A detailed description of the study methods and a comprehensive presentation of the results can be found in the full report, 'Analysis of Ontario Sample in Cycle 2.2 of the Canadian Community Health Survey (2004)'.

2 Energy and Nutrient Intakes

2.1 Assessment of Nutrient Adequacy

Through an examination of Ontarians' energy and nutrient intakes from food, we assessed their usual intakes in relation to current estimates of requirements. Although we found little evidence of suboptimal nutrient intakes in children 1-3 years and 4-8 years of age, some prevalence of inadequate nutrient intakes was noted for older children, adolescents and adults. In considering the public health and policy implications of our results, it is important to consider the basis for the requirement estimates against which intakes have been compared. The estimates of prevalence of inadequacy presented here are not estimates of nutrient deficiency. We have applied the requirement estimates presented in the Dietary Reference Intakes reports (1), but these differ from requirement estimates published in the past. The requirement estimates against which usual nutrient intakes have been evaluated in this report take into account intake requirements for the avoidance of signs and symptoms of nutrient deficiency but also, where evidence was considered strong enough, these requirement estimates encompass nutrient needs for optimal health (i.e., maximizing nutrient stores and nutrient functions linked to the reduction of risk of chronic diseases). Thus one should not expect to find corresponding clinical evidence of nutrient deficiencies. The prevalences of nutrient inadequacy reported here reflect intakes that are deemed insufficient for optimal health. In considering the programmatic and policy implications of the indications of nutrient inadequacy presented here, it is essential to review the foundations of current requirement estimates for the specific nutrients of concern.

For some nutrients, there is presently insufficient scientific evidence to describe the distribution of requirements. In these cases, the Institute of Medicine has published Adequate Intake (AI) estimates, based on observed or experimentally determined approximations of the average nutrient intake, by a defined population or subgroup, that appears to sustain a defined nutritional state (e.g. normal circulating nutrient values or growth). Calcium, potassium, vitamin D, and fibre all fall into this category. In

assessing the adequacy of intakes for these nutrients, we have made qualitative judgements based on a comparison of median and mean usual intakes in the population to the AI (1). While it is more difficult to interpret the public health implications of these findings, wide gaps between average usual intakes and current understanding of what constitutes adequate intake for these nutrients suggest a need for improvements in some cases.

Key findings are briefly summarized below.

- The proportion of energy coming from carbohydrate, protein, and fat fell well within recommended ranges for most Ontario adults, adolescents, and children. However, 23-24% of adults, 31-50 years of age, consumed more than 35% of their calories from fat.
- Energy intakes appeared lower than estimated energy requirements for adults in this survey, suggesting some underreporting of food intakes. However, from a review of the existing research in this area, it is unlikely that underreporting accounts for the evidence of inadequate nutrient intakes reported here.
- Vitamin A intakes were insufficient to meet requirements among 21% of boys and 29% of girls, 9 to 13 years of age, 37-39% of adolescents, 46-62% of adult males, and 37-56% of adult women.
- Magnesium intakes were insufficient to meet requirements among 22% of girls, 9 to 13 years of age, 64% of adolescent girls, 47% of adolescent boys, and 37% or more adult men and women; the prevalence of inadequacy reached 73% among elderly men.
- Folate intakes were insufficient to meet needs among 25% to 44% of female Ontarians aged 14 years or older. Among men over 70, 29% had inadequate intakes.
- Vitamin B6 intakes were inadequate to meet requirements among 16% of adolescent girls, 21-26% of adult women, and 35% for women over 70. The intakes of males appeared adequate to meet their needs except among those over 70 where a 22% prevalence of inadequacy was observed.
- Vitamin B12 intakes were generally adequate among young children, boys and men of all ages, but prevalences of inadequacy of 15-28% were noted among adolescent girls, young women, and women over 50.
- Vitamin C intakes were insufficient to meet current requirement estimates for 15-27% of adults over 30. When the added vitamin C requirements of smokers were taken into account, the estimated proportion of men between 30 and 70 years that failed to meet their requirement rose to 25-29% and the proportion of women in this age range with inadequate intakes rose to 21-26%.
- Zinc intakes were inadequate to meet requirements among some proportion of females 9 years or older and males over the age of 50 years; estimated prevalences of inadequacy for zinc ranged from 12% to 42% among these groups.
- Iron intakes were generally adequate to meet requirements except among premenopausal women; 20-23% of women 19-50 years of age had iron intakes below their requirements.
- Virtually no inadequate niacin intakes were noted, and prevalences of inadequacy were negligible for thiamin and riboflavin for almost all age/sex groups.

- Dietary fibre and potassium intakes, on average, were well below estimates of Adequate Intakes for these nutrients across the Ontario population.
- Calcium intakes for females 9 years or older and males over the age of 30 were, on average, well below the Adequate Intake.
- Vitamin D intakes, on average, approximated or exceeded the Adequate Intake for this nutrient for all age/sex groups except those over 50.
- Sodium intakes exceeded the tolerable upper intake level (UL) for this nutrient for a large proportion of the population. Of particular note, 74% of 1 to 3 year-olds, 90% of 4 to 8 year-olds, and over 96% of boys and men from age 9 to 50 years had intakes that exceeded the UL. Among women, the proportions with usual intakes above the UL ranged from 42% to 62%.

Our results suggest that the dietary intakes of a substantial proportion of Ontario adults are insufficient to meet their requirements for some nutrients, but these findings need to be interpreted with caution because only nutrient intakes from food sources were included in the analyses. The use of vitamin and mineral supplements is fairly widespread among the Ontario population. In this survey, as many as two-thirds of adults in some age groups reported taking supplements in the past month. The data on supplement use were not available for analysis at the time of this project, but if nutrient intakes from supplements were taken into account, the estimated prevalence of inadequacy for some nutrients, for some age and sex groups, would undoubtedly fall. It is highly unlikely that all of the indications of suboptimal dietary intakes found in the present analysis would disappear, however. Other research suggests that supplement use is more prevalent among those with relatively good dietary habits (2). Furthermore, supplement formulations vary widely and supplement use by individuals is often sporadic. Thus in instances where a 15-25% prevalence of inadequacy has been noted, there may be little change in these numbers once supplement use is taken into account. As well, the use of vitamin and mineral supplements will have no impact on the very low fibre intakes documented among adults and children alike, the high fat intakes found among some adult groups, and the high sodium intakes found throughout the population.

2.2 Indications of Suboptimal Food Intake Patterns

An examination of food intake patterns is central to understanding the origins of problems of nutrient inadequacies. However, the food intake data collected in CCHS 2.2 are not available to the Share partners. Thus our discussion of the needs for improvements in food intake patterns among Ontario adults, adolescents and children is based on inferences from our examination of patterns of nutrient intakes. More complete, population-specific guidance on needed dietary improvements could and should be developed from a detailed analysis of food intake patterns in relation to observed nutrient inadequacies in CCHS 2.2, but this requires access to the food intake data from the survey.

Among adults and adolescents in Ontario, we have identified extremely high prevalences of inadequacy, ranging from 37% to 73%, for vitamin A and magnesium. Although the prevalences of inadequacy were somewhat lower in children 9 to 13 years

of age, intakes of these two nutrients were still suboptimal. From this, it can be inferred that many Ontarians are consuming insufficient quantities of fruits and vegetables, especially dark green leafy vegetables and orange coloured fruits, as well as whole grains, legumes, nuts, and milk and alternatives for optimal health. This inference is further supported by the suboptimal intakes of potassium and fibre throughout the population.

Among children aged 9 to 13 years, the prevalence of inadequate phosphorus intakes ranged from 14% for boys to 33% for girls. This prevalence remained high for adolescent girls and points to a need for greater consumption of legumes and foods from the milk and meat groups, especially for girls, among these age groups.

For adolescent girls and women of childbearing age (19 to 50 years old) an additional concern is the prevalences of inadequacy, ranging from approximately 15% to 30%, for nutrients such as folate, zinc, and vitamins B6, B12, C, and thiamin. This suggests that they could benefit from increased consumption of whole grain and enriched breads and cereal products, fortified cereals, meats and alternatives such as legumes and nuts, and fruits (including citrus) and vegetables (including dark green leafy ones). Furthermore, for women aged 19 to 50 years, prevalences of inadequacy of 20% to 30% for iron and folate were noted. However, without inclusion of intake from supplements for these two nutrients in particular, one should be cautious about inferring too much about food intake based on prevalence levels of this magnitude.

Aside from the aforementioned widespread problems with vitamin A and magnesium intakes, the only additional prevalence of inadequacy to be noted for adolescent boys and men aged 19 to 50 years old is that of vitamin C which ranged between 15% and 30%. As mentioned above, it can be inferred from this that intakes of fruits (including citrus) and vegetables within this group are lacking.

Amongst men and women over 50 years of age, there are some nutrients of particular concern. For women, prevalences of inadequacy ranging from approximately 30% to 50% were observed for vitamin A, folate, and magnesium. For men, prevalences of inadequacy for vitamin A and magnesium ranged from 46% to 73%, and were significantly higher for men over 70 years old than for those between 51 and 70 years old. Of additional concern for women are vitamins B6, B12, C, and zinc, the prevalences of which ranged between 15% and 30%. For men, prevalences of inadequacy for vitamin C and zinc ranged from 21% to 42%. Men over 70 years old also had increased prevalences of inadequacy for vitamin B6 and folate (22% and 29%, respectively). These results speak to the need to encourage continued consumption of fruits and vegetables, especially dark green leafy vegetables and orange coloured fruits (including citrus), as well as whole grain and enriched breads and cereal products, fortified cereals, meats and alternatives such as legumes and nuts, and milk and alternatives, throughout the lifespan. This inference is further supported by the suboptimal intakes of calcium, vitamin D, and potassium for men and women in this age range.

3 Overweight and Obesity

All respondents aged 2 and older were asked for their permission to have their height and weight measured as part of the CCHS 2.2 survey, but not all respondents had these measurements taken, for a number of reasons. For the Ontario sample, measured height and weight data are available for 53.5% of respondents 2 years of age and older, and BMI is available for 53.1%. (BMI is not calculated for pregnant women). Even so, given the biases associated with self-reported height and weight data, the results from this survey are an important contribution to our understanding of the weight status of Ontarians.

Key findings are briefly summarized below.

- Almost one quarter of the adult population of Ontario was obese at the time of the CCHS 2.2 survey (2004), and close to 60% was either overweight or obese.
- A significantly higher proportion of men (64%) than women (53%) were overweight or obese.
- Nineteen percent of children and adolescents, aged 2 to 17 years, were overweight and 8% were obese.

Considerable regional variation was observed in the prevalence of overweight and obesity among men, women, adolescents, and children. However, the regional differences observed varied considerably by age and sex. While our analysis of geographic and socio-demographic factors in relation to overweight and obesity suggests that some specific subgroups may be more at risk than others, no clear patterns of vulnerability emerged. The magnitude of the overall prevalence estimates among adults in particular indicates that this is a population-wide problem, not one confined to specific subgroups.

The high prevalence of overweight and obesity observed in this survey indicates an unhealthy imbalance between food intake patterns and physical activity levels among a majority of Ontario adults and a substantial number of children and adolescents. Although not reflected in the estimated energy intakes reported here, the habitual energy intakes of many Ontarians must be in excess of their needs. The lack of congruence between estimated energy intakes and requirements is likely explained by systematic underreporting of food intakes among a substantial proportion of adults in this sample. As expected, we found significant associations between various indicators of physical activity and body weight status for adults and children, but the physical activity measures included in CCHS 2.2 are limited to estimates of leisure time physical activity only. This means that activity levels linked with occupation cannot be taken into consideration. Furthermore, the cross-sectional nature of this survey means that it cannot be used to address questions of causation.

4 Household Food Insecurity

The Household Food Security Survey module used in the CCHS 2.2 focusses on self-reported uncertain, insufficient or inadequate food access, availability and utilization due to financial constraints, and the compromised eating patterns and food consumption that this may bring about. This is the first time a CCHS survey has included a measure of household food insecurity based on a standardized, multi-item questionnaire with known measurement properties.

Key findings are briefly summarized below.

- An estimated 379,100 Ontario households (8.4%) were food insecure in 2004. While this is similar to the prevalence nationally, it is important to recognize that, according to the estimates generated from CCHS 2.2, approximately one-third of all food-insecure households in Canada reside in this province.
- Women and men in food-insecure households had significantly lower intakes of vitamin A, magnesium, and calcium when compared to those in food secure households. Significantly lower vitamin A intakes were also found among girls and, to a lesser extent, boys 9 to 18 years of age in food insecure households. Thus, household food insecurity is associated with increased nutritional vulnerability, making it a serious public health concern in this province.
- The likelihood of food insecurity increased markedly as the adequacy of household income declined; almost half of those in the lowest category of income adequacy were food insecure.
- Sixty percent of those on social assistance (Ontario Works or Ontario Disability Support Program) were food insecure. Compared to households where the main source of income was salary or wages, households reliant on social assistance were significantly more likely to experience food insecurity. They comprise 23% of food-insecure households in this province.
- While households on social assistance are more vulnerable to food insecurity, 55% of those who are food insecure in Ontario are reliant on employment for their incomes. Thus the public policy implications of food insecurity go beyond social assistance.

Within the province, there are marked differences in the prevalence of household food insecurity across health regions. The rates of households that experienced some degree of income-related food insecurity during 2004 ranged from 1 in 15 households in the South West and Central East health regions to 1 in 10 households in the Toronto and North Ontario health regions. The multivariate analyses we conducted to further explore this regional variation suggest that it is largely a function of the regional variations in income, income source, and home ownership. Nonetheless, the findings indicate the greater burden of problems of household food insecurity in some health regions than others.

5 Discussion

5.1 Nutrition and Physical Activity

Our results in some ways challenge conventional notions of nutritional vulnerability in relation to the life cycle. Young children and the elderly are often regarded as the most nutritionally vulnerable groups in the population because they have high nutrient needs but relatively low energy requirements and so must consume nutrient-dense diets in order to meet their nutrient requirements. As well, nutrition is critical to the healthy growth and development of children. However, there are few indications from this analysis that young children's food intake patterns place them at risk of nutrient inadequacies. Although prevalences of inadequacy in the range of 20-40% were noted for some nutrients among 9-13 year olds and 14-18 year olds (most notably for vitamin A and magnesium), even for these age groups usual intakes appeared adequate for most of the nutrients examined here. In contrast, our assessment of nutrient adequacy among adults revealed relatively widespread nutrient inadequacies across a broad spectrum of vitamins and minerals. Among adults, women and the elderly appear to be at greater risk of nutrient inadequacies than adult men. The estimated prevalence of nutrient inadequacies among adults may be biased upward because of dietary intake underreporting, and intakes may appear more in line with requirements once nutrient intakes from supplements are taken into consideration. However, taken at face value, our results suggest that the most nutritionally vulnerable group in this province is adults.

Suboptimal food intake patterns are also implied by the high prevalence of overweight and obesity among Ontario adults. Although diet is only one of the factors that contribute to weight gain, our results suggest that Ontarians would benefit from healthier eating patterns. The food intake patterns described in the recently revised Canada's Food Guide (3) provide a sound basis for making food-based dietary recommendations to the public.

The very high prevalence of overweight and obesity among Ontario adults points to an urgent need for improvements in both physical activity and diet. The prevalence of overweight and obesity is lower among children and adolescents than adults, but our results suggest that these groups are also at risk. While the measures of physical activity included on CCHS 2.2 are somewhat limited, present activity levels among many adults, adolescents, and children appear to be insufficient for the maintenance of healthy body weights. Healthier eating patterns and more active lifestyles will help Ontarians achieve and maintain healthy body weights. Without access to the full complement of data from CCHS 2.2, which would enable us to examine food choices and location of consumption, it is not possible to derive more specific recommendations than this though. Other research must be drawn upon to identify the most effective means to improve dietary practices and physical activity levels in the population.

5.2 Addressing Excess Sodium Intakes

Most Ontario children, adolescents, and adults had sodium intakes that were well above the Tolerable Upper Intake Level for this nutrient. The high sodium levels documented here constitute a serious public health concern given the evidence of a link between high sodium intakes and hypertension. This is a problem nationwide (4), and it reflects the extraordinary amounts of sodium now present in processed foods, coupled with the sodium that resides in certain vegetables, milk products, and seafood. Even if people follow Canada's Food Guide, their sodium intakes are likely to exceed the tolerable upper intake level (5). Health Canada has consequently included several directional statements in the food guide to encourage the consumption of foods that are low in salt.

Action is clearly required to lower sodium intakes in the population. Nutrition education campaigns could be mounted to educate people as to the sources of sodium in their diets and encourage them to make low-sodium choices. However, the success of such a consumer education initiative hinges on the availability of sodium content information for all foods, and the availability and affordability of low-sodium options for all Ontarians. Current labeling regulations do not apply to foods sold in restaurants and fast-food outlets, a fact that severely limits the scope of 'label reading' campaigns. Furthermore, low-sodium alternatives are not available for many products, and there is some evidence to suggest that many products specifically formulated to be marketed as 'low sodium' options will have higher prices than their 'regular' counterparts (6). If sodium-reduced products are marketed at higher prices, the benefits of nutrition education campaigns to encourage consumers to select these products will be felt most by health conscious consumers who do not have budgetary constraints. Because 'point of purchase' campaigns are unlikely to benefit price-conscious consumers, they have limited effectiveness as strategies for population health. Thus we recommend that government work with representatives of the food industry (including representatives of the restaurant and fast-food industries) to develop strategies to lower the sodium content of food. It will also be imperative to monitor this problem, to ensure that real progress is made.

5.3 Household Food Security

The prevalence of household food insecurity and the evidence of dietary compromise among adults, and to a lesser extent, children in food insecure households signify the failure of existing policies and programs to ensure that all low-income Ontarians have access to the basic prerequisites to health. Household food insecurity is a problem of income adequacy. The prevalence and nutritional implications of this problem point to the need for more effective income-support programs to ensure that individuals and families who are reliant on social assistance or employment incomes from low-waged jobs have sufficient financial resources to purchase the food they need. Income support programs at both the federal and provincial level should be aligned with basic living costs. Such policy reforms need to be recognized as a cornerstone of population health and health promotion.

It is beyond the scope of this report to provide specific recommendations for policy changes that would ensure household food security for all Ontarians. Although a recent analysis of policy options for improving food security in British Columbia sheds some light on this question (7), given the inter-provincial differences, an analysis of the policy options in Ontario is needed. We recommend that the province undertake a systematic examination of the interrelationship between a broad spectrum of current policies and programs and household food security (considering those related to minimum wages, Ontario Works, the Ontario Disability Support Program, and other income support programs, as well as policies that relate to the affordability of housing, child care, public transportation, higher education, dental care, prescription medications, special dietary needs, and other expenditures that can impact the food budgets of low-income households). We also recommend that in the future, the impact of proposed policy changes on household food security be routinely assessed as part of the process of evaluating the merit of policy options. Only when food security becomes an objective of social policy in Ontario will problems of household food insecurity diminish.

5.4 Research and Monitoring

Given the extraordinary costs of collecting food intake data on a representative sample of the population, it is likely not feasible to conduct another dietary intake survey of the magnitude of CCHS 2.2 in the near future. However, this makes it all the more important to glean as much as possible from the data that have been collected in CCHS 2.2. The analyses presented in this report barely ‘scratch the surface’ of what can be learned about the food intake patterns of Ontarians from this rich data source. Some specific suggestions for further analysis emerge from our work.

Pending access to the data on supplement intakes, it will be important to re-examine the prevalence of nutrient inadequacies across all age/sex subgroups. With the increased use of vitamin and mineral supplements, there is a need to understand the impact of this practice on the prevalence of nutrient inadequacies and excessive intakes in the population. The widespread prevalence of nutrient inadequacies observed among elderly women, for example, may diminish substantially once supplement use is taken into account, but if this is not the case, targeted interventions to improve the adequacy of nutrient intakes among this subgroup are warranted. Additionally, the supplement data collected in CCHS 2.2 provide an important opportunity to assess the extent to which Ontarians are adhering to current recommendations regarding supplement use for specific ‘at-risk’ subgroups (e.g., folic acid for women of child-bearing age, vitamin D for adults over 50, etc),

To better understand the specific food intake patterns that underpin the nutrient problems identified here, it will be important to examine the food intake data should it be made available to Share partners. Because Canada’s Food Guide is the primary tool for nutrition communications and education programs, it is very important to examine the population’s intakes in relation to this guidance. Some very basic, descriptive tables have been published by Statistics Canada (8), but interpretation of this work is limited because

intakes were compared to the 1997 version of Canada's Food Guide and there was no detailed examination of food selection patterns within population subgroups. Much more analysis could be conducted, using the newly released Food Guide, if the province were to gain access to the food intake data from CCHS 2.2. In order to develop effective public health programs to promote healthier food choices, for example, it would be useful to know what kinds of foods people are choosing now and how these relate to the recommendations and directional statements in the recently-revised Canada's Food Guide. It would also be informative to examine common food sources of nutrients of particular concern, to gain insight into what modifications in food selection might be most feasible. In targeting interventions, it would also be helpful to understand the extent to which adults' and children's food intakes include commercially prepared meals and snacks, and foods consumed away from home. An understanding of the extent to which commercially prepared meals and snacks contribute to problems of excess sodium would importantly help to prioritize targets for intervention to address this problem. These are but a few examples of the kinds of analyses that can be conducted with CCHS 2.2 data to extend our understanding of the barriers to healthy eating among Ontarians and the opportunities for improvements.

In thinking about future analyses to conduct with data from CCHS 2.2, it is important to also build on the methodologic insights gained from this project. Despite the fact that data were available for roughly 10,000 Ontarians, sample size limitations quickly surfaced when we endeavoured to conduct analyses of specific subgroups. For example, very few analyses could be conducted at the level of individual health regions, because once the sample was subdivided into meaningful age and sex groups, the cell sizes were often too small to yield stable estimates across variables of interest. Similarly, it was not feasible to examine the influence of ethnicity and immigration on dietary intake patterns or body weight status. These limitations lead us to conclude that the data from CCHS 2.2 are most effectively used to examine patterns at a provincial level. The feasibility of additional studies of within-province differences in dietary intake or body weight status by region, income, education, immigration status, etc is questionable.

The use of 24-hour dietary recall methodology to collect intake data on CCHS 2.2 also poses some limitations that should be considered in the development of future analytic projects. As discussed elsewhere in this report, the survey was designed to furnish the data needed to estimate distributions of usual intake in the population and thus permit the estimation of prevalences of nutrient inadequacy. However, this means there is very little data on the intakes of individual respondents. Thus although the dietary intake data can be used to describe food intake patterns in the population, these data are not well suited to the exploration of questions about factors that influence intake patterns within the population.

Monitoring dietary intakes, body weights, and food security status is important in ensuring the policies and programs remain relevant to population health. While it may only be feasible to conduct population-level dietary intake assessments once every 5-10 years, there are other indicators of nutritional health and well-being that can and should be measured more frequently. As discussed below, these include food insecurity and

body weight status. However, the province should also explore other, less costly ways to measure and monitor key food intake behaviours over time. A six-item fruit and vegetable ‘screener’ has been included on several population health surveys now, including CCHS 2.2, but the usefulness of this questionnaire as a tool to monitor changes in fruit and vegetable intakes over time in the Canadian population remains unknown. We recommend that more work be done to evaluate this ‘screener’ and, if necessary, explore other alternatives. We also suggest that the province explore the use of household food expenditure data, collected periodically by Statistics Canada, as a means to examine changes in food purchasing patterns around broad categories of foods of particular relevance to nutritional health (e.g., milk products, fruits, vegetables, whole grain products). Although the survey does not include detailed information on foods purchased and consumed away from home, the bulk of food purchasing happens in stores, so understanding food selection at this level is meaningful.

The only way to track the impact of policy and programmatic changes on household food insecurity is with effective monitoring of this problem. The use of different indicators of food security in earlier population surveys makes it impossible to compare prevalence rates for household food insecurity over time. Household food insecurity needs to be a core component of future population surveys, but it is imperative that survey designs and sampling frameworks remain consistent across surveys and that the Household Food Security Survey Module used on CCHS 2.2 be repeated. Measuring food insecurity on population surveys is only worthwhile if the results can be compared over time. That said, we also suggest that serious consideration be given to measuring and monitoring household food insecurity on an expenditure survey (e.g., Statistics Canada’s Survey of Household Spending or Survey of Labour and Income Dynamics) rather than a population health survey. This would facilitate identification of the specific features of household income and expenditures that underpin food insecurity and thus enable examination of the roles that various policies and programs play in relation to household food insecurity.

It is also important to collect measured data on the height and weight on Ontario adults and children in subsequent provincial surveys to track problems of overweight and obesity in our population. Consideration should also be given to the inclusion of measurements on waist circumference, given its importance as an indicator of chronic disease risk. The biases associated with self-reported data mean that it cannot be used to effectively monitor this problem. Thus it will not be valid to compare the prevalence estimates from CCHS 2.2 with future or past prevalence estimates derived from self-report data.

6 Conclusions

The foregoing analysis of data from the Ontario Share File of the CCHS, Cycle 2.2 has yielded important new information about the nutritional health of the Ontario population. Our examination of body weight status confirms that overweight and obesity are serious public health problems in Ontario. Household food insecurity also appears to

pose a very real threat to the nutritional health and well-being of many low-income Ontarians. Through an examination of adults' and children's nutrient and energy intakes we have identified some relatively widespread problems of nutrient inadequacy in the population. While some of the specific nutrient inadequacies reported here would likely appear less severe if vitamin and mineral intakes from supplements were taken into account, our findings nonetheless indicate that food intake patterns are suboptimal among some segments of the population. The present results highlight the need for Ontario adults in particular to practice healthier eating habits in order to achieve and maintain healthy body weights and minimize risks of diet-related chronic diseases. Our results also highlight the need for widespread intervention to lower the levels of sodium consumption throughout the population.

7 Implications of the findings

What follows is a brief summation of what we see as the key implications emerging from the results of the analyses presented in this report (not in order of priority).

1. The results of this survey provide strong evidence of the need to promote and support healthier eating patterns and more active lifestyles among Ontario adults and children, to help them achieve and maintain healthy body weights.
2. The pattern of nutrient inadequacies identified among adults, and to a lesser extent, adolescents and children, speaks to the need for increased consumption of vegetables, fruit, whole grains, and milk and alternatives. While some of the micronutrient problems identified here may appear less serious once nutrient intakes from supplements are considered, there are still many indications that food habits need to be improved for optimal health.
3. Pending access to the data on supplement intakes from CCHS 2.2, it is imperative that the prevalences of nutrient inadequacies reported here be re-assessed, considering nutrient intakes from both food and supplements. Apart from the promotion of healthy eating, no interventions should be considered to address specific problems of vitamin or mineral inadequacy identified in this report until the prevalence estimates are confirmed.
4. Government needs to work with representatives of the food industry (including representatives of the restaurant and fast-food industries) to develop strategies to lower the sodium content of food. It will also be imperative to monitor this problem, to ensure progress is made.
5. More effective income-support programs are required to ensure that individuals and families who are reliant on social assistance or employment incomes from low-waged jobs have sufficient financial resources to purchase the food they need. To this end, we recommend that the province undertake a systematic examination of the interrelationship between a broad spectrum of current policies and programs and

household food security and that in the future, the impact of proposed policy changes on household food security be routinely assessed as part of the process of evaluating the merit of policy options.

6. To monitor progress in lessening problems of household food insecurity in Ontario, food security needs to be measured consistently and repeatedly on future population surveys.
7. It will be important to collect measurements of the height and weight of adults and children in subsequent provincial surveys to monitor problems of overweight and obesity. Consideration should also be given to the inclusion of measurements on waist circumference, given its importance as an indicator of chronic disease risk.
8. To better understand the specific food intake patterns that underpin the nutrient problems identified here, further examination of the food intake data from CCHS 2.2 should be conducted, if access to these data can be obtained. Because Canada's Food Guide is the primary tool for nutrition communications and education programs, it is important to examine the population's intakes in relation to this guidance. In targeting interventions, it would also be helpful to understand the extent to which adults' and children's food intakes include commercially prepared meals and snacks, and foods consumed away from home.
9. In the development of future analyses of data from CCHS 2.2, it is important to build on the methodologic insights gained from this project. The data from CCHS 2.2 are most effectively used to examine patterns at a provincial level. Given sample size limitations, the feasibility of additional studies of within-province differences in dietary intake or body weight status by health region, income, education, immigration status, and other socio-demographic variables is questionable.
10. Monitoring dietary intakes is important in ensuring that nutrition- and food-related policies and programs remain relevant to population health, but the high costs of conducting 24-hour dietary intake recalls on a representative sample of the population limit the frequency with which this kind of assessment can and should be conducted. The province should explore other, less costly ways to measure and monitor key food intake behaviours over time. We recommend evaluation of the six-item fruit and vegetable 'screener' questionnaire included on CCHS 2.2 and several other population health surveys to assess its usefulness as an indicator of intake patterns. We also suggest that the province explore the use of household food expenditure data, collected periodically by Statistics Canada, as a means to examine changes in food purchasing patterns around broad categories of foods of particular relevance to nutritional health.

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