Results of a National Survey Examining Canadians’ Concern, Actions, Barriers, and Support for Dietary Sodium Reduction Interventions

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ABSTRACT
Population-wide dietary sodium reduction is considered a priority intervention to address sodium-related chronic diseases. In 2010, the Canadian government adopted a sodium reduction strategy to lower sodium intakes of Canadians; however, there has been a lack of coordinated action in its implementation. Our objective was to evaluate Canadians’ concern, actions, reported barriers, and support for government-led policy interventions aimed at lowering sodium intakes.

We conducted a survey among Canadians about sodium knowledge, attitudes, and behaviours. Data were weighted to reflect the 2006 Canadian census. Among 2603 respondents, 67.0% were concerned about dietary sodium and 59.3% were currently taking action to limit sodium intake. Those aged 50-59 years (odds ratio [OR], 1.79; 95% confidence interval [CI], 1.17-2.72) and 60-69 years (OR, 1.63; 95% CI, 1.05-2.55) were more likely to be concerned about sodium vs younger adults. Most Canadians have sodium intake levels that exceed recommendations, a risk factor for several cardiovascular conditions. To address this issue, a federal government-appointed Sodium Working Group developed A Sodium Reduction Strategy for Canada.1 Recommendations focused on the food supply, education and awareness, and research to achieve mean population intakes of 2300 mg/d by 2016.1 Food supply recommendations were for structured voluntary sodium reductions in food, with the option for regulation should industry fail to reach targets. Except for the recent release of sodium reduction targets for the food industry and a public education campaign,7 there is little known coordinated action toward implementing the Strategy’s 27 recommendations and presently no monitoring and evaluation framework exists.

We conducted a survey to assess Canadians’ concern about sodium, and actions and barriers in limiting sodium consumption. Public opinion to a large degree influences the political agenda, and in light of the proposed federal Bill C-460, to legislate the implementation of the Strategy’s recommendations, we also sought to determine Canadians’ level of support, if any, for multisectoral sodium reduction initiatives.

Methods
An online survey was administered in November-December 2011 to a longitudinal Canadian survey panel representative of the Canadian population for age, sex, province, and education (http://consumermonitor.ca/).
French-speaking eligible participants were: age 20-69; a household grocery shopper; and had e-mail access. Thirty thousand were invited; 6665 completed the baseline questionnaire. The present survey was the ninth survey administered to this panel. Typically 2000-3000 responses were obtained per survey.

Questions were developed by sodium and/or consumer survey experts, or taken from similar national surveys. Each question was plain language-reviewed and pilot-tested among a small group of participants from Guelph, Ontario, and many questions were administered to a larger panel of Ontarians. Snap 10 Professional Survey Software and Web-host (Snap Surveys, Portsmouth, NH) were used for survey administration. Participants provided informed consent. Research ethics board approval was obtained from University of Toronto and University of Guelph.

Statistical analysis

Data are presented as percentages and standard errors. A 5-point Likert scale was used (1 = not at all important/strongly disagree; 5 = extremely important/strongly agree). Responses of concern about sodium and action in limiting sodium intake were dichotomized based on responses: “4 or 5” = “concern” or “taking action” and “1, 2, or 3” = “no concern” or “not taking action.” For barriers, responses were coded: “1 or 2” = “not important” or “disagree”; “3” = “neutral,” “4 or 5” = “important” or “agree,” and “6” = “not applicable.” Rao-Scott $\chi^2$ tested the association between action and reported barriers. Multivariable logistic regression was used to determine relationships between action and/or concern and age, sex, and blood pressure status. All estimates were weighted to be representative of the 2006 census population. $P < 0.05$ was considered statistically significant. SAS version 9.3 (SAS Institute, Cary, NC) was used for statistical analyses.

Results

There were 2603 respondents, 65% women (Supplemental Table S1). Respondents were slightly older and had a higher level of education compared with 2006 Canadian census respondents. One-fifth (20.9%) had been diagnosed with hypertension.

Concern

Most respondents (67.0%) were concerned about sodium intake. Those 50-59 years old (odds ratio [OR], 1.79; 95% confidence interval [CI], 1.17-2.72) and 60-69 years (OR, 1.63; 95% CI, 1.05-2.55) were more likely to be concerned compared with respondents aged 20-29 (Supplemental Fig. S1), as were hypertensive individuals compared with normotensives (OR, 4.13; 95% CI, 3.05-5.59).

Personal action

Many respondents (59.8%) believed that their health would improve if they reduced sodium in their diet, and 59.3% were actively trying to do so. Action toward limiting dietary sodium was more likely with each increasing age group, and among hypertensive individuals (OR versus normotensives, 3.48; 95% CI, 2.58-4.69) (Supplemental Fig. S2). There were no differences between men and women.

Primary reasons for limiting, previously limiting, or interest in limiting sodium (78.2% of respondents) were: to improve overall health (84.5%), because they heard they should (54.2%), to manage a health condition (38.2%), or a health professional recommended it (26.3%). Reasons for not limiting sodium (21.8% of respondents) were: low or normal blood pressure (69.9%), overall good health (56.4%), a health care professional had not recommended it (36.6%), or do not like the taste of lower sodium foods (27.2%). Most
respondents (77.4%) limiting sodium intake were concerned about their sodium consumption; however, 43.6% of those not limiting their sodium intake were also concerned. Those concerned about high blood pressure (43.0%) were more likely to be taking action to limit sodium, compared with those not concerned about high blood pressure (71.9% vs 49.7%; \( P < 0.001 \)).

**Barriers**

Significant barriers to limiting sodium were lack of lower sodium options among processed and restaurant foods (Table 1). Only 15.5% and 12.4% correctly identified the recommended (1500 mg/d) and maximum (2300 mg/d) sodium levels, respectively. Most (72.5%) of those limiting sodium intake avoided high-sodium foods. However, 45.9% of those admitted limiting sodium intake but not avoiding high sodium foods, and thought their sodium intake was low because they do not add salt to their food.

**Sodium reduction interventions**

Most respondents (80.2%) agreed that the food industry should lower sodium in the foods they produce. There was strong support for sodium reduction interventions (Supplemental Table S2); government to work with the food industry to lower levels in processed foods (86.6%), set maximum levels for foods served in publicly funded institutions (81.8%-82.3%), and educational interventions (80.4%-83.1%). However, there was less support for financial incentives (29.1%) and disincentives (26.5%).

**Discussion**

Two-thirds of respondents were concerned about dietary sodium, which was greater in older people and in hypertensive individuals. More than half of the respondents were actively limiting their sodium intake, despite several misconceptions and inadequate knowledge of recommended sodium levels. We also found very strong support for almost all sodium reduction interventions, particularly those targeting the food supply and consumer education. This was not surprising because the greatest barriers to sodium reduction were a lack of lower-sodium processed and restaurant foods. These are all areas in which strong government leadership is needed.

Our data complement existing evidence that highlights the need for interventions aimed at lowering sodium in the food supply. Over 80% of respondents believed that the food industry should reduce sodium in prepared and packaged food, which is explained by the respondents’ reported barriers to sodium reduction. This is relevant because most of dietary sodium is derived from packaged and prepared foods. Health Canada data have shown it is practically impossible to consume sodium intakes < 2300 mg/d following Canada’s Food Guide, because of the high amounts of sodium in the food supply. Unfortunately, there has been minimal action on the Strategy’s 10 food supply-focused recommendations. Although Health Canada recently published sodium reduction benchmarks to guide food manufacturers in reducing sodium levels, no such targets exist for the restaurant sector. Additionally, without a coordinated national monitoring and evaluation program, which Canada does not have, the food industry cannot be held accountable to these targets, nor can their success be measured.

Approximately half of our respondents were actively limiting their sodium intake. However, food intake or urinary excretion data would be required to verify actual adherence with sodium recommendations. Our data revealed several concerns and misconceptions. First, many were not limiting their sodium intake because they had low or normal blood pressure and overall good health, contradicting the literature.

<table>
<thead>
<tr>
<th>Table 1. Reported barriers to limiting sodium intake: those taking action to limit sodium vs those who are not</th>
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<tbody>
<tr>
<td><strong>Not taking personal action</strong></td>
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<tr>
<td></td>
</tr>
<tr>
<td>Disagree (%)</td>
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<tr>
<td>---------------------------------------------------------------</td>
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<tr>
<td>There is not enough variety of low-sodium processed foods</td>
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<tr>
<td>It is hard to understand sodium information on food labels</td>
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<tr>
<td>I don’t know how/lack of information</td>
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<tr>
<td>A lack of support from my family/friends makes reducing sodium difficult</td>
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<td>Only one person in my household wants to/needs to lower their sodium intake. It’s too much trouble for one person to eat lower sodium.</td>
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<tr>
<td>Lack of willpower</td>
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<td>Low sodium food products don’t taste as good, compared with regular products</td>
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<tr>
<td>I don’t know how or don’t like to cook</td>
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<tr>
<td>I don’t always have time to prepare low sodium meals/ from scratch</td>
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<tr>
<td>The price difference between low-sodium and regular foods is too high for me</td>
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<td>When eating at fast food restaurants, I find that lower sodium options are not available or only in limited variety</td>
</tr>
<tr>
<td>When eating at sit-down restaurants, I find that lower sodium options are not available or only in limited variety</td>
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Data presented as percentage (standard error of percentage). Subjects had the option of choosing “not applicable” for each barrier, which makes up the difference in the percentages. These individuals were included in the analysis. The Rao-Scott \( \chi^2 \) test was used to test the association between barriers and personal action.
demonstrating benefits of sodium reduction in normotensive individuals. Second, respondents who where actively limiting sodium, but not actually restricting high sodium foods, thought they consumed low amounts of sodium because they did not add salt to their food. Additionally, few individuals were aware of the actual sodium recommendations. Whether these findings support the need for, or highlight the ineffectiveness of, educational interventions is unknown; however, they demonstrate the need for other types of interventions, such as those targeting the food supply.

Our population might not reflect the entirety of the Canadian population. Although data were weighted, respondents had a higher education level and were slightly older than the Canadian population. We also only included household grocery shoppers. Although the response rate was relatively low in contrast to the number of respondents who completed the baseline survey (39.1%), it is comparable with other surveys administered to this longitudinal survey cohort, and the sample size remains much larger than other national surveys.3

These data provide further evidence supporting the need for multisectoral sodium reduction initiatives, to assist Canadians in lowering their sodium intakes to levels consistent with dietary recommendations.

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**Disclosures**

The authors have no conflicts of interest to disclose.

**References**


**Supplementary Material**

To access the supplementary material accompanying this article, visit the online version of the *Canadian Journal of Cardiology* at [www.onlinecjc.ca](http://www.onlinecjc.ca) and at [http://dx.doi.org/10.1016/j.cjca.2013.01.018](http://dx.doi.org/10.1016/j.cjca.2013.01.018).