

Use of Vitamin and Mineral Supplements among Canadian Adults

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ABSTRACT

Objective: To estimate the prevalence and determinants of use of vitamin and mineral supplements among adult Canadians.

Methods: Data from adult respondents of the Canadian Community Health Survey Cycle (CCHS) 2.2 were used. Participants were asked about their use of vitamin and mineral supplements in the month prior to being surveyed. The prevalence of vitamin and mineral supplement use was compared across various socio-demographic and lifestyle factors. Logistic regression analysis was used to assess determinants of supplement use.

Results: In the month prior to the interview, 40.1% of adult Canadians took supplements. In the fully adjusted model, females of all ages were more likely to be users than males 19-30 years. Physical activity, fruit/vegetable consumption, and higher levels of household education and income were positively related to supplement use.

Conclusions: A substantial proportion of adult Canadians take vitamin and mineral supplements. The use was more prevalent among those with healthier lifestyles and of socio-economically advantaged backgrounds. Further investigation is needed to reveal the impact of supplements on nutrient adequacy and health.

Key words: Adult; Canada; vitamins; epidemiologic factors; minerals

La traduction du résumé se trouve à la fin de l'article.

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In recent years, there has been increased consumption of vitamin and mineral supplements in industrialized nations.¹⁻⁴ At the same time, there has been growing attention to the potential role of vitamin and mineral supplements in augmenting total nutrient intake, improving health and ameliorating disease risk.⁵⁻⁷ There have also been concerns that some consumers who take supplements may exceed the Upper Tolerable Limit for certain nutrients.^{7,8}

International studies have reported prevalences ranging from 36%⁹ to 52%,⁴ and have identified age, female gender and higher socio-economic status^{4,9-11} to be associated with vitamin and mineral supplement use. In Canada, only a few studies but no population-based ones have examined the use of supplements, whereas such information is critical to inform policy decision-makers, stakeholders and the public.

Therefore, the objective of the current study was to determine the prevalence of vitamin and mineral supplement use among adults and its association with demographic and lifestyle factors. To this end, we accessed data from the Canadian Community Health Survey, cycle 2.2 (CCHS 2.2), a nationally representative cross-sectional survey of Canadian residents of all ages.¹²

METHODS

Design and sampling strategy

Data from the General Health Component of the CCHS 2.2 were used. The General Health Component contained information on respondents' physical activity, self-reported chronic disease, smoking status, alcohol consumption, fruit/vegetable consumption, household food security, socio-demographic characteristics, and vitamin and mineral supplement consumption.¹²

A single member in each of 35,107 households was surveyed using a complex multistage sampling strategy to select households and respondents. Excluded from the survey were persons living on Indian reserves or Crown lands, persons living in institutions, full-

time members of the Canadian Forces and residents of some remote regions, and persons living in the Territories. The target population covered by the survey represents approximately 98% of the population of the 10 provinces. The overall survey response rate was 76.5%. Detailed descriptions of the survey design, sample and interview procedures are available elsewhere.¹²

Inclusion/Exclusion criteria

Respondents 19 to 70 years of age were included in the current analysis. Pregnant women and respondents with missing responses to the question about vitamin and mineral supplement use in the past month were excluded. Missing values were treated as a separate covariate category where possible. However, individuals with missing data for physical activity, fruit/vegetable consumption, self-reported chronic disease, and smoking status had to be removed from the analysis as Statistics Canada does not allow release of information on subsets with $n < 10$ for the CCHS in order to avoid respondent information disclosure. The final sample size was 15,553 respondents.

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Disclaimer: This analysis was based on the Statistics Canada CCHS 2.2 master file which contains anonymized data collected in 2004/2005. The responsibility for the use and interpretation of these data is solely that of the authors. The opinions expressed in this paper are those of the authors and do not represent the views of Statistics Canada.

Table 1. Prevalence and Determinants of Vitamin and Mineral Supplement Use among Canadians Aged 19-70

Determinants		Distribution in the Population (%)	Prevalence of Vitamin/Mineral Supplement Use (%)	Odds Ratio (95% Confidence Interval)	
				Unadjusted	Adjusted†(Full Model)
Age-sex groups					
19-30 years	M	12.3	27.9	1	1
	F	11.3	34.5	1.36 (1.09-1.70)	1.40 (1.12-1.75)
31-50 years	M	23.2	29.2	1.07 (0.85-1.33)	1.06 (0.84-1.34)
	F	22.9	46.4	2.24 (1.79-2.79)	2.24 (1.77-2.83)
51-70 years	M	14.9	40.2	1.74 (1.41-2.14)	1.66 (1.32-2.09)
	F	15.4	60.5	3.96 (3.20-4.90)	4.13 (3.25-5.24)
Physical activity					
Active		18.4	47.9	1	1
Moderate		25.3	42.3	0.79 (0.67-0.94)	0.75 (0.63-0.90)
Inactive		56.3	36.5	0.62 (0.54-0.73)	0.64 (0.54- 0.76)
Fruit & vegetable daily consumption					
<5 servings/day		69.1	37.0	1	1
≥5 servings/day		30.9	46.8	1.50 (1.31-1.71)	1.18 (1.03-1.36)
Chronic condition					
Yes		38.5	44.5	1	1
No		61.5	37.3	0.74 (0.66-0.84)	0.89 (0.77-1.02)
Smoking status					
Non-smoker		47.4	41.3	1	1
Current smoker		26.8	32.8	0.69 (0.60-0.80)	0.85 (0.73-1.00)
Previous smoker		25.8	45.3	1.17 (1.01-1.37)	1.10 (0.93-1.30)
Alcohol					
<once/month		16.6	40.9	1	1
1-3 times/month		19.8	40.4	0.98 (0.81-1.18)	1.08 (0.87-1.33)
≥once/week		45.8	40.9	1.00 (0.84-1.19)	1.05 (0.86-1.27)
Missing		17.8	36.8	0.84 (0.69-1.03)	0.86 (0.70-1.06)
Household food security					
Secure		90.7	40.8	1	1
Insecure		8.9	33.3	0.73 (0.60-0.87)	1.03 (0.83-1.29)
Missing		0.4	26.4	0.52 (0.18, 1.52)	0.72 (0.27-1.92)
Highest household education					
Secondary school or less		17.9	33.4	1	1
Post-secondary school/college		44.7	40.3	1.35 (1.16-1.58)	1.37 (1.17-1.61)
University		35.3	43.8	1.56 (1.33-1.82)	1.41 (1.18-1.69)
Missing		2.1	29.9	0.85 (0.57-1.28)	0.88 (0.57-1.35)
Household income adequacy					
Lowest		7.9	32.9	1	1
Lower middle		17.0	34.1	1.05 (0.82-1.36)	1.04 (0.79-1.37)
Upper middle		32.8	38.5	1.27 (1.02-1.59)	1.23 (0.95-1.60)
Highest		34.0	46.8	1.79 (1.44-2.23)	1.62 (1.24-2.12)
Missing		8.3	37.9	1.24 (0.94-1.64)	1.17 (0.86-1.59)

Note: The estimates represent population estimates as they were weighted to the Canadian population.

† Full model included all covariates.

‡ Parsimonious model included only significant covariates

Outcome

The primary outcome was the period prevalence (hereafter referred to as ‘prevalence’) of self-reported consumption of vitamin and mineral supplements. Respondents were asked, “In the past month, did you take vitamins/minerals?”. Respondents who answered “yes” were defined as “vitamin and mineral supplement users” and those who answered “no” were defined as “vitamin and mineral supplement non-users” in this study.

Socio-demographic and lifestyle factors

The following variables were considered as covariates in the analysis based on previous information from the literature: age; gender; physical activity (active, moderate, inactive); fruit and vegetable daily consumption (<5x/day, ≥5x/day), self-reported chronic disease (yes/no), smoking status (non-smoker, current smoker, former smoker), alcohol consumption (<1x/month, 1-3x/month, ≥1x/week), household income adequacy (takes into account both the number of people in the household and the total household income from all sources in the 12 months before the interview; lowest, lower middle, upper middle, highest), highest household education (secondary school or less, post-secondary school/college, university), household food insecurity (based on a revised interpretation of the responses to the United States Household Food

Security Survey Module developed by Health Canada’s Office of Nutrition Policy and Promotion in consultation with experts in nutrition and food security;¹³ yes/no).

Consistent with Dietary Reference Intakes (DRIs), specific age/sex categories recommended by the Institute of Medicine (IOM)¹⁴ were used in the analysis (males 19-30 years, females 19-30 years, males 31-50 years, females 31-50 years, males 51-70 years, females 51-70 years).

Statistical analysis

Associations between socio-demographic and lifestyle factors and vitamin and mineral supplement use were examined using cross-tabulations and logistic regression analysis. Backward selection procedure was employed to build the parsimonious multiple regression model, and the Likelihood-Ratio test was used to exclude non-significant covariates (p>0.05) from the model. Odds ratios and 95% confidence intervals were reported.

The coefficients of variation for the prevalence estimates for the outcome and the covariates indicated acceptable sampling variability (<16%) as per Statistics Canada policy.¹⁵ All estimates were obtained using sampling weights provided by Statistics Canada to account for design effect and non-response bias. Standard errors were estimated using a bootstrapping procedure.¹² Stata 9 (Stata Corp, College Station, TX, USA) was used to perform the statistical analyses.

The current research was approved by the Health Research Ethics Board at the University of Alberta.

RESULTS

The prevalence of vitamin and mineral supplement use among adult Canadians ages 19-70 years was 40.1%. Gender and age differences were observed in that more females than males took supplements (48.1% vs. 32.2%) and older persons were more likely to take supplements than younger persons: 51% (51 to 70 years) vs. 38% (31 to 50 years) and 31% (19 to 30 years).

In both the univariate and multiple regression analysis, respondents with less healthy lifestyle behaviours or of lower socio-economic status were generally less likely to be vitamin and mineral supplement users. Respondents from food-insecure households were as likely to use supplements as those from food-secure households after adjusting for socio-economic status. Respondents with a self-reported chronic disease were more likely to be vitamin and mineral supplement users than those without a chronic condition; this association was only statistically significant in the univariate analysis. Detailed results from the univariate and full adjusted model are presented in Table 1. Presence of a chronic condition, alcohol consumption, and household food security were not retained in the parsimonious model. Odds ratios from the parsimonious model were very similar to those from the full model (data not shown).

DISCUSSION

The current study showed that 40% of adult Canadians reported having used vitamin or mineral supplements in the previous month. Vitamins and mineral supplements were more commonly used by individuals with healthy lifestyle behaviours or of higher socio-economic status, women and adults beyond the age of 50.

Only a few Canadian studies have examined vitamin and mineral supplement use. However, due to limitations in sample representativeness and comprehensiveness, their findings may not be generalizable.^{8,16-19} The 1997/98 *Food Habits of Canadians* study interviewed 1,543 Canadian adults aged 18-65 randomly selected from five geographic regions across Canada and reported that 41% of the respondents used supplements.⁸ The *Baseline Natural Health Products Survey Among Consumers* collected information on the use of natural health products in 2,004 adult Canadians in 2005.¹⁹ The reported usage of natural health products in that survey was 71%, and the most commonly used product was vitamins (57%), indicating that 40.5% of survey respondents used vitamins, which is comparable to the 40% prevalence in the present study.¹⁹ As in our study, users of natural health products tended to have a higher level of education and household income, and were more likely to be female.¹⁹ In the US, the prevalence of vitamin and mineral supplement use in the month prior to the interview was reported to be 42% among participants of the third National Health and Nutrition Examination Survey (NHANES III).²

The current study, consistent with patterns presented in previous studies, demonstrated that females, older people, and those with a socio-economically advantaged background were more likely to use vitamin and mineral supplements.^{2,3,10,11,19-23} Studies in the United States and Europe have shown that physical activity is positively associated with vitamin and mineral supplement use.⁹ Our results confirm these findings in a Canadian setting. Additionally, in agreement with previous research,¹⁰ we found that per-

sons who had a higher fruit and vegetable intake were more likely to take vitamin and mineral supplements.

Results from the Baseline Natural Health Products Survey have shown that personal health concerns and the desire to maintain and promote personal health are primary motivation in Canadians for use of natural health products.¹⁹ Ervin and colleagues² pointed out the role of recommendation by family and friends, media, advertisement, and health professionals on the consumption of supplements. Other reasons might include the desire to improve athletic performance²⁴ or to increase energy,² or the scientific evidence on association of higher intake of certain nutrients with decreased risk for certain diseases.² While some researchers have found a positive association between supplement use and self-reported health status,^{2,25} others have found no significant association²⁶ or a negative one.²⁷ Bender et al.²⁸ found that individuals who had one or more health problems were more likely to take supplements, however, after controlling for socio-economic factors, this significant positive relationship disappeared. The findings of Bender et al. are similar to our results from the CCHS 2.2 indicating that the negative association between having a self-reported chronic condition and supplement use is affected by socio-economic factors.

So far, no studies have assessed the relationship between income-related household food insecurity and the use of vitamin and mineral supplements. The univariate analysis showed that household food insecurity is inversely associated with vitamin and mineral supplement use. However, after adjusting for income and education, this association vanished, indicating that the relationship is confounded by socio-economic status.

The strengths of the present study can be attributed to the features of CCHS 2.2 that include a large representative sample size, the population-based design, and a high response rate. Our findings from the CCHS 2.2 could, therefore, represent Canadian estimates of vitamin and mineral supplement use. The study is limited by the lack of an exact definition of a vitamin and mineral supplement in the CCHS 2.2 questionnaire and the absence of more detailed data on the frequency and type of the supplement intake. Respondents might have had different understandings of the question, and this might have led to the under- or over-reporting of supplement usage. Also, self-reported responses are prone to reporting bias and to error. The current paper used fruit and vegetable intake as a proxy for diet quality as fruits and vegetables contribute significantly to an individual's dietary intake of fibre, vitamin A, folate, iron and potassium.²⁹ Future studies should compare a broader range of dietary factors between users and non-users of supplements.

Given the high prevalence of supplement use by Canadians, it is important to evaluate the contribution of vitamin and mineral supplement use to the nutritional adequacy and well-being of Canadians. Although it is recommended that adequate nutrition be maintained through a well-balanced diet, many people do not get enough nutrients from food to ensure optimal health³⁰⁻³² and would benefit from the use of vitamin and mineral supplements. Unfortunately, as shown in the current study, individuals who would likely benefit the most from vitamin and mineral supplement use are less likely to use them. On the other hand, individuals with an adequate diet who take supplements may inadvertently exceed the recommended upper intake limit for some nutrients, which may result in toxicity.³³ Future studies should examine the

role of vitamin and mineral supplement use in relation to nutrient adequacy and health.

In summary, consumption of vitamin and mineral supplements is common in Canadian adults, and is positively associated with higher socio-economic status and healthier lifestyle behaviours. This study not only provides an enhanced understanding of estimates of vitamin and mineral supplement use, but also provides baseline data for further epidemiologic investigations that need adequate estimates of prevalence rates in different strata to assess the role of supplements in nutrition and health. Furthermore, this study presents data of public health significance that warrants further exploration, and also provides data that can be used to develop evidence-based health policy and programs.

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RÉSUMÉ

Objectif : Estimer la prévalence et les déterminants de la consommation de vitamines et de suppléments minéraux chez les Canadiens adultes.

Méthode : Nous avons utilisé les données des répondants adultes du cycle 2.2 de l'Enquête sur la santé dans les collectivités canadiennes (ESCC). Les participants avaient indiqué leur consommation de vitamines et de suppléments minéraux au cours du mois précédent l'enquête. Nous avons comparé la prévalence de la consommation de vitamines et de suppléments minéraux selon divers facteurs sociodémographiques et liés au mode de vie. Les déterminants de la consommation de suppléments ont été évalués par analyse de régression logistique.

Résultats : Au cours du mois précédent l'enquête, 40,1 % des Canadiens adultes avaient pris des suppléments. Dans le modèle ajusté selon l'âge et le sexe, les femmes de tout âge étaient plus susceptibles d'en avoir consommé que les hommes de 19 à 30 ans. L'activité physique, la consommation de fruits et légumes et des niveaux plus élevés d'instruction et de revenu du ménage étaient positivement associés à la consommation de suppléments.

Conclusion : Une proportion importante de Canadiens adultes prend des vitamines et des suppléments minéraux. Cette consommation prévaut davantage chez les personnes ayant un mode de vie sain et venant d'un milieu socioéconomique aisé. Il faudrait pousser la recherche pour connaître l'incidence des suppléments sur l'adéquation de l'apport en nutriments et la santé.

Mots clés : adultes; Canada; vitamines; facteurs épidémiologiques; minéraux