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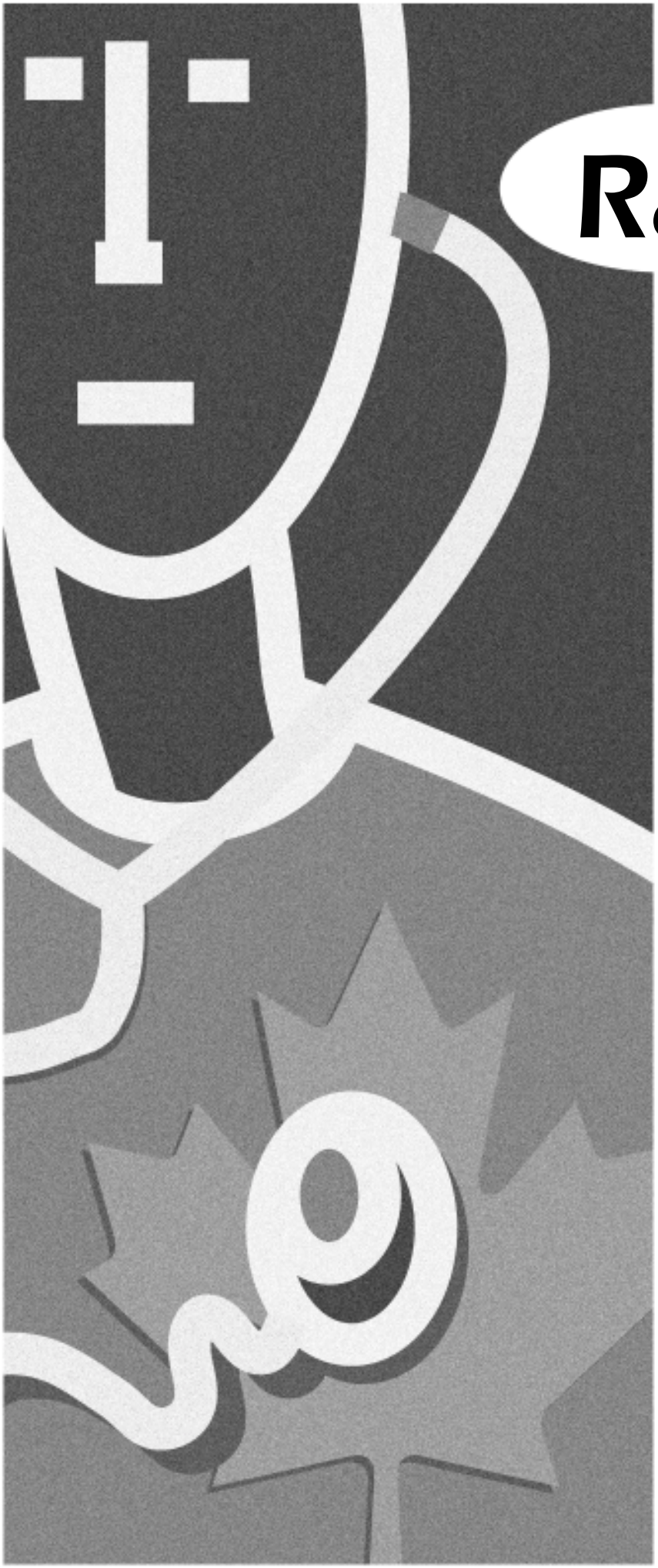
Research Articles



Research Articles

In-depth research and analysis in the fields of health and vital statistics

Canadian Community Health Survey — Methodological overview

Yves Béland

- *Implementation of the Canadian Community Health Survey (CCHS) marks an important turning point in the collection of information on the health of Canadians. For the first time, it will be possible to compare health-related characteristics of the population at sub-provincial levels in all provinces and territories.*

Abstract

Objectives

This article describes the design, sampling strategy, interviewing procedures, data collection and processing of the Canadian Community Health Survey (CCHS).

Summary

Data collection for cycle 1.1 of the CCHS began in September 2000. This first cycle provides cross-sectional data at the regional level for 136 health regions; the first half of data collected for cycle 1.1 provides data for 133 health regions. In addition to the survey methods, this article reports the sample size and rates of proxy response and non-response for each province, for the first six months of cycle 1.1. A summary of methods used to impute values that were not provided by proxy respondents is provided. A discussion of survey errors and their sources follows.

Key words

health surveys, cross-sectional studies

Author

Yves Béland (613-951-1494; belayve@statcan.ca) is with the Household Survey Methods Division at Statistics Canada, Ottawa, Ontario, K1A 0T6.

The Canadian Community Health Survey (CCHS) is part of a recent federal initiative aimed at providing health information at the regional and provincial levels. The CCHS, for which data collection began in 2000, consists of two cross-sectional surveys conducted over a two-year, repeating cycle. The first survey, referred to as cycle 1.1, was designed to collect data from a sample large enough to provide information by health region. The second survey (cycle 1.2) will focus on a specific health topic, and will provide data at the provincial level.

This article describes the sampling strategy, data collection, data processing and sources of survey error in the CCHS. It supplements the other articles in this issue, each of which is based on analysis of data collected in the first half of cycle 1.1. Although the full cycle 1.1 data file will support analysis at the provincial and regional levels, the reports based on the first half of the data for cycle 1.1 provide preliminary findings at the national level only.

Target population

The CCHS targets individuals aged 12 or older who are living in private dwellings. People living on Indian reserves or Crown lands, residents of institutions, full-time members of the Canadian Armed Forces, and residents of certain remote regions are excluded. The CCHS covers approximately 98% of the Canadian population aged 12 or older. The three territories were not included in the analyses based on the preliminary file comprising the first half of data collected for cycle 1.1, because data collection in those areas began later than in the rest of the country.

Health regions

For administrative purposes, each province is divided into health regions (HR), and each territory is designated as a single HR (Table 1). Statistics Canada, in consultation with the provinces, has made minor changes to the boundaries of some of the HRs to correspond to the geography of the 1996 Census. Cycle 1.1 of the CCHS collects data in 133 HRs in the 10 provinces, in addition to one HR per territory, totalling 136 HRs.

Table 1
Number of health regions and targeted sample sizes, by province/territory, Canadian Community Health Survey, cycle 1.1

	Number of health regions	Sample size, first six months of data collection	Total sample size (projected)
Canada	**136**	**54,788**	**133,300**
Newfoundland	6	1,834	4,010
Prince Edward Island	2	909	2,000
Nova Scotia	6	2,158	5,040
New Brunswick	7	2,245	5,150
Québec	16	10,065	24,280
Ontario	37	16,508	42,260
Manitoba	11	3,823	8,000
Saskatchewan	11	3,702	7,720
Alberta	17	6,477	14,200
British Columbia	20	7,067	18,090
Yukon	1	0	850
Northwest Territories	1	0	900
Nunavut	1	0	800

Sample size and allocation

Although producing reliable estimates at the HR level is a primary objective of cycle 1.1, the quality of the estimates for certain key characteristics at the provincial level was also deemed important. Therefore, the sample allocation strategy, consisting of three steps, gives relatively equal importance to the HRs and the provinces. In the first two steps, the sample is allocated among the provinces and territories according to their respective populations and the number of HRs they contain (Table 1). In the third step, each province's sample is allocated among its HRs proportionally to the square root of the estimated population in each HR.

This three-step approach guarantees each HR sufficient sample with minimal disturbance to the provincial allocation of sample sizes. The sample sizes were enlarged before data collection to take into account out-of-scope and vacant dwellings and anticipated non-response. (For the complete list of updated HRs and projected sample sizes, see: http://www.statcan.ca/health_surveys.)

Frames, household sampling strategies

The CCHS uses the area frame designed for the Canadian Labour Force Survey as its primary sampling frame. A multistage stratified cluster design was used to sample dwellings within the area frame.[1] In the first stage of the design, a list of the dwellings was prepared. At the second stage, a sample of dwellings was selected from this list. The households in the selected dwellings then formed the sample of households. The majority (88%) of the targeted sample was selected from the area frame, and face-to-face interviews were held with respondents randomly selected from households in this frame.

In some HRs, a random digit dialling (RDD) sampling frame was also used.[2] The sampling of households from the RDD frame used the Elimination of Non-Working Banks method, a procedure adopted by Statistics Canada's General Social Survey.[3] A telephone bank (the area code plus the first five digits of a seven-digit telephone number) was considered as "working" for the purposes of sampling if it included at least one residential telephone number. The working banks were regrouped to create RDD strata to encompass, as closely as possible, the HR areas. Within each

RDD stratum, a bank was randomly chosen, and a number between 00 and 99 was generated at random to create a complete 10-digit telephone number. This was repeated until the required number of telephone numbers within the RDD stratum was reached. Respondents in the RDD frame, who accounted for the remaining 12% of the targeted sample, were interviewed by telephone.

Respondent sampling

Selection of individual respondents was designed to ensure over-representation of youths (12 to 19) and seniors (65 or older). The selection strategy was designed to consider user needs, cost, design efficiency, response burden and operational constraints.

In approximately 82% of the households selected from the area frame, one person aged 12 or older was randomly selected; two people (12 or older) were randomly chosen in the remaining households. Selection of respondents from households in the area frame depended on the household composition, and was intended to increase the representation of the two age groups of special interest in the sample: youths and seniors. For households selected from the RDD frame, one person aged 12 or older was randomly chosen from all household members. The sample design of the CCHS is described in a previous report.[4]

Data collection

Data collection for cycle 1.1 began in September 2000 and was conducted over 12 months. This helped balance interviewer workload and minimize seasonal effects on certain health-related characteristics such as physical activity. The sample of households was allocated randomly over the 12-month period, and every HR was visited in each collection month. The data for the first half of cycle 1.1 were collected between September 5, 2000 and March 2, 2001.

Questionnaire design

The CCHS questionnaire was designed for computer-assisted interviewing (CAI). Thus, as the questions were developed, the associated logical flow into and out of the questions was programmed. This included specifying the type of answer required, minimum and maximum response values, on-line edits associated with the question, and procedures for handling item-non-response. With CAI, the interview can be directed based on the respondent's answers. On-screen prompts appear when an invalid entry is recorded. In this way, immediate feedback is given to the interviewer so that inconsistencies can be addressed.

In the developmental phase of the CCHS, consultation was undertaken with users of health information across Canada. Data needs were identified, and the questionnaire content was developed. An important goal of the CCHS is to collect data on issues of specific relevance to the HRs. To achieve this goal, the questionnaire was divided into two parts—a common content section 35 minutes in length, and a 10-minute optional content section containing questions selected to meet the particular needs of each HR. This resulted in 27 different versions of the questionnaire. For a summary of the common and optional content, see Appendix Table A. The complete CCHS questionnaire is available on Statistics Canada's website at: http://www.statcan.ca/health_surveys.

Interviewing

At the initial contact, Statistics Canada field interviewers visited all dwellings selected from the area frame. An inventory was made of everyone residing in the household, and one household member was randomly selected to be the survey respondent. Interviewers were instructed to administer the questionnaire directly to the selected respondent whenever possible. The procedure was similar for the sampling units from the RDD frame, where interviewers made as many as eight attempts to contact a householder.

When the selected respondent was unavailable at the time of the visit or telephone call, interviewers were instructed to return at a later date or to attempt to reach the respondent by telephone. When a selected respondent remained unavailable after repeated contact attempts, interviewers requested that another resident of the household complete a

Table 2
Percentage of interviews provided by proxy respondents in first six months of data collection, by province, Canadian Community Health Survey, cycle 1.1, September 2000 to February 2001

	%
Canada	**7.6**
Newfoundland	6.3
Prince Edward Island	7.9
Nova Scotia	4.9
New Brunswick	11.0
Québec	5.9
Ontario	6.8
Manitoba	10.0
Saskatchewan	7.2
Alberta	8.1
British Columbia	9.5

proxy interview on behalf of the designated respondent. After the first six months of data collection for cycle 1.1, nearly 8% of all interviews had been obtained by proxy; the rate varied somewhat among the provinces (Table 2).

Non-response

CCHS interviewers were instructed to make all reasonable attempts to obtain interviews. Designated respondents who initially refused to be interviewed were contacted by a senior interviewer, who stressed the importance of the survey and the household's co-operation. Additional attempts were then made to schedule the interview at the respondent's convenience. To maximize response rates for the first half of cycle 1.1, many non-respondents were contacted again in March 2001 at the end of the six-month period of data collection and were encouraged to participate. Despite these efforts, some non-response remained (Table 3).

Table 3
Non-response rate after six months of data collection, by province, Canadian Community Health Survey, cycle 1.1, September 2000 to February 2001

	%
Canada	**20.0**
Newfoundland	9.7
Prince Edward Island	13.2
Nova Scotia	18.2
New Brunswick	14.5
Québec	18.4
Ontario	23.9
Manitoba	13.6
Saskatchewan	15.3
Alberta	17.5
British Columbia	22.7

Data processing

Through the use of a computer-assisted interviewing (CAI) application, a great deal of editing is either precluded or performed as the data are collected. For example, the CAI application does not allow out-of-range values and controls flow errors. CAI ensures that questions that do not apply to a specific respondent are not asked. In other situations, warning messages are displayed. For instance, when contradictory information is entered, the interviewer is alerted. Then, depending on instructions specific to the question being asked, the interviewer may leave the response as given or request clarification. At the completion of data collection, some inconsistencies are removed during editing by Head Office staff.

Imputation for proxy respondents

Because of their private or sensitive nature, many CCHS questions are appropriate for self-response only, and are skipped when the questionnaire is answered by proxy respondents. During the first half of data collection for cycle 1.1, an unexpectedly high proportion of interviews were completed by proxy (Table 2). Consequently, important information was missing for the individuals represented in those interviews. Values for missing information in proxy interviews were imputed during data processing. This affected key variables in two articles in this issue: "Fruit and vegetable consumption" and "Community belonging and health."

Data for proxy interviews were imputed using the "nearest neighbour" imputation method. Within pre-defined imputation classes, another respondent with characteristics similar to the designated respondent was identified; this individual became the "donor" whose data were imputed to the designated respondent.

Imputation was used only to complete information for respondents whose interviews were provided by proxy respondents. Imputation was

not performed in cases of total non-response or when responses to individual questionnaire items were refused in non-proxy interviews. The issue of total non-response was addressed in the weighting strategy, and item-non-responses in non-proxy interviews were left as missing values on the data file.

Weighting

Each respondent was assigned a weight to represent his or her contribution to the total population. The weight was used to derive estimates for all characteristics surveyed. Taking into account the sample design, estimates were produced from the sample data by employing estimation techniques from survey sampling theory. Because the CCHS used two overlapping sampling frames with separate sample designs, two weighting strategies with various adjustments were processed side-by-side and integrated at a certain point with a dual-frame technique. The integrated weights were then calibrated to population projections using a one-dimensional post-stratification adjustment of 10 age/sex post-strata (that is, the age groups 12 to 19, 20 to 29, 30 to 44, 45 to 64 and 65 or older for each sex) within each province.

Before the integration and calibration adjustments, key factors determined the weighting strategy for the CCHS data collected during the first half of cycle 1.1. For the area frame sample units, these factors included:

- use of a stratified, multistage design, involving probability sampling proportional to size at all stages except the final stage, when systematic sampling of dwellings was used;
- monthly stabilization of sampled dwellings;
- use of only half of the full, pre-defined cycle 1.1 sample;
- household-level non-response;
- selection of one or two respondents, based on household composition;
- person-level non-response.

For the RDD frame sampling units, some of the determining factors were:

- use of simple random sampling of telephone numbers within working banks of each RDD stratum;
- use of only six monthly RDD samples;
- household-level non-response;
- households not included in the frame because of no telephone line;
- selection of only one person per household;
- person-level non-response.

A detailed account of the cycle 1.1 weighting strategy has been reported previously.[5]

Sampling error

The survey produces estimates based on information collected from a sample of individuals. Sampling error is the error attributed to studying a fraction of the population rather than carrying out a complete census under the same general conditions (questionnaire, interviewers, processing methods, etc.). The extent of this error depends on factors such as sample size, the variability of the characteristic of interest, sample design and estimation method. Because of the complexity of the sample design, sampling error for CCHS estimates was calculated using the bootstrap resampling technique.

Non-sampling error

Errors not related to sampling are called non-sampling errors; these errors can arise during any survey activity. For example, interviewers may misunderstand instructions about questionnaire administration, respondents may give erroneous answers, responses may be incorrectly recorded, and errors may be introduced in data processing. Over a large number of observations, randomly occurring non-sampling errors will have little effect on overall estimates derived from a survey. However, errors that occur systematically will contribute to biased estimates.

Considerable time and effort have been expended to reduce non-sampling error in the CCHS. Extensive training of interviewers with respect to survey procedures and questionnaire content, use of skilled interviewers for follow-up of non-respondents, monitoring interviewers to detect problems, and quality assurance protocols were among the measures implemented to minimize non-sampling error.

Non-response

Non-response is a major source of non-sampling error. The extent of non-response ranges from item-non-response (failure to answer single questions) to total non-response. Partial non-response to the CCHS was rare; once an interview was started, the questionnaire was usually completed with very little item-non-response. Total non-response occurred either because a respondent refused to participate in the survey, or because the interviewer was unable to contact the selected respondent. After the first half of data collection for cycle 1.1, non-response varied considerably by province (Table 3).

Concluding remarks

The CCHS has been designed to study differences in health among sub-provincial units. Using the data from the CCHS, policy-makers and health care professionals will be able to identify benchmarks and track the progress of health programs within their regions. As well, the CCHS will allow the study of subgroups in the population with special needs, including seniors, home care recipients and single mothers. ●

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Appendix

Table A
Summary of common and optional content, by number of participating health regions, Canadian Community Health Survey, cycle 1.1

Common content	Optional content	
Item	Item	Number of health regions (out of 136)
Alcohol	Breast examinations (clinical)	53
Alcohol dependence/abuse	Breast self-examination	69
Blood pressure check	Changes made to improve health	100
Breastfeeding	Dental visits	56
Chronic conditions	Depression	134
Contacts with mental health professionals	Distress	24
Exposure to second-hand smoke	Driving under influence	103
Food insecurity	Drug use	29
Fruit and vegetable consumption	Eye examinations	2
General health	Flu shots	57
Health care utilization	Home care	41
Health Utilities Index (HUI)	Mastery	55
Height / Weight	Mood	14
Injuries	Physical check-up	4
Mammography	Sedentary activities	68
PAP test	Self-esteem	45
Physical activities	Sexual behaviours	57
PSA test	Smoking-cessation aids	56
Restriction of activities	Social support	86
Smoking	Spirituality	8
Tobacco alternatives	Suicidal thoughts and attempts	70
Two-week disability	Use of protective equipment	59
Administration	Work stress	97
Household record variables		

Changes in unmet health care needs

Claudia Sanmartin, Christian Houle, Stéphane Tremblay and Jean-Marie Berthelot

Abstract

Objectives

This article examines recent trends in self-reported unmet health care needs among the household population aged 12 or older, and explores various explanations for the increase observed.

Data sources

The data are from the first half (September 2000 through February 2001) of data collection for cycle 1.1 of the Canadian Community Health Survey and from cross-sectional (1994/95 through 1998/99) household components of the National Population Health Survey.

Analytical techniques

Weighted frequencies and cross-tabulations were used to estimate the proportion of people aged 12 or older who reported that they did not receive health care when they thought they needed it. Estimates were also produced for the type of care sought, and specific reasons for unmet health care needs.

Main results

The percentage of people reporting unmet health care needs rose gradually between 1994/95 and 1998/99, then doubled (from 6% to over 12%) between 1998/99 and 2000/01. Long waiting time was the reason most frequently reported for unmet needs.

Key words

health services needs and demand, health services accessibility, health care reform, health surveys

Authors

Claudia Sanmartin (613-951-6059; sanmcla@statcan.ca), Christian Houle, Stéphane Tremblay, and Jean-Marie Berthelot (613-951-3760; berthel@statcan.ca) are with the Social and Economic Studies Division at Statistics Canada, Ottawa, Ontario, K1A 0T6.

- *Given recent changes to the health care system, concerns are growing about Canadians' access to health care services.*
- *"Unmet health care needs"—defined as the difference between health care services deemed necessary to deal with a particular health problem and the actual services received—has emerged as a key indicator of access to care.*
- *The rise in self-reported unmet health care needs appears to be accelerating. The percentage of people reporting unmet needs increased from 4% in 1994/95 to 6% in 1998/99, and then to 12% in 2000/01.*
- *Long waits and unavailability of services are the most frequently reported reasons for unmet health care needs.*

The Canada Health Act guarantees reasonable access to necessary medical services. Health care system reforms and restrained health care budgets, however, have led to concerns about the accessibility of health care services.[1-2]

Access to health care has been described as a dynamic process involving the person seeking care, the system providing care, and the various factors that intervene in this exchange.[3-5] However, measures of access to health care services are commonly limited to event-oriented indicators such as physician visits and hospitalization rates. While these

Methods

Data source

This report is based on cross-sectional data collected in 1994/95, 1996/97 and 1998/99 for cycles 1 through 3 of the National Population Health Survey (NPHS), and in 2000/01 during the first half of the first cycle (cycle 1.1) of the Canadian Community Health Survey (CCHS). Complete data for the first cycle of the CCHS will cover 136 health regions across the country. (See "Canadian Community Health Survey—Methodological overview" in this issue.)

The NPHS data used for this report were provided by respondents aged 12 or older who numbered 17,626 in 1994/95; 73,402 in 1996/97; and 15,249 in 1998/99. CCHS data were provided by 55,576 respondents aged 12 or older in 2000/01. At the household level, the respective NPHS response rates in 1994/95, 1996/97 and 1998/99 were 88.7%, 82.6% and 88.2%. The response rate at the household level for the CCHS was 80.0%. For selected respondents aged 12 or older within households, the NPHS response rates in 1994/95, 1996/97 and 1998/99 were 97.0%, 96.8% and 99.0%, respectively. The response rate of the selected respondents aged 12 or older to the CCHS was 94.0%. The data for each survey were weighted to represent the household population in the 10 provinces over the respective periods of data collection.

Statistics Canada took measures to ensure the consistency of the information collected for the NPHS and CCHS, including standardized interviewer training, the use of a glossary of terms, and quality assurance procedures. However, data collection methods differed somewhat between the NPHS and CCHS.[7] First, collection for cycle 1 of the NPHS was by face-to-face interview, and for cycles 2 and 3, mainly by telephone. Collection for the CCHS was principally by personal interview. Second, the extent to which interviews were provided by proxy differed. In the NPHS cycles 1, 2 and 3, proxy reporting rates were 29%, 28% and 15%, respectively. In the first half of cycle 1.1 of the CCHS, the proxy reporting rate was just under 8%. However, comparative analysis of data from each survey indicated that these differences did not explain the changes observed between surveys in the proportions of people reporting unmet needs (data not shown). Furthermore, analyses showed no evidence of bias due to seasonal effects, household size, or location effects.

Analytical techniques

Weighted frequencies were produced. For unmet needs, estimates for each sex and three age groups (12 to 34, 35 to 64 and 65 or older) were produced. The bootstrap technique, which fully accounts for the design effects of the surveys, was used to estimate variance; the variance estimates were used to calculate coefficients of variation and for testing the statistical significance of differences between estimates.[8-10] Statistical significance was established at the level of $p < 0.05$.

measures reflect actual utilization of the health care system, they do not fully capture information about difficulties people may encounter in accessing care. Information that better reflects people's experiences with the health care system is required to better understand the process of accessing care.

"Unmet health care needs"—defined as the difference between health care services deemed necessary to deal with a particular health problem and the actual services received—embodies a process-oriented measure of access to health care.[6] Unmet needs can arise as a result of features of the health care system (for example, unavailability of services or waiting times), or as a result of the personal circumstances of those seeking care (for example, socio-economic status or time constraints).

Based on preliminary data from the 2000/01 Canadian Community Health Survey (CCHS), together with data from the first three cycles (1994/95, 1996/97 and 1998/99) of the National Population Health Survey (NPHS), this article focuses on self-reported unmet health care needs over the last few years (see *Methods* and *Defining unmet health care needs*). The extent to which perceptions of unmet need increased between 1998/99 and 2000/01 is highlighted. Several potential explanations for this increase are explored.

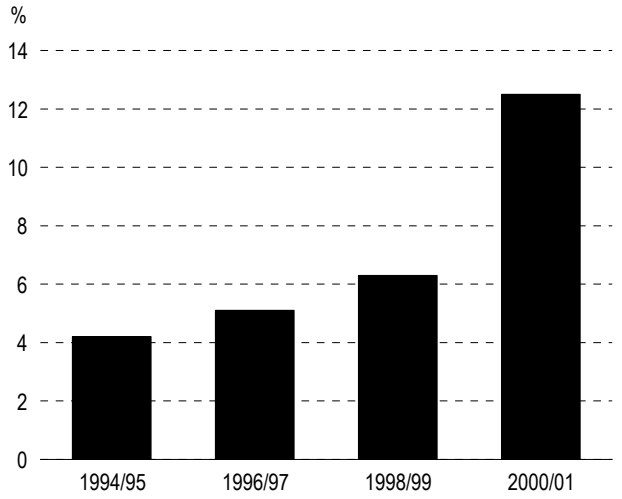
Unmet needs increasing

According to data from the first three cycles of the NPHS, the proportion of people aged 12 or older reporting unmet health care needs rose slightly but steadily from 4.2% in 1994/95 to 5.1% in 1996/97 and 6.3% in 1998/99 (Chart 1). Between 1998/99

and 2000/01, however, reports of unmet needs rose substantially. Preliminary data from the CCHS indicate that 12.5% of Canadians aged 12 or older (3.2 million) experienced unmet health care needs in 2000/01, nearly double the proportion two years earlier. These findings are consistent with other recent research.[11,12]

Substantial increases in unmet needs were reported for both sexes and across age groups (Tables 1 and 2). Among people who reported unmet needs in 1998/99 and 2000/01, the types of health problems for which care was needed were similar in each year (Table 3 and Appendix Table A). Physical health problems comprised the leading reason for requiring care in both years.

Chart 1
Percentage of household population aged 12 or older reporting unmet health care needs, Canada excluding territories, 1994/95, 1996/97, 1998/99 and September 2000 to February 2001



***Data sources**: 1994/95, 1996/97 and 1998/99 National Population Health Survey, cross-sectional samples; Canadian Community Health Survey, preliminary file, September 2000 to February 2001*
***Note:** Each value differs significantly from others (p < 0.05); critical values adjusted for multiple comparisons.*

Defining unmet health care needs

The National Population Health Survey (NPHS) and the Canadian Community Health Survey (CCHS) measure self-reported unmet health care needs by asking, "During the past 12 months, was there ever a time when you felt that you needed health care but you didn't receive it?" A "yes" response was tabulated as an unmet need. This question was followed by, "Thinking of the most recent time, why didn't you get care?" Responses to this question were categorized and tabulated. A second follow-up question ascertained the care required: "Again, thinking of the most recent time, what was the type of care that was needed?" Major response categories were established and the data tabulated.

Table 1
Percentage of household population aged 12 or older reporting unmet health care needs, by sex, Canada excluding territories, 1994/95, 1996/97, 1998/99 and September 2000 to February 2001

	Males†		Females†	
	%	95% confidence interval	%	95% confidence interval
1994/95	4.0	3.4, 4.5	4.5	3.9, 5.0
1996/97	4.3	3.8, 4.7	6.0	5.6, 6.4
1998/99	5.2	4.6, 5.8	7.4	6.6, 8.1
2000/01	10.9	10.4, 11.4	14.0	13.4, 14.6

***Data sources**: 1994/95, 1996/97 and 1998/99 National Population Health Survey, cross-sectional samples; Canadian Community Health Survey, preliminary file, September 2000 to February 2001*
***Note:** Tukey procedure used to adjust for multiple comparisons*
† Within-sex estimates differ significantly from each other (p < 0.05) except those for males in 1994/95 and 1996/97.

Table 2
Percentage of household population aged 12 or older reporting unmet health care needs, by age group, Canada excluding territories, 1998/99 and September 2000 to February 2001

	Age group					
	12 to 34		35 to 64		65 or older	
	%	95% confidence interval	%	95% confidence interval	%	95% confidence interval
1998/99	6.6	5.7, 7.5	6.4	5.7, 7.1	5.1	3.9, 6.2
2000/01	13.2†	12.5, 13.9	13.2†	12.7, 13.7	8.1†	7.4, 8.8

***Data sources**: 1998/99 National Population Health Survey, cross-sectional sample; Canadian Community Health Survey, preliminary file, September 2000 to February 2001*
† Significantly different from value for same age group in 1998/99 (p < 0.05)

Table 3
Type of care needed by household population aged 12 or older reporting unmet health care needs, Canada excluding territories, 1998/99 and September 2000 to February 2001

Type of care needed	1998/99 %	1998/99 95% confidence interval	2000/01 %	2000/01 95% confidence interval
Treatment of physical problem	70.3	66.6, 74.1	71.0	69.6, 72.4
Treatment of emotional or mental problem	11.1	8.5, 13.6	8.9	8.0, 9.8
Care of injury	9.9	7.7, 12.1	10.2	9.3, 11.2
Regular check-up (including regular pre-natal care)	7.4	5.3, 9.6	7.5	6.6, 8.5
Other	5.8	4.0, 7.5	6.7	6.0, 7.4

***Data sources**: 1998/99 National Population Health Survey, cross-sectional sample; Canadian Community Health Survey, preliminary file, September 2000 to February 2001*
***Note:** Because multiple responses were allowed, percentages do not total 100% .*

Reasons for unmet needs

In both 1998/99 and 2000/01, the most common reasons reported for unmet health care needs related to features of the health care system. Long waits and the unavailability of services when needed were cited most frequently (Table 4). Among people reporting unmet health care needs, the proportion indicating waiting time as the reason increased from 23% in 1998/99 to 30% in 2000/01. Considering that the magnitude of the estimates for the specific reasons given for unmet needs may be underestimated in the CCHS data (see *Limitations*), this change is striking.

The relative proportions who attributed their unmet needs to factors reflecting their personal circumstances declined between 1998/99 and 2000/01. For example, in the latter period, smaller proportions of respondents with unmet needs reported that they "didn't get around to it" or were "too busy" (Table 4).

Aside from the changes in reporting among those with unmet needs, when the Canadian population as a whole is considered, the *absolute* numbers of people reporting most reasons increased. For

Table 4
Reasons reported for unmet health care needs as percentage of people reporting unmet needs and of total household population aged 12 or older, Canada excluding territories, 1998/99 and September 2000 to February 2001

	Population aged 12 or older reporting unmet needs				Total population aged 12 or older	
	1998/99		2000/01			
	%	95% confidence interval	%	95% confidence interval	1998/99 %	2000/01 %
Features of health care system						
Waiting time too long	22.9	19.5, 26.3	30.4†	28.8, 31.9	1.4	3.8†
Service not available when needed	14.7	11.1, 18.3	14.3	13.1, 15.4	0.9	1.8†
Service not available in area	6.7	4.7, 8.7	7.2	6.5, 8.0	0.4	0.9†
Personal circumstances						
Didn't get around to it/Didn't bother	14.4	11.5, 17.4	10.6†	9.5, 11.6	0.9	1.3†
Too busy	13.5	10.1, 16.8	9.5†	8.6, 10.5	0.8	1.2†
Felt care would be inadequate	12.6	10.1, 15.1	5.3†	4.6, 6.0	0.8	0.7
Cost	11.2	8.8, 13.5	8.9	8.0, 9.7	0.7	1.1†
Decided not to seek care	5.2	3.3, 7.1	6.7	5.9, 7.6	0.3	0.8†
Didn't know where to go	3.8‡	2.2, 5.5	2.7	2.0, 3.3	0.2‡	0.3
Transportation problems	1.8‡	0.9, 2.7	2.1	1.6, 2.5	0.1‡	0.3
Dislikes doctors/Afraid	1.8‡	0.9, 2.6	2.6	2.1, 3.0	0.1‡	0.3
Personal/Family responsibilities	--	-- --	1.2	0.9, 1.5	--	0.2
Other	6.8	4.4, 9.2	19.1†	17.9, 20.4	0.4	2.4†

***Data sources**: 1998/99 National Population Health Survey, cross-sectional sample; Canadian Community Health Survey, preliminary file, September 2000 to February 2001*
***Note:** Because multiple responses were allowed, percentages do not total 100%.*
† Significantly different from value for same reason in 1998/99 ($p < 0.05$)
‡ Coefficient of variation between 16.6% and 25.0%
-- Coefficient of variation greater than 33.3%

example, the number who felt that they waited too long for services rose from an estimated 358,000 in 1998/99 to 969,000 in 2000/01 (Appendix Table B). At the same time, those reporting that they were too busy to access care went from an estimated 211,000 to 304,000. These increases in the absolute numbers were reflected in significant increases in the percentages of the overall population who reported unmet needs for numerous reasons (Table 4).

Why are more people reporting unmet needs?

Several factors—related either to the structures and processes within the health care system or to characteristics of the population—may explain the substantial rise in reported unmet needs between 1998/99 and 2000/01. Health reforms involving fiscal restraint, regionalization or hospital restructuring may account for some of the increase in reported unmet needs. However, while the full effect of these changes is not yet known, recent evidence suggests that hospital downsizing and budget cuts have not resulted in less health care utilization or poorer health outcomes.[13-15] Moreover, relative expenditure on health care has increased approximately 4% since the mid-1990s, after adjusting for inflation and population growth. In most regions, however, the impact of these increases may not yet be realized.[16]

Unmet needs may be affected by more than just the absolute amount of resources available. The allocation of resources across services and regions and the delivery of specific services, including the availability of general and family practitioners and primary care, may influence unmet needs.

Unmet needs may arise from the perceived timeliness of care delivery; that is, when people receive care later than when they feel it is most needed. Despite indications from the NPHS and CCHS that waiting for care is the leading and fastest growing reason for unmet health care needs, there is currently a lack of accurate and reliable data on waiting times at the national level. It is thus difficult to determine if waiting times did, in fact, increase between 1998/99 and 2000/01.[17,18] Provincial reports indicate that waiting times lengthened in some cases, but remained relatively unchanged in others.[17-20]

Changes over time in the characteristics of individuals requiring care may contribute to the rise in reported unmet needs. The growth in the number of seniors—the age group in which the prevalence of chronic disease and disability is highest—may be creating a greater demand for health care services. Even so, the percentage, as well as the increase in

Limitations

Information on unmet needs from the NPHS and CCHS is based on self-reported experiences and so is open to interpretation. Respondents may interpret an unmet need as a situation in which they did not receive care for a health problem, or when they received care, but not at the time they felt they needed it or requested it. In the latter case, such experiences may be more representative of problems with access to care rather than true unmet health care needs. While the reasons given for unmet needs provide some insight into the types of unmet needs experienced, it is not possible to distinguish between types of experiences.

The Canadian Community Health Survey (CCHS) data in this report are from the first 6 months of data collection. Point estimates based on the full data set collected over the 12-month period will likely vary somewhat from those presented here.

Information on unmet needs is based on self- or proxy-reported experiences; the validity of the data was not checked against clinical or other sources. Furthermore, the survey collects only limited information about the nature of the unmet need, so all reported unmet needs have been counted in this analysis.

The specific reasons for reporting unmet needs may be underestimated or incomplete, given the large proportion of responses that were coded "other." Closer examination and recoding to more precise categories will be conducted once data collection for the first cycle of the CCHS is complete.

Because of the wording of the question addressing unmet needs, it is not possible to distinguish situations in which people did not receive services at all from situations in which they did not receive them in a timely manner. This ambiguity limits the interpretation of the data, particularly in relation to specific policy options that might be considered to reduce the occurrence of unmet needs.

The results of this analysis for 1994/95 to 1998/99 differ slightly from a previous report[12] because the population considered here is aged 12 or older, rather than 18 or older in the previous study.

the percentage, of seniors reporting unmet needs was lower than in other age groups (Table 2). Moreover, the two-year interval during which the large increase in reported unmet needs emerged is much shorter than the period of time generally required for changes in a population's health care needs to occur. Perhaps the rise in unmet needs is related to people's ability and capacity to access health care services when they need them. Factors such as time constraints, knowledge of the system and personal resources may be key.

Finally, changes in perceptions of the performance capacity of the health care system may affect the likelihood of reporting unmet needs. Although national survey data addressing this issue are not available, public opinion polls suggest that the proportion of people who felt that the health care system should be the top priority of government policies grew from 30% in July 1998 to 55% in January 2000, reflecting an increased concern about the state of health care.[18] Nonetheless, in 1999 over 80% of Canadians were satisfied that the health care system could meet their own health needs and those of their family, although a somewhat lower proportion—62%—felt that the system could adequately meet the needs of all provincial residents.[18] The apparent declining confidence in the state of the health care system may have increased individuals' awareness of their own experiences in accessing care.

Concluding remarks

In 2000/01, one in 8 people reported that in the previous year they had had health care needs that were not met in a timely or satisfactory manner, up from one in every 24 people in 1994/95. Waiting for health care services was the leading reason offered among people reporting unmet needs, and the number of people citing this reason rose substantially between 1998/99 and 2000/01.

The purpose of this article is to highlight the increase in unmet health needs, based on preliminary data provided by the Canadian Community Health Survey, and earlier data from the National Population Health Survey. While various hypotheses are proposed to explain the increase, further study is needed to fully understand the determinants of unmet health care needs and their potential health implications. ●

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Appendix

Table A

Frequency of type of care needed by household population aged 12 or older reporting unmet health care needs, Canada excluding territories, 1998/99 and September 2000 to February 2001

Type of care needed	1998/99			2000/01		
		Estimated population			Estimated population	
	Sample size	'000	%	Sample size	'000	%
Treatment of physical problem	716	1,102	70.3	5,020	2,266	71.0
Treatment of emotional or mental problem	105	173	11.1	643	284	8.9
Care of injury	98	156	9.9	727	327	10.2
Regular check-up (including regular pre-natal care)	66	116	7.4	531	239	7.5
Other	62	90	5.8	516	214	6.7

***Data source**: 1998/99 National Population Health Survey, cross-sectional sample; Canadian Community Health Survey, preliminary file, September 2000 to February 2001*
***Note:** Because multiple responses were allowed, percentages do not total 100%.*

Table B

Frequency of reasons reported for unmet health care needs, household population aged 12 or older, Canada excluding territories, 1998/99 and September 2000 to February 2001

	1998/99			2000/01		
		Estimated population			Estimated population	
	Sample size	'000	%	Sample size	'000	%
Features of health care system						
Waiting time too long	222	358	1.4	2,110	969	3.8
Service not available when needed	154	230	0.9	1,100	455	1.8
Service not available in area	72	104	0.4	660	231	0.9
Personal circumstances						
Didn't get around to it/Didn't bother	148	226	0.9	729	337	1.3
Too busy	115	211	0.9	634	304	1.2
Felt care would be inadequate	132	197	0.8	371	170	0.7
Cost	119	175	0.7	625	283	1.1
Decided not to seek care	43	81	0.3	463	215	0.8
Didn't know where to go	35	60	0.2†	159	86	0.3
Transportation problems	30	28	0.1†	195	66	0.3
Dislikes doctors/Afraid	22	27	0.1†	192	82	0.3
Personal/Family responsibilities	10	--	--	91	39	0.2
Other	63	106	0.4†	1,448	611	2.4

***Data source**: 1998/99 National Population Health Survey, cross-sectional sample; Canadian Community Health Survey, preliminary file, September 2000 to February 2001*
***Note**: Multiple responses were allowed.*
† Coefficient of variation between 16.6% and 25.0%
-- Coefficient of variation greater than 33.3%

Fruit and vegetable consumption

Claudio E. Pérez

Abstract

Objectives

This article focuses on associations between the frequency of fruit and vegetable consumption and other health-related behaviours or conditions, including physical activity, smoking, obesity and alcohol-dependence.

Data source

The data are from the first half of cycle 1.1 of the Canadian Community Health Survey, collected from September 2000 through February 2001.

Analytical techniques

Weighted means provide information on average frequency of fruit and vegetable consumption in relation to selected health behaviours and conditions, health status and socio-demographic characteristics. Multivariate linear regression is used to model the associations between eating fruit and vegetables and health behaviours, while controlling for other influences.

Main results

Women consume fruit and vegetables more often than do men. When other influences are taken into account, the frequency of eating fruits and vegetables is positively related in both sexes to being physically active, not smoking and not being overweight, and in women, to not being alcohol-dependent.

Key words

diet, food habits, health behaviour, health surveys

Author

Claudio E. Pérez (613-951-1733; perecla@statcan.ca) is with the Health Statistics Division at Statistics Canada, Ottawa, Ontario, K1A 0T6.

- *For the first time in several decades, population-based information on fruit and vegetable consumption across Canada is available from the Canadian Community Health Survey.*
- *Low frequency of fruit and vegetable consumption is associated with other health risk behaviours (namely, physical inactivity, smoking, obesity and alcohol-dependence).*
- *Women consume fruit and vegetables more frequently than do men, although men diagnosed with cancer, heart disease, high blood pressure or diabetes tend to consume these foods more often than do men without these conditions.*

Numerous studies indicate that a diet rich in fruits and vegetables may help to prevent cardiovascular disease and certain cancers, which are leading causes of death in Canada.[1-8] Despite the importance of nutrition to good health, information on food consumption patterns at the national level has been scarce since the early 1970s.[9,10] To partially address this gap, the Canadian Community Health Survey (CCHS) has begun to collect information on the frequency with which people are eating fruit and vegetables.

Methods

Data source

The Canadian Community Health Survey (CCHS) collects information on the health of the Canadian population for use at the regional level (see "Canadian Community Health Survey—Methodological overview" in this issue). This analysis uses data collected during the first half (September 2000 through February 2001) of the first cycle (cycle 1.1) of the CCHS (see *Limitations*).

The analysis is based on a sample of 46,866 people living in households in the 10 provinces. The analysis was restricted to the population aged 20 or older, because they are more likely than younger people to make their own food choices. The data were weighted to represent 22.4 million people, the household population aged 20 or older in the 10 provinces, averaged over September 2000 through February 2001. The response rate for the first half of cycle 1.1 was 80%.

Analytical techniques

Respondents were asked how many times they consumed specific fruits and vegetables and "other" vegetables, and for each person, the total daily frequency of eating any fruit or vegetable was derived. Because the data were right-skewed, outliers (defined as values above three standard deviations from the mean) were capped, and reassigned the value of the mean plus three standard deviations. Thus for men, 216 records (1.0%) were reassigned the value of 12.157; for women, 309 records (1.2%) were reassigned the value of 12.238. Means of daily frequencies were estimated for selected sub-populations using these capped values. The data were analyzed separately for males and females. Differences between means for specific sub-populations were tested for statistical significance, which was established as $p < 0.05$.

Multiple linear regression models were fitted to study the associations between selected health-related behaviours (independent variables) and frequency of fruit and vegetable consumption (dependent variable), while controlling for the effects of other influences known to affect what people eat. These included variables reflecting health status and socio-demographic characteristics. The models were fitted to a log transformation of the daily intake frequency values (non-capped), which resulted in a better fit of the models than did non-transformed or capped data. Daily frequency values of zero were converted to the value of 0.005 before computing the log. The full models were applied. Some interaction terms were included in preliminary models (for example, between smoking and alcohol-dependence), but were subsequently dropped because they were not statistically significant. To account for the multi-stage sample design of the survey, the bootstrap technique was used to estimate variance; the variance estimates were used to calculate confidence intervals and coefficients of variation and for testing the statistical significance of differences.[15-17] A significance level of $p < 0.05$ was applied in all cases.

Research conducted in the United States suggests that healthy food choices are closely related to other health-promoting behaviours.[11-14] Based on data from the first half-year of the initial CCHS data collection cycle (cycle 1.1), this article focuses on the association of fruit and vegetable consumption frequency with selected health-related conditions and behaviours, including physical activity, smoking, body mass index (BMI) and alcohol-dependence (see *Methods*).

Low fruit and vegetable intake, other health risks linked

Consistent with the findings of previous research, the frequency of eating fruit and vegetables was associated with other health-related behaviours.[11-14] The average consumption frequencies for men and women whose level of physical activity was moderate or active and for those who were not daily smokers were significantly higher than the respective averages for men and women who were physically inactive or who smoked daily (Table 1). Of course, for physically active people, greater energy needs may partially explain more frequent fruit and vegetable consumption. In fact, because complete information is not available, it is not possible to determine if the intake frequency of other—including less nutritious—foods, was higher in response to the higher caloric expenditure among these people.

Relationships between the frequency of eating fruit and vegetables and body mass index (BMI) also emerged. Men in the acceptable weight range ate fruit and vegetables more frequently than did obese

men. Women who were underweight, of acceptable weight or overweight consumed fruit and vegetables more frequently than did those who were obese. These findings differ from research results in the United States; one study reported an association between BMI and fruit and vegetable intake only for women;[11] in another, no pattern emerged for either sex.[13] A recent study in Alberta, however, reported findings consistent with those of the CCHS; the average number of daily servings of fruit and vegetables was lowest in people who were overweight.[18]

Fruit and vegetable consumption frequency was also higher among men and women who were not alcohol-dependent, compared with those who were. Although this relationship may be due to a tendency for people who are not alcohol-dependent to practice generally more healthful behaviours, it might also be partially explained by the contribution of alcohol to daily calorie requirements. People who drink heavily may receive a substantial proportion of their energy needs from alcohol, resulting in lowered intake not only of fruit and vegetables, but also of other foods.

Table 1
Average daily frequency† of fruit and vegetable consumption, by sex and selected characteristics, household population aged 20 or older, Canada excluding territories, September 2000 to February 2001

	Men		Women	
	Times per day	95% confidence interval	Times per day	95% confidence interval
Total	**4.2**	**4.2, 4.3**	**4.9††**	**4.8, 4.9**
Behavioural characteristics				
Physical activity				
Active	4.9*	4.8, 5.0	5.7*	5.6, 5.8
Moderate	4.3*	4.3, 4.4	5.3*	5.2, 5.3
Inactive‡	3.9	3.8, 4.0	4.5	4.5, 4.6
Smoking status				
Non-smoker	4.4*	4.4, 4.5	5.1*	5.0, 5.1
Occasional	4.5*	4.2, 4.7	5.0*	4.8, 5.2
Daily‡	3.7	3.6, 3.7	4.1	4.0, 4.2
Body mass index				
Underweight	4.2	3.8, 4.6	5.0*	4.7, 5.2
Acceptable weight	4.3*	4.2, 4.4	4.9*	4.9, 5.0
Overweight	4.2	4.2, 4.3	4.9*	4.8, 5.0
Obese‡	4.1	4.0, 4.2	4.7	4.6, 4.8
Alcohol-dependent				
No	4.3*	4.2, 4.3	4.9*	4.8, 4.9
Yes‡	3.8	3.6, 4.1	3.9	3.5, 4.3
Measures of health				
Chronic condition(s)§				
Yes‡	4.6	4.5, 4.7	4.9	4.8, 5.0
No	4.2*	4.1, 4.2	4.9	4.8, 4.9
Disability				
Yes‡	4.6	4.3, 4.8	4.7	4.6, 4.9
No	4.2*	4.2, 4.3	4.9	4.8, 4.9
Self-perceived health				
Excellent	4.5	4.5, 4.6	5.3*	5.2, 5.4
Very good	4.1*	4.1, 4.2	4.8*	4.8, 4.9
Good	4.1*	4.0, 4.2	4.7*	4.6, 4.8
Fair	4.1*	3.9, 4.2	4.6	4.5, 4.7
Poor‡	4.4	4.2, 4.7	4.5	4.2, 4.7
Socio-demographic characteristics				
Age group				
20-24‡	4.2	4.0, 4.4	4.6	4.5, 4.8
25-34	4.0	3.9, 4.1	4.7	4.6, 4.8
35-44	4.1	4.0, 4.2	4.7	4.6, 4.8
45-64	4.3	4.2, 4.3	5.0*	4.9, 5.0
65+	4.8*	4.7, 4.9	5.1*	5.1, 5.2
Household income				
Lowest‡	3.7	3.5, 4.0	4.5	4.3, 4.7
Lower-middle	3.8	3.7, 4.0	4.5	4.4, 4.7
Middle	4.3*	4.2, 4.4	4.8*	4.7, 4.8
Upper-middle	4.2*	4.1, 4.2	4.9*	4.8, 5.0
Highest	4.3*	4.3, 4.4	5.1*	5.0, 5.2
Education				
Less than secondary graduation‡	4.1	4.0, 4.2	4.6	4.5, 4.7
Secondary graduation	4.1	4.0, 4.2	4.6	4.5, 4.7
Some postsecondary	4.3	4.1, 4.5	4.8	4.6, 4.9
Postsecondary graduation	4.4*	4.3, 4.4	5.1*	5.1, 5.2
Marital status				
Married/Common-law	4.3*	4.3, 4.4	5.0*	4.9, 5.0
Single	4.0*	3.9, 4.1	4.7	4.6, 4.8
Divorced/Separated/Widowed‡	4.1	4.0, 4.3	4.6	4.5, 4.7

***Data source**: Canadian Community Health Survey, preliminary file, September 2000 to February 2001*
***Notes:** Analysis based on samples of 21,267 men and 25,599 women; missing values shown in Appendix Table A. Because of rounding, the values of an estimated mean may be contained in the confidence interval of another estimated mean from which it differs significantly.*
† Based on data with reassigned values for outliers.
‡ Reference category
§ Cancer, heart disease, high blood pressure, diabetes
†† Significantly different from men ($p < 0.05$); other male-female comparisons not tested.
** Significantly different from reference category ($p < 0.05$).*

Definitions

The *frequency of fruit and vegetable consumption* was assessed using the following questions from the Behavioral Risk Factor Surveillance System in the United States:[19] "The next questions are about the foods you usually eat or drink. Think about all the foods you eat, both meals and snacks, at home and away from home.

(1) How often do you usually drink fruit juices such as orange, grapefruit or tomato? (for example, once a day, three times a week, twice a month)
(2) Not counting juice, how often do you usually eat fruit?
(3) How often do you (usually) eat green salad?
(4) How often do you usually eat potatoes, not including French fries, fried potatoes, or potato chips?
(5) How often do you (usually) eat carrots?
(6) Not counting carrots, potatoes, or salad, how many servings of other vegetables do you usually eat?"

Level of *physical activity* was based on total energy expenditure during leisure time. Information about energy expenditure at work was not available. Values for energy expenditure were calculated using information on the frequency and duration of respondents' reported leisure-time activities in the previous three months, as well as the metabolic energy demand of each of these activities. Only activities lasting at least 15 minutes contributed to the energy expenditure calculations. Frequency of physical activity was based on the number of times in the previous three months that respondents had participated in an activity for more than 15 minutes. For bivariate analysis, three categories were defined: active (3.0 or more kilocalories per kilogram of body weight per day), moderate (from 1.5 to less than 3.0 kcal/kg/day), and inactive (less than 1.5 kcal/kg/day). In multivariate analysis, kcal/kg/day was used as a continuous variable.

Smoking status was determined by asking individuals if they smoked cigarettes daily, occasionally, or not at all. Three groups were established: daily, occasional, and non-smokers.

Body mass index (BMI) is calculated by dividing reported weight in kilograms by the square of reported height in metres. For bivariate analysis, BMI categories were defined according to the World Health Organization standards: less than 18.5 (underweight), 18.5 to less than 25 (acceptable weight), 25 to less than 30 (overweight), and 30 or more (obese).[20] In multivariate analysis, BMI was used as a continuous variable.

Alcohol-dependence was assessed only in people who reported having five or more drinks at least once a month during the year before the survey. The set of questions used to derive the measure of probability of alcohol-dependence was developed by Kessler and colleagues.[21] Respondents were coded as *alcohol-dependent* if the score derived from their responses to these questions was 0.85 or higher.

Four chronic conditions were included in the analysis: cancer, heart disease, high blood pressure and diabetes. Respondents were asked if they had any "long-term conditions that have lasted or are expected to last six months or more and that have been diagnosed by a health professional." Presence of *chronic conditions* was defined as a reported diagnosis of at least one of the four conditions noted above.

The capacity to independently perform instrumental activities of daily living (IADL) is a commonly used indicator of *disability*. Respondents who reported that they needed assistance with either or both of two specific IADLs (selected in part because they may affect the foods people eat) were categorized as having a disability. Respondents were asked: "Because of any condition or health problem, do you need the help of another person ... in preparing meals? ... in shopping for groceries or other necessities?"

Self-perceived health was assessed with the question, "In general, would you say your health is: excellent? very good? good? fair? poor?"

Five *age groups* were established for bivariate analysis: 20 to 24, 25 to 34, 35 to 44, 45 to 64, and 65 or older. For multivariate analysis, actual age was used as a continuous variable.

Household income groups were based on household size. For bivariate analysis, five categories were derived:

Household income group	People in household	Total household income
Lowest	1 to 4	Less than $10,000
	5 or more	Less than $15,000
Lower-middle	1 or 2	$10,000 to $14,999
	3 or 4	$10,000 to $19,999
	5 or more	$15,000 to $29,999
Middle	1 or 2	$15,000 to $29,999
	3 or 4	$20,000 to $39,999
	5 or more	$30,000 to $59,999
Upper-middle	1 or 2	$30,000 to $59,999
	3 or 4	$40,000 to $79,999
	5 or more	$60,000 to $79,999
Highest	1 or 2	$60,000 or more
	3 or more	$80,000 or more

These categories were used as a continuous variable in multivariate analysis.

Education was categorized into four groups: less than secondary graduation; secondary graduation; some postsecondary; and postsecondary graduation.

Marital status was categorized into three groups: married or living in a common-law relationship; single (never married); and divorced, separated or widowed.

Even allowing for the effects of health status and socio-demographic variables, all health-related behaviours examined, except alcohol-dependence in men, were independently associated with the frequency of eating fruit and vegetables (Table 2). In fact, of all the factors considered, being physically active was most strongly related to frequent fruit and vegetable consumption for men and women. Being a non-smoker was also linked to frequent fruit and vegetable consumption for both sexes. As expected from the bivariate findings, higher BMI was negatively associated with the frequency of eating fruit and vegetables. Finally, alcohol-dependence was negatively associated with the frequency of fruit and vegetable consumption for women.

Table 2
Multivariate regression results describing association between log-transformed daily frequency of fruit and vegetable consumption and selected characteristics, by sex, household population aged 20 or older, Canada excluding territories, September 2000 to February 2001

	Men			Women		
	Unstandardized coefficient (b)	95% confidence interval	Standardized coefficient (beta)	Unstandardized coefficient (b)	95% confidence interval	Standardized coeffcient (beta)
Physical activity	0.05*	0.04, 0.06	0.17*	0.06*	0.05, 0.06	0.18*
Smoking status						
Non-smoker	0.18*	0.15, 0.21	0.14*	0.20*	0.18, 0.23	0.16*
Occasional	0.20*	0.14, 0.25	0.06*	0.21*	0.16, 0.26	0.08*
Daily†	...	...	...	...	...	...
Body mass index	-0.005*	-0.01, -0.002	-0.03*	-0.002*	-0.004, -0.0003	-0.02*
Alcohol-dependent						
No	0.08	-0.004, 0.16	0.02	0.14*	0.01, 0.27	0.02*
Yes†	...	...	...	...	...	...
No chronic conditions§††	-0.09*	-0.12, -0.06	-0.05*	-0.01	-0.04, 0.02	-0.01
No disability§	-0.06	-0.12, 0.01	-0.02	0.01	-0.03, 0.06	0.005
Self-perceived health‡	0.04*	0.02, 0.05	0.06*	0.03*	0.02, 0.04	0.05*
Age	0.01*	0.004, 0.01	0.14*	0.01*	0.01, 0.01	0.17*
Household income‡	0.02*	0.001, 0.03	0.03*	0.01*	0.003, 0.03	0.03*
Education‡	0.02*	0.01, 0.03	0.04*	0.04*	0.03, 0.05	0.09*
Marital status						
Married/Common-law	0.13*	0.10, 0.17	0.10*	0.09*	0.06, 0.11	0.08*
Single	0.11*	0.07, 0.16	0.08*	0.04*	0.001, 0.08	0.03*
Divorced/Separated/Widowed†	...	...	...	...	...	...
Intercept	0.62			0.52		

***Data source**: Canadian Community Health Survey, preliminary file, September 2000 to February 2001*
***Note**: Based on samples of 18,721 men and 21,093 women; records for 2,546 men and 4,506 women were excluded because of missing values for one or more variables.*
† Reference category
‡ Coded from low to high (for self-reported health, lowest is "poor," highest is "excellent")
§ Reference category is presence of characteristic.
†† Cancer, heart disease, high blood pressure, diabetes
··· Not applicable
** $p < 0.05$*
R^2 = 0.09 for men, 0.11 for women; adjusted R^2 = 0.09 for men, 0.11 for women
d.f. men = 13, 18,707; women = 13, 21,079

Links with health differ by sex

Consistent with recent Canadian data showing pronounced differences between the sexes in their attention to nutrition,[22] women reported eating fruit and vegetables more often than men did (Table 1). However, average fruit and vegetable consumption frequency among men with a diagnosis of one or more of four chronic conditions—heart disease, high blood pressure, diabetes and cancer—was higher than among men without any of these conditions. Similarly, men with a disability, as measured by the reported need for help with meal preparation or shopping, ate fruit and vegetables more frequently, on average, than did those without a disability.

When the effects of other influences on food choices were considered, the positive relationship between fruit and vegetable consumption frequency and chronic disease persisted for men. On average, men without the selected chronic diseases reported less frequent fruit and vegetable consumption than did those with a diagnosis of at least one of the

Limitations

The nutrition questions in the Canadian Community Health Survey (CCHS) were developed for the Behavioral Risk Factor Surveillance System (BRFSS) by the United States Centers for Disease Control.[19] The questions address only fruit and vegetable consumption; no information is available about other food groups. The questions ask about the *number of times* any fruits or vegetables are consumed, but not about amounts consumed. Because the questions do not specify portion sizes, compliance with daily intake recommendations, such as those in the Canada Food Guide, are not assessed.[23] Other research indicates that consumption estimates based on the BRFSS questions are lower than those based on 24-hour recalls or food diaries.[24] The extent to which the questions may misclassify respondents in relation to fruit and vegetable consumption is unknown, and mean estimates should be interpreted with caution.

Significant variations in the performance of the BRFSS questions have been reported among different ethnic populations in the United States.[25] The measurement properties of the questions have not been validated in specific Canadian sub-populations, and it is possible that response accuracy, and thus the proper classification of respondents, may vary between ethnic or cultural subgroups.

Eating patterns vary throughout the year.[26] Therefore, observations based on the data used for this study, which cover only the period from September 2000 through February 2001, may differ from those based on the full file. However, inclusion of a variable representing month of data collection in the multivariate models did not change the significance or direction of results for the other variables (data not shown). Hence, use of the preliminary data to compare consumption frequency among population subgroups seems appropriate.

Of the 54,788 interviews (of people aged 12 or older) conducted during the first half of cycle 1.1 data collection, 7.6% were completed by proxy respondents. However, specific sections of the questionnaire, including the section on fruit and vegetable consumption frequency, were designed for self-response only; thus, responses to these sections were missing for persons whose interviews were completed by proxy. During data processing, imputation was used to complete data that were not obtained because of proxy response (see "Canadian Community Health Survey—Methodological overview" in this issue). The effects of imputation on the associations observed are unknown.

Data from the CCHS are cross-sectional, and therefore, no temporal or causal relationships among variables can be inferred.

The data are self-reported, and the degree to which they are accurate is unknown. To reduce reporting error related to chronic diseases, respondents were instructed to report only conditions that were (or were expected to be) of at least six months' duration and that had been diagnosed by a health professional.

The small proportions of the variance (R^2 = 0.09 for men and 0.11 for women) explained by the independent variables included in the multivariate models suggest that other important factors related to fruit and vegetable consumption frequency were not examined in the analysis. Also, the small proportions of variance explained may partially result from a poor correlation between the measured frequency of eating fruit and vegetables, based on the survey questions, and actual consumption quantities.

The large number of CCHS respondents provides statistical power at the national level previously unseen in any Canadian sample survey. By virtue of this number of respondents, many of the differences and associations observed are statistically significant. However, the clinical or biological significance of results is not addressed in this analysis.

chronic conditions (Table 2). In contrast to the findings for men, no associations emerged for women between fruit and vegetable intake and chronic disease or disability (Tables 1 and 2).

For both sexes, self-perceived health contributed positively to the multivariate models (Table 2). For men, however, this association was inconsistent with the positive relationship observed between fruit and vegetable intake frequency and chronic disease. The association between self-reported health and fruit and vegetable consumption frequency is curvilinear (U-shaped), with higher averages for men in poor health and for those in excellent health.

The cross-sectional nature of the data limits interpretation of these findings. However, one explanation is that for men, but probably not women, the diagnosis of a specific disease, rather than simply self-perceived ill health, influences fruit and vegetable consumption. That is, once men are diagnosed with a specific chronic condition, they increase the frequency of eating fruit and vegetables in the hope of improving or preventing further deterioration in their health. Indeed, further analysis revealed that men reporting poor or fair health and one or more of the four selected chronic conditions ate fruits and vegetables 4.6 times daily, on average, compared with 3.9 times for men at similar levels of health but without the chronic conditions (data not shown). Consistent with these findings, other recent cross-sectional Canadian data indicate that men who have been diagnosed with cancer or heart disease are more aware of selecting food in consideration of their health than are men without these conditions.[22]

Age, socio-economic status

Fruit and vegetable consumption was higher among seniors than among younger people. For both sexes, as age increased, so did the frequency of eating fruit and vegetables (Table 2). This is consistent with survey results from the mid-1990s, indicating that people aged 55 or older were more likely than younger people to rate their eating habits as excellent or very good.[27]

Previous studies have revealed that people of lower socio-economic status are at greater risk of low frequency of fruit and vegetable consumption, compared with people of higher socio-economic status.[13,28] The CCHS data corroborate these findings. Consumption of fruit and vegetables was higher for people in the middle, upper-middle and highest income categories, compared with those in the lowest category (Table 1). Similarly, people with postsecondary graduation reported higher consumption frequency than did people with less than high school graduation. When other factors were taken into account, income and education remained significantly and positively associated with consumption frequency (Table 2).

Concluding remarks

To the extent that frequency of fruit and vegetable consumption correlates with the amount consumed, this analysis of preliminary data from the Canadian Community Health Survey is consistent with previous research indicating that fruit and vegetable intake is higher in people who practice other health-promoting behaviours. Conversely, people who are physically inactive, obese or smoke—and are thus at extra risk of numerous major chronic diseases—tend to eat fruit and vegetables less frequently, compared with people without these risk factors. Even when the effects of health status and socio-economic status were controlled, health-related behaviours were independently associated with the frequency of fruit and vegetable intake. These results support a multi-factorial approach to health promotion consisting, for example, of programs that address multiple-risk behaviours simultaneously.

The CCHS data also indicate that the frequency of eating fruit and vegetables was higher among men who had been diagnosed with specific chronic diseases, compared with men without these conditions. This finding highlights an opportunity for health education. Campaigns designed to appeal especially to men could promote the value of dietary measures not only in coping with disease once it is diagnosed, but also in preventing disease and protecting health. ●

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Appendix

Table A

Distribution of selected characteristics, by sex, household population aged 20 or older, Canada excluding territories, September 2000 to February 2001

	Men			Women		
	Sample size	Estimated population '000	%	Sample size	Estimated population '000	%
Total	**21,267**	**10,957**	**100.0**	**25,599**	**11,432**	**100.0**
Physical activity						
Active	4,696	2,432	22.2	4,186	1,828	16.0
Moderate	4,895	2,588	23.6	5,842	2,615	22.9
Inactive	11,432	5,846	53.4	15,323	6,913	60.5
Missing	244	91	0.8	248	76	0.7
Smoking status						
Non-smoker	14,512	7,648	69.8	18,877	8,594	75.2
Occasional	860	457	4.2	955	440	3.8
Daily	5,842	2,825	25.8	5,736	2,386	20.9
Missing	53	27	0.2	31	12	0.1
Body mass index						
Underweight	224	135	1.2	934	441	3.9
Acceptable weight	8,467	4,713	43.0	12,080	5,584	48.8
Overweight	8,786	4,400	40.2	7,009	2,988	26.1
Obese	3,631	1,634	14.9	3,882	1,538	13.5
Missing	159	75	0.7	1,694	881	7.7
Alcohol-dependent						
No	20,464	10,570	96.5	25,260	11,280	98.7
Yes	587	299	2.7	200	97	0.8
Missing	216	88	0.8	139	55	0.5
Chronic conditions						
Yes	3,085	1,370	12.5	3,973	1,489	13.0
No	18,143	9,563	87.3	21,588	9,927	86.8
Missing	39	24	0.2	38	16	0.1
Disability						
Yes	1,011	462	4.2	2,133	877	7.7
No	20,243	10,490	95.7	23,460	10,550	92.3
Missing	13	5	0.0	6	5	0.0
Self-perceived health						
Excellent	4,994	2,908	26.5	5,486	2,686	23.5
Very good	7,347	3,860	35.2	8,829	3,995	34.9
Good	5,802	2,898	26.4	7,202	3,151	27.6
Fair	2,280	942	8.6	3,023	1,182	10.3
Poor	837	348	3.2	1,052	416	3.6
Missing	7	1	0.0	7	2	0.0
Age group						
20-24	1,506	1,105	10.1	1,713	1,033	9.0
25-34	3,645	2,094	19.1	4,289	2,076	18.2
35-44	4,988	2,616	23.9	5,567	2,651	23.2
45-64	7,244	3,558	32.5	8,017	3,630	31.8
65+	3,884	1,584	14.5	6,013	2,042	17.9
Household income						
Lowest	834	324	3.0	1,322	449	3.9
Lower-middle	1,329	539	4.9	3,248	1,021	8.9
Middle	4,556	2,170	19.8	6,200	2,520	22.0
Upper-middle	7,360	3,710	33.9	7,602	3,548	31.0
Highest	5,337	3,267	29.8	4,514	2,710	23.7
Missing	1,851	947	8.6	2,713	1,184	10.4
Education						
Less than secondary graduation	5,757	2,407	22.0	7,062	2,620	22.9
Secondary graduation	3,877	2,084	19.0	4,879	2,333	20.4
Some postsecondary	1,620	984	9.0	2,039	974	8.5
Postsecondary graduation	9,794	5,384	49.1	11,377	5,395	47.2
Missing	219	98	0.9	242	110	1.0
Marital status						
Married/Common-law	13,826	7,582	69.2	14,545	7,409	64.8
Single	4,514	2,438	22.3	3,943	1,873	16.4
Divorced/Separated/Widowed	2,908	929	8.5	7,072	2,136	18.7
Missing	19	8	0.1	39	14	0.1

***Data source**: Canadian Community Health Survey, preliminary file, September 2000 to February 2001*

Community belonging and health

Nancy Ross

Abstract

Objectives

This article explores the relationship between sense of community belonging and self-perceived health.

Data source

The data are from the first half of cycle 1.1 of the Canadian Community Health Survey (CCHS), collected from September 2000 through February 2001.

Analytical techniques

Descriptive information relating socio-demographic variables to sense of community belonging is presented. Multiple logistic regression is used to study the association between sense of community belonging and self-perceived health, while controlling for socio-demographic conditions and other health-related factors.

Main results

Just over half (56%) of Canadians report a strong or somewhat strong sense of belonging to their local community. Community belonging is associated with self-perceived health, even when controlling for socio-economic status, the presence of chronic disease, health behaviours, stress and other factors.

Key words

health status, social identification, health surveys

Author

Nancy Ross (514-398-4307) is with McGill University and the Social and Economic Studies Division at Statistics Canada, Ottawa, Ontario, K2A 0T6.

- *Researchers have known for some time that social relationships are important for good health.*
- *This study examines the relationship between individuals' sense of belonging to their local community and their self-perceived health. Even after taking account of a range of other factors, Canadians' sense of community belonging is associated with health.*

For some time, research has shown that people who feel attached to and interact with others enjoy better health than do those who are more isolated.[1-3] Some of the best evidence of the benefits of social connections comes from a large study of residents of Alameda County, California through the late 1960s and 1970s. This research indicated that people who reported ties to the community (measured by the numbers of friends and acquaintances, and volunteer and religious affiliations) experienced lower rates of disease and death, compared with people without such links, even when taking into account differences in socio-economic status, health behaviours and the use of health care services.[1] Throughout the 1980s and 1990s, further study demonstrated an association between lack of social relationships and poor health outcomes.[2-3]

More recently, interest in the concept of "social capital" and its association with good health has been growing.[4,5] Social capital has numerous meanings: at its most basic level, the term refers to the notion that relationships with others have important implications for well-being.[9] Individuals can possess social capital by having a large network of friends and acquaintances, but social capital can also be thought of as a type of social savvy. In the broader context, many researchers consider social capital to

Methods

Data source

This analysis is based on the first half of data collected for cycle 1.1 of Statistics Canada's Canadian Community Health Survey (CCHS); these data were collected from September 2000 through February 2001. The CCHS collects information about the health of the population in health regions across the country. (See "Canadian Community Health Survey—Methodological Overview" in this issue.) Data from the CCHS are cross-sectional.

Data from a sample of 48,412 respondents aged 18 or older residing in households in the 10 provinces were used in the analysis. The data were weighted to represent the household population of the provinces over the period of data collection, September 2000 through February 2001. The response rate was 80%.

Analytical techniques

Weighted cross-tabulations were used to estimate the proportions of people reporting a strong or somewhat strong sense of belonging to their local community, by selected socio-demographic characteristics. Multiple logistic regression was used to model the relationship between self-perceived health reported as very good or excellent, and sense of community belonging. Socio-demographic characteristics, and other factors known to influence health (activity restriction, chronic conditions, smoking, stress) were included in the model as control variables.

To account for survey design effects, the variance used in the calculation of coefficients of variation and confidence limits was estimated with the bootstrap technique.[6-8]

Limitations

The content of the CCHS varies somewhat between health regions; this analysis focuses on information collected in all health regions. In multivariate analysis, the principal explanatory variable of interest in relation to health was sense of community belonging. However, data on other variables (for example, social support and psychosocial factors) that may have modified the apparent relationship between community belonging and health were not available from all health regions and were therefore not included in the analysis. When four composite measures of social support were included in a model based on a reduced sample, the magnitude of the odds ratio for community belonging was not substantially affected (data not shown). This suggests that sense of belonging to local community is conceptually distinct from social support and has an independent relationship with self-reported health. However, the findings of other analysis on reduced samples suggested that self-esteem might act as an intermediary between community belonging and health.

The CCHS data are cross-sectional, and associations observed between variables cannot be inferred to be causal. Thus it cannot be concluded that a weak sense of belonging to local community brings about poor health. It may be that poor health influences one's sense of community belonging.

The data are self- (or proxy-) reported, and the degree to which they are biased because of reporting error is unknown. To minimize reporting error in data related to chronic conditions, respondents were instructed to report only conditions that had been "diagnosed by a health professional."

Of the 54,788 interviews (of people aged 12 or older) conducted during the first half of data collection for cycle 1.1, 7.6% were completed by proxy respondents. However, specific sections of the questionnaire, including the question on community belonging, were designed for self-response only; responses to these sections were missing for persons whose interviews were completed by proxy. During data processing, imputation was used to complete data that were not obtained because of proxy response.

The question used to measure sense of community belonging ("How would you describe your sense of belonging to your local community?") may be interpreted differently among survey respondents. For example, the term 'local community' is not defined, and might be understood in a variety of ways. The effect of such differences in interpretation on the observed association between sense of community belonging and self-perceived health is unknown.

The analysis pertains only to individuals' sense of community belonging. Data on the social or material properties of communities that make individuals feel connected to them are not available from the CCHS.

comprise properties of a community, which are indirectly linked to health.[10] So, for example, communities with high levels of social capital might be those that offer opportunities for interaction and that have well-developed public resources such as parks, libraries and recreational facilities.

According to one observer, the drop in memberships in major civic organizations and in socializing with neighbours over the past two decades is an indicator that social capital is on the decline, at least in the United States.[11]

Despite the variety of viewpoints in the literature as to what exactly social capital is, the concept is compelling. Research in the United States indicates that in states where social capital is high, children watch less television, violent crime is less common, and health is better than elsewhere.[4]

Social interaction and health

Interaction between community members can affect health in a number of ways. One way is through the transmission of social norms related to health-promoting or health-damaging behaviours.[12] Another theory suggests that being socially disconnected is chronically stressful, and that a biological response to the stress may be a kind of "accelerated aging."[12] Community involvement may also lead to increased social influence and access to social and material resources, which may in turn provide the health benefits that social status seems to afford.[13,14]

Preliminary data from Statistics Canada's Canadian Community Health Survey (CCHS) provide a unique opportunity to examine self-perceived health in relation to sense of community belonging (see *Methods*). Self-perceived health has repeatedly been shown to be a reliable measure of physical and mental health status and is predictive of future adverse health events.[15-17]

The concept of community belonging used for this analysis differs from the traditional epidemiologic measures of social ties (that is, counts of friends or affiliations) or perceived social and emotional support, upon which most knowledge about the importance of social connections to health is based. To measure connection to the community, the CCHS asks respondents to rank, on a four-point Likert scale, their sense of belonging to their local community.

This analysis provides a profile of people who report a strong sense of belonging to their communities. It also presents the findings of an analysis of community belonging in relation to self-reported health, while taking into account the effects of other pertinent factors.

About half feel connected to community

Preliminary data from the CCHS indicate that just over half (56%) of Canadians feel at least a

Table 1
Percentage of population aged 18 or older reporting strong/somewhat strong sense of community belonging, by selected characteristics, Canada excluding territories, September 2000 to February 2001

	%
Sex	
Men	56
Women	56
Age group	
18-29	48†
30-44	55†
45-64	58†
65+	65†
Children under age 12 in household	
No	56‡‡
Yes	57
Education‡	
Less than secondary graduation	54
Secondary graduation	55
Some postsecondary	56
Postsecondary graduation	56
Household income	
Low	48§
Lower-middle	53††
Middle	56
Upper-middle	57
High	57
Residential area	
Urban	55‡‡
Rural	62

***Data source**: Canadian Community Health Survey, preliminary file, September 2000 to Feburary 2001*
***Notes**: Based on 48,412 respondents aged 18 or older. Where applicable, significance tests were adjusted for multiple comparisons.*
† Significantly different from values in all other categories ($p < 0.05$)
‡ For people aged 25 to 64
§ Significantly lower than values for middle, upper-middle and high income categories ($p < 0.05$)
†† Significantly lower than values for upper-middle and high income categories ($p < 0.05$)
‡‡ Significantly lower than value for other category ($p < 0.05$)

Definitions

To measure *sense of community belonging*, respondents to the Canadian Community Health Survey were asked, "How would you describe your sense of belonging to your local community? Would you say it is: very strong? somewhat strong? somewhat weak? very weak?" For the multivariate analysis, respondents were categorized in two groups: very strong or somewhat strong; and somewhat weak or very weak.

Self-perceived health was assessed with the question, "In general, would you say your health is: excellent? very good? good? fair? poor?" Based on their response to this question, individuals were categorized into two groups: very good or excellent; and poor, fair or good.

Four *age groups* were established: 18 to 29, 30 to 44, 45 to 64, and 65 or older.

Marital status was categorized into three groups: single (never married); divorced, separated or widowed; and married or common-law.

A variable categorizing respondents as living in households with *children under age 12* or not was derived from information provided on household composition.

Education was categorized into four groups: less than secondary graduation, secondary graduation, some postsecondary, and postsecondary graduation. For the bivariate analysis, the variable measuring education was applied to the population aged 25 through 64.

Household income level is a derived variable that adjusts the reported post-transfer, pre-tax household income from all sources for household size. Five household income groups were defined:

Household income group	People in household	Total household income
Lowest	1 to 4	Less than $10,000
	5 or more	Less than $15,000
Lower-middle	1 or 2	$10,000 to $14,999
	3 or 4	$10,000 to $19,999
	5 or more	$15,000 to $29,999
Middle	1 or 2	$15,000 to $29,999
	3 or 4	$20,000 to $39,999
	5 or more	$30,000 to $59,999
Upper-middle	1 or 2	$30,000 to $59,999
	3 or 4	$40,000 to $79,999
	5 or more	$60,000 to $79,999
Highest	1 or 2	$60,000 or more
	3 or more	$80,000 or more

Residential area was categorized as urban or rural, based on Statistics Canada's geographical classifications for the 1996 Census at the Census Enumeration Area level.

Respondents were categorized as *currently having a job* if they reported that in the 7 days before the interview they had either worked at, or been absent from, a paying job. Questions related to this variable were asked of respondents under age 75.

To measure *activity restriction*, respondents were asked about health problems that affect daily activities. If they indicated that, because of a long-term physical or mental condition or a health problem (one that had lasted or was expected to last six months or more), they sometimes or often had difficulty hearing, seeing, communicating, walking, climbing stairs, bending, learning or doing any similar activities, or were limited in the kind or amount of activity they could do at home, at school, at work or in other activities such as transportation to or from work or during leisure time, they were considered to have an activity restriction.

To measure the presence of *chronic conditions*, respondents were asked about specific long-term conditions that had lasted or were expected to last six months or more and that had been diagnosed by a health professional. Counts of chronic conditions were categorized as none, one, and two or more, based on responses to questions about diagnoses of the following conditions: asthma, fibromyalgia, arthritis or rheumatism, back problems, high blood pressure, migraine headaches, chronic bronchitis, emphysema or chronic obstructive pulmonary disease, diabetes, epilepsy, heart disease, cancer, stomach or intestinal ulcers, effects of a stroke, urinary incontinence, bowel disorder such as Crohn's disease or colitis, Alzheimer's disease or any other dementia, cataracts, glaucoma, a thyroid condition, Parkinson's disease, multiple sclerosis, chronic fatigue syndrome, multiple chemical sensitivities.

Smoking status was determined from the question, "At the present time, do you smoke cigarettes daily, occasionally, or not at all?"

Stress was determined from the question, "Thinking about the amount of stress in your life, would you say that most days are: not at all stressful, not very stressful, a bit stressful, quite a bit stressful or extremely stressful?" Respondents were considered to have high stress if they responded that most days were quite a bit or extremely stressful and low stress if they answered not stressful at all, not very stressful or a bit stressful.

somewhat strong sense of belonging to their local community (data not shown). The proportions of men and women who reported a sense of community belonging at this level did not differ (Table 1).

Young adults were the least likely to report feeling at least somewhat strongly connected to their community. At progressively older ages, increasingly larger proportions of people reported feeling connected. This finding is consistent with research that has identified a positive link between age and sense of community; observers conjecture that as people age, they have more time to participate in community life.[18]

Time pressures experienced by people with young children may explain why they were only slightly more likely than others to feel connected to the community. Although children's involvement in school and organized activities, as well as informal play, may facilitate their parents' sense of community belonging, the demands of childrearing may interfere with active community involvement.

The literature reports conflicting findings on the relationship between educational attainment and social involvement. In one study, educational attainment was identified as the single most important predictor of social engagement,[5] while other research has shown a negative association between educational attainment and neighbourhood cohesion.[19,20] In contrast, data from the CCHS indicate neither a positive nor a negative association between sense of community belonging and level of education. This diversity of findings in relation to education may reflect conceptual or measurement differences in the social variables used in the various studies.

For household income, a limited positive association with sense of community belonging did emerge. People in lower income groups were less likely to report being strongly connected to their communities, compared with those in middle or upper income groups. There were no differences between people in the middle, upper middle or high income groups. These findings suggest that some threshold of income increases the potential for strong connection to local community.

Finally, people living in rural areas were far more likely to report a strong or somewhat strong sense of community belonging than were people in urban areas.

Community attachment relates to health

Sense of community belonging was strongly related to self-perceived health status, even when the effects of numerous other influences on health were taken into account (Table 2). Compared with people reporting a very or somewhat weak sense of belonging to their local community, those who felt very strongly connected had nearly twice the odds of reporting excellent or very good health. Indeed, leaving aside the "very weak" sense of community belonging, for every step up this scale, the odds of reporting excellent or very good health increased with the strength of sense of community belonging. This early finding from the CCHS provides evidence that social integration is linked to health status, an association that could be further explored as more data become available.

The results of the multivariate analysis in Table 2 also reinforce some familiar relationships between level of health and socio-demographic factors, health behaviours and stress. Higher levels of education and household income were positively associated with excellent or very good health. Being employed outside the home was also linked with favourable levels of health. Of course, the cross-sectional nature of the data precludes interpretation of the direction of these relationships. Reverse causation, or the idea that ill health is the precursor of unemployment, underemployment or low income has been offered as an explanation for the income-health relationship.[21] Other research, which has followed individuals over a number of years, shows that reverse causation is not likely the main contributor to the relationship between income and health.[22]

People living in urban areas had lower odds of reporting excellent or very good health, compared with residents of rural areas. As expected, chronic conditions and activity restrictions were both associated with lower self-perceived health. Not

Table 2
Adjusted odds ratios for reporting very good or excellent health, by sense of community belonging and other selected characteristics, population aged 18 or older, Canada excluding territories, September 2000 to February 2001

	Adjusted odds ratio	95% confidence interval
Sense of community belonging		
Very strong	1.7*	1.6, 1.9
Somewhat strong	1.3*	1.2, 1.4
Somewhat weak	1.0	1.0, 1.1
Very weak†	1.0	...
Sex		
Women	1.1*	1.1, 1.2
Men†	1.0	...
Age group		
18-29	1.6*	1.4, 1.9
30-44	1.3*	1.1, 1.4
45-64	1.0	0.9, 1.1
65 or older†	1.0	...
Marital status		
Single	1.0	0.9, 1.1
Divorced/Separated/Widowed	1.0	1.0, 1.1
Married/Common-law†	1.0	...
Children under age 12 in household		
Yes	1.1	1.0, 1.2
No†	1.0	...
Education		
Postsecondary graduation	1.9*	1.7, 2.0
Some postsecondary	1.6*	1.4, 1.8
Secondary graduation	1.5*	1.4, 1.6
Less than secondary graduation†	1.0	...
Household income		
Highest	2.5*	2.1, 3.0
Upper-middle	1.8*	1.5, 2.0
Medium	1.4*	1.2, 1.6
Lower-middle	1.1	0.9, 1.3
Lowest†	1.0	...
Currently has job		
Yes	1.4*	1.3, 1.5
No†	1.0	...
Residential area		
Urban	0.9*	0.9, 1.0
Rural†	1.0	...
Activity restriction		
Yes	0.4*	0.4, 0.4
No†	1.0	...
Chronic conditions		
Two or more	0.3*	0.2, 0.3
One	0.6*	0.5, 0.6
None†	1.0	...
Smoking status		
Daily	0.7*	0.7, 0.8
Occasional	0.9	0.8, 1.1
Non-smoker†	1.0	...
Stress		
High	0.7*	0.6, 0.7
Low†	1.0	...

Data source: *Canadian Community Health Survey, preliminary file, September 2000 to February 2001*
Notes: *Based on 47,160 respondents aged 18 or older. An "unknown" category for income was included in the analysis to maximize the sample size; the odds ratio is not shown. Figures were rounded; some odds ratios having confidence intervals with 1.0 as the lower or upper limit were significant.*
† Reference category
... Not applicable
** $p < 0.01$*

surprisingly, people who smoked daily had significantly lower odds of reporting excellent or very good health, compared with non-smokers. Finally, individuals reporting high levels of stress in their daily lives had lower odds of excellent or very good health, compared with people under less stress.

Still, even after all these factors were taken into account, the preliminary CCHS data show an important relationship between sense of community belonging and self-perceived health.

Concluding remarks

This analysis indicates an association between sense of community belonging and health. This finding comes at a time when many researchers are suggesting that social capital is eroding or that the notion of "community" is disappearing in highly urbanized, post-industrial societies like Canada's. The availability of full data from the CCHS in the near future will provide the opportunity to compare sense of community belonging among regions of the country. This will allow for research that examines the role of community belonging in mediating health outcomes at the regional level, as well as studies of policies and practices in place at smaller geographic scales that enhance or diminish community belonging. ●

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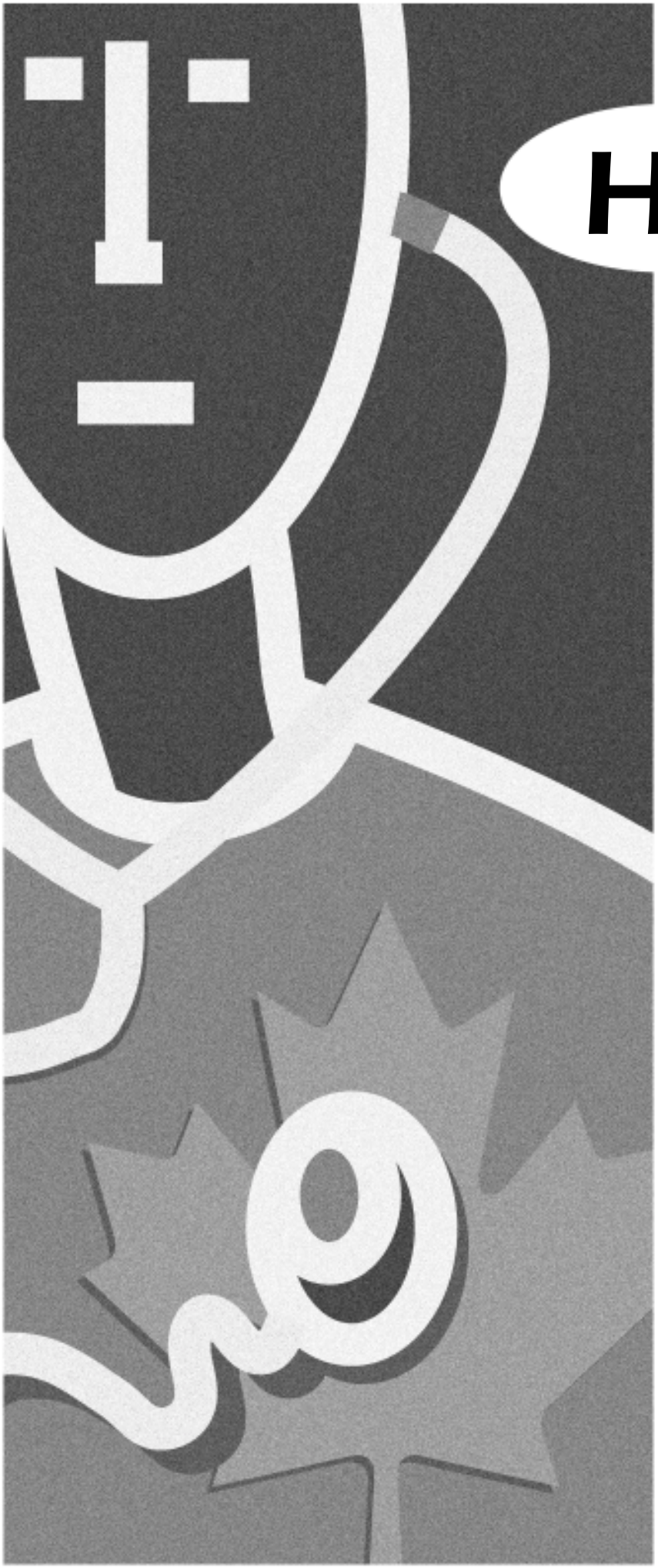

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A new survey, the Canadian Community Health Survey (CCHS), is being conducted by Statistics Canada to provide regular and timely cross-sectional estimates of health determinants, health status and health system utilization for 136 health regions across the country.

On May 8, 2002, the following products will be made available:
- Health Indicators, updated to include estimates based on CCHS data for 136 health regions
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A public-use CCHS microdata file is planned for release later in the year.

For more information about this survey, visit our web site at http://www. statcan.ca, under "Statistical Methods," followed by "New surveys."

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