

# Lack of awareness of heart disease and stroke among Chinese Canadians: Results of a pilot study of the Chinese Canadian Cardiovascular Health Project

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**BACKGROUND:** According to Statistics Canada's 2001 census, the Chinese make up the largest (27.5%) visible minority population in Canada. The cardiovascular health information for this population is therefore important for the allocation of health care and promotion resources.

**OBJECTIVES:** In the present pilot study, the authors sought to define the degree of awareness and knowledge of cardiovascular disease, as well as their risk factors, among the Chinese Canadian population.

**METHODS:** A 16-item telephone survey was conducted among 1004 ethnic Chinese subjects (18 years of age and older) in the greater Toronto area of Ontario (n=503) and the greater Vancouver area of British Columbia (n=501) in February 2004.

**RESULTS:** Among the respondents, 73% spoke Cantonese at home and 21% spoke Mandarin. Ninety-seven per cent were immigrants, and 53% had been in Canada for less than 10 years. A history of hypertension was reported in 9.2% of respondents, diabetes in 3.2% and high cholesterol in 14.5%. Thirty-two per cent and 40% of respondents were unable to name at least one symptom of heart attack or stroke, respectively, unaided. Thirty-two per cent and 35% of respondents named at least one incorrect symptom of heart attack and stroke, respectively. When asked about their immediate response in a hypothetical case of a heart attack or stroke, only 20% would have called 911.

**CONCLUSIONS:** The present study is the first to address the awareness of cardiovascular health and disease among Chinese Canadians. These data suggest that Chinese Canadians have a relatively low awareness of the warning symptoms for common cardiovascular emergency situations. The findings presented here have important implications for the development of future health promotion and research initiatives targeted to visible minority populations in Canada.

**Key Words:** Chinese; Ethnicity; Myocardial infarction; Population health; Stroke

## La méconnaissance des maladies cardiaques et des accidents vasculaires cérébraux chez les Sino-Canadiens : Les résultats d'un projet pilote de l'étude sur la santé cardiovasculaire des Sino-Canadiens

**HISTORIQUE :** D'après le recensement de 2001 effectué par Statistique Canada, les Chinois forment la principale minorité visible (27,5 %) du Canada. Il est donc important de fournir de l'information sur la santé cardiovasculaire à cette population pour l'attribution des ressources de soins de santé et de promotion de la santé.

**OBJECTIFS :** Dans le présent projet pilote, les auteurs visaient à définir le degré de sensibilisation aux maladies cardiovasculaires et de connaissance de ces maladies, de même que les facteurs de risque au sein de la population sino-canadienne.

**MÉTHODOLOGIE :** Une enquête téléphonique à 16 questions a été menée auprès de 1 004 sujets d'ethnie chinoise (18 ans et plus) de la grande région de Toronto, en Ontario (n=503) et de Vancouver, en Colombie-Britannique (n=501), en février 2004.

**RÉSULTATS :** Parmi les répondants, 73 % parlaient le cantonais à la maison et 21 %, le mandarin. Quatre-vingt-dix-sept pour cent étaient immigrants, et 53 % étaient au Canada depuis moins de dix ans. Des antécédents d'hypertension ont été déclarés par 9,2 % des répondants, de diabète, par 3,2 % d'entre eux, et d'hypercholestérolémie, par 14,5 % d'entre eux. Trente-deux pour cent et 40 % des répondants étaient incapables de nommer au moins un symptôme de crise cardiaque ou d'accident vasculaire cérébral (AVC), respectivement, sans aide. Trente-deux pour cent et 35 % des répondants ont nommé au moins un faux facteur de risque de crise cardiaque et d'AVC, respectivement. Lorsqu'on leur demandait leur réaction immédiate à un cas hypothétique de crise cardiaque ou d'AVC, seulement 20 % auraient appelé le 911.

**CONCLUSIONS :** La présente étude est la première à traiter de la sensibilisation à la santé cardiovasculaire et aux maladies cardiovasculaires parmi les Sino-Canadiens. Ces données indiquent que les Sino-Canadiens sont relativement peu informés des symptômes avertisseurs des situations courantes d'urgence cardiovasculaire. Les observations qui sont présentées ont d'importantes répercussions sur l'élaboration de futurs projets de recherche et de promotion de la santé ciblant les minorités visibles au Canada.

Across Canada, the burden of diagnosing and treating cardiovascular disease (CVD), and the distribution of cardiovascular risk factors among the entire population vary substantially by ethnic origin, geographical region, sex and age group (1-3). Ethnicity research is particularly relevant in Canada, given the large proportion of the population who are immigrants (18.4% in 2001) (4). In addition, the home countries of new immigrants to Canada have changed markedly in recent years. Currently, the fastest growing immigrant populations are those

from China and India. According to Statistics Canada's 2001 census, visible minorities account for 13.4% of the total Canadian population. One of the largest visible minority groups in North America consists of new Chinese immigrants and subsequent generations. Ethnic Chinese people account for 27.5% of all visible minorities in Canada. There were approximately 1.1 million ethnic Chinese in Canada in 2001. In larger metropolitan areas such as Toronto, Ontario, and Vancouver, British Columbia, the Chinese population accounted for 23.9% and

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43.7% of the visible minorities, respectively (4). Moreover, a substantial number of the North American Chinese are recent immigrants. Their awareness and knowledge of heart disease and stroke have not been well established thus far. A lack of knowledge and awareness of CVD may impede treatment, preventive efforts and the adoption of healthy lifestyles (5). Information on the cardiovascular health of this population is therefore of particular importance for the allocation of health care resources for health promotion and research.

The Chinese Canadian Cardiovascular Health Project is an ongoing project of the Chinese Canadian Council of the Heart and Stroke Foundation of Ontario with an aim to improve the cardiovascular health of Chinese Canadians. The present report was a pilot study of the Chinese Canadian Cardiovascular Health Project conducted to obtain background information on the awareness, perception and knowledge of cardiovascular risk and prevention among the ethnic Chinese in Canada. Data specific to this ethnic group have not been available previously. The results obtained from the present study are to be used for the planning of public health campaigns to address the knowledge gaps and for the specific needs among Chinese Canadians.

The objectives of the present study were to assess the current level of knowledge of the warning symptoms for heart attack and stroke, as well as to know what actions to take in case heart attack or stroke symptoms occur. We conducted a telephone survey in two major Canadian metropolitan centres where there are large concentrations of ethnic Chinese to define the knowledge and awareness of cardiovascular disease symptoms among the Chinese Canadian population. We also studied their self-reported prevalence of cardiovascular disease, lifestyle habits (such as level of physical activity) and sources of health information.

## PARTICIPANTS AND METHODS

A list of telephone numbers was purchased from a sampling company (SM Research Technologies Inc, Canada). This phone list was generated from the most updated telephone directories from the greater Toronto and Vancouver areas. Listings that matched Chinese surnames, including Cantonese and Mandarin surnames, were selected in a random fashion to make up the contact list. The telephone interviewers were fluent in English and in these two major Chinese dialects. Subjects were informed that all responses were confidential and that the investigators were studying cardiovascular health issues among Chinese Canadians. Calls were monitored to ensure the accuracy of answers provided by the respondents. Within each household, the telephone interviewer asked to speak to an adult 18 years of age or older. The respondent was then asked to confirm that he or she was of ethnic Chinese origin, as defined by having both parents of Chinese descent and originally being from Hong Kong, China or Taiwan (2,3). Surname analysis has been used in other population-based ethnic studies (6) to identify people of Chinese origin. Chinese surnames have been reported to have a 92% sensitivity and an 80% specificity for Chinese ethnicity.

To eliminate any potential bias or provision of proprietary information, subjects were excluded from the present study if they were employed by a hospital or clinic, health care institution or pharmaceutical company, newspaper, magazine, radio or television station, advertising agency, public relations firm or a market research firm. Respondents who had relatives employed in these work settings were also excluded.

A 16-item telephone survey divided into three sections was developed for use in the present study. Open-ended and prompting questions were incorporated into the three sections. The first section queried each respondent's knowledge of the warning symptoms of heart attack and stroke. The warning symptoms for heart attack and stroke were obtained from the Web site and brochures of the Heart and Stroke Foundation of Canada and the American Heart Association. In this section, each respondent was asked to spontaneously name as many warning symptoms of heart attack and stroke as possible (unaided). Each respondent was also queried about their immediate response in the hypothetical occurrence of a heart attack or stroke. In this question, only the first response was accepted. The second section queried each respondent about their health habits,

including exercise level, barriers to exercising regularly and smoking history, as well as which resources were used to obtain health knowledge (such as print media, radio or television broadcasts, or a physician); this section also queried information on a self-reported history of heart disease, stroke, hypertension, diabetes and high cholesterol. The final section contained questions about demographic characteristics, including age, sex, duration of residence in Canada, household language, country of origin, marital status, employment status, educational level and household income.

The questionnaire was translated into Chinese and translated back into English to check for accuracy. (A copy of the telephone questionnaire is available from the authors on request.) All calls were monitored to ensure the accuracy of the respondents' answers. The questionnaire took approximately 10 min to complete. The response rate was defined as the percentage of people who agreed to participate in the study divided by the number of valid telephone calls made. If more than one household member was eligible for the survey, then the first respondent to the telephone call was used. The survey was discontinued when at least 1000 participants were recruited. The sampling error for the study was  $\pm 3\%$  at 95% CI.

A total of 7126 households were contacted and 2443 households agreed to go through further screening (response rate was 34.2%). Among these 2443 subjects, 1439 were ineligible due to one or more exclusion criteria, which resulted in 1004 eligible respondents. This response rate is similar to other telephone surveys on cardiovascular disease awareness targeted at minority groups in the United States (5).

SPSS (Mac OS version 11; SPSS Inc, USA) was used for statistical analysis. Descriptive data were presented as percentages.  $\chi^2$  was used for univariate analysis to identify the predictors for the ability to name any heart attack or stroke warning symptom and stepwise multiple logistic regression analysis was used to adjust for potential confounding factors. Statistical significance was set at  $P < 0.05$ .

## RESULTS

### Demographics

The telephone survey was conducted between February 3 and 13, 2004. There were a total of 1004 ethnic Chinese respondents (18 years old and older) from the greater Toronto ( $n=503$ ) and greater Vancouver ( $n=501$ ) areas. Demographic characteristics of the respondents are given in Table 1. Among the respondents, 58% were female and 62% were younger than 45 years of age. Seventy-three per cent of respondents reported speaking Cantonese at home and 21% reported speaking Mandarin. Ninety-seven per cent were immigrants, and 53% had been in Canada for less than 10 years. Forty-five per cent of respondents were born in mainland China, 43% in Hong Kong and 5% in Taiwan. Among the respondents, 9.2% reported a history of hypertension, 3.2% had diabetes and 14.5% had high cholesterol. Heart disease was reported by 3.3% of respondents and a history of stroke by 0.5%. Comparing the demographic variables between the greater Toronto and greater Vancouver area respondents in the survey, more greater Toronto area respondents had a college education or higher (35% versus 28%,  $P=0.008$ ), more greater Toronto area respondents reported an income range between \$30,000 to \$59,000 (34% versus 25%,  $P=0.002$ ) and fewer were in the income range of \$0 to \$30,000 (22% versus 30%,  $P < 0.004$ ). There were more respondents from Taiwan in greater Vancouver than greater Toronto (7% versus 3%,  $P=0.003$ ). A higher proportion of respondents reported to have high cholesterol in the greater Toronto area (17% versus 12%,  $P < 0.0081$ ). Otherwise, there were no significant differences in demographic variables between respondents from the greater Toronto area versus the greater Vancouver area.

### Knowledge of heart disease and stroke

Respondents were asked to spontaneously list as many warning symptoms associated with having a heart attack or a stroke as they could.

The ability of respondents to name warning symptoms of heart attack unaided are shown in Figures 1 and 2. Approximately 50% of

**TABLE 1**  
**Respondent demographics**

Characteristic	Toronto* (n=503)	Vancouver† (n=501)	All (n=1004)
Female sex, %	57	58	58
Age in years, %			
18–24	15	15	15
25–34	17	18	18
35–44	28	29	29
45–54	23	24	24
55–64	9	6	8
≥65	5	6	6
Marital status, %			
Single (never married)	30	27	28
Married or living with someone	64	67	65
Separated or divorce	1	2	2
Widowed	1	1	1
Education, %			
≤ High school graduate	35	44	39
Technical school or college	26	26	26
≥ University graduate	35	28	32
Employment status, %			
Employed (full-time or part-time)	56	50	53
Student	13	13	13
Homemaker	16	18	17
Retired	7	11	9
Unemployed	7	7	7
Household income before tax, %			
<\$30,000	22	30	26
\$30,000–\$59,000	34	25	30
\$60,000–\$89,000	5	4	4
≥\$90,000	3	1	2
Language spoken at home, %			
Cantonese	70	76	73
Mandarin	23	18	21
Other Chinese dialects	2	2	2
English	3	3	4
Duration of stay in Canada in years, %			
<1	1	1	1
1–2	7	7	7
3–5	17	16	17
6–10	25	31	28
>10	46	42	44
Born in Canada	4	2	3
Smoking status, %			
Current, male	16	17	17
Current, female	3	3	3
Past, male	17	18	18
Past, female	4	3	4
History of disease, %			
Heart disease	3	3	3
Stroke	1	0	0
Diabetes	3	3	3
Hypertension	11	8	9
High cholesterol	17	12	15

\*Greater Toronto area, Ontario; †Great Vancouver area, British Columbia

all respondents identified chest pain or heaviness as a warning symptom of heart attack. Of all respondents, 32% identified ‘trouble breathing’ and 15% identified ‘loss of consciousness’ as warning symptoms of heart attack. Fewer than 5% of respondents were able to

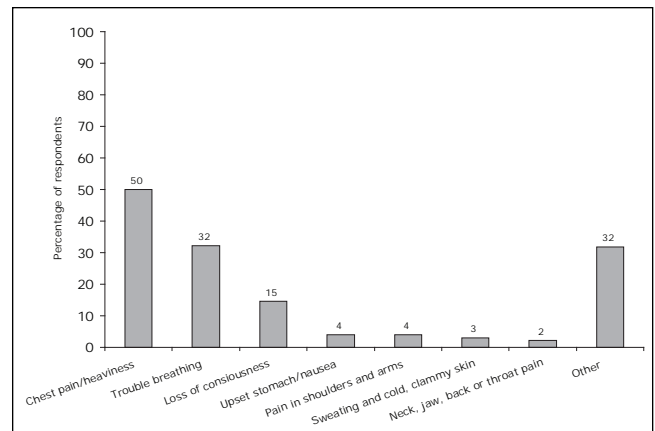


Figure 1) Unaided responses for the warning symptoms of a heart attack

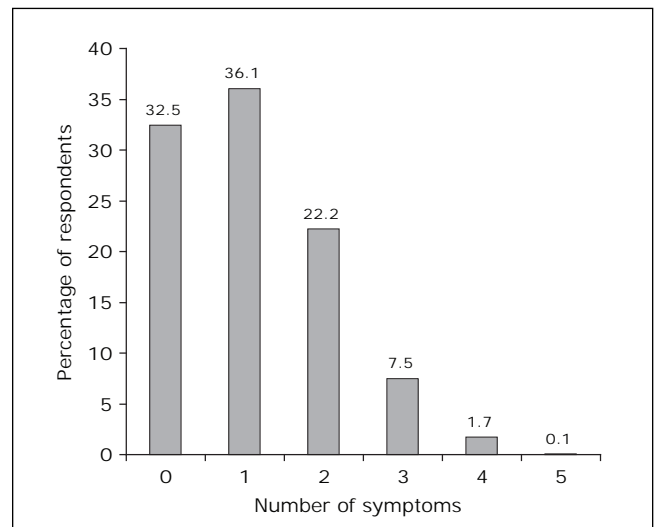


Figure 2) Number of heart attack warning symptoms named unaided

identify an upset stomach or nausea, pain in shoulders and arms, sweating, cold and clammy skin, and neck, jaw, back or throat pain as warning symptoms of heart attack. Of all respondents, 32% named at least one warning symptom that is not listed in the Heart and Stroke Foundation of Canada health brochures (an incorrect response) and 33% were unable to name any heart attack warning symptom.

The ability of respondents to name warning symptoms of stroke unaided is shown in Figures 3 and 4. The awareness and knowledge of stroke warning symptoms was noticeably low among all respondents compared with symptoms of heart attack. Of the respondents, 38% named dizziness or a sudden loss of balance as a warning symptom of stroke. Thirty per cent of respondents identified sudden numbness or weakness, and 16% identified confusion or impaired speech as warning symptoms of stroke. Of the respondents, 5% or fewer were able to identify sudden severe headache and sudden loss of vision as warning symptoms of stroke. At least one incorrect stroke symptom was named by 35% of respondents, and 40% were unable to name any stroke symptoms.

In the univariate analysis, the relationships among age, sex, income, duration of residence in Canada, education level, city location and the respondent’s ability to spontaneously name any heart attack or stroke warning symptoms were examined. The only significant univariate predictors for identifying any heart attack symptoms were found to be level of education and the ability to speak English. In the multivariate analysis, after adjusting for the above variables, respondents with a university education or higher (OR 1.4, 95% CI 1.1 to 1.0, P=0.018) and respondents who were able to speak English (OR 1.5, 95% CI 1.2 to 2.1, P=0.004) were more likely to name at

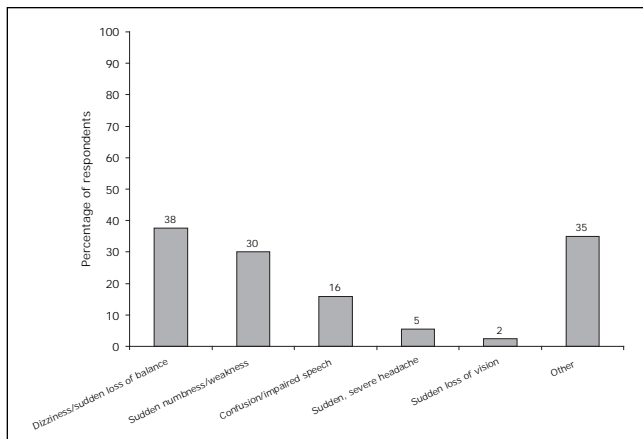


Figure 3) Unaided responses for the warning symptoms of a stroke

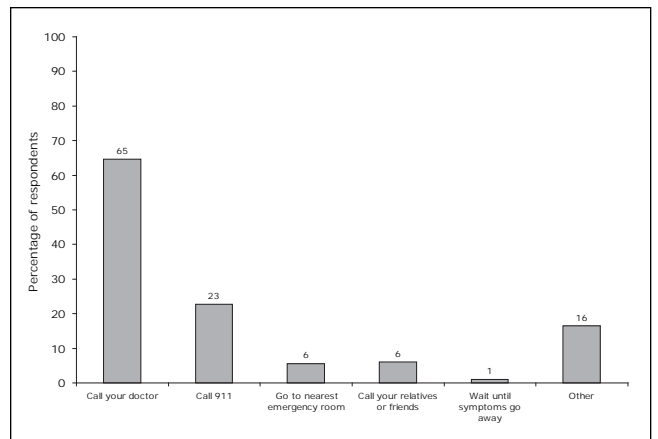


Figure 5) Immediate response in case warning symptoms of heart attack or stroke occur (unaided response)

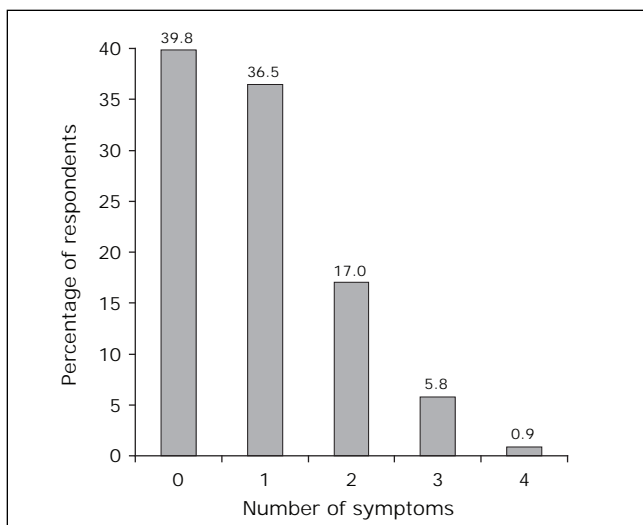


Figure 4) Number of stroke warning symptoms named unaided

least one heart attack warning symptom. None of the variables were found to be significant predictors for the ability to name at least one stroke symptom in either univariate or multivariate analysis. There was also no significant difference in the ability to recall symptoms of heart attack or stroke between respondents from the greater Toronto area and the greater Vancouver area.

**Knowledge to take action in case of heart attack or stroke**

The immediate response of respondents in a case of heart attack or stroke is shown in Figure 5. Of all respondents, 65% would call their doctors as their first response. Only 23% of respondents would call 911 immediately, the action recommended by the Heart and Stroke Foundation of Canada, and 6% would go to the nearest emergency room. Finally, 6% would call their relatives and 1% would wait until symptoms go away.

**Sources of health information**

It is important to know how Chinese Canadians obtain their health information, so that one can plan effectively to deliver cost-effective public health messages to this principally Chinese-speaking immigrant group. The majority of respondents obtain their health information from printed media, such as newspapers and magazines (27%), and broadcasts, such as television (25%) and radio (9%). The remaining media are much less frequently used. Only 8% of the Chinese Canadian respondents used the Internet for health-related information.

**Health habits**

Seventeen per cent of male respondents were active smokers and 18% were past smokers, while 3% of the female respondents were active smokers and 4% were past smokers. Only 48% of respondents exercised regularly, as defined by exercising at least three times a week, 20 min each time. Most participate in walking (22%), jogging (15%), aerobic exercise (14%), swimming (9%) and Tai Chi (4%). ‘Busy or don’t have time’ were cited as the most common barrier to exercising regularly by 47% of respondents. ‘Being lazy’ was the second-most common barrier cited by 29% of respondents. ‘Having done enough exercise by working on chores at home or at work’ was cited by 6% of respondents and ‘not liking sports or exercise’ was cited by 4% as reasons for not exercising regularly.

**DISCUSSION**

One of the key novel findings of our study was that among Chinese Canadians, there is a relative lack of knowledge of the warning symptoms for heart attack and stroke – the knowledge of stroke warning symptoms was worse. The other novel finding was that there is a significant lack of familiarity of the appropriate steps to take in response to a cardiovascular emergency such as heart attack or stroke.

The present study of CVD knowledge is important for a number of reasons. In case of a heart attack or stroke, early recognition of the warning symptoms by the patient or someone who is with the patient is an important first step that must occur before evaluation and life-saving treatment can be obtained (7). Then, appropriate immediate action, such as calling 911, has to be taken to get urgent medical attention. Patient inability to recognize the warning symptoms of a cardiovascular emergency and inappropriate immediate actions have been cited as the main reasons for delay in presenting to an emergency department, where prompt diagnosis and reperfusion treatment can take place (7). Gupta et al (8) compared south Asian Canadians with matched controls who suffered an acute myocardial infarction. They found that the median time for south Asian Canadians to present to an emergency department with a heart attack was almost 1 h longer than that of non-south Asians (8). Until now, there have been no similar data available for other ethnic minorities in Canada.

The results in our study are in agreement with previous studies that indicated a significant lack of awareness and knowledge of heart disease and stroke among the general public. A Canadian Stroke Network survey (9) was conducted in 2003 among 1537 Canadians older than 35 years of age. The inability to identify a single stroke symptom was evident. In this study, 50% of respondents were unable to correctly describe what a stroke was. The inability to identify a single stroke symptom was evident in 48% of subjects. Furthermore, 36% would not take immediate emergency measures if they were

experiencing stroke warning symptoms. Finally, 19% were unable to identify hypertension as a cardiovascular risk factor.

Our findings indicate that there is a serious lack of knowledge of the appropriate steps to take in case of a cardiovascular emergency. Only 23% of respondents would immediately call 911, the action recommended by the Heart and Stroke Foundation of Canada, and 6% would go to the nearest emergency room. Our study did not specifically address the reasons behind this knowledge gap. Possible explanations include a lack of information provided by the media, which predominantly targets the Caucasian population, fear of calling 911 and not being able to speak English, as well as being of a culture not wanting to trouble other people, particularly those who do not speak the same language. Further studies are warranted to explain these knowledge gaps and strategies to address them.

Our study of Chinese Canadians has shown that a higher education level and the ability to speak English are the only strong independent predictors for better unaided recall of heart attack warning symptoms, but not for stroke warning symptoms. There was no significant independent predictor for the ability to recall stroke symptoms unaided. Several studies (10,11) have examined the determinants of CVD knowledge, predominantly in the Caucasian populations. Age, sex, education and income have all been directly related to differences in CVD knowledge (10,11). The reasons for the discrepant results between other studies and ours are unclear. The results may be due to differences in the metrics used in qualifying what is considered good cardiovascular knowledge, or the particular population studied. The lack of effect of education and the ability to speak English on stroke warning symptoms may be related to overall poor respondent knowledge of stroke warning symptoms. In addition, stroke symptoms may be more vague or nonspecific compared with heart attack symptoms. Because most health promotion is being supplied by the media (broadcast news, press, books and pamphlets), a lower education level and the lack of good command of English or French may essentially limit access to this health information. There may also be a general lack of regard for such health information among the lower education group. The lack of age effect may be due to a smaller number of older respondents in our group. In the future, it is important to gear health promotional strategies toward making CVD knowledge accessible to groups with a lower education. In particular, translated and culture-specific health promotional materials would help in disseminating knowledge among different ethnic groups, especially those who do not have a sufficient communication ability in English or French.

The media sources most commonly cited as sources of health information by the respondents in our study are similar to those identified by Pancioli et al (12) in a telephone survey of the greater Cincinnati area, Ohio, and by Mosca et al (5) in another telephone survey among women in the United States. In our study, newspapers and magazines were reported as a health information source by the highest percentage of respondents (27%), followed by television (25%). Fortunately, there are nationwide Chinese newspapers and television networks in Canada (both in Cantonese and Mandarin) that may be used to disseminate health information. The Internet was only used by 9% of respondents. In part, reliable Chinese-based electronic health information is still in its early infancy, and there is a lack of Chinese health-related materials in Canada for the ethnic Chinese.

Our findings carry important health care implications. In China, CVD accounted for nearly 40% of deaths in 1994, and CVD incidence and mortality in China are projected to increase substantially during the next 20 years (13). Although there are no specific statistics addressing the evolving burden of heart disease and stroke among Chinese Canadians, it is possible that with the adoption of western lifestyles, the incidence and prevalence of CVD among the Chinese immigrants may even be higher than that in the countries they came from. Despite these factors, our study has demonstrated a significant lack of knowledge of CVD. Indeed, the recent immigrants who had already adopted western lifestyles in China may be particularly disadvantaged because language difficulties may limit the impact of health

promotion more so in their newly adopted country. Identification of differences in perception of heart disease and cardiovascular risk factors and barriers to good health habits has been shown to be useful to develop key messages and strategies for targeted groups (14). For example, the National Heart, Lung, and Blood Institute's Latino community-based cardiovascular disease prevention and outreach initiative, 'Salud Para Su Corazon', is a heart disease and educational campaign targeting the Latino community, and was based on data from ethnic-specific groups (14).

Based on the data obtained from the present study, the Chinese Canadian Council of the Heart and Stroke Foundation of Ontario has initiated multiple public health campaigns to increase awareness and knowledge of cardiovascular symptoms specifically addressing the Chinese Canadian population in the greater Toronto area. These actions are being accomplished via our annual public symposia for the Chinese community, as well as through local Cantonese and Mandarin radio. We were also able to disseminate knowledge of heart disease and stroke to ethnic Chinese in other Canadian cities through national Chinese newspaper articles and national Chinese television appearances.

### Limitations

One of the potential limitations of the present survey was that only households with telephones were included. It is possible that we did not survey Chinese Canadians in the lowest socioeconomic group who may not have access to telephones. This is sometimes referred to as an undercoverage bias. Fortunately, in Canada, the overall household telephone penetration rates are high (98% to 99%), while the rate is 95% to 96% among low-income households (15). Another potential limitation is that the surname method may underestimate those women who have married outside their ethnic groups and whose surnames changed accordingly. However, it has been established that women of ethnic origin who marry outside their ethnic groups and change their surname total less than 1%, suggesting that these potential biases were minimal (16). Finally, our response rate of 34.2%, although consistent with those of other telephone surveys, was still relatively low and might have impacted the general applicability of our results.

## CONCLUSIONS

To our knowledge, the present study is the first of its kind. Our study results will help in developing key messages and strategies for future health promotion initiatives targeted to the Chinese Canadian population to address specific knowledge gaps and misconceptions about heart disease and stroke. The data suggest that Chinese Canadians have a relatively low awareness of warning symptoms for common cardiovascular emergencies and they are not aware of taking the appropriate step in calling 911 when heart attack or stroke warning symptoms occur. Our findings indicate a need for the development of future health promotion initiatives targeted to this growing and mainly immigrant population to address the specific knowledge gaps and misconceptions about heart disease and stroke. Based on the data from the study, a series of public health campaigns had been carried out to address these knowledge gaps. Future studies will focus on the effectiveness of the public health campaigns in closing these knowledge gaps.

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