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Ethnic and gender differences in patient education about heart disease risk and prevention

Gilat L. Grunau^{a,*}, Pamela A. Ratner^b, Paul M. Galdas^b, and Shahadut Hossain^a^aNEXUS, University of British Columbia, Vancouver, Canada^bNEXUS & School of Nursing, University of British Columbia, Vancouver, Canada

Abstract

Objective—To investigate whether there are gender and ethnic disparities in the patient education provided by primary healthcare providers about heart disease (HD) risk and prevention.

Methods—A telephone survey, conducted in four languages, was completed by 976 people, 40+ years of age, in Metro Vancouver, Canada. Questions assessing communication with healthcare providers' provision of HD risk and management education were the focus.

Results—Statistically significant gender and ethnic differences were found. Women were less likely to report discussing HD risk and management with their healthcare providers. Chinese-Canadian participants had less likelihood of receiving HD education compared with participants of other ethnic origins. These differences persisted after multivariate adjustment with income, highest level of education attained, age, and other factors.

Conclusion—Primary healthcare providers should make improved efforts towards education about HD and its risk factors for women in general, and for postmenopausal women especially.

Practice implications—Healthcare providers should be aware that some ethnic populations may not be receiving patient education similar to that received by people of other communities, as found for Chinese-Canadian members of this study community. Further understanding of the barriers faced by ethnic groups must be gained to develop solutions.

Keywords

Heart disease; Gender; Ethnic groups; Patient education; Physician–patient relations

1. Background

Physicians and other healthcare providers are expected to view each patient objectively [1], to be unaffected by the patient's socio-demographic characteristics in forming judgments about the patient [2], and to use only biomedical information to develop a diagnosis and treatment plan [1]. These expectations, however, are often unrealistic [3]. To make the social

*Corresponding author at: GENESIS and NEXUS, School of Nursing, University of British Columbia, 302-6190 Agronomy Road, Vancouver, BC V6T 1Z3, Canada. Tel.: +1 604 822 5045; fax: +1 604 822 7869. gilatgrunau@gmail.com (G.L. Grunau).

Conflict of interest

The authors report no conflict of interest.

world more manageable, individuals often make judgments about people and generalize those judgments to categories or groups of people [4]. Time pressure, brief encounters, and the need to manage very complex cognitive tasks, factors that have been associated with an increased likelihood of stereotype usage [5–7], are common characteristics of healthcare providers' work [3].

There is evidence that patients' socio-demographic characteristics influence physicians' behavior during medical encounters; differences that persist even when patients' income, insurance coverage, and disease severity are controlled [8–10]. The gender and ethnicity or race of a patient have been shown to influence the diagnostic and treatment recommendations of physicians, independent of other risk factors. A significant body of literature has emerged that shows that non-medical factors, including gender and perceived race/ethnicity contribute to disparities in coronary heart disease (HD) treatment [9,11].

Heart disease is a leading cause of death in Canada with over 70,000 deaths in the year 2004, responsible for 22.9% of all deaths. Twenty five percent of those deaths are due to myocardial infarction [12]. In general, immigrants have been found to have lower rates of heart disease than the Canadian-born population after adjustment for differences in age, education and income. However, when analyzed by subgroups, this advantage is only found in men who have resided in Canada for less than 20 years. All other immigrant men and all immigrant women have similar rates to those of the Canadian-born population [13].

Most of the related studies completed in North America have been conducted in the USA. We examined whether differences in communications with healthcare providers are found in an ethnically diverse city in Canada. The purpose of this study was to investigate whether there are gender and ethnic disparities in the patient education provided for the prevention and management of heart disease. This study was part of a larger study that aimed to identify the relationship between socio-demographic, clinical, cognitive, psychological, and social factors and delay in treatment seeking for cardiac symptoms.

2. Methods

2.1. Sample, data collection, and questionnaire

This study used data collected between January 2003 and October 2004, as part of a larger study which is described in detail elsewhere [14,15]. A telephone survey of a random sample of men and women ($n = 3419$), 40 years of age and older, living in Metro Vancouver, Canada, was conducted. The questionnaire was administered in four languages (English, Punjabi, Mandarin, and Cantonese) to ensure representation of the two largest immigrant communities in the city (Chinese and South Asian) [16]. Informed consent was distributed by mail and returned prior to conducting the interview.

Defining ethnicity is a complex matter due to its multidimensionality, and the use of the term has provoked much debate and controversy in health research [17]. Researchers face challenges in how to accurately describe and measure ethnicity and, despite the ongoing debate, there remains no widely accepted standardized definition or consensus [18]. The concept of ethnicity includes many aspects including race, origin, identity, language and

religion. Other more subtle dimensions include culture, customs, beliefs and practices. Further complicating the matter is that ethnicity is a dynamic concept; it is in a constant state of flux due to new immigration flow, intermarriage and new identities being formed [19].

Statistics Canada, the government agency, uses three approaches to measuring ethnicity including: origin or ancestry (the roots or ethnic background of a person), race (a concept based primarily on genetically imparted physiognomical features among which skin color is a dominant attribute), and identity (how people perceive themselves rather than their ancestors) [19].

In this study, we aimed to compare immigrants to Canada with Canadian-born individuals. Thus we first categorized the respondents based on their immigration status—those born in Canada and those that were not. The immigrant group was further divided based on two aspects of ethnicity—identity and language, as follows.

Participants were classified as “Chinese” if they met the following two criteria: (a) they were born in a country other than Canada and (b) they spoke Chinese as their first language or self-identified as Chinese. Similarly, participants were classified as “South Asian” if they met these two criteria: (a) they were immigrants to Canada and (b) they spoke Punjabi or Hindi as their first language, or self-identified as Punjabi.

The remaining respondents in the immigrant group were classified as not born in Canada (but not Chinese or South Asian). Three cases were excluded from the analyses; they functioned entirely in English, were born in Canada, spoke Chinese as their first language, and identified as Chinese. Given that none of the other participants born in Canada indicated that they were Chinese or spoke Chinese as their first language, we concluded that these few individuals did not fit into the categorization scheme and were therefore excluded.

The sample was obtained from the British Columbia (BC) Ministry of Health Services, Client Registry Database. The registry includes the name, date of birth, sex, address, and telephone number of all health insured residents [20]. To be listed in the registry, residents must have lived in the province for at least 3 months and applied for the Medical Services Plan. Approval for accessing the list and conducting the study was received from the BC Ministry of Health’s Confidentiality Agreement: Security Provisions for Personal Information in Individual Identifiable Form and from the University of British Columbia’s Behavioral Research Ethics Board.

The questionnaire included 71 questions, and of those, four questions were the focus of this study: “Has your doctor or another health care provider, such as a nurse or health educator, ever talked to you about:

1. How you might reduce your risk of having a heart attack? (Yes or No)
2. The signs and symptoms of a heart attack? (Yes or No)
3. What to do if you experience symptoms of a heart attack? (Yes or No)
4. Your personal risk of having a heart attack? (Yes or No)”

2.2. Analysis

The statistical packages SPSS (SPSS, Chicago, IL, 2006), S-Plus (Insightful Corp., Seattle, WA, 2001) and OpenEpi [21] were used for data analyses. Univariate analyses were conducted using the *t*-test and Chi-square test. Multivariate logistic regression analysis was used to assess the relationships between the predictors and the outcome variable for all questions. Predictor variables in the regression model included: gender, age, ethnicity/immigration status, income, education, and history of acute myocardial infarction (AMI), either personally, in the family or among friends.¹ All continuous and ordinal variables in the multivariable models were assessed for conformity to a linear gradient. All independent variables in the models were tested for multi-collinearity, goodness of fit was appraised, and influential observations were inspected.

Nineteen percent of the participants did not disclose their household income; therefore multiple imputations of values for missing data were used to reduce bias and to provide proper uncertainty assessment of the estimated effects [22,23]. Covariates and other variables predictive of those covariates were used to impute five complete sets of data. Logistic regression analysis was completed, as described above, for each dataset and the estimated coefficients were averaged across the five datasets. We defined $p < 0.05$ as significant.

3. Results

Of the 3419 names from the client registry, 976 people completed the survey, and 759 refused to participate. The remaining 1684 people were found to be ineligible or could not be contacted (39% were “wrong” or fax numbers; 26% were numbers not in service; 25% could not be contacted; 5% no longer lived in the sampling area; 4% spoke languages other than those provided; and 1% had died). The minimum response rate (defined as the number of completed interviews divided by the number of interviews plus the number of non-interviews (refusals) plus all cases of unknown eligibility) [24] was 28.5%. The maximum response rate (defined as the number of completed interviews divided by the number of interviews plus the refusals; this eliminates those who had died, were known to not meet the eligibility criteria, and those cases with no contact for whom eligibility could not be determined) was 56.3%. The interview language chosen by the respondents was as follows: 85.1% completed the survey in English, 11.5% in Chinese, and 3.4% in Punjabi. The interview was completed over one phone call, with mean duration of 28.7 min (range of 7–94 min).

The age of the participants ranged from 40 (by inclusion criterion) to 89 years with a mean of 55.5 years (S.D. = 11.1). For other characteristics, see Ratner et al. [14,15]. Among those classified as Chinese and not born in Canada, the places of birth were: the People’s Republic

¹AMI exposure in self, family or friend was assessed using the following questions:

- a. Have you ever had a heart attack? (Yes/No)
- b. Has anyone in your immediate family [such as your spouse, parents, siblings, children] ever had a heart attack? (Yes/No)
- c. Have any of your other relatives or close friends ever had a heart attack? (Yes/No)

of China (40.9%), Hong Kong (35.6%), Taiwan (12.1%), India (2.7%), the Philippines (0.7%) and elsewhere, including Malaysia, Vietnam, Singapore, Macau, Indonesia and Cambodia (8.7%). Chinese was the first language for 92.6% of this group. For most (81.2%), Chinese was spoken most often at home; 12.1% spoke English most often at home. The majority (88.6%) described their ethnic background as Chinese, and the rest identified as Canadian (1.3%) or Taiwanese (10.7%). One quarter (24.8%) completed the survey in English and 75.2% communicated in Mandarin or Cantonese.

Among those classified as South Asian and not born in Canada, 62.7% were born in India, 4.5% were born in Pakistan, and 32.8% were born in other countries, including Egypt, countries in the Caribbean, Fiji, Malaysia, Singapore, Sri Lanka, Tanzania, Uganda, and Zanzibar Island. For 65.7% of this group, Punjabi was their first language; 16.4% reported Hindi as their first language, and 6.0% reported English. For 22.4%, English was spoken most often at home and the rest most often spoke Hindi (7.5%) or Punjabi (61.2%). The majority described themselves as Punjabi (61.2%) and the others self-identified as: Canadian (4.5%), Fijian (4.5%), Hindi (3.0%), African (1.5%) or something else (31.3%; East Indian, Gujarati, Muslim Canadian, Pakistani, or South East Asian). One half (50.7%) completed the survey in English and the other half (49.3%) in Punjabi.

Of those not born in Canada (and neither Chinese nor South Asian), their birthplaces included: the United Kingdom (20.4%), Germany (8.6%), the Philippines (8.1%), the Netherlands (1.8%), New Zealand (1.4%), India (0.9%), and elsewhere (58.4%; the USA, Africa, Asia, Australia, the Caribbean, the Middle East, and South America). For 46.2% of the respondents in this group, English was the first language spoken. Three quarters of them (77.8%) spoke English most often at home. They self-identified as: Canadian (24.9%), British (18.6%), Filipino (7.7%), Scottish (5.4%), European (4.5%), Australian (1.4%), Korean (1.4%), Russian (0.9%), African (0.5%), French (0.5%), Japanese (0.5%), or Welsh (0.5%). They all completed the survey in English.

Among those born in Canada, English was the first language spoken by most (88.0%) and English was the language most often spoken at home (99.8%). They described their ethnic origin as: Canadian (44.4%), British (22.0%), Scottish (14.4%), French (5.2%), European (2.1%), Welsh (1.7%), Aboriginal (1.1%), Russian (0.7%), Japanese (0.6%), or African (0.2%). All completed the survey in English.

3.1. Univariate analysis

In the univariate analysis for the responses to all four health education questions by gender, there were statistically significant differences noted; women were less likely to respond 'yes' than were men. Also, the Canadian-Chinese population was significantly less likely to respond 'yes' to all four questions compared with the Canadian-born participants.

The educational attainment of the respondents was statistically significantly associated with only one of the questions (question 4; Chi-square = 8.83, d.f. = 3; $p = 0.032$) with those with higher education more likely to respond 'yes'. AMI exposure (in oneself, a family member or a friend) was statistically significantly associated with all four questions; individuals who had had AMI exposure more likely to answer 'yes' they had received health professional

education ($p < 0.001$ for all). The household income of the respondents was significantly associated with only question 1 ($p = 0.044$), however no particular trend was observed.

There was a statistically significant association between the respondents' age and questions 1 ($t = 2.94$; d.f. = 974; $p = 0.003$) and 3 ($t = 3.88$; d.f. = 970; $p < 0.001$) with older individuals being more likely to respond "yes" to these questions (see Table 1).

3.2. Multivariate analysis

Interactions between sex and ethnicity/immigration status, sex and AMI exposure, and AMI exposure and ethnicity/immigration status were tested and were not significant for questions 1, 2, and 4. For question 3, the interaction between AMI exposure and ethnicity/immigration status was significant; therefore, for this question, the results are presented separately for those with and without AMI exposure. Ethnic differences in the respondents' reports of whether they had received health professional counseling about HD persisted in the multivariate analysis, with the Chinese group being significantly less likely to indicate that they had received important health information (except with regard to what to do if experiencing symptoms of a heart attack for those with no AMI exposure). The South Asian group was significantly less likely to indicate that they had discussed their personal risk of having a heart attack, and individuals not born in Canada (but not Chinese or South Asian) who had no AMI exposure were significantly more likely to have discussed what to do if experiencing symptoms of a heart attack, compared with those born in Canada. The men in the study were significantly more likely to report having discussed their risk and the appropriate management of heart attacks with their healthcare providers (except the men with no AMI exposure with regard to what to do if experiencing symptoms of a heart attack) (see Tables 2 and 3).

4. Discussion and conclusion

This study found significant gender and ethnic disparities in health professionals' communication regarding the risk and management of HD. Women were significantly less likely than men to have had discussions regarding the management of, and their risk of, HD with their healthcare providers. This is consistent with other findings that postmenopausal women receive suboptimal healthcare provider counseling regarding their risk factors for coronary artery disease [25]. This is also consistent with findings regarding physicians' tendency not to pursue an aggressive approach to HD management for women compared with their approach for men [26]. The findings of our study are of concern given that myocardial infarction is a leading cause of death for women in Canada [27]. Our findings contradict those found in previous studies that have shown that female patients generally receive more information, ask more questions, and have more "partnership-building" with physicians than do male patients [2]. However, these previous findings do not refer specifically to communication regarding cardiovascular issues. The gender disparities found in our study may be specific to communication regarding cardiovascular disease.

Our study also found that Canadian-Chinese people were consistently less likely than other ethnic groups to communicate with their healthcare providers about HD. Although language barriers may hinder patients' interactions with their healthcare providers, and could be an

explanation for our findings, it is unlikely given the results for the Canadian–South Asian group, where English was not the first language and was not spoken most often at home by a majority of the participants. This suggests that the Canadian-Chinese population is not being well informed about issues of HD, perhaps due to a dynamic that exists during healthcare provider–patient interactions. It should be made a priority to investigate reasons for this apparent communication barrier in order to develop solutions.

A limitation of this study was the response rate, ranging between 28.5% and 56.3% (Section 3). Although our sample included few individuals with less than high school education and reported household income of less than \$ 20,000 [people often underrepresented in survey research], the sample characteristics in our study are representative of the Vancouver population, based on the 2001 Census, with regard to ethnicity [28]. For example, our sample included 15.3% individuals classified as Chinese, compared with 16.6% found in the Census. Similarly, our sample included 6.9% South Asian people, compared with 6.2% found in the Census.

The questionnaire used in this study was administered over the telephone. Marcus and Crane compared evidence of survey research conducted via the telephone versus face to face [29]. They concluded that, in general, the results are quite favorable for telephone surveys. They reviewed several studies showing that telephone household report rates of morbidity and utilization are comparable to those of all households, suggesting minor under-coverage bias in telephone interviews. However they cautioned about greater under-coverage bias being expected with telephone surveys of subgroups that are less likely to have access to telephones, including low-income minorities and people with lower educational levels. These groups are at high risk for nonresponse, which exacerbates under-coverage bias. However, as noted above, we are confident that our sample is representative of the Vancouver population with regard to ethnicity. Marcus and Crane also noted that telephone surveys yield higher rates of missing data for family income [29]. In our study, we used multiple imputation to manage this issue.

4.1. Practice implications

Heart disease is a leading cause of morbidity and mortality in men and women, both those who are Canadian-born and immigrants [12,13]. It is important that healthcare providers make improved efforts in patient education about HD and its risk factors, for women in general, and for postmenopausal women especially [30]. It is necessary for these professionals to understand the seriousness of HD in women in order for women to understand the importance of primary and secondary prevention [31]. In addition, this study shows that healthcare providers should be aware that the Canadian-Chinese population is not receiving patient education similar to that received by other communities. Although the Chinese community has been found to have a lower mortality rate associated with heart disease, compared with other ethnic groups, they are by no means immune [32,33]. The change in behavior of Chinese people following immigration puts them at higher risk for cardiovascular disease, specifically with regard to changes in their dietary consumption [34,35].

Although our findings may reflect physicians' and other healthcare providers' stereotypical ideas regarding who is likely to have HD, it is also important to acknowledge that patients play a role in the interaction with healthcare providers, and our findings may thus reflect the preconceptions and communication styles that patients themselves bring to their consultations with healthcare professionals.

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Table 1

Univariate analysis.

	1. How you might reduce your risk of having a heart attack?			2. The signs and symptoms of a heart attack?			3. What to do if you experience symptoms of a heart attack?			4. Your personal risk of having a heart attack?		
	Yes	No	Total	Yes	No	Total	Yes	No	Total	Yes	No	Total
Gender												
	Women <i>n</i> (% of women)	335 (61.1)	548	149 (27.3)	397 (72.7)	546	104 (19.0)	442 (81.0)	546	159 (29.1)	388 (70.9)	547
	Men <i>n</i> (% of men)	231 (54.4)	425	152 (35.8)	273 (64.2)	425	119 (28.1)	304 (71.9)	423	169 (39.9)	255 (60.1)	424
	Total (% of total)	444 (45.6)	973	301 (31.0)	670 (69.0)	971	223 (23.0)	304 (71.9)	963	328 (33.8)	643 (66.2)	971
Odds ratio (male/female); 95% CI	1.87 (1.45, 2.42)			1.48 (1.13, 1.95)			1.66 (1.23, 2.25)			1.62 (1.24, 2.11)		
Chi-square (d.f. = 1)	$\chi^2 = 23.13, p < 0.001$			$\chi^2 = 8.03, p = 0.005$			$\chi^2 = 11.03, p = 0.001$			$\chi^2 = 12.43, p < 0.001$		
Ethnicity/immigration status												
	Born in Canada <i>n</i> (% born in Canada)	277 (51.7)	536	181 (33.8)	354 (66.2)	535	133 (25.0)	400 (75.0)	533	220 (41.0)	316 (59.0)	536
	Not born in Canada (not Chinese/South Asian) <i>n</i> (% of not born in Canada, not Chinese/South Asian)	117 (52.9)	221	81 (36.8)	139 (63.2)	220	60 (27.3)	160 (72.7)	220	77 (35.2)	142 (64.8)	219
Odds ratio (ethnic group/born in Canada); 95% CI	1.05 (0.77, 1.44)			1.14 (0.82, 1.58)			1.13 (0.79, 1.61)			0.78 (0.56, 1.08)		
	South Asian <i>n</i> (% of South Asian)	23 (34.3)	67	18 (26.9)	49 (73.1)	67	16 (23.9)	51 (76.1)	67	14 (20.9)	53 (79.1)	67
Odds ratio (ethnic group/born in Canada); 95% CI	0.49 (0.29, 0.83)			0.72 (0.41, 1.27)			0.94 (0.52, 1.71)			0.38 (0.21, 0.70)		
	Chinese <i>n</i> (% of Chinese)	27 (18.1)	149	21 (14.1)	128 (85.9)	149	14 (9.4)	135 (90.6)	149	17 (11.4)	132 (88.6)	149
Odds ratio (ethnic group/born in Canada); 95% CI	0.21 (0.13, 0.32)			0.32 (0.20, 0.53)			.032 (0.17, 0.56)			0.19 (0.11, 0.32)		
	Total <i>n</i> (% of total)	444 (45.6)	973	301 (31.0)	670 (69.0)	971	223 (23.0)	746 (77.0)	969	328 (33.8)	643 (66.2)	971
Chi-square (d.f. = 3)	$\chi^2 = 61.57, p < 0.001$			$\chi^2 = 25.93, p < 0.001$			$\chi^2 = 19.01, p < 0.001$			$\chi^2 = 51.14, p < 0.001$		
Education												
	<High school <i>n</i> (% of <high school)	32 (34.8)	92	23 (25.0)	69 (75.0)	92	19 (20.7)	73 (79.3)	92	21 (23.1)	70 (76.9)	91
	High school <i>n</i> (% of high school)	110 (45.3)	243	79 (32.5)	164 (67.5)	243	57 (23.5)	186 (76.5)	243	74 (30.5)	169 (69.5)	243
Odds ratio (education category/<high school); 95% CI	1.55 (0.94, 2.55)			1.45 (0.84, 2.49)			1.18 (0.66, 2.12)			1.46 (0.83, 2.55)		
	College/university incomplete <i>n</i> (% of College/university incomplete)	153 (44.7)	342	108 (31.6)	234 (68.4)	342	79 (23.2)	261 (76.8)	340	121 (38.2)	221 (64.6)	342

1. How you might reduce your risk of having a heart attack?										2. The signs and symptoms of a heart attack?										3. What to do if you experience symptoms of a heart attack?										4. Your personal risk of having a heart attack?																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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Odds ratio (education category/<high school); 95% CI										1.52 (0.94, 2.45)					145 (49.3)					294					1.39 (0.82, 2.34)					202 (69.2)					292					1.16 (0.66, 2.04)					225 (77.1)					292					1.83 (1.07, 3.12)					181 (61.8)					293																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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Chi-square (d.f. = 3)										$\chi^2 = 7.50, p=0.057$					524 (54.3)					971					$\chi^2 = 1.87, p = 0.60$					669 (69.0)					969					$\chi^2 = 0.33, p = 0.96$					745 (77.0)					967					$\chi^2 = 8.83, p = 0.032$					641 (66.2)					969																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
AMI exposure										Yes <i>n</i> (% of yes)					334 (48.2)					693					247 (35.7)					444 (64.3)					691					185 (26.8)					505 (73.2)					690					269 (38.9)					422 (61.1)					691																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
										No <i>n</i> (% of no)					191 (69.7)					274					51 (18.6)					223 (81.4)					274					36 (13.2)					237 (86.8)					273					57 (20.8)					217 (79.2)					274																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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Odds ratio (yes/no); 95% CI										2.47 (1.84,3.33)															2.43 (1.73,3.42)															2.41 (1.64,3.56)										2.43 (1.75,3.37)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
Chi-square (d.f. = 1)										$\chi^2 = 36.62, p < 0.001$					45 (58.4)					77					24 (31.2)					53 (68.8)					77					15 (19.5)					62 (80.5)					77					$\chi^2 = 28.82, p < 0.001$					26 (33.8)					51 (66.2)					77																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
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Odds ratio (income category/< \$ 20,000); 95% CI										0.89 (0.51,1.55)					94 (56.0)					168					0.86 (0.47,1.56)					119 (71.3)					167					37 (22.2)					130 (77.8)					167					58 (34.7)					109 (65.3)					167																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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										1.11 (0.64, 1.91)					55 (46.6)					118					0.89 (0.50, 1.60)					76 (64.4)					118					1.18 (0.60, 2.30)					86 (72.9)					118					1.04 (0.59, 1.85)					75 (63.6)					118																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
Odds ratio (income category/< \$ 20,000); 95% CI										1.61 (0.90, 2.88)					56 (52.3)					107					1.22 (0.66, 2.25)					73 (68.2)					107					1.59 (0.77, 3.08)					78 (73.6)					106					38 (35.5)					69 (64.5)					107																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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										1.28 (0.71, 2.31)					78 (45.6)					171					1.03 (0.55, 1.93)					109 (63.7)					171					1.48 (0.73, 3.02)					130 (76.5)					170					1.08 (0.58, 2.00)					71 (41.5)					100 (58.5)					171																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
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										1.68 (0.97, 2.89)					420 (53.1)					791					1.26 (0.71, 2.23)					538 (68.1)					790					1.27 (0.65, 2.48)					601 (76.3)					788					1.39 (0.79, 2.44)					277 (35.1)					513 (64.9)					790																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
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Chi-square (d.f. = 5)										$\chi^2 = 11.38, p < 0.044$																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	

Table 2

Multiple logistic regression model for predictors of having received education about heart disease from a health professional (questions 1, 2, and 4).

Variable	Category	How you might reduce your risk of having a heart attack? Odds ratio (95% CI)	The signs and symptoms of a heart attack? Odds ratio (95% CI)	Your personal risk of having a heart attack? Odds ratio (95% CI)
Gender of respondent	Female	1.00	1.00	1.00
	Male	1.96 (1.48–2.60) *	1.51 (1.13–2.02) **	1.71 (1.28–2.29) *
Age		1.02 (1.01 to 1.03) **	1.01 (0.99 to 1.02)	1.01 (0.99 to 1.02)
Education	<High school	1.00	1.00	1.00
	High school complete	1.66 (0.93–2.94)	1.42 (0.78–2.59)	1.38 (0.74–2.58)
	College/diploma/certificate/incomplete university	1.57 (0.88–2.78)	1.33 (0.73–2.43)	1.61 (0.87–3.01)
	Baccalaureate or higher	2.11 (2.11–3.80) ***	1.31 (0.71–2.42)	1.94 (1.03–3.65) ***
Income ^a	\$ 0–\$ 19,999	1.00	1.00	1.00
	\$ 20,000–\$ 39,999	0.72 (0.39 to 1.31)	0.76 (0.39 to 1.45)	0.63 (0.34 to 1.17)
	\$ 40,000–\$ 59,999	0.91 (0.51 to 1.63)	0.80 (0.44 to 1.47)	0.86 (0.47 to 1.59)
	\$ 60,000–\$ 79,999	1.03 (0.55 to 1.93)	0.91 (0.49 to 1.70)	0.77 (0.39 to 1.52)
	\$ 80,000–\$ 99,999	0.92 (0.48 to 1.76)	0.79 (0.42 to 1.51)	0.79 (0.41 to 1.56)
	\$ 100,000+	1.07 (0.59 to 1.94)	0.94 (0.51 to 1.74)	0.88 (0.48 to 1.62)
AMI exposure	No	1.00	1.00	1.00
	Yes	2.23 (1.62–3.07) *	2.26 (1.59–3.22) *	2.09 (1.48–2.95) *
Ethnicity/immigration status	Born in Canada	1.00	1.00	1.00
	Not born in Canadian (not Chinese/South Asian)	1.08 (0.78–1.51)	1.21 (0.86–1.70)	0.78 (0.56–1.10)
	South Asian (not born in Canada)	0.62 (0.34–1.11)	0.85 (0.46–1.58)	0.45 (0.23–0.87) ***
	Chinese (not born in Canada)	0.24 (0.14–0.39) *	0.28 (0.22–0.64) *	0.22 (0.12–0.38) *

^aMultiple imputations of values for missing data for income were used. A set of covariates and other variables predictive of those covariates were used to impute five complete sets of data. Logistic regression analysis was completed for each dataset and the estimated coefficients were averaged across the five datasets.

* $p < 0.001$.

** $p < 0.01$.

*** $p < 0.05$.

Table 3

Multiple logistic regression model for predictors of having received education about what to do if experiencing symptoms of a heart attack (question 3) by AMI exposure status.

Variable	Category	Yes, AMI exposure what to do if you experience symptoms of a heart attack? Odds ratio (95% CI)	No, AMI exposure what to do if you experience symptoms of a heart attack? Odds ratio (95% CI)
Gender of respondent	Female	1.00	1.00
	Male	1.80 (1.26–2.56) *	1.31 (0.61–2.78)
Age		1.02 (1.01–1.04) *	1.02 (0.98–1.05)
Education ^a	<High school/high school	1.00	1.00
	College/diploma/certificate/incomplete university	1.12 (0.73–1.73)	0.93 (0.35–2.50)
	Baccalaureate or higher	1.05 (0.66–1.67)	1.59 (0.59–4.24)
Income ^b	\$ 0–\$ 19,999	1.00	1.00
	\$ 20,000–\$ 39,999	0.94 (0.34–2.64)	0.97 (0.18–5.11)
	\$40,000–\$59,999	0.94 (0.41–2.15)	1.49 (0.28–7.89)
	\$ 60,000–\$ 79,999	1.13 (0.48–2.66)	0.96 (0.17–5.45)
	\$ 80,000–\$ 99,999	0.94 (0.41–2.13)	1.62 (0.32–8.17)
	\$ 100,000+	0.84 (0.38–1.84)	1.61 (0.29–8.96)
Ethnicity	Born in Canada	1.00	1.00
	Not born in Canadian (not Chinese/South Asian)	0.85 (0.55–1.30)	3.02 (1.33–6.84) *
	South Asian (not born in Canada)	1.52 (0.74–3.11)	0.33 (0.04–2.82)
	Chinese (not born in Canada)	0.43 (0.21–0.86) **	0.37 (0.10–1.45)

^aFor individuals with no AMI exposure, there were no individuals in the “<high school” category for those who replied ‘yes’ to the question. This resulted in unusual high estimates and standard errors, therefore we collapsed the categories of “<high school” and “high school complete”.

^bMultiple imputations of values for missing data for income were used. A set of covariates and other variables predictive of those covariates were used to impute five complete sets of data. Logistic regression analysis was completed for each dataset and the estimated coefficients were averaged across the five datasets.

* $p < 0.01$.

** $p < 0.05$.