Heart Disease Prevention Practices among Immigrant Vietnamese Women

Gloria D. Coronado, Ph.D.,¹ Erica D. Woodall, M.P.H.,¹ Hoai Do, M.P.H.,¹ Lin Li, M.D., M.S.,¹
Yutaka Yasui, Ph.D.,² and Vicky M. Taylor, M.D., M.P.H.¹

Abstract

Background: Cardiovascular disease is a leading cause of death in the United States as well as in many countries around the world, including Vietnam.

Methods: Using data from a household survey of Vietnamese American women aged 20–79 years in Seattle, Washington, collected in 2006 and 2007, we examined heart disease prevention practices. Multivariable analyses were conducted to examine the relationship between demographic factors and preventive behaviors.

Results: A total of 1523 immigrant women completed interviews. The average daily consumption of fruits and vegetables was 3.5 servings, and 31% of our sample reported being physically active (engaging in at least 30 minutes of physical activity 5 or more days per week). Few respondents reported being current smokers (1.5%). Over three quarters of women had received a recent blood pressure check and a recent cholesterol check. Age and length of time in the United States were strongly associated with several cardiovascular prevention behaviors.

Conclusions: Our findings confirm the need for continued efforts to develop and implement targeted educational campaigns to reduce the risk of cardiovascular disease among Vietnamese American women.

Introduction

ASIANS ARE AMONG THE FASTEST growing racial/ethnic populations in the country. United States Census Bureau data from 2000 show that there are approximately 1,100,000 ethnic Vietnamese living in the United States and that the population nearly doubled since 1990 (593,213).¹ Over three quarters (76%) of Vietnamese Americans are foreign-born, of whom 48% have lived in the United States for less than 10 years.¹

Cardiovascular disease (CVD) is a leading cause of death in the United States as well as in many countries around the world, including Vietnam.² Risk factors for heart disease include low levels of fruit/vegetable consumption, low levels of physical activity, tobacco use, hypertension, and hyperlipidemia.^{3,4} Dietary Guidelines for Americans 2005 specifies that adults should consume a minimum of five servings of fruit/vegetables daily and engage in at least 30 minutes of moderate intensity physical activity on most days of the week.⁵ The Joint National Commission on Detection, Evaluation, and Treatment of High Blood Pressure recommends routine blood pressure monitoring for all adults every 1–2

years.⁶ Finally, the National Cholesterol Education Program Expert Panel recommends routine cholesterol measurement for all persons aged ≥ 20 at least once every 5 years.⁷

There is a dearth of research on CVD among Asian American populations, particularly among Vietnamese. Although several previous investigations have addressed smoking behavior among Vietnamese,^{8–12} no study to our knowledge has addressed other important CVD risk factors, such as physical activity behaviors, fruit and vegetable consumption, or the frequency of blood pressure and cholesterol checks. Our research group conducted a needs assessment survey of Vietnamese American women aged 20–79 years in Seattle, Washington, over a 12-month period during 2006 and 2007. This exploratory descriptive report focuses on Vietnamese immigrants' heart disease prevention practices.

Materials and Methods

Sampling methods

We used sampling methods that have been used in previous investigations involving Vietnamese Americans.^{13,14}

¹Cancer Prevention Program, Fred Hutchinson Cancer Research Center, Seattle, Washington.

²Department of Public Health Sciences, University of Alberta, Edmonton, Alberta, Canada.

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Specifically, we identified Vietnamese households using two validated lists of Vietnamese last names^{15,16} and an electronic version of the telephone book for metropolitan Seattle. We compiled a list of 55 Vietnamese last names that were included in one or both of these published lists and identified all households with 1 of the 55 Vietnamese names, which were listed in the metropolitan Seattle telephone book. Then, we identified ZIP codes that included at least 50 households with one of the Vietnamese last names. Households in ZIP codes with relatively few Vietnamese residents were excluded for interviewer travel cost reasons. Listings with incomplete address information were excluded because the Institutional Review Board required an introductory letter be mailed to households. Our study sample included 4436 households (with complete address information) in these 33 ZIP codes.

Household recruitment

The Fred Hutchinson Cancer Research Center Institutional Review Board approved all study procedures. Selected households received an introductory mailing from the project. The mailing included Vietnamese and English versions of an introductory letter, as well as a small participation incentive (a keychain with a painting of Vietnam). Bilingual, bicultural, female survey workers conducted interviews in women's homes approximately 2 weeks after the introductory mailings. Women who completed the survey were given a \$15 grocery store card as a token of appreciation for their time. Each respondent was given the option of completing her survey in Vietnamese or English, and each interview took approximately 30 minutes to complete. Up to five door-to-door attempts were made to contact each household (in-

cluding at least one daytime, one evening, and one weekend attempt).

Participant selection

We aimed to interview one adult woman, aged 20–79, in each household. Our previous experience indicates that survey response rates in Vietnamese communities are negatively impacted by attempts to list household members and then randomly select one respondent in households with two or more eligible respondents. We chose not to use the nearest birthday method for our within-household participant selection because a meaningful proportion of Vietnamese immigrants do not know their birthday and routinely use January 1 for U.S. documentation purposes. However, to ensure that our sample was representative of different age groups, we randomly assigned households to one of two groups: households where we initially asked to speak with a woman in the 20–49 age group (and then asked to speak with a woman aged 50–79 if there were no women in the younger age group) and those where we initially asked to speak with a woman in the 50–79 age group (and then asked to speak with a woman aged 20–49 if there were no women in the older age group). Interviews were conducted and data were collected in 2006 and 2007.

Survey instrument

The survey instrument was developed in English, translated into Vietnamese using double-forward methods, and pretested.^{17,18} Respondents specified their age, marital status, educational level, and household income. Foreign-born respondents were asked how many years they had lived in

TABLE 1. STUDY GROUP CHARACTERISTICS

<i>Sociodemographic variable</i>	<i>n</i>	<i>%</i>
Age, years		
<35	267	17.7
35–49	493	32.6
50–64	546	36.1
65–79	205	13.6
Marital status		
Currently married	1203	79.7
Previously married	185	12.3
Never married	122	8.1
Education, years		
<12	764	50.6
12	355	23.5
≥12	391	25.9
Household income		
\$30,000	725	48.0
≥\$30,000	537	35.5
Unknown	250	16.5
Years in United States		
<10	312	20.6
10–19	944	62.4
≥20	257	17.0
English proficiency		
Speaks fluently or well	175	11.6
Speaks quite well	715	47.4
Does not speak well or at all	619	41.0

the United States and where they were born. All respondents were asked to specify their English-language proficiency [speaks fluently, speaks very well, speaks quite well (so so), does not speak well, and does not speak at all].

Participants were queried about their fruit/vegetable consumption and physical activity. Usual fruit/vegetable consumption during the previous 30 days was assessed with a modified version of the instrument used in the National 5-A-Day for Better Health program.¹⁹ Specifically, survey participants were asked a series of six questions about their consumption of pure orange/grapefruit juice, other pure fruit juices, fruits, green salads, potatoes (excluding fried potatoes), and vegetables (other than green salads and potatoes). To our knowledge, this instrument has not been validated in the Asian population. Each participant was asked how often she had engaged in physical activity during the last 30 days. Those who had engaged in any physical activity during this time period were asked to indicate how long they usually spent doing physical activity.

Other questions addressed tobacco use, history of blood pressure checks, and history of cholesterol testing. Survey respondents were asked if they had smoked 100 or more cigarettes in their lifetime and, if so, whether they had smoked cigarettes during the last 30 days. Each respondent was also asked if she had ever had a blood pressure check and, if so, when she last had a blood pressure check. Similarly, respondents were asked if they had ever had a cholesterol test and, if so, when they last had a cholesterol test.

Data analysis

Total fruit intake was estimated as the sum of servings of fruit plus juice, and total vegetable intake was estimated as the sum of servings of salad, potatoes, and vegetables. The amounts of fruit and vegetable intake were combined in the analysis to be consistent with national recommendations.⁵ Survey participants who reported five or more servings per day of fruits and vegetables were defined as being consistent with the national recommendations. Survey participants who reported that they did physical activity for 30 minutes or more at least 5 days a week were defined as being physically active. Participants who indicated they had smoked at least 100 cigarettes in their lifetime and had smoked during the last 30 days were defined as current smokers.

Unconditional logistic regression models were used to test the associations of individual factors with each of the five heart disease prevention strategies (fruit/vegetable consumption, physical activity, tobacco use, blood pressure checks, and cholesterol checks), with and without adjusting for all demographic factors as potential confounding variables.^{20,21}

Results

Survey response

A total of 1532 women completed interviews. The disposition of the other addresses in our original sample was as follows: a nonresidential address (i.e., vacant dwelling or

TABLE 2. FACTORS ASSOCIATED WITH FRUIT/VEGETABLE CONSUMPTION AND PHYSICAL ACTIVITY

Sociodemographic variable	Fruit/vegetable servings (5 or more daily) n (%)	Unadjusted OR (95% CI)	Adjusted ^a OR (95% CI)	Physically active n (%)	Unadjusted OR (95% CI)	Adjusted ^a OR (95% CI)
Age, years						
<35	37 (14.0)	1.0 (referent)	1.0 (referent)	48 (18.0)	1.0 (referent)	1.0 (referent)
35–49	91 (18.7)	1.4 (0.93,2.14)	1.7 (1.11,2.71)^b	106 (21.6)	1.3 (0.86,1.83)	1.3 (0.84,1.89)
50–64	104 (19.1)	1.5 (0.96,2.18)	2.0 (1.25,3.25)	191 (35.1)	2.5 (1.72,3.52)	2.4 (1.63,3.76)
65–79	32 (16.0)	1.2 (0.70,1.95)	2.0 (1.06,3.72)	122 (59.5)	6.7 (4.39,10.15)	6.1 (3.61,10.17)
Marital status						
Never married	24 (19.7)	1.0 (referent)	1.0 (referent)	30 (24.6)	1.0 (referent)	1.0 (referent)
Currently married	204 (17.1)	0.8 (0.54,1.72)	0.8 (0.47,1.28)	358 (29.8)	1.3 (0.85,2.00)	1.0 (0.63,1.59)
Previously married	35 (19.2)	1.0 (0.54,1.72)	0.9 (0.47,1.64)	77 (42.1)	2.2 (1.34,3.69)	1.0 (0.57,1.76)
Education, years						
<12	129 (17.1)	1.0 (referent)	1.0 (referent)	266 (35.0)	1.0 (referent)	1.0 (referent)
12	59 (16.8)	1.0 (0.7, 1.37)	0.8 (0.56,1.17)	91 (25.7)	0.6 (0.49,0.85)	1.0 (0.69,1.31)
≥12	75 (19.4)	1.2 (0.85,1.60)	1.0 (0.66,1.48)	110 (28.2)	0.7 (0.56,0.95)	1.3 (0.87,1.83)
Household income						
<\$30,000	125 (17.5)	1.0 (referent)	1.0 (referent)	255 (35.4)	1.0 (referent)	1.0 (referent)
≥\$30,000	102 (19.2)	1.1 (0.84,1.5)	1.1 (0.78,1.53)	129 (24.0)	0.6 (0.45,0.74)	0.8 (0.59,1.07)
Unknown	37 (14.9)	0.8 (0.55,1.23)	0.9 (0.57,1.31)	82 (32.9)	0.9 (0.66,1.22)	1.0 (0.74,1.43)
Years in United States						
<10	49 (15.9)	1.0 (referent)	1.0 (referent)	74 (23.8)	1.0 (referent)	1.0 (referent)
10–19	178 (19.0)	1.2 (0.88,1.75)	1.0 (0.71,1.50)	303 (32.2)	1.5 (1.13,2.04)	1.1 (0.79,1.52)
≥20	37 (14.6)	0.9 (0.57,1.43)	0.6 (0.35,1.00)	90 (35.2)	1.7 (1.20,2.50)	1.2 (0.80,1.91)
English proficiency						
Speaks fluently or well	32 (18.4)	1.0 (referent)	1.0 (referent)	51 (29.1)	1.0 (referent)	1.0 (referent)
Speaks quite well	143 (20.2)	1.1 (0.73,1.72)	0.9 (0.52,1.47)	172 (24.2)	0.8 (0.54,1.12)	0.7 (0.41,1.03)
Does not speak well or at all	89 (14.5)	0.8 (0.48,1.18)	0.5 (0.27,0.94)	239 (38.7)	1.5 (1.07,2.21)	0.9 (0.51,1.52)

^aAdjusted for all other sociodemographic characteristics.

business) 243, unable to access a secure building 202, eligibility not established (i.e., no contact after five attempts) 975, verified to be ineligible (i.e., household not Vietnamese or no Vietnamese woman aged 20–79 years) 888, and eligible but refused 596. The cooperation rate (i.e., response among reachable and eligible households) was 72%. Because we wanted to focus on immigrant women, we eliminated from the analysis 9 women who were U.S.-born.

Demographics

The characteristics of the 1523 women are shown in Table 1. Respondents were generally aged ≥ 35 and married. One half of respondents had <12 years of education; nearly one quarter had completed >12 years. Nearly one half reported a household income of $<\$30,000$ (16.5% did not report income). The majority had lived in the United States for ≥ 10 years, but only 12% reported speaking English fluently or very well.

Fruit and vegetable servings

The average daily consumption of fruits and vegetables was 3.5 servings; 18% of women in our sample consumed 5 or more fruits and vegetables daily (Table 2). Age was directly associated with fruit and vegetable consumption, with those < 35 in all age groups eating more fruits and vegetables than those < 35 . After adjustment for all other demographic factors, years in the United States and English proficiency were both associated with fruit and vegetable consumption. Women who had lived in the United States for

≥ 20 years consumed fewer fruits and vegetables than women who had lived in the United States for <10 years. Women who spoke little or no English consumed fewer fruits and vegetables than those who spoke English fluently or well.

Physical activity

Overall, 31% of our sample reported being physically active (engaging in 30 minutes of physical activity 5 or more days per week). Age was significantly associated with being physically active, with those aged 50–79 having two times and over six times, respectively, greater odds of being physically active than those <35 (Table 2).

Smoking

Few respondents reported being current smokers (1.5%). Those who were currently married were less likely to smoke than those who had never been married (Table 3). Those with a 12th grade education or higher were less likely to smoke than those with less than a 12th grade education. Years in the United States was associated with tobacco use, with those having lived in the United States ≥ 20 years being over 13 times more likely to smoke than those who had more recently immigrated (those living in the United States <10 years).

Blood pressure check

Over 90% of women had received a blood pressure check in the past 2 years (Table 4). As expected, having had a re-

TABLE 3. FACTORS ASSOCIATED WITH TOBACCO USE

Sociodemographic variable	Current smoker n (%)	Unadjusted OR (95% CI)	Adjusted ^a OR (95% CI)
Age, years			
<35	9 (3.4)	1.0 (referent)	1.0 (referent)
35–49	6 (1.2)	0.4 (0.12,0.99)^b	0.4 (0.11,1.29)
50–64	5 (0.9)	0.3 (0.09,0.79)	0.3 (0.06,1.05)
65–79	2 (1.0)	0.3 (0.06,1.31)	0.2 (0.03,1.65)
Marital status			
Never married	6 (5.0)	1.0 (referent)	1.0 (referent)
Currently married	12 (1.0)	0.2 (0.07,0.53)	0.3 (0.09,1.00)
Previously married	4 (2.2)	0.4 (0.12,1.56)	0.6 (0.12,3.24)
Education, years			
<12	11 (1.5)	1.0 (referent)	1.0 (referent)
12	5 (1.4)	1.0 (0.34,2.82)	0.7 (0.20,2.32)
≥ 12	5 (1.3)	0.9 (0.30,2.55)	0.2 (0.04,0.89)
Household income			
$<\$30,000$	9 (1.2)	1.0 (referent)	1.0 (referent)
$\geq \$30,000$	9 (1.7)	1.4 (0.54,3.45)	1.2 (0.37,3.90)
Unknown	4 (1.6)	1.3 (0.40,4.27)	0.9 (0.23,3.21)
Years in United States			
<10	1 (0.3)	1.0 (referent)	1.0 (referent)
10–19	13 (1.4)	4.4 (0.57,33.43)	5.1 (0.63,42.02)
≥ 20	8 (3.1)	10.0 (1.24,80.20)	13.1 (1.33,128.90)
English proficiency			
Speaks fluently or well	8 (4.6)	1.0 (referent)	1.0 (referent)
Speaks quite well	8 (1.1)	0.2 (0.09,0.64)	0.3 (0.06,1.24)
Does not speak well or at all	6 (1.0)	0.2 (0.07,0.61)	0.3 (0.04,1.80)

^aAdjusted for all other sociodemographic characteristics.

TABLE 4. FACTORS ASSOCIATED WITH BLOOD PRESSURE CHECKS AND CHOLESTEROL TESTING

<i>Sociodemographic variable</i>	<i>Blood pressure check last 2 years n (%)</i>	<i>Unadjusted OR (95% CI)</i>	<i>Adjusted^a OR (95% CI)</i>	<i>Cholesterol test last 5 years %</i>	<i>Unadjusted OR (95% CI)</i>	<i>Adjusted^a OR (95% CI)</i>
Age, years						
<35	233 (87.9)	1.0 (referent)	1.0 (referent)	154 (57.9)	1.0 (referent)	1.0 (referent)
35–49	449 (91.6)	1.5 (0.92,2.45)	1.1 (0.65,1.93)	396 (80.3)	3.0 (2.14,4.13)^b	2.3 (1.56,3.23)
50–64	506 (94.1)	2.2 (1.3,3.63)	1.3 (0.71,2.47)	497 (91.5)	7.9 (5.33,11.58)	5.4 (3.40,8.45)
65–79	203 (99.0)	13.9 (3.3,58.89)	5.4 (1.16,24.91)	199 (97.1)	24.1 (10.33,56.26)	16.2 (6.40,41.20)
Marital status						
Never married	96 (79.3)	1.0 (referent)	1.0 (referent)	71 (58.2)	1.0 (referent)	1.0 (referent)
Currently married	1113 (93.2)	3.6 (2.18,5.87)	3.2 (1.85,5.60)	1010 (84.2)	3.8 (2.58,5.65)	2.4 (1.50,3.69)
Previously married	181 (98.9)	23.6 (5.47,101.62)	13.9 (3.10,62.12)	162 (88.0)	5.3 (2.98,9.38)	1.9 (0.95,3.60)
Education, years						
<12	711 (93.4)	1.0 (referent)	1.0 (referent)	652 (85.7)	1.0 (referent)	1.0 (referent)
12	322 (92.0)	0.8 (0.50,1.31)	1.2 (0.68,1.94)	288 (81.4)	0.7 (0.52,1.02)	0.9 (0.61,1.33)
≥12	356 (92.2)	0.8 (0.52,1.34)	1.5 (0.80,2.61)	305 (78.0)	0.6 (0.43,0.81)	0.9 (0.61,1.45)
Household income						
<\$30,000	679 (94.6)	1.0 (referent)	1.0 (referent)	606 (83.8)	1.0 (referent)	1.0 (referent)
≥\$30,000	493 (92.3)	0.7 (0.44,1.09)	0.7 (0.43,1.19)	448 (83.7)	1.0 (0.73,1.35)	1.3 (0.88,1.83)
Unknown	218 (88.3)	0.4 (0.26,0.71)	0.5 (0.29,0.85)	191 (76.4)	0.6 (0.44,0.89)	0.8 (0.54,1.23)
Years in United States						
<10	279 (89.4)	1.0 (referent)	1.0 (referent)	206 (66.0)	1.0 (referent)	1.0 (referent)
10–19	874 (93.4)	1.7 (1.07,2.60)	1.4 (0.86,2.34)	813 (86.5)	3.3 (2.44,4.45)	2.2 (1.58,3.17)
≥20	239 (94.8)	2.2 (1.12,4.23)	2.0 (0.93,4.44)	228 (88.7)	4.1 (2.57,6.36)	2.7 (1.56,4.78)
English proficiency						
Speaks fluently or well	156 (90.7)	1.0 (referent)	1.0 (referent)	127 (72.6)	1.0 (referent)	1.0 (referent)
Speaks quite well	649 (91.7)	1.1 (0.63,2.01)	0.9 (0.43,1.80)	587 (82.1)	1.7 (1.18,2.54)	1.3 (0.78,2.18)
Does not speak well or at all	582 (94.5)	1.8 (0.94,3.26)	1.2 (0.49,2.87)	528 (85.9)	2.3 (1.53,3.43)	1.2 (0.64,2.29)

^aAdjusted for all other sociodemographic characteristics.

cent blood pressure check was associated with age, with those aged 65–79 having greater odds of having had a recent blood pressure check than those aged ≤35 (adjusted model). In both unadjusted and adjusted models, women who were currently married or previously married had greater odds of having had a recent blood pressure check than those who had never married.

Cholesterol check

Over three quarters (82.6%) of women had received a cholesterol check in the past 5 years. Age was strongly associated with having had a recent blood cholesterol check, with those aged 35–49, those aged 50–64, and those aged 65–79 having over 2, 5, and 16 times higher odds, respectively, of having had recent testing than those < age 35 (adjusted model) (Table 4). Women who were currently married had twice the odds of having had a recent blood cholesterol check compared with women who were never married or were previously married. In both unadjusted and adjusted models, years in the United States was strongly associated with having had a recent cholesterol check, with those living in the United States 10–19 years and those living in the United States ≥20 years having 2.2 and 2.7 times, respectively, higher odds of recent testing than those living in the United States for <10 years.

BRFSS data

Data from the Behavioral Risk Factors Surveillance Survey (BRFSS) from 2005 and 2006 for Washington State show that 30.9% of women consumed 5 or more fruits and vegetables daily and that this percentage rose with increasing age, education, and household income (Table 5). Being a daily or occasional smoker was reported by 15.2% of women, and the percentages were highest among younger, less educated, and lower-income women. Fifty-four percent of women reported engaging in physical activity for at least 30 minutes 5 days a week or vigorous physical activity for 20 minutes at least 3 days per week. The percentage of women who were physically active decreased with increasing age and increased with increasingly levels of education and income.

Discussion

CVD is the leading cause of death among Asian/Pacific Islander women (36% of all deaths) and accounts for 31% of all deaths among Vietnamese women in Vietnam.²² This study addressed a number of indicators for CVD, including consumption of fruits and vegetables, physical activity, smoking, and blood pressure and cholesterol checks. Our findings show that compared to the general female popula-

TABLE 5. WASHINGTON STATE BEHAVIORAL RISK FACTOR SURVEILLANCE DATA FOR WOMEN, 2005 AND 2006

<i>Sociodemographic variable</i>	<i>Fruit/vegetable servings (5 or more daily)^{a,c}</i> %	<i>Current smoker^{b,d}</i> %	<i>Physically active^c</i> %
Age, years			
<35	27.1	18.9	57.6
35–49	30.4	18.0	56.6
50–64	31.7	13.3	53.2
65–79	35.2	9.5	47.4
Marital status			
Never married	26.2	23.0	57.3
Currently married	27.6	10.5	55.5
Previously married	30.4	24.9	47.3
Education, years			
<12	23.3	28.8	46.8
12	22.7	23.0	48.8
≥12	35.7	13.3	57.1
Household income			
<\$35,000	25.9	24.8	49.3
≥\$35,000	34.0	12.1	58.8
Unknown	NA	NA	

^aPercent consuming 5 or more servings per day.

^bAverage of current daily smokers and current occasional smokers

^c2005 data.

^d2006 data.

tion in Washington State, Vietnamese women had lower levels of fruit and vegetable consumption and engaged less often in physical activity. Vietnamese women, however, reported receiving cholesterol checks more regularly and had lower smoking rates than the general Washington State female population.

Our findings showed that 18% of Vietnamese women consumed 5 or more servings of fruits and vegetables daily. Data from the Racial and Ethnic Approaches to Community Health (REACH) 2010 Risk Factor Survey reported that 18% of all Asian American/Pacific Islander women consumed 5 or more servings of fruits and vegetables per day²³ and that 11% of Vietnamese from Los Angeles, Orange, and Santa Clara counties had consumed 5 or more fruits and vegetables per day.²⁴ Both percentages were lower than the 30.9% reported for a general population of women in Washington State surveyed as part of the 2005 BRFSS.^{25,26} Notably, the BFRSS was conducted using telephone interviewing rather than personal interviewing, as in the present study.

Our finding that 31% of Vietnamese women participated in at least 30 minutes of moderate physical activity was higher than the 17% for Asian Americans/Pacific Islanders and 14% for Vietnamese reported in the REACH survey²³ and lower than the 54.1% reported for the general female population of Washington State.²⁵ Notably, the REACH study included both men and women, whereas our study only included women. This difference may be a result of the belief noted in a qualitative study of heart disease risk factors among Vietnamese American adults that physical activity is a way to restore good health and promote a healthy image rather than prevent disease.²⁷

Our finding that 1.5% of Vietnamese women were current smokers was consistent with the findings of some previous

research and lower than the findings of others. BFRSS data show that 15.2% of Washington State women of all races and ethnicities are current smokers.²⁵ A recent review of the literature on smoking practices among Asian Americans showed smoking rates among Vietnamese women to range from 0.4% in a California-based study²⁸ to 18.8% in a Pennsylvania and New Jersey-based study.¹¹ Washington State has restrictive policies on smoking that ban smoking in restaurants and bars and within 25 feet of the entries of commercial buildings. These policies may explain, in part, the relatively low smoking rates we observed. Our finding may be explained further by the perception among Vietnamese that it is not generally acceptable for Vietnamese women to smoke and that female smokers are often considered of low class.²⁷ Consistent with this notion, all previous studies on smoking by Vietnamese have reported a higher smoking rate among men than women.²⁹

There are few published reports on the frequency of blood pressure checks in the Asian American population. Our finding that 93% of Vietnamese women received a blood pressure check in the last 2 years is slightly higher than the findings from a study that used national data from the Medical Expenditure Panel Survey showing that 93.3% of adults who had a regular source of care and 73.9% of those who had not had received a blood pressure check within the past 2 years.³⁰

A surprisingly high percentage of women in our study reported having received a cholesterol check in the last five years (83%). This percentage is higher than that reported for the general population of adult women in Washington State (74%).²⁶ Notably, REACH data show that only 68% of Vietnamese had ever had their blood cholesterol checked. Asian immigrants in Seattle are reported to have relatively high access to healthcare services³¹; however, this finding raises the possibility of poor respondent recall for this question.

Among the demographic factors that we examined, age appeared to be important across cardiovascular prevention behaviors, with older age being associated with eating a greater number of fruits and vegetables, being more likely to engage in physical activity, and having had a recent blood pressure and cholesterol check.

Our findings pertinent to length of time spent in the United States stand out. Having spent ≥20 years in the United States was inversely correlated with fruit or vegetable consumption and unassociated with physical activity levels (in the adjusted model). However, time spent in the United States was strongly correlated with having received a recent blood pressure check and having received a recent cholesterol check. These associations may, in part, be explained by greater access to healthcare among established immigrants compared with more recent arrivals and is consistent with prevailing theories about the health behaviors of immigrant populations.³² Having spent ≥20 years in the United States was associated with a greater likelihood of smoking, and this finding was consistent with previous research. In a recent review of the smoking literature among Asian Americans, Kim et al.²⁹ report that of five studies that examined the relationship between smoking and acculturation among women, all reported a direct association.^{33–37}

Our study has several strengths. We used population-based sampling methods, administered the survey in person, and had a relatively good cooperation rate. However, our study also has several limitations. Specifically, respon-

dents were recruited in one geographic area of the United States, only households with listed telephone numbers were eligible, and a proportion of households was unreachable or refused to participate. Additionally, our data are cross-sectional; thus, we are unable to identify the temporal aspects of the observed relationships. Finally, we did not attempt medical records verification of self-reported behaviors.

Our findings confirm the need for continued efforts to develop and implement targeted educational campaigns to reduce the risk of CVD among Vietnamese women. Among recently immigrated women, supporting the maintenance of protective health practices, such as eating fruits and vegetables and not smoking, is warranted. Moreover, expanding access to healthcare services to improve uptake of cholesterol and blood pressure testing might further reduce this burden.

Disclaimer Statement

No competing financial interests exist.

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Address reprint requests to:

*Gloria D. Coronado, Ph.D.
Cancer Prevention Program
Fred Hutchinson Cancer Research Center
1100 Fairview Avenue North
Seattle, WA 98109*

E-mail: gcoronad@fhcrc.org