Original Investigation

Smoking prevalence and factors associated with smoking status among Vietnamese in California

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Abstract

Introduction: Vietnamese American men have smoking prevalence rates higher than the general population. We analyzed Vietnamese American smoking behavior by demographic and health-related factors, including some specific to Vietnamese, in the largest tobacco-specific survey yet targeting the Vietnamese population.

Methods: Using a statewide surname probability sample and computer-assisted telephone interviewing, we surveyed 1,101 Vietnamese men and 1,078 Vietnamese women in California (63.5% participation among successfully contacted eligible individuals) in 2007–2008. We conducted multivariate regression models to analyze the association between Vietnamese male smoking status and demographic and health-related factors.

Results: Among women, <1% were current smokers and <2% were former smokers. Among men, 25% were current and 24% were former smokers. Regression models for Vietnamese men delineated factors associated with both current and former smoking (vs. never smoking): being married, being employed, having lower educational attainment, and consuming alcohol. Other factors associated with current smoking (vs. never smoking) were having no health insurance, having seen a Vietnamese doctor or no doctor visit in the past year, having Vietnamese military or Vietnamese reeducation camp experience, having less knowledge about the harms of smoking, and reporting higher depression symptoms. Increasing age and not being Buddhist were associated with former (vs. never) smoking.

Discussion: Smoking patterns of Vietnamese women and Vietnamese men are significantly different from the general California population. Tobacco control efforts targeting Vietnamese men should include community outreach since current smokers have low health care access, utilization, and knowledge.

Introduction

Vietnamese American men are at high risk for using tobacco, the leading preventable cause of mortality (Centers for Disease Control and Prevention, 2002). With 40% of the entire U.S. Vietnamese population (1,122,528) living in California (U.S. Census Bureau, 2006), Vietnamese men have the highest adult smoking prevalence rates (35.4% males vs. 2.0% females) among six Asian American subgroups (California Health Interview Survey, 2009). In contrast, the smoking prevalence in the general population is lower for men and higher for women in both California (16.5% for men and 10.6% for women; M. Modayil, Ph.D., personal communication, May 13, 2009, regarding unpublished results from the 2008 California Adult Tobacco Survey) and the United States (23.9% men and 18.0% women; Centers for Disease Control and Prevention, 2007). The Vietnamese male smoking prevalence rate is even higher in Vietnam, which had the highest rate in Asia in 1995 (72.8% males vs. 4.0% females; Jenkins, Dai, et al., 1997), although it has dropped recently to 42% in men and 1.9% in women due to increased tobacco control efforts (World Health Organization, 2008).

In California, there has been a progressive steady, but slow, decline in Vietnamese male smoking prevalence. Estimates from the early 1990s showed that Vietnamese male smoking rates ranged from 35% to 56% (Jenkins, McPhee, Bonilla, Nam, & Chen, 1995; Jenkins, McPhee, et al., 1997; McPhee et al., 1992). In 2003, a telephone survey of 660 adult Vietnamese men in Santa Clara County, CA, reported a smoking prevalence rate of 31.9% (Rahman et al., 2005). Between 2000 and 2005, Centers for Disease Control and Prevention study using data obtained by the National Opinion Research Center found a Vietnamese male current smoking rate in Santa Clara County of 29.8% (Nguyen et al., 2009). In contrast, other states have reported higher prevalence rates. A 1994 telephone survey of 774 Vietnamese men living in 12 communities in Massachusetts found a male smoking rate of 43% (Wiecha, Lee, & Hodgkins, 1998), and a 2002 in-person survey of 509 Vietnamese men in Seattle, WA, reported a current smoking rate of 37% (Chan et al., 2007).

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Understanding factors associated with the high smoking prevalence of Vietnamese American men may help inform strategies for intervention. Demographic factors previously found to be related to smoking among Vietnamese populations include lower acculturation (measured by language fluency and preference; Rahman et al., 2005), lower educational level, lack of health insurance, and geographical origin from the south coast of Vietnam (Wiecha et al., 1998). Having less knowledge about the health risks of smoking and more depression symptoms has been associated with current smoking (compared with never smoking; Chan et al., 2007; Wiecha et al.). Social acceptance of smoking is also associated with smoking, especially in Vietnamese adolescents and adult men (Chan et al.; Nguyen, Gildengorin, Gregorich, McPhee, & Kaplan, 2007). Vietnamese Americans, with their history of postwar immigration, comprise a disadvantaged population particularly with regard to health (Frisbie, Cho, & Hummer, 2001).

In 2006, the State of California's Tobacco Control Program initiated its first in-language statewide survey of Vietnamese Americans, using a statewide surname probability sample larger than previous studies. In this article, we report the prevalence of smoking among California's Vietnamese and examine the associations between Vietnamese male smoking status and demographic and health-related factors.

Methods

Data source

Researchers at the University of California, San Francisco's Vietnamese Community Health Promotion Project (VCHPP), and at the California Tobacco Control Program collaborated to develop the California Vietnamese Adult Tobacco Use Survey. The survey instrument was based on the 2005 California Adult Attitudes and Practice Tobacco Survey, the VCHPP's prior Vietnamese tobacco surveys (Jenkins et al., 1995; Jenkins, McPhee, et al., 1997; Lai, McPhee, Jenkins, & Wong, 2000; McPhee et al., 1995), and two other Vietnamese tobacco surveys (Rahman et al., 2005; Wiecha et al., 1998). Survey items were translated into Vietnamese and back translated into English by professional Vietnamese translators with the assistance of VCHPP staff. To ensure consistency between the English and Vietnamese versions of the instrument, the developers discussed and pilot tested the translations thoroughly with community-based organization leaders and other community members. The first pretest of 30 participants led to some revisions of questionnaire and interviewer instructions; the second pretest of 95 participants ensured these revisions were adequate before continuing further.

In conjunction with VCHPP, the Public Research Institute at San Francisco State University trained 2 lead interviewers (monitors) and 21 interviewers, who were fluent in Vietnamese and English to conduct the computer-assisted telephone interviewing between November 2007 and May 2008. For recruitment and outreach, the VCHPP conducted a mass-media prenotification about the survey, including display of bilingual posters in places frequented by Vietnamese American adults and publication of bilingual advertisements in newspapers. These activities were conducted in the major media markets of the San Francisco Bay Area and Sacramento, Orange, Los Angeles, and San Diego Counties.

Study inclusion criteria required respondents to be reached at a private residence, aged ≥ 18 years, self-identified as Vietnamese, and able to speak Vietnamese or English. A professional sampling company used a list of the 55 most common Vietnamese surnames (Lauderdale & Kestenbaum, 2000; Swallen et al., 1998) to provide a simple random sample of 13,000 numbers from all residential telephone landline numbers published in California directories. This surname list has been verified to identify about 80% of potential Vietnamese households (Taylor, Nguyen, Hoai Do, Li, & Yasui, 2009). From this sampling frame, 5,723 numbers were identified as eligible to participate, resulting in 2,179 completed interviews (1,101 male and 1,078 female). Household members were selected randomly by whoever had the most recent birthday or else, if birthdays were unknown, selected randomly by sex and birth order; 40% of those eligible were not available in the study period (e.g., selected household member did not participate in callback appointment). The number of initial refusals that were converted to completed interviews was 192 (8.2%). Of all eligible respondents successfully contacted, 63.5% participated in the survey.

Participants who refused to answer the full survey were asked to participate in a short nonrespondent survey. Of 2,341 refusals, only 38 men and 39 women participated: 64% were aged ≥ 50 years, 36% of men and 8% of women were current smokers, and 66% refused to state the number of other household members who smoke. Unfortunately, there were too few respondents to be useful in estimating biases.

Measures

The primary outcome measure was smoking status with three categories: *Current smokers* were those who reported having smoked 100 cigarettes in their life and currently smoke cigarettes every day or some days, *former smokers* were those who reported having smoked 100 cigarettes during their lifetime but not currently smoking cigarettes at all, and *never-smokers* were those who reported not having smoked 100 cigarettes in their life and not smoking any cigarettes in the past 30 days.

Sociodemographic variables included age, marital status, educational attainment, federal poverty level based on household size, employment status, and health insurance status. Responses with $>5\%$ of "don't know" or "refused" responses were categorized as a separate "unknown" category. Religious affiliation was categorized as Buddhist or Christian or a category combining "none," "other," or missing. Two variables measured acculturation of respondents: number of years living in the United States (categorized as <15 years, ≥ 15 years, or born in the United State [since 15 years approximates the time of the California tobacco control program's Asian language outreach]) and language of interview (Vietnamese or English). Life experiences in Vietnam included having served in the Vietnamese military or police, having been in a Vietnamese "reeducation" (concentration) camp, having been in a refugee (resettlement) camp, and having ever traveled back to Vietnam. (If the respondent was not an adult by 1975 when the Vietnam war ended, the respondent was not asked questions about service in the Vietnamese military or police and postwar reeducation camp since their age would have made them ineligible. U.S. born respondents were assumed never to have been in a refugee camp.)

Health-related questions included self-reported general health; having seen a doctor in the past year and, if so, whether this doctor was Vietnamese; use of alcohol in the past month; depression symptoms in the past week; and health knowledge. Self-reported general health responses were dichotomized as “fair, poor, or unknown” versus “excellent, very good, or good.” To measure the frequency of depression symptoms experienced in the past week, we utilized four items (each using a 4-point Likert scale) from a larger depression scale previously validated among Vietnamese (Hinton et al., 1994) and demonstrated to be associated significantly with Vietnamese American male smoking status (Wiecha et al., 1998): (1) *feeling low or slowed down*, (2) *difficulty falling or staying asleep*, (3) *worrying too much about things*, and (4) *feeling sad or blue*. The total depression symptom score (with Cronbach's $\alpha = .73$ for study sample) ranged from 4 (*not at all* for each query) to 16 (*extremely* for each); a final scale was created based on quartiles. A health knowledge scale (Cronbach's $\alpha = .60$ for study sample) was constructed based on the sum of responses (*correct* = +1, *incorrect* = -1, and *missing response* = 0) to the following four questions: (a) *Among those who smoke less than 5 cigarettes per day, the risk of developing cancer is the same as among those who never smoke*; (b) *Among those who smoke less than 5 cigarettes per day, the risk of developing heart disease is the same as among those who never smoke*; (c) *Smoking light cigarettes is the same as smoking regular cigarettes*; and (d) *Tobacco is not as addictive as other drugs*. For media exposure, participants were asked if they had seen protobacco ads or antitobacco ads in the past month (yes vs. no or don't know responses grouped together). For current or former smokers, additional questions were asked about smoking behavior and history (e.g., age started smoking, cigarette consumption, type of cigarette, smoking situations).

Data analyses

Data were analyzed using SAS v. 9.2 with the “proc survey” commands for survey data. Based on population estimates developed by the Bureau of the Census in year 2000, poststratification weights were developed to adjust the sample distribution to approximate California's Vietnamese statewide population distribution on age and gender; there were insufficient samples of Vietnamese to develop weights by region. Descriptive statistics were computed for each of the variables, including weighted means, SEs, and percents, by smoking status. Initial analyses compared current smokers with never-smokers and former smokers with never-smokers, for all variables. We used weighted chi-square tests for categorical variables and weighted regression models for continuous variables.

Multivariate generalized logistic regression models for Vietnamese men were created comparing (a) current smokers with never-smokers and (b) former smokers with never-smokers. For each, a series of regression models were built sequentially to assess the association of the following potential predictor variable groups on smoking status: (a) sociodemographics, (b) life experiences, (c) depression symptoms, (d) health knowledge, and (e) media exposure. In this series of sequential regression models, no significant changes in the variable associations were noted. Prior to constructing the multivariate model, we examined correlations to determine if any variables were collinear. Variables that were collinear (years in the United States vs. survey language used and self-reported general health vs. depression symptom scale quartiles) were examined in the model for the

best fit. The variables about Vietnamese military/police service and reeducation camp stay were collinear, so the variable was recategorized to include those participants who were either in Vietnamese military/police service or in reeducation camp versus neither. Given the potential for cohort effects, we also examined interactions between age and the covariates. We modified the age variable into a continuous variable with 10-year increments and the education variable into lower (less than or equal to high school) versus higher (more than or equal to some college) educational levels in order to facilitate our interaction analysis. The education variable was dichotomized since the lower education levels were behaving in a similar manner as were the higher education levels, and this categorization has been used in other Asian American surveys (Tong, Tang, Tsoh, Wong, & Chen, 2009). We calculated adjusted odds ratio with 95% CIs, with a significance level of $p < .05$ for all statistical tests.

Results

Among California Vietnamese female respondents, <1% were current smokers, <2% were former smokers, and 97% were never-smokers. Vietnamese female smoking status did not differ by age or acculturation measures used in the survey, but the number of current smokers in the cells was very small (<5). Among California Vietnamese male respondents, 25% were current smokers, 24% were former smokers, and 51% were never-smokers. Most (94%) interviews were conducted in Vietnamese. Due to the low prevalence of Vietnamese female current and former smoking, the remaining results focus on Vietnamese men.

Demographics and smoking-related health behavior

Table 1 displays demographics, health behavior and knowledge, and tobacco media exposure of Vietnamese men by smoking status. Among all male current smokers, 71.6% started smoking their first whole cigarette before reaching age 18 ($M: 17.3 \pm 0.29$ years). Additionally, 62.8% started regularly smoking before reaching age 20 ($M: 20.8 \pm 0.36$ years). Over half (54%) of current smokers were light (<10 cigarettes/day [cpd]) or intermittent smokers (smoked some days within last 30 days), whereas 32% were moderate (10–19 cpd) smokers and 14% heavy (≥ 20 cpd) smokers. On average, daily smokers smoked a median of 10 cpd ($M: 10.33 \pm 0.59$ cpd) and intermittent smokers smoked a median of four cigarettes on days when they smoked (2.9 ± 0.2 cpd).

The types of cigarettes most frequently smoked by current smokers were filtered (39%), light (37%), regular (29%), and menthol (6%; multiple answers allowed). The brands most frequently smoked by current smokers were Marlboro (59%), Salem (40%), and 555 (28%). Situations that triggered smoking most frequently were socializing with friends (76%); coffee shops, restaurants, or bars (49%); driving (48%); and working or studying (34%). The majority of current smokers agreed that “smoking is harming my health” (97.2%), although significantly less agreed that “I am addicted to cigarettes” (66.4%).

Multivariate regression analyses

Table 2 displays the variables significantly associated with current and former smoking (with never smoking as a reference category) in the multivariate regression models. Associated with

Table 1. Demographics and smoking-related health behavior of Vietnamese men by smoking status, California Vietnamese Adult Tobacco Use Survey, 2008

	Current smoker (n = 260), %	Former smoker (n = 370), %	Never-smoker (n = 451), %
Age (years)			
18–24	14.6	1.6	30.1
25–44	52.3	33.8	43.0
45–64	29.1	46.2	15.5
>65	4.0	18.4	11.4
Marital status			
Married, living with partner	70.8	83.3	47.6
Others	29.2	16.7	52.4
Educational attainment			
Less than high school	17.1	15.6	9.5
Completed high school	34.5	27.0	17.1
Some college	30.2	25.0	36.4
College graduate and above	18.2	32.5	37.0
Poverty level based on household size			
Above	69.1	72.1	66.8
Below	14.7	16.3	17.2
Unknown	16.2	11.6	16.0
Employment status			
Employed	73.0	67.5	54.3
Others	27.0	32.5	45.7
Health insurance			
Yes	73.3	87.9	84.1
No/unknown	26.7	12.1	15.9
Religion			
Buddhist	41.0	44.2	50.3
Christian	37.6	33.1	28.0
None/other/unknown	21.4	22.7	21.7
Years in the United States			
<15	40.0	25.7	33.0
≥15	56.1	71.0	54.1
U.S. born	2.9	2.3	10.5
Unknown	1.0	1.1	2.4
Survey language used			
Vietnamese	88.0	95.1	77.1
English	12.0	4.9	22.9
Experience in Vietnam			
Served in Vietnamese military or police			
Yes	12.0	33.1	12.0
No	6.3	15.7	6.3
Born in the United States/not adult by 1975	81.7	51.2	79.7
Was in a reeducation camp			
Yes	8.9	26.1	8.9
No	9.4	22.7	9.4
Born in the United States/not adult by 1975	81.7	51.2	79.7

Table 1. Continued

Table 1. Continued

	Current smoker (n = 260), %	Former smoker (n = 370), %	Never-smoker (n = 451), %
Was in a refugee camp			
Yes	40.1	51.4	35.1
No/U.S. born	59.9	48.6	64.9
Ever traveled back to Vietnam			
Yes	70.1	68.5	56.4
No	29.9	31.5	43.6
Health behavior			
Self-reported general health			
Fair/poor/unknown	42.4	47.6	22.7
Excellent/very good/good	57.6	52.4	77.3
Saw doctor in past 1 year			
Yes	63.6	84.8	70.7
No/missing	36.4	15.2	29.3
Has Vietnamese doctor			
Yes	52.4	68.3	49.1
No	11.2	16.5	21.5
Did not see a doctor past year	36.4	15.2	29.3
Alcohol use in past month			
Yes	60.4	55.0	27.9
None	37.0	40.0	69.5
Don't know/refused	2.6	5.0	2.6
Depression symptoms			
Feeling low			
Not at all	47.2	62.0	56.3
Sometimes	43.5	30.1	36.0
Frequently	6.6	5.7	5.1
Very frequently	2.7	2.2	2.5
Difficulty sleeping			
Not at all	61.6	67.6	68.8
Sometimes	24.0	22.7	24.2
Frequently	12.2	6.3	4.8
Very frequently	2.2	3.5	2.1
Worry			
Not at all	42.5	60.9	53.3
Sometimes	44.1	26.1	35.7
Frequently	9.8	9.4	6.3
Very frequently	3.5	3.6	4.6
Feel sad			
Not at all	55.0	71.7	71.4
Sometimes	39.6	24.6	22.7
Frequently	3.2	3.1	2.1
Very frequently	2.2	0.6	3.8
Depression scale			
None	20.3	34.2	30.5
Second quartile	13.7	19.5	21.3
Third quartile	39.6	28.4	28.4
Fourth quartile	26.4	17.8	19.8
Health knowledge			
Lung cancer risk the same in <5 cpd smoker as in never-smoker			
Correct	61.4	67.8	64.5
Missing	14.6	14.7	12.6
Incorrect	24.0	17.5	22.9

Table 1. Continued

Table 1. Continued

	Current smoker (<i>n</i> = 260), %	Former smoker (<i>n</i> = 370), %	Never-smoker (<i>n</i> = 451), %
Heart disease risk the same in <5 cpd smoker as in never-smoker			
Correct	61.0	64.4	64.1
Missing	17.1	15.9	17.6
Incorrect	21.9	19.7	18.3
Smoking light cigarettes is safer than smoking regular cigarettes			
Correct	58.7	73.8	72.0
Missing	11.0	5.6	10.7
Incorrect	30.3	20.6	17.3
Tobacco is not as addictive as other drugs			
Correct	51.6	72.7	70.9
Missing	5.8	5.3	7.9
Incorrect	42.6	22.0	21.1
Knowledge scale			
Range -4 to 4 (<i>M</i> ± <i>SE</i>)	1.2 ± 0.2	2.0 ± 0.1	1.9 ± 0.1
Media exposure			
Protobacco ads seen in past 1 month			
Yes	11.4	8.1	13.8
No/unknown	88.6	91.9	86.2
Antitobacco ads seen in past 1 month			
Yes	41.3	49.6	49.3
No/unknown	58.7	50.4	50.7

Note. cpd = cigarettes per day.

both current and former smoking were being married, being employed, having lower educational attainment, and consuming alcohol. Additional factors significantly associated with current smoking (compared with never smoking) were having no health insurance, having seen a Vietnamese doctor or no doctor in the past year, having Vietnamese military/police or Vietnamese reeducation camp experience, having more depression symptoms, and having less knowledge about the harms of smoking. Additional factors significantly associated with former smoking (compared with never smoking) were increasing age and not being Buddhist (compared with no or other non-Christian religion); the latter variable did not quite reach statistical significance in its association with current smoking ($p = .057$).

In the multivariate analysis for interactions, the only variables interacting with increasing age were the Vietnamese military/reeducation camp experience variable ($p < .0001$) and the educational level variable ($p = .05$). Specifically, with increasing age, men who were born in the United States or not age eligible for military service (i.e., not an adult by 1975) versus those who had no military or reeducation camp experience were more likely to be current ($p = .04$) or former ($p = .0002$) smokers than to be never-smokers. For the educational level variable, with increasing age, higher versus lower educated men were more likely to be former smokers than to be never-smokers ($p = .02$).

Discussion

This is the largest in-language study of tobacco-related behavior of Vietnamese Americans in California. In addition to its size and focus, strengths of this study include its culturally and linguistically

competent survey methods and large surname sampling frame. The importance of using such methods and of disaggregating data by ethnic subgroup is reflected in the wide disparity (Figure 1) between the smoking prevalence among Vietnamese American men in our study (25%) versus general California men (16.5%; M. Modayil, Ph.D., personal communication, May 13, 2009, regarding unpublished results from the 2008 California Adult Tobacco Survey) and California Asian/Pacific Islander (English speaking only) men (14.9%; Al-Delaimy et al., 2008). Similarly, the importance of disaggregating smoking prevalence by gender is reflected in our study's low smoking prevalence among Vietnamese American female population (1%) compared with the general California female population (10.6%; M. Modayil, Ph.D., personal communication, May 13, 2009, regarding unpublished results from the 2008 California Adult Tobacco Survey) and California Asian/Pacific Islander (English speaking only) females (5.3%; Al-Delaimy et al.). This study highlights the importance of survey sampling methods appropriate to the population, such as using the Vietnamese surname list and using the appropriate language (English and Vietnamese) as determined by the individual respondent.

Our study's estimates for Vietnamese male smoking prevalence are consistent with other recent estimates for California (California Health Interview Survey, 2009; Nguyen et al., 2009; Tang, Shimizu, & Chen, 2005) and may be more accurate, given our study's larger statewide sample size (four times the number of Vietnamese adults than the California Health Interview Survey). The fact that studies in other states report higher Vietnamese male smoking prevalence rates (Chae, Gavin, & Takeuchi, 2006; Chan et al., 2007; Wiecha et al., 1998) may be due to several factors. California has one of the oldest tobacco control programs that includes in-language Asian media outreach and cessation services (Tang et al.). Additionally, the VCHPP began Vietnamese smoking cessation interventions during the 1990s (Jenkins, McPhee, et al., 1997; Lai et al., 2000; McPhee et al., 1995).

One possible explanation for why the California Vietnamese male smoking prevalence rate has decreased but remains persistently higher than for men in the general California population is the continuing influx of new immigrants from Vietnam, where male smoking prevalence rates are much higher. About 12% of Vietnamese immigrants entered the United States in 2000 or later

Figure 1. Comparison of smoking status for California Vietnamese male respondents, California Vietnamese Adult Tobacco Use Survey, 2008, and the California general male population (M. Modayil, Ph.D., personal communication, May 13, 2009, regarding unpublished results from the 2008 California Adult Tobacco Survey).

Table 2. Multivariate regression analysis of factors significantly associated with current versus never smoking status and former versus never smoking status of Vietnamese men

	Current vs. never-smoker, OR (95% CI)	Former vs. never-smoker, OR (95% CI)
Age (10-year increments)	0.91 (0.67–1.25)	1.49 (1.18–1.88)
Marital status		
Others (reference)	1.0	1.0
Married, living with partner	2.85 (1.52–5.37)	1.93 (1.08–3.43)
Educational level ^a		
≤High school (reference)	1.0	1.0
Some college to graduate degree	0.31 (0.19–0.49)	0.49 (0.31–0.77)
Employment status and type		
Unemployed (reference)	1.0	1.0
Employed	2.36 (1.33–4.18)	2.48 (1.52–4.05)
Health insurance		
No (reference)	1.0	1.0
Yes	0.40 (0.21–0.75)	0.69 (0.37–1.28)
Religion		
None/other/unknown (reference)	1.0	1.0
Buddhist	0.52 (0.27–1.02)	0.52 (0.31–0.87)
Christian	1.06 (0.55–2.05)	0.75 (0.42–1.35)
Survey language used		
English (reference)	1.0	1.0
Vietnamese	1.87 (0.76–4.59)	1.84 (0.69–4.93)
Health behavior		
Saw a Vietnamese doctor past year		
No, but saw a doctor past year (reference)	1.0	1.0
Yes	2.06 (1.07–3.94)	1.58 (0.93–2.69)
Did not see a doctor past year	2.54 (1.21–5.33)	0.91 (0.46–1.82)
Alcohol use		
None (reference)	1.0	1.0
Some	3.39 (2.10–5.48)	3.84 (2.56–5.76)
Don't know/refused	1.99 (0.73–5.44)	4.16 (1.72–10.09)
Depression symptom quartiles (4–16)		
None (reference)	1.0	1.0
Second quartile	0.87 (0.41–1.88)	0.73 (0.42–1.28)
Third quartile	2.15 (1.13–4.09)	0.87 (0.52–1.44)
Fourth quartile	2.25 (1.15–4.40)	0.77 (0.44–1.37)
Vietnamese military/police service/reeducation camp stay ^a		
None (reference)	1.0	1.0
At least one	2.18 (1.16–4.13)	1.44 (0.89–2.33)
Born in United States/not adult by 1975	1.90 (0.90–4.04)	1.06 (0.56–2.01)
Health knowledge scale (–4 to 4)	0.88 (0.80–0.97)	1.06 (0.96–1.16)
Media exposure		
Protobacco ads seen in past 1 month		
No/unknown (reference)	1.0	1.0
Yes	1.10 (0.57–2.13)	0.64 (0.32–1.28)
Antitobacco ads seen in past 1 month		
No/unknown (reference)	1.0	1.0
Yes	0.67 (0.42–1.05)	0.78 (0.53–1.16)

Note. OR = odds ratio.

^aInteractions found between age and Vietnamese military/reeducation camp experience variable ($p < .0001$) and between age and educational level variable ($p = .05$). See text for more detailed description.

(Ponce et al., 2009). Another explanation is that Vietnamese men are much lighter smokers than other Asian American men (Tong, Nguyen, Vittinghoff, & Perez-Stable, 2009). Effective treatments for lighter smokers have not yet been defined—they may not be so addicted as to require medications to quit. Also, health care providers tend to assist heavier smokers (Fiore et al., 2008).

Additionally, California Vietnamese female smoking prevalence has remained persistently low over the years (Jenkins et al., 1995; Jenkins, McPhee, et al., 1997; McPhee et al., 1992; Tang et al., 2005; Tong, Nguyen, et al., 2009). This female phenomenon may be due to cultural factors since we did not find any difference in smoking status by age or acculturation

measures, but the numbers of current female smokers were very small. Sustained targeting and development of effective health program strategies for the male immigrant population are crucial.

Three VCHPP community-based media-led smoking cessation interventions were conducted during the 1990s with mixed effectiveness. The first study (McPhee et al., 1995) tested a 24-month multimedia smoking cessation intervention among Vietnamese men in Santa Clara County, CA; Vietnamese men in Houston, TX, served as controls. Following a media intervention, the proportion of recent quitters was greater in Santa Clara County than in Houston, but there was no significant intervention effect in either community. In the second study (Jenkins, MCPhee, et al., 1997), a similar but longer (36-month) media intervention among Vietnamese men in Alameda and San Francisco Counties (with Houston men again serving as controls) produced a statistically significant but modest reduction in smoking prevalence (36.1%–33.9%) and increase in recent quitters (7.2%–10.2%). In the third study (Lai et al., 2000), two “Quit & Win” smoking cessation contests were advertised for Vietnamese smokers in Santa Clara County in 1995–1996; out of 89 smokers who participated, 72% reported being abstinent at 6 months.

The findings from the present study may help us to develop more targeted health programs for Vietnamese American smoking cessation. As a guiding framework for such programs, the Population Health Promotion Model integrates two important health concepts, population health and health promotion, to help determine “what, how, and with whom” one should take action to improve health: the full range of health determinants, comprehensive action strategies, and various levels of action (Hamilton & Bhatti, 1996). For the “what” component of targeting health determinants, this study demonstrates that education and associated health behaviors are important. Vietnamese male current smokers have lower educational attainment and less knowledge than their never-smoker counterparts about the harms of smoking, particularly about addiction and light cigarettes. Vietnamese male current smokers also report more behaviors that may serve as triggers for smoking or relapse (Anda et al., 1990; Leventhal, Ramsey, Brown, LaChance, & Kahler, 2008; Shiffman, 2006), with higher depression symptoms and report of alcohol intake. These findings are consistent with other studies of Vietnamese male current smokers (Chan et al., 2007; Rahman et al., 2005; Wiecha et al., 1998).

For the “how” component of developing comprehensive action strategies, this study suggests that strengthening community outreach may have a greater effect than reorienting health services; this outreach should include Vietnamese doctors. Although Vietnamese male current smokers are more likely to be employed than their never-smoker counterparts, they less often have health insurance and make fewer doctor visits. Community outreach in places where smokers congregate is perhaps a better potential strategy. This study suggests that socializing with friends and smoking in coffee shops, restaurants, or bars are the two most frequently reported triggers for smoking. This common trigger of social situations and after meals was also reported in another study in Seattle (Chan et al., 2007). The fact that media exposure was not significantly associated with smok-

ing status in this study may be limited by the period of recall to the past month.

Regarding the “for whom” component of which level of society to target, besides acting directly on individuals, families and community groups may be also targeted. Vietnamese male current smokers were more likely than their never-smoker counterparts to be married or (among age-eligible men) to have had a Vietnamese military/police or reeducation camp experience. Social relationships, both close and distant ties, are thought to be important mediators of smoking behavior and facilitators of cessation (Christakis & Fowler, 2008). Men who served in the Vietnamese military/police or had reeducation camp stays had a social norm of smoking during those periods; these groups may be targeted through community programs. For younger men, other social dynamics, including influence of this older generation of smokers, should be investigated. Although targeting the recent immigrant community makes sense given the greater male smoking social norm in Vietnam, the fact that the number of years of residence in the United States was not significantly associated with current or former smoking compared with never smoking, requires further exploration. The role of years of residence in the United States may be complicated in that recent immigrants may be more likely to quit than their counterparts in the countries of origin (Zhu, Wong, Tang, Shi, & Chen, 2007), but longer term residents in the United States are also more likely to start smoking (U.S. Department of Health and Human Services, 1998). The complex relationship among length of time, social factors, and smoking status for Vietnamese American men is also highlighted in our interaction analysis. One of the interactions with increasing age was with the Vietnamese military/reeducation camp experience variable. This interaction with increasing age was driven by the subset of men “born in the United States/not adults by 1975” who were more likely, relative to those who had no service, to be current or former smokers. However, simply being in this “born in the United States/not adults by 1975” category, relative to those who had no service, was not in itself predictive of being a current or former smoker in our primary multivariate analysis that controlled for age.

We examined the potential protective role of religious affiliation and found that there was a significant association between former smoking (vs. never smoking) and not being Buddhist (compared with other non-Christian religion or no religion); this association did not quite reach statistical significance ($p = .057$) in its association with current smoking. Although a previous smaller survey found no association between religion and smoking status among Vietnamese men in Seattle (Chan et al., 2007), the current findings suggest that a possible association between religion and tobacco use is worth exploring more. For example, religious affiliation has been suggested as a protective role for tobacco use among California’s South Asians (McCarthy et al., 2005). Also, the majority of Buddhist smokers in Thailand and Muslim smokers in Malaysia believed that their religion discourages smoking, and over half reported their religious leaders encouraged them to quit (Yong, Hamann, Borland, Fong, & Omar, 2009).

The findings in this study are subject to limitations. First, the information from this survey was based on self-report and smoking status was not validated by biochemical tests. However, self-reported population-based data on current smoking status

have high validity in the general population when compared with measured serum cotinine levels (Caraballo, Giovino, Pechacek, & Mowery, 2001). Second, this study used a cross-sectional design so factors found to be associated with smoking status are not necessarily causally associated. Third, the methodology of a statewide telephone interview survey, even though conducted in-language, potentially may result in a lower representation of less-aculturated participants compared with the familiarity of an in-person or community-based survey. Although declining response rates have already been observed in statewide tobacco surveys for the general population in California and Massachusetts, there is no evidence that this has resulted in different representation of population subgroups and any less accurate or biased estimates of smoking behavior (Biener, Garrett, Gilpin, Roman, & Currivan, 2004). In comparison with the California tobacco surveys for other Asian American subgroups that used similar methodology, our study achieved a higher participation rate of eligible contacted participants (63.5%) than the surveys for Chinese Americans (52%) or Korean Americans (48%; Tong, Tang, et al., 2009).

With California Vietnamese men continuing to smoke at higher rates than the general population, sustained efforts at targeting and assessing this population for smoking cessation, using culturally and linguistically competent methodologies, remain important. Utilizing a population-based approach with community outreach may be most beneficial since current smokers have low health care access, utilization, and knowledge. Future analyses will further examine smoking cessation behaviors within the Vietnamese American population.

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Declaration of Interests

None declared.

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