NIH Public Access
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Ethn Health. Author manuscript; available in PMC 2010 December 1.

Published in final edited form as:
Ethn Health. 2009 December ; 14(6): 575–589. doi:10.1080/13557850903111589.

PAP SMEAR RECEIPT AMONG VIETNAMESE IMMIGRANTS: THE IMPORTANCE OF HEALTH CARE FACTORS

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Abstract

Objective—Recent US data indicate that women of Vietnamese descent have higher cervical cancer incidence rates than women of any other race/ethnicity, and lower levels of Pap testing than white, black, and Latina women. Our objective was to provide information about Pap testing barriers and facilitators that could be used to develop cervical cancer control intervention programs for Vietnamese American women.

Design—We conducted a cross-sectional, community-based survey of Vietnamese immigrants. Our study was conducted in metropolitan Seattle, Washington. A total of 1,532 Vietnamese American women participated in the study. Demographic, health care, and knowledge/belief items associated with previous cervical cancer screening participation (ever screened and screened according to interval screening guidelines) were examined.

Results—Eighty-one percent of the respondents had been screened for cervical cancer in the previous three years. Recent Pap testing was strongly associated ($p<0.001$) with having a regular doctor, having a physical in the last year, previous physician recommendation for testing, and having asked a physician for testing. Women whose regular doctor was a Vietnamese man were no more likely to have received a recent Pap smear than those with no regular doctor.

Conclusion—Our findings indicate that cervical cancer screening disparities between Vietnamese and other racial/ethnic groups are decreasing. Efforts to further increase Pap smear receipt in Vietnamese American communities should enable women without a source of health care to find a regular provider. Additionally, intervention programs should improve patient-provider communication by encouraging health care providers (especially male Vietnamese physicians serving women living in ethnic enclaves) to recommend Pap testing, as well as by empowering Vietnamese women to specifically ask their physicians for Pap testing.

Keywords

Cervical cancer; Immigrants; Pap testing; Vietnamese

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INTRODUCTION

The number of Asian Americans in the United States (US) increased from approximately one million in 1970 to over 12 million in 2000 (Lin-Fu 1993; US Census Bureau 2007). Asian Americans are not homogeneous. Rather, they are a diverse ethnic group originating from the Far East, Indian subcontinent, and Southeast Asia (Asian American Health Initiative 2005). They have different economic characteristics, religious backgrounds, and health practices. For example, some Asian American groups (e.g., Chinese and Japanese) have higher educational levels and household incomes than non-Latino whites, while other Asian American groups (e.g., groups of Southeast Asian descent) are very educationally and economically disadvantaged (Ro 2002). Therefore, data collection efforts should focus on individual Asian sub-groups and intervention approaches should be tailored to specific Asian communities (Truman *et al*. 1994).

Eleven percent of Asian Americans are of Vietnamese descent, and the Vietnamese population now exceeds 1,400,000 (Pfieifer 2008; US Census Bureau 2007). A majority of Vietnamese Americans came to the US during one of three immigration waves. The first wave occurred in 1975, following the fall of Saigon, while the second wave started in 1979 as political turmoil escalated in Southeast Asia. Finally, the third wave of immigrants began in 1989 when the Vietnamese government began allowing emigration under the auspices of the Orderly Departure Program and Family Reunification Program (Pham 1999).

Nearly one-third (30%) of Vietnamese Americans have less than a high school education and only about one-quarter (24%) have a Bachelor's degree. Vietnamese American households have an average income of $46,000 (compared to $56,000 among all Asian American households) and 14% of Vietnamese Americans live below the Federal poverty level. Notably, 55% of Vietnamese Americans have limited English proficiency and 88% speak Vietnamese (rather than English) at home (US Census Bureau 2007). Forty-nine percent of Vietnamese Americans live in the West, 30% live in the South, 11% live in the Northeast, and 10% live in the Midwest. Washington State has the third largest Vietnamese population in the US (after California and Texas) (Pfeifer 2008).

Vietnamese have higher rates of invasive cervical cancer than any other racial/ethnic group in the US (Cockburn and Deapen 2004). Recent data show the cervical cancer incidence rate among Vietnamese women is over twice the cervical cancer incidence rate among non-Latina white women (16.8 versus 8.1 per 100,000) (Miller *et al*. 2008). The President's Advisory Commission on Asian Americans recently identified cervical cancer among Vietnamese women as one of the most important health disparities experienced by Asian American populations. This group also specified that the research community should support community-based studies to specifically address health disparities experienced by Asian American sub-groups, as well as to identify barriers and facilitators to disease prevention among each Asian sub-group (President's Advisory Commission on Asian Americans and Pacific Islanders 2003).

Humanpapilloma virus (HPV) infection has been identified as a universal risk factor for cervical cancer (American Cancer Society 2005; Parkin 2006). While little is known about HPV infection among Vietnamese women living in the US, the limited available data indicate that the cervical cancer disparity is more likely to be due to low Papanicolaou (Pap) testing levels than variations in HPV infection rates and/or types (Vo *et al.* 2004).

National guidelines specify that women should be screened for cervical cancer every one to three years, depending on their risk factors for disease and previous screening history (Saslow *et al.* 2002). National cervical cancer screening goals for the year 2010 specify that at least 97% of women should have been screened on at least one occasion, and 90% should have

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received a Pap smear within the previous three years (US Department of Health and Human Services 2000). However, an analysis of 2003 California Health Interview Survey responses showed that only 70% of Vietnamese women had received a Pap smear in the last three years. In contrast, the proportions of white, black, and Latina women reporting recent Pap smear receipt were 84%, 87%, and 85%, respectively (Holtby *et al.* 2006).

Over a 12-month period during 2006 and 2007, we conducted a community-based survey of Vietnamese women aged 20–79 years living in metropolitan Seattle. For this analysis, we used our survey data to examine the influence of both cognitive and contextual factors on Pap testing use. The goal of the analysis was to provide information about Pap testing barriers and facilitators that could be used to develop future cervical cancer control intervention programs for Vietnamese women.

METHODS

Sampling Methods

Two validated lists of Vietnamese last names have previously been published (Lauderdale and Kestenbaum 2000; Nguyen *et al.* 2002). We compiled a list of 55 Vietnamese names that were included in one or both of these published lists. Our name list was applied to an electronic version of the 2005 telephone book for metropolitan Seattle. We identified all households, with one of the 55 Vietnamese names, which were listed in the telephone book. Then, we identified zip codes that included at least 50 households with one of the 55 names. Our study sample included 4,436 households in these 33 zip codes. Households in zip codes with relatively few Vietnamese residents were excluded for interviewer travel cost reasons, and those with incomplete address information were excluded because the Institutional Review Board required an introductory letter.

Household Recruitment

The Fred Hutchinson Cancer Research Center Institutional Review Board approved our study procedures. Households received an introductory mailing from the project. The letter explicitly stated that the project aimed to interview Vietnamese/Vietnamese American women in the Seattle area, and asked households to contact the project if they did not consider themselves to be Vietnamese or Vietnamese American. Bilingual, bicultural, female survey workers conducted interviews in women's homes. Before completing surveys, the interviewers verified that women self-identified as being Vietnamese or Vietnamese American. 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 interviews took about 45 minutes to complete. Up to five door-to-door attempts were made to contact each household.

Participant Selection

We aimed to interview one woman aged 20 to 79 years in each household. Our previous experience indicates that survey response rates, in Vietnamese communities, are negatively effected by attempts to list household members and then randomly select one respondent in households with two or more eligible respondents. However, to ensure 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).

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Survey Instrument

The survey instrument was developed in English, translated into Vietnamese using double-forward methods, and pre-tested (Eremenco *et al.* 2005). We used findings from an earlier qualitative study and the Health Behavior Framework to guide our survey instrument development (Burke *et al.* 2004; Curry and Emmons 1994; Gritz and Bastani 1992). The theoretical perspective of the Health Behavior Framework has recently been described in detail elsewhere (Bastani *et al.* 2007; Jo *et al.* 2007). Briefly, it specifies that factors influencing the use of preventive health procedures include demographic characteristics (including acculturation in foreign-born individuals), health care and physician factors (including communication with providers), and knowledge and beliefs (including cultural beliefs).

Women were read the following statement: “A Pap test is when a doctor does a pelvic exam and also takes a scraping of tissue from the cervix inside the vagina and sends it to a laboratory.” They were then asked whether they had ever had a Pap test and, if so, when they were last screened. Survey participants were queried about their age, marital status, educational level, household income, length of time in the US, and English language proficiency.

Each woman was asked to specify if she had a history of hysterectomy, had received obstetric services in the US, had received family planning services in the US, and had completed a physical exam in the last year. Women indicated whether they had health insurance and if there was one doctor who usually provided their care. Those with health insurance specified if they had Medicare, Medicaid, the Basic Health Plan (a Washington insurance program for lower income families), or private insurance. Similarly, those with a regular physician provided information about their doctor’s gender and ethnicity. Finally, respondents were asked whether a doctor had ever recommended Pap testing, and whether they had ever asked a doctor for testing.

Each woman specified whether she thought Vietnamese are more likely than whites to get cervical cancer; and cervical cancer can be prevented by using traditional Vietnamese washes, cervical cancer can be prevented by observing the sitting month, and cervical cancer can be prevented by getting regular Pap tests. (Our earlier qualitative study found that Vietnamese women believe that maintaining female hygiene by washing regularly with alum and observance of a set of traditional post-partum practices, known as the sitting month, both protect women from gynecologic problems.) Participants were also asked whether they thought Pap testing is necessary for asymptomatic women, Pap testing is necessary for sexually inactive women, and Pap testing is necessary for post-menopausal women.

Data Analysis

We compared the characteristics of women who had received at least one Pap test and those who had not, as well as the characteristics of women who had received a Pap test in the previous three years and those who had not. Household income was classified as ≥$30,000, <$30,000, or unknown. We chose to use this classification for income because 17% of the respondents either did not know their household income or refused to answer the income question. Medicare, Medicaid, and the Basic Health Plan were combined into a public insurance category for the purpose of this analysis. To examine the effect of physician gender and ethnicity on Pap testing behavior, we created a physician characteristics variable (Vietnamese man, Vietnamese woman, Non-Vietnamese man, non-Vietnamese woman, and no regular physician).

Statistical methods included chi-square tests and unconditional logistic regression. Three multivariable analyses were conducted, for each of our Pap testing outcomes, using pre-specified explanatory variables. The first of these models included demographic variables, the

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second included health care variables (adjusted for demographics), and the third included knowledge/belief variables (adjusted for demographics). Additionally, we conducted summary backward selection multivariable analyses for our two Pap testing outcomes. All study variables (demographic, health care, and knowledge/belief) were included in the backward selection analyses and $p<0.05$ was the criterion for retention.

RESULTS

Survey Response

A total of 1,532 women completed interviews and 596 eligible households refused participation. The cooperation rate (i.e., response among reachable and eligible households) was 72%. Table 1 provides the dispositions of the other addresses in our original sample. For 1,177 of the addresses, we were unable to establish if the household was Vietnamese (either because the interviewer was unable to access a secure building or there was no-one home after five attempts). We verified that 888 of the households were ineligible (either because the household was not Vietnamese or did not include an age-eligible Vietnamese woman).

One woman was excluded from this analysis because she was in her early eighties and should not have been interviewed. As this analysis focused on immigrants, nine women were excluded because they were born in the US. Finally, we excluded six women who reported a personal history of cervical cancer. Therefore, the study group included 1,516 women.

Pap Testing History

Ninety-three percent of the respondents had received cervical cancer screening on at least one occasion. The proportions reporting Pap smear receipt in the last year, last two years, and last three years were 53%, 72%, and 81%, respectively.

Demographic Characteristics

As shown in Table 2, about one-half of the study group were younger than 50 years of age (50%), had less than 12 years education (51%), and reported an annual household income of less than $30,000 (48%). Approximately four-fifths were currently married (80%) and had been in the US for at least 10 years (79%). Only 12% spoke English very well or fluently. In bivariate comparisons, both the Pap testing outcomes (ever received Pap testing and received Pap testing in the last three years) were associated with age, marital status, household income, and English language proficiency. Length of time in the US was associated with ever having received a Pap smear and educational level was associated with recent Pap testing.

Health Care Factors

Table 3 gives information about health care factors. Only 6% had a history of hysterectomy. The proportions reporting obstetric and family planning services in the US were 42% and 26%, respectively. A majority had received a physical in the last year (77%), had some form of health insurance (89%), and had a regular provider (85%). Eighty-two percent reported a previous physician recommendation for testing and 68% had asked a doctor for testing. As would be expected, women with a previous hysterectomy were less likely to have been screened in the previous three years. The following variables were strongly correlated with both our cervical cancer screening outcomes in bivariate analyses: Obstetric services in the US, family planning services in the US, physical in the last year, health insurance, physician characteristics, and the two communication with provider variables.

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Knowledge and Beliefs

Information about knowledge and beliefs is provided in Table 4. Less than one-quarter (21%) of our participants knew that Vietnamese women are more likely to get cervical cancer than white women. The proportions who thought cervical cancer can be prevented by traditional Vietnamese washes, observing the sitting month, and getting regular Pap tests were 81%, 74%, and 92%, respectively. A majority knew that Pap testing is necessary for women who are asymptomatic (95%), sexually inactive (86%), and post-menopausal (91%). Respondents who knew that Vietnamese women are at increased risk of cervical cancer and the disease can be prevented by regular Pap tests were more likely to have ever been screened and to have been screened in the previous three years. Additionally, the three Pap testing knowledge variables were all strongly associated with our two cervical cancer screening outcome variables.

Results of Regression Analyses

Table 2 presents results of our multivariable analyses of demographic variables associated with the two Pap testing outcomes. Independent associations between health care factors and cervical cancer screening (after adjustment for demographics) are given in Table 3, and independent associations between knowledge/beliefs and cervical cancer screening (after adjustment for demographics) are given in Table 4.

Table 5 shows the summary backward elimination models. Never married women were less likely to have ever received a Pap smear than currently and previously married women. Women with a female Vietnamese doctor, a male non-Vietnamese doctor, and a female non-Vietnamese doctor were more likely to have received at least one Pap smear than women without a regular doctor. However, women with a male Vietnamese doctor were no more likely to have been recently screened than those with no regular doctor. Finally, having received obstetric services in the US and our provider communication variables were strongly associated with cervical cancer screening on at least one occasion. The following variables were strongly associated with a Pap smear in the last three years: Age, physician characteristics, physical in the previous 12 months, doctor had recommended Pap testing, and had asked doctor for Pap testing.

DISCUSSION

We previously completed a survey of Vietnamese women in Seattle during 2002. This earlier survey found that 71% of women without a history of hysterectomy had been screened for cervical cancer at least once and 68% had been screened in the last three years (Taylor *et al.* 2004b). In the five years since our prior survey, Pap testing rates have increased substantially. Specifically, in 2006–2007, we found that 92% of women without a history of hysterectomy had ever received a Pap smear and 82% had received a recent Pap smear (in the last three years). Over the last five years, Seattle's Vietnamese community has been the focus of cervical cancer control efforts by the National Breast and Cervical Cancer Early Detection Program, as well as a community clinic system serving limited English speaking Asian Americans. Our findings indicate that these efforts may have been successful in increasing Pap testing levels among Vietnamese women.

This study identified sub-groups of women who could usefully be the focus of future cervical cancer control efforts in Vietnamese communities. For example, over one-quarter of never married women had not received a Pap smear, and the odds of ever having been screened were about four times higher among currently/previously married women than among never married women in our backward elimination model. Similarly, the odds of Pap test receipt on at least one occasion were estimated to be four times higher among women who had been in the US for at least 20 years than those who had been in the US for less than 10 years.

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Current cervical cancer screening guidelines specify that women aged 70 years and older who have had three or more normal Pap smears and no abnormal Pap smears in the last 10 years may choose to stop cervical cancer screening. They also specify that screening is not necessary after hysterectomy with removal of the cervix (Saslow *et al.* 2002). Therefore, it is not surprising that women in their seventies had lower levels of recent Pap testing than younger women, and women with a history of hysterectomy had lower levels of recent Pap testing than women without a history of hysterectomy. Interestingly, nearly three-quarters of our respondents with a history of hysterectomy did report a recent Pap smear. While a proportion of these women may have received a hysterectomy without removal of the cervix, this finding suggests that some physicians may be performing unnecessary Pap testing.

Some authors have speculated that traditional health beliefs may act as barriers to utilization of preventive health services (Jenkins *et al.* 1996). A majority of our respondents believed cervical cancer can be prevented by traditional Vietnamese washing procedures and proper observance of the sitting month; however, these beliefs were not important correlates of Pap testing behavior. Nonetheless, it is important that health educational programs for Vietnamese and other immigrant groups recognize communities' cultural beliefs and incorporate them into intervention programs. Indeed, decontextualization of a health problem from the belief systems and daily routines of the target population may diminish the effectiveness of health education efforts (Hubbell *et al.* 1995).

Levels of knowledge about Pap testing were relatively high and over 80% of our participants knew that Pap testing is necessary for asymptomatic women, Pap testing is necessary for sexually inactive women, and Pap testing is necessary for post-menopausal women. Our multivariable analyses of knowledge/beliefs and Pap testing suggest that educational programs might usefully focus on the role of Pap testing in the prevention of cervical cancer and the necessity of Pap testing for all women.

Our summary multivariable analyses indicate that health care factors are the most important determinants of cervical cancer screening participation. Findings with respect to physician–patient communication about Pap testing were very similar to those reported from a recent study of Vietnamese women in California and Texas. Specifically, Nguyen and colleagues found that women who had requested a Pap test were nine times more likely to have ever been screened than women who had never requested the test, and women who had received a physician recommendation were eight times more likely to have ever been screened than those who had not received a recommendation (Nguyen *et al.* 2002).

Previous research has consistently demonstrated that women of Southeast Asian descent who have a female doctor are more likely to receive cervical cancer screening than those who have a male doctor (McPhee *et al.* 1997a; McPhee *et al.* 1997b; Nguyen *et al.* 2002; Taylor *et al.* 1999; Taylor *et al.* 2004a). However, previous findings with respect to physician ethnicity have been inconsistent (McPhee *et al.* 1997a; McPhee *et al.* 1997b; Nguyen *et al.* 2002; Taylor *et al.* 2004a). In this study, multivariable analyses indicated that women with a male Vietnamese doctor were no more likely to have been recently screened than those with no regular doctor. However, screening rates among women with a female Vietnamese physician were comparable to those among women with a non-Vietnamese physician. Low levels of Pap smear use among Vietnamese male physicians may be attributable to a lack of emphasis on prevention during medical training in Vietnam, as well as a cultural sensitivity to personal modesty issues among female patients (Lai *et al.* 2004). If male Vietnamese physicians are uncomfortable performing Pap tests, they could be advised to refer their patients to an appropriate provider. Finally, our results suggest that positive associations between physician-patient racial/ethnic concordance and quality of care cannot be assumed (Cooper and Powe 2004).

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Coyne and colleagues conducted a literature review of factors associated with cervical cancer screening among women in the US. This review found that individual barriers to screening, as well as their relative importance, differ markedly between population subgroups. For example, Spanish-speaking Latina women are more likely to report that they find Pap smears embarrassing and frightening than do English-speaking Latina women. As might be expected, logistic issues such as transportation, childcare, and concern about using scarce resources for unnecessary tests are most important among socially disadvantaged and racial/ethnic minority women. For the female population as a whole, these authors concluded that the most important barriers to Pap testing are perceptions that it is unnecessary, fear of embarrassment, and lack of physician recommendation (Coyne *et al.* 1992).

A group of researchers recently described perceived barriers to cervical cancer screening from the perspectives of women, men, and healthcare providers in five Latin American countries (Ecuador, El Salvador, Mexico, Peru, and Venezuela). The main barriers were accessibility and availability of quality health services, medical facilities that lacked comfort and privacy, the financial costs of screening, and levels of courtesy among providers (Agurto *et al.* 2004).

Similarly, the following have been reported to be barriers to Pap testing among Mexican women from urban (Mexico City) and rural (the State of Oaxaca) areas of the country: Problems in doctor/medical institution-patient relationships, long waits for sample collection and receiving results, and perceived high costs for care (Lazcano-Ponce *et al.* 1999).

The recently completed Vietnamese REACH for Health Initiative evaluated a multifaceted cervical cancer control intervention program for Vietnamese women in Santa Clara County, California (Nguyen *et al.* 2006). Intervention components included continuing medical education sessions for Vietnamese physicians (Lai *et al.* 2004; Nguyen *et al.* 2006). Doctors who participated in the educational sessions were asked to complete pre-education and post-education surveys. Results showed that the sessions were effective in improving knowledge about cervical cancer and Pap testing (Lai *et al.* 2004). Indirect evidence, from surveys of women, also suggested that levels of physician recommendation for cervical cancer screening increased as a result of the continuing medical education sessions (Nguyen *et al.* 2006).

During 1998–2002, the cervical cancer incidence rate among Cambodian women in California and Washington was 15.0 per 100,000 women, compared to 7.7 per 100,000 among non-Latina white women (Kem and Chu 2007). Additionally, the incidence rate among Hmong women in California during 1996–2001 was 33.7 per 100,000 (Yang *et al.* 2004). While these other Southeast Asian groups come from the same geographic area and have similar immigration histories to the Vietnamese, there are many cultural differences. Therefore, it is important that future efforts to increase Pap testing focus on these communities.

The reported study has several limitations that warrant discussion. Our findings with respect to Pap testing rates may not be applicable to all geographic areas. For example, we documented relatively high rates of health insurance coverage, compared to other studies (Nguyen *et al.* 2002; Nguyen *et al.* 2006). Only households with listed telephone numbers were eligible for the study. Also, survey respondents may have had different preventive behavior patterns than those who were unreachable or refused participation. Finally, Pap testing self-reports may be faulty due to inaccurate recall or desirability bias. Since racial/ethnic minority women tend to over-report screening test receipt when compared to non-Latina white women, it is possible that our study over-estimated levels of Pap testing use (McPhee *et al.* 2002).

Conclusion

A recent analysis indicated that disparities in Pap smear use among black, white, and Latina women no longer exist in California (De Alba *et al.* 2004). While nearly 20% of our survey

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participants had not received a recent Pap smear, our study findings indicate that disparities between Vietnamese and other racial/ethnic groups are decreasing. Our findings also suggest that, as in other disadvantaged groups, the cervical cancer disparity among Vietnamese women is likely a marker for health care access inequities, and efforts to further increase screening participation in Vietnamese communities should enable women without a source of health care to find a regular provider (Freeman and Wingrove 2005). Additionally, intervention programs should improve patient-provider communication by encouraging health care providers (especially male Vietnamese physicians serving women living in ethnic enclaves) to recommend Pap testing, as well as by empowering Vietnamese women to specifically ask their physicians for Pap testing. Finally, healthcare providers, particularly Vietnamese males, need to be informed about the value of Pap tests for women with an intact cervix, and continuing medical education programs should focus on clarifying cultural beliefs and US cancer screening recommendations.

Acknowledgments

This publication was supported, in part, by grant R01-CA-115564 from the National Cancer Institute, cooperative agreement U01-CA-114640 from the National Cancer Institute, and cooperative agreement U48-DP-000050 from the Centers for Disease Control and Prevention. The contents of the article are solely the responsibility of the authors and do not necessarily represent the views of the National Cancer Institute nor the Centers for Disease Control and Prevention.

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Table 1

Survey Response

Household Disposition	N
Interview completed	1,532
Not a residential address (vacant dwelling or business)	243
Unable to access a secure building (apartment or condominium complex)	202
Unable to contact household (no-one home after five contact attempts)	975
Verified to be ineligible (household not Vietnamese or did not include an age-eligible Vietnamese woman)	888
Eligible but refused (household included an age-eligible Vietnamese woman but declined to participate)	596

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Table 2

Demographic Characteristics and Cervical Cancer Screening

Variable	n (%)	Ever screened %	OR (95% CI) †	Screened last three years %	OR (95% CI) †
Demographic					
Age in years					
70–79	110 (7)	85***	0.3 (0.1–0.9)***	54***	0.2 (0.1–0.4)***
60–69	232 (15)	92	0.6 (0.2–1.5)	75	0.4 (0.2–0.9)
50–59	409 (27)	94	0.9 (0.4–2.2)	84	0.9 (0.5–1.7)
40–49	304 (20)	95	1.5 (0.6–3.5)	87	1.2 (0.6–2.2)
30–39	355 (23)	96	2.4 (1.03–5.5)	88	1.4 (0.8–2.7)
20–29	101 (7)	78	Reference	74	Reference
Marital status					
Currently married	1203 (80)	95***	10.1 (5.5–18.6)***	85***	3.7 (2.3–5.8)***
Previously married	185 (12)	90	6.4 (2.9–14.2)	71	2.8 (1.6–5.0)
Never married	122 (8)	72	Reference	63	Reference
Years of education					
>12	391 (26)	93	0.9 (0.5–1.8)	86**	1.4 (0.9–2.2)
12	355 (24)	94	1.2 (0.7–2.3)	81	0.9 (0.7–1.4)
<12	764 (51)	92	Reference	79	Reference
Household income in dollars					
≥30,000	537 (36)	95**	1.3 (0.7–2.3)	89***	2.0 (1.3–3.0)**
<30,000	725 (48)	92	1.6 (0.96–2.8)	78	1.5 (1.03–2.1)
Unknown	250 (17)	88	Reference	73	Reference
Acculturation					
Years in US					
≥20	257 (17)	97***	8.3 (3.3–20.8)***	82	1.6 (0.96–2.7)*
10–19	944 (62)	94	3.6 (2.2–5.9)	82	1.6 (1.1–2.4)
<10	312 (21)	86	Reference	79	Reference
English proficiency					
Speaks very well or fluently	175 (12)	91**	0.98-0.4-2.6)	83**	0.6 (0.3–1.2)
Speaks quite well (so-so)	715 (47)	95	1.5 (0.9–2.7)	84	0.9 (0.6–1.3)
Does not speak well or at all	619 (41)	90	Reference	78	Reference

* p<0.05

** p<0.01

*** p<0.001

† Adjusted for all other demographic variables

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Table 3

Health Care Factors and Cervical Cancer Screening

Variable	n (%)	Ever screened %	OR (95% CI) †	Screened last three years %	OR (95% CI) †
Medical history					
Previous hysterectomy					
Yes	94 (6)	96	3.2 (0.8–12.9)	73*	0.5 (0.3–0.99)*
No	1421 (94)	92	Reference	82	Reference
Obstetric services in US					
Yes	636 (42)	98***	3.0 (1.3–7.1)*	89***	1.2 (0.7–2.0)
No	879 (58)	89	Reference	76	Reference
Family planning services in US					
Yes	398 (26)	97***	1.3 (0.5–3.4)	91***	1.6 (0.9–2.8)
No	1115 (74)	91	Reference	78	Reference
Physical last year					
Yes	1154 (77)	96***	1.7 (0.98–3.1)	89***	5.4 (3.7–7.9)***
No	346 (23)	82	Reference	55	Reference
Health insurance					
Private	750 (50)	95***	1.3 (0.6–2.8)	87***	1.2 (0.7–2.2)
Public	594 (39)	93	1.6 (0.7–3.8)	79	1.4 (0.8–2.6)
None	171 (11)	81	Reference	63	Reference
Physician characteristics					
Vietnamese man	324 (22)	90***	2.1 (0.99–4.5)***	72***	1.0 (0.6–1.7)***
Vietnamese woman	283 (19)	96	4.1 (1.6–10.2)	88	1.9 (1.04–3.5)
Non-Vietnamese man	188 (12)	97	5.7 (1.8–18.4)	87	2.3 (1.2–4.6)
Non-Vietnamese woman	485 (32)	98	4.8 (2.0–11.7)	91	2.6 (1.5–4.6)
None	226 (15)	77	Reference	61	Reference
Communication with provider about Pap testing					
Doctor had recommended Pap testing					
Yes	1223 (82)	97***	4.4 (2.5–7.4)***	87***	2.8 (1.9–4.1)***
No	276 (18)	75	Reference	55	Reference
Had asked doctor for Pap testing					
Yes	1037 (68)	99***	10.0 (5.0–19.9)***	93***	5.8 (4.1–8.3)***
No	477 (32)	79	Reference	57	Reference

* p<0.05

*** p<0.001

† Adjusted for all other health care variables as well as all demographic variables

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Table 4

Knowledge, Beliefs, and Cervical Cancer Screening

Variable	n (%)	Ever screened%	OR (95% CI) †	Screened last three years %	OR (95% CI) †
Knowledge and beliefs about cervical cancer					
Vietnamese women are more likely than whites to get cervical cancer					
Yes	323 (21)	96*	2.0 (1.04–3.8)*	86*	1.4 (0.97–2.0)
No	1186 (79)	92	Reference	80	Reference
Cervical cancer can be prevented by using traditional Vietnamese vaginal washes					
Yes	1219 (81)	93	0.8 (0.4–1.6)	81	1.0 (0.6–1.5)
No	293 (19)	92	Reference	83	Reference
Cervical cancer can be prevented by observing sitting month					
Yes	1119 (74)	93	0.7 (0.4–1.3)	81	0.9 (0.6–1.3)
No	394 (26)	92	Reference	81	Reference
Cervical cancer can be prevented by getting regular Pap tests					
Yes	1397 (92)	94***	2.7 (1.4–5.4)**	83***	2.1 (1.3–3.5)**
No	116 (8)	77	Reference	54	Reference
Knowledge about Pap testing					
Pap testing is necessary for asymptomatic women					
Yes	1433 (95)	94***	1.8 (0.8–4.0)	83***	2.7 (1.5–4.9)**
No	82 (5)	74	Reference	44	Reference
Pap testing is necessary for women who are not sexually active					
Yes	1300 (86)	94***	1.3 (0.7–2.4)	84***	1.4 (0.9–2.1)
No	214 (14)	84	Reference	66	Reference
Pap testing is necessary for post-menopausal women					
Yes	1376 (91)	94***	2.3 (1.2–4.3)*	83***	1.8 (1.1–2.9)*
No	139 (9)	78	Reference	60	Reference

*p<0.05

**p<0.01

***p<0.001

†Adjusted for all other knowledge and belief variables as well as all demographic variables

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Table 5

Factors Independently Associated with Cervical Cancer Screening

Variable	Ever screened OR (95% CI)	p-value	Screened last three years OR (95% CI)	p-value
Age in years				
70–79	–	–	0.3 (0.1–0.8)	<0.001
60–69			0.7 (0.3–1.6)	
50–59			1.3 (0.6–2.7)	
40–49			1.1 (0.5–2.4)	
30–39			1.5 (0.7–3.1)	
20–29			Reference	
Marital status				
Currently married	4.3 (2.1–8.7)	<0.001	–	–
Previously married	3.7 (1.5–9.1)			
Never married	Reference			
Household income in dollars				
≥30,000	–	–	2.1 (1.2–3.5)	0.02
<30,000			1.4 (0.9–2.2)	
Unknown			Reference	
Years in US				
≥20	4.0 (1.5–10.9)	0.003	–	–
10–19	2.3 (1.5–4.1)			
<10	Reference			
Regular provider				
Vietnamese man	2.2 (1.1–4.4)	<0.001	1.1 (0.6–1.9)	<0.001
Vietnamese woman	5.1 (2.2–12.1)		2.1 (1.1–3.7)	
Non-Vietnamese man	6.5 (2.2–19.4)		2.5 (1.3–4.9)	
Non-Vietnamese woman	5.7 (2.5–12.8)		2.9 (1.7–5.0)	
None	Reference		Reference	
Hysterectomy			0.5 (0.3–0.97)	0.04
Obstetric services in US	4.5 (2.1–9.4)	<0.001	–	–
Family planning services in US	–	–	1.8 (1.1–3.1)	0.02
Physical last year	–	–	5.7 (3.9–8.2)	<0.001
Doctor had recommended Pap testing	3.7 (2.2–6.3)	<0.001	2.7 (1.8–3.9)	<0.001
Had asked doctor for Pap testing	10.3 (5.2–20.3)	<0.001	5.7 (4.0–8.2)	<0.001
Cervical cancer can be prevented by observing sitting month	0.5 (0.2–0.9)	0.02	–	–
Cervical cancer can be prevented by getting regular Pap tests	2.2 (1.1–4.4)	0.03	2.0 (1.1–3.5)	0.02