Papanicolaou Testing Among Vietnamese Americans
Results of a Multifaceted Intervention

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Background: Vietnamese-American women have the highest incidence of cervical cancer of any ethnic group, and they underutilize Papanicolaou (Pap) tests.

Design: Development and implementation of a multifaceted intervention using community-based participatory research (CBPR) methodology and evaluated with a quasi-experimental controlled design with cross-sectional pre-intervention (2000) and post-intervention (2004) telephone surveys. Data were analyzed in 2005.

Setting: Santa Clara County, California (intervention community) and Harris County, Texas (comparison community).

Participants: Vietnamese-American women aged 18 and older (n =1566 at pre-intervention and 2009 at post-intervention).

Intervention: A community–academic coalition developed and implemented six components: Vietnamese-language media campaign, lay health worker outreach, Vietnamese Pap clinic, patient registry/reminder system, restoration of a government-funded low-cost screening program, and continuing medical education for Vietnamese physicians.

Outcome Measure: Pap test receipt.

Results: Overall response rate was 56%. Pap test receipt increased in the intervention (77.5% to 84.2%, p <0.001), but not in the comparison community (73.9% to 70.6%, p >0.05). In multivariate analyses, the intervention was associated with increased Pap test receipt (odds ratio [OR]=2.02, 95% confidence interval [CI]=1.37–2.99). Other factors associated with increased Pap testing included longer U.S. residence, having health insurance, having a regular site of care, having a respectful physician, having a non-Vietnamese or a female Vietnamese physician, and recalling exposure to Vietnamese-language media about Pap testing. Factors associated with reduced likelihood of Pap test receipt were age 65 years and older, never married, less than high school education, and income below poverty level.

Conclusions: A multifaceted CBPR intervention was associated with increased Pap test receipt among Vietnamese-American women in one community.
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Introduction

Vietnamese-American women have the highest rate of cervical cancer of any ethnic group,[1,2] yet they underutilize cervical cancer screening.[3–5] Their Papanicolaou (Pap) test receipt has been associated with sociodemographic factors, beliefs, access to care, and physician characteristics.[4,5]

Community-based participatory research (CBPR) involves community members in project design, implementation, and interpretation[6–8] to address health disparities in a culturally appropriate manner[6,9,10] and

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to produce sustainable community-based solutions.[11] Previous interventions to address Pap test receipt among Vietnamese Americans have not used CBPR.[12,13] This article reports quantitative results of a CBPR project to increase Pap testing and build community capacity. Baseline data and CBPR outcomes are reported elsewhere.[4,14]

Methods

Intervention

Coalition building and community action plan. In 1999, the Vietnamese Community Health Promotion Project (VCHPP), a community–academic research organization, formed a coalition with ten other organizations in Santa Clara County (SCC), California. The Vietnamese REACH for Health Initiative (VRHI) Coalition (the Coalition) developed a logic model based on the Pathways model to describe barriers to cervical cancer screening. In the model, healthy behaviors occur after the negotiation of complex pathways.[15,16] Community members negotiate a community pathway influenced by socioeconomic status, beliefs, knowledge, attitudes, social reinforcement, exposure to information, and access to health care. Medical providers negotiate a medical pathway influenced by their knowledge, attitudes, beliefs, and incentives. These pathways interact through cultural concordance, patient education, and system capacity.[16] Since many factors were involved, the Coalition formulated an intervention with six components.[14]

Community pathway: media campaign. The media campaign ran for 27 months from 2002 to 2004 through Vietnamese-language television, radio, and print media along with the distribution of education materials. Media companies, community members, and the Coalition assisted in the development and distribution of materials. Vietnamese physicians, Coalition members, cancer survivors, and others appeared in fifteen 30- to 60-second television advertisements about the importance of cervical cancer screening guidelines, where to obtain Pap tests, and how to ask for one. Radio advertisements (audio tracks of TV ads) were broadcast weekly. Newspaper advertisements (images of TV ads) ran weekly in six newspapers and were supplemented by ten newspaper articles. Distribution of materials with screening messages at health fairs, physicians' offices, and other venues included 5000 culturally appropriate annual calendars, 16,000 silk roses, and 25,000 copies of a Vietnamese-language cervical cancer booklet. Details can be found at www.healthisgold.org.

Community pathway: lay health worker outreach. The Coalition recruited and trained five community-based organizations (CBOs), which recruited 50 Vietnamese-American women as lay health workers (LHWs). Each LHW recruited 20 Vietnamese-American women who were randomized into LHW outreach (LHWO) or comparison group. Overall, 1005 women participated. Over 3 to 4 months, each LHW conducted two small-group sessions to educate the LHWO group about Pap testing. Comparison-group participants received one educational session after the post-LHWO survey was completed. Details and results have been reported elsewhere.[17,18]

Medical pathway: continuing medical education. The Coalition and the Vietnamese Physician Association of Northern California organized continuing medical education (CME) seminars on cervical cancer. Of 192 members, 48, 56, and 55 physicians attended the three annual seminars, respectively, each lasting 1 hour. Pre- and post-CME surveys showed significant increases in physician knowledge about survival rates for early- and late-stage cervical cancer, recommendations about screening intervals, and options for evaluating abnormal results.[19]

Medical pathway: Breast and Cervical Cancer Control Program (BCCCP) restoration. The Breast and Cervical Cancer Control Program, a federal program providing free screening for low-income women, no longer existed in SCC in 1999. Coalition members testified at legislative briefings, collected and forwarded 2748 petitions, and met with state legislators and health officials. In 2003, the program was re-established and grew to 15 sites, six with Vietnamese-speaking providers.

Pathway interactions: Vietnamese Pap clinic and patient navigator. The Coalition and the county medical system established a weekly clinic staffed by a Vietnamese female physician to provide Pap tests at discounted rates, and a bilingual staff person helped women to navigate by telephone. From 2001 to 2003, 1257 people received telephone assistance, and 462 received a Pap test during 71 clinic sessions, with 90 obtaining one at other sites.

Pathway interactions: Pap registry/reminder system. Primary care physicians with large Vietnamese patient populations were recruited for a reminder system. In 1 year, 28 physicians enrolled 4180 women at the time of a Pap test. Reminder cards were sent on the 1-year anniversary to remind women to obtain repeat Pap testing.

Evaluation

Cross-sectional pre- and post-intervention surveys were administered using a computer-assisted telephone interviewing (CATI) system to Vietnamese-American women in the intervention and control communities in 2000 and in 2004. The University of California-San Francisco Institutional Review Board approved study protocols.

The survey included questions previously developed with community input in English, translated and back-translated, pilot tested, and fielded in multiple surveys along with new questions.[3,4,12,13,20] A multidisciplinary multilingual team reviewed all questions and their translations. The new surveys were tested in pilot interviews for comprehension and cultural appropriateness and changed as needed.[4] Researchers and the surveying organization, Public Research Institute, trained and monitored bilingual interviewers.

Intervention and Comparison Communities. The intervention community, SCC, is home to 102,841 Vietnamese living in a metropolitan area with churches, pagodas, stores, restaurants, and CBOs.[21] Vietnamese media capacity included three radio stations, two daily television programs, and 13 publications. Harris County (HC), Texas was chosen as the comparison community because it has the largest Vietnamese-American community (population 58,248) outside California, had similar ethnic media capacity (five radio stations, one television station, and four publications), and was distant enough

to minimize media contamination. The two Vietnamese communities were also similar in gender ratios, age, birthplace, linguistic isolation, educational attainment, and per capita income.[21] Neither county had a BCCCP site in 2000. Vietnamese physicians numbered 110 in HC and 150 in SCC.

Sampling and Response Rates. Genesys Sampling Systems provided random samples of listed telephone numbers with 37 Vietnamese surnames. Listed surname sampling is standard in this population, with the 37 surnames accounting for most Vietnamese Americans.[4] Eligible participants were women aged ≥18 years, resident in either county, and self-identified as Vietnamese. In households with more than one eligible respondent, one woman was randomly selected. Other than the maximum number of call attempts (8 in 2000, 12 in 2004), recruitment was similar for both surveys.

Using a baseline Pap receipt rate of 70%, an effect size of 7%, power of 80%, and significance level of 0.05, the sample size was calculated at 750 per community per survey. The overall response rate (number of respondents/number of households reached and eligible) was 56% (63% pre- and 59% post-intervention in SCC, 54% pre- and 50% post-intervention in HC). Both communities had the same group of female interviewers for each survey. Over 95% of participants responded in Vietnamese at both sites for both surveys.

Variables. Community pathway measures included sociodemographic and health status. Household poverty level was determined using 1999 or 2003 income scales from the U.S. Department of Agriculture.[22] Beliefs and knowledge about cervical cancer were measured by asking respondents how likely they were to get cervical cancer and about its causes. Access measures included health insurance status, regular place of care, regular physician, and physician's gender and ethnicity. Pathway interactions were measured by asking participants if they preferred a Vietnamese-speaking or a female physician for a Pap test, if they would feel more comfortable with a female present during the test, if they believed that people were treated unfairly due to ethnicity or English proficiency, if they trusted healthcare providers, if they felt their doctors treated them with respect, and if they understood their physicians' explanations. To assess exposure to intervention activities, respondents were asked if they had seen/heard a Vietnamese-language newspaper article, booklet, or television, radio, or newspaper advertisement concerning cervical cancer in the previous 6 months.

Outcome measures included Pap awareness, defined as an affirmative response to the question, "Have you ever heard of a Pap test?" After an explanation of the test, Pap test receipt was measured by asking, "Have you ever had a Pap test?" Recency of Pap test (receipt within 12 months) was measured by asking, "How long has it been since you had your last Pap test?" Planning was measured by asking, "Are you planning to have a Pap test in the next 12 months?"

Statistical Analysis. All data were analyzed in 2005 using SAS, version 8.2 (SAS Institute, Inc., Cary NC, 2001). Descriptive statistics were calculated for each variable by site (county) and time period. Women who had a hysterectomy were excluded from the analysis of Pap testing. Initial analyses used chi-square and Student's t tests to examine differences between sites and between pre- and post-intervention within each site. Assuming a normal distribution and identity link function, a linear model was constructed with site, time, and site-by-time interactions.[23,24] These models were used for cervical cancer knowledge, Pap test screening, and media exposure variables to test for differences in the change from pre- to post-intervention between the two sites.

Logistic regression analyses were used to identify factors related to the outcome variables of Pap test receipt and recency. To identify fairly full stepwise models, a backward elimination method was employed with an exclusion criterion of $p>0.20$. All models included variables measuring site (SCC=1, HC=0), time (post-intervention=1, pre-intervention=0), and site × time interaction to test for an intervention effect. Exploratory analyses included interaction terms (site × other covariates), but these were not significant and were excluded from the models. Variables included in the model using this approach are listed in the multivariate model results. Covariates in the final models but not listed with odds ratio included employment, exposure to smoking, understanding of physician's explanations, trust in healthcare providers, perception that people are treated unfairly due to race/ethnicity or language, perceived likelihood of developing cervical cancer, preference for female physician or Vietnamese physician performing the Pap test, preference of another woman in the room for the Pap test, and report having seen a Vietnamese television advertisement or a Vietnamese booklet concerning cervical cancer in the last 6 months. The final models included all variables statistically significantly different at baseline between the two sites (shown in Tables 1, 2, and 3) except for having seen a Vietnamese calendar and knowing that smoking caused cervical cancer. A significance level of 0.05 was used for all statistical tests.

Results

There were significant differences in sociodemographic and healthcare measures within each community from pre- to post-intervention and between intervention and comparison communities (Table 1). Exposure to Vietnamese-language television or radio advertisements increased in both communities, with increases being significantly greater in SCC compared to HC (Table 2).

Knowledge of the Pap test rose in SCC (76% to 94%, $p<0.001$), but declined in HC (72% to 67%, $p<0.05$) (Table 3). Knowledge about screening recommendations by age (60% to 82%, $p<0.001$) and by sexual initiation (33% to 56%, $p<0.001$) increased in SCC. There was little change in knowledge about the causes of cervical cancer.

In bivariate analyses (Table 4), Pap test receipt increased in SCC (77.5% to 84.2%, $p<0.001$) but not in HC (73.9% to 70.6%, $p>0.05$). Pap test recency also increased in SCC (64.9% to 70.4%, $p<0.05$) but not in HC (59.2% to 53.1%, $p>0.05$). More women in SCC reported physician offering of a Pap test over time (59.2% vs 68.5%, $p<0.001$). Among women who never had the test, more planned to obtain one in SCC (41.3% to 53.6%, $p<0.05$) but not in HC (43.1% to 27.1%, $p<0.001$).

Table 1. Characteristics of Vietnamese-American women by site at pre-intervention (2000) and post- intervention (2004)

	Intervention community Santa Clara County		**Comparison community Harris County**	
	Pre-intervention (n = 798)	**Post-intervention (n = 1004)**	**Pre-intervention (n = 768)**	**Post-intervention (n = 1005)**
Sociodemographic characteristics	**Percentage or mean ± SD (range)**			
Age (years)	45.2 ± 14.3 (18–90)	**46.9 ± 15.0**^{**a} (18–102)	44.8 ± 14.1 (18–89)	**47.0 ± 14.3**^{***a} (18–96)
Years in the United States	11.8 ± 8.4 (0–82)	**13.8 ± 7.1**^{***a} (1–40)	12.1 ± 8.4 (0–52)	**14.7 ± 8.3**^{***ab} (0–50)
Speaks English poorly or not at all	38	**46**^{***a}	40	**48**^{***a}
Less than high school education	42	38	42	40
Unemployed	43	**59**^{***a}	40	**44**^{***b}
Never married	9	12	11	13
Household income below poverty level	22	25	**27**^{*b}	25
Health and access to health care				
Good-to-excellent health	73	**55**^{***a}	71	54^{***a}
Had hysterectomy	6	4	6	6
Someone in household smokes cigarettes	32	31	37	**36**^{*b}
Has health insurance	69	**81**^{***a}	**59**^{***b}	**69**^{***ab}
Has usual place for health care	93	**88**^{***a}	**85**^{***b}	**77**^{***ab}
Has a regular physician at a usual place for health care	85	**91**^{***a}	**76**^{***b}	**85**^{***ab}
Regular physician is a woman	30	31	25	**20**^{***ab}
Regular physician is Vietnamese	86	88	**81**^{*b}	**81**^{***b}
Attitudes toward healthcare system				
Physician treats respondent with respect	94	96	**92**^{*b}	**93**^{*b}
Physician explains things in a way respondent can understand	84	81	82	79
Can trust physicians to do what is best for the patient	79	77	**74**^{*b}	**73**^{*b}
Thinks healthcare system never treats people unfairly based on their race or ethnicity	69	71	**59**^{***b}	**62**^{***b}
Thinks healthcare system never treats people unfairly based on language	66	68	**58**^{***b}	**60**^{***b}

[a] p values are for chi-square test for the pre–post comparison in each community.
[b] p value for the differences at pre- or post-intervention between intervention vs. comparison community.
*p < 0.05;
**$p < 0.01$;
***$p < 0.001$ (all bolded).
SD, standard deviation.

Multivariate model results (Table 5) show that the intervention term (site × time) was significantly associated with ever having received a Pap (OR [odds ratio]=2.02, 95% CI [confidence interval]=1.37–2.99). Factors associated with lower likelihood of test receipt were age ≥65 years, never having been married, less than high school education, and household income below poverty. Longer U.S. residency, having health insurance, and having a regular place of care were associated with increased Pap test receipt. Compared to women with no regular physician, those with female Vietnamese, female non-Vietnamese, or male non-Vietnamese physicians were more likely to have obtained a Pap test. Women who reported that their physician treated them with respect were more likely to have obtained a test. Exposure to radio advertisements (OR=1.5, CI=1.17–1.80) or newspaper articles (OR=1.8, CI=1.46–2.27) was associated with test receipt.

Along with longer U.S. residence, self-reported good health, having health insurance, and having a regular place of care, the intervention term was also significantly associated with Pap test recency (OR=1.67, CI=1.19–2.34). Variables associated with lower likelihood of Pap test recency were age ≥65 years, never married, limited English proficiency, and unknown household income. Pap test recency and Pap test receipt were associated with the same physician characteristics. Exposure to newspaper advertisements (OR=1.4, CI=1.10–1.76) and articles (OR=1.3, CI=1.06–1.70) were associated with recency.

Table 2. Exposure to media education elements (%) by site, at pre-intervention (2000) and post-intervention (2004)

Media exposure	Intervention community Santa Clara County		Comparison community Harris County		Intervention vs comparison pre–post change
	Pre-intervention (n = 798)	Post-intervention (n = 1004)	Pre-intervention (n = 768)	Post-intervention (n = 1005)	
	% answering "yes"				
With respect to cervical cancer and the Pap test, in the past 6 months, have you					
. . . seen a Vietnamese-language television ad?	45	**71****	**16****	**24***	**26 vs 8****
. . . heard an ad on a Vietnamese-language radio station?	54	**75****	**33****	**43****	**21 vs 10****
. . . seen a Vietnamese newspaper ad?	59	**73****	**42****	42	**14 vs 0****
. . . seen a Vietnamese newspaper article?	47	**54***	**31****	29	**7 vs −2***
. . . seen a Vietnamese booklet about cervical cancer?	14	**19***	**6****	4	**5 vs −2***
. . . seen a red and gold Vietnamese calendar urging women to get Pap tests?	12	**31****	**5****	5	**19 vs 0****

*$p < 0.01$;
**$p < 0.001$ (all bolded).
p values are for chi-square test for the pre–post comparison (post-intervention columns) in each community and for the pre- intervention comparison (Harris pre-intervention column) between intervention community (Santa Clara) and comparison community (Harris), or for a linear model for intervention community change relative to comparison community change.

Discussion

Results show that the multifaceted intervention designed and implemented by the VRHI Coalition was successful in increasing cervical cancer screening among Vietnamese-American women. The effect size of 10% is comparable to other community-based interventions.[13,26] Although there are variations in the measurement of CBPR effectiveness, changes in health behaviors are ultimately important.[25,27] This is one of the first reports of a significant community-wide change in behavior resulting from an CBPR project, as a recent systematic review of CBPR projects found only 12 articles reporting results of completed interventions and only two with improved outcomes.[27] Other CBPR measures such as capacity building, system change, sustainability, and dissemination for this project have been described elsewhere.[14]

Knowledge deficits and cultural beliefs are important targets of health promotion. Although there were knowledge changes following the intervention, no knowledge measure was associated with Pap test receipt. Respondents continued cultural behaviors such as deferring to physicians, since less than half had asked for a Pap test.[28] The most important determinants of Pap test receipt and recency were the intervention, physician characteristics, and healthcare access. These findings suggest that culturally appropriate interventions can succeed in changing health behaviors even if they are not successful in changing cultural barriers.

Of equal importance are system barriers such as access to health care. Interventions to improve access have the largest effect on screening among the underserved.[29] The relationship among access, physician characteristics, and Pap test receipt in this study illustrates the importance and complexity of healthcare access in an ethnic minority population. Confirming the importance of financial and logistic access, Vietnamese-American women with health insurance and a regular place of care were more likely to obtain tests.[3,13,20,30,31] The community identified access as a major barrier, and therefore the Coalition included two intervention components to address financial access. As a catalyst for system change, the Coalition focused on Vietnamese-American issues, but the resulting improved financial access benefited all eligible county residents. Such success may not have been possible in a traditional research approach, which often dictates a single intervention. In addition, a CBPR approach included community members and policy advocates, without whom there may be no policy change.

Culturally accessible care, however, is more nuanced. Respect is an important component of interpersonal relationships in Vietnamese culture. Women who reported having a physician who treated them respectfully were more likely to obtain a Pap test. Women with

Table 3. Cervical cancer awareness and knowledge (%) among Vietnamese-American women by site at pre-intervention (2000) and post-intervention (2004)

	Intervention community Santa Clara County		Comparison community Harris County		
	Pre-intervention (n = 798)	Post-intervention (n = 1004)	Pre-intervention (n = 768)	Post-intervention (n = 1005)	Intervention vs comparison pre–post change
Awareness					
Heard of cervical cancer	91	**95****	**88***	87	**4 vs −1***
Think "almost certain" or "very likely" to develop cervical cancer[a]	27	**7*****	**22***	**7*****	−20 vs −15
Heard of Pap test	76	**94*****	72	**67***	**18 vs −5*****
Correct knowledge					
Women aged ≥18 should have Pap tests	60	**82*****	55	**64****	**22 vs 9*****
Virgins should have Pap tests	33	**56*****	36	35	**23 vs −1*****
HPV infection causes cancer	16	**3*****	14	**5*****	−13 vs −9
Smoking or exposure to smoking causes cervical cancer	2	3	**0.5****	0.4	1 vs −0.1
Incorrect knowledge					
One can get cervical cancer from heredity[a]	12	**7*****	12	**8****	−5 vs −4
One can get cervical cancer from uncleanliness[a]	16	17	15	**20***	1 vs 5

p values are for chi-square test for the pre–post comparison (post-intervention columns) in each community and for the pre-intervention comparison (Harris pre-intervention column) between the intervention community (Santa Clara) and the comparison community (Harris), or for a linear model for the intervention community change relative to comparison community change.
[a]Only women who reported not having a hysterectomy.
*$p < 0.05$;
**$p < 0.01$;
***$p < 0.001$ (all bolded).
HPV, human papilloma virus; Pap, Papanicolaou test.

Vietnamese male physicians were no more likely to obtain a Pap test than were those with no physician, indicating that ethnic concordance did not automatically lead to appropriate care.[20,32] Many male Vietnamese physicians are older, trained in Vietnam, and less likely to have Western preventive care training.[28]

Table 4. Pap testing (%) among Vietnamese-American women by site at pre-intervention (2000) and post-intervention (2004)[a]

	Intervention community Santa Clara County		Comparison community Harris County		
	Pre-intervention (n = 746)	Post-intervention (n = 956)	Pre-intervention (n = 718)	Post-intervention (n = 935)	Intervention vs comparison pre–post change
Ever had a Pap test	77.5	**84.2*****	73.9	70.6	**6.7 vs −3.3*****
Had a Pap test in last year	64.9	**70.4***	59.2	53.1	**5.5 vs −6.0*****
Had a Pap test in last year if ever had one	84.2	83.8	80.7	**75.6***	−0.4 vs −5.1
Ever asked doctor to perform a Pap test	43.7	43.2	42.9	**32.9*****	**−0.5 vs −10.0****
Doctor ever offered a Pap test	59.2	**68.5*****	52.5	50.8	**9.3 vs −1.7****
Planning to get next Pap test in next 12 months (if have had one)	94.1	**90.2***	91.6	**86.3****	−3.9 vs −5.3
Thought about getting a Pap test (if never had one)	41.3	**53.6***	43.1	**27.1*****	**12.3 vs −16.0*****

p values are for chi-square test for the pre–post comparison in each community and for a linear model for the intervention community (Santa Clara) change relative to comparison community (Harris) change.
[a]Only those who reported not having a hysterectomy.
*$p < 0.05$;
**$p < 0.01$;
***$p < 0.001$ (all bolded).
Pap, Papanicolaou test.

Table 5. Multivariate logistic models for factors associated with Pap test receipt and Pap test recency

	Ever had a Pap[a,b] $n = 3081$ OR (95% CI)	Had a Pap in last 12 months[a,c] $n = 2862$ OR (95% CI)
Intervention (site × pre–post)	2.02 (1.37–2.99)	1.67 (1.19–2.34)
Age, years (ref = 40–64)		
18–39	0.8 (0.64–1.01)	1.0 (0.81–1.20)
≥65	0.5 (0.37–0.68)	0.5 (0.41–0.72)
Years in United States (5-year increments)	1.2 (1.16–1.34)	1.1 (1.03–1.15)
Poor or no English fluency (ref = fluent)	—[d]	0.8 (0.66–0.99)
Never married marital status (ref = married)	0.1 (0.12–0.21)	0.2 (0.18–0.32)
Less than high school education (ref = at least high school)	0.6 (0.50–0.77)	—[d]
Household income (ref = above poverty)		
Below poverty level	0.8 (0.60–0.96)	0.8 (0.67–1.03)
Unknown	1.3 (0.74–2.26)	0.8 (0.62–0.97)
Good/excellent health status (ref = poor/fair)	—[d]	1.2 (1.00–1.45)
Have any health insurance (ref = none)	1.4 (1.12–1.72)	1.5 (1.28–1.88)
Have usual place of care (ref = none)	2.0 (1.35–3.10)	2.6 (1.76–4.00)
Have a regular doctor (ref = none)		
Female, Vietnamese	2.0 (1.36–2.93)	1.8 (1.32–2.56)
Female, non-Vietnamese	3.8 (1.88–7.87)	2.7 (1.65–4.54)
Male, Vietnamese	1.2 (0.90–1.64)	1.1 (0.87–1.49)
Male, non-Vietnamese	1.9 (1.12–3.17)	2.1 (1.38–3.23)
Doctor treats with respect (ref = no)	1.9 (1.29–2.71)	2.4 (1.64–3.57)
Have heard Vietnamese radio ad in the last 6 months about cervical cancer (ref = no)	1.5 (1.17–1.80)	—[d]
Have seen Vietnamese newspaper ad in last 6 months about cervical cancer (ref = no)	—[d]	1.4 (1.10–1.76)
Have seen Vietnamese newspaper article in last 6 months about cervical cancer (ref = no)	1.8 (1.46–2.27)	1.3 (1.06–1.70)

Notes: Variables included but not significant in either model include employment, exposure to smoking, understanding of physician's explanations, trust in healthcare providers, perception that people are treated unfairly due to race/ethnicity or language, perceived likelihood of developing cervical cancer, preference for female physician or Vietnamese physician performing the Pap test, preference of another woman in the room for the Pap test, and report having seen a Vietnamese television advertisement or a Vietnamese booklet concerning cervical cancer in last 6 months.

[a]Only those who reported not having a hysterectomy.

[b]Hosmer-Lemeshow $p = 0.34$.

[c]Hosmer-Lemeshow $p = 0.40$.

[d]Indicates that variable was removed from final model.

CI, confidence interval; OR, odds ratio; Pap, Papanicolaou test; ref, reference.

Women with female Vietnamese or female non-Vietnamese physicians were equally likely to receive screening, confirming that, for the Pap test, physician gender concordance is more important than ethnic concordance.[20,31,33,34] This finding indicates that effective preventive care can still be delivered to Asian Americans in areas without large numbers of ethnic-concordant physicians.

Commitment to a community-driven agenda in CBPR often means designing the research to fit community needs, which here dictated a multifaceted intervention. Since it is difficult to evaluate which component had the most impact, a multidimensional approach could be considered a research limitation.[35] However, more complex strategies are more effective in changing screening behaviors among the underserved.[29] In addition, some components were evaluated separately and found to be effective.[17,19]

Of the 12 CBPR studies with quantitative evaluations, five were quasi-experimental and four were randomized controlled trials.[27] Thus, the quasi-experimental design is appropriate for the evaluation of this CBPR intervention, particularly the media campaign. Some effects of the media campaign were captured in the intervention term, but exposure to radio and newspaper advertisements was independently associated with Pap test receipt. Other communities without capacity to implement all six components could focus on changing knowledge and behavior through education by using relatively inexpensive ethnic media sources. Materials developed by this project are accessible to others at www.healthisgold.org.

The main limitations of the survey included the relatively low response rate of 56% and the use of self-report of test receipt. The response rate is not unusual for a telephone-based survey in this population.[13,36] Although there are ethnic differences in the validity of self-reports,[37] this bias should affect intervention and comparison samples similarly. Another limitation is the small number of communities and their nonrandomized selection. Randomized controlled trials are not always feasible or ethically appropriate in CBPR.[27] There are few large Vietnamese communities in the United States, and the cost of conducting CBPR in more than one community would be prohibitive. In addition, a CBPR approach requires that the interven-

tion community be closely related to the research organization. Although there were significant differences at baseline between the communities, these were addressed in the multivariate analyses. Nonetheless, there may have been unmeasured confounders. Although the Vietnamese populations were different in size, they were comparable in other respects.[21] Finally, similar to most CBPR projects, only one health disparity in one ethnic group was addressed, and thus the results may not be generalizable to other settings.

There is an abundance of data showing that a variety of interventions are effective in addressing some aspects of health disparities.[35] Proponents of CBPR argue that interventions not grounded in the community will not lead to lasting changes. CBPR requires extensive commitment in personnel, time, and resources, but is inherently valued by the communities suffering from the disparities. Effectiveness of studies such as this provides another building block in the justification for the commitment of resources to this approach in health promotion research.

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References

1. Miller BA, Kolonel LN, Bernstein L, et al. Racial/ethnic patterns of cancer in the United States 1988–1992. Bethesda MD: National Cancer Institute, 1996.
2. Cockburn M, Deapen D, eds. Cancer incidence and mortality in California: trends by race/ethnicity, 1988–2001. Los Angeles: Cancer Surveillance Program, University of Southern California, 2004.
3. McPhee SJ, Bird JA, Davis T, et al. Barriers to breast and cervical cancer screening among Vietnamese-American women. Am J Prev Med 1997;13:205–13.
4. Nguyen TT, McPhee SJ, Nguyen T, et al. Predictors of cervical Pap smear screening awareness, intention, and receipt among Vietnamese-American women. Am J Prev Med 2002;23:207–14.
5. Taylor VM, Yasui Y, Burke N, et al. Pap testing adherence among Vietnamese American women. Cancer Epidemiol Biomarkers Prev 2004;13:613–9.
6. Israel BA, Schulz AJ, Parker EA, et al. Review of community-based research: assessing partnership approaches to improve public health. Annu Rev Public Health 1998;19:173–202.
7. Green L, Daniel M, Novick L. Partnerships and coalitions for community-based research. Public Health Rep 2001;116:S20–31.
8. George MA, Daniel M, Green LW. Appraising and funding participatory research in health promotion. Int Q Comm Health Educ 1998;18:181–97.
9. Altman DG. Sustaining interventions in community systems: on the relationship between researchers and communities. Health Psychol 1995;14:526–36.
10. Israel BA, Schulz A, Parker EA, et al. Critical issues in developing and following community-based participatory research principles. In: Minkler M, Wallerstein N, eds. Community-based participatory research for health. San Francisco: Jossey-Bass, 2003:53–77.
11. American Public Health Association. Policy statement 2004-12. Support for community-based participatory research in public health. Available at: http://apha.org/legislative/policy/2004/. Accessed October 12, 2005.
12. Bird JA, McPhee SJ, Ha NT, et al. Opening pathways to cancer screening for Vietnamese-American women: lay health workers hold a key. Prev Med 1998;27:821–9.
13. Jenkins CN, McPhee SJ, Bird JA, et al. Effect of a media-led education campaign on breast and cervical cancer screening among Vietnamese-American women. Prev Med 1999;28:395–406.
14. Nguyen TT, McPhee SJ, Bui-Tong N, et al. Community-based participatory research increases cervical cancer screening among Vietnamese-Americans. J Health Care Poor Underserved 2006 (in press).
15. Green L, Kreuter MW. Health promotion planning: an educational and environmental approach. 2nd ed. Mountain View CA: Mayfield, 1991.
16. Hiatt RA, Pasick R, Perez-Stable E, et al. Pathways to early cancer detection in the multiethnic population of the San Francisco Bay Area. Health Educ Q 1996;23:S10–27.
17. Lam TK, McPhee SJ, Mock J, et al. Encouraging Vietnamese-American women to obtain Pap tests through lay health worker outreach and media education. J Gen Intern Med 2003;18:516–24.
18. Mock J, Nguyen T, Nguyen KH, et al. Processes and capacity building benefits of lay health worker outreach focused on preventing cervical cancer among Vietnamese. Health Promot Pract 2006 (in press).
19. Lai KQ, Nguyen TT, Mock J, et al. Increasing Vietnamese-American physicians' knowledge of cervical cancer and Pap testing: impact of continuing medical education programs. Ethn Dis 2004;14:S122–7.
20. McPhee SJ, Stewart S, Brock KC, et al. Factors associated with breast and cervical cancer screening practices among Vietnamese American women. Cancer Detect Prev 1997;21:510–21.
21. U.S. Census Bureau. American FactFinder. Custom table, Census 2000 Summary File 4 (SF 4), Sample Data. Available at: http://factfinder.census.gov/servlet/. Accessed January 20, 2006.
22. U.S. Department of Health and Human Services, The HHS Poverty Guidelines. Available at: http://aspe.os.dhhs.gov/poverty/figures-fed-reg.shtml. Accessed May 6, 2006.
23. Agresti A. An introduction to categorical data analysis. New York: John Wiley and Sons, 1996.
24. McCullagh P, Nelder JA. Generalized linear models. 2nd ed. London: Chapman and Hall, 1989.
25. Paskett ED, Tatum CM, D'Agostino R Jr, et al. Community-based interventions to improve breast and cervical cancer screening: results of the Forsyth County Cancer Screening (FoCaS) Project. Cancer Epidemiol Biomarkers Prev 1999;8:453–9.
26. Viswanathan M, Ammerman A, Eng E, et al. Community-based participatory research: assessing the evidence. Rockville MD: Agency for Healthcare Research and Quality, 2004 (publication 04-E022-2).
27. Springett J. Issues in participatory evaluation. In: Minkler M, Wallerstein N, eds. Community-based participatory research for health. San Francisco: Jossey-Bass, 2003:263–88.
28. McPhee SJ. Caring for a 70-year-old Vietnamese woman. JAMA 2002;287:495–504.
29. Legler J, Meissner HI, Coyne C, et al. The effectiveness of interventions to promote mammography among women with historically lower rates of screening. Cancer Epidemiol Biomarkers Prev 2002;11:59–71.
30. Faulkner LA, Schauffler HH. The effect of health insurance coverage on the appropriate use of recommended clinical preventive services. Am J Prev Med 1997;13:453–8.
31. Taylor VM, Schwartz SM, Yasui Y, et al. Pap testing among Vietnamese women: health care system and physician factors. J Community Health 2004;29:437–50.

32. Lee MM, Lee F, Stewart S, et al. Cancer screening practices among primary care physicians serving Chinese Americans in San Francisco. West J Med 1999;170:148–55.
33. Taylor VM, Schwartz SM, Jackson JC, et al. Cervical cancer screening among Cambodian-American women. Cancer Epidemiol Biomarkers Prev 1999;8:541–6.
34. Tu SP, Yasui Y, Kuniyuki A, et al. Breast cancer screening: stages of adoption among Cambodian American women. Cancer Detect Prev 2002;26:33–41.
35. Pasick RJ, Hiatt RA, Paskett ED. Lessons learned from community-based cancer screening intervention research. Cancer 2004;101:S1146–64.
36. McPhee SJ, Nguyen T, Euler GL, et al. Successful promotion of hepatitis B vaccinations among Vietnamese-American children ages 3 to 18: results of a controlled trial. Pediatrics 2003;111:1278–88.
37. McPhee SJ, Nguyen TT, Shema SJ, et al. Validation of recall of breast and cervical cancer screening by women in an ethnically diverse population. Prev Med 2002;35:463–73.