Effective Lay Health Worker Outreach and Media-Based Education for Promoting Cervical Cancer Screening Among Vietnamese American Women

| Jeremiah Mock, PhD, MSc, Stephen J. McPhee, MD, Thoa Nguyen, Ching Wong, BS, Hiep Doan, MD, Ky Q. Lai, MD, MPH, Kim H. Nguyen, MPH, Tung T. Nguyen, MD, and Ngọc Bui-Tong, MHA |

Cervical cancer can cause a woman to lose her fertility because of surgery or radiation treatment and can result in untimely death. Vietnamese American women have the highest incidence of cervical cancer of any racial or ethnic group in the United States, 5 times higher than that of non-Hispanic Whites (43.0 per 100000 vs 7.5 per 100000).

In 1999, the Centers for Disease Control and Prevention initiated the Racial and Ethnic Approaches to Community Health (REACH 2010) program to reduce health disparities. In response, we formed a coalition of researchers and community members in Santa Clara County, Calif, called the Vietnamese REACH for Health Initiative, to address the cervical cancer disparity experienced by Vietnamese American women.

This disparity is entirely preventable. Persistent infection with a high-risk human papillomavirus (HPV) is generally accepted as the major cause of cervical cancer. However, both active and passive exposure to cigarette smoke is an additional risk factor. Although Vietnamese American women have a low prevalence of active smoking, passive smoke exposure is a genuine problem for them given the high prevalence of smoking by Vietnamese men.

For this reason, we considered even Vietnamese American women who had not been sexually active to be at risk for cervical cancer and thus eligible for screening. Papanicolaou (Pap) test screening is highly effective for detecting precancerous cervical dysplasia and koilocytosis, which is highly suggestive of HPV infection.

We conducted a baseline communitywide survey of Vietnamese American women in Santa Clara County that showed that only 78% had ever had a Pap test, compared to other survey data showing a rate of 96% among non-Hispanic White women. The survey also showed that women who had never obtained a Pap test were more often older than 65 years, unmarried or widowed, less educated, had a male Vietnamese doctor, had never requested a Pap test, had never had their doctor recommend a Pap test, and felt that their doctor did not always treat them respectfully. Therefore, we sought to encourage Vietnamese American women in Santa Clara County to obtain regular Pap tests and receive appropriate follow-up. We implemented a comprehensive, multifaceted program (details reported elsewhere).

Here we report the final outcomes of 2 components—the lay health worker outreach program and the media-based health education campaign.

When our project began, the largest proportion (41%) of the 1.22 million Vietnamese in the United States lived in California, with nearly 105 000 living in Santa Clara County. Many Vietnamese in Santa Clara County were working in high-tech manufacturing plants, restaurants, shops, nail salons, and social service agencies. Nearly all Vietnamese were first-generation immigrants who fled Vietnam after the fall of Saigon. The first immigrants, who arrived in 1975, were primarily officials and high-ranking military officers and their families and were generally well educated, from urban areas, and healthy. In the 1980s, large numbers of refugees arrived, including the so-called “boat people.” Most were from rural areas, less educated, and in poorer health. Survivors of “reeducation” (concentration) camps and family members of those already living in the United States immigrated in the late 1980s and 1990s.

For more than 50 years, lay health workers (LHWs) have reached out to underserved populations to reduce cardiovascular disease, diabetes, and cancer. LHWs typically work through their social networks to reach those who have poor access to health services or health information, such as immigrants.

**Objectives.** We sought to promote cervical cancer screening among Vietnamese American women in Santa Clara County, Calif.

**Methods.** In 2001–2004, we recruited and randomized 1005 Vietnamese American women into 2 groups: lay health worker outreach plus media-based education (combined intervention) or media-based education only. Lay health workers met with the combined intervention group twice over 3 to 4 months to promote Papanicolaou (Pap) testing. We used questionnaires to measure changes in awareness, knowledge, and Pap testing.

**Results.** Testing increased among women in both the combined intervention (65.8% to 81.8%; P < .001) and media-only (70.1% to 75.5%; P < .001) groups, but significantly more in the combined intervention group (P = .001). Among women never previously screened, significantly more women in the combined intervention group (46.0%) than in the media-only group (27.1%) obtained tests (P < .001). Significantly more women in the combined intervention group obtained their first Pap test or obtained one after an interval of more than 1 year (became up-to-date; 45.7% to 67.3%, respectively; P < .001) than did those in the media-only group (50.9% to 55.7%, respectively; P = .035).

**Conclusions.** Combined intervention motivated more Vietnamese American women to obtain their first Pap tests and to become up-to-date than did media education alone. (Am J Public Health. 2007;97:1693–1700. doi:10.2105/AJPH.2006.086470)
who do not understand the health care system, do not know their rights, or rely on family and friends for information.\textsuperscript{16–20} LHW outreach has been used in African American and Latino communities but rarely in Asian American communities.\textsuperscript{21–24}

Evaluations of LHW outreach have shown that LHWs provide emotional, instrumental (in the form of money or services), information, and appraisal support.\textsuperscript{16,18–20,25–27} Results have varied in the few randomized controlled studies of LHW outreach for the prevention of chronic diseases.\textsuperscript{10,2,13,28–33} Among African Americans and Latinos, LHW outreach has increased mammography\textsuperscript{13,30,31} but not Pap testing rates.\textsuperscript{12,21} One prior LHW outreach study showed increases among Vietnamese American women in recognition, receipt, and maintenance of breast and cervical cancer screening.\textsuperscript{21}

**METHODS**

In 2000–2004, our coalition partnered with 5 community-based organizations serving Vietnamese people in Santa Clara County to conduct LHW outreach. We staggered the 5 community-based organizations’ lay health workers outreach activities over a 4-year period with each organization conducting activities for 12 months.

Each of the 5 community-based organizations hired a Vietnamese woman as their LHW outreach coordinator. Each coordinator recruited 10 Vietnamese American women to become LHWs (N=50 LHWs). We paid LHWs $1500 for their work. Our research staff trained the coordinators and LHWs in procedures and approaches to LHW outreach in 2 sessions each lasting 3 hours. LHWs received Vietnamese-language flip charts and booklets to use in their outreach to explain the causes of cervical cancer and the Pap testing procedure.

Each LHW then used her social network to recruit 20 Vietnamese American women. Vietnamese American women aged 18 years or older who lived in Santa Clara County were eligible to participate. We randomized recruits into a LHW outreach plus media education (combined intervention) group or a media-based education-only (media-only) group. Women who were recruited from the same households were not split up because of the likelihood of cross-contamination. Women in the combined intervention group received outreach over 3 to 4 months while being exposed to the media campaign. Over the same 3 to 4 months, women in the media-only group were only exposed to the media campaign; LHWs only contacted women in the media-only group to ensure none were lost to follow-up. After the 3- to 4-month period, women in the media-only group received delayed outreach from the LHWs. All participants received a $60 incentive.

**Lay Health Worker Outreach**

LHWs organized 2 small group gatherings of 90 minutes for 3 to 5 women, or 120 minutes for 6 to 10 women. LHWs used the outreach materials and led the gatherings using the style and approach they felt would be most comfortable and effective. Generally, in the first gathering, the LHWs used the flip chart to give a 15- to 20-minute presentation about cervical cancer and Pap testing and then led a question-and-answer session. Next, over 3 to 4 months, LHWs contacted participants to explain how to access medical services and to help with scheduling appointments. Then LHWs held a second gathering with the same women to answer questions and reemphasize the benefits of annual Pap testing. Further details of the LHW outreach process are described elsewhere.\textsuperscript{24}

**Media-Based Education Campaign**

LHW outreach took place concurrently with several other projects that our coalition organized to reduce barriers to Pap testing. The media-only campaign began before the LHW outreach started and was the widest reaching: it focused on creating program recognition, eliminating culturally based stigma about cancer, informing community members that cervical cancer is preventable, shaping attitudes about Pap testing, and encouraging women to obtain Pap tests. We produced 15 advertisements distributed through Vietnamese-language television, radio, and newspapers. Spots modeled good doctor–patient communication, women politely asserting themselves by asking for Pap tests, and virgins asking about Pap tests. Some advertisements featured female community role models talking about actual life experiences.

Because Vietnamese physicians served 86% of Vietnamese American women in the county,\textsuperscript{8,9} other advertisements showed Vietnamese physicians talking about Pap testing, thereby reinforcing the continuing medical education seminars that we organized for them. The media campaign publicized our patient navigator services and low- or no-cost Pap testing clinic attended by a Vietnamese provider at Silver Creek Clinic in San Jose, Calif. It also publicized the coalition’s successful advocacy to have the federally funded Breast and Cervical Cancer Control Program reinstated as part of the state of California’s Every Woman Counts program.

Each ad was run on 3 television channels concurrently with 3 radio stations, and in 5 newspapers. Each television commercial was broadcast 2 to 3 times per week for 2 to 3 months. Radio commercials were aired 1 to 2 times per day, 5 days per week. Print ads and newspaper articles were published weekly.

We also created and distributed 25,000 Vietnamese-language booklets, 12,000 silk roses with reminder cards, 5000 posters, and 15,000 reminder calendars at the LHW outreach gatherings and at physicians’ offices, community forums, cultural events, community-based organizations, churches, temples, and flea markets.

**Measurement**

We used pre- and postoutreach questionnaires to collect data on demographics, attitudes, changes in knowledge, exposure to our media activities, and screening practices. We developed, pretested, and revised yes or no and multiple choice questions in English and Vietnamese. Combined intervention participants completed a pencil-and-paper preoutreach questionnaire at the beginning of the LHWs’ first gathering and a pencil-and-paper postoutreach questionnaire at the end of the second gathering. Media-only participants completed the preoutreach questionnaire by telephone with our research staff. They completed a pencil-and-paper postoutreach questionnaire 3 to 4 months later prior to receiving information from LHWs (delayed outreach). Most participants completed the Vietnamese questionnaires themselves. For those with reading difficulties, our research staff administered the questionnaires in Vietnamese.
Primary outcomes were (1) having ever obtained a Pap test and (2) being up-to-date for Pap tests, defined as having obtained a first test or having obtained a test after a lapse of more than 1 year. Secondary outcomes were changes in participants’ awareness of cervical cancer and beliefs about causes; knowledge about which types of women should obtain Pap tests; and intention to obtain a test. We measured exposure to our media education campaign as a mediating factor.

Analyses
To test for significant pre- to postoutreach changes, we conducted a matched comparison of participants’ responses to identical questions on the pre- and postoutreach questionnaires. We conducted an intention-to-treat analysis and used the McNemar $\chi^2$ test to determine if the change between pre- and postoutreach was statistically significant. The McNemar $\chi^2$ test compares the proportion of respondents who changed their answer at postoutreach (e.g., “no” at preoutreach was changed to “yes” at postoutreach) to the proportion who changed their answer in the opposite direction (e.g., “yes” changed to “no”).

We conducted $\chi^2$ tests to determine if learning about the causes of cervical cancer or learning which women should have a Pap test was associated with becoming up-to-date for a Pap test by the end of the program period. For questions measuring learning, we assigned a +1 for those who changed from having an incorrect answer to a correct answer between pre- and postoutreach; a zero for those who had incorrect answers at pre- and postoutreach; and a −1 for those who had a correct answer at preoutreach but an incorrect answer at postoutreach. A zero change in participants’ awareness of cervical cancer was associated with becoming up-to-date for a Pap test at the end of the program period, and to identify variables that were associated with becoming up-to-date. For this analysis, we selected a subsample of women who at preoutreach had not obtained a Pap test or who were not up-to-date (no Pap test in the last year; $n=525$). This subsample included women who obtained a Pap test between pre- and postoutreach (changed=1; $n=185$) as well as those who did not obtain a Pap test between pre- and postoutreach (not up-to-date and never=0; $n=340$). In a full model, we included a variable for the treatment effect (media-only=0; combined intervention=1) and variables measuring changes in understanding, beliefs, media-only exposure, and sociodemographics. To create a parsimonious model, we then used a backward stepwise selection procedure to eliminate those variables that were not significant at $P=.10$.

Finally, we ran bivariate and multivariate analyses to identify factors that were associated with ever having had a Pap test and being up-to-date. We conducted analyses with SPSS version 11.0 (SPSS Inc, Chicago, Ill). $P$ values less than .05 were considered significant.

RESULTS
LHWs recruited 1005 women; 37 dropped out of the study, yielding 968 in the combined intervention group and 477 in the media-only group (retention rates=97.8% and 94.8%, respectively). All combined intervention participants attended both gatherings. More than 90% of participants elected to complete questionnaires. There were no significant differences between the 2 groups according to sociodemographic characteristics (Table 1).

Obtaining a Pap Test
At baseline, 65.8% of the combined intervention group and 70.1% of the media-only group reported having already had at least 1 Pap test (Table 2). Over the program period, 16.0% of women in the combined intervention group obtained a Pap test (increasing from 65.8% to 81.8%; $P<.001$) compared with 5.4% in the media-only group (increasing from 70.1% to 75.5%; $P<.001$). The increase in the combined intervention group was significantly greater than that in the media-only group ($Z$ test $P=.001$). Among women who at baseline had never had a Pap test, 46.0% of those in the combined intervention group obtained one during the program period ($P<.001$) compared with 27.1% of those in the media-only group ($P<.001$). Again, the increase was significantly greater in the combined intervention group ($Z$ test $P=.001$). In the combined intervention group, 21.6% became up-to-date during the program period (increasing from 45.7% to 67.3%; $P<.001$) compared with 4.8% in the media-only group (increasing from 50.9% to 55.7%; $P=.035$). The increase in being up-to-date was also significantly greater in the combined intervention group ($Z$ test $P<.001$). Among women who had still never obtained a Pap test, the proportions that reported thinking about obtaining one increased significantly in both the combined intervention group (increasing from 59.7% to 82.3%; $P<.001$) and the media-only group (increasing from 55.8% to 76.7%; $P<.001$); the increases in the 2 groups were not significantly different.

Media Education and Changes in Awareness, Beliefs, and Understandings
The majority of women in both groups had seen our media education campaign by baseline, as it preceded and occurred throughout the lay health worker outreach. By the end of the program period, nearly all participants had been exposed (Table 2), and nearly all had heard about cervical cancer (Table 3). Significantly more women in the combined intervention group than those in the media-only group learned correct information about the causes of cervical cancer. The proportion who knew that HPV and cigarette smoke can cause cervical cancer increased significantly in both groups, but the increase was significantly greater in the combined intervention group. In the combined intervention group, a significant proportion learned that cervical cancer is not hereditary, whereas in the media-only group, more women continued to hold this belief. A significantly greater number of women in the combined intervention group learned that women cannot get cervical cancer from being “unclean” than in the...
AWARENESS OF PAP TESTING INCREASED SIGNIFICANTLY IN BOTH GROUPS, WITH THE INCREASE BEING SIGNIFICANTLY LARGER IN THE COMBINED INTERVENTION GROUP (Table 3). By postoutreach, nearly all women in both groups knew that married women should get Pap tests; at postoutreach, increases in the proportions of the participating individuals who knew this fact were significant and similar in both groups. At preoutreach, most women also knew that postmenopausal women should continue to obtain Pap tests. By postoutreach, knowledge of this fact increased significantly in both groups, but slightly larger in the combined intervention group. The proportion of the combined intervention group who knew that Vietnamese American women aged 18 years and older should obtain Pap tests increased significantly, whereas there was almost no increase in the media-only group. The proportion who knew that even virgins should get Pap tests increased significantly, whereas there was almost no increase in the media-only group. The increase was substantially larger in the combined intervention group than in the media-only group whose beliefs largely remained unchanged.

Awareness of Pap testing increased significantly in both groups, with the increase being significantly larger in the combined intervention group (Table 3). By postoutreach, nearly all participants had heard of Pap testing. At preoutreach, nearly all women in both groups knew that married women should get Pap tests; at postoutreach, increase was substantially larger in the combined intervention group. The proportion who knew that even virgins should get Pap tests increased significantly, whereas there was almost no increase in the media-only group. The increase was substantially larger in the combined intervention group than in the media-only group whose beliefs largely remained unchanged.

### Variables Associated With Obtaining a Pap Test Between Pre- and Postoutreach

The χ² analyses revealed that being up-to-date for the Pap test at postoutreach was associated with learning that HPV is a cause of cervical cancer, but not with learning that exposure to cigarette smoke is a cause of cervical cancer nor with learning that heredity and personal cleanliness are not causes. Being up-to-date was associated with learning that women aged 18 years and older should obtain Pap tests (P<.01) and learning that even virgins should obtain Pap tests (P<.006), but not with learning that married women and postmenopausal women should obtain Pap tests.

Backward stepwise logistic regression analysis predicting whether or not a woman became up-to-date during the intervention initially produced the following correlates: age; age² (a quadratic term that can be included with the unmodified variable to estimate an association between a dependent variable and a nonlinear independent); marital status; reading a newspaper article promoting Pap tests at either pre- or postoutreach; and participating in the LHW outreach during the media-only campaign. We removed age and age² because age was strongly associated with marital status; the 3 other variables that remained in the model remained significant, and the predictive success of the model increased (Table 4). These 3 variables were being currently married (odds ratio [OR]=1.66), having read a newspaper article about Pap testing (OR=2.06), and having participated in combined intervention (OR=2.68). The model successfully predicted 34.6% of the cases that became up-to-date between pre- and postoutreach and 86.2% of the cases that did not change.

To test whether learning specific facts about cervical cancer and Pap testing was associated with becoming up-to-date, we removed the treatment variable (media-only vs combined intervention) group and included variables measuring changes in knowledge. The backward stepwise procedure loaded the variable measuring learning about HPV being a cause of cervical cancer and loaded the variable measuring learning that virgins should obtain Pap tests. Both variables were significant at P<.05. However, the model’s predictive success dropped substantially, especially in its capacity to successfully predict the status of those who had become up-to-date. We reentered the treatment variable and ran the backward stepwise procedure again. The 2 variables that measured learning of facts dropped out of the model, and the treatment variable remained. The predictive success of the model increased substantially, indicating that the 2 variables measuring the learning of facts were not very powerful predictors.

### Table 1—Sociodemographic Characteristics of Vietnamese American Women at Baseline by Intervention Group: Vietnam REACH Study, 2010 Santa Clara County, Calif, 2001

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Media-Only Group (n = 477)</th>
<th>Combined Intervention Group (n = 491)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age, y (SD)</td>
<td>46.0 (± 15.3)</td>
<td>45.7 (± 15.4)</td>
<td>.75</td>
</tr>
<tr>
<td>Minimum–maximum</td>
<td>19–84</td>
<td>18–88</td>
<td></td>
</tr>
<tr>
<td>Mean residence in US, y (SD)</td>
<td>9.23 (± 6.3)</td>
<td>8.92 (± 5.8)</td>
<td>.42</td>
</tr>
<tr>
<td>Minimum–maximum</td>
<td>0–58</td>
<td>0–28</td>
<td></td>
</tr>
<tr>
<td>Self-rated English-speaking ability: %</td>
<td>57.7</td>
<td>56.3</td>
<td>.65</td>
</tr>
<tr>
<td>“poorly” or “not at all,” %</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education &lt; 12 y, %</td>
<td>54.8</td>
<td>57.5</td>
<td>.41</td>
</tr>
<tr>
<td>Marital status, %</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>64.3</td>
<td>61.3</td>
<td>.81</td>
</tr>
<tr>
<td>Widowed</td>
<td>7.9</td>
<td>9.3</td>
<td></td>
</tr>
<tr>
<td>Divorced/separated</td>
<td>9.9</td>
<td>9.7</td>
<td></td>
</tr>
<tr>
<td>Living with a partner</td>
<td>0.2</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td>Never married</td>
<td>17.6</td>
<td>19.2</td>
<td></td>
</tr>
<tr>
<td>Employment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Currently employed</td>
<td>27.1</td>
<td>26.0</td>
<td>.26</td>
</tr>
<tr>
<td>Unemployed</td>
<td>22.4</td>
<td>26.8</td>
<td></td>
</tr>
<tr>
<td>Homemaker</td>
<td>37.3</td>
<td>37.0</td>
<td></td>
</tr>
<tr>
<td>Student</td>
<td>13.3</td>
<td>10.1</td>
<td></td>
</tr>
<tr>
<td>Religion, %</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ancestral</td>
<td>1.7</td>
<td>3.2</td>
<td>.32</td>
</tr>
<tr>
<td>Buddhist</td>
<td>34.7</td>
<td>36.5</td>
<td></td>
</tr>
<tr>
<td>Christian</td>
<td>58.8</td>
<td>57.8</td>
<td></td>
</tr>
<tr>
<td>Other or combination</td>
<td>4.8</td>
<td>2.5</td>
<td></td>
</tr>
</tbody>
</table>

Note. The media-only group consisted of women assigned to media education only; the combined intervention group consisted of women assigned to both lay health worker outreach and media education. Media-only, n = 291; combined intervention, n = 282. Data are only from third, fourth, and fifth community-based agencies conducting the lay health worker outreach.
TABLE 2—Obtaining a Pap Test by Intervention Group: Vietnamese REACH 2010 Study, Santa Clara County, Calif, 2000–2004

<table>
<thead>
<tr>
<th>Responses</th>
<th>Media-Only Group</th>
<th>Combined Intervention Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Preoutreach, Postoutreach, P*</td>
<td>Preoutreach, Postoutreach, P*</td>
</tr>
<tr>
<td>Saw campaign ads on television</td>
<td>461</td>
<td>60.1</td>
</tr>
<tr>
<td>Heard campaign ads on radio</td>
<td>465</td>
<td>78.1</td>
</tr>
<tr>
<td>Read campaign newspaper ads</td>
<td>457</td>
<td>57.3</td>
</tr>
<tr>
<td>Read campaign newspaper articles</td>
<td>461</td>
<td>48.2</td>
</tr>
<tr>
<td>Ever had Pap test (all participants)*</td>
<td>481</td>
<td>70.1</td>
</tr>
<tr>
<td>Ever had Pap test (among those who had not had Pap test preoutreach)*</td>
<td>144</td>
<td>0</td>
</tr>
<tr>
<td>Being up-to-date: had Pap test in last year (all participants)*</td>
<td>458</td>
<td>50.9</td>
</tr>
<tr>
<td>Ever thought about having Pap test (among those who had not had Pap test pre- or postoutreach)*</td>
<td>86</td>
<td>55.8</td>
</tr>
</tbody>
</table>

Note. Pap = Papanicolaou. The media-only group consisted of women assigned to media education only; the combined intervention group consisted of women assigned to both lay health worker outreach and media education.

* Pre- vs Postoutreach.
* Excludes “don’t know” responses.

compared with the overall effect of participating in the combined intervention.

**DISCUSSION**

This study demonstrates that Vietnamese American LHWs can help women obtain Pap tests in the context of a Vietnamese-language media education campaign. The combination of LHW outreach and media exposure produced large increases in Pap testing. In just 3 to 4 months, LHWs helped nearly half the women who had never had a Pap test to obtain their first test, and one fifth to become up-to-date. LHW outreach was more effective than media exposure in teaching women specific health information about causes of cervical cancer. Nevertheless, exposure to the media campaign alone appears to have motivated over one quarter of women in the comparison group to obtain their first Pap test, although far fewer women became up-to-date. We can reject other possible explanations for differences in outcomes between the 2 groups (i.e., sociodemographics, levels of awareness before the study, or exposure to our media campaign) because the 2 groups were similar in these regards.

These findings raise the question of whether there are specific factors associated with Vietnamese American women’s obtaining Pap tests. The regression analysis suggested that participation in the LHW outreach was strongly associated with obtaining a first Pap test or becoming up-to-date. Women in the combined intervention group were 2.7 times more likely to have become up-to-date than women in the media-only group.

Additionally, women who read at least 1 of our newspaper articles were twice as likely to become up-to-date or obtain a first Pap test. This suggested that newspaper articles have an impact above and beyond a general media campaign, perhaps because such articles provide detailed information in a form that women can contemplate and keep for future reference.

Being married was also associated with Pap testing, increasing the likelihood of becoming up-to-date or obtaining a first Pap test by 1.7 times. Marital status is undoubtedly related to Pap testing during routine obstetrical care but also may include husbands’ support in encouraging their wives to get appointments for Pap tests and driving them to the appointments.

Finally, women were more likely to become up-to-date if they learned that HPV causes cervical cancer or learned that Pap testing is recommended even for virgins. However, learning medical facts alone did not increase the likelihood of a woman’s getting a Pap test nearly as much as the overall effect of participating in the LHW outreach program. These findings suggest that the synergy of LHW outreach and a media campaign produced conditions, beyond just educating women about specific facts, that stimulated them to obtain Pap tests. The LHWs’ encouragement and logistical assistance most likely played an important role in helping women obtain Pap tests.34

**Limitations**

This study has several limitations. We could not randomize the few women who came from the same households because of potential cross contamination. Ethically, we could not exclude them from the study. However, women participating in LHW outreach small groups were expected to influence each other, so any bias in outcomes would be minimal.

Data were collected through self-reports. Even though we described the Pap testing procedure, it is possible that some women mistakenly thought they had obtained a Pap test when they had only received a pelvic examination. At baseline, this would result in conservative bias (higher baseline). At postoutreach, this could have resulted in overreporting. Some women may have reported that they had a Pap test in order to please the LHWs, community-based organizations, or researchers.

It is also possible that the use of different questionnaire procedures (in person vs by telephone) may have produced differences between the groups in the accuracy of data.
TABLE 4—Logistic Regression Model With Variables Associated With Obtaining a Pap Test
Vietnamese REACH 2010 Study, Santa Clara County, Calif, 2000–2004

<table>
<thead>
<tr>
<th>Variable</th>
<th>β Coefficient</th>
<th>SE</th>
<th>P</th>
<th>OR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Currently married</td>
<td>.507</td>
<td>.196</td>
<td>.009</td>
<td>1.661</td>
<td>1.132, 2.437</td>
</tr>
<tr>
<td>Read newspaper article promoting</td>
<td>.720</td>
<td>.244</td>
<td>.003</td>
<td>2.055</td>
<td>1.274, 3.316</td>
</tr>
<tr>
<td>Pap tests at pre- or postoutreach</td>
<td>.984</td>
<td>.195</td>
<td>&lt;.001</td>
<td>2.676</td>
<td>1.826, 3.921</td>
</tr>
</tbody>
</table>

Note. LHW = lay health worker; Pap = Papanicolaou; HPV = human papilloma virus. Variables eliminated by the backward stepwise procedure were age; age²; years in the United States; education; employment; unemployed vs all other conditions; married vs all other conditions; change in exposure to TV ads; change in exposure to radio ads; change in exposure to campaign newspaper articles; learning that HPV causes cervical cancer; learning that smoke exposure causes cervical cancer; learning that lack of personal cleanliness does not cause cervical cancer; learning that heredity does not cause cervical cancer; learning that those aged 18 years or older should obtain Pap tests; learning that virgins should obtain Pap tests; interaction term between group and change in exposure to TV ads; interaction term between group and change in exposure to radio ads; interaction term between group and change in exposure to campaign newspaper articles.

The time interval of 3 to 4 months between the pre- and postoutreach measurements was short given the steps involved in deciding to get a Pap test, making an appointment, and waiting to see a provider. The short measurement period created a conservative bias in our results. It is possible that a longer time interval might have allowed us to measure additional cases of Pap testing.

Although the regression procedure produced reliable results, it is possible that we did not completely measure all factors associated with becoming up-to-date. For example, we did not measure exposure to every feature of the media campaign or the use of the low- or no-cost Pap clinic at Silver Creek Clinic in San Jose, Calif. Also, the final regression model successfully predicted a large proportion
(82%) of the cases that had not become up-to-date but was less successful at predicting those cases that became up-to-date (35%). This is partly an artifact of having a greater proportion of cases that did not become up-to-date (65%). The model therefore tells us more about why women did not get Pap tests.

Conclusions
This randomized trial clearly demonstrates the efficacy of LHW outreach and a media campaign in motivating Vietnamese American women in an urban community to obtain Pap tests. Asian Americans constitute 1 of the fastest-growing ethnic groups in the United States, yet many Asian Americans are still not being reached for cancer screening. This may be because many Asian Americans, especially immigrants, lack access to affordable, linguistically and culturally appropriate health care services. It may also be because they lack access to information about services such as Pap testing. This study shows that a coalition serving Vietnamese can organize community-based efforts to reach women through sources they trust—their friends and their ethnic media. This study provides the strongest evidence to date that Vietnamese LHWs truly “hold a key” to reducing health disparities.

About the Authors
Jeremiah Mock is with the Department of Anthropology, History and Social Medicine and the Center for Health and Community at the University of California, San Francisco. Stephen J. McPhee, Thoa Nguyen, Chung Wong, Ky Q. Lai, Tung T. Nguyen, Hiep Doan, and Kim H. Nguyen are with the Vietnamese Community Health Promotion Project, Division of General Internal Medicine, Department of Medicine, University of California, San Francisco. Ngoc Bui-Tong is with the Department of Health and Human Services, Ambulatory and Community Health Services, Santa Clara County, California.

Requests for reprints should be sent to Stephen J. McPhee, MD, Vietnamese Community Health Promotion Project, University of California, San Francisco, 44 Page St, Suite 500, San Francisco, CA 94102 (e-mail: smcphee@medicine.ucsf.edu) or Jeremiah Mock (e-mail: Jeremiah.Mock@ucsf.edu).

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Contributors
J. Mock oversaw all aspects of the evaluation research, conducted and synthesized analyses, and led the writing of the article. S. J. McPhee originated the study and supervised all aspects of its implementation. T. Nguyen organized the lay health worker outreach program. C. Wong developed the media education campaign. H. Doan and K. Q. Lai assisted with the implementation of the study. K. H. Nguyen contributed to the data analysis. T. T. Nguyen and N. Bui-Tong assisted with the study implementation. All authors helped to conceptualize ideas, interpret findings, and review drafts of the article.

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Ngoc Bui-Tong also served as chair of the coalition in 2003–2004.

Note. The content of the article is solely the responsibility of the authors and does not necessarily represent the views of the Centers for Disease Control and Prevention.

Human Participation Protection
This study was approved by the institutional review board at the University of California, San Francisco.

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