Effectiveness of *Cultivando La Salud*: A Breast and Cervical Cancer Screening Promotion Program for Low-Income Hispanic Women

María E. Fernández, PhD, Alicia Gonzales, MSW, Guillermo Tortolero-Luna, MD, PhD, Janet Williams, MPH, Monica Saavedra-Embesi, MPH, Wenyaw Chan, PhD, and Sally W. Vernon, PhD

Objectives. We tested the effectiveness of a lay health worker intervention to increase breast and cervical cancer screening among low-income Hispanic women.

Methods. Participants were women 50 years and older who were nonadherent to mammography (n=464) or Papanicolaou (Pap) test (n=243) screening guidelines. After the collection of baseline data, lay health workers implemented the *Cultivando la Salud* (CLS; Cultivating Health) intervention. Data collectors then interviewed the participants 6 months later.

Results. At follow-up, screening completion was higher among women in the intervention group than in the control group for both mammography (40.8% vs 29.9%; $P<.05$) and Pap test (39.5% vs 23.6%; $P<.05$) screening. In an intent-to-treat analysis, these differences remained but were not significant. The intervention increased mammography self-efficacy, perceived susceptibility, perceived survivability, perceived benefits of mammography, subjective norms, and processes of change. The intervention also significantly increased Pap test self-efficacy, perceived benefits of having a Pap test, subjective norms, and perceived survivability of cancer. It did not change Pap test knowledge, perceived susceptibility, or perceptions about negative aspects of Pap test screening.

Conclusions. Our results add to the evidence concerning the effectiveness of lay health worker interventions for increasing Pap test screening and mammography. Future research should explore the effectiveness of CLS in other Hispanic groups, the mechanisms through which interpersonal communication influences decisions about screening, and how effective interventions such as CLS can best be adopted and implemented in community-based organizations or other settings. (*Am J Public Health.* 2009;99:936–943. doi:10.2105/AJPH.2008.136713)

Although incidence and mortality rates for breast cancer are lower among Hispanic women than among non-Hispanic women, Hispanic women are more likely to be diagnosed at a later stage of the disease and have lower survival rates.[1–6] Cervical cancer incidence and mortality rates are nearly twice as high for Hispanic women as they are for non-Hispanic White women; in addition, Hispanic women are diagnosed at later stages and have poorer survival rates.[1,6]

Lower levels of cancer screening among Hispanic women are the result of psychosocial factors including fear of cancer, invasive procedures, and pain; lack of knowledge about cancer and its screening methods; attitudes of fatalism; religious or spiritual beliefs; concerns over confidentiality; language barriers and perceived discrimination; embarrassment; and partner disapproval.[1,7–24] External factors also influence screening, such as a lack of health insurance, regular sources of health care, and physician referral; transportation barriers; cost; and restrictive work policies.[7–12,14,15,25–38]

Successful cancer-control programs for Hispanic women have used (1) Spanish-language media; (2) role models appearing in mass media (newspapers, television) with social reinforcement by community volunteers; (3) "small media," such as videos delivered in group settings or kiosks; (4) multimethod approaches; and (5) lay health workers or *promotoras*.[38–47] The lay health worker or *promotora* model, which was first developed in Latin America, is a peer health education model whereby respected community members educate peers in a culturally appropriate manner.[48,49]

A recent Cochrane review documented the effectiveness of lay health worker programs for increasing immunization uptake, promoting breastfeeding, improving tuberculosis outcomes, and reducing morbidity and mortality as the result of childhood illnesses.[50,51] In another systematic review, the US Preventive Services Task Force identified 1-on-1 education as an effective strategy for increasing both breast and cervical cancer screening.[52] The task force was unable to make a recommendation about the use of lay health worker programs specifically because there were insufficient numbers of published studies evaluating their effectiveness.

Although evidence suggests that lay health worker programs can improve some health behaviors, the effectiveness of this model for increasing cancer screening has yet to be fully explored. To fill this gap in the literature, we implemented and evaluated *Cultivando la Salud* (Cultivating Health), a lay health worker–delivered educational intervention for breast and cervical cancer screening. We expected the intervention would increase mammography and Papanicolaou (Pap) test screening among low-income Hispanic farmworker women who did not adhere to recommended screening guidelines.

METHODS

We developed an educational intervention (*Cultivando la Salud*) in 2004 to increase breast and cervical cancer screening among low-income, low-literacy, Hispanic female farmworkers aged 50 years and older. Even though Pap test screening is recommended for younger women, we chose to include only women 50 years and older because evidence suggests that rates of invasive cervical cancer are higher, rates of screening are lower, and barriers to screening differ among older Hispanic women than among younger women.[13,18,53–57] We

developed the intervention by using principles of community-based participatory research[58] and intervention mapping, a systematic approach for intervention planning and implementation.[14,59] We chose lay health workers to deliver the intervention program because of their unique ability to reach, through personal contact in the community, women who rarely or never access medical care. Lay health workers were expected not only to educate women and motivate them to obtain screening but also to offer practical assistance that would facilitate the women's access to screening services.

The program materials consisted of a program manual, a training curriculum, and a set of teaching tools for the lay health workers ("tool box"). The program manual was designed to increase adoption of the program and to provide guidelines for program implementation and sustainability. It included a description of the program, evidence of its effectiveness, and information about how to develop and manage a lay health worker program. The training curriculum consisted of lesson plans, learning activities, and visual aids for lay health worker training by clinic staff. The "tool box" contained bilingual breast and cervical cancer educational materials including a video, flipchart, breast models, pamphlets, and a teaching guide. The lay health workers used these materials to deliver screening information to women in the community.[60] A pilot study conducted in 2 farmworker communities in south Texas (Brownsville and Pharr) provided information on the appropriateness and acceptability of the educational materials and the feasibility of implementing the program.[14,61]

Study Design

The intervention trial had a pre–post comparison group design with matched pairs of communities in 2 geographic areas, and communities within pairs were randomly assigned to either the intervention or control group. We selected 2 communities along the US–Mexico border (Anthony, NM, and Eagle Pass, TX) and 2 in the Central Valley of California (Merced and Watsonville). We selected *colonias* (neighborhoods) based on 4 criteria: the existence of a Community and Migrant Health Center with a lay health worker program, a high proportion of farmworker women who were 50 years and older living in the catchment area of the Community/Migrant Health Center, no active breast or cervical cancer educational program currently in operation, and the availability of a screening site supported by the National Breast and Cervical Cancer Early Detection Program within 20 miles of the health center. We selected farmworker "home-based" communities (where farmworker families return following migration for work), because farmworker families typically live in these communities for several months of the year, easing participant follow-up and tracking. Each health center agreed to not engage in any other breast or cervical cancer outreach and education activities in the targeted communities during the term of the study. The 2 communities in each area (US–Mexico border and California Central Valley) were randomly assigned to either the intervention group (Merced and Eagle Pass) or the control group (Watsonville and Anthony).[60]

Participant Recruitment

To be eligible to participate in the baseline survey, women had to be 50 years or older, have no prior or current cancer diagnosis, and have farmworker status (defined as personal or family participation in farm work for at least 5 years during their lifetime). Participants were identified by using the EPI Sampling Quadrants Scheme.[62] Each *colonia* was divided into 4 quadrants, and after selecting a starting point in each quadrant, data collectors systematically walked the neighborhood door-to-door. Data collectors screened households for eligible women and continued to the next house until all households in the quadrant had been visited. Eligible women were invited to participate in the study, and those who agreed completed the baseline interview. If more than 1 woman in a household was eligible, the woman with the most recent birth date was selected. Participants received a $20 incentive upon completion of the interview.

Baseline data were collected during a 2-month period. All interviewers were recruited from the community and were female, bilingual, and had attended a 2-day training session before data collection. All interviews were conducted in Spanish and lasted approximately 2 hours.

During the recruitment period, 805 eligible women were asked to complete the baseline survey; of these, 713 (88.6%) agreed. Response rates were high in Watsonville (96%), Anthony (92%), and Eagle Pass (88%), but lower in Merced (70%). Among those who agreed to be surveyed, only women not adherent to breast or cervical cancer screening recommendations (i.e., no mammogram in the past year or no Pap test in the past 3 years) were invited to participate in the intervention trial. Of the 713 women who completed the baseline survey, 497 were nonadherent to mammography (n=464) or Pap test (n=243) screening recommendations. Some women (n=211) were nonadherent for both mammography and Pap test screening and therefore were included in both cohorts. All nonadherent women agreed to participate in the trial.

Measurements

The baseline interview consisted of 276 brief, closed-ended questions with discrete response categories. The instrument was refined after pilot testing with 200 low-income Hispanic women and is described elsewhere.[63] The sociodemographic characteristics assessed included age, education, place of birth, income, insurance, marital status, farmworker-related information (e.g., migration, crops), and acculturation level. Screening behavior was assessed by asking participants the exact month and year of their last mammogram and Pap test. Those unable to remember the date were asked to estimate the number of years elapsed since being screened.

Acculturation was measured with the Bidimensional Acculturation Scale, which included 60 items.[64] Psychosocial constructs were assessed with 5-point Likert-type scales. The measure to assess processes of change in decision making was adapted from an existing scale and included 7 items for processes of change for Pap test screening and 9 items for mammography screening.[65] Other scales, including those assessing the perceived pros and cons (benefits and barriers) of mammography (20 items) and Pap test screening (16 items),[66–68] subjective norms (6 items),[69] perceived survivability of cancer (2 items),[70] perceived susceptibility to cancer (4 items),[71,72] and mammography and Pap test self-efficacy (a measure of how confident the woman feels in her ability to obtain the screening; 11 and 8 items, respectively),[73] included items from existing scales and new

items generated from our focus groups and other findings, as described elsewhere.[74] The internal consistency of scales with more than 3 items for the baseline data was as follows: perceived susceptibility to breast and cervical cancer (0.93 and 0.93, respectively), perceived pros and cons of mammography (0.84 and 0.82, respectively), perceived pros and cons of Pap test screening (0.87 and 0.75, respectively), processes of change for mammography (0.57) and Pap test (0.90) screening, self-efficacy for mammography (0.92) and Pap test (0.95) screening, subjective norms for mammography (0.80) and Pap test (0.82) screening, and acculturation (0.90).

Intervention Implementation

Lay health workers contacted all women in the intervention communities who had completed the baseline survey to set up an appointment for a 1-on-1 session in the women's homes within 2 months of the initial contact. The sessions, lasting 1 to 2 hours each, consisted of a presentation and discussion using the *Cultivando la Salud* materials. At the end of each session, the lay health workers gave the women information about local providers of breast and cervical cancer screening. Two weeks after the intervention was delivered, the lay health workers contacted the participants in person or by phone to provide any further assistance that might be needed.

We used process evaluation measures, including lay health worker encounter forms and randomly selected instances of direct observation (by a supervisor), to provide information about program delivery.

Women in the intervention and control communities were followed up 6 months after the completion of the educational intervention. During the follow-up visit, the women completed a second face-to-face interview and received an incentive of $20.

Analyses

To assess the overall effectiveness of the intervention on the primary outcomes, we calculated the percentage of women who reported having completed screening for each behavioral outcome (mammography and Pap test) among those reached for follow-up in the mammography (n=307) and Pap test (n=170) cohorts. We also calculated the percentage of women who reported having completed screening among all women regardless of whether they were reached for follow-up (intent-to-treat analysis, n=497).

We first tested differences in screening completion between the intervention and control groups stratified by geographic region (US–Mexico border and California Central Valley) using the Mantel–Haenszel test. We then used generalized linear mixed models to perform the analysis of the effect of the intervention on mammography and Pap test screening. In these analyses, demographic variables that were significantly associated with the outcomes or were significantly different between groups (i.e., education for the Pap test model, and income and insurance for the mammography model) were included in the fixed effect for adjustment of the model that had logit as its link function. Site location (US–Mexico border or California) was used as a random effect to adjust for possible correlation of the outcome within the geographic area.

The validity of self-reported screening behavior was evaluated by reviewing the medical records of all women who reported having completed screening and a random sample of 25% of participants who reported having no screening in each site. Screening records for 58.3% of women in the mammography cohort and 57.3% of women in the Pap test cohort were located. We calculated validity with concordance, sensitivity, and specificity estimates.[75] Overall, concordance, sensitivity, and specificity estimates for both cohorts met Tisnado's[76] criteria for good agreement (concordance estimate>0.80). The concordance estimate for the mammography cohort was 0.81, with sensitivity and specificity estimates of 0.83 and 0.81, respectively. For the Pap test cohort, the concordance estimate was 0.83, with sensitivity and specificity estimates of 0.83 and 0.82, respectively.

To assess the efficacy of the intervention on intermediate variables, we first calculated scale scores for each construct. We then assessed differences at follow-up (posttest) between the intervention and control groups on intermediate variables by using a generalized linear mixed model with site as the random effect and the pretest score serving as a covariate. We also adjusted for demographic variables.

RESULTS

The demographic information of the women participating in the intervention trial is provided in Table 1. The intervention and control groups were equivalent in demographic characteristics and most psychosocial constructs measured at baseline. In the mammography cohort, the intervention group had significantly higher baseline scores for self-efficacy (P=.01) and mammography knowledge (P=.014) and lower scores for perceived pros (P<.001) and cons (P<.001) of mammography screening. In the Pap test cohort, the intervention group had significantly lower scores for perceived pros (P=0.03) and cons (P=.001) of Pap test screening. We controlled for pretest scores in the analysis of the intervention effect on intermediate variables.

During the intervention phase, lay health workers attempted to deliver the program to all women participating in the cohort study. Process evaluation measures showed that 138 women (61%) received the required intervention strategies (either video or flipchart) and at least the minimum (30 minutes) face-to-face time with the lay health worker. These measures indicated high levels of intervention fidelity across both intervention sites: 99% of contacts received required intervention materials, 97% lasted 1 hour or more, and 99% lasted 30 minutes or more.

The overall 6-month follow-up rate was 66.9%. There were no statistically significant differences in demographic variables or acculturation between women contacted for follow-up and those lost to follow-up. There was also no significant difference in the follow-up rate by study arm among women in the mammography cohort (63.3% and 70.8% for the intervention and control sites, respectively; P=.085). However, there were differences in follow-up rate by study arm in the Pap cohort (61.4% and 80.2% for the intervention and control sites, respectively; P=.001). Across study groups, there were no significant differences in demographic characteristics among those lost to follow-up.

The proportion of women by intervention group who completed the recommended screening among those reached for follow-up is shown in Table 2. In the mammography

TABLE 1—Demographic Characteristics of Study Participants: *Cultivando La Salud* Intervention

	Mammography Cohort, % (No.)	Pap Cohort, % (No.)
Sample, no.	464	243
Age, y		
50-59	48.9 (227)	45.2 (110)
60-69	26.9 (125)	25.5 (62)
≥70	24.1 (112)	29.2 (71)
Education, y		
0	8.8 (41)	9.1 (22)
1-5	45.9 (213)	46.1 (112)
6-11	33.2 (154)	34.2 (83)
≥12	9.1 (42)	7.4 (18)
Marital status		
Never married	2.8 (13)	2.9 (7)
Married or living together	67.6 (314)	61.7 (150)
Divorced or separated	7.3 (34)	8.3 (20)
Widowed	22.0 (102)	27.2 (66)
Income, $		
<5000	24.7 (115)	23.0 (56)
5000-9999	27.4 (127)	23.9 (58)
10000-19999	22.8 (106)	24.7 (60)
≥20000	8.2 (38)	6.5 (16)
Don't know	16.4 (76)	21.4 (52)
Health insurance coverage		
Any	55.4 (257)	54.7 (133)
None	44.6 (207)	45.3 (110)
Years in the United States		
<5 y	4.1 (19)	4.9 (12)
5-10 y	8.2 (38)	7.4 (18)
11-19 y	7.8 (36)	7.8 (19)
≥20 y	56.5 (262)	56.8 (138)
Born in United States	20 (93)	21.0 (51)
Acculturation		
Low	75.0 (348)	76.5 (186)
Bicultural	24.6 (114)	23.5 (57)

cohort, a significantly higher percentage of women in the intervention group than in the control group completed screening (40.8% vs 29.9%; $P<.05$). In the Pap cohort, a significantly higher percentage of women in the intervention group than in the control group completed screening (39.5% vs 23.6%; $P<.05$).

We also calculated screening completion by using an intent-to-treat analysis. For mammography (n=464), although a higher percentage of women in the intervention group than in the control group reported mammography screening (25.6% vs 20.6%), this difference was not significant ($P>.05$). Similarly, for Pap test screening (n=243) although a higher proportion of women in the intervention group than in the control group completed a Pap test within 6 months (24.2% vs 18.9%), this difference was not significant ($P>.05$).

The intervention appeared to be equally effective among women with low levels of acculturation and those who were bicultural. In fact, although not statistically significant, a somewhat higher percentage of women with low levels of acculturation (42.5%) than bicultural women (33.3%) reported being screened ($P=.28$) in the intervention group. Among women in the Pap test cohort, 39.7% of women with low levels of acculturation completed screening compared with 41.2% of bicultural women ($P=.562$) in the intervention group. Thus, acculturation had no effect on intervention effectiveness.

The mean posttest score for both the intervention and the control groups for the intermediate variables and the results of the adjusted linear regression analyses are shown in Table 3. Women in the intervention group had significantly higher mean scores for mammography self-efficacy, perceived susceptibility to breast cancer, perceived survivability of breast cancer, perceived mammography pros, mammography subjective norms, and mammography processes of change. Scores on the breast cancer knowledge scale were higher for women in the intervention group, but this difference was not significant. Nevertheless, when asked about ways breast cancer could be detected, women in the intervention group were more likely than were those in the control group to mention mammography (42.3% vs 28.8%; $P=.014$).

Scores on Pap test self-efficacy, perceived pros, subjective norms, and processes of change were significantly higher among women in the intervention group. There were no statistically significant posttest differences in perceived Pap test cons, cervical cancer knowledge, or perceived survivability of cervical cancer between the intervention and control groups. There were also no significant posttest differences between the intervention and control groups in knowledge of the Pap test.

DISCUSSION

Our systematic review of the literature assessing the effectiveness of lay health worker models indicated that although such models represent a promising approach in health promotion, the evidence is insufficient to justify practice or policy recommendations.[50] Although intervention studies with lay health workers targeting Hispanics exist, few included rigorous evaluation methods to test program effectiveness,[50,77] and even fewer evaluated effects on mammography and Pap test screening.[78–80] Our study adds to the evidence of the effectiveness of the lay health worker

TABLE 2—Screening Completion, by Study Group: *Cultivando La Salud* Intervention

	Intervention Group, No. (%)	Comparison Condition, No. (%)	P^a	P^b
Mammography cohort				
With follow-up[c]	53/130 (40.8)	53/177 (29.9)	.046	.041
Without follow-up[d]	53/207 (25.6)	53/257 (20.6)	.278	.142
Pap test cohort				
With follow-up[c]	32/81 (39.5)	21/89 (23.6)	.009	.002
Without follow-up[d]	32/132 (24.2)	21/111 (18.9)	.193	.411

Note. Pap = Papanicolaou.
[a]Adjusted for site location with the Mantel-Haenszel test.
[b]Adjusted for site location and demographics (generalized linear mixed model).
[c]Number of women receiving screening over number of women completing follow-up.
[d]Number of women receiving screening over total number of women within the cohort.

approach among Hispanics and also to the US Preventive Services Task Force recommendation of 1-on-1 education as an effective strategy for increasing both breast and cervical cancer screening.[52] Our study also supports the Task Force recommendations for use of "small media" materials for increasing breast and cervical cancer screening[52] and adds to the small number of studies that target Hispanic women.

Because several studies have shown that less acculturated women are less likely to obtain mammograms and Pap tests,[81–84] we designed our intervention materials to appeal to these women.[7] Our study findings showed that the program was equally effective among low-acculturated and bicultural women. Future studies designed to identify which components of effective programs are most salient to persons of varying acculturation levels could improve our understanding of how to develop appropriately targeted programs for Hispanics.

TABLE 3—Effect of the Intervention on Intermediate Impact Variables: *Cultivando La Salud* Intervention

	Intervention Group, Mean (SD)	Control Group, Mean (SD)	*P*
Mammography-related variables			
Self-efficacy	4.24 (0.69)	3.98 (0.89)	<.001
Perceived susceptibility to breast cancer	3.44 (1.10)	3.23 (0.92)	.012
Perceived survivability of breast cancer	3.57 (0.73)	3.35 (0.55)	.004
Breast cancer knowledge (range = 0–7)	4.69 (1.31)	4.38 (1.38)	.431
Perceived pros	4.56 (0.49)	4.24 (0.53)	<.001
Perceived cons	2.60 (0.68)	2.57 (0.58)	.397
Subjective norms	4.23 (0.70)	3.76 (0.68)	<.001
Processes of behavior change	3.71 (0.66)	3.53 (0.62)	.006
Pap test–related variables			
Self-efficacy	4.29 (0.90)	3.87 (0.99)	.017
Perceived susceptibility to cervical cancer	3.46 (1.10)	3.23 (1.00)	.209
Perceived survivability to cervical cancer	3.82 (0.89)	3.80 (0.71)	.587
Cervical cancer knowledge (range = 0–15)	8.23 (2.14)	8.45 (2.64)	.112
Perceived pros	4.50 (0.56)	4.25 (0.52)	<.001
Perceived cons	2.79 (0.71)	2.84 (0.59)	.727
Subjective norms	4.15 (0.71)	3.65 (0.70)	<.001
Processes of behavior change	4.28 (0.64)	3.83 (0.72)	<.001

Note. Pap = Papanicolaou. All scale scores except knowledge scales range from 1 to 5. *P* values are adjusted.

We identified key determinants of screening during the pilot phase.[14,61] During program development, we chose methods and strategies that were expected to affect these determinants[59]: role models, persuasive messages, vicarious reinforcement,[85] facilitation,[86] and entertainment education (providing learning through a medium that both educates and entertains).[87] The results showing that the intervention did influence several of these variables (Table 3) provide further evidence that the observed program effectiveness was attributable to the intervention and not to another external factor. These results also provide information about the effect of specific elements of the program. The intervention increased self-efficacy and positive attitudes toward screening and decreased fatalistic beliefs about the survivability of cancer (for breast cancer) but did not influence perceptions about the negative aspects of screening (cons).

We targeted perceived susceptibility in our program because it has been shown to be associated with breast and cervical cancer screening.[88,89] We included in our educational materials staged testimonials of women who had been diagnosed with these cancers; the actors were carefully chosen so that the study participants would identify with the characters and messages. Although these strategies influenced perceived susceptibility for breast cancer, they did not seem to influence perceived susceptibility for cervical cancer. This may indicate that stronger messages or different approaches are needed. Future studies should examine how changes in perceived susceptibility and other determinants interact to influence mammography and Pap test screening.

Although the intervention successfully increased the perception of pros about both mammography and Pap test screening, neither the perception of cons for mammography nor those for Pap test screening were significantly different between the intervention and control groups at the posttest assessment. Nevertheless, the intervention influenced the overall decisional balance scores (decisional balance = pros − cons),[65] which were higher in the intervention group than in the control group (for both mammography and Pap test screening). It is possible that an intervention such as *Cultivando la Salud* may increase positive attitudes about screening but may not be sufficient

to decrease negative (and perhaps accurate) perceptions of the screening tests (e.g., pain, embarrassment, cost, inconvenience). These findings indicate that it may be more important and feasible to shift decisional balance by increasing the perception of pros rather than by decreasing the perception of cons.

In general, the intervention had a similar effect on intermediate variables for both mammography and Pap test screening. One difference was that although the intervention increased perceived susceptibility and survivability of breast cancer among women in the mammography cohort, it did not increase these perceptions related to cervical cancer among women in the Pap test cohort. Because mean scores for cervical cancer survivability were high in both the intervention and the control groups, it is possible that there is a ceiling effect and that the intervention messages were not strong enough to further increase perceived survivability.

Strengths and Limitations

A strength of our study is that we assessed the effectiveness of the *Cultivando la Salud* program under real-world conditions. The program was implemented in the same manner as it would be in clinic and community settings. Although many intervention trials describe implementation by researchers or program developers, in our study the clinic staff used the program to train lay health workers, who in turn delivered the intervention. This process increased the external validity of our study, and practitioners can be more confident that the intervention will have a similar impact in their communities than if we had conducted the trial under more artificial conditions.

Several factors limit the generalizability of our study findings. First, although the program was designed to be applicable to Hispanics from different subpopulations and used bilingual materials, the study participants were primarily Mexican American. Studies examining program effectiveness with other Hispanic populations are warranted. Also, because most participants preferred the Spanish-language materials, we recommend future studies evaluating the English-language materials. Finally, because this study included only women who were 50 years and older, no information about the potential effectiveness of the Pap test screening component among younger women was produced. Evaluation of the Pap test screening materials among younger women is encouraged.

Two possible limitations are related to the study response rate. First, the reported response rate (88.6%) was based on all women who completed the baseline interview among all women eligible for the interview. However, only a subset of these women (i.e., those nonadherent to breast and cervical cancer screening) was eligible for the intervention trial. Because we do not have screening information for those who refused to participate in the survey, we cannot calculate a response rate specifically for nonadherent women. Another possible limitation is the potential for nonresponse bias introduced by different response rates across sites. We did not have information on women who refused to participate, so we could not analyze differences in demographic characteristics or other factors that might distinguish participants from nonparticipants. However, because the invitation to participate in the intervention trial took place after completion of the survey, and all women across the 4 sites who had completed the survey and were nonadherent to screening agreed to participate in the trial, it is unlikely that group assignment influenced the participation rate.

Another limitation of the study was the rate of loss to follow-up (33.1%). Although we attempted to reach participants for follow-up during seasons when there was less migration for farm work, migration schedules vary depending on the crops that individual farmworker families typically follow. The fact that women in the intervention group had higher rates of loss to follow-up than did those in the control group may partially be explained by the fact that the intervention group on the US–Mexico border (Eagle Pass) had a higher proportion of women who were still doing farm work (15% vs 5%) and migrating for work (65% vs 25%) than did the control group. Another potential explanation of differential follow-up across groups is that the additional time burden for women in the intervention group may have affected willingness to complete final follow-up. At follow-up, women in the intervention group were being asked to spend another 2 hours with a data collector to talk about breast and cervical cancer screening yet again. This may have seemed unnecessary, particularly for those who had already obtained screening or had made a decision not to be screened.

When we addressed the potential bias introduced by our rate of loss to follow-up in an intent-to-treat analysis, screening completion among the intervention group remained higher than in the control group, but these differences were not statistically significant. Analyses that compared women who were lost to follow-up and those who remained in the study, however, revealed no differences on variables related to screening (income, education, insurance). Thus, the intent-to-treat analysis may be overly conservative.

Conclusions

Our study provided further evidence that the lay health worker model can increase breast and cervical cancer screening among low-income Hispanic women. Although several examples of successful lay health worker programs have now been documented, more research that explores the interaction between lay health workers and community members is needed. Such studies will improve our understanding of the active ingredients of the lay health worker model (e.g., information tailoring, trust, modeling, persuasion) and subsequently lead to more effective interventions, lay health worker training, and implementation protocols. ■

About the Authors

María E. Fernández, Janet Williams, and Sally W. Vernon are with the Center for Health Promotion and Behavioral Sciences, School of Public Health, University of Texas Health Science Center, Houston. Alicia Gonzales and Monica Saavedra-Embesi are with the National Center for Farmworker Health, Buda, TX. Guillermo Tortolero-Luna is with the Comprehensive Cancer Center, University of Puerto Rico, San Juan. Wenyaw Chan is with the Department of Biostatistics, School of Public Health, University of Texas Health Science Center, Houston.

Requests for reprints should be sent to María E. Fernández, PhD, University of Texas–Houston School of Public Health, Division of Health Promotion and Behavioral Sciences, 7000 Fannin St, Suite 2558, Houston, TX 77030 (e-mail: Maria.E.Fernandez@uth.tmc.edu).

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Contributors

M.E Fernández, A. Gonzales, and G. Tortolero-Luna originated the study, designed the measurement instruments and research protocols, and oversaw study implementation. A. Gonzales and M. Saavedra-Embesi,

our community partners from the National Center for Farmworker Health, drafted the descriptions of the program and also participated in the implementation of the study. J. Williams drafted the measurement sections of the article and the tables. W. Chan assisted in the analysis of the data for the revised article and contributed to the analysis and results sections of the article. All authors participated in conceptualization of ideas, interpretation of results, and article review and editing.

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Human Participant Protection

This research was conducted with the approval of the Committee for the Protection of Human Subjects at the University of Texas Houston Health Science Center, School of Public Health (HSC-SPH-99-082).

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