

A community-based education program about cervical cancer improves knowledge and screening behavior in Honduran women

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ABSTRACT

Objectives. *This study examined changes in knowledge and behavior after a community-based cervical cancer education program in Honduras.*

Methods. *The program consisted of radio broadcasts targeting rural women and presentations to community nurses. The effectiveness of the radio broadcasts was assessed using a cross-sectional design (control groups $n = 124$, $n = 243$; intervention group $n = 233$). A pre-/post-test design was used to evaluate the nurses' training program ($n = 32$). A subset of nurses ($n = 16$) was retested two years later. Evaluation included *t* tests, chi-square and Fisher exact analyses.*

Results. *The radio broadcast increased the proportion of women who were familiar with the term "cervical cancer," who could identify means of preventing cervical cancer, and who understood the purpose of the Pap smear. In addition, older and under-screened women were successfully recruited for screening via radio. The nurses' program improved understanding of the correct use of the Pap smear, the age-related risk of dysplasia, and the proper triage of abnormal results. The nurses retained a significant amount of knowledge two years after this training.*

Conclusions. *In developing countries, inexpensive, community-based educational programs using radio broadcasts and lecture presentations can increase cervical cancer knowledge and improve screening behavior.*

Key words

Communications media; developing countries; female; health education; mass screening; uterine cervical neoplasms/dysplasia; Honduras.

Cervical cancer is the leading cause of cancer death among women in de-

veloping countries, primarily due to the lack of organized screening programs (1). To obtain a Pap smear, each woman must proactively seek screening opportunities. Because the onus of screening is on the individual, each woman's understanding of cervical cancer prevention becomes crucial in her decision to obtain a Pap smear. As expected, prior research shows a positive association between a woman's knowledge about cervical cancer

screening and her likelihood of obtaining a Pap smear (2–5). The recommendation of a health care provider can also influence screening behavior (6–8), but many providers in developing countries lack basic knowledge about cervical cancer prevention (9–12).

In Honduras, the incidence of cervical cancer is 39.6/100 000, four times that of the United States (13, 14); it is the leading cause of cancer death for women. Honduras does not have an

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organized screening program, which likely contributes to the high mortality from cervical cancer. We created an educational program to generate interest in cervical cancer prevention and to create a culture of screening among patients and providers that would persist after the education program ended. To make the most sustainable program possible, local health providers and other community members worked alongside project staff to create a two-part educational program that addressed the knowledge deficits of the community. The objectives of this pilot project were to improve knowledge about cervical cancer prevention and to promote acceptance of Pap smear screening among Honduran women and their health care providers.

MATERIALS AND METHODS

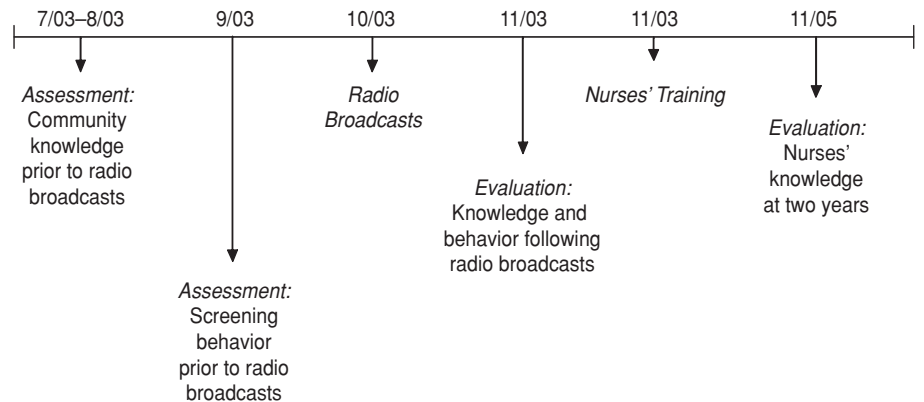
Setting

The project took place in the communities of Yuscaran, Moroceli, and Jicarito in Honduras. The total population of these communities is approximately 30,000, of whom 8,000 are women of reproductive age. Two-thirds of the population lives below the poverty line and half lacks basic sanitation and potable water. The average person has had 2–3 years of schooling, and 30% of the population is illiterate (15). There are two regional radio stations, and most families have battery-powered radios.

Timeline

The project timeline is detailed in Figure 1. The first step, which occurred between July and September 2003, was a baseline assessment of cervical cancer knowledge and screening behavior in the region. During October 2003, members of a U.S.-based nongovernmental organization worked together with Honduran community leaders to develop educational programs appropriate to women in the community and their health care providers. The educational program

FIGURE 1. Timeline of cervical cancer education projects and evaluations in Honduras; 2003 to 2005



for the general public provided information using radio broadcasts. The program for training health care providers consisted of a lecture presentation at the nurses' monthly educational session.

The following messages were emphasized in both educational programs: (a) the Pap smear is the key to preventing cervical cancer, and (b) women aged 30 and over are most at risk for pre-cancerous changes.

Radio program

The radio program consisted of a series of broadcasts on one of the two radio stations in the region. The primary broadcast was an hour-long, stressed the importance of cervical cancer screening, and stated that women aged 30 and over and those who had not been screened in two or more years were at higher risk for developing dysplasia. Short messages emphasizing salient points were also aired. Both U.S. and Honduran health care providers participated in program writing and performance. The hour-long program was broadcast twice daily and the short messages were broadcast at 15 to 30 minute intervals for one week prior to an organized screening activity. No other cervical cancer education programs existed in the region at this time.

Knowledge about cervical cancer was assessed in a sample of women in the community (Group 1: Community knowledge prior to radio broadcasts; $n = 124$). These data were used to represent knowledge in the community at baseline. The women selected for these interviews included all women that were participating in a housing improvement project being conducted by our organization.⁴ All interviews were completed before the radio broadcasts began to ensure that no one in the control group could be influenced by the educational programming.

Unfortunately, screening behavior could not be adequately assessed in the women who participated in the community knowledge assessment (Group 1). Therefore, a second group of women was used to represent screening behavior. All women who presented for Pap smears at two orga-

⁴ All women participated in interviews, but only those women who had a prior history of Pap screening were included in the final analysis. This decision was made because women who have never been screened know less about cervical cancer (3, 4) and there were more unscreened women in the community sample than in the sample used to assess knowledge and behavior after the radio program. To avoid biasing the results toward a positive finding by the unequal distribution of unscreened women, the analysis in all groups was limited to only those women reporting a prior history of screening. A majority of women in both samples reported at least one prior Pap smear; the number of unscreened women in each group was too small to allow for meaningful statistical analysis.

nized screening activities that occurred prior to the radio broadcasts were included in Group 2 (Screening behavior prior to radio broadcasts; $n = 243$).

Group 1 (Community knowledge prior to radio broadcasts; $n = 124$) and Group 2 (Screening behavior prior to radio broadcasts; $n = 243$) were compared to a group that included all women attending an organized screening activity that occurred immediately after the radio broadcasts (Group 3: Knowledge and behavior following radio broadcasts; $n = 233$).⁵ Women in Groups 1, 2, and 3 lived in separate villages located within the same region of Honduras; the socioeconomic status and access to health care were similar for all three groups.

Structured interviews were used to assess knowledge levels in the community before and after the radio broadcasts. The percentage of correct responses in Group 1 (Community knowledge prior to radio broadcasts; $n = 124$) was compared to the percentage of correct responses in Group 3 (Knowledge and behavior following radio broadcasts; $n = 233$). The success of the radio program in recruiting high-risk women for screening was assessed by comparing the number of high-risk women presenting for screening before the radio broadcasts (Group 2; $n = 243$) and after the broadcasts (Group 3; $n = 233$). High-risk women were defined in the radio broadcast as those aged 30 and over and those whose most recent Pap smear was two or more years earlier.

Training for community nurses

The training for community nurses consisted of a 45-minute lecture with visual aids given during the nurses' monthly educational meeting. The lecture focused on the importance of screening, the age group at highest risk for dysplasia, and the Pap smear results that required referral to a gynecologist.

Approximately 70% of the nurses staffing the health centers involved in the project attended the lecture program. The same nurses participated in the pre-intervention, post-intervention, and two-year post-intervention evaluations.

The effectiveness of the presentation was assessed by comparing the percentage of correct answers on pre- and post-intervention questionnaires. A combination of free response and forced-choice questions were included. Two years after the initial intervention, those nurses who had heard the original presentation and were still working in the communities were surveyed to determine their level of knowledge retention.

Data analysis

The use of the data for research purposes was approved by the Institutional Review Board of Boston University. Data were analyzed using SAS statistical software Version 8.2 (SAS Institute Inc., Cary, North Carolina, U.S.A.). Demographic characteristics, knowledge, and screening behaviors were compared for (Group 1: Community knowledge prior to radio broadcasts; $n = 124$), (Group 2: Screening behavior prior to radio broadcasts; $n = 243$), and Group 3 (Knowledge and behavior following radio broadcasts; $n = 233$). We then assessed the impact of the radio program on knowledge and recruitment of high-risk women for screening. Student *t* tests and chi-square analyses were used. Fisher exact tests were used to assess the impact of the nurses' training program.

RESULTS

Radio program

Comparison of demographic characteristics. Because this study was not randomized, relevant demographic variables in Group 1 (Community knowledge prior to radio broadcasts; $n = 124$), Group 2 (Screening behavior prior to radio broadcasts; $n = 243$) and

Group 3 (Knowledge and behavior following radio broadcasts; $n = 233$) were compared to assess for important differences that could affect the validity of the results (Table 1). Women in Groups 1, 2, and 3 were similar on the majority of demographic variables. Women in Group 1 were more likely to be married and had fewer lifetime sex partners than women in Group 3. However, over 90% of women in both groups reported two or fewer lifetime partners. Women in Group 1 had received more Pap smears in their lifetimes, and they were more likely to have been screened within the past year than women in Group 3. There was a significant relationship between age and the total lifetime number of Pap smears obtained (correlation 14%, $P = 0.0017$) which did not differ between groups.

Comparison of knowledge before and after the radio broadcasts.

To compare knowledge before and after the radio broadcasts, the percentage of correct responses in Group 3 (Knowledge and behavior following radio broadcasts; $n = 233$) was compared to that in (Group 1: Community knowledge prior to radio broadcasts; $n = 124$). Women surveyed after the radio broadcasts (Group 3) knew more than women surveyed before the radio broadcasts (Group 1) on all questions related to cervical cancer and Pap smears (Table 2). The women interviewed following the radio broadcast were more familiar with the term "cervical cancer" (91% versus 78%, $P = 0.0004$), were better able to identify gynecological exams or Pap smears as a method of cervical cancer prevention (79% versus 69%, $P = 0.001$), and were more apt to state that the primary purpose of the Pap smear was cancer detection (61% versus 46%, $P < 0.0001$).

Recruitment of high-risk women for screening using the radio program.

To determine whether radio programs could successfully recruit high-risk women for cervical cancer screening, we compared the numbers of high-risk women who attended organized

⁵ To make Groups 1, 2, and 3 as comparable as possible, only women with a prior history of Pap screening were included in the final analysis.

TABLE 1. Comparison of demographic variables among subjects assessed before and after radio broadcasts about cervical cancer and screening, Honduras, 2003

	Group 1: Community knowledge prior to radio broadcasts ^a (n = 124)	Group 2: Screening behavior prior to radio broadcasts ^a (n = 243)	Group 3: Knowledge and behavior following radio broadcasts ^a (n = 233)	Group 1 compared with Group 3; P value ^b	Group 2 compared with Group 3; P value ^b
Mean age ± SD ^c (range)	38.0 ± 13.1 (17–77)	36.9 ± 13.2 (15–88)	38.6 ± 12.0 (17–75)	NS ^d	NS
Mean age at first birth ± SD (range)	19.1 ± 3.1 (14–30)	...	19.8 ± 3.7 (13–33)	NS	NA ^f
Mean age at first coitus ± SD (range)	18.0 ± 3.2 (9–30)	...	18.6 ± 3.6 (9–34)	NS	NA
Mean number sex partners ± SD (range)	1.2 ± 0.5 (1–3)	1.6 ± 1.1 (1–10)	1.5 ± 0.8 (1–6)	0.0001	NS
Mean parity ± SD (range)	4.2 ± 2.7 (0–14)	4.5 ± 3.0 (0–14)	4.2 ± 2.7 (0–15)	NS	NS
Mean age at first Pap ± SD (range)	25.8 ± 9.1 (15–63)	...	27.9 ± 10.5 (15–71)	NS	NA
Number using family planning, (%) ^g	70 (59%)	138 (67%)	131 (69%)	NS	NS
Marital status ^g					
Number married (%)	41 (39%)	78 (32%)	57 (25%)		
Number living with partner (%)	49 (47%)	115 (48%)	124 (55%)		
Number single (%)	15 (14%)	49 (20%)	46 (20%)	0.03	NS
Number with >5 lifetime Pap smears (%) ^g	52 (48%)	...	71 (31%)	0.003	NA
Date of last Pap ^g					
Number unsure of date of last Pap (%)	6 (5%)	4 (2%)	12 (5%)		
Number with last Pap ≤ 1 year ago (%)	93 (76%)	166 (69%)	70 (30%)		
Number with last Pap 2–5 years ago (%)	16 (13%)	57 (24%)	147 (63%)		
Number with last Pap > 5 years ago (%)	7 (6%)	15 (6%)	4 (2%)	< 0.0001	< 0.0001

^a Group 1 was recruited between July and August 2003; Group 2 was recruited between September and October 2003; Group 3 was recruited in November 2003.

^b Student *t* tests were performed for continuous variables. Chi-square analyses were performed for categorical data.

^c SD = standard deviation.

^d NS = not significant at *P* < 0.05 level.

^e ... = data not available.

^f NA = not applicable.

^g Percentages are based on the number of complete responses. Cell totals may be less than the total number in the group.

TABLE 2. Cancer screening knowledge prior to and following radio broadcasts, Honduras, 2003

Question	Response	Group 1: Community knowledge prior to radio broadcasts (n = 124)	Group 3: Knowledge and behavior following radio broadcasts (n = 233)	P value ^a
Have you heard of cervical cancer?	Yes (%) ^b	96 (78%)	212 (91%)	0.0004
How do you prevent cervical cancer?	Correct (%) ^{b, c}	59 (69%)	163 (79%)	0.001
What is the purpose of the pap smear?	Correct (%) ^{b, d}	11 (46%)	142 (61%)	< 0.0001

^a Chi-square analyses were performed.

^b Percentages are based on the number of complete responses. Cell totals may be less than the total number in the group.

^c Correct answers included "Gynecological exams" and "Pap smears."

^d Correct answers included "Detection of cancer."

screening activities before and after the radio broadcasts (comparison of Groups 2 and 3). The proportion of women aged 30 and over who attended the organized screening activities increased from 64% prior to the radio broadcasts to 74% afterward (*P* = 0.02). The proportion of women who had not been screened in two years or more increased from 30% to 65% (*P* < 0.0001) (Table 3).

Training of community nurses

To train community nurses in the importance of Pap smear screening and the proper triage of results, a 45-minute lecture presentation was given during their monthly educational meeting. This lecture had a significant impact on knowledge: recognition of cervical cancer as a leading cause of cancer mortality in Honduran women

rose from 28% to 100% (*P* < 0.0001), understanding the importance of the Pap smear in detecting cervical dysplasia improved from 3% to 47% (*P* < 0.0001), understanding the correct management of cervical intraepithelial neoplasia (CIN) improved from 41% to 91% (*P* < 0.0001), and recognition of the age-associated risk of dysplasia improved from 0% to 72% (*P* < 0.0001) (Table 4).

TABLE 3. Cancer screening behavior prior to and following radio broadcasts, Honduras, 2003

Characteristics	Group 2: Screening behavior prior to radio broadcasts (n = 243)	Group 3: Knowledge and behavior following radio broadcasts (n = 233)	P value ^a
Number of women age 30 and over (%) ^b	154 (64%)	170 (74%)	0.02
Number of women with no Pap test in 2 or more years (%) ^b	72 (30%)	151 (65%)	< 0.0001

^a Chi-square analyses were performed.

^b Percentages are based on the number of complete responses. Cell totals may be less than the total number in the group.

TABLE 4. Change in nurses' knowledge about cervical cancer and screening following training, Honduras, 2003 and 2005

Question	Correct response	Pre-evaluation (n = 32)	Immediately following evaluation (n = 32)		At two-year follow-up (n = 16)	
				P value ^a		P value ^a
How common is cervical cancer among Honduran women?	Very common (%)	9 (28%)	32 (100%)	< 0.0001	16 (100%)	< 0.0001
What is the purpose of the Pap smear?	Detect dysplasia (%)	1 (3%)	15 (47%)	< 0.0001	3 (19%)	NS ^b
What Pap smear results require referral?	CIN ^c I, II, III (%)	13 (41%)	29 (91%)	< 0.0001	14 (88%)	0.002
What age group is most at risk for dysplasia?	30 and over (%)	0 (0%)	23 (72%)	< 0.0001	11 (69%)	< 0.0001

^a Compared with pre-evaluation scores. All responses were obtained anonymously to protect nurse confidentiality, therefore two-sample comparisons using Fisher exact tests were used instead of paired analyses.

^b NS = not significant at $P < 0.05$ level.

^c CIN = cervical intraepithelial neoplasia.

Those nurses who had heard the original presentation and were still working in the communities (n = 16) were surveyed again two years later. Comparisons were made to the nurses' initial pre-test evaluation. All nurses recalled that cervical cancer was very common among Honduran women ($P < 0.0001$), 88% recalled the correct management of CIN ($P = 0.002$), and 69% recalled the age-related risk of dysplasia ($P < 0.0001$). Only 19% recalled that the Pap smear detects pre-invasive lesions (not significant) (Table 4).

DISCUSSION

Prior to the educational program, both patients and health care providers in Honduras had limited knowledge about the importance of Pap smear screening in preventing cervical cancer and about the age-related risk of dysplasia. An inexpensive program using radio broadcasts and short lecture presentations to nurses had a substantial impact. Not

only did knowledge improve following both interventions, but the nurses recalled important points about cervical cancer screening two years later. In addition, the radio broadcasts successfully recruited high-risk women for screening.

This study demonstrates that successful education programs are possible in developing nations when working within the constraints of existing community resources. To create an inexpensive, sustainable program, community volunteers were involved in all aspects of the project. Recruitment of volunteers was easy—the health center and radio station staffs readily donated their time and resources to the project. Their willingness to help may be due to a strong sense of community loyalty. Most people who work in these communities have lived there for many years, and are thus motivated to participate in a project that they perceive as directly benefiting their neighbors, their families, and themselves. The health care providers' belief in the importance of this project may be one reason why they recalled

important points about cervical cancer screening two years later.

Other studies in Latin America and with Latino populations in the United States and Canada have emphasized the importance of involving the community in cervical cancer education and screening efforts (6, 16). The Alliance for Cervical Cancer Prevention recently published a summary of lessons learned from a variety of international projects. Their recommendations for effective community-based cervical cancer prevention programs in developing countries were to: (a) include key stakeholders in the community and community health workers in program development and implementation, (b) involve local health care workers in the design of educational materials, and (c) provide training for health care workers (16). This project provides an example of the successful implementation of these principles.

Another important consideration for sustainability is the women's commitment to continued screening after their first Pap tests. The high number of lifetime Pap smears per woman in

the community assessment (Group 1) and the high number of women with a prior screening history who presented for repeat Pap smears at organized screening days (Groups 2 and 3) seem to indicate that once a woman has begun screening, she makes efforts to continue screening. This has implications for sustainability because an intensive, one-time effort to recruit previously unscreened women might have a sustained impact as these women become part of the culture of screening. Results from this study as well as the world literature indicate that media may be effective to recruit women for health services. Use of the media appears to be a cost-effective means of affecting health behavior (17), and has been successfully employed in developing countries to increase attendance at cervical cancer screening activities (18).

This study has a number of limitations because it was not a randomized experimental design. When evaluating the impact of the radio program, cross-sectional comparisons were performed between women who may not be entirely equivalent. Different women were included in Group 1 (Community knowledge prior to radio broadcasts; $n = 124$), Group 2 (Screening behavior prior to radio broadcasts; $n = 243$), and Group 3 (Knowledge and behavior following radio broadcasts; $n = 233$). Although the groups were similar on many demographic variables, the higher rate

of marriage and the increased level of screening in Group 1 may indicate that this group of women was of a higher socioeconomic status than women in Group 3. In Honduras, only couples with means can afford to legally marry, and only women with disposable income can participate in regular screening in private clinics. The women attending the project's outreach services, in contrast, were all availing themselves of free screening (Groups 2 and 3). Based on existing studies, however, one would expect that women of higher socioeconomic status and those who participate in screening regularly would know more about cervical cancer than those of lower socioeconomic status or those who have been screened less often (19, 20). The opposite was found in this study, which supports the hypothesis that the radio program improved knowledge in the community.

Limitations also exist with regards to the nurses' training program. We do not know if the nurses received any additional training in cervical cancer prevention during the two-year period between the provider training intervention and the final evaluation. Because the nurses do exert control over the content of their educational programs, however, seeking additional training on cervical cancer prevention would be considered a successful outcome of the original training. Further research in this area could address the above limitations.

CONCLUSIONS

In countries without organized cervical cancer screening, patient education is crucial to increase the number of women screened. This study demonstrates that inexpensive educational programs utilizing existing community resources can successfully improve cervical cancer knowledge and screening behavior. This model could be adopted on a larger scale to increase cervical cancer awareness and screening in developing countries.

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RESUMEN

Programa educacional basado en la comunidad mejora el conocimiento sobre el cáncer cervicouterino y la conducta ante el tamizaje de mujeres en Honduras

Objetivos. Examinar los cambios ocurridos en el conocimiento sobre el cáncer cervicouterino y el comportamiento ante el tamizaje después de un programa educacional basado en la comunidad en Honduras.

Métodos. El programa consistió en transmisiones radiales dirigidas a mujeres de zonas rurales y conferencias a enfermeros de la comunidad. La eficacia de las transmisiones radiales se evaluó mediante un diseño transversal (grupos de control: $n = 124$ y $n = 243$; grupo de intervención: $n = 233$). Se utilizó una prueba previa y otra posterior para evaluar el programa de entrenamiento de enfermeros ($n = 32$). Después de dos años se repitió la prueba a un subgrupo de enfermeros ($n = 16$). Se emplearon las pruebas exacta de Fisher, de la t de Student y de la χ^2 al cuadrado.

Resultados. Las transmisiones radiales elevaron la proporción de mujeres familiarizadas con el término "cáncer cervicouterino", que podían identificar las vías para prevenir el cáncer cervicouterino y que comprendían los objetivos de la prueba de Papanicolau. Además, mediante el radio se reclutaron exitosamente para tamizar más mujeres de los grupos de mayor edad y menos tamizadas. Con el programa para enfermeros se mejoró la comprensión del uso correcto de la prueba de Papanicolau, del riesgo relativo de displasia según la edad y de la conducta apropiada a seguir ante resultados alterados. Los enfermeros retenían una cantidad importante de conocimientos dos años después del entrenamiento.

Conclusiones. En los países en desarrollo, el empleo de programas educacionales poco costosos basados en la comunidad mediante transmisiones radiales y conferencias puede elevar el conocimiento sobre el cáncer cervicouterino y mejorar el comportamiento ante el tamizaje.

Palabras clave

Medios de comunicación, países en desarrollo, mujeres, educación en salud, tamizaje masivo, neoplasias del cuello uterino, displasia del cuello uterino, Honduras.