Screening Practices for Cervical and Breast Cancer in Costa Rica[1]

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Cervical cancer and breast cancer are leading causes of cancer-related morbidity and mortality in Costa Rica. This article reports results of an evaluation of cervical and breast cancer screening practices among Costa Rican women 25 to 58 years old that was based on a nationwide 1984–1985 survey. The evaluation showed that while Pap smears were widely used to screen for cervical cancer, many women did not have their first cervical smear or gynecologic examination until age 30, and that cervical cancer screening was less common among certain high-risk groups, including women with multiple sexual partners and those with high parity. Less than half the women surveyed reported having had a breast examination by a health care provider. Utilization of both cervical cancer and breast cancer screening examinations could be increased by targeting inadequately screened high-risk women through the existing health care system.

Gynecologic cancer has become an increasingly important health problem in Costa Rica and many other Latin American countries (*1, 2*). Specifically, Costa Rica reports one of the highest incidence rates of cervical cancer in the world, and cervical cancer is the second leading cause of cancer mortality among Costa Rican women. In 1984, 18 Costa Rican women per 100,000 over 19 years of age died of this disease (*3*).

Conversely, the annual incidence of breast cancer in Costa Rica is less than half that found in the United States. However, mortality from this disease has been increasing gradually, to a point where in 1984 it caused 16 deaths per 100,000 Costa Rican women over 19 years of age (*3, 4*).

Cervical and breast cancer are among the few cancers for which screening or early-detection tests are available. In Costa Rica, screening services are provided through an extensive system of Government-sponsored clinics, rural health workers who encourage referrals to these clinics, and, for a minority of women, private-sector clinicians (*5*). Cervical smears and pelvic examinations have been offered extensively since the late 1960s, largely in conjunction with family planning services. Breast examinations provided by doctors or nurses have been widely available throughout Costa Rica, and self-examination has been promoted recently through educational campaigns. However, access to mammography continues to be very limited (*6*).

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METHODS

To determine the extent and potential benefits of screening for cervical and breast cancer in Costa Rica, we analyzed data from a population-based, case-control study of these cancers that had been conducted in 1984. The methods employed in that study have previously been reported in detail (*7–11*).

The analysis presented here had two components: a descriptive analysis of the control women included in the study and a case-control analysis of invasive cervical cancer cases and controls. We restricted the descriptive analysis to the control group because the women in that group constituted a sample representative of women 25–58 years old nationwide, one that would reflect the cancer screening practices among the general population.

These control women had been identified through a household survey conducted between September 1984 and February 1985. Their selection through probability sampling was based on a multistage, cluster-sample methodology that used a sampling frame from the June 1984 census. Certain age groups were oversampled so that the age distribution of the control women would match that of the combined group of cervical and breast cancer cases in the case-control study. In the descriptive analysis the results were weighted for age to compensate for this oversampling and reflect the actual age distribution of Costa Rican women 25 to 58 years old (*12*).

During the household survey, trained interviewers questioned women in their homes about demographic characteristics, reproductive and contraceptive histories, risk factors for cervical and breast cancer, and history of screening examinations. Of the 938 women eligible for inclusion as controls, 861 (91.8%) between the ages of 25 and 58 completed an interview.

We evaluated the following aspects of the controls' cervical cancer screening histories: their history of cervical smears or gynecologic examinations completed before the interview and before 1982 (when the cancer case enrollment period began), the year of their first smear or examination and their age at that time, the interval between the interview and the last smear or examination, and the number of cervical smears before 1982. Although we collected information on cervical smears and gynecologic examinations separately, we combined this information to obtain a single measure of cervical cancer screening. In Costa Rica, the pelvic examination usually includes a cervical smear, although a woman may not know such a smear has been taken.

We also evaluated two methods for early detection of breast cancer: the number of breast examinations performed by a doctor or nurse before 1982 and the frequency of breast self-examinations conducted by the subject before 1982. We did not collect any information on mammography.

For the case-control analysis, we estimated the degree of protection against invasive cervical cancer that screening provided. This was done using methods reported elsewhere—by calculating odds ratios (estimates of relative risk) associated with biopsy-confirmed invasive cervical cancer (*7–9*). Overall, we compared the screening histories of 149 invasive cervical cancer cases and 764 controls who did not have cervical disease before the reference date. (For cases, the reference date was the date of diagnosis; for controls it was 15 February 1983, the midpoint of the case enrollment period.) Women who had undergone a hysterectomy or conization of the cervix were excluded from the control group. Although

the study included cases of carcinoma *in situ*, these were excluded from the present analysis because most carcinoma *in situ* cases are asymptomatic and are detected only as a result of a cervical smear; thus, in most women a history of cervical smears would be directly linked to diagnosis.

Using logistic regression (*13*), odds ratios were adjusted simultaneously for the following confounding factors: age, socioeconomic status, region of residence, number of lifetime sexual partners, and use of oral contraceptives at any time. For each analysis, women lacking the particular screening history served as the reference group. Tests for linear trends (*13*) among women with the particular screening history in question were performed using three factors as continuous variables—the number of smears, the subjects' age (in years) at the time of the first smear, and the number of months elapsed since the last smear. We did not evaluate the effect of early-detection procedures for breast cancer because we did not collect information on the stage of the cancer at diagnosis or mortality.

Table 1. History of cervical smears or gynecologic examinations in control women 25–58 years old.

History	%
Had at least one smear or examination before interview[a]	83.5
Had smear before 1982[a]	74.7
Interval since last smear or examination[b]	
≤1 year	51.3
1–2 years	21.2
3–4 years	16.2
5–9 years	6.9
≥10 years	3.7
Unknown	0.7
Age at first smear or examination:[b]	
<20 years	12.9
20–24 years	30.3
25–29 years	22.2
30–39 years	19.0
40–49 years	12.9
50+ years	2.7
Age at first smear or examination (among women 25–34 years old):[c]	
<20 years	23.2
20–24 years	46.5
25–29 years	24.8
30–34 years	5.5

[a]Percentage of all women (N = 861); weighted for age
[b]Percentage of all women who had smear or exam (N = 711); weighted for age
[c]Percentage of all women 25–34 years old who had smear or exam (N = 249); weighted for age.

RESULTS

Cervical Cancer Screening Practices

Most of the control women (83.5%) reported having had a cervical smear or gynecologic examination before the interview; fewer (74.7%) specifically reported having a smear taken before 1982 (Table 1). About half (51.3%) of those reporting a smear or examination had one of these done within a year before interview.

The proportion of women whose first cervical smear was taken by age 30 was greater among younger women than older women, which reflects the increased availability of this test in the 1970s. Of those controls 25 to 58 years old who reported a smear or gynecologic exam, the mean age at the first smear or exam was 30.4 years (standard deviation of 9.9 years); 56.8% reported having their first smear or examination after age 24, and 34.6% after age 29. By comparison, among the controls 25 to 34 years old, a group that would have had greater access to cervical smears in their teens and twenties, the mean age at their first smear or exam was 22.8 years (standard deviation of 4.0 years), while only 30.3% reported having had their first smear or examination after age 24.

In all, 612 of the controls reported having a smear taken before 1982. However, the data in Table 2 show that those 30 to 49 years old were more likely to have had a smear than younger or older women.

Table 2. Control women 25–58 years old who had at least one cervical smear before 1982, by selected characteristics.

Characteristic	%[a]	Characteristic	%[a]
Age:		*No. of lifetime sexual partners:*	
25–29 years	67.7	None	28.1
30–39 years	80.6	1	78.4
40–49 years	76.8	2–4	77.7
50+ years	68.6	≥5	58.1
Marital status:		*No. of pregnancies:*	
Currently married	80.8	None	36.1
Divorced, separated, or widowed	73.2	1–2	75.0
Single	50.6	3–9	83.4
Residence:		≥10	59.9
San José	82.5	*History of any sexually transmitted disease:*	
Central valley	73.5	Yes	84.4
Other urban	78.4	No	73.3
Other rural	62.1		
Socioeconomic status:		*Treated for any sexually transmitted disease:*	
Low	67.2	Yes	83.5
Medium	75.7	No	73.6
High	86.8		
Years of education:		*Have used oral contraceptives:*	
None	54.5	Yes	90.1
1–6 years	76.1	No	58.5
≥ 7 years	77.0	Unknown	82.3
Age at first sexual intercourse:		*Have received tetanus vaccine:*	
<20 years	80.0	Yes	76.4
20–24 years	78.5	No	62.5
≥25 years	67.7	Unknown	73.9
Never had sexual intercourse	28.1	*Smoking history:*	
		Never smoked	72.6
		Current smoker	83.4
		Former smoker	78.7

[a]Percentage of women in a given group who had at least one smear taken; weighted for age (N = 861).

Similarly, women who were currently married, lived in the capital of San José, had the highest socioeconomic status, and had some formal education were relatively more likely to have been screened at some time before 1982. A history of having been screened was also more common among women who first had intercourse before age 20, who had one to four sexual partners (as compared with no partners or five or more partners), who were pregnant one to nine times (as compared to no times or 10 or more times), and who had a history of any sexually transmitted disease (STD) or reported treatment for any STD.

Screening was also more common among women who had undergone hysterectomy or tubal sterilization and among those who had used oral contraceptives and other modern contraceptives (including injectable hormones, intrauterine devices, diaphragms, spermicides, or condoms). In addition, women who had received tetanus vaccine, who reported being current smokers, who

ever douched, who had undergone a breast examination by a doctor or nurse, or who practiced breast self-examination were more likely to have been screened for cervical cancer than other control women. However, the controls' histories indicated no appreciable screening prevalence differences among those who had received rubella vaccine, who had been diagnosed as infertile by a physician, or who had a family history of cervical cancer.

Women who had at least one cervical smear taken before 1982 experienced about one-half the risk of invasive cervical cancer of women who had none (Table 3). There was no clear pattern of increasing or decreasing risk with the number of smears or the subject's age at first smear. However, women who had their last cervical smear less than one year before the reference date had a significantly elevated risk of cervical cancer, and the level of risk decreased significantly as the time elapsed since the last examination increased. In a separate analysis, we excluded women who had their last cervical smear during the year before their reference date. In this group, the overall risk of cervical cancer associ-

Table 3. Relative risk of invasive cervical cancer associated with a history of at least one cervical smear or gynecologic exam.

History	Cases (N=136)[a]	Controls (N=700)[a]	Adjusted RR (95% CI)[b]
Never had smear (referent)	*52*	*174*	*1.0*
Had smear before 1982	*84*	*526*	*0.6 (0.4–1.0)*
No. of smears:[c]			
1 smear	9	103	0.3 (0.2–0.7)
2–4 smears	33	169	0.8 (0.5–1.4)
5–9 smears	11	117	0.5 (0.2–1.0)
≥ 10 smears	19	96	1.0 (0.5–2.0)
Unknown number of smears	12	41	—
	Test for trend: p = 0.2		
Age at first smear or gynecologic examination:[c]			
<20 years	12	46	2.0 (0.8–4.8)
20–29 years	27	248	0.7 (0.4–1.2)
30–39 years	17	98	0.6 (0.3–1.1)
≥40 years	16	93	0.5 (0.2–1.0)
Unknown age	12	41	—
	Test for trend: p = 0.5		
Interval between last smear and reference date:[c]			
1–11 months	12	40	4.7 (1.6–13.8)
12–23 months	4	24	2.7 (0.7–10.7)
24–59 months	2	47	0.5 (0.1–2.6)
≥60 months	1	39	0.4 (0.1–3.0)
Had last smear after reference date	53	335	—
Unknown interval	12	41	—
	Test for trend: p = 0.009		

[a]Thirteen cases and 64 controls with unknown values for adjustment factors have been excluded from the frequency tables.

[b]Adjusted for age, socioeconomic status, residence, history of oral contraceptive use, and number of lifetime sexual partners. Women who never had had a smear served as a reference group for all analyses.

[c]Among women who had at least one smear taken before 1982.

ated with ever having had a smear (relative to those who never had a smear) was lowered from 0.6 to 0.2 (95% confidence interval 0.1–0.4).

Breast Cancer Screening Practices

Less than half (48.1%) of the 861 Costa Rican women 25 to 58 years old in the control group reported having had a breast examination performed by a doctor or nurse (Table 4). Among women who reported having had at least one such examination, the vast majority had undergone less than five examinations before 1982.

As the data in Table 5 indicate, groups of controls more likely to have had an examination by a doctor or nurse included those between 30 and 49 years old, those who were or had been married, those residing in San José, those with a relatively high socioeconomic status, and those with some formal education. Provider examinations were also more common among women who had one to nine pregnancies (as compared to no pregnancies or 10 or more), who were surgically postmenopausal (as compared with premenopausal or naturally menopausal), who had previously undergone a hysterectomy, who had a history of physician-diagnosed infertility, who used oral contraceptives and other modern contraceptives (including injectable hormones, intrauterine devices, barrier methods, or tubal sterilization), who had received rubella vaccine, and who had a family history of breast cancer.

Women who had practiced self-examination were also more likely to have had a provider examination. No appreciable differences in the prevalence of provider examinations were observed in groups who had a history of or who had been treated for diabetes, hypertension, or STD, who had received tetanus vaccine, or who had ever smoked.

Less than half (41.7%) of the women in the control group had performed self-examination of their breasts before 1982 (see Table 4), and of these less than half (38.2%) had done so frequently. As indicated in Table 5, self-examination was more common among women 30 to 49 years old than among younger or older women. Characteristics of women who performed self-examinations were generally similar to those of women who received provider examinations, with the exception that women with physician-diagnosed infertility were less likely to have examined their breasts.

Table 4. History of doctor- or nurse-provided breast examination and breast self-examination before 1982 among control women 25–58 years old.

History	%[a]
No. of examinations provided by doctor or nurse:	
None	*51.9*
1 or more	*48.1*
1	15.2
2–4	19.6
5–9	6.9
≥10	6.1
Unknown	0.3
Frequency of self-examination:	
Never	*58.3*
At least once	*41.7*
Frequently	16.1
Occasionally	25.6

[a]Percentage of all women (N = 861); weighted for age.

DISCUSSION

Cervical Cancer Screening

Screening for cervical cancer is fairly widespread in Costa Rica. We found that about 83% of the controls 25 to 58 years old had had at least one cervical smear. This prevalence of cervical cancer screening was somewhat greater than the

Table 5. Control women 25–58 years old who had breast examinations before 1982, by selected characteristics.

Characteristic	% who had provider examinations[a]	% who performed self-examinations[a]
Age:		
25–29 years	39.8	38.3
30–39 years	56.2	45.4
40–49 years	51.3	44.8
≥ 50 years	37.1	34.5
Marital status:		
Married	51.6	41.5
Divorced or separated	50.0	45.2
Widowed	24.5	37.9
Single	36.3	41.9
Residence:		
San José	57.9	45.7
Central valley	48.5	40.5
Other urban	45.4	44.1
Other rural	33.0	36.6
Socioeconomic status:		
Low	34.9	33.5
Medium	53.9	45.3
High	65.1	53.0
Years of education:		
None	21.0	26.7
1–6 years	44.5	38.9
≥ 7 years	59.5	49.6
Number of pregnancies:		
None	35.2	35.1
1–2	51.9	46.0
3–4	53.3	40.2
5–9	49.1	45.1
≥ 10	28.3	34.6
Menopausal status:		
Premenopausal	49.0	42.3
Postmenopausal (natural)	38.9	34.4
Postmenopausal (surgical)	58.1	55.1
History of hysterectomy:		
Yes	54.2	55.7
No	47.5	40.8
Physician-diagnosed female infertility:		
Yes	71.3	40.3
No	47.3	41.7
Have used oral contraceptives:		
Yes	53.1	43.8
No	43.4	39.5
Unknown	46.7	43.2

Table 5. Continued.

Characteristic	% who had provider examinations[a]	% who performed self-examinations[a]
Have received rubella vaccine:		
Yes	51.3	47.3
No	43.6	37.3
Unknown	47.5	36.8
Family history of breast cancer:		
Yes	59.4	59.4
No	48.2	41.3
Unknown	33.1	37.5
Have performed breast self-examination:		
Yes	58.2	—
No	40.6	—
Have received provider breast examination:		
Yes	—	50.8
No	—	33.7

[a]Percentage of women in any given group who ever had a provider exam or performed a self-exam; weighted for age (N=861).

69.9% prevalence reported for Costa Rican women 15 to 49 years old in 1986 (*6*), possibly because our control group included a greater proportion of older women.

However, this 83% prevalence is still substantially lower than the 93% prevalence found in 1985 for U.S. women 17 years of age and older (*14*). Although most of the women in our study had been screened, more than half had their first smear taken after age 24, several years after their mean age of first intercourse (20 years) and at the age when the incidence of carcinoma *in situ*, a precursor of invasive cervical cancer, begins to peak (*3*). For many women, therefore, the first smear may have been done too late to detect the early, most readily treatable stages of this disease.

It is noteworthy that the incidence of invasive cervical cancer in Costa Rica declined during the late 1970s (*3*). Our study suggests that two factors may have contributed to this decline. First, women tended to be screened at a younger age during the 1970s; and second, screening became fairly common among certain groups of women at high risk for cervical cancer—such as those who began sexual activity at an early age and those who had contracted an STD (*15*). However, cervical cancer screening was reported less frequently by other women potentially at high risk, such as those who had multiple sexual partners (*15*) or high parity (*16*), and these women should be targeted for future prevention efforts.

Because having been screened for cervical cancer was associated with hysterectomy, tubal sterilization, treatment of STD, provider breast exams, use of prescription contraceptives, and receipt of tetanus vaccination, it appears that women who used gynecologic, obstetric, and family planning services also availed themselves of cancer screening services. Providers of these services could expand

screening coverage by using simple risk assessment procedures to identify inadequately screened women and by increasing the number and frequency of referrals made by rural health workers. In addition, further research on the determinants of screening behaviors is needed to explain why some women are not screened despite the availability of services.

Our case-control analysis found that cervical smears provided important protection against development of invasive cervical cancer; women who were screened experienced roughly half the risk of those who were not. This finding is consistent with risk estimates reported by other case-control studies (*17–19*). However, all case-control studies must be interpreted cautiously because their design is of limited usefulness in evaluating the effect of screening on reducing cancer cases (*20*).

Because we did not collect information on the date of the last normal smear, we could not exclude women whose invasive cancer was detected directly as a consequence of a last smear which was *abnormal*, i.e., one that led directly to diagnosis. The inclusion of these women among the 84 subjects with cervical cancer who had smears taken (Table 3) biased the odds ratio toward unity, thereby underestimating the protective effect of routine screening. The risk estimate of 0.2, which was based only on women who had their last smear more than one year before the reference date—a test that was less likely to have led directly to diagnosis—is a more accurate estimate of the protective effect of routine screening.

Conversely, the adjusted risk estimate of 4.7 for women who had their last smear taken during the year before the reference date (Table 3) overestimates the true risk. Many (335) control women who had their last smear shortly before their interview but after the common reference date (15 February 1983) were not included in the calculation.

Although limitations of this nature prevent us from estimating the magnitude of the protective effect in a completely unbiased fashion, our data do suggest that screening provides some important degree of protection against the development of invasive cervical cancer.

Impressive progress has been made over the last two decades in Costa Rica by increasing the availability of Pap smears to all women, especially those at high risk of developing cervical cancer. Despite these gains, however, cervical cancer incidence and mortality remain high. Both could be reduced further by continued progress toward the Government's goal of providing an annual cervical smear for all women of reproductive age (*6*). Improving the quality of smears is also critically important—as shown by recent reports in the international literature citing the low sensitivity of smears (*21*). Finally, an obvious point must be emphasized—that the cervical smear by itself has no preventive value, and that women with abnormal smears must be appropriately followed, diagnosed, and treated.

Breast Cancer Screening

Regarding detection of breast cancer, much work remains to be done. As of 1982, a majority of Costa Rican women had not received a provider breast examination. Similarly, a majority had not performed breast self-examination. Nor is there any indication that this situation has changed in recent years; available data indicate that as of 1986 only about 41.3% of Costa Rican women 30 to 49 years old had ever practiced self-examination (*6*). This prevalence is far lower than that for U.S. women 17 years of age and older: 1985 data indicate that 73% of these U.S. women had practiced self-ex-

amination and 92% had received a provider examination (*14*).

Both provider examinations and self-examinations were more common among Costa Rican women in certain groups at high risk for breast cancer (e.g., those with relatively high socioeconomic status, those naturally postmenopausal, those with a history of infertility, and those with a family history of breast cancer) (*22*). However, screening was relatively uncommon among women who had reached their fiftieth birthday—the age when breast cancer incidence and mortality begin to rise dramatically (*3*). Nulliparous women, another high-risk group (*22*), were also less likely to have been screened than parous women, largely because nulliparous women in Costa Rica tend to be young.

In the future, women who are not receiving breast examinations or performing self-examinations might be identified through existing obstetric, gynecologic, and family planning services—because these examinations appear linked to receipt of other medical services such as rubella vaccination, hysterectomy, prescription contraceptives, and tubal sterilization. Innovative strategies are required to identify older women who do not routinely seek these services. The fact that women who receive provider exams tend to have characteristics similar to those who perform self-examinations (Table 5) suggests that providers could encourage women to perform breast self-examinations by giving explicit instruction during clinic visits.

Although it is likely that, as currently practiced, provider and self-examinations allow for early detection of breast cancer in Costa Rica as in other countries (*23*), it is not clear that provider or self-examinations, particularly when done infrequently or without the added benefit of mammography, would contribute to any substantial decline in breast cancer mortality. However, until further studies resolve this issue, it seems prudent to encourage provider and self-examinations, and mammography when possible, particularly among older women at high risk.

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