

Fam Community Health
Vol. 26, No. 2, pp. 130-139

Breast and Cervical Cancer Screening Practices Among Hispanic and Non-Hispanic Women Residing near the United States-Mexico Border, 1999-2000

*Steven S. Coughlin, PhD; Robert J. Uhler, MA;
Thomas Richards, MD; Katherine M. Wilson, MPH, PhD*

This study examined the breast and cervical cancer screening practices of Hispanic and non-Hispanic women ($n = 3,568$) in counties that approximate the US southern border region. According to the Health Resources Services Administration (HRSA), border counties are those in which any part of the county is within 100 kilometers (62.14 miles) of the border.¹ The study used data from Behavioral Risk Factor Surveillance System (BRFSS) surveys of adults aged ≥ 18 years conducted in 1999 and 2000. The study looked at recent use of mammography and the Papanicolaou (Pap) test. Hispanic women were less likely to have had a recent mammogram or Pap test as compared with non-Hispanic women in border counties, and as compared with Hispanic and non-Hispanic women in nonborder counties of Texas, New Mexico, Arizona, and California combined, and with other women in the United States. Results underscore the need for continued efforts to ensure that medically underserved women who live in the border region have access to cancer screening services. **Key words:** *cancer prevention and control, Hispanics, Pap tests, screening mammography*

SOME OF THE poorest counties in the United States are in the US-Mexico border

From the Division of Cancer Prevention and Control, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, Atlanta, Ga.

Corresponding author: Steven S. Coughlin, PhD, Epidemiology and Health Services Research Branch, Division of Cancer Prevention and Control, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, 4770 Buford Hwy NE (K-55), Atlanta, GA 30341 (e-mail: stc9@cdc.gov).

The authors thank Dr. Herschel Lawson for comments on this article.

This material was developed in the public domain. No copyright applies.

region, which extends 2,000 miles from San Ysidro, California, to Brownsville, Texas.^{1,2} More than a third of US border families live at or below the poverty line, and the unemployment rate is 2.5 to 3.0 times higher than in the rest of the United States.¹ Lack of access to health care is an important problem in the border region.^{1,3} Problems include an uneven distribution of physicians and other health care providers, a shortage of bilingual health information, and not having enough culturally sensitive systems of care.¹

The public health concerns of this region include the prevention and control of breast and cervical cancer through routine screening. In *Healthy Border 2010*,³ the US-Mexico Border Health Commission identified

numerous objectives for 2010, including a reduction in mortality from breast cancer by 20% and from cervical cancer by 30%. Studies in selected border localities suggest that screening rates for these cancers may be relatively low. A recent study by Byrd et al.⁴ found that 14.6% of women in two border counties (El Paso, Texas, and Dona Ana, New Mexico) had never been screened for cervical cancer; rates for this screening were much less in the two counties than in the rest of the United States.

About one fourth of persons living in the border region are Hispanic. Studies in various parts of the United States⁵⁻⁷ have shown that Hispanic women are less likely to undergo routine breast and cervical screening than are non-Hispanic women. Reasons for underuse of screening tests among Hispanic women include limited awareness and knowledge about cancer screening.⁵⁻¹⁰ Other potential barriers include lack of health insurance, lack of transportation or child care, cultural beliefs, embarrassment, fatalistic attitudes about cancer, and socioeconomic factors.⁹⁻¹¹

Poverty is associated with lack of health insurance and decreased access to preventive health care services.¹²⁻¹⁴ Correspondingly, the poor have an increased risk of mortality from several diseases, including breast and cervical cancer.^{13,15} Decreased cancer survival among the poor may be associated with diminished access to health care, later diagnosis, and other factors.^{13,15,16}

This article examines screening rates for breast and cervical cancer in 1999-2000 among Hispanic and non-Hispanic women in counties that approximate the border region of the United States. These rates are compared with those of Hispanic and non-Hispanic women in the other counties of the

four border states, as well as those of other women in the United States. Correlates of cancer screening among women in border counties are also examined.

METHODS

The data used were from 3,568 women in border counties of the United States (as well as women from other parts of the border states and the rest of the United States) who were interviewed as part of the Behavioral Risk Factor Surveillance System (BRFSS) in 1999 or 2000. All eligible women were included regardless of their self-identified race or ethnicity (ie, white, black, Hispanic, or other). After exclusion of 17 women whose ages were unknown, a sample of 3,551 women was available for analysis. Data from the two years were pooled to increase the size of the sample.

The BRFSS is a state-based telephone survey of adults who are 18 years or older.^{17,18} The BRFSS uses a random-digit dialing technique and multistage cluster sampling in each participating state to sample noninstitutionalized adults who have telephones.¹⁹ A computer-assisted interview is administered by trained interviewers. The interviews included questions about general health status, tobacco use, alcohol consumption, demographic and socioeconomic characteristics, screening mammography, clinical breast examinations, and Pap tests. Each adult female respondent was asked if she had ever had a mammogram. Those who responded positively were asked how long it had been since their last mammogram. Similar questions were asked for the clinical breast examination and Pap test. Women were also asked whether they had undergone a hysterectomy.

The study population was drawn from women aged 18 years or older who responded to BRFSS surveys in Texas, Arizona, New Mexico, or California. Based upon their county of residence at the time of the interview, women were identified who lived in counties within 100 kilometers (62.14 miles) of the US-Mexico international border.¹ The

Studies have shown that Hispanic women are less likely to undergo routine breast and cervical screening than are non-Hispanic women.

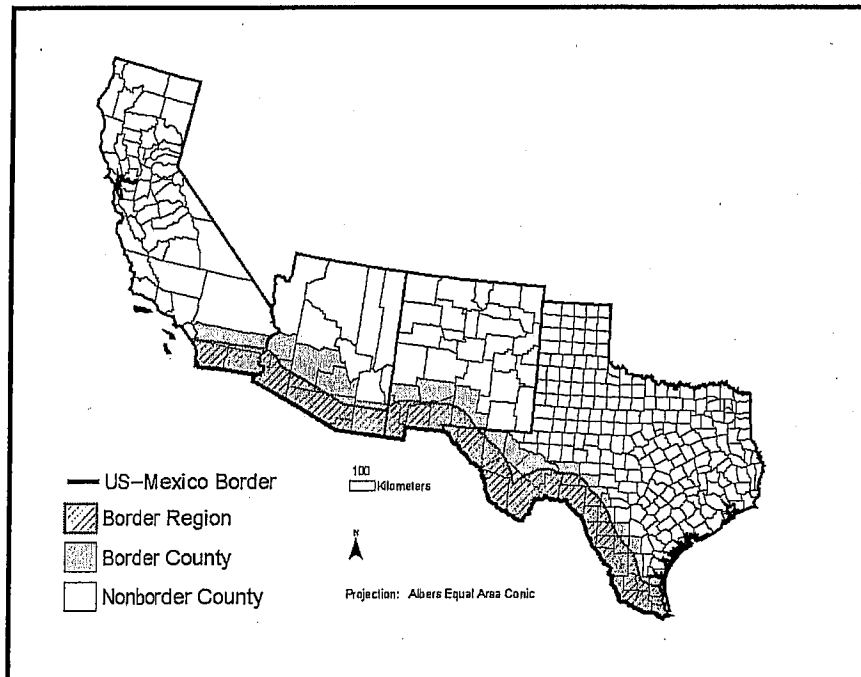


Figure 1. US-Mexico border region and border counties of California, Arizona, New Mexico, and Texas

border region and border counties are shown in Figure 1. According to this definition, border counties are not limited to those contiguous with the US-Mexico international border. Analyses of screening mammogram and clinical breast examination use were limited to women who were 40 years of age or older, regardless of hysterectomy status ($n = 2,161$). Analyses of Pap test use were limited to those who were 18 years of age or older who had not had a hysterectomy ($n = 2,654$).

Rural versus nonrural residence was defined using US Department of Agriculture 1993 rural-urban continuum codes (the most recent version available), sometimes referred to as the Beale codes.²⁰ Codes 6-9 correspond to rural populations and nonmetropolitan urban populations of up to 19,999, and other codes (0-5) were considered to be nonrural in the present analysis.

Age-adjusted rates of screening-test use were calculated for the two-year period of

interest. In examining bivariate associations, levels of statistical significance were obtained using Pearson's chi-square tests and SUDAAN.²¹ The direct method was used to age-adjust estimates of the proportion of women screened for cancer, using the age distribution for all women in the United States who participated in the BRFSS surveys as the standard. All analyses used Statistical Analysis System (SAS) and SUDAAN to calculate 95% confidence intervals (CIs) and p -values and to allow for weighting of the estimates.²¹ The samples were weighted to compensate for the unequal sampling probability resulting from the unique number of phones per household; the number of unique phone numbers per primary sampling unit; and poststratification by age, sex, and race.

A multivariate analysis of predictors of screening test use was carried out using logistic regression techniques and SUDAAN.²¹ Indicator variables for survey year, age categories, and race categories were included in all

models. Two or more indicator variables were included for categorical variables such as age, and the Wald F test was used to examine the overall statistical significance of related design variables. Covariates for categories of educational attainment were included in the models rather than those for household income to avoid problems with co-linearity and missing data. Covariates for number of children in the household were included rather than those for number of persons in the household.

RESULTS

Overall response rates in the 1999 BRFSS, among households of all races and ethnicities in border states, were 58.1% (California), 47.7% (Arizona), 62.4% (New Mexico), and 36.2% (Texas). Overall response rates in the 2000 BRFSS were 46.1% (California), 44.4% (Arizona), 51.5% (New Mexico), and 33.5% (Texas). Response rates for border counties of these four states are unavailable.

Of the women living in border counties who were at least 40 years of age regardless of hysterectomy status (the analytic sample for analyses on breast screening), 34.0% were 40- to 49-years old; 32.2% were 50- to 64-years old; and 33.8% were 65 years or older, all on the basis of weighted estimates (results not shown). About 30.7% (582 of 2,161) reported that they were Hispanic. About 22.6% (404 of 2,154) reported having less than a high school education and 18.7% (305 of 1,721) reported having an annual household income of \$15,000 or less. Almost 74.9% (1,685 of 2,142) reported that they had seen a physician within the past year.

Among the women residing in border counties who were at least 18 years of age and who had not had a hysterectomy (the analytic sample for Pap testing analyses), about 27.8% were 18- to 29-years old; 26.4% were 30- to 39-years old; 19.2% were 40- to 49-years old; 14.6% were 50- to 64-years old; and 12.1% were 65 years or older, all on the basis of weighted estimates (results not shown). About 42.6% (1,051 of 2,654) reported that they were Hispanic. About 20.8%

of the women (488 of 2,653) reported having less than a high school education. About 19.1% (414 of 2,208) reported having an annual household income of \$15,000 or less. Almost 67.6% (1,891 of 2,632) reported that they had seen a physician within the past year.

Not having had a mammogram in the past two years was associated with lower education, lower household income, more children in the household, not having seen a physician in the past year, not having health insurance coverage, current cigarette smoking, and lack of current alcohol use (Table 1).

Not having had a Pap test in the past three years was associated with marital status, not having seen a physician in the past year, and not having health insurance coverage (Table 2). The association with lower household income was of borderline significance.

Table 3 shows cancer screening rates among Hispanic and non-Hispanic women in border counties; in nonborder counties of California, Arizona, New Mexico, and Texas; and in the remainder of the United States. Hispanic women in border counties were less likely to have had a recent cancer screening test as compared with non-Hispanic women in border counties; as compared with Hispanic and non-Hispanic women in nonborder counties of Texas, New Mexico, Arizona, and California combined; and as compared with women in the remainder of the United States. Non-Hispanic women in border counties were somewhat more likely to have had a recent Pap test or to have ever received one as compared with non-Hispanic women in the remainder of the United States.

Further analyses were carried out to compare unadjusted breast and cervical cancer screening rates among Hispanic and non-Hispanic women in border counties, nonborder counties of border states, and the remainder of the United States. These exploratory analyses suggested that the rates of mammographies, clinical breast examinations, and Pap tests were particularly low for older (≥ 65 years old) Hispanic women in border counties as compared with non-Hispanic women

Table 1. Percentage of Hispanic and non-Hispanic women in border counties of the United States who had received a mammogram in the past 2 years, according to selected demographic characteristics, medical history, and cancer screening practices*

Variable	Hispanic			Non-Hispanic		
	n	Percentage	(95% CI)	n	Percentage	(95% CI)
Age						
40 to 49 years	250	62.5	(54.0, 70.9)	394	66.5	(59.8, 73.2)
50 to 64 years	200	75.0	(64.8, 85.1)	519	85.2	(79.8, 90.7)
≥65 years	129	59.2	(45.1, 73.3)	654	84.2	(79.6, 88.8)
Marital status						
Currently married	319	70.0	(62.4, 77.6)	738	82.3	(78.6, 86.0)
Divorced or separated	130	71.6	(58.1, 85.0)	329	70.0	(61.9, 78.0)
Widowed	88	52.3	(30.5, 74.1)	402	81.6	(73.1, 90.1)
Never married or living as unmarried couple	41	46.7	(24.5, 69.0)	95	69.8	(57.7, 82.0)
Educational attainment[†]						
<High school graduate	287	60.3	(51.9, 68.7)	113	70.3	(55.8, 84.7)
High school graduate/GED	153	71.6	(62.7, 80.5)	509	76.3	(70.7, 81.8)
Some college, technical school, or college graduate	137	78.1	(67.7, 88.4)	940	80.9	(77.5, 84.3)
Household income[‡]						
< \$15,000	145	60.9	(48.2, 73.6)	157	52.9	(42.6, 63.2)
\$15,000-\$34,999	211	71.6	(63.2, 79.9)	518	74.8	(69.0, 80.6)
≥\$35,000	92	85.4	(75.6, 95.2)	591	83.3	(79.2, 87.4)
Number of children in household[†]						
None	332	71.9	(64.2, 79.5)	1307	82.7	(79.4, 86.0)
1 Child	120	60.4	(39.9, 80.9)	127	62.0	(45.9, 78.2)
2+ Children	127	43.9	(25.0, 62.9)	129	66.5	(43.9, 89.0)
Number of persons in household						
1 person	115	72.8	(60.6, 84.9)	617	78.6	(73.0, 84.2)
2 persons	175	71.7	(61.7, 81.7)	663	84.6	(80.8, 88.4)
3 persons	126	70.4	(60.3, 80.4)	138	73.7	(60.9, 86.4)
4+ persons	163	55.3	(42.6, 68.0)	145	64.4	(46.3, 82.6)
Employment status						
Currently employed	240	66.8	(52.9, 80.7)	620	79.9	(74.7, 85.1)
Homemaker or retired	247	68.4	(59.5, 77.3)	842	76.5	(70.0, 83.1)
Unemployed or unable to work	91	66.2	(51.2, 81.1)	103	72.0	(60.8, 83.1)
Area of residence						
Rural	87	50.0	(35.0, 65.0)	134	61.0	(48.7, 74.5)
Nonrural	492	67.6	(61.2, 74.0)	1433	79.2	(76.1, 82.2)
General health status						
Good to excellent	348	68.1	(59.4, 76.8)	1292	79.4	(76.3, 82.6)
Fair to poor	231	62.2	(53.1, 71.4)	272	74.4	(65.2, 83.7)
Saw physician within past year[§]						
Yes	431	76.0	(69.6, 82.3)	1246	87.0	(84.2, 89.9)
No	140	41.9	(29.2, 54.6)	312	50.7	(42.6, 58.7)
Any health insurance coverage[§]						
Yes	398	72.8	(66.2, 79.3)	1450	80.8	(77.7, 83.8)
No	180	53.0	(39.8, 66.2)	117	52.4	(37.3, 67.5)
Current cigarette smoker[†]						
Yes	83	49.7	(28.3, 71.1)	300	71.5	(64.3, 78.7)
No	495	68.8	(62.5, 75.0)	1262	80.3	(77.0, 83.7)
Current alcohol user[†]						
Yes	142	76.3	(64.6, 87.9)	365	80.2	(74.6, 85.8)
No	313	54.6	(46.5, 62.7)	542	75.6	(70.0, 81.1)

*Weighted population estimates adjusted to the 1999-2000 age distribution for all women who participated in the Behavioral Risk Factor Surveillance System (BRFSS) surveys in the United States; women who responded "don't know" or "not sure" or who refused are excluded.

[†] $p < .05$.

[‡] $p < .01$.

[§] $p < .001$.

Table 2. Percentage of Hispanic and non-Hispanic women in border counties of the United States aged 18 years or older, who had received a Pap test in the last 3 years, according to selected demographic characteristics, medical history, and cancer screening practices*

Variable	Hispanic			Non-Hispanic		
	n	Percentage	(95% CI)	n	Percentage	(95% CI)
Age						
18 to 29 years	318	77.0	(70.1, 83.9)	314	88.4	(83.5, 93.3)
30 to 39 years	328	81.8	(74.9, 88.7)	350	91.6	(87.8, 95.5)
40 to 49 years	201	81.2	(72.4, 90.0)	302	90.2	(85.4, 95.0)
50 to 64 years	121	71.0	(55.6, 86.5)	317	90.6	(84.9, 96.3)
≥65 years	80	47.4	(29.9, 64.9)	310	82.3	(74.7, 90.0)
Marital status[†]						
Currently married	568	78.5	(71.9, 85.1)	769	93.5	(91.2, 95.8)
Divorced or separated	178	72.8	(60.4, 85.2)	294	84.5	(76.3, 92.6)
Widowed	71	75.5	(63.9, 87.2)	209	87.3	(79.2, 95.4)
Never married or living as unmarried couple	230	59.8	(43.7, 75.8)	320	80.1	(71.1, 89.0)
Educational attainment						
<High school graduate	394	71.4	(64.4, 78.5)	88	77.5	(66.8, 88.3)
High school graduate/GED	316	72.9	(62.6, 83.2)	462	87.7	(83.7, 91.7)
Some college, technical school, or college graduate	337	79.2	(70.2, 88.2)	1037	90.2	(87.6, 92.8)
Household income						
<\$15,000	259	67.3	(56.8, 77.8)	153	70.5	(59.3, 81.8)
\$15,000-\$34,999	413	83.5	(77.3, 89.8)	535	88.5	(84.1, 93.0)
>\$35,000	181	74.6	(60.3, 89.0)	654	91.9	(88.5, 95.4)
Number of children in household						
None	325	70.8	(62.7, 78.8)	1012	87.9	(84.7, 91.0)
1 Child	226	81.9	(72.6, 91.3)	219	80.6	(67.9, 93.2)
2+ Children	497	58.6	(49.4, 67.8)	355	73.8	(62.4, 85.1)
Number of persons in household						
1 person	107	82.8	(75.6, 90.0)	460	82.5	(77.4, 87.5)
2 persons	203	74.8	(66.4, 83.2)	539	93.0	(90.5, 95.9)
3 persons	225	78.0	(68.1, 87.9)	232	79.1	(68.6, 89.6)
4+ persons	513	76.8	(67.3, 86.3)	355	78.3	(62.4, 85.1)
Employment status						
Currently employed	588	73.9	(63.9, 83.9)	929	89.1	(85.3, 92.9)
Homemaker or retired	343	77.0	(70.3, 83.6)	562	90.5	(86.8, 94.3)
Unemployed or unable to work	116	73.5	(61.5, 85.5)	98	75.4	(63.7, 92.8)
Area of residence						
Rural	111	72.9	(62.1, 83.6)	107	82.0	(71.5, 92.4)
Nonrural	937	73.8	(68.5, 79.1)	1486	88.5	(86.1, 91.0)
General health status						
Good to excellent	786	73.9	(67.5, 80.4)	1427	89.2	(86.7, 91.7)
Fair to poor	261	72.4	(64.1, 80.7)	164	83.9	(75.3, 92.4)
Saw physician within past year[§]						
Yes	698	82.6	(77.6, 87.7)	1179	94.0	(92.6, 96.1)
No	338	55.4	(46.5, 64.4)	399	69.8	(63.0, 76.6)
Any health insurance coverage[†]						
Yes	631	76.1	(70.6, 81.6)	1415	90.5	(88.1, 92.8)
No	414	76.8	(69.4, 84.1)	176	65.3	(52.9, 77.8)
Current cigarette smoker						
Yes	144	66.3	(48.7, 83.9)	321	88.5	(83.8, 93.2)
No	900	74.5	(69.4, 79.6)	1268	88.2	(85.5, 91.0)
Current alcohol user						
Yes	287	83.8	(77.2, 90.3)	382	90.2	(85.9, 94.4)
No	504	70.8	(64.6, 77.0)	485	85.5	(80.6, 90.5)

*Excludes women who had had a hysterectomy along with those who responded "don't know" or "not sure" or who refused. Weighted population estimates adjusted to the 1999-2000 age distribution for all women who participated in the Behavioral Risk Factor Surveillance System (BRFSS) surveys in the United States.

[†]p < .05.
[‡]p < .01.
[§]p < .001.

Table 3. Percentage of Hispanic and non-Hispanic women in border counties; in nonborder counties of California, Arizona, New Mexico, and Texas; and in the remainder of the United States who had received a mammogram, clinical breast exam, or Pap test^a

	Border counties of border states						Nonborder counties						Remainder of United States					
	Hispanic			Non-Hispanic			Hispanic			Non-Hispanic			Hispanic			Non-Hispanic		
	n	%	(95% CI)	n	%	(95% CI)	n	%	(95% CI)	n	%	(95% CI)	n	%	(95% CI)	n	%	(95% CI)
Mammogram ^{c,l}																		
Ever	459	79.4	(±5.5%)	1,415	89.1	(±2.4%)	1,137	84.6	(±3.1%)	5,719	89.6	(±1.0%)	4,282	86.0	(±1.8%)	100,581	88.1	(±0.3%)
Never	122	20.6	(±5.5%)	162	10.9	(±2.4%)	254	15.4	(±3.1%)	753	10.4	(±1.0%)	823	14.0	(±1.8%)	14,587	11.9	(±0.3%)
Mammogram in past 2 years ^{d,e,k}																		
Yes	376	66.5	(±6.1%)	1,229	78.7	(±3.0%)	956	75.3	(±3.7%)	4,778	75.6	(±1.4%)	3,671	76.7	(±2.1%)	85,377	75.9	(±0.4%)
No	203	33.5	(±6.1%)	338	21.3	(±3.0%)	431	24.7	(±3.7%)	1,667	24.4	(±1.4%)	1,414	23.3	(±2.1%)	29,063	24.1	(±0.4%)
Clinical breast exam ^{4,l}																		
Ever	447	74.9	(±5.6%)	1,397	88.8	(±2.4%)	1,142	80.0	(±3.7%)	5,909	89.9	(±1.1%)	4,331	82.5	(±2.0%)	103,892	90.2	(±0.3%)
Never	135	25.1	(±5.6%)	175	11.2	(±2.4%)	244	20.0	(±3.7%)	546	10.1	(±1.1%)	759	17.5	(±2.0%)	10,834	9.8	(±0.3%)
Clinical breast exam in past 2 years ^{4,l,i}																		
Yes	377	61.6	(±6.1%)	1,222	77.3	(±3.2%)	973	71.8	(±4.0%)	4,985	76.1	(±1.5%)	3,780	74.7	(±2.3%)	89,700	79.1	(±0.4%)
No	201	38.4	(±6.1%)	339	22.7	(±3.2%)	404	28.2	(±4.0%)	1,433	23.9	(±1.5%)	1,267	25.3	(±2.3%)	23,903	20.9	(±0.4%)
Pap test ^{b,d,f,h,k,m}																		
Ever	933	85.1	(±4.0%)	1,520	96.2	(±1.4%)	2,422	91.3	(±1.9%)	7,005	94.6	(±0.8%)	8,928	91.3	(±1.1%)	131,300	94.7	(±0.2%)
Never	117	14.9	(±4.0%)	79	3.8	(±1.4%)	214	8.7	(±1.9%)	349	5.4	(±0.8%)	794	8.7	(±1.1%)	5,973	5.3	(±0.2%)
Pap test in past 3 years ^{b,d,g,i,l,n}																		
Yes	839	73.6	(±5.0%)	1,386	88.3	(±2.4%)	2,219	83.3	(±2.8%)	6,296	84.6	(±1.2%)	8,296	84.1	(±1.6%)	118,085	85.0	(±0.3%)
No	209	26.4	(±5.0%)	207	11.7	(±2.4%)	411	16.7	(±2.8%)	1,038	15.4	(±1.2%)	1,397	15.9	(±1.6%)	18,331	15.0	(±0.3%)

^aWeighted population estimates adjusted to the 1999-2000 age distribution for all women who participated in the Behavioral Risk Factor Surveillance System (BRFSS) surveys in the United States.

^bExcludes women who had had a hysterectomy along with those who responded "don't know" or "not sure" or who refused.

^c*p* < .01, comparing Hispanic women in border counties with non-Hispanic women in border counties.

^d*p* < .001, comparing Hispanic women in border counties with non-Hispanic women in border counties.

^e*p* < .05, comparing Hispanic women in border counties with Hispanic women in nonborder counties of border states.

^f*p* < .01, comparing Hispanic women in border counties with Hispanic women in nonborder counties of border states.

^g*p* < .001, comparing Hispanic women in border counties with Hispanic women in nonborder counties of border states.

^h*p* < .05, comparing non-Hispanic women in border counties with non-Hispanic women in nonborder counties of border states.

ⁱ*p* < .01, comparing non-Hispanic women in border counties with non-Hispanic women in nonborder counties of border states.

^j*p* < .05, comparing Hispanic women in border counties with Hispanic women in the United States.

^k*p* < .01, comparing Hispanic women in border counties with Hispanic women in the United States.

^l*p* < .001, comparing Hispanic women in border counties with Hispanic women in the United States.

^m*p* < .05, comparing non-Hispanic women in border counties with non-Hispanic women in the United States.

ⁿ*p* < .01, comparing non-Hispanic women in border counties with non-Hispanic women in the United States.

in border counties, with women in nonborder counties of border states, and the remainder of the United States (results not shown).

In multivariate analysis of data from border counties (results not shown), factors found to be positively associated with having had a mammogram in the past two years included age, having fewer children, nonrural residence, having seen a physician in the past year, and having health insurance. Factors positively associated with having had a Pap test in the past three years included younger age, non-Hispanic ethnicity, having fewer children, nonrural residence, having seen a physician in the past year, and having health insurance (results not shown).

DISCUSSION

Results indicated that the breast and cervical cancer screening rates among non-Hispanic women in border counties compare favorably with those of non-Hispanic women in other counties of border states and with those of non-Hispanic women in the rest of the United States. Hispanic women in border counties, however, especially those who are older, are less likely to have received a mammogram (in the past two years) or a Pap test (in the past three years or ever) than are Hispanic women in other parts of border states or in the remainder of the United States. Cultural attitudes, beliefs, and lack of knowledge about the importance of routine cancer screening, especially among older Hispanic women and recent immigrants,²²⁻²⁵ may help explain these findings. Also, lack of access to health care services in the border region^{1,3} may partly account for lower cancer screening rates among Hispanic women. In this analysis, both Hispanic and non-Hispanic women who had seen a physician in the past year and those with health insurance were more likely to have received a recent mammogram or Pap test.

The definition of the border region and counties along the US-Mexico international border used in this article is the one adopted by the Health Resources Services

Exploratory analyses suggested that the rates of mammographies, clinical breast examinations, and Pap tests were particularly low for older Hispanic women.

Administration (HRSA).¹ According to this definition, border counties are those in which any part of the county is within 100 kilometers (62.14 miles) of the border.¹ The nonborder areas of Texas, New Mexico, Arizona, and California include some communities that have similar patterns of migration, socioeconomic characteristics, and health conditions as the border communities. Such similarities between border counties and some nonborder counties should be taken into account in interpreting the pattern of cancer screening rates observed in this study.

Previous authors^{4,26} have noted that the geography of the border may allow for unique health care practices. Women may seek some health care services in Mexico and this can affect opportunities for routine cancer screening. For example, because pharmacies in Mexico legally sell birth control medications without a prescription,^{4,26} some women may avoid a physician's appointment in the United States and, with it, the opportunity for a Pap test.

As a group, women over 65 years of age in border counties were least likely to have had a Pap test. This is consistent with prior surveys conducted in the border cities of El Paso, Texas, and Dona Ana, New Mexico.⁴ Some older women may have delivered babies at home and not used a health care system for perinatal services, thereby reducing opportunities for a Pap test.

The acculturation level of women in border counties may also affect breast and cervical cancer screening. Acculturation has been measured among Hispanic groups as a function of primary language spoken, age of arrival in the United States, number of years in the United States, and the ethnicity of persons

About 15% of the Hispanic women in border counties had never had a Pap test. It is important to reach them with cancer control interventions because their risk of invasive cervical cancer is likely to be higher.

in their social networks.²⁷⁻³⁰ This study is limited by a lack of information about whether the interviews were completed in English or Spanish and whether the women were immigrants. California, New Mexico, and Texas utilized a Spanish questionnaire for BRFSS. Measures of acculturation have been found to be strongly related to education and health insurance status in prior studies of Hispanic women.²⁸ Women who are less acculturated are more likely to have more traditional Latin values, including those associated with health and illness. Such women may value health but not worry about it until they are ill, and may have less of a prevention orientation.^{26,31} Embarrassment and shame may also be important barriers to screening among less acculturated women.³¹

About 15% of the Hispanic women in border counties had never had a Pap test. It is important to reach them with cancer control interventions because their risk of invasive cervical cancer is likely to be higher.

With respect to other limitations, response bias is a possibility because response rates were low and the telephone survey excluded women in households without a telephone. Rural residents, Hispanic

women, and those with lower incomes may be less likely to have a telephone in the household. Although information about the proportion of border and nonborder households that lack a telephone is unavailable, telephone ownership among persons living in colonias in border areas is likely to be relatively low. The estimates of cancer screening observed in the current study may be biased upward to some extent, and the differences in cancer screening across geographic areas may have been underestimated.

Also, self-reported information about cancer screening practices may differ from information obtained from the records of health care providers.³²⁻³⁴ Finally, some misclassification of rural/nonrural residences may have resulted from our use of rural-urban continuum codes (Beale codes) from 1993, which are based upon data from the 1990 United States Census. Rural-urban continuum codes updated with data from the 2000 United States Census are not currently available (personal communication, Calvin Beale, July 20, 2000).

In conclusion, additional efforts should be made to increase breast and cervical cancer screening among women in border counties. In addition to the correlates of screening examined in the present study, factors such as culture, traditions, and health care practices are likely to influence the health practices of residents of the border region. Further research is needed to clarify these influences on routine cancer screening and to design and evaluate interventions to increase cancer screening in these populations.

REFERENCES

1. Health Resources Services Administration. Facts about U.S./Mexico border health. <http://bphc.hrsa.gov/bphc/borderhealth>. Accessed February 19, 2002.
2. Health Resources Services Administration. *Assuring a health future along the U.S.-Mexico border. A HRSA priority*. Rockville, MD: U.S. Department of Health and Human Services, 2000.
3. National Center for Health Statistics Office of International and Refugee Health. *Healthy Border 2010: An agenda for improving health on the U.S.-Mexico border*. U.S. Department of Health and Human Services, 2003, in press.
4. Byrd TL, Cardenas VM, Pauli A. Self-reported use of cervical cancer screening among Hispanic women of two US-Mexico border counties. *J Womens Cancer*. 2001;3:49-55.
5. Frazier EL, Jiles RB, Mayberry R. Use of screening

- mammography and clinical breast examinations among Black, Hispanic, and white women. *Prev Med*. 1996;25:118-125.
6. Blackman DK, Bennett EM, Miller DS. Trends in self-reported use of mammograms (1989-1997) and Papanicolaou tests (1991-1997)—United States. *MMWR*. 1999;48:1-22.
 7. Pearlman DN, Ehrlich B, Rakowski W, Clark MA. Breast cancer screening practices among Black, Hispanic, and White women: Reassessing differences. *Am J Prev Med*. 1996;12:327-337.
 8. Tortolero-Luna G, Glober GA, Villarreal R, Palos G, Linares A. Screening practices and knowledge, attitudes, and beliefs about cancer among Hispanic and non-Hispanic white women 35 years old or older in Nueces County, Texas. *J Natl Cancer Inst Monographs*. 1995;18:49-56.
 9. Suarez L, Nichols D, Roche RA, Simpson DM. Knowledge, behavior, and fears concerning breast and cervical cancer among older low-income Mexican-American women. *Am J Prev Med*. 1997;13:137-142.
 10. Morgan C, Park E, Cortes DE. Beliefs, knowledge, and behavior about cancer among urban Hispanic women. *J Natl Cancer Inst Monographs*. 1995;18:57-63.
 11. Hubbell FA, Chavez LR, Mishra SI, Valdez RB. Differing beliefs about breast cancer among Latinas and Anglo women. *West J Med*. 1996;164:405-409.
 12. Freeman HP. Cancer in the socioeconomically disadvantaged. *CA: A Cancer Journal for Clinicians*. 1989;39:266-288.
 13. Freeman H. Race, poverty, and cancer (editorial). *J Natl Cancer Inst*. 1991;83:526-527.
 14. Strickland J, Strickland DL. Barriers to preventive health services for minority households in the rural south. *J Rural Health*. 1996;12:206-217.
 15. Tomatis L. Poverty and cancer (editorial). *Cancer Epidemiol Biomarkers Prev*. 1992;1:167-175.
 16. Pamies RJ, Woodard IJ. Cancer in socioeconomically disadvantaged populations. *Cancer Epidemiol Prev Screening*. 1992;19:443-451.
 17. Centers for Disease Control and Prevention. CDC Surveillance Summaries. *MMWR*. 1997;46(SS-3).
 18. Frazier EL, Franks AI, Sanderson LM. Behavioral risk factor data. In: *Using Chronic Disease Data: A Handbook for Public Health Practitioners*. Atlanta, GA: US Dept of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention; 1992:4-1-4-17.
 19. Waksberg J. Sampling methods for random digit dialing. *J Am Stat Assoc*. 1978;73:40-46.
 20. US Dept of Agriculture Economic Research Service. 1993 Rural-urban continuum code. <http://www.ers.usda.gov/briefing/rural/data>. Accessed February 19, 2002.
 21. Shah BV, Barnwell BG, Bieler GS. SUDAAN User's Manual: Software for Analysis of Correlated Data, Release 6.40. Research Triangle Park, NC.
 22. Lantz PM, Dupuis L, Reding D, et al. Peer discussions of cancer among Hispanic farm workers. *Public Health Reports*. 1994;109:512-520.
 23. Lantz PM, Reding D. Cancer beliefs and attitudes of migrant Latinos. *JAMA*. 1994;272:31-32.
 24. Skaer TL, Robison LM, Sclar DA, et al. Cancer-screening determinants among Hispanic women using migrant health clinics. *J Health Care Poor Underserved*. 1996;7:338-354.
 25. Goldsmith DE, Sisneros GC. Cancer prevention strategies among California farmworkers: Preliminary findings. *J Rural Health*. 1996;12(4 Suppl):343-348.
 26. Mines R, Mullenaz N, Saca L. *The binational farmworker health survey: an in-depth study of agricultural worker health in Mexico and the United States*. Davis, California: California Institute for Rural Studies; 2001. <http://www.cirsinc.org>. Accessed February 19, 2002.
 27. Cuellar I, Harris LC, Jasso R. An acculturation scale for Mexican American normal and clinical populations. *Hispanic Journal of Behavioral Sciences*. 1980;2:199-217.
 28. Suarez L, Pulley L. Comparing acculturation scales and their relationship to cancer screening among older Mexican-American women. *J Natl Cancer Inst Monograph*. 1995;18:41-47.
 29. Chavez LR, Hubbell FA, McMullin JM, Martinez RG, Mishra SI. Structure and meaning in models of breast and cervical cancer risk factors: a comparison of perceptions among Latinas, Anglo women, and physicians. *Med Anthropol Q*. 1995;9:40-74.
 30. Marin G, Sabogal F, Marin BV, et al. Development of a short acculturation scale for Hispanics. *Hispanic J Behav Sci*. 1987;9:183-205.
 31. Lazcano-Ponce EC, Moss S, Alonso de Ruiz P, Salmeron Castro J, Hernandez Avila M. Cervical cancer screening in developing countries: Why is it ineffective? The case of Mexico. *Arch Med Res*. 1999;30:240-250.
 32. Suarez L, Goldman DA, Weiss NS. Validity of Pap smear and mammogram self-reports in a low-income Hispanic population. *Am J Prev Med*. 1995;11:94-98.
 33. Zapka JG, Bigelow C, Hurley T, Ford LD, Egelhofer J, Cloud WM, et al. Mammography use among sociodemographically diverse women: the accuracy of self-report. *Am J Public Health*. 1996;86:1016-1021.
 34. Paskett ED, Tatum CM, Mack DW, Hoen H, Case LD, Velez R. Validation of self-reported breast and cervical cancer screening tests among low-income minority women. *Cancer Epidemiol Biomarkers Prev*. 1996;5:721-726.