# Breast and Cervical Cancer Screening for Puerto Ricans, African Americans, and Non-Hispanic Whites Attending Inner-City Family Practice Centers

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**Objectives:** Disparities exist for breast and cervical cancer screening among racial/ethnic groups and low-income women. This study determines racial/ethnic variation in: 1) staging readiness for mammography, Pap smears, and clinical breast exam (CBE); 2) identifying patterns of adherence; and 3) determining sociodemographics associated with compliance with all three exams.

**Design:** Cross-sectional.

**Setting:** Two urban family medicine clinics.

**Patients:** A consecutive sample of 343 women presenting for care.

**Interventions:** Women were staged (maintainers, actors, contemplators, precontemplators, relapse contemplators, and relapse precontemplators) according to self-reported receipt of mammography, CBEs, and Pap smears.

**Main Outcome Measures:** Adherence across exams was assessed. Sociodemographics were compared among racial/ethnic groups for women adherent with all three exams.

**Results:** Sixty-one percent were adherent with mammography, 93% with Pap smears, and 67% with CBEs. Thirty percent were contemplating mammography. Fifty-eight percent of Puerto Rican women were adherent with CBEs compared to 68.6% of African American and 78.5% of non-Hispanic White women. Puerto Rican women were less likely to be maintainers of CBE and more likely to be precontemplators and relapsers than non-Hispanic White women ($P$=.004). Forty-eight percent were adherent with all three exams. Puerto Rican women compliant with all three screens were younger and less educated than African American and non-Hispanic White women.

**Conclusions:** Racial/ethnic differences in screening patterns exist among women attending urban family practice centers. Primary care providers must be culturally sensitive when recommending screening and can use staging as a tool to target women most receptive to intervention. (*Ethn Dis*. 2006;16:994–1000)

**Key Words:** African American, Hispanic Americans, Low-Income, Mammography, Pap Smear, Primary Care, Puerto Ricans

## Introduction

Minority women are dying from breast and cervical cancer at rates higher than are White women.[1] The five-year breast and cervical cancer survival rates for African American women are 75% and 66%, respectively, compared to 89% and 74% for White women. The death rate for cervical cancer is higher among African American and Latino women (5.6/100,000 and 3.6/100,000 women, respectively) than among non-Hispanic White women (2.6/100,000).[1]

Preventive screening facilitates early cancer diagnosis and treatment. Mortality attributed to breast cancer can be reduced by up to 30% with the use of combined mammogram and breast examination.[2,3] However, screening rates are suboptimal, especially for minority women. Data from the 1990 National Health Interview Survey (NHIS) show that among women ≥50 years of age, 89% had a Pap smear at least once, 86% had a clinical breast exam (CBE), and 67% had a prior mammogram.[4] Data from the 2000 NHIS showed that African Americans and Latinas were less likely than non-Hispanic White women to get a mammogram in the past year (52.8%, 48.0%, and 56.9%, respectively). Latinas were less likely than non-Hispanic White and African American women to receive a Pap smear in the last three years (77.9%, 85.5%, 83.9% respectively).[1] These trends are consistent throughout the literature.[5–8] McCarthy et al found that older Black women were less likely to undergo mammography screening compared to older White women.[6] A study of urban, low-income Hispanic women showed that while 90% had reported ever having a Pap smear, only 24% were compliant with recommended screening.[5] Similarly, 62% of women reported having a mammogram, but only 33% were compliant with guidelines.[5] One study offered mammography at no cost and still found African American participants to have lower mammography and CBE rates compared to White women, (odds ratio 3.93 and 4.49 for mammography; and odds ratio 4.92 and 5.35 for CBE).[8]

Many provider- and patient-based interventions have been incorporated into office systems to improve screening rates.[9–11] These include reminder sys-

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tems, patient prompts, and physician detailing. The transtheoretical model of behavior change states that an individual must be ready to change before behavior change occurs. Prochaska and DiClemente categorize individuals as maintainers, actors, contemplators, precontemplators, relapse contemplators, and relapse precontemplators.[12,13] Actors and maintainers are currently engaging in a behavior, precontemplators and relapse precontemplators are not ready to begin behavior change, and contemplators and relapse contemplators are individuals considering engaging in the behavior. The latter group is most receptive to intervention. This readiness to change staging paradigm can be applied to the receipt of cancer screening to best identify women receptive to screening intervention.[14]

Studies have shown that receiving one screening test is predictive of receiving other preventive services.[15–17] However, screening behavior is not always consistent among different examinations. Data from the 1990 NHIS showed that only 44% of women age 50–75 received all three exams within a two-year period, and 23% did not receive any of the three screening exams.[4] In 2002, screening rates for mammography combined with CBE were similar for African American women and White women, 55.9% and 55.3%, respectively.[18]

The NHIS and Behavioral Risk Factor Surveillance System (BRFSS) studies were primarily population-based and included all races. To date, no investigation has studied adherence to mammography, Pap smears, and CBEs with respect to minority populations attending urban family practice centers. The purposes of the present study were: 1) to determine racial/ethnic variation in staging women for readiness for receipt of mammography, Pap smear, and CBE in accordance with recommended guidelines; 2) to identify patterns of adherence with mammography, Pap smear, and CBE by race/ethnicity; and 3) to determine demographic characteristics associated with women compliant with all three screening exams by race/ethnicity.

## METHODS

This cross-sectional study was conducted with a sample drawn from two family health centers in Buffalo, New York. Both centers were located in low-income, inner-city communities and served predominantly minority populations: one mostly African American and the other mostly Puerto Rican. The research protocol was approved by the institutional review board of the State University of New York at Buffalo.

Women ≥40 years of age at each site were consecutively asked to participate; 510 were approached. Forty-five women were ineligible because of mental deficiencies, language barriers (speaking a language other than English or Spanish), and/or past cancer diagnosis. Forty-one women were unable to be contacted at the time of their visit. We identified 424 women as eligible, and 343 interviews were completed, for a response rate of 81%.

All participants gave informed consent for a verbal interview and access to their medical records. The survey instrument was available in either Spanish or English. The instrument was back-translated to ensure the appropriateness of translation.[19] Women were interviewed in the language preference of the respondent by trained bilingual, bicultural interviewers. Each interview took approximately one half hour to complete and included measures of screening behavior, locus of control, stress, coping, *fatalismo( fatalism)*, health status, and demographic characteristics. Chart review was performed to determine validity of self-report of screening practices. The level of agreement between self-report and chart review were assessed.[20] In brief, variations exist among ethnic groups in the agreement between self-reported and medical record documentation of Pap and mammography use. Agreement was higher for Pap smear use and most recent screens. Thirty percent of the sample was determined to have had hysterectomies either by chart review or self-report.

Recommended screening maintenance was based on the January 1997 guidelines from the American Cancer Society.[21] The guidelines recommended yearly Pap smears to women ≥18 years of age every three years. The society also recommended that mammograms be given annually for women ≥50 and every two years for women 40–49.[21]

Women were classified according to stage of screening maintenance originally developed by Prochaska and DiClemente for smoking cessation.[13] Skinner et al later adapted the paradigm for mammography utilization.[14] For our purposes, the paradigm was used to stage all three screening behaviors. Precontemplators were defined as women who had never heard of the screening test or those who had heard of it but have never had the test and are not considering having one in the next six months. Relapse precontemplators consisted of those who had heard of a test, have had at least one test not within recommended guidelines, and are not considering having one in the next six months. Contemplators included women who have never had a test but are considering having one in the next six months. Relapse contemplators were defined as those who have had at least one test not within the recommended guidelines and are considering having a test in the next six months. Maintainers consisted of those who have had more than one test, had their last test within the recommended guidelines, and are considering having one within the next six months. Actors are defined as those who have had only one test within the recommended guidelines and are considering having the test in the next six months.

Survey design did not allow intention questions to be included for CBE. Therefore, staging was categorized into three categories that mostly coincided with the six-stage model. Precontemplators/contemplators were defined as those who have never heard of a CBE or have heard of a CBE but have never had one. Maintainers were women who had a CBE within the recommended guidelines. Women who had a CBE but not within the recommended guidelines were grouped as relapsers.

A variable was computed to identify women who were maintainers or actors of the three screening exams in combination. Specifically, women staged as maintainers or actors were categorized as being adherent with all three exams, or composites of such. This variable was then further condensed as being adherent with all three exams or not being adherent with all three exams.

The analyses included a bivariate comparison of sociodemographic and economic characteristics across the three racial/ethnic groups. These characteristics included age, marital status, education, employment status, income, and place of care. Age was collected continuously and collapsed in this analysis into three categories (40–49, 50–69, and ≥70 years). Marital status was defined as married or living with someone, single/never married, divorced or separated, and widowed. Education was categorized as less than an eighth-grade education, some high school, completed high school, and some college or more. Employment was reported as either currently employed or unemployed. Income was collected as a categorical variable (<$10,000 per year, $10,000–$20,000 per year, and >$20,000 per year). Because of the small number of responses in the >$20,000 category ($n$=24), the income variable was dichotomized as <$10,000 per year and ≥$10,000 per year.

Chi-square analysis was used to determine statistical significance, since all variables were categorical. Fisher's exact test was used in the case of small cell sizes. An $\alpha < .05$ was considered statistically significant. The percentage distribution of the six screening stages for Pap smear and mammography was described for each racial/ethnic group. Three stages were described for CBE. Again, chi-square analysis was used to compare distribution of staging for each exam across racial/ethic groups. A patient was considered adherent with an exam if she was staged as an actor or maintainer. The pattern of adherence for all three screening exams was described for each racial/ethnic group. Results were purely descriptive because of small numbers in several categories. In addition, bivariate analyses, specifically chi-square, were used to compare socioeconomic and demographic characteristics among racial/ethnic groups for women compliant with all three screening tests. An alpha level of .05 was used to determine statistical significance. All analyses were conducted using SPSS for Windows version 10.0.7 (SPSS Inc., Chicago, Ill.).[22]

## RESULTS

Selected demographics of the sample by race are presented in Table 1.

Puerto Rican women were more likely to present to clinic 1 and African American and non-Hispanic White women to clinic 2. This finding is expected because of the communities where the health centers are located. Demographic characteristics were compared across site to assess for potential bias (data not shown). Patients from clinic 1 were more likely to be married or living with someone compared to patients from clinic 2 (35.8% and 19.3%, respectively). Fifty-one percent of patients from clinic 1 had less than an eighth-grade education, compared to 13% of patients from clinic 2. Eighty-four percent of patients from clinic 1 earned <$10,000 annually, compared to 70% of patients from clinic 2. Although differences in sociodemographics existed between the two health centers, the rate of compliance with all three exams was similar.

Table 2 categorizes the study population by racial/ethnic group within each screening paradigm; 61.3% of the sample were adherent to mammography, ie, maintainers or actors. Thirty percent of the women were either contemplators or relapse contemplators. No statistically significant differences were seen across racial/ethnic groups in staging.

Table 2 also shows that 93.3% of the population were receiving Pap smears within acceptable screening guidelines (ie, maintenance or action). Approximately 4% were staged as contemplators or relapse contemplators. Again, no statistically significant differences were seen among racial/ethnic groups.

In contrast, only 66.8% of the population indicated receiving a CBE as per screening guidelines. A statistically significant difference was seen among racial/ethnic groups for CBE staging. Non-Hispanic White women were more likely to be maintainers compared to African American and Puerto Rican women. Puerto Rican women were more likely to be relapsers than African American and non-Hispanic White women. Puerto Rican women were more likely to be precontemplators compared to African American and non-Hispanic White women. Puerto Rican women were more likely to be precontemplators compared to African American and non-Hispanic White women. Pairwise analyses were conducted to describe each group to a reference category. African American women were not significantly different than non-Hispanic White women. However, Puerto Rican women were statistically less likely to be maintainers of CBE and more likely to be precontemplators and relapsers than non-Hispanic White women ($P$=.004). Staging of African American women was not statistically different than Puerto Rican women.

**Table 1. Percent distribution of selected demographics by race/ethnicity**

| Selected Variables | Total *N*=326 % | Puerto Rican *n*=128 % | African American *n*=118 % | Non-Hispanic White *n*=80 % | *P* value |
|---|---|---|---|---|---|
| Age (years) | | | | | NS |
| 40–49 | 42 | 46.1 | 39.0 | 42.5 | |
| 50–69 | 48 | 43.0 | 54.2 | 46.3 | |
| ≥70 | 10 | 10.9 | 6.8 | 11.3 | |
| Place of care | | | | | <.001 |
| Clinic 1 | 44.6 | 97.7 | 5.9 | 20.0 | |
| Clinic 2 | 55.4 | 2.3 | 94.1 | 80.0 | |
| Employment status | | | | | NS |
| Employed | 24.4 | 21.9 | 26.3 | 25.0 | |
| Unemployed | 75.6 | 78.1 | 73.7 | 75.0 | |
| Income | | | | | .01 |
| <$10,000/year | 76.0 | 85.0 | 68.1 | 74.3 | |
| ≥$10,000/year | 24.0 | 15.0 | 31.9 | 25.7 | |
| Marital status | | | | | .006 |
| Married/living with someone | 26.9 | 36.7 | 21.4 | 19.0 | |
| Single/never married | 17.4 | 10.2 | 24.8 | 17.7 | |
| Divorced/separated | 34.5 | 34.4 | 30.8 | 43.0 | |
| Widowed | 20.4 | 18.8 | 23.1 | 20.3 | |
| Education | | | | | <.001 |
| Eighth grade or less | 29.2 | 56.3 | 11.2 | 16.3 | |
| Some high school | 16.8 | 16.4 | 19.0 | 13.8 | |
| Completed high school | 28.3 | 15.6 | 39.5 | 37.5 | |
| Some college or more | 25.7 | 11.7 | 35.3 | 32.5 | |

NS= not significant.

**Table 2. Percentage distribution of staging of screening behavior for mammography, Pap smear, and clinical breast exam by stage of change**

| Mammography staging *P* value=NS | Total *N*=323 % | Puerto Rican *n*=126 % | African American *n*=118 % | Non-Hispanic White *n*=79 % |
|---|---|---|---|---|
| Maintainers | 55.4 | 54.8 | 55.1 | 57.0 |
| Relapse precontemplators | 6.8 | 8.7 | 5.1 | 6.3 |
| Contemplators | 6.2 | 6.3 | 6.8 | 5.1 |
| Relapse contemplators | 23.8 | 19.0 | 26.3 | 27.8 |
| Actors | 5.9 | 7.9 | 5.9 | 2.5 |
| Precontemplators | 1.9 | 3.2 | .8 | 1.3 |
| **Pap smear staging *P* value=NS** | **Total *N*=316 %** | **Puerto Rican *n*=120 %** | **African American *n*=117 %** | **Non-Hispanic White *n*=79 %** |
| Maintainers | 90.5 | 89.2 | 90.6 | 92.4 |
| Relapse precontemplators | 2.2 | 3.3 | .9 | 2.5 |
| Contemplators | 1.3 | 1.7 | .9 | 1.3 |
| Relapse contemplators | 2.5 | 1.7 | 2.6 | 3.8 |
| Actors | 2.8 | 2.5 | 5.1 | 0.0 |
| Precontemplators | .6 | 1.7 | 0.0 | 0.0 |
| **Clinical breast exam staging* *P* value=.03** | **Total *N*=323 %** | **Puerto Rican *n*=126 %** | **African American *n*=118 %** | **Non-Hispanic White *n*=79 %** |
| Maintainers | 66.8 | 57.8 | 68.6 | 78.5 |
| Relapsers | 30.5 | 36.7 | 29.7 | 21.5 |
| Precontemplators | 2.7 | 5.4 | 1.7 | 0.0 |

* The series of questions for clinical breast exam (CBE) did not include intention of behavior. Screening behavior for the CBE can only be categorized into three categories: maintainers, precontemplators, and relapsers.

NS= nonsignificant

**Table 3. Patterns of staging behavior for mammography, Pap smear, and clinical breast exam by race/ethnicity**

| Pattern | Total *N*=326 % | Puerto Rican *n*=128 % | African American *n*=118 % | Non-Hispanic White *n*=80 % |
|---|---|---|---|---|
| CBE, mammogram, Pap smear | 48.3 | 43.2 | 49.6 | 51.9 |
| CBE and mammogram only | .9 | 1.7 | .9 | 0 |
| CBE and Pap smear only | 16.1 | 13.6 | 17.1 | 22.1 |
| Mammogram and Pap smear only | 13.4 | 18.6 | 10.3 | 9.1 |
| CBE only | 1.8 | .8 | 1.7 | 3.9 |
| Pap smear only | 15.5 | 16.9 | 18.8 | 9.1 |
| Mammogram only | .6 | .8 | .9 | 0 |
| None | 3.3 | 4.2 | .9 | 3.9 |

Table 3 describes the sample's pattern of combined screening adherence by racial/ethnic group. In general, 48.3% of the sample received all three exams per guidelines. No statistically significant difference was seen in adherence between racial/ethnic groups. When all three examinations were compared versus all other combinations, no difference was seen in utilization with respect to race. *P* values are not reported because of small numbers in each cell once comparisons were made.

The analyses conducted in Tables 2 and 3 were stratified by income to identify any effect modification that might be present (data not presented). No differences were found.

Table 4 describes the socioeconomic and demographic characteristics of women adherent with all three screening practices by race. No difference was seen among racial/ethnic groups in employment status, marital status, or yearly household income for women adherent with all three screening exams. Forty-nine percent of Puerto Rican women adherent with all three exams had an eighth-grade education or less, whereas 34.5% of African American and 27.5% of non-Hispanic White adherent women had some college education. This distribution reflects the distribution of education level for the entire sample. Most adherent Puerto Rican women (58.8%) were <50 years old, whereas most adherent African American (55%) and non-Hispanic White adherent women (60.3%) were 50–69 years old.

Pairwise comparisons of racial/ethnic group were also conducted for education and age (data not shown). Age distribution of women compliant with all three screening exams was not statistically different between African American and non-Hispanic White women. Similarly, the age distribution of Puerto Rican women compliant with

**Table 4. Characteristics of women compliant with mammography, Pap smear, and clinical breast exam by racial/ethnic group**

| Characteristic | Puerto Rican *n*=51 *n* (%) | African American *n*=58 *n* (%) | Non-Hispanic White *n*=40 *n* (%) | *P* value |
|---|---|---|---|---|
| Age (years) | | | | .03 |
| <50 | 30 (58.8) | 19 (32.8) | 22 (55.0) | |
| >50–69 | 16 (31.4) | 35 (60.3) | 15 (37.5) | |
| ≥70 | 5 (9.8) | 4 (6.9) | 3 (7.5) | |
| Employment status | | | | NS |
| Employed | 9 (17.6) | 14 (24.1) | 10 (25.0) | |
| Unemployed | 42 (82.4) | 44 (75.9) | 30 (75.0) | |
| Marital status | | | | NS |
| Married/living with someone | 17 (33.3) | 11 (19.3) | 7 (17.5) | |
| Single/never married | 11 (21.6) | 14 (24.6) | 8 (20.0) | |
| Divorced/separated | 14 (27.5) | 19 (33.3) | 19 (47.5) | |
| Widowed | 9 (17.6) | 13 (22.8) | 6 (15.0) | |
| Education | | | | <.001 |
| Eighth grade or less | 25 (49.0) | 7 (12.1) | 5 (12.5) | |
| Some high school | 9 (17.6) | 10 (17.2) | 7 (17.5) | |
| Completed high school | 9 (17.6) | 21 (36.2) | 17 (42.5) | |
| Some college or more | 8 (15.7) | 20 (34.5) | 11 (27.5) | |
| Yearly household income | | | | NS |
| <$10,000 | 38 (84.4) | 38 (70.4) | 27 (75.0) | |
| ≥$10,000 | 7 (15.6) | 16 (29.6) | 9 (25.0) | |

NS= nonsignificant

all three screens was not statistically different than that of non-Hispanic White women. However, the age distribution of African American women was statistically different than that of Puerto Rican women ($P=.01$). Specifically, compliant Puerto Rican women were younger than African American women. Education level of African American women compliant with all three screening exams was not statistically different than that of non-Hispanic White women. However, compliant Puerto Rican women had significantly lower education levels than did non-Hispanic White ($P=.001$) and African American women ($P\leq.001$).

## DISCUSSION

This study staged women for receipt of mammography, Pap smear, and CBE according to the transtheoretical model of behavior change. Through staging, we determined that 61.3% of women were current with mammography and 93.2% were current with Pap smears. Another 30% of women were contemplating mammography, and 3.8% were contemplating Pap smears. No difference in screening was seen by racial/ethnic group. However, Puerto Rican women were the least likely to be current with receipt of CBE compared to African American and non-Hispanic White women. Approximately half of the women participating in this study were current with all three screening exams. Puerto Rican women who were compliant with all three tests were younger and less educated than compliant African American and non-Hispanic White women.

Several studies have shown that having a regular source of care is predictive of cancer screening.[7,8,15,16,17,23,24] One study found that women with a usual source of care were 3.6 times as likely to have had a recent mammogram and Pap smear than were those without a source of care.[7] However, the findings from this study were similar to screening rates identified in population studies. Specifically, in this study, rates of mammography and Pap smear utilization were similar to national averages.[1] The findings also showed 48.3% of women received all three exams. A population-based study showed that 44% received all three exams regardless of race and ethnicity.[4]

*Through staging, we determined that 61.3% of women were current with mammography and 93.2% were current with Pap smears.*

This study stages women attending a primary care setting for mammography, CBE, and Pap smear utilization. The primary care setting provides a unique opportunity to improve the receipt of preventive services. Staging can assist providers in targeting women who would be most receptive to interventions to improve screening. For all screening, the contemplators/relapse contemplators are those who would be most acceptable to intervention given they are at least thinking about receiving the examinations. In this study, 30% were contemplating mammography. Clinicians need to understand that many of their patients may be considering these examinations and may actually receive them if an intervention is made.

More than 90% of the sample was current on their Pap smear. Given that CBE can also be done during a primary care visit, we hypothesized that adherence rates would be similar. However, only 67% of the sample were current, which is closer to mammography maintenance at 56%. Competing demands may preclude providers from performing CBE on a regular basis.[25] Because our sample was from a minority population, cultural factors may influence receipt of a CBE. This may especially be true with respect to Puerto Rican women, who had the lowest rate of CBE.

Older age and lower education level are demographic characteristics that have been found to be associated with lower rates of cancer screening.[8,15,16,17,26] Age and education have been identified in the literature as predictors of compliance with all three screening exams.[4] In this study, age and education of compliant women varied across racial/ethnic groups. Most adherent Puerto Rican and non-Hispanic White women were $<50$ years old, whereas most adherent African American women were 50–69 years old. Given that guidelines are relatively consistent for women $\geq50$, we are surprised that this age group was less adherent. Perhaps the increased utilization in women $<50$ can be attributed to the fact that many of these women are premenopausal and seek medical attention more frequently. This trend has previously been seen among multiethnic women with regard to breast and cervical cancer screening. Specifically, Mandelblatt et al found that elderly women reported being screened less often than did younger women.[27] Age differences of adherent women among racial/and ethnic groups should be considered when developing interventions to increase screening rates.

Selection bias may exist in this study. This bias was not assessed since data were not collected on women who were ineligible or who refused. Bias may also be present due to the sociodemographic differences between health centers from which patients were recruited. No information was collected on site or provider strategies, such as reminder systems to improve screening rates. Since the rate of compliance was similar across sites, we can assume that such differences were minimal. All data collected were based on self-report. Recall bias may be present, particularly

when asking history of screening. Since women were recruited from two inner-city health centers, the results may not be generalizable to women attending other health centers or the general population.

Findings from this study support the potential usefulness of staging patients for preventive services and targeting those appropriate for intervention. Additionally, the study found lower CBE rates among Puerto Rican patients and identified age and education levels as predictors of compliance. Although primary care contributes to increased rates of breast and cervical cancer screening, minority low-income women within a healthcare system are not receiving cancer screening according to recommended guidelines. Clinicians need to continue their efforts at every office visit to ensure adherence across all screening guidelines. The staging paradigm is helpful in determining which patients would be most receptive to an intervention. Cultural, practice factors, and/or access to care may influence receipt of combined cancer screening, particularly by increasing rates of CBE. Further investigations may need to evaluate which factors are most influential on cancer screening practices among minority populations.

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