Validation of Self-Reported Breast and Cervical Cancer Screening Tests among Low-Income Minority Women


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Abstract

The objective of the Forsyth County Cancer Screening Project is to assess barriers to breast and cervical cancer screening among low-income women and to develop an educational program to address these barriers. To properly assess the barriers, it was first necessary to properly assess the barriers, it was first necessary to determine if self-reported rates of breast and cervical cancer screening were accurate. All women who participated in the baseline survey (n = 555) were asked to provide information regarding if, where, and when they had obtained mammograms and Pap smears. Identified health care facilities were then contacted to verify this information. Approximately 80% of responses were verified for at least one of the exams with the information provided. For mammography, 77% of self-reports were correct, whereas 67% of self-reports of Pap smear screening were correct (κ = 0.54 and 0.15, respectively). For both tests, women thought they had received them more recently than they actually had, by an average of 3 months for mammography and 23 months for Pap smears. Using validated reports of screening did not substantially change identified predictors of screening for mammography. For Pap smear screening, however, most of the identified predictors of screening became nonsignificant when medical chart reports were used instead of self-reports, suggesting that caution should be used in relying on self-reports to design programs to improve cervical cancer screening practices.

Introduction

Breast and cervical cancer screening have been shown to reduce mortality from these cancers by as much as 35% for breast cancer (1) and 98% for cervical cancer (2). Most studies rely on self-reports of use to determine rates of screening in general populations and to assess the effects of programs and interventions. In addition, public health policy recommendations for improving screening rates rely on self-report data. Self-reports of screening are used rather than medical record review mainly due to the time, cost constraints, and issues involved in accessing medical records. Medical records themselves are not useful for generating population-based estimates of health behaviors such as screening unless they are to capture all possible events, e.g., mammograms, that could have occurred within a defined population. To make valid estimates, conclusions, and recommendations, self-reports need to be as accurate as possible.

The accuracy of self-reporting has been examined in studies of other behaviors such as tobacco use (3–5), reports of hysterectomies (6), prevalence of herpes zoster (7), hospital admissions (8), and family history of cancer (9, 10). In terms of cancer screening, several reports have been published on the validity of self-reports of mammography, Pap smear, and stomach cancer screening (11–24). These studies have found varying degrees of accuracy, from a high of 97% for mammography usage in a health maintenance organization population (19) to a low of 68% for Pap smear usage among Hispanic women in Texas (17). Few studies have examined the accuracy of women’s self-reports of Pap smear and mammography screening among low-income minority women.

As part of a study designed to improve breast and cervical cancer screening among low-income minority women, self-reports of screening for breast and cervical cancer screening were validated. This paper focuses on three aspects of self-reporting: (a) the accuracy of self-reports of screening behaviors; (b) identifying women who report screening rates accurately; and (c) the effects that inaccuracies in self-reporting have on identifying areas for intervention.

Materials and Methods

Setting. The Forsyth County Cancer Screening project is directed at women ages 40 and older who reside in low-income housing communities in Winston-Salem and Greensboro, North Carolina. The majority of these women are African-American. Nine housing communities in Winston-Salem and 13 housing communities in Greensboro are included. A total of 1929 women (908 in Winston-Salem and 1021 in Greensboro) in these communities formed our target population.

Survey. A baseline survey of women’s knowledge, attitudes, and practices related to breast and cervical cancer screening was conducted in the winter of 1993. A random sample of 726 women, stratified by city and age group (40–64 years; ≥65 years), from the target population was selected by simple random selection to participate in the survey. Lists were made within each stratum, and a random number generator was used to choose women from these lists. Women were interviewed face-to-face by interviewers who were of the same ethnic background. The interviews lasted approximately 45 min and were mainly conducted in the women’s homes. A total of 555 (78% response rate) women completed a survey, 82% in Win-
ston-Salem and 73% in Greensboro. Women who did and did not complete interviews were similar with respect to age and race, the only information we had on the nonrespondents.

Written informed consent, including permission to review medical records, was obtained from each woman before the interview began. In the survey, women were asked if, when, and where they had obtained breast and cervical cancer screening. For women who reported having had a mammogram and/or Pap smear, the provider site where the last reported test was performed was obtained. For women who reported never having had either test, the usual primary care provider sites were obtained. Identified provider sites were contacted and asked to check their medical records for evidence of whether or not the tests had been performed for each woman. If a test was recorded in the medical record, the date of the procedure was noted. When no evidence of either procedure having been performed was found in the medical chart, records at other provider sites that the woman listed were searched for evidence of a Pap smear and/or mammogram test. For both cities combined, 68% of the mammograms and 77% of the Pap responses verified were done by searching one source. Of the mammograms and Pap responses not verified (15%), only one source could be searched for 75% of the mammograms and 79% of the Paps. Women whose records could and could not be verified did not differ significantly on any factors used subsequently in the analyses (see below), except nonrecruited women were somewhat less likely to have chronic medical conditions.

**Analysis.** We examined the accuracy of self-report compared to medical chart for both screening tests. We determined whether or not the woman ever had the test, and if a woman did have the test, as listed in the medical chart, we recorded the date the test was completed. The reported date of the test was compared with the actual date the test was performed. A total of 85% of the responses were able to be verified for at least one procedure, 73% (n = 407) for both tests, 6% (n = 31) for Pap smears only, and 6% (n = 34) for mammography only. Some reports were not verified because of missing medical records at indicated provider sites or misreporting of provider sites. \( \chi^2 \) tests were used to assess the univariate association between respondent characteristics and obtaining screening, using both self-report and medical chart data. Logistic regression was then used to determine which factors were jointly predictive of obtaining mammograms and Pap smears, using both self-report and medical chart data. Variables used in the analyses included age, city of residence, smoking status, previous births, marital status, working status, insurance status, education, race, having regular check-ups, having a primary doctor, chronic medical problem, knowledge, beliefs, perceived barriers to screening, and perceived risks of developing cancer. Both forward- and backward-stepping algorithms were used to select a subgroup of factors associated with screening. Logistic regression was also used to identify the characteristics of women who gave accurate self-reports for each test, using the same predictor variables.

**Results**

From the 555 women who completed the baseline survey, 438 women (78.9%) had data available for Pap smear verification, and 441 women (79.5%) were included in the mammography verification sample. Because there were some women unique to each sample, the demographic characteristics of each are shown in Table 1. The samples are similar in all characteristics. A little over half of the women were ages 65 and older, most were currently unmarried, and most never finished high school. This

<table>
<thead>
<tr>
<th>Table 1 Demographic Characteristics of Validation Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable</td>
</tr>
<tr>
<td>----------</td>
</tr>
<tr>
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</tr>
<tr>
<td>Greensboro</td>
</tr>
<tr>
<td>Winston-Salem</td>
</tr>
<tr>
<td>Age</td>
</tr>
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<tr>
<td>White</td>
</tr>
<tr>
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<tr>
<td>Given birth</td>
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<tr>
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</tr>
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<tr>
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<tr>
<td>Very good</td>
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<td>Excellent</td>
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<td>Perceived risk of cervical cancer</td>
</tr>
<tr>
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<td>Had Pap smear within last 3 years</td>
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*Guidelines are 1–2 years for women ages 40–49 and annually for women ages 50 and older.*
demographic profile of our participants is similar to the demographics of the low-income minority population that resides in public housing communities. In these communities, approximately 70% of the women were African-American. Almost half of the sample report were current smokers (48% and 47%). This smoking prevalence rate is higher than that reported from the National Health Interview Survey (25) for African-American adults (29.1%), adults with less than a high school education (31.4%), or adult women (23.5%). One reason for this high prevalence rate is the fact that this population is of lower socioeconomic status, which has been documented to be associated with higher prevalence rates of smoking (26). The geographic location of the study population (i.e., North Carolina) has not been shown to be related to higher smoking prevalence rates (27). In the Pap smear validation sample, self-reports of screening estimate that 77% of the women had a Pap smear within the last 3 years. Among women in the mammography verification sample, 44% had had a mammogram within recommended guidelines (1–2 years for women ages 40–49 and annually for those ages 50 and older).

Self-reports of having obtained Pap smears compared to medical record reporting are shown in Table 2. The overall accuracy of the self-reports compared to medical chart review was 67%. Of the 405 women indicating that they had had a Pap smear, only 268 were validated by medical chart review (positive predictive value = 66%). For women who indicated that they had not had a Pap smear (n = 33), 25 of these were validated by medical chart review (negative predictive value = 76%). The chance-corrected estimate of agreement (κ) of self-reports with medical chart reports was 15%, which indicates poor agreement between the two sources. Overall, 92.5% of the women stated that they had had a Pap smear, whereas only 63% were found to have had a Pap smear from review of medical charts. Thus, approximately 30% of the women reported they had had a Pap smear when, in fact, they had not.

For self-reports of mammography use (Table 3), the overall accuracy of self-reports compared with medical chart review was 77%. Of the 300 women who said they had had a mammogram, 212 of these were validated by medical chart review (positive predictive value = 71%). Of the 141 women who said they had not had a mammogram, 129 of these were validated by medical record review (negative predictive value = 91%). The chance-corrected agreement for mammography was 54%, which indicates fair agreement. Overall, 68% of the women stated that they had had a mammogram, whereas only 50.8% had a mammogram based on medical record review, a difference of 17%.

Among women who had a screening test verified by chart review, we looked at the difference between the reported and actual dates of each test. For Pap smears (Fig. 1), women overestimated the date of their last Pap smear by an average of 23 months. Women were better at remembering the date of their last mammogram; the average length for overestimation of time since their last exam was 3 months (Fig. 2).

The effect of self-reports on predictor variables for the receipt of screening was examined next. Univariate predictors of self-reported and chart-verified Pap smear screening are shown in Table 4. City of residence, having a regular check-up, having a chronic medical condition, and positive beliefs about Pap smear screening were factors that were significantly associated with both self-reported and chart-verified Pap smear screening. Interestingly, smoking status, parity, age, education, barriers, and knowledge about Pap smears and cervical cancer were associated with self-reported Pap screening but not chart-verified screening. Using self-reports of screening, predictors of recent Pap smear screening in logistic regression analyses included city (P = 0.003), parity (P = 0.009), race (P = 0.004), having a regular check-up (P = 0.010), younger age (P = 0.011), fewer barriers (P = 0.008), and positive beliefs about Pap smears (P = 0.049). Most of these predictors of Pap smear screening became nonsignificant when medical chart reports were used instead of self-reports. Only city (P < 0.001) and age (P = 0.027) remained significantly associated with Pap smear screening.
Univariate predictors of self-reported and chart-verified mammography are shown in Table 5. Having a regular check-up, having a chronic medical condition, barriers to medical care, beliefs, and knowledge about mammography and breast cancer were significantly associated or approached statistical significance with self-reported and chart-verified mammography. City of residence was associated with self-reported but not chart-verified mammography. Multivariate predictors of self-reported mammography included having had a regular check-up ($P < 0.001$), fewer barriers ($P < 0.001$), and positive beliefs about breast cancer screening ($P < 0.001$). Having a regular check-up ($P = 0.012$) and fewer barriers ($P < 0.001$)
were also significantly associated with chart-verified mammography, but beliefs about breast cancer and mammography were not statistically significant (P > 0.05).

We then examined possible predictors of accurate reporting for each test. Using logistic regression analyses, we found three variables that were statistically significant predictors of accurate reporting of Pap smears: (a) living in Winston-Salem instead of Greensboro (P < 0.001); (b) younger age (P = 0.03); and (c) not currently working (P = 0.02). For accurate reporting of mammography tests, only living in Greensboro emerged as a significant predictor (P = 0.015).

Discussion

This study examined the accuracy of self-reports of Pap smear and mammography use in a low-income population. Almost 80% of the self-reports for both tests were validated. Women were more accurate in reporting mammography use than Pap smear screening. This could be due to several factors, including: (a) confusion over a pelvic examination versus a Pap smear (20); (b) our inability to find documentation of a recent Pap smear in a woman’s chart (20); (c) the fact that mammography occurs in a separate place during a separate visit whereas a Pap smear is done at the doctor’s office; or (d) the fact that women can see a mammogram being done on themselves but cannot see a Pap smear being performed (19).

Estimates of accuracy among women in this study are similar to estimates found in other studies with similar populations. Table 6 summarizes the results of our study and selected other studies similar to ours. For Pap smear screening, the accuracy of women’s self-reports averages about 79%, with two exceptions. The study by Suarez et al. (17), conducted among low-income Hispanic women, reported a 67.1% accuracy rate for Pap smear screening within the last 3 years. The present study, conducted among low-income, predominately African-American women, found 67% accurate self-reports. Thus, these studies conducted among low-income women found similar rates. For mammography screening, these two studies also reported the lowest accuracy rates (74.7% and 77%, Hispanic and African-American populations, respectively).

Reasons as to why low-income women were poorer reporters of screening behavior were not identified in the study by Suarez et al. (17), nor did previous studies find differences in the accuracy of reporting by sociodemographic characteristics (19, 20, 21). In the present study, the study population was relatively homogeneous; therefore, as in the study by Suarez et al. (17), few sociodemographic characteristics emerged as predicting accurate reporters. For Pap smears, younger women and women who were not currently working were more likely to be accurate reporters. It is probably not surprising that younger women have better recall. There is no obvious explanation for why women who are not currently working recall Pap smear exams more accurately. City of residence was also a predictor of accurate Pap smear screening reports. Winston-Salem had had a prior study conducted among the target population that focused on education about Pap smear screening and cervical cancer (28). Although this study did not impact Pap smear utilization rates, knowledge about Pap smears improved (28). Other than this factor, both communities are similar in terms of access to health care, public health clinics, and the Breast and Cervical Cancer Control Program activities. This difference should not be influenced by survey response rates, as these rates were similar in the two cities. For mammography reporting, only living in Greensboro was associated with accurate reporting. This could be due to activities of the county health department in that area regarding mammography utilization.

In terms of the accuracy in reporting the date of the last screening test, for both tests, women tended to report that they had the test later than they actually had. Other studies have found that accuracy in reporting the date declines over time. Etzi et al. (18) reported overestimation among women who had a mammogram 6 or more months previously. Telescoping, however, was common for mammography usage in two other studies (12, 21). The use of patient reminders to schedule regular screening tests could alleviate problems with women remembering when a screening test is due.

Accuracy is a concern of researchers who rely on self-reports of screening behavior to form policy and intervention decisions about actions to improve screening. The present study and the study by Suarez et al. (17) demonstrate that in low-income populations, self-reports of screening behavior overestimate the prevalence rates of Pap smears and mammography usage. Relying on self-reports of screening, our baseline survey found 44% of women in compliance with recommended mammography screening guidelines (1–2 years ages 40–49 and annually ages 50 and older) and 77% of women in compliance with a 3-year interval for Pap smear screening. Applying the positive and negative predictive values found in this validation study, these prevalence rates are reduced to 42% and 56%, respectively. Thus, this population of low-income women is farther from reaching the year 2000 objectives for cancer control (29) than self-reports indicate.

Based on the results of this study, self-reports can be used

<table>
<thead>
<tr>
<th>Study</th>
<th>Population</th>
<th>No. subjects</th>
<th>Pap smear</th>
<th>Mammogram</th>
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<tr>
<td>King et al. (19)</td>
<td>HMO</td>
<td>199</td>
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<td>82.0</td>
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<tr>
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<td>78</td>
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<td>74.7</td>
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<tr>
<td>Gordon et al. (16)</td>
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<td>83.7</td>
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<tr>
<td>Montano &amp; Phillips (23)</td>
<td>Physician practices</td>
<td>3600</td>
<td>79.0</td>
<td>74.0</td>
</tr>
<tr>
<td>Paskett et al.</td>
<td>Low-income housing communities</td>
<td>441</td>
<td>67.0</td>
<td>77.0</td>
</tr>
</tbody>
</table>

*HMO, health maintenance organization.

a NA, not applicable.

Table 6: Summary of the accuracy of self-reports for Pap smear and mammography use from previous studies.
to guide intervention development in intervention-based breast cancer screening studies. However, the factors associated with self-reported and chart-verified Pap smear screening were quite different, so caution should be used when developing intervention strategies based on self-reported Pap smear screening data. Caution must also be used when interpreting prevalence rates of screening in target populations, especially in low-income women. Both of these concerns are lessened, of course, when the accuracy of self-report is high, so some effort should be expanded on teaching women how to recognize when they have had a screening test.

In light of these conclusions, the limitations of this validation study must also be considered. Procedures were validated using charts in provider offices that women reported. If women visited a different provider for either test and failed to report this provider, the information could not be obtained. We endeavored to reduce this error by using the following strategy. If no documentation of screening was found at a reported provider office where the screening was supposedly ordered, the offices of all providers the woman listed in the survey were contacted. A second limitation deals with the restrictions of medical charts. Charts may be incomplete in that provider notes may not always reflect tests that were ordered. We relied on laboratory reports (i.e., Pap smear pathology reports or mammography reading reports), however, reports could have been misfiled or lost. Using these strategies, we should have obtained reports reflecting most recent use.

In conclusion, women’s self-reports on mammography screening are fairly accurate and should have little impact on falsely identifying predictor variables for intervention studies. Because Pap smear and pelvic exams are done in a similar manner, women may not be distinguishing the procedures from each other, thus limiting the accuracy of self-reports. Implications for intervention efforts are apparent in terms of educating women about the differences between a Pap smear and a pelvic exam to improve the accuracy of reporting. The results of this study also underscore the need for intervention efforts in populations of low-income women to improve knowledge about and bring usage rates of breast and cervical cancer screening closer to the year 2000 objectives for cancer control.

References
Validation of self-reported breast and cervical cancer screening tests among low-income minority women.

E D Paskett, C M Tatum, D W Mack, et al.


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