

## **BARRIERS TO MAMMOGRAPHY SCREENING IN A MANAGED CARE POPULATION**

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### **ABSTRACT**

The purpose of this study was to identify personal, economic, and health care system barriers to mammography in a managed care population. Participants were Black and White female residents of Middle Tennessee, aged 40 years and older, who were members of a Medicaid-funded managed care organization and, according to claims data, were not current with mammography screening at least one year prior to study initiation. Twenty-one barriers were grouped into three categories - personal, economic, and health care system barriers. Trained interviewers recorded participant self-reported responses to barrier statements from 173 women (46% Black) through telephone or personal visits. The correlations of reported barriers to annual checkup, clinical breast exam, and mammogram screening were examined. The findings suggest that even among insured low-income women, significant barriers remain to breast cancer screening, particularly low rates of physician recommendation, lack of relevant information, and prevalence of mistrust and fear. Health care system changes can improve cancer prevention screening practice and would result in an increase in breast cancer screening rates among low-income insured and uninsured populations.

Key words: Attitude to health, health personnel, mammography, clinical breast exam, annual physical checkup, managed care programs, preventive health services.

Breast cancer is the second most common cause of cancer deaths in all women and, in 2004, accounted for 29% of cancer deaths among women in Tennessee (American Cancer Society, 2007; Division of Health Statistics, 2006; United States Department of Health and Human Services, 2000). Demographic characteristics contribute to the range of personal barriers women face in gaining access to and receiving regular screening mammography. Racial and ethnic disparities persist within the health care practices of the U.S. in spite of efforts to reduce or eliminate them (Smedley, Stith, & Nelson, 2003; United States Department of Health and Human Services, 2000). Minority women are at much higher risk of dying from breast cancer than white women, despite their lower incidence of the disease (American Cancer Society, 2003, 2007; Ries, Wingo, Miller D.S., et al., 2000; United States Department of Health and Human Services, 2000). Studies report that disparities exist in screening mammography as a function of age (Han, Well, & Primas, 2003; Husaini, Emerson, Hull, et al., 2005; Powell, Carter, Bonsi, et al., 2005), educational background (Lairson, Chan, & Newmark, 2005; Schulz & et al., 2002), and economic status (Peek & Han, 2004; Schulz et al., 2002; Steven, Fitch, Dhaliwal, et al., 2004).

Breast cancer deaths are preventable when proven early detection and treatment modalities are employed as recommended. Screening mammography continues to be validated as the most effective method for early breast cancer detection (American Cancer Society, 2007; Humphrey, Helfand, Chan, et al., 2002; Joy, Penhoet, & Petitti, 2005; United States Department of Health and Human Services, 2000). However, women with racial/ethnic group membership, advanced age, rural residence, immigrant status, low income, lack of health insurance, low educational attainment, and no usual source of health care, are associated with low utilization rates of

mammography screening for early detection of breast cancer (Ries et al., 2000; Ryerson, Miller, Ehemann, et al., 2007; United States Department of Health and Human Services, 2000). Such women are reported to use mammography less and to present at more advanced stages of the disease than women with higher incomes (American Cancer Society, 2007; Ries et al., 2000; United States Department of Health and Human Services, 2000) despite a significant national decline in overall mortality rate from breast cancer (United States Department of Health and Human Services, 2000).

Among low-income populations, commonly recognized economic barriers to mammography are often related to accessibility to mammography facilities including proximity, transportation, and child care (Ferrante et al., 2006; Llewellyn, et al., 2006; Powell et al., 2005); and accessibility to mammography services including insurance (Mayberry, Mili, & Ofili, 2000; Morales, et al., 2004; Peek & Han, 2004; Royak-Schaler, et al., 2003), usual source of care (Gimotty, Burack, & George, 2002; Hawley et al., 2000; Joy, et al., 2005), and having a regular doctor (Ahmed, Fort, Elzey, et al., 2004, 2005; Ahmed, Fort, Micah, et al., 2001, Hawley, et al., 2000). In fact, women have identified health insurance not covering preventive services as a deterrent to mammography (Consedine, Magai, Krivoshekova, et al., 2004; Ell et al., 2002; Ferrante, Chen, & Jacobs, 2006). Health insurance is the major precondition to health care access and its lack is one of the main barriers to screening mammography. Despite the removal of these significant barriers for our target population (lack of health insurance, usual sources of care, and regular doctor) by the TennCare Managed Care Organization (MCO), 42% still had never had a mammogram and 66% were not adherent to mammography guidelines. The question then becomes how we identify

other remaining modifiable barriers that act as deterrents for these women to receive screening mammography.

Among the remaining barriers are the attitudes and beliefs women hold toward health care and breast cancer screening. The literature reports that, among women, perceptions of susceptibility (Finney Rutten & Iannotti, 2003; Paskett, Tatum, Rushing, et al., 2004; Rauscher, Hawley, & Earp, 2005; Steven et al., 2004), severity of disease (Finney Rutten & Iannotti, 2003; Steven et al., 2004), and benefits of treatment (Finney Rutten & Iannotti, 2003; Steven et al., 2004) are identified as important barriers to screening (Austin, Ahmad, McNally, et al., 2002; Cohen, 2006; Finney Rutten & Iannotti, 2003; Grindel, Brown, Caplan, et al., 2004; Jibaja-Weiss, Volk, Smith, et al., 2003; Lairson et al., 2005; Partin & Slater, 2003; Paskett et al., 2004; Rauscher et al., 2005; Secginli & Nahcivan, 2006; Steven et al., 2004; Wu, West, Chen, et al., 2006). Many studies also highlight the impact of inaccurate or counter-productive health knowledge (Aro, de Koning, Abstez, et al., 2001; Ell, Padgett, Vourlekis, et al., 2002), beliefs (Carney, Harwood, Greene, et al., 2005; Coughlin, Thompson, Hall, et al., 2002), and/or attitudes (Aro et al., 2001; Coughlin et al., 2002) on screening behavior found among at-risk study participants. Often these barriers are reported in composite scores, usually at a conceptual level and not specific enough to develop interventions aimed at providing detailed and accurate knowledge to address these barriers.

There is a clear need to gather definitive information on specific factors or interventions that can be applied to at-risk populations (Ahmed et al., 2004, 2005; Hardy, Ahmed, Hargreaves, et al., 2000; Smedley et al., 2003; Strzelczyk & Dignan, 2002; United States Agency for Healthcare Research and Quality, 2004). The purpose of the current study was to identify and describe, item-by-item, specific barriers to breast cancer screening (and its

precursors) reported by women in a managed care organization in Tennessee, and then to explore the association between each item and the women's actual screening practices as recorded in the MCO's claims data. We believe the findings of our study will be useful to develop interventions to address specific remaining barriers to breast cancer screening among low-income insured women.

## **METHODS**

### *Study Participants and Data Collection*

Participants in this study were women, aged 40 years or older; enrolled in the TennCare program (which replaced Tennessee's Medicaid program in 1994); member of Access MedPlus, a managed care organization; not current with mammography screening at least one year prior to the initiation of the study according to TennCare mammogram claims data; and resident of the Middle Tennessee area. The detailed subject identification, recruitment, and selection process is described elsewhere (Hardy et al., 2000). A sample of 302 women was randomly selected from a pool of 899 eligible women not adherent to mammography screening guidelines. Trained interviewers gathered the data based on the interviewee's preferences through telephone interviews (68%) or personal home visits (32%). We successfully reached 195 (65%) women. Typically, low-income families are hard to reach because they have no telephone, have an incorrect physical address on record, and/or because they have moved. The final sample includes complete survey data on 173 Blacks (46%) and Whites (54%). Twelve participants were excluded due to incomplete surveys; and ten, reported as other races, were excluded because their small number limited meaningful analyses and comparisons.

### *Study Variables*

The goal of the analysis was to identify significant barrier-items and classify each item under known categories of barriers to breast cancer screening in order to examine the correlation between the barrier-items and screening behaviors. To accomplish this goal, the dichotomous variable “ever had mammography screening” was designated as the primary outcome measure. Intermediate dichotomous outcome variables, considered precursors of mammography screening, were “clinical breast exam” and “yearly health checkup.”

The barriers list of 21 items was developed from varied sources – surveys from the National Center for Health Statistics including the National Health Interview Survey and the Behavioral Risk Factor Surveillance System, from focus group discussions, lay health workers’ personal reports, and study investigators’ previous experience and interests. The investigators discussed barriers to cancer screening as reported in the literature and reached consensus on those barriers to include in this study by selecting barriers that could be addressed with efficiency through specific interventions. Consequently, each barrier was assigned to one of three categories - personal, economic, or health care system. The 21 barriers to breast cancer screening were read to each participant who was then asked to respond with one of the following response options: strongly agree, agree, disagree or strongly disagree. The positive responses are considered participant barriers.

*Personal barriers.* Items grouped as personal barriers were 1) not much can be done to avoid cancer; 2) cancer treatment not worth going through; 3) embarrassed by the clinical breast exam; 4) yearly physical checkup not worthwhile; 5) afraid of doctor’s possible findings; 6) risk of finding something wrong prevents health seeking behavior; and 7) when sick, delay seeing doctors.

*Economic barriers.* Items grouped as economic barriers were 1) transportation problem; 2) difficulty in taking time off from work for an appointment; 3) medical care cost prevents doctor's visit; and 4) seeking further medical care services prevented by cost.

*Health system barriers.* Items grouped as health system barriers were: 1) lack of trust in doctor's capability; 2) made to feel uncomfortable by doctors; 3) privacy is important during health care visit; 4) medical procedure not explained adequately by doctors; 5) fear of pain associated with medical visits; 6) worried about radiation exposure during mammography; 7) unwilling to have mammogram unless doctor recommends; 8) it takes too long to get doctor's appointment; 9) reminder for medical appointment would be helpful; and 10) unaware of health services available in the community.

#### *Statistical Analysis*

First, sociodemographic characteristics of the participants were described and contrasted by race. Each barrier component was cross-tabulated by sociodemographic characteristics. A Chi-square test was performed to assess any significant differences between the categories. Partial correlation coefficients were calculated to evaluate the association between individual barriers and their correlates after controlling for confounding variables such as age, race, education, and income. The association between barrier items and mammography screening behavior was explored to specify which items had significant influence on outcomes. In addition, associations between barrier items and clinical breast exams and annual health check-up were explored. A conventional  $p\text{-value} \leq .05$  was considered significant using a two-tailed method.

## RESULTS

### *Sample Characteristics*

Data from the final sample of 173 Black and White women were analyzed for this report. Table 1 shows comparisons between Black and White women on selected demographic factors.

Blacks, in comparison to Whites, were younger and had more education, earned significantly lower annual incomes, and had a significantly higher proportion of single heads of household. The distribution of mammography screening, clinical breast exam and health checkups is also shown, with no significant difference between the races. The data indicate that 31% of the women in this study had not had a regular health check up in the past three years; 13% of these women had never had a clinical breast exam (17% of White women and 9% of Black women); more than 66% were not adherent to mammography guidelines; and 42% of women in this study had never had a mammogram (49% of Whites and 35% of Blacks).



Table 1  
*Socio-demographic characteristics of sample women of MCO (SD in parentheses)*

	All	Blacks	White
N (%)	173	79 (46%)	94 (54%)
<b>Age in years: Mean*</b>	54.6 (8.3)	52.7 (8.2)	56.1 (8.0)
40-49	32%	43%	24%
50-64	53%	48%	57%
65 and Above	15%	9%	19%
<b>Marital status**</b>			
Currently Married	27%	18%	34%
Single	16%	25%	8%
Widow	22%	18%	26%
Divorced/Separated	35%	39%	32%
<b>Annual income: Mean**</b>	\$8447 (5717)	\$7709 (5916)	\$9045 (5539)
Median	\$6,944	\$6,317	\$7,405
Up to \$5,000	39%	43%	36%
\$5,001 - \$10,000	28%	26%	29%
\$10,001 - \$15,000	20%	21%	19%
\$15,001 - \$25,000	9%	8%	10%
\$25,001 and above	4%	1%	6%
<b>Years of education: Mean **</b>	10.5 (2.8)	11.2 (2.2)	9.8 (3.1)
Up to 8	23%	9%	34%
9 - 11	32%	31%	33%
12	32%	46%	21%
13 and above	13%	14%	11%
<b>Outcome Variables</b>			
No physical checkup in 3 years	31%	29%	32%
Never had a clinical breast exam	13%	9%	17%
Never had a mammogram***	42%	35%	49%
Not adherent to mammography guideline	66%	62%	69%

\*p ≤ 0.01, \*\*p ≤ 0.001, \*\*\*p ≤ 0.05

*Correlation Between Barrier Items And Sociodemographic Characteristics*

A number of barriers were significant when correlated with sociodemographic characteristics (Table 2).

*Personal barriers.* **Age** was positively correlated with two variables: *When sick delay seeing doctors* (70.0%,  $r = .15$ ,  $p < .01$ ); and *Embarrassed by the clinical breast exam* (29.4%,  $r = .16$ ,  $p < .01$ ). **Education** and **income** were both negatively correlated with *Afraid of doctor's findings* (47.3%,  $r = -.21$ ,  $p < .001$  and  $r = -.16$ ,  $p < .01$ , respectively). **Race** was positively correlated with *Afraid of doctor's possible findings* (47.3%,  $r = .16$ ,  $p < .01$ ) and negatively correlated with *Embarrassed by the clinical exam* (29.4%,  $r = -.15$ ,  $p < .01$ ).

Table 2

*Prevalence of barriers and correlation coefficient with demographic variables*

Barrier Item	%	Age	Educ.	Income	Race+
<b><i>Personal barriers (P)</i></b>					
When sick delay seeing doctors	70.0	.15*	-.03	-.08	-.09
Afraid of doctor's possible findings	47.3	-.04	-.21**	-.16*	.16*
Not much can be done to avoid cancer	32.9	.08	-.07	.02	.04
Embarrassed by the clinical breast exam	29.4	.16*	-.13 ~	.03	-.15*
Risk of finding something wrong prevents health seeking behavior	23.1	-.04	-.09	-.03	.01
Cancer treatment not worth going through	6.9	.01	.05	-.04	.03
Yearly physical checkup not worthwhile	3.5	-.05	.01	-.02	-.14~

Table 2, continued

*Economic barriers (E)*

Seeking further medical care services prevented by cost	76.3	-.04	-.06	-.06	.04
Transportation problem	49.4	.08	-.30**	-.25**	-.01
Medical care cost prevents doctor's visit	34.7	.04	-.01	.02	-.13
Difficulty in taking time off from work for an appointment	22.4	-.13~	.11	.14~	.10

*System barriers (S)*

Reminder for medical appointment important	95.3	.09	-.05	.01	-.13
Privacy important during health care visit	92.4	-.10	.04	-.03	.09
Worried about radiation exposure during mammography	57.7	-.03	-.01	-.03	.12
Lack of trust in doctor's capability	51.5	-.10	.04	-.03	-.09
Unwilling to have mammogram unless doctor recommends	45.2	.16*	-.17*	.08	.03
It takes too long to get doctor's appointment	38.8	.01	.09	.19**	-.13
Made to feel uncomfortable by doctors	27.4	.02	-.07	-.03	-.11
Fear of pain associated with medical visits	27.4	.16*	-.13~	-.01	.10
Unaware of health services available in the community	25.0	.08	-.02	-.01	.02
Medical procedure not explain adequately by doctors	23.7	-.05	.08	.19**	.04

+Race: White =1 and Black=2; Age group; Education Group; Income Group trend ~ .07< p<0.05; \*p< 0.01; \*\*p<0.001

*Economic barriers.* Both *education* and *income* were significantly correlated to the economic barrier of *Transportation problem* (49.4%,  $r=-.30$  and  $r=-.25$

respectively,  $p < .001$ ). Age and race were not significantly correlated with any economic barriers.

*System barriers.* **Age** was positively correlated with *Unwilling to have mammogram unless doctor recommends* (45.2%,  $r = .16$ ,  $p < .01$ ) and negatively correlated with *Fear of pain associated with medical visits* (27.4%,  $r = -.16$ ,  $p < .01$ ). Unlike age, **education** was negatively correlated with *Unwilling to have mammogram unless doctor recommends* (45.2%,  $r = -.17$ ,  $p < .01$ ). **Income** was positively correlated with *It takes too long to get doctor's appointment* (38.8%,  $r = .19$ ,  $p < .001$ ) and *Medical procedure not explained adequately by doctors* (23.7%,  $r = .19$ ,  $p < .001$ ). Race was not significantly correlated with any system barriers.

#### *Correlation between Barrier Items and Outcome Variables*

All socio-demographic characteristics of the respondents were considered potential confounders between barriers and screening mammography behavior, and income and educational differences between the races were found. Therefore, correlation coefficients were calculated after controlling for the effects of age, race, education, and income. Table 3 displays prevalence rate and the *partial correlation coefficient* of barrier items in the three categories: personal, economic and health system barriers to breast cancer screenings.

Table 3  
*Prevalence of barrier items and partial correlation<sup>+</sup>  
 coefficient with screening rates*

Barrier Item	%	Mamm	CBE	Checkup
<b><i>Personal barriers (P)</i></b>				
When sick delay seeing doctors	70.0	-0.07	-0.14*	-0.11~
Afraid of doctor's possible findings	47.3	-0.02	-0.02	-0.21***
Not much can be done to avoid cancer	32.9	-0.08	-0.05	-0.01
Embarrassed by the clinical breast exam	29.4	-0.12~	0.00	-0.18**
Risk of finding something wrong prevents health seeking behavior	23.1	-0.16*	0.01	-0.19**
Cancer treatment not worth going through	6.9	-0.07	0.10~	-0.17*
Yearly physical checkup not worthwhile	3.5	-0.13*	0.05	-0.11~
<b><i>Economic barriers (E)</i></b>				
Seeking further medical care services prevented by cost	76.3	0.10	-0.01	-0.07
Transportation problem	49.4	0.09	0.00	-0.15*
Medical care cost prevents doctor's visit	34.7	-0.03	-0.09	-0.15*
Difficulty in taking time off from work for an appointment	22.4	0.03	0.06	-0.06
<b><i>System barriers (S)</i></b>				
Reminder for medical appointment important	95.3	0.09	-0.08	0.04
Privacy important during health care visit	92.4	-0.02	-0.14*	0.05
Worried about radiation exposure during mammography	57.7	-0.01	0.02	-0.05
Lack of trust in doctor's capability	51.5	-0.08	-0.07	-0.15*
Unwilling to have mammogram unless doctor recommends	45.2	-0.19***	-0.66	-0.12~
It takes too long to get doctor's appointment	38.8	0.15*	0.17*	-0.17**

Table 3, continued

Made to feel uncomfortable by doctors	27.4	-0.10	0.02	-0.14*
Fear of pain associated with medical visits	27.4	-0.07	0.01	-0.15*
Unaware of health services available in the community	25.0	-0.17**	-0.30***	-0.17**
Medical procedure not explain adequately by doctors	23.7	0.05	0.09	-0.05

<sup>+</sup> Partial correlation coefficient after controlling for age, race, education, and income; Trend ~ .07 < p < 0.05; \*p < 0.01; \*\*p < 0.001; \*\*\*p < 0.0001

The following barrier items in each category were significantly associated with the outcome variable *mammogram* and its precursors *annual checkup* and *clinical breast exam (CBE)*.

*Personal barriers.* Receiving a physical **health checkup** in the past three years was inversely associated with four barriers: *Afraid of doctor's possible findings* (47%,  $r = -.21$ ,  $p \leq .001$ ), more prevalent among women with education of less than 12 years; *Risk of finding something wrong prevents health seeking behavior* (23%,  $r = -.19$ ,  $p \leq .01$ ); *Embarrassed by the clinical breast exam* (29%,  $r = -.18$ ,  $p \leq .01$ ), reported more frequently by White women; and *Cancer treatment not worth going through* (7%,  $r = -.17$ ,  $p \leq .05$ ). Other important barriers, although they did not achieve statistical significance include: *When sick delay seeing doctors* reported by 70% respondents; and *Yearly physical checkup not worthwhile*. The only personal barrier item that was significant and negatively related to **clinical breast exam** was *When sick delay seeing doctors* (70%,  $r = -.14$ ,  $p \leq .05$ ). The following personal barriers were significantly and negatively correlated with ever had **mammography screening** rates: *Risk of finding something wrong prevents health seeking behavior* (23%,  $r = -.16$ ,  $p \leq .05$ ); and *Yearly physical checkup not worthwhile* (4%,  $r = -.13$ ,  $p \leq .05$ ).

*Economic barriers.* Neither the mammography screening nor clinical breast exam was correlated with perceived economic barriers. The physical health **checkup** was negatively associated with *Transportation problem* (49%,  $r = -.15$ ,  $p \leq .05$ ) and *Medical care cost prevents doctor's visit* (35%,  $r = -.15$ ,  $p \leq .05$ ).

*System barriers.* The physical health **checkup** was negatively associated with the *Lack of trust in doctor's capability* (52%,  $r = -.15$ ,  $p \leq .05$ ), *Made to feel uncomfortable by doctors* (27%,  $r = -.14$ ,  $p \leq .05$ ), *Unaware of health services available in the community* (25%,  $r = -.17$ ,  $p \leq .01$ ), *It takes too long to get doctor's appointment* (39%,  $r = -.17$ ,  $p \leq .01$ ), and *Fear of pain associated with medical visits* (27%,  $r = -.15$ ,  $p \leq .05$ ). Two system barriers were negatively associated with **mammography** screening: *Unwilling to have mammogram unless doctor recommends* (45%,  $r = -.19$ ,  $p \leq .001$ ) and *Unaware of health services available in the community* (25%,  $r = -.17$ ,  $p \leq .01$ ), while *It takes too long to get doctor's appointment* (39%,  $r = .15$  and  $r = .17$  respectively,  $p \leq .05$ ) was positively associated with mammography use and receiving **clinical breast exam**. Receiving a clinical breast exam was inversely related to: *Unaware of health services available in the community* (25%,  $r = -.30$ ,  $p \leq .001$ ) and *Privacy is important during health care visits* (92%,  $r = -.14$ ,  $p \leq .05$ ).

## DISCUSSION

In this population of women, all of whom were participants in a managed care organization, major economic barriers (insurance and co-payment) to mammography screening were eliminated. A lack of physician's recommendation remains the strongest barrier to mammography screening. As the most common channel to receiving a recommendation is through a routine physical checkup, where clinical breast exam usually occurs, the

annual physical health checkup became a precursor of both clinical breast exam and mammography. This requires the use of health services, to which these women have access. Our discussion points, based on Andersen's updated Behavioral Model of Health Services Use, hinge on interventions within the health system to promote the use of health services (Andersen, 1995).

For the checkup, transportation and associated costs remain ongoing factors. Lack of trust in the system and fear are deeply rooted barriers to mammography and other screening procedures as well noted (Powell et al., 2005; Schulz et al., 2002; Tinley et al., 2004). Seeking a routine physical checkup, as well as mammography screening, was found to be significantly affected by the fear of finding something wrong. Delaying seeing doctors when sick was very frequently reported in this population. It is clear that messages should be developed (using relatable examples) to ease feelings of fear and to promote trust in the health care system.

The clinical breast examination appears associated with an expressed embarrassment by the exam, possibly augmented by the feeling of need more privacy during clinic visits. Our previous studies on empowering factors have repeatedly shown that women report, even when following the prescribed schedule for preventive medicine, the health care system is lax in protecting their privacy (Ahmed et al., 2004, 2005; Ahmed et al., 2001).

The health care system itself is often found to be a barrier, due to fragmented care (Schulz et al., 2002), long service wait times (Holt et al., 2003; Johansson & Bertero, 2003; Peek & Han, 2004; Rauscher et al., 2005; Schulz et al., 2002; Tinley, Houfek, Watson, et al., 2004; Young & Severson, 2005), and poor interaction with the physician (Young & Severson, 2005). Long wait time for appointments, appointment reminders, privacy, feeling uncomfortable, and mistrust in the system are, fortunately,



issues that can be addressed within the healthcare system through in-service staff training. The system can also improve its marketing of health care facility resources and services, not only to the community-at-large, but also to those who are already participating members. Newsletters and telephone calls to the members about specific upcoming events or services may need to be augmented and increased, perhaps by colorful, low-literacy, simple and brief written and visual communications [signs, posters, flyers] along with internal signage that keep the users aware of services and other resources accessible within the facility.

Participation in screening mammography by the women in this study appears more determined by their experiences with the health care system than with personal or economic barriers. This population indicates not only a lack of awareness of the health services available within their community, but most importantly, indicates they are not aware of mammography as a valuable procedure for them. It appears they would go – if their doctor recommended it.

The need for physician recommendation is consistent with findings of other studies and, as such, is another barrier that can be eliminated through changes within the system. Studies document a number of barriers to screening mammography, with physician recommendation commonly cited as the most important predictor of mammography use (Rauscher et al., 2005). Researchers in a longitudinal study of predictors of mammography in southern rural women, concluded that the most valuable intervention for initiation and maintenance of screening mammography would be to communicate to physicians the importance of recommending regular mammography use to their rural patients, since fewer than 60% reported ever having had a physician make such a recommendation (Rauscher et al., 2005). Other studies have also found that women report their physician has not recommended mammography (American Cancer Society, 2007; Davis, Emerson, & Husaini, 2005; Division of Health

Statistics, 2006; Smedley et al., 2003; Taplin, Urban, Taylor, et al., 1997; United States Department of Health and Human Services, 2000; Zhu, Hunter, Bernard, et al., 2000).

Recommendations have included patient record “ticklers” for health care personnel to utilize the “teachable moment” when a patient is present for whatever reason. Emotional factors, such as fear of finding cancer, can be important barriers to cancer screening. Women who are fearful may need extra help in taking the steps from scheduling to completing a mammography appointment since avoidance at any step in this process is fear-reducing. Sympathetic case managers or well-trained peer counselors or patient navigators may be needed to help some women overcome their fears. The significant differences found in our study imply a need for the health care system and those proposing inclusive programs to consider tailoring their outreach efforts among low-income managed care populations to match program elements with client needs that are identified by risk grouping or through individual assessment (Bernstein, Mutschler, & Bernstein, 2000; Council on Scientific Affairs, 1998; Gimotty, Burack, & George, 2002; Guidry, Matthews-Juarez, & Copeland, 2003). For example, information designed for seniors may need to be much different from that designed for younger females. Similarly, information and outreach programs to women may need to consider their marital status, and to involve different strategies for single versus married women.

We found the economic barrier of personal/household income will likely affect the planning in health system efforts despite the fact that all the clients within a given managed care organization fall within a prescribed income range. To the extent that women with very low household incomes face different barriers, outreach efforts can be tailored to income level. Educational attainment will have implications for outreach programs and the materials used; of course, it is

especially important to use materials suitable for women with low literacy levels.

Low socioeconomic status and economic barriers probably affect mammography use via several pathways. Women's lack of resources, combined with cultural and attitudinal barriers, along with limited access to affordable mammography directly reduce the likelihood of mammography use (Council on Scientific Affairs, 1998; Morales, Rogowski, Freedman, et al., 2004; Royak-Schaler, Chen, Zang, et al., 2003). Poor women may have many other competing priorities related to survival that make health screening a low priority. Efforts to develop programs and/or policies to improve breast cancer screening among low-income populations should increase cancer knowledge, awareness, and information and include complementary efforts to help women address emotional, socioeconomic, and other barriers to clinical breast exam and mammography use.

Additional barriers to breast cancer screening arise from the attitudes our sample women expressed toward the health care system and its procedures. Some can be rectified with focused and specific effort. Our study participants need and expect their doctors to recommend a mammogram, if and when needed. This finding is consistent with that of other investigators who report that patients/clients will perform preventive health practices when the healthcare system so recommends (Carney et al., 2005; Consedine et al., 2004; Engelman, Hawley, Gazaway, et al., 2002). Hawley et al (2000), suggest that women be encouraged to request mammography screening, in addition to the health care system assuring that its physicians make appropriate recommendations. Crump et al., (2000) found that their patients were more responsive when the recommendation came from the physician's assistant or nurse practitioner. The participants in our study nearly uniformly indicated a need for reminders from the system for appointments, and client

reminders are among those interventions recommended with strong evidence of effectiveness in the Guide to Community Preventive Services (Mayer et al., 2000; Simon, Gimotty, Moncrease, Dews, & Burack, 2001). The time it takes to obtain service within the system, from making an appointment to completing one, appears to affect women's readiness to obtain a mammogram - perhaps more than has been previously acknowledged or realized. With annual breast cancer awareness efforts, it may be feasible to place more emphasis on this yearly opportunity for low or no-cost mammography.

Physicians, and the health care system support staff, may find health promotion efforts more successful with low-income women if they take time and effort to give clients the information they need to make informed choices and decisions (Ahmed et al., 2004; Gimotty et al., 2002). Even the women in our study, already enrolled in a managed care organization with greater access to screening, indicated a need for more information and for specific recommendations. Although women may have heard of the mammogram and known others who have had the exam, having the complete procedure and all its elements explained may reduce questions and accompanying anxiety in obtaining the exam.

It is imperative to emphasize the importance of adjustments the health care system can make within its procedures to lessen certain barriers to mammography screening among low-income women. While there may be a fine line between some personal and system barrier components, the distinction was made with program and/or policy recommendations in mind. The responsibility of the health care system to reduce barriers would seem more feasible and cost-effective than attempts to overcome personal barriers of low-income women with limited resources; such women face a difficult choice between meeting their day-to-day necessities and pursuing health

seeking behaviors, leading them to give their immediate basic needs greater priority.

Certainly the health care system should be accountable for making its constituents aware of the health resources that exist within the service areas and also for increasing their number and availability. The responses of study participants suggest that they might be amenable to engage in more preventive practices if they were more fully aware of what was available to them and if they had quick and easy access to these services. Clearly, adequate information provided to women appears to be one of the most important aspects to increase adherence to improved health care practices. Lack of awareness, in this and in other studies, is associated with adherence to fewer health care services (Ahmed et al., 2004; Ahmed et al., 2001; Consedine et al., 2004; Harris, Miller, & Davis, 2003; Hiatt, Klabunde, Breen, et al., 2002; Zaza, Briss, & Harris, 2005). For our study participants, this meant fewer mammography screening experiences, clinical breast exams and physical checkups.

In summary, our study of low-income women found socioeconomic factors such as income and education levels, age, and marital status, all are predictive of mammography screening. In our study results, significant system barriers to breast cancer screening appear to be lack of physician recommendation and lack of adequate relevant information. It is evident that providing sufficient information to create both screening test awareness and cancer knowledge among low-income women would reduce barriers to breast cancer screening. The health care system should be forthcoming and provide adequate, effective cancer prevention screening procedures and information in a caring environment, especially for low-income women in order to gain their trust in the system and ease their fear in addressing health issues.

These results follow a logical path. In order to receive a clinical breast exam one needs to see a health care professional (usually during annual checkup). Often after a

clinical breast exam, women receive a referral/recommendation for a screening mammography. It is imperative to remove barriers to annual physical checkups, which will reduce the barriers to clinical breast exam, which in turn will increase the probability of a physician recommendation and ultimately a screening mammogram. Current American Medical Association policy encourages the elimination of these barriers through sensitizing physicians and others in the health care system to the need for improved access to health care and through practices that preclude racial disparities (Minority Affair Consortium, 2007; Voelker, 2005).

*Limitations of the study.* The lack of statistical power resulting from the small sample size in the present study decreases our ability to detect an association which might be present. However, programs using a race classification help address socioeconomic issues and are supported by previous studies of mammography utilization and race/ethnicity (Morales et al., 2004; Royak-Schaler et al., 2003). Socioeconomic and demographic variables, rather than race/ethnicity, are more likely to be statistically significant predictors of breast cancer screening (Mayberry, Mili, & Ofili, 2000). The race differential may operate through socio-economic constraints rather than through race alone, although small sample size would limit statistical significance but with potential trends, as indicated in our results.

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