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## Factors Influencing Mammography Screening of Chinese American Women

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**Objective:** To explore factors influencing breast cancer screening behavior among Chinese women residing in the United States.

**Design:** A descriptive study guided by the health belief model adapted for Chinese American women. An English-language questionnaire was modified, translated, and pretested before use in the study sample. Data were analyzed using descriptive and multivariate analysis techniques.

**Setting:** An urban area in Michigan in 2001.

**Participants:** A consecutive nonprobability sample of 206 Chinese American women age 40 and older.

**Main Outcome Measure:** The percentage of women age 40 and older who received a mammogram in the past year.

**Results:** Access to health care, perceived barriers to mammography screening, need for breast health care, and information-seeking behavior had direct effects on Chinese American women's mammography screening utilization. Cultural affiliation had an indirect effect on breast cancer screening behavior, moderated through access to health care. The variance in mammography screening explained by these factors was 51%.

**Conclusion:** Effective strategies for promoting breast cancer screening among Chinese American women should address ways to improve information-seeking behaviors and access to health care. Cultural affiliation and beliefs should be considered when counseling Chinese American women regarding breast cancer screening. *JOGNN*, 34, 386-394; 2005. DOI: 10.1177/0884217505276256

**Keywords:** Barriers to health care—Chinese American women—Cultural affiliation—Health beliefs—Mammography screening

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Since 1980, cancer has been the number one killer of Asian American women, while heart disease has been reported as the leading cause of death for Americans (Intercultural Cancer Council, 2001; National Center for Health Statistics, 1998). In fact, Asian/Pacific Islander American women are the only American group for which cancer is the leading cause of death (Asian American Network for Cancer Awareness, Research, and Training, 2002). Between 1980 and 1993, the cancer death rate for Asian women increased by 240%, the largest increase for any racial or ethnic group (Ma, 2000).

Breast cancer is the leading type for Asian American women (e.g., Chinese, Filipino, Japanese, and Korean) (American Cancer Society [ACS], 1997). Not only is the prevalence of breast cancer rising among Asian American women, but the risk also increases for each subsequent Chinese American generation (Deapen, Liu, Perkins, Bernstein, & Ross, 2002).

Although breast cancer screening is known to be an effective measure for early detection of cancer, Asian Americans tend to underutilize such cancer screening programs (ACS, 2004; National Institutes of Health [NIH], 2002; U.S. Department of Health and Human Services, 2000). Asian and Pacific Islander women have lower rates of mammogram and clinical breast examination than any other U.S. racial or ethnic group (ACS, 1997, p. 20). Using the data from the National Health Interview Survey, Kagawa-Singer and Pourat (2000) found that the breast cancer screening rate for Asian American and Pacific Islanders was below that of White women

and well below national goals and guidelines. Another study conducted among Chinese and Korean women living in southeastern Michigan reported that approximately 56% of the women had received mammograms in the past 2 years, about 21% lower than the statewide rate of Michigan (Yu, Hong, & Seetoo, 2003). Due to the underutilization of early cancer detection, breast cancer often is found in its later stages among Asian American women (Hedeen, White, & Taylor, 1999; National Asian Women's Health Organization [NAWHO], 2001).

Cultural, economic, institutional, linguistic, and psychosocial barriers have adversely affected the way Asian women utilize cancer screening (Juon, Choi, & Kim, 2000; Juon, Seo, & Kim, 2002; Yu et al., 2003; Yu, Seetoo, Tsai, & Sun, 1998). Few studies measure the multiple factors influencing breast cancer screening behavior or examine the full range of concepts derived from prior empirical and promising theoretical work.

This study examined the predictors of breast cancer screening behavior among Chinese American women, the largest Asian female population in the United States, and was guided by an adaptation of the health belief model (Becker et al., 1977) specifically for Chinese American women. The terminology "breast cancer screening" refers to the utilization of mammography.

### **The Health Belief Model and Chinese American Women**

The health belief model (HBM) has been commonly used by researchers as a theoretical framework to explore reasons that some people who are illness-free take actions to avoid illness, whereas others fail to take protective actions (Pender, 1996). In this model, certain factors such as access, knowledge, perceived need, cues, and information-seeking behavior combine with the effect of individual health beliefs about the risks and benefits of preventive actions to predict the likelihood that a health-promoting behavior will occur.

The conceptual framework used in this study to predict the influences on mammography screening utilization for Chinese American women is a culturally specific adaptation of the HBM (Becker et al., 1977; Champion, 1993; Mood, 1997). The framework has three overarching constructs: modifying factors, individual health beliefs, and likelihood of action to utilize mammography screening.

A few studies have used the HBM to quantitatively examine the cancer control behavior of Asian women (Choudhry, Srivastava, & Fitch, 1998; Fung, 1998; Lu, 1995). However, these studies assessed health beliefs relating to breast cancer risk and prevention strategies without taking into account the impact of the cultural milieu of minorities (Perez-Stable, Sabogal, Otero-Sabogal, Hiatt, & McPhee, 1992). Failure to take

women's cultural beliefs into account may result in ineffective breast cancer screening programs (Rajaram & Rashidi, 1998). To increase understanding of the use of breast cancer screening among Chinese American women, the role of their sociocultural context must be understood.

**T**his study examined the predictors of breast cancer screening behavior by testing constructs of the Health Belief Model adapted specifically for Chinese American women.

### **Modifying Factors**

The first modifying factor is cultural affiliation. Chinese immigration to the United States began more than 100 years ago. Some women are now second- or third-generation Chinese Americans, whereas some are recent immigrants. Some carry on traditions from the Chinese culture, and some may even observe traditions from several cultures because of interracial marriages. Every immigrant group has unique cultural attitudes toward health, health care, and illness, and widely varying health and illness beliefs and practices exist within each of these groups (Castillo, 1979; Spector, 1996).

Whatever their origins, the pride in carrying on traditions is what we define as "cultural affiliation" (Mood, 1997). For example, Asians often practice preventive health care through the regulation of diet and exercise. When seeking medical help, they may wait until critical signs of illness arise, rather than using preventive health screening (NAWHO, 2001). Seeking annual health check-ups or cancer screening even when feeling healthy is somewhat contradictory to the Asian traditional concept of "prevention" (Yu et al., 2002).

The second modifying factor, "access to mammography screening," represents the ability to receive breast health care, including availability of health insurance, transportation, and so forth. The third modifying factor, "need for mammography screening," assesses the extent to which women feel threatened by breast cancer, which may increase with age and previous breast cancer diagnoses in self, family, or friends.

The fourth modifying factor is knowledge, in this case, awareness of the recommended timing for mammography screening. According to the HBM, cues to action have indirect influences on people's health behavior (Strecher & Rosenstock, 1997). The fifth modifying factor,

information-seeking behavior, represents the influence of the media on women's breast cancer screening behavior.

### **Individual Health Beliefs**

According to Strecher and Rosenstock (1997), "perceived susceptibility" concerns one's subjective perception of his or her chances of getting a condition. "Perceived severity" addresses personal feelings of how serious a condition could be if left untreated. "Perceived benefits" measures personal perception of the outcomes produced by the advised action. "Perceived barriers" measures personal perception of the impediments or costs to undertaking the advised action.

### **Likelihood of Action**

In this study, the action of interest was obtaining a mammogram in the past year. The ACS (2004) screening guidelines recommend that annual mammograms begin at age 40. Therefore, the variable "likelihood of practicing mammography screening" was measured as the percentages of women age 40 and older who received or who did not receive mammograms in the past year.

### **Hypotheses**

Based on the HBM, the following six hypotheses were tested:

1. Strength of cultural affiliation will influence the use of mammography both directly and indirectly. (a) Women who have a stronger affiliation with Chinese culture (a higher score on Strength of Cultural Affiliation Scale [SCAS]) will be less likely to have had a mammogram in the past year. (b) In addition to having a direct effect, women's cultural affiliation will have an impact on women's cancer screening behavior indirectly through other predictors, such as access to health care.
2. Women who have no health insurance, are non-English speakers, and cannot drive themselves to clinics (indicators of access to health care) will be less likely to have had mammography screening in the past year.
3. Women who are younger and who identify themselves or anyone close to them as not having any experience with breast cancer (indicators of need for breast health care) will be less likely to have had a mammography screening in the past year.
4. Women who lack knowledge about mammography screening will be less likely to have had a mammogram in the past year.
5. Women who do not seek information about breast cancer will be less likely to have had a mammogram in the past year.

6. Chinese women's likelihood of action, that is, practicing mammography screening, will be directly affected by culture-specific beliefs about breast cancer and cancer screening (i.e., perceived susceptibility, severity, benefits, and barriers).

## **Methods**

### **Instruments**

The five modifying factors were treated as independent variables. The instrument used to assess a Chinese woman's strength of cultural affiliation was adapted from Mood (1997). Mood's instrument is a 17-item self-administered tool designed to measure the extent to which a person shares a sense of affiliation with a particular ethnic group, that is, SCAS. Of the 17 items, the 1st and 17th items were open-ended questions. The other 15 items were scored on a 4-point Likert-type scale. The SCAS score was calculated by summing values of the 15 items, ranging from 0 to 60.

The second modifying factor, "access to mammography screening," was measured as the sum of three indicators including availability of health insurance, skill in speaking English, and ability to drive to clinics (Yu, Wu, & Mood, in press). The three indicators were coded as dummy variables (yes or no). The overall score was summed and had a possible range of 0 to 3.

The third modifying factor, "need for mammography screening," was measured as a sum of three indicators: age (if a woman was 50 years or older), if the women had ever been diagnosed with breast cancer, and if anyone close to the women (e.g., mother, grandmother, sister, aunt, cousin, niece, friend, coworker, or other) had ever been diagnosed with breast cancer (Yu et al., in press). These three indicators were loaded as dummy variables (yes or no) and were scored by summing all three items (the score ranged from 0 to 3).

The fourth modifying factor, "knowledge of cancer screening," was measured by a single item that asked, "At what age do you think a woman should start having a mammogram every year?" The coding on this question was 0 (the answer is not correct) or 1 (the answer is correct).

The fifth modifying factor, "information-seeking behavior," was measured by the question, "In the past year, have you seen or heard or read anything about breast cancer screening?" The coding on this question was 0 (no) or 1 (yes).

In light of Champion's instrument refinement (1993), the concept "individual health beliefs" was measured by four scales, including perceived susceptibility to breast cancer (4 items), perceived seriousness of breast cancer (7 items), perceived benefits of mammography screening (5

items), and perceived barriers to mammography screening (17 items). The fourth scale, perceived barriers, was further measured by three factors, including lack of access to health care (7 items), inconvenience (4 items), and discomfort (6 items) (Wu & Yu, 2003). Responses to the items were measured on a Likert-type scale from 1 to 4, with *strongly agree* scored as 1 and *strongly disagree* scored as 4. Mean scores were calculated for each of the subscales (i.e., the total score divided by number of items in each of the subscales).

To measure the likelihood of action, one question was used: "About how long ago has it been since you had your last mammogram?" Women had several choices for responses: within the past year, within the past 1-2 years, within the past 3-5 years, more than 5 years ago, or never had one. The responses were recoded into two categories: those who did and those who did not have their last mammography screening in the past year.

### Instrument Development and Validation

To develop culturally and linguistically appropriate research questionnaires, focus group meetings were conducted with Chinese women to elicit comments on the research instruments. Four professional and four lay experts were invited to evaluate the appropriateness of the questions used in the instrument. The bilingual versions (English and Mandarin Chinese) of the questionnaire were developed using the procedure of translation, back-translation, and pilot testing.

The instruments were normed with a cross-sectional study of Chinese Americans and tested for their reliability and validity (Wu & Yu, 2003). Cronbach's alpha (Cronbach & Meehl, 1955OR 1995?) was calculated to determine the internal consistency of subscales in the English questionnaire, including the scales of women's health beliefs about cancer and cancer screening (susceptibility, seriousness, benefits, and barriers) and Mood's SCAS. Psychometric tests for internal consistency (alpha of .7 or higher was considered acceptable) and construct validity yielded satisfactory results, with Cronbach's alphas for the five subscales (cultural affiliation and beliefs about cancer and cancer screening including susceptibility, seriousness, benefits, and barriers) ranging from .77 to .90 (Table 1).

To establish a content-valid research instrument, four professional and four lay experts were invited to evaluate the appropriateness of the items in the questionnaire. Their evaluation had three focuses. The first focus was to identify the domain of content, that is, to have all necessary variables that are specified in the theoretical model. The second focus was to construct the questions that can measure each of the variables properly and culturally specific. Once the words had been selected for each of the

**TABLE 1**  
*Reliability and Validity of the Subscales*

<i>Subscale</i>	<i># of Items</i>	<i>Internal Consistency (Cronbach's Alpha)</i>
Mammography screening belief <sup>a</sup>	33	
Perceived susceptibility	4	.78
Perceived seriousness	7	.77
Perceived benefits	5	.87
Perceived barriers, including three factors	17	.90
Lack of access	7	
Inconvenience	4	
Discomfort	6	
Cultural affiliation <sup>b</sup>	17	.84

<sup>a</sup>For more information, see Wu and Yu (2003).  
<sup>b</sup>For more information, see Yu, Wu, and Mood (in press).

questions, the third focus was to put all questions in a form that allowed the variables to be measured adequately. The critique from both professional and lay experts was carefully studied, discussed, and considered for revising the questionnaire.

### Sample

The target population was Chinese American women aged 40 years and older. The term "Chinese American women" refers to any female person of Chinese ancestry regardless of country of citizenship. The sample was recruited from an urban county in southeastern Michigan that had the highest density Asian population of all counties in the state. The selected county was the location of three universities/colleges including the University of Michigan.

A consecutive nonprobability sample of 220 Chinese women residing in southeastern Michigan participated in the survey. Of the 220 questionnaires that were returned, 14 were excluded from the data analysis because of missing data. Therefore, data from 206 participants were used for the final analyses.

### Data Collection

Approval to conduct the survey was obtained from the University Health Sciences Institutional Review Board prior to conducting the survey in 2001. As soon as an eligible woman's name, mailing address, and telephone number became available, a bilingual cover letter with a consent form and the survey questionnaire (in Chinese) was mailed to the participant. The letter stated that the questionnaire required approximately 60 minutes to com-



plete, and the questionnaire was also available in English upon request. In fact, among those who returned the questionnaire, 97% used the questionnaire in Chinese.

Several strategies were used to increase the response rate of the mailed survey. The cover letter provided an e-mail address and the toll-free telephone number of the research office for those who had questions. Bilingual project staff members were available to answer women's questions. The cover letter also stated that when their questionnaire was received, the respondents would be sent a \$10 gift certificate to express appreciation for their participation. A postcard reminder was sent to the women approximately 1 week and at 2 weeks after mailing the questionnaire. If there were any problems with a woman's responses, a member of the research staff called her to clarify any issues.

### *Data Management*

The quantitative data sets collected were cleaned, coded, and entered into the Statistical Package for the Social Sciences (SPSS-PC) version 11.0 (SPSS Inc., Chicago, IL). All coding and data entries were verified. Frequency distributions were calculated for all variables, and incorrect codes were identified and corrected. SPSS also was used for descriptive statistics on the characteristics of research participants and for bivariate Pearson correlations. AMOS 4.0 was used to perform the multivariate analysis and test the conceptual framework of mammography compliance in Chinese American women.

## **Results**

### *Characteristics of Research Participants*

The mean age of the 206 Chinese women was 54.6 years, ranging from 40 to 85 years ( $SD = 10.8$ ). The majority of these women was married (85%) and had 6 to 25 years of education ( $M = 15$ ,  $SD = 3.7$ ). With the exception of 3 who were born in the United States (1%), the other 203 women were born in China (79%), Taiwan (18%), Hong Kong, Singapore, or other countries (2%). Of the women who were born outside of the United States, 37% had lived in the United States for less than 10 years ( $M = 13.6$ ,  $SD = 11.4$ ). During the past year, 32% had an annual household income of less than \$10,000 and 21% had an annual income of more than \$100,000.

Regarding access to mammography screening, 42% of these women had no health insurance and about one third of them could not speak English and/or drive themselves to a clinic. In the highest category of perceived need for mammography screening, 24% of the sample were 50 years and older and had been diagnosed with breast cancer or had someone close to them diagnosed with breast cancer. Regarding knowledge, 25% did not answer cor-

rectly "At what age do you think a woman should have a mammogram annually?" For information-seeking behavior, approximately 43% of the women had not seen, heard, or read anything about breast cancer screening in the past year. For the outcome of interest, more than half of the 206 women in this sample (53%) reported receiving their last mammogram in the past year. The percentage of women aged 40 years and older in this sample who reported receiving a mammogram in the past year was lower for those women with an annual household income of \$10,000 or less (23% of them received a mammography screening in the past year) and those who had no health insurance (only 10%).

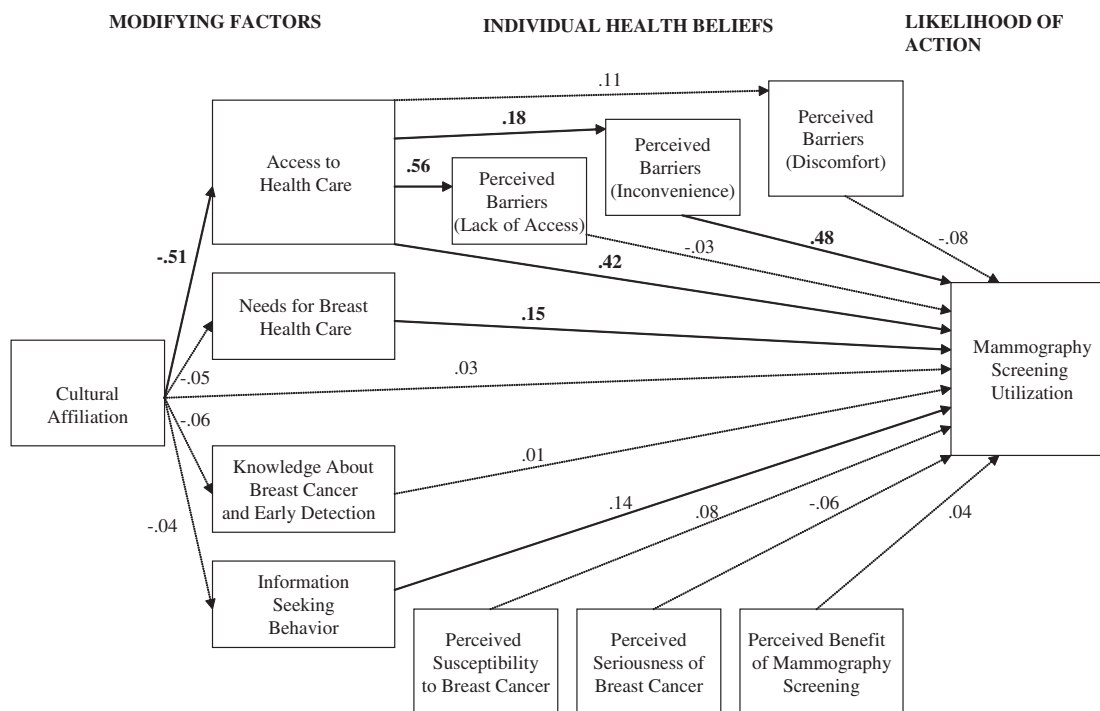
### *Correlations Among Variables*

Bivariate Pearson coefficients revealed that mammography screening utilization was significantly associated with perceived barriers to mammography screening, including its three factors (lack of access, inconvenience, and discomfort), need for and access to mammography screening, information-seeking behavior, and cultural affiliation ( $r = .16$  to  $.54$ ).

Significant Pearson bivariate correlations also existed among the three measures of health beliefs. Perceived susceptibility to breast cancer was significantly associated with perceived seriousness of breast cancer and perceived benefits of mammography screening ( $r = .16$  and  $.28$ ), and perceived seriousness of breast cancer was correlated with perceived benefits as well as barriers (including inconvenience and discomfort) toward mammography screening ( $r = .16$  to  $.29$ ).

**S**trategies for promoting breast cancer screening among Chinese American women include overcoming barriers to access to health care and improving their information-seeking behaviors.

There also were significant correlations between other independent variables, including between access to mammography screening and perceived barriers (lack of access,  $r = .54$ ). Greater cultural affiliation was negatively associated with perceived barriers to mammography screening and access to breast health care ( $r = -.17$  and  $-.51$ , respectively). The significance levels of all the above Pearson correlations were  $\leq .05$ .



\*Total direct and indirect effect  $R^2 = 51\%$

**FIGURE 1** Standardized regression weights of influences on mammography screening for Chinese American women ( $n = 206$ ).

### *Predictors of Mammography Use Among Chinese American Women*

Figure 1 demonstrates that predictors of mammography screening utilization in the past year included the direct effects of perceived barriers (inconvenience) to mammography screening, access to breast health care, need for breast cancer screening, and information-seeking behavior. Access to breast health care also had an indirect impact on mammography screening utilization moderated through perceived barriers: lack of access and inconvenience. Strength of cultural affiliation (SCAS score) had an indirect impact on mammography utilization moderated through access to breast health care. The squared multiple correlation between the independent variables and the likelihood of receiving mammography was .56, including both direct and indirect effects of the predictors.

Cultural affiliation did not affect perceived need for care, knowledge about screening, or awareness of media information. Cultural affiliation, perceived susceptibility to breast cancer or seriousness of the disease, discomfort or lack of access as barriers, and benefit of screening did not predict screening behavior.

### **Discussion**

The study's objective was to examine the factors that have an impact on breast cancer screening utilization by

Chinese women residing in the United States. Much effort was devoted to designing and implementing a culturally and linguistically appropriate research project. The conceptual framework was derived from culture-specific adaptations made from the HBM. More specifically, because the Asian population includes a large percentage of immigrants, and every immigrant group has unique cultural attitudes toward health, health care, and illness, a SCAS was adapted to measure the extent to which a person shared a sense of affiliation with a particular ethnic group. Considering that economic, linguistic, and transportation barriers are major concerns of some older and new Chinese immigrants, availability of health insurance and the ability to speak English and to drive were used as three indicators of the modifying variable, access to mammography screening.

Another characteristic of the study's research design was the emphasis on assessing the reliability and the validity of the research instrument. Particularly during the third phase of questionnaire development, extensive effort was devoted to determining the internal consistency of the subscales in the English version. The questionnaire, originally developed in English, was modified for cultural appropriateness, translated into Chinese with the back-translation technique, and pretested. Although the questionnaire was available in both English and Chinese for women, 97% elected to use the Chinese version. This

finding suggests that it is very important to develop research instruments in the languages of the group of interest when conducting studies among minority populations with a significant proportion of immigrants.

Analysis of the descriptive data demonstrated that the sample had characteristics similar to the general Asian American population in the United States, including being composed primarily of immigrants of varying socioeconomic and health status. However, the Michigan sample had a disproportionate number of recent immigrants: Of the 206 Chinese women in the sample, only 3 were born in the United States. Among those who were born in foreign countries, 37% of them had lived in the United States for less than 10 years. The finding that 32% of these women had an annual household income of less than \$10,000 also challenges the stereotype that all Chinese American women are prosperous.

The Chinese American women in the sample had a lower mammography screening utilization rate than the general population. Comparing these data with national surveys, the mammography screening rates for the Chinese women aged 40 years and older in the sample were 11% lower than those of women in the general population (Centers for Disease Control and Prevention, 2002), and for participants aged 50 and older, the rates were 23% lower than the rate of the same age group in the general population (Michigan Department of Community Health and Michigan Public Health Institute, 2002). The women in this sample who reported a low use of mammography also reported not having adequate access to health care. The percentages of women aged 40 years and older who reported receiving a mammogram in the past year were very low for those women with low income or no health insurance.

Some of the proposed hypotheses were supported by the multivariate analysis. Women's strong Chinese cultural affiliation affected their screening rates by reducing their access to health care. Nevertheless, cultural affiliation did not have a direct effect on breast cancer screening utilization, and women's knowledge about breast cancer screening recommendations did not directly affect their cancer screening behavior.

An unexpected finding was that several subscales of individual health beliefs, including perceived susceptibility, perceived seriousness, and benefits, did not predict breast cancer screening behavior. In this population, the lack of relationship between knowledge and mammography utilization suggests that knowledge alone is not an effective strategy for promoting breast cancer screening in the Chinese community.

### **Limitations**

One of the limitations of the study was its relatively low response rate of 42%. Future studies are needed to

further explore effective culturally appropriate strategies and to increase the response rate. In addition, because a nonprobability sampling method was used to recruit survey participants, these results cannot be generalized to the broader Chinese American population. However, the findings of this cross-sectional survey can provide a foundation for future population-based studies in the Chinese American population.

**D**evelopment of culturally specific nursing interventions focusing on reducing health disparities in breast cancer screening among Chinese Americans is needed.

### **Clinical Implications**

Based on the finding that access to health care is a strong predictor of mammography screening utilization, an effective strategy to promote early breast cancer detection among Chinese American women is to overcome their barriers to participating in such cancer screening programs. Because Chinese Americans include a significant number of recent immigrants, personalized assistance is particularly needed for those who have difficulties receiving needed health care due to cultural, economic, linguistic, or transportation barriers. Strategies to increase mammography screening use may include sponsoring health-promotion seminars provided by bilingual health care providers, promoting free or low-cost mammography screening services, and providing interpretation or transportation services through the assistance of community volunteers.

In light of the findings that perceived barriers, specifically inconvenience, had a strong impact on women's receipt of mammography screening, a challenging issue for American health care institutions is how to improve these aspects of quality health care. Providing more convenient clinic hours and reducing waiting time for appointments, for example, may help women who have difficulty visiting hospitals/clinics during daytime hours, as well as those who are too busy to care for their breast health.

Because information-seeking behavior was positively related to women's mammography screening use, American health professionals can seek ways to stimulate women's information-seeking behavior, perhaps by providing culturally and linguistically appropriate health



educational materials, especially for women of some racial and ethnic groups who have their own cultural beliefs and linguistic barriers.

Finally, the finding that strength of affiliation with the Chinese culture had an indirect effect on mammography screening use suggests that Chinese health beliefs should be considered when counseling Chinese women regarding breast cancer screening. Cultural competency training programs can help health care providers understand more about Chinese culture. Such programs could be tested to determine whether they can reduce disparities in receipt of breast cancer screening in Chinese Americans.

## Conclusion

Asian Americans are one of the fastest growing ethnic populations in the United States. However, the health of Asian Americans is compromised by a complex set of cultural, linguistic, structural, and financial barriers to care (NIH, 2002). The low mammography screening utilization rate is a major health concern of Chinese American women. The study's findings can guide future research and raise possibilities for culturally specific nursing intervention strategies to reduce health disparities such as breast cancer screening among Chinese American women.

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