Published in final edited form as:
Cancer Detect Prev. 2002 ; 26(1): 33–41.

Breast cancer screening: stages of adoption among Cambodian American women

Shin-Ping Tu, MD, MPH[a,d,*], **Yutaka Yasui, PhD**[e], **Alan Kuniyuki, MS**[e], **Stephen M. Schwartz, PhD**[b,e], **J. Carey Jackson, MD, MPH**[a,d], and **Vicky M. Taylor, MD, MPH**[c,e]
a *Department of Medicine, University of Washington, Seattle, WA 98104, USA*

b *Department of Epidemiology, University of Washington, Seattle, WA, USA*

c *Department of Health Services, University of Washington, Seattle, WA, USA*

d *International Medicine Clinic, Harborview Medical Center, Seattle, WA 98104, USA*

e *Division of Public Health Sciences, Fred Hutchinson Cancer Research Center, Seattle, WA 98109, USA*

Abstract

Background—Little information is available on the breast cancer screening behavior of Cambodian American women.

Methods—We identified households from multiple sources using Cambodian surnames and conducted a cross-sectional survey, administered by bilingual and bicultural interviewers. Breast cancer screening stages of adoption were examined based on concepts from the transtheoretical model of behavioral change.

Results—Our response rate was 73% (398 women in clinical breast exam (CBE) analysis, and 248 in mammography analysis) with approximately 25% each in the maintenance stage. We found significant associations between screening stage with physician characteristics. Asian American female physician increased the likelihood of being in the maintenance stage (CBE, OR = 10.1, 95% CI 2.8–37.1; mammogram, OR = 74.7, 95% CI 8.3–674.6), compared to Asian American male physician with precontemplation/contemplation stage as our referent outcome.

Conclusion—Results from this study support the need to promote regular breast cancer screening among Cambodian American women.

Keywords

Breast cancer; Screening; Asian; Stages of adoption

1. Introduction

Breast cancer is the most common major malignancy among Asian American women [1–6]. Although the incidence of breast cancer among Asian American women is low compared to white women, breast cancer risk for Asian American women increases after migration to the United States (US) [7–9]. In fact, the risk of breast cancer for Asian American women born in the US approaches that of the white population [8].

*Corresponding author. Tel.: +1-206-731-4236; fax: +206-731-6097. *E-mail address:* shinping@u.washington.edu (S.-P. Tu)..

Studies have demonstrated varying breast cancer screening rates among Asian American ethnic groups [10–23]. It has also been postulated that the low utilization of breast cancer screening may be responsible for the higher proportion of Asian American women diagnosed with larger tumors (>1 cm) [24].

The 1990 census estimated 150,000 Cambodians living in the US [25]. The majority of Cambodians migrated to the US as a result of political and personal persecution imposed by the Khmer Rouge regime during the 1970s. Coming from a predominantly agrarian society, Cambodians are especially unfamiliar with Western culture, institutions, and biomedical concepts of early detection [26,27].

Little information is available on breast cancer screening behavior in the Cambodian American population. Our recent report showed higher rates of breast cancer screening compared to earlier reports of Cambodian American women [22]. Recent screening levels, however, were low. Song and Fletcher reported low re-screening rates among minority women, including Asian Americans; their study, however, did not examine specific Asian ethnic groups [28].

The transtheoretical model of behavioral change has been used to assess and promote breast cancer screening [29–35]. This framework has also been applied to minority groups, specifically African American and Hispanic women [32,36–41]. Tailored intervention using stage-matched materials have been shown to improve mammography use [34,35,37,42]. Only two published studies have described screening behavior in Southeast Asian women based on the transtheoretical framework [13,43]. To our knowledge, this is the first report on the breast cancer screening stages of adoption among Cambodian American women.

Using concepts from the transtheoretical model of behavioral change, our aim was to describe breast cancer screening stages of adoption in a Cambodian American community, and to identify factors associated with each stage in this underserved community (Table 1).

2. Methods

This study was approved by the Human Subjects Committee of the Fred Hutchinson Cancer Research Center, and all participants provided an informed consent prior to completing the survey.

2.1. Study sample

Seattle's Cambodian population is concentrated in a few neighborhoods in the southern part of the city [25,44]. As described in our earlier paper, we constructed a sampling frame based on multiple sources of household data to recruit a representative sample of Cambodian American women living in this geographic area (the target area defined by ZIP codes) [22]. Our sources consisted of electronic listings of all Asian clients of the Seattle Housing Authority and King County Housing Authority, a computer database of motor vehicle licenses from the State of Washington, and two compact-disc read only memory (CD-ROM) telephone directory databases (Select Phone and Phone Disk). All households with ZIP codes corresponding to the target area were linked to a database of more than 1000 known or potential Cambodian surnames. To eliminate duplicate entries, linked records were merged from these sources according to street addresses. Our final sampling frame contained 2145 households provisionally determined to be Cambodian as described above. From this sampling frame, we selected 1365 households located in geographically-defined neighborhoods known to have a high density of Cambodians.

2.2. Survey methods

To publicize the survey, we distributed Khmer language posters in community settings (e.g. Cambodian owned grocery stores and restaurants). An introductory letter printed in Khmer and English was also mailed to each of the study households. From late 1997 to early 1998 bilingual and bicultural Cambodian American women administered face-to-face interviews in participants' homes. Participants were given the option of answering the survey questions in either Khmer or English.

Cambodian women (18 years of age or older) were eligible to complete the questionnaire. In households with two or more age-eligible women, interviewers requested to interview the oldest woman. This approach was used instead of a random selection algorithm because attempts to enumerate household members have been shown to reduce response rates in Asian populations [45]. Interviewers made up to five attempts at contacting each household (at least once during the daytime, evening, and weekend).

2.3. Survey instrument

The survey included several socio-demographic items: age, marital status, educational level, location of birth, type of housing (i.e. government-subsidized versus other), employment status, and religion. To accommodate cultural sensitivity on questions of household income, type of housing was used as a proxy for economic status. Survey questions on acculturation consisted of: how many years the women had lived in the US, their age at immigration, and whether or not they spoke English fluently.

Included in the survey were questions on breast cancer screening behavior and intentions. Screening behavior was identified for clinical breast exam (CBE) and mammography screening. Women were asked whether they had ever had breast cancer screening and, if so, the interval since their last screening. Women who had never been screened were asked if they had ever thought about breast cancer screening and, if so, whether they thought about getting screened. Those who had received breast cancer screening were also asked if they planned to get the screening test in a specified interval (next 12 months for CBE, and next 2 years for mammogram).

Taylor et al. reported our earlier qualitative study addressing cervical cancer screening. Results showed that Cambodian women's preventive and traditional beliefs versus biomedical orientations were important determinants of early detection behavior [46]. Health belief questions were, therefore, included in the study. These questions queried whether women believed: illness is a matter of karma; illness is a matter of fate; women should have regular check-ups; some diseases are caused by wind; coin rubbing is the best treatment for some diseases; cancer is curable; and some American medicines are too strong for Cambodian people.

We also included items addressing access to health services. Women were questioned if they had ever received prenatal services in the US, and whether they had a regular medical provider. The association of physician gender and ethnicity with screening participation has been demonstrated in some studies [4,22,46]. We, therefore, selected these items for our breast cancer screening study. Questions on access, such as problems with transportation, finding medical interpreters, and concerns about costs were also included in the survey.

All items on the survey were developed in English and translated into Cambodian. To ensure lexical equivalence, all questions were back translated into English and subsequently pre-tested [47]. Since many Cambodian Americans have little or no formal education [25], the questions and response options were intentionally made as simple as possible.

3. Data analysis

The CBE analyses included all women 18 years of age or older. Since current breast cancer screening guidelines of the American Cancer Society and the National Cancer Institute recommend that women aged 40 years and older should have regular mammograms [48,49], we restricted the mammography screening analyses to women who were 40 years of age and older.

Classification of women into breast cancer screening stages of adoption was based upon the classification proposed by McPhee et al. from the Pathways to Early Cancer Detection Project [13]. Because of the different recommendations for CBE and mammography screening at the time of this study, the relapse, action, and maintenance stages of adoption involved different intervals for the two tests (Table 1).

Due to the small number of women in the contemplation stage, precontemplators and contemplators were combined into one category for the bivariate and multivariate analyses. Bivariate analyses were conducted using a Chi-square test and, when necessary, Fisher's exact test [50]. We used polytomous logistic regression models to determine independent associations between a woman's characteristics and breast cancer screening stages of adoption. This method allows the relationship between a categorical outcome and a set of covariates to be examined when the outcome has two or more categories of interest [51]. As a tool to build a summary model, we used a stepwise variable selection approach with a 0.15 significance level for entry into the model and 0.05 for retention in the model.

4. Results

4.1. Study group

Four hundred and thirteen women completed the survey. Our total household response rate was 73% (Table 2). Out of the households that were reachable and known to be eligible, 89% agreed to participate. Six women reported a personal history of breast cancer, while another six women did not report their age. Among the remaining 401 women, three did not indicate whether or not they had ever had a CBE and were excluded from the CBE analysis (n = 398). In addition, 249 of the 401 women were of ages 40 years or older. Among these 249 women, 1 did not respond to the mammography screening questions, so data from this participant were excluded from the mammography analysis (n = 248).

In all, responses from 400 women were examined for screening behavior. The mean age of the participants was 45 years with 38% under 40 years of age. Participants had lived in the US for an average of 13 years, and 84% had resided in the US for 10 or more years at the time of the survey. Eighty-nine percent of the women were Buddhist and 14% were born in the urban city of Phnom Penh. Thirty-six percent of the participants were previously married and 46% were currently married. Forty-two percent of the women reported receiving no formal education and 86% of the women had health insurance. Among these women, 70% had insurance through Medicare, Medicaid, or state-subsidized health insurance. Finally, 66% of the women reported living in housing that was subsidized for low-income families.

4.2. Bivariate analyses

4.2.1. Clinical breast exam—Table 3 summarizes our bivariate analysis results. The following socio-demographic and acculturation variables were significantly associated with CBE stages of adoption: age, education, marital status, age at immigration, and proportion of life in the US. Among health belief variables, the belief that cancer is curable was associated with more favorable CBE stages of adoption. Male physician gender, Asian American physician ethnicity, having transportation problems, and having never received prenatal care

in the US were all negatively associated with CBE stages of adoption. Having problems finding childcare was also significantly associated with CBE screening behavior.

4.2.2. Mammography screening—Among the socio-demographic variables, number of years in the US was positively associated with mammography screening stage of adoption. Among health belief variables, the belief that coin rubbing was the best treatment for some diseases was negatively associated with stage of adoption, while the belief that cancer is curable was favorably associated. Additional variables positively associated with mammography stages of adoption included female physician gender and non-Asian physician ethnicity, as well as having health insurance.

4.3. Multiple regression analysis

Physician gender and ethnicity had statistically significant associations with the stages of adoption of both screening modalities (Table 3). As with our earlier study, we created a physician characteristics variable in the regression analysis that crossed physician gender and ethnicity variables: Asian American female; non-Asian female; non-Asian male; Asian American male; and no regular physician [22].

Results of the logistic regression analyses are reported in Tables 4 and 5. In these analyses, all odds ratios are relative to women in the combined precontemplation/contemplation stage. It should be noted that the odds ratios for other stage comparisons can be calculated by simple division [51].

4.3.1. Clinical breast exam—For CBE, physician characteristics, belief cancer is curable, prenatal care in the US, education, being a Buddhist, age at immigration, and problems with transportation entered into our stepwise regression model. Having an Asian American female physician, or a non-Asian physician of either gender, resulted with significantly higher odds of women in the action and maintenance stages, when compared to women with Asian American male physicians. The belief that cancer is curable also resulted with a higher odds ratio for the maintenance stage. Women who received prenatal care in the US or had some formal education were more likely to be in the maintenance stage. Although the odds ratios for women who were Buddhist suggest higher stages of screening adoption as compared to non-Buddhists, the comparisons were not statistically significant. Also, women who immigrated between the ages of 20 and 39 years had higher odds of being in the action stage, while women who reported problems with transportation were significantly less likely to be in the maintenance stage.

4.3.2. Mammography screening—Only four variables were statistically significant in our final logistic regression model for mammography screening stages of adoption: physician characteristics, belief cancer is curable, health insurance, and years in the US. Again, women with Asian American female physicians were significantly more likely to be in the action and maintenance stages, as compared to women with Asian American male physicians. Although the point estimates for the belief that cancer is curable were greater than one, they were not statistically significant. Of note, women who had public health insurance had a higher odds of being in the relapse stage, although not statistically significant, and women who had resided in the US for 10 or more years were more likely to be in the relapse or maintenance stage.

5. Discussion

To our knowledge, this is the first study addressing breast cancer stages of adoption in Cambodian women. Hedeen et al. had found a higher proportion of women who were diagnosed with tumors greater than 1 cm among Asian Americans when compared to white women in

the US [24]. They postulated that this finding may be attributed to lower utilization of breast cancer screening among Asian American women. Although our previously published research showed breast cancer screening among Cambodian American women had increased since earlier reports by Yi [15], and Kelly et al. [52] it remained to be determined whether Cambodian American women have adopted regular screening and whether stage-matched interventions should be considered in this community.

Our survey found that only 26% of Cambodian American women were in the maintenance stage for CBE, and 23% of women who were 40 years or older reported being in the maintenance stage for screening mammography. These mammography maintenance rates were comparable to reports of San Francisco and Sacramento Vietnamese women in 1993 [13]. The proportion of women in our combined precontemplation/contemplation stage (almost one-third for each screening method) was smaller than that of the Vietnamese study; however, the proportion of Cambodian American women in the relapse stage was almost double that of Vietnamese women in the same study [13].

Rakowski et al's. stages of mammography adoption differs from the stage classifications used in this study, precluding direct comparisons of our results to studies that used Rakowski et al's. stages of adoption [30]. In an earlier study by Rakowski et al., 10% of the women were in precontemplation; 18% contemplation; 13% action; 36% maintenance; and 7% relapse [30]. A second study of community women in Washington State showed a greater proportion of women in the maintenance stage (47–50%) [33]. In a recent study by Rimer et al., less than 8% of the women were in the precontemplation or relapse stage and 55% of the women were in the action or maintenance stage [42]. This study of younger, predominantly white women oversampled "non-adherent" women.

Among the variables examined in our study, only physician characteristics was consistently associated with women being in the action and maintenance stages of CBE and mammography screening. Women who had Asian American female physicians revealed statistically significant associations with higher stages of screening adoption, as compared to women with Asian American male physicians; similarly non-Asian physicians were also associated with women being in the maintenance stage. These findings are consistent with our earlier results showing Cambodian women with Asian American male physicians to be the least likely to have undergone breast cancer screening (ever screened and recently screened) [22]. Although the wide confidence intervals indicate that the odds ratios are unstable (reflecting our small sample size), the lower confidence limits were still significantly greater than one.

These results suggest that Asian American physician practices may vary by gender. Although this survey did not assess other physician characteristics or interview physicians regarding their recommendations, it is likely that factors such as the country and period of medical training may influence physicians' preventive practice [22]. The preference of certain Asian American groups to seek health care for acute problems has also been identified [53]. Recent studies demonstrate that many Asian American physicians serving this population do not use appointment systems and have high volume practices to accommodate their patients' health seeking behaviors [54,55].

When we examined CBE and mammography screening independently, health beliefs, as in breast cancer is curable, and some acculturation variables did show statistically significant associations with higher stages of screening adoption. Other variables, including some health beliefs and acculturation, did not consistently correlate with screening. Although it has been postulated that socio-economic status and acculturation are factors that may deter screening among minority women, in this survey these variables were not significantly associated with the stage of screening adoption after adjusting for other covariates in the model.

Our study results must be interpreted in recognition of several potential limitations. First, we cannot be certain that all Cambodians within the selected areas of Seattle with a high density of Cambodians were identified by our surnames database. Second, our findings may not be generalizable to other geographic regions or to Cambodians who do not reside in neighborhoods where the proportion of Southeast Asians is high. Cambodian American women residing in other and more affluent neighborhoods may have different screening behaviors. Third, our results may be subject to inaccurate recall and acquiescence bias (i.e. over-reporting of a behavior perceived as desirable) [4,45,56,57]. Fourth, our results may be an overestimate of CBE and mammography stages of adoption, since non-respondents may under-utilize breast cancer screening. Lastly, we focused on exploratory rather than confirmatory analysis, therefore, the results of our multiple regression findings were not hypothesis-driven and will need to be interpreted with care.

In summary, this study illustrates the need to determine screening based on the transtheoretical model of behavioral change. Significant strides have been accomplished in promoting breast cancer screening among Cambodian American women. With almost one-quarter of the Cambodian women in each of the two relapse stages, interventions tailored by stage should be explored so Cambodian American women can progress along the continuum of breast cancer screening adoption and maintain positive screening behaviors. With an increase in regular screening practices, the current diagnostic pattern of larger breast tumors among Asian American women may be reversed.

Acknowledgements

This research was supported by a Primary Care Physician Career Development Award from the American Cancer Society and Grants # CA 70922 and # CA 86322 from the National Cancer Institute. The authors also wish to thank Mary Walsh for her assistance in the preparation of this manuscript.

References

1. Racial/ethnic patterns of cancer in the United States 1988–1992. Bethesda (MD): National Cancer Institute; 1996.
2. Parker S, Davis K, Wingo P, et al. Cancer statistics by race and ethnicity. CA Cancer J Clin 1998;48 (1):31–48. [PubMed: 9449932]
3. Cancer: confronting critical health issues of Asian and Pacific Islander Americans. In: Zane, N.; Takeuchi, D.; Young, K., editors. Thousand Oaks: Sage; 1994.
4. McPhee S, Bird J, Davis T, et al. Barriers to breast and cervical cancer screening among Vietnamese American women. Am J Prev Med 1997;13:205–13. [PubMed: 9181209]
5. Bernstein L, Miu A, Monroe K, et al. Cancer incidence among Filipinos in Los Angeles County, 1972–1991. Int J Cancer 1995;63:345–8. [PubMed: 7591229]
6. SEER cancer statistics review, 1973–1995. Bethesda (MD): National Cancer Institute; 1998.
7. Stanford JL, Herrinton LJ, Schwartz SM, et al. Breast cancer incidence in Asian migrants to the United States and their descendents. Epidemiology 1995;6:181–3. [PubMed: 7742407]
8. Ziegler R, Hoover R, Pike M, et al. Migration patterns and breast cancer risk in Asian American women. J Nat Cancer Inst 1993;83:53–60.
9. Yu H, Harris R, Gao Y, et al. Comparative epidemiology of cancers of the colon, rectum, prostate and breast in Shanghai, China versus the United States. Int J Epidemiol 1991;20:76–81. [PubMed: 2066247]
10. Centers for Disease Control. CA: Behavioral Risk Survey of Chinese, 1989. Morbidity and Mortality Weekly Report 1992;41:266–70. [PubMed: 1560795]
11. Centers for Disease Control. CA: Behavioral Risk Survey of Vietnamese, 1992. Morbidity and Mortality Weekly Report 1992;41:69–72. [PubMed: 1732712]
12. Hiatt R, Pasick R, Perez-Stable E, et al. Pathways to early cancer detection in the multiethnic population of the San Francisco Bay Area. Health Educ Q 1996;23(Suppl):S10–27.

13. McPhee S, Bird J, Ha N, et al. Pathways to early cancer detection for Vietnamese women: Suc Khoe La Vang! (Health is gold!). Health Educ Q 1996;23(Suppl):S60–75.
14. Yi JK. Breast cancer screening practices by Vietnamese women. J Women's Health 1994;3(3):205–13.
15. Yi JK, Prows SL. Breast cancer screening practices among Cambodian women in Houston, Texas. J Cancer Educ 1996;11(4):221–5. [PubMed: 8989636]
16. Smyser M, Krieger J, Solet D. The King County ethnicity and health survey 1995–1996 1999:31–44.
17. Kagawa-Singer M, Pourat N. Asian American and Pacific Islander breast and cervical carcinoma screening rates and healthy people 2000 objectives. Cancer 2000;89(3):696–705. [PubMed: 10931471]
18. Wismer BA, Moskowitz JM, Chen AM, et al. Mammography and clinical breast examination among Korean American women in two California counties. Prev Med 1998;27:144–51. [PubMed: 9465365]
19. Centers for Disease Control. Alameda County (CA): Behavioral Risk Factor Survey of Korean Americans 1994. Morbid Mortal Week Rep 1997;46(33):774–7.
20. Tanjasiri S, Kagawa-Singer M, Foo M, et al. Breast cancer screening among Hmong women in California. J Cancer Educ 2001;16:50–4. [PubMed: 11270901]
21. Tang T, Solomon L, McCracken L. Cultural barriers to mammography, clinical breast exam, and breast self exam among Chinese American women 60 years and older. Prev Med 2000;31:575–83. [PubMed: 11071839]
22. Tu S, Yasui Y, Kuniuyki A, et al. Breast cancer screening among Cambodian American women. Cancer Detection Prev 2000;24(6):549–63.
23. Lee M, Lee F, et al. Pathways to early breast and cervical detection for Chinese American women. Health Educ Q 1996;23(Suppl):S76–88.
24. Hedeen AN, White E, Taylor V. Ethnicity and birthplace in relation to tumor size and stage in Asian American women with breast cancer. Am J Public Health 1999;89:1248–52. [PubMed: 10432917]
25. US Department of Commerce. We the Asian Americans. Washington (DC): US Department of Commerce; 1993.
26. Muecke MA. Caring for Southeast Asian refugee patients in the USA. Am J Public Health 1983;73 (4):431–8. [PubMed: 6829826]
27. Uba, L. , . Cultural barriers to health care for Southeast Asian refugees. Public health reports. 1992.
28. Song L, Fletcher R. Breast cancer re-screening in low-income women. Am J Prev Med 1998;15(2): 128–33. [PubMed: 9713668]
29. Rakowski W, Dube C, Marcus B, et al. Assessing elements of women's decisions about mammography. Health Psychol 1992;11:111–8. [PubMed: 1582379]
30. Rakowski W, Fulton J, Feldman J. Women's decision-making about mammography: a replication of the relationship between stages-of-adoption and decisional balance. Health Psychol 1993;12:209–14. [PubMed: 8500450]
31. Rakowski W, Ehrich B, Dube C, et al. Screening mammography and the transtheoretical model: robustness of associations using two definitions of the stages-of-adoption. Ann Behav Med 1996;18:91–100.
32. Rimer B, Conaway M, Lyna P, et al. Cancer screening practices among women in a community health center population. Am J Prev Med 1996;12(5):351–7. [PubMed: 8909646]
33. Rakowski W, Anderson M, Stoddard A, et al. Confirmatory analysis of opinions regarding the pros and cons of mammography. Health Psychol 1997;16(5):433–44. [PubMed: 9302540]
34. Pearlman DN, Rakowski W, et al. Why do women's attitudes toward mammography change over time? Cancer Epidemiol Biomarkers Prev 1997;6(6):451–7. [PubMed: 9184780]
35. Rakowski W. Increasing mammography among women aged 40–74 years by use of a stage-matched, tailored intervention. Prev Med 1998;27(5 Pt 1):748–56. [PubMed: 9808807]
36. Rimer B, Lyna P, Glassman B, et al. The impact of tailored interventions on a community health center population. Patient Educ Counselling 1999;37:125–40.
37. Lipkus I, Rimer BK, Halabi S, et al. Can tailored interventions increase mammography use among HMO women. Am J Prev Med 2000;18(1):1–10. [PubMed: 10808977]

38. Stoddard A, Rimer B, Lane D, et al. Underusers of mammogram screening: stage of adoption in five US subpopulations. Prev Med 1998;27:478–87. [PubMed: 9612839]
39. Pearlman DN, Rakowski W, et al. Breast cancer screening practices among black, Hispanic, and white women: reassessing differences. Am J Prev Med 1996;12(5):327–37. [PubMed: 8909641]
40. Skinner C, Strecher V, Hospers H. Physicians' recommendations for mammography: do tailored messages make a difference? Am J Public Health 1994;84:43–9. [PubMed: 8279610]
41. Skinner C, Arfken C, Sykes R. Knowledge, perceptions, and mammography stage of adoption among older urban women. Am J Prev Med 1998;14(1):54–63. [PubMed: 9476836]
42. Rimer B, Halabi S, Skinner C, et al. The short-term impact of tailored mammography decision-making interventions. Patient Educ Counselling 2001;43:269–85.
43. Taylor V, Jackson J, Yasui Y, et al. Pap testing stages of adoption among Cambodian immigrants. Asian Am Pacific Islander J Health 2000;8:58–68.
44. US Department of Commerce. Washington (DC): US Department of Commerce; 1993. 1990 census of population and housing: population and housing characteristics for census tracts and black numbering areas—Seattle, WA PSMA.
45. Taylor VM, Schwartz SM, Jackson JC, et al. Cervical cancer screening among Cambodian American women. Cancer Epidemiol Biomarkers Prev 1999;8:541–6. [PubMed: 10385145]
46. Taylor VM, Jackson JC, Schwartz SM, et al. Cervical cancer control in a Cambodian American population. Asian Am Pacific Islander J Health 1998;6(2):368–77.
47. Eyton J, Neuwirth G. Cross-cultural validity: ethnocentricism in health studies with special reference to the Vietnamese. Social Sci Med 1984;18:447–53.
48. Leitch AM, Dodd GD, Costanza M, et al. American Cancer Society guidelines for the early detection of breast cancer. CA Cancer J Clin 1997;47:150–3. [PubMed: 9152172]
49. National Cancer Institute. Statement from the National Cancer Institute on the National Cancer Advisory Board recommendations on mammography. CancerNet Web site, 1997.
50. Fundamentals of biostatistics. 5th ed. Duxbury Press; 2000.
51. Applied logistic regression analysis. New York: Wiley; 2000.
52. Kelly A, Chacori M, et al. A program to increase breast and cervical cancer screening for Cambodian women in a midwestern community. Mayo Clin Proc 1996;71:437–44. [PubMed: 8628022]
53. Hoang GN, Erickson RV. Cultural barriers to effective medical care among Indo–Chinese patients. Ann Rev Med 1985;36:229–39. [PubMed: 3994324]
54. McPhee SJ, Stewart S, Brock KC, et al. Factors associated with breast and cervical cancer screening practices among Vietnamese American women. Cancer Detection Prev 1997;21(6):510–21.
55. Lee M, Lee F, Stewart S, et al. Cancer screening practices among primary care physicians serving Chinese Americans in San Francisco. Western J Med 1999;170:148–55.
56. Jenkins CN, McPhee SJ, Bird JA, et al. Effect of a media-led education campaign on breast and cervical cancer screening among Vietnamese American women. Prev Med 1999;28:395–406. [PubMed: 10090869]
57. Nguyen TT, McPhee SJ, Somkin CP, et al. How valid are PAP smear and mammogram self-reports in a multi-ethnic population. JGIM 2001;16(S1):160.

Table 1

Stages of adoption—breast cancer screening

	CBE	*N* (%)	Mammogram	*N* (%)
Precontemplation	Never had a CBE & never thought about having a CBE	77 (19)	Never had a mammogram & never thought about having a mammogram	67 (27)
Contemplation	Never had a CBE, but has thought about having a CBE	40 (10)	Never had a mammogram, but has thought about having a mammogram	14 (6)
Relapse	Had a CBE, but does not plan to have a CBE in the next 12 months	91 (23)	Had a mammogram, but does not plan to have a mammogram in the next 2 years	64 (26)
Action	Last CBE ≥1 year ago, but plans to have a CBE in the next 12 months	86 (22)	Last mammogram ≥2 years ago, but plans to have a mammogram in the next 2 years	46 (18)
Maintenance	Last CBE <1 year ago & plans to have a CBE in the next 12 months	104 (26)	Last mammogram <2 years ago & plans to have a mammogram in the next 2 years	57 (23)

Table 2

Summary of survey response by source of household identification

Household response category	Housing authority (*N* = 492)		Telephone CD-ROM—motor vehicle registration (*N* = 873)		All households (*N* = 1365)	
	n	**%**	***n***	**%**	***n***	**%**
A: Eligibility not established[a]	61	12	238	—	299	22
B: Verified to be ineligible[b]	139	28	464	—	603	44
C: Refused	25	5	25	—	50	4
D: Participated	267	54	146	—	413	30
E: Estimated proportion of eligible among households where eligibility was not established (C + D)/(B + C + D)	—	68	—	27	—	43
F: Estimated number of eligible among households where eligibility was not established (E × A)	41	—	64	—	105	—
G: Estimated total household response rate D/(C + D + F)	—	80	—	62	—	73
H: Response rate among reachable and eligible households D/(C + D)	—	91	—	86	—	89

[a] No contact after five attempts.

[b] Household not Cambodian or no age-eligible women.

Table 3

Stages of adoption in relation to socio-demographic and other characteristics[a]

Variable	CBE				Mammogram			
	Precontemplation/ contemplation (*N* = 117; %)	Relapse (*N* = 91; %)	Action (*N* = 86; %)	Maintenance (*N* = 104; %)	Precontemplation/ contemplation (*N* = 81; %)	Relapse (*N* = 64; %)	Action (*N* = 46; %)	Maintenance (*N* = 57; %)
Socio-demographic								
Age (years)								
18–39	25	19	21	35*	—	—	—	—
≥40	32	26	22	21	—	—	—	—
40–49	—	—	—	—	33	20	25	23†
50–64	—	—	—	—	30	27	16	27
≥65	—	—	—	—	38	38	9	16
Location								
Rural	28	21	24	27†	32	24	19	26†
Urban	29	29	9	34	30	48	9	13
Religion								
Buddhism	29	21	23	27†	33	25	19	23
Other	33	37	12	19	31	35	12	23
Education								
None	34	25	24	16***	34	22	23	21
Some	26	21	19	34	34	28	12	25
Employed								
Yes	31	17	21	30	38	15	25	21
No	29	25	22	24	31	28	17	24
Years in US								
0–9	39	20	26	15†	61	11	16	13***
≥10	27	23	21	28	27	29	19	25
English								
Yes	27	24	18	30	67	0	33	0
No	30	23	22	26	32	26	19	24
Marital status								
Never married	25	15	25	35***	50	25	17	8
Currently married	23	23	25	29	28	22	23	28
Previously married	41	27	15	17	35	30	14	20
Housing								
Public	29	24	20	28	30	29	16	25†
Rented	36	21	24	19	46	19	21	13
Owned	20	22	27	31	23	20	30	27
Age at immigration (years)								
<20	24	19	21	37***	0	0	0	0
20–39	23	21	29	27	34	21	24	22
≥40	42	28	11	19	31	30	14	24
% Life in US								
<25	36	26	21	17*	36	27	16	21
25–50	25	20	23	31	29	25	21	25
>50	28	28	12	32	0	0	0	0
Health beliefs								
Believed illness is a matter of karma	34	26	17	23†	37	29	16	18†
Believed illness is a matter of fate	34	21	21	24	35	24	19	22
Believed women should have regular check-ups	28	22	22	28†	32	26	18	24

Variable	CBE				Mammogram			
	Precontemplation/ contemplation (*N* = 117; %)	Relapse (*N* = 91; %)	Action (*N* = 86; %)	Maintenance (*N* = 104; %)	Precontemplation/ contemplation (*N* = 81; %)	Relapse (*N* = 64; %)	Action (*N* = 46; %)	Maintenance (*N* = 57; %)
Thought some diseases arc caused by wind	29	21	23	27	34	23	19	23†
Thought coin rubbing is the best treatment for some diseases	30	21	22	27	35	24	19	22*
Thought some American medicines are too strong for Cambodians	32	21	24	22	37	26	19	18
Believed cancer is curable	25	18	24	33**	33	18	25	25*
Avoided cancer tests because of fear of treatment	25	27	16	31	39	29	13	19
Access								
MD gender								
Male	36	23	20	21*	40	23	19	19*
Female	18	23	25	34	19	30	18	33
None	33	22	20	26	23	36	18	23
MD ethnicity								
Asian American	40	20	18	22**	42	24	18	17*
Other	19	26	25	30	23	27	20	30
No/not sure	33	22	20	26	23	36	18	23
MD gender/ethnicity								
Asian male	45	22	15	19***	53	23	16	9***
Non-Asian male	21	26	28	26	20	21	23	36
Asian female	19	13	32	35	4	24	24	48
Non-Asian female	17	26	23	33	27	33	15	25
No regular MD	33	22	20	26	23	36	18	23
Transportation problems	38	24	21	16**	37	31	16	16†
Childcare problems	21	14	26	39**	38	19	24	19
Interpreter problems	27	23	23	26	31	25	19	25
Concerns about costs	33	17	26	24	31	21	24	25
Ever received prenatal care in US								
Yes	21	22	24	33***	29	23	24	23
No	42	23	18	17	35	27	15	23
Health insurance								
Public	28	24	21	27	31	29	16	24*
Private	29	21	31	19	35	8	38	19
None	34	17	15	34	40	13	23	23

[a] Statistical test: Chi-square test; Fisher's exact test when appropriate.

† $0.05 < P \leq 0.10$.

* $0.01 < P \leq 0.05$.

** $0.001 < P \leq 0.01$.

*** $P < 0.001$.

Table 4

Multiple logistic regression results, modeling CBE stages of adoption (N = 376)

	Relapse odds ratio[a] (95% CI)	Action odds ratio[a] (95% CI)	Maintenance odds ratio[a] (95% CI)
MD characteristics[b] (P = 0.001)			
Asian American female	1.9 (0.4, 7.8)	**10.1** (2.7, 38.2)	**10.1** (2.8, 37.1)
Non-Asian female	**2.8** (1.3, 6.0)	**4.3** (1.8, 10.0)	**3.8** (1.7, 8.5)
Non-Asian male	2.4 (1.0, 5.4)	**4.6** (1.9, 11.0)	**3.6** (1.5, 8.6)
No MD	1.3 (0.5, 3.6)	2.2 (0.7, 6.6)	2.2 (0.8, 6.1)
Believe cancer is curable (P = 0.003)	0.8 (0.5, 1.6)	1.9 (1.0, 3.5)	**2.5** (1.3, 4.6)
Prenatal care in US (P = 0.027)	**2.6** (1.1, 6.1)	1.2 (0.5, 2.8)	**3.0** (1.3, 6.9)
Education (P = 0.007)	1.0 (0.5, 1.9)	0.7 (0.3, 1.3)	**2.1** (1.1, 4.2)
Buddhist (P = 0.027)	0.6 (0.3, 1.4)	2.3 (0.7, 7.3)	2.2 (0.8, 6.2)
Age at immigration[c] (P = 0.002)			
<20 years	0.5 (0.1, 1.6)	2.9 (0.8, 10.8)	0.8 (0.3, 2.8)
20–39 years	0.7 (0.3, 1.7)	**6.1** (2.3, 16.3)	1.1 (0.4, 3.0)
Transportation problems (P = 0.046)	0.8 (0.4, 1.6)	0.8 (0.4, 1.7)	**0.4** (0.2, 0.8)

[a] Relative to women in the precontemplation/contemplation stage; odds ratios in bold are significant at the 5% level.

[b] Relative to Asian American male MD.

[c] Relative to age at immigration ≥40 years. Overall P-value.

Table 5

Multiple logistic regression results, modeling mammography screening stages of adoption (N = 237)

	Relapse odds ratio[a] (95% CI)	Action odds ratio[a] (95% CI)	Maintenance odds ratio[a] (95% CI)
MD characteristics[b] (P < 0.001)			
Asian American female	**12.9** (1.4, 118.2)	**22.6** (2.5, 208.2)	**74.7** (8.3, 674.6)
Non-Asian female	**4.1** (1.5, 11.2)	1.5 (0.5, 4.8)	**6.5** (2.1, 20.3)
Non-Asian male	**2.9** (1.0, 8.2)	**3.8** (1.3, 10.7)	**12.1** (4.1, 35.9)
No MD	**4.5** (1.2, 17.7)	1.8 (0.4, 8.4)	**6.0** (1.3, 27.1)
Believe cancer is curable (P = 0.029)	0.6 (0.3, 1.2)	2.1 (0.9, 4.6)	1.3 (0.6, 2.8)
Health insurance[c] (P = 0.042)			
Public	2.4 (0.7, 8.8)	0.8 (0.2, 2.4)	1.0 (0.3, 3.3)
Private	0.4 (0.1, 2.9)	1.7 (0.4, 7.3)	0.6 (0.1, 2.9)
≥10 years in US (P = 0.015)	**5.2** (1.6, 16.8)	2.2 (0.8, 6.5)	**4.1** (1.3, 13.3)

[a] Relative to women in the precontemplation/contemplation stage; odds ratios in bold are significant at the 5% level.

[b] Relative to Asian American male MD.

[c] Relative to no health insurance. Overall P-value.