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Permalink

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Journal

Journal of Cancer Education, 25(1)

ISSN

1543-0154

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Publication Date

2010-03-01

DOI

10.1007/s13187-009-0016-y

Peer reviewed

Predictors of Breast and Cervical Cancer Screening among Chamorro Women in Southern California

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Published online: 29 January 2010

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Abstract This study examined the role of sociodemographic characteristics, health insurance, cancer knowledge, perceived health risk, and having a recent physicians' visit on breast and cervical cancer screening utilization among a randomly selected group of Chamorro women ($n=250$) residing in San Diego, California. Data were collected by a telephone survey and analyzed using multiple logistic regression models. After adjusting for covariates, having a recent full exam was the strongest predictor of having had a Pap exam in the past 2 years for women 21 years and older and a clinical breast exam in the past 2 years for women 40 years and over.

Keywords Breast cancer · Cervical cancer · Pacific Islander · Chamorro · Early detection

Introduction

The National Institutes of Health considers Pacific Islanders to be an underserved and disadvantaged ethnic subgroup [1]. Chamorros, Micronesians, Tongans, and Samoans are

the four main groups within the Pacific Islander populations. The Chamorro community is made up of people indigenous to the Mariana Islands, with Guam and Saipan being home to the top two largest populations. In 2003, the leading causes of death for Asian Americans and Pacific Islander (AAPI) were: cancer (26.2%), diseases of the heart (25.3%), and cerebrovascular disease (9.0%) [2]. Among all US ethnic groups from 1999 to 2003, AAPI women had the lowest age-adjusted overall cancer incidence and mortality rates [3]; however, breast cancer is the most common cancer for Pacific Islander women [4] and for Chamorro women living in Guam [5].

With cancer as a leading cause of morbidity and mortality, intervention efforts are hampered by the limited cancer-related data available to guide the creation of tailored cancer control programs [6–12]. There are few published studies focused on predictors of cancer screening targeted for the individual communities within the Pacific Islander subgroups [13–15]. Of the published studies, most focus on the Chamorro community in Guam, on noncancer health problems, or are outdated [9, 16–29]. With San Diego, California being home to the largest urban population of Chamorros outside of Guam [4, 7, 20], the authors were specifically interested in identifying data related to health promotion practices and cancer screening that could be applied to improving the health of that community [9, 12, 30].

The San Diego Chapter of the National Cancer Institute-funded Pacific Islander Cancer Control Network's (PICCN) Board of Directors hypothesized that Chamorro women would be models of optimal health practices. They based their assumption on the fact that many Chamorro families had access to health care through the military and, as military families, they were more likely to have a positive orientation to following directives. Furthermore, since English literacy is high among Chamorros, health literacy

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would also likely be high and thereby contribute to better-than-average health knowledge and practices. The leaders of the PICCN invited faculty at UCSD to assist them in evaluating the accuracy of their assumptions. Additionally, since only limited research has been conducted with Chamorro women, this study was also designed to explore predictors of cancer screening.

Materials and Methods

Hypothesis #1: Chamorro women would be models of optimal health practices.

Hypothesis #2: Sociodemographic characteristics, baseline knowledge, and health care variables would significantly predict the likelihood of recent cancer screening.

Participant Recruitment

PICCN board members set up meetings with each of the 11 Chamorro community leaders/members at their monthly meetings to raise awareness of the importance of this community–campus partnership project and to ask for their cooperation in promoting the community members’ involvement. The recently updated *Chamorro Directory International* (a telephone directory composed exclusively of those who have self-identified as members of the Chamorro community¹) was used to identify Chamorros living in San Diego. All San Diego entries in the directory were entered into a database and randomly contacted using a computer-generated call list. If a female answered the phone, she was invited to complete the survey if she was at least 21 years of age and reported herself to be of Chamorro descent. If a male answered the phone, he was asked to pass the phone call to any female in the household who met the above qualifications. Using an institutional review board-approved oral consent protocol, bilingual female university students placed calls throughout the day and evening, 7 days a week, to ensure a diverse sample with minimal selection bias.

Up to 10 attempts were made to reach each computer-generated name. Once an eligible woman was reached, surveyors followed a telephone script to assure that the health-related survey data would be gathered consistently. Potential participants were given the option of conversing in Chamorro.

¹ The *Chamorro Directory International* is a private project of Lee Ann Cruz as a tool to help Chamorros contact other Chamorros in the mainland United States. The database is updated continually. It has proven to be a very important reference not only for the Chamorro community, but also for the medical/health/research/academic societies.

To reach the sample goal of 250 Chamorro women, the surveyors attempted to reach 1,144 of the 1,245 women in the database. Of the 894 other women for whom up to 10 call attempts were made, two participants provided incomplete data, 421 attempts failed due to the phone being disconnected, a wrong number, or the person moved. Of the remainder, 179 were not interested in participating, 70 resulted in no answer, 34 had no eligible woman available to take the call, and the remainder either offered other reasons ($n=20$) or no reason.

Sample Description

Participants’ ages ranged from 21 to 91 years old ($M=40.4$, $SD=13.0$, $n=243$). The majority (67.6% $n=169$) reported being born in the Mariana Islands, with 30.4% ($n=76$) in the US mainland and 2.0% ($n=5$) elsewhere. For women who were not born in the US mainland, they reported moving to the mainland at 19 years of age on average ($SD=13.0$, $n=172$). Nearly all women (83.2%, $n=208$) reported living in the continental United States for most of their lives, while the remainder reported living in Guam most of their lives (14.4%, $n=36$) and the rest (2.4%) had spent most of their lives elsewhere. None of the participants availed themselves of the option of conversing in Chamorro, preferring to use English. Over half had completed at least some college (53.8%, $n=133$; Table 1). Participants

Table 1 Sample demographics

Characteristic	Women 21+ ($n=250$), % (n)	Women 40+ ($n=180$), % (n)
Insurance		
Yes	93.1 (230)	95.0 (171)
No	6.9 (17)	5.0 (9)
Total	100.0 (247)	100.0 (180)
Education		
High school or lower	46.2 (114)	50.0 (90)
Some college or higher	53.8 (133)	50.0 (90)
Total	100.0 (247)	100.0 (180)
Place of birth		
Mainland US	30.4 (76)	25.6 (46)
Mariana Islands	67.6 (169)	72.8 (131)
Other	2.0 (5)	2.6 (3)
Total	100.0 (250)	100.0 (180)
What country have you spent most of your life?		
Mainland US	83.2 (208)	83.9 (151)
Guam	14.4 (36)	12.8 (23)
Other	2.4 (6)	3.3 (6)
Total	100.0 (250)	100.0 (180)

Incomplete data are due to participant nonresponse. Percentages may not add to 100% due to rounding

were most likely to report a health care provider as the number 1 source of health information compared to other sources (Table 2).

Data Analysis

Logistic regression models were used to examine the relationship between all explanatory variables and the two outcomes of interest: a Pap exam in the preceding 2 years for women 21 years and older and a clinical breast examination (CBE) in the preceding 2 years for women 40 years and older. (For this study, women were not asked about their most recent mammogram.) A time frame of 2 years was selected as a reasonable window for defining recent screening behaviors given the fact that screening guidelines vary [31, 32] and studies generally report recent breast and cervical cancer screening in the previous 2 years [33–36]. Explanatory variables were: recent physicians visit in the preceding 2 years, health insurance, education, age, place of birth (US mainland or Mariana Islands), self-reported adequacy of cervical and breast cancer knowledge, and perceived health risks among Chamorro women (e.g., cancer, diabetes, heart disease, and cerebrovascular disease) [9, 12, 18, 30]. Separate logistic regression models were run for each screening modality (e.g., for recent Pap exam and recent CBE). Simple logistic regression models were run to determine the unadjusted odds ratios (OR) for each independent variable. Multivariate logistic regression models were run including significant unadjusted independent variables to determine the adjusted OR. Data were analyzed using SPSS version 14.0.

Results

Hypothesis #1 was Proven True Women's likelihood of having health insurance and rates of Pap exams were consistently higher than the average in California and the nation.

Most of the sample (93.1%, $n=230$) reported having health insurance, and this was at a rate that was higher than national and state percentages. In 2004, 84.3% of the nation had health insurance and, from 2002 to 2004, 81.6% of Californians had health insurance [37].

Many of the sample's Chamorro women (78.9%, $n=168$) reported having had a Pap exam within the previous 2 years,² with 92.6% ($n=199$) in the previous 3 years. In 2004, 85.9% of the women nationally and 84.8% of

California women had a Pap exam in the previous 3 years (<http://www.cdc.gov/brfss/index.htm>).

Depending on the screening guidelines used for CBE, 42.9% ($n=66$) of the Chamorro women 40 years and older had a CBE in the past year and 74% ($n=144$) had a CBE in the past 2 years (see Table 2). Equivalent state and national data were not available for CBE.

When asked to list the most commonly occurring diseases among Chamorro women, they listed the correct diseases for the AAPI community, although not in the exact order of magnitude. Study participants listed: diabetes (33.5%, $n=83$); cancer (33.1%, $n=82$); cerebrovascular disease (15.7%, $n=39$); heart disease (13.7%, $n=34$); and other (4.0%, $n=10$; Table 2). In 2003, the leading causes of death for the AAPI community were cancer (26.2%), diseases of the heart (25.3%), cerebrovascular disease (9.0%), and accidents/unintentional injuries (4.9%) [2].

Hypothesis #2 was Partially Supported Adjusting for all other variables, a recent full exam significantly predicted the likelihood of recent CBE and Pap exam.

Table 3 displays the results from the simple logistic regression analyses revealing unadjusted OR and corresponding 95% confidence intervals (95% CI) for both recent Pap exam and recent CBE models. Having a recent full exam in the previous 2 years (OR=28.191), being born in the US mainland (OR=2.596), self-reported adequacy of cervical cancer knowledge (OR=2.153), and breast cancer knowledge (OR=2.370) were significant independent predictors of having had a recent Pap exam. Increasing age (OR=0.950) was inversely related to having had a Pap exam.

Having a recent full exam in the previous 2 years (OR=16.406) and self-reported adequacy of breast cancer knowledge (OR=2.221) were significant independent predictors of having had a recent CBE for women 40 years and older.

Table 4 displays the results from the multivariate logistic regression analyses revealing the adjusted OR and corresponding 95% CI for both recent Pap exam and recent CBE models. Adjusting for all other variables in the model (place of birth, perceived cervical cancer knowledge, and perceived breast cancer knowledge), having a recent full exam in the previous 2 years (OR=42.703) was a significant predictor of having a recent Pap exam and increasing age (OR=0.929) continued to be inversely related to the likelihood of having had a recent Pap exam. Adjusting for the other variable in the model (breast cancer knowledge), having a recent full exam in the previous 2 years (OR=15.344) was a significant predictor of having had a recent CBE exam for women 40 years and older. Thus, after adjusting for all other variables, having had a recent full exam was the most significant predictor of likelihood of recent breast and cervical cancer screening.

² The U.S. Preventive Services Task Force recommends to start Pap screening 3 years after vaginal intercourse, no later than age 21, and to continue annually. After 30 and three or more normal Pap tests, women should screen every 2–3 years (<http://ahrq.gov>).

Table 2 Sample health-related characteristics

Characteristic	Women 21+ (<i>n</i> =250), % (<i>n</i>)	Women 40+ (<i>n</i> =180), % (<i>n</i>)
Do you have enough breast cancer knowledge?		
Yes	60.0 (150)	63.9 (115)
No, don't know	40.0 (100)	36.1 (65)
Total	100.0 (250)	100.0 (180)
Do you have prostate cancer knowledge?		
Yes	28.8 (72)	32.2 (58)
No	71.2 (178)	67.8 (122)
Total	100.0 (250)	100.0 (180)
Do you have enough cervical cancer knowledge?		
Yes	36.4 (91)	35.6 (64)
No, don't know	63.6 (159)	64.4 (116)
Total	100.0 (250)	100.0 (180)
Time since last full health exam		
Less than 2 years	78.8 (171)	79.9 (127)
Two or more years	21.2 (46)	20.1 (32)
Total	100.0 (217)	100.0 (159)
Time since last CBE		
Less than 2 years	77.5 (165)	74 (114)
Two or more years	22.5 (48)	26.0 (40)
Total	100.0 (213)	100.0 (154)
Time since last Pap exam		
Less than 2 years	78.9 (168)	74.8 (113)
Two or more years	21.1 (45)	25.2 (38)
Total	100.0 (213)	100.0 (151)
Reported number 1 source of health care information		
Health care provider (doctor, nurse, doctor's office)	35.3 (88)	35.0 (63)
Audio-visual media (television, news, radio)	20.5 (51)	23.9 (43)
Print media (pamphlet, brochure, books, magazines)	14.8 (37)	15.6 (28)
Internet	10.4 (26)	9.4 (17)
Family	10.0 (25)	8.3 (15)
Self	4.4 (11)	4.4 (8)
Social club, friends, work	3.2 (8)	2.2 (4)
Other	1.4 (3)	1.1 (2)
Total	100.0 (249)	100.0 (180)
Reported number 1 health risk affecting Chamorro women		
Diabetes	33.5 (83)	32.0 (57)
Cancer	33.1 (82)	35.4 (63)
Cerebrovascular disease (including stroke and high blood pressure)	15.7 (39)	13.5 (24)
Heart disease	13.7 (34)	14.0 (25)
Other	4.0 (10)	5.1 (9)
Total	100.0 (248)	100.0 (178)

Incomplete data are due to participant nonresponse. Percentages may not add to 100% due to rounding

Discussion

Results showed that, after adjusting for covariates, having had a recent full exam was the strongest predictor of a recent Pap exam for women 21 years and older and recent

CBE for women 40 years and over. While being younger predicted the likelihood of having had a Pap exam, cervical cancer is a concern for women of all ages. While there were relatively high rates of cervical screening compared to state and national averages, the annual CBE rate was still only

Table 3 Unadjusted OR

	Recent Pap exam 21+ (in the previous 2 years)			Recent CBE 40+ (in the previous 2 years)		
	OR	95% CI	<i>n</i>	OR	95% CI	<i>n</i>
Recent full exam	28.191*	11.471–69.282	196	16.406*	6.217–43.295	145
Health insurance	1.260	0.386–4.112	212	1.459	0.347–6.131	154
Education	1.056	0.544–2.048	212	0.942	0.457–1.941	154
Age (years)	0.950*	0.923–0.978	209	0.971	0.934–1.009	154
Place of birth	2.596*	1.133–5.950	208	1.083	0.624–1.882	154
Cervical cancer knowledge	2.153*	1.021–4.539	213	1.759	0.813–3.804	154
Breast cancer knowledge	2.37*	1.215–4.624	213	2.221*	1.059–4.659	154
Perceived health risk						
Cancer	1.363	0.653–2.843	211	1.000	0.461–2.168	152
Diabetes	0.660	0.336–1.296	211	2.393 ^a	0.967–5.920	152
Heart disease	1.731	0.568–5.274	211	1.237	0.426–3.596	152
Cerebrovascular disease	1.101	0.447–2.716	211	0.483	0.183–1.274	152

Missing values are due to participant nonresponse. Reference categories are “no” for all categorical variables except place of birth [1=US mainland, 0=Mariana Islands (reference category)]

95% CI 95% confidence interval

* $p < 0.05$

^a Approaching significance

42.9% and 74% for the past 2 years, offering another area in which cancer educators and primary care providers could be focusing on increasing screening rates.

For health educators and health care providers, this study's findings underscore the importance of promoting women's annual physical examinations. No other independent variable was more predictive of adherence to CBE and Pap exam guidelines than undergoing an annual examination. The encouragement to have an annual physical examination thus appears to be the single most important message health educators need to convey. The Foot-in-the-Door theory [38, 39] has potential applications here. Once a woman has committed to undergoing an annual exam, she may be likely to be more receptive to other recommendations for screening, and this may be particularly so for these

Chamorro women who report that their health care provider is their leading source of health care information.

Thus equally important, the clinicians must be vigilant in assuring that, when women do come for their annual exams, they are offered the full panel of recommended screening guidelines. Since the annual exam is so highly correlated with adherence to screening guidelines, those health care providers who have systems that remind women that it is time for their annual examination will be simultaneously increasing adherence to screening guidelines. This finding raises concern for the well being of those women who do not have a regular physician or those who do not routinely see any doctor. They may be the most at-risk group for late-stage cancer detection. Studies have addressed the potential value of offering cancer screening

Table 4 Adjusted OR

	OR	95% CI
Recent Pap exam 21+ (in the previous 2 years; <i>n</i> =187)		
Recent full exam	42.703*	13.637–133.715
Age (years)	0.929*	0.885–0.977
Place of birth	2.14	0.657–6.973
Cervical cancer knowledge	0.915	0.278–3.009
Breast cancer knowledge	1.732	0.578–5.189
Recent CBE 40+ (in the previous 2 years; <i>n</i> =143)		
Recent full exam	15.344*	5.751–40.939
Breast cancer knowledge	1.434	0.570–3.608

Missing data are due to participant nonresponse. Reference categories are “no” for all categorical variables except place of birth [1=US mainland, 0=Mariana Islands (reference category)]

95% CI 95% confidence interval

* $p < 0.05$

recommendations in the emergency department and urgent care clinics, places that may be particularly important for those women without regular contact with a health care provider [40–43].

Limitations of this study were the narrow geographic area from which the study participants were recruited and the participants' high rates of health insurance coverage and levels of education that may have positively biased this sample's cancer screening behaviors in comparison to Chamorros living in other parts of the country. However, the 250 women who participated in this study represent a relatively large sample size given the size of the mainland Chamorro population and when compared to previous studies and this may offer some compensation. Of the Chamorro women in the continental United States, previous sample sizes range from 128 to 404 Chamorro women (i.e., [4, 5, 9, 12, 18, 30, 44]).

A strength of this study was the community–campus partnership that prompted this study and that the study's questions arose from the community itself. As a result, the PICCN's board members actively promoted study participation throughout San Diego's Chamorro community. The *Chamorro Directory International* proved to be another important strength of the study. The community took pride in updating and expanding their directory, and ultimately, creating a research tool of considerable value in making a community needs assessment. As a result, it proved useful in identifying and recruiting a diverse sample of Chamorros, an otherwise difficult task to accomplish in such a close-knit, yet “hard-to-reach” community. In spite of these strengths, generalizations must be made with caution.

Conclusion

Additional studies are required to further investigate the causal role of access to health care (e.g., quality and type of health insurance) and cultural health beliefs in relation to cancer screening and rescreening among Chamorro women living in the mainland United States.

Acknowledgements This project was funded by a National Cancer Institute grant R25CA65745, a San Diego County Mini Grant, a National Institutes of Health Summer Research Training Grant, a P30 CURE Grant, a UCI/PICCN grant L00-CA-86073-5, and a National Institutes of Health Division of National Center on Minority Health and Health Disparities EXPORT grant P60MD00220. Generous contributions of educational materials were made by the American Cancer Society; American Diabetes Association; California Department of Health Services; National Heart, Lung, and Blood Institute; National Institute of Diabetes and Digestive and Kidney Diseases; National Institutes of Health; the Pacific Islander Cancer Control Network; San Diego County's Reduce or Eliminate Health Disparities With Information; and United States Department of Agriculture. The contents of this article are the sole responsibility of the authors and do not necessarily represent the official beliefs of the funding agencies.

The authors acknowledge the help of the following Pacific Islander Cancer Control Network (PICCN) board members: Lillian A. Blas, Frances G. Benito, Annabelle L. Cruz, MSW, Evelyn B. Blas, Rose P. Treltas, Tara Blas, Rachel Acfalle, Beverly Acfalle, Alicia Simpliciano, and Nicole Johnson. The following community leaders played key roles in encouraging and disseminating information: Agat Social Club of California: Guadalupe Castro Rabon, Asan Nino Perdido y Sagrada Familia: Bernie Toves Iseman, Barrigada San Roke Fiesta Group: Thomas Guzman, Inarajan/St. Joseph Fiesta Group: John Fejeran, Mangilao/Santa Teresita Foundation: Jeanette Perez Charfauros, Oceanside/San Luis Rey Guamanian Community: Tom Cruz, San Dimas/Merizo Guam Club of California: Joaquin Naputi, Santa Rita Fiesta Group: Eloise M. Gogue, Sons and Daughters of Guam Club, Inc: John S. Cruz, Sinajana/St. Jude Fiesta Group: Jesus Perez, and Yona/St. Francis Fiesta Group: Jesus Y. Quitugua. In addition, the authors thank Drs. Allan Hubbell and Maria Reyes of UCI for their help with this project. Most importantly, the authors acknowledge the 249 women from the Chamorro community who generously gave of their time to help assess the health and well being of San Diego's Chamorro community.

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