

POPULATIONS AT RISK

Predictors of Papanicolaou Smear Use Among American Samoan Women

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To explore the rate and predictors of Papanicolaou (Pap) smear use among American Samoans, we conducted a survey of 986 randomly selected adult, self-identified Samoan women in American Samoa ($n = 323$), Hawaii ($n = 325$), and Los Angeles ($n = 338$). Only 46% of the women reported having Pap smears within the past 3 years. These women were more likely than others to reside in Hawaii (odds ratio [OR], 1.7), be less than 40 years of age (OR, 2.2), be married (OR, 1.9), have more than 12 years of formal education (OR, 2.1), have an income of more than \$20,000 per year (OR, 1.6), have health insurance (OR, 1.6), and have higher acculturation levels (OR, 1.9). Knowledge and attitudes about cervical cancer did not predict Pap smear screening. It is likely that the low rate of Pap smear screening contributes to the high site-specific incidence of cervical cancer among American Samoan women.

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American Samoa is a territory of the United States located in the South Pacific approximately 2,600 miles southwest of Hawaii. Because of its territorial status, its indigenous people are considered Native Americans by the U.S. government. The islands have been an asset to the U.S. military, housing an important naval station until the end of World War II. Currently, the U.S. Department of the Interior has administrative responsibility for American Samoa. After Hawaiians, Samoans are the largest group of Pacific Islanders in the United States, comprising 17% of the total Pacific Islander population.¹ They live primarily in American Samoa and a few urban areas in the United States, principally Hawaii and California. American Samoans tend to be younger, have fewer years of formal education, and have lower family incomes than non-Latino whites.¹⁻³ They are also among the most rapidly growing populations in the United States.¹

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For the past 7 years, our research group has been evaluating the cancer control needs of American Samoans. A review of cancer registry data revealed that American Samoan women had a higher site-specific incidence of cervical cancer than women from other ethnic groups. For example, cervical cancer accounts for 7.2% of cancers diagnosed among Samoan women in Los Angeles County compared to 2.7% of non-Latino white women in this location.⁴ These figures are troublesome because an effective screening test exists for cervical cancer, i.e., the Papanicolaou (Pap) smear.⁵⁻⁷ Thus, to understand the high site-specific incidence of cervical cancer in this population, it is important to know the rate of Pap smear use.

Unfortunately, little is known about the use of any cancer prevention services among American Samoans. The paucity of data has been due in part to the lack of a specific ethnic identifier. Until 1980, American Samoans were included in the broad category of "Asian and Pacific Islanders" and consequently, their unique problems were largely obscured. It is particularly important to learn more about the cervical cancer control needs of this population because the high site-specific rate of the disease, the potential for prevention of the disease, the rapid growth of the population, and the previous neglect by cancer researchers.

METHODS

This study was part of a large investigation of the cancer control needs of American Samoans. Previous publications have detailed accounts of the methodology.^{4,8} In this report, we focused on results related to the rates and predictors of Pap smear use among respondents to an in-depth survey. The study protocol received approval from the Human Subjects Review Committees of the University of California, Irvine and the National Office of Samoan Affairs. All participants provided written informed consent.

We used systematic random sampling procedures to study 986 noninstitutionalized, adult (between the ages of 18 and 75 years), self-identified Samoan women residing in American Samoa, Hawaii, and Los Angeles. The sampling strategy differed in American Samoa from the other 2 sites. In American Samoa, the large majority of households are occupied by American Samoans; therefore, random

sampling from U.S. Census data listings was an efficient sampling method. However, a relatively small proportion of the populations of Los Angeles and Hawaii are American Samoans. Using U.S. Census data for sampling would have been inefficient and expensive in these settings. Therefore, we developed a sample frame based on household address listings provided by Samoan churches and social service providers in these settings. An estimated 85% to 90% of American Samoans residing in Hawaii and Los Angeles belong to the Samoan churches in those locations. To check for completeness of the lists, the interviewers asked respondents to the survey for the names and addresses of American Samoans who were their relatives and neighbors. Over 90% of the names generated by this approach were already on our lists.

The sample frame for American Samoa comprised all 8,898 households on the islands of Tutuila, Aunu'u, Ofu, Olosega, and Tau. From these households, we randomly selected 666 households for study. These 666 households resulted in 609 completed interviews (this number included 286 men and 323 women who were included in the overall study—only women answered questions about cervical cancer, the focus of this report). There were 56 ineligible households and 1 refusal. The sample frame for Hawaii comprised 4,346 households from which we randomly selected 1,859 households for study. These 1,859 households resulted in 610 completed interviews (285 men, 325 women), 26 refusals, and 1,233 ineligible households. The sample frame for Los Angeles comprised 4,828 households from which we randomly selected 2,222 households for study. These 2,222 households resulted in 615 completed interviews (277 men, 338 women), 42 refusals, and 1,565 ineligible households.

We developed the survey instrument using questions from the National Health Interview Survey,⁹ its Cancer Control Supplement,¹⁰ and focus group findings.⁸ The survey had questions about demographics, access to medical care, cancer-related knowledge and attitudes, and use of cancer screening examinations. In the knowledge and attitudes section, we chose possible risk factors based on a review of the medical literature and focus group findings. The survey also included a 5-item acculturation scale that asked about the preferred language (English or Samoan) used to read, speak, think, talk with friends, and when growing up.

We translated the survey into Samoan using established methods¹¹ and pilot tested the English-language and Samoan-language versions prior to administration.⁸ Specially trained bilingual (English and Samoan) Samoan interviewers administered the survey at the respondent's place of residence between June 1996 and April 1997. We enlisted the cooperation of Samoan community-based organizations, churches, and government officials in the study sites to encourage cooperation with the survey. The survey took approximately 40 minutes to complete, and the respondents received a small gift for participating.

We used the χ^2 statistic to assess differences in Pap smear use according to demographic characteristics, knowledge, and attitudes. To address possible bias due to multiple comparisons, only differences at $P < .01$ were considered significant.¹² We employed logistic regression analyses to predict utilization of Pap smears. Independent variables included site of residence, age, education level, employment status, marital status, income, insurance status, acculturation level, and knowledge and attitude variables (including knowledge about risk factors, signs and symptoms of cervical cancer). The results appear as odds ratios and 95% confidence intervals.^{13,14}

RESULTS

The cooperation rates, defined as the number of completed interviews divided by the sum of the completed interviews and refusals,¹⁵ were 99.8% in American Samoa, 93.6% in Los Angeles, and 95.9% in Hawaii. Overall, 64% of respondents reported ever receiving a Pap smear, and 46% reported receiving one within the past 3 years. As shown in Table 1, women reporting a recent Pap smear were more likely than other respondents to reside in Hawaii, be young (<40 years of age), be married, have more years of formal education (>12 years), have higher income levels (>\$20,000 per year), have health insurance, and have higher acculturation levels. Only 2 of the knowledge and attitude variables were associated with Pap smear use. The beliefs that family history was a risk and that vaginal trauma was not a risk factor were reported in a higher percentage of women who had received a recent Pap smear. The logistic regression analysis revealed that the independent predictors for Pap smear screening (Table 2) were similar to those in the bivariate analysis. However, none of the knowledge and attitude variables predicted having Pap smear after controlling for the other characteristics.

DISCUSSION

The U.S. Department of Health and Human Services has set forth the goal of eliminating health disparities between racial and ethnic groups in this country by the year 2010. In order to do so, it is important to have a better understanding about the cultural, social, and economic factors that may lead to health disparities. The results of this study shed light on factors associated with the use of preventive services for an important disease, cervical cancer, among an economically disadvantaged population.

Only 46% of the American Samoan women reported having a Pap smear within the past 3 years. The highest rate (53.8%) was among women residing in Hawaii, followed by women in Los Angeles (48.8%) and women in American Samoa (32.2%). These rates were lower than those reported for other ethnic groups residing in these same locations. For example, in one recent study, 73% of

Table 1. Characteristics of American Samoan Women Reporting Pap Smear Screening Within the Past 3 Years (N = 986)

Characteristic	Women, n	Women Reporting Pap Smear in Past 3 Years, %	P Value
Demographics			
Site of residence			
Hawaii	325	53.8	<.001
Los Angeles	338	48.8	
American Samoa	323	32.2	
Age, y			
18–39	566	53.2	<.001
≥40	420	34.0	
Education, y			
≤12	686	38.5	<.001
>12	292	61.0	
Marital status			
Married	602	50.8	<.001
Not married	382	36.1	
Employment status			
Employed	410	49.0	
Not employed	576	42.2	
Household income			
<\$20,000	607	41.7	<.001
≥\$20,000	247	60.3	
Health insurance status			
Not insured	107	29.0	<.001
Insured	879	47.0	
Acculturation			
Less	481	31.2	<.001
More	505	58.2	
Knowledge about risk factors			
Multiple sexual partners			
Agree	815	44.9	
Disagree	171	45.6	
Early sexual intercourse			
Agree	598	42.8	
Disagree	388	48.5	
Smoking			
Agree	766	43.0	
Disagree	220	51.4	
Family history			
Agree	698	48.6	.001
Disagree	288	36.5	
Vaginal trauma			
Agree	673	41.5	.001
Disagree	313	52.7	
Knowledge about signs and symptoms			
Abnormal vaginal bleeding			
Agree	861	45.4	
Disagree	125	42.4	
Inguinal rash			
Agree	429	46.4	
Disagree	557	44.0	
Attitudes			
If cancer is found early, it can be cured			
Agree	860	44.2	
Disagree	97	54.6	
I would undergo cancer treatment			
Agree	805	42.9	
Disagree	143	56.6	
I would rather not know if I had cancer			
Agree	231	39.8	
Disagree	740	46.6	
There is not much I can do to prevent getting cancer			
Agree	354	42.1	
Disagree	600	46.7	
Cancer is caused by spirits			
Agree	37	45.9	
Disagree	899	44.7	
Cancer is a punishment from God			
Agree	157	45.9	
Disagree	785	45.1	

Table 2. Adjusted Odds Ratios for Predictors of Pap Smear Screening Within Past 3 Years

Predictors	Odds Ratio (Confidence Interval)
Site of residence	
American Samoa	0.7 (0.45 to 1.09)
Hawaii	1.7 (1.15 to 2.48) [†]
Age <40 y	2.2 (1.62 to 3.10) [‡]
>12 y of education	2.1 (1.46 to 3.00) [‡]
Unemployed	1.1 (0.81 to 1.57)
Married	1.9 (1.32 to 2.57) [‡]
Annual income >\$20,000	1.6 (1.08 to 2.27)*
Have health insurance	1.6 (1.04 to 2.33)*
More acculturated	1.9 (1.36 to 2.64) [‡]

The predictor variables included age (≥ 40 years = 0, 18 to 39 years = 1), education level (≤ 13 years = 0, >13 years = 1), marital status (currently single, widowed or divorced = 0, currently married = 1), employment status (employed = 0, unemployed or not in the workforce = 1), annual family income ($\leq \$20,000$ = 0, $> \$20,000$ = 1), insurance status (not insured = 0, insured, either private, public or both = 1), and acculturation (less = 0, more = 1). For these analyses, Hawaii and American Samoa (the predictor sites of residence) were compared against Los Angeles (the control site of residence).

* $P < .05$.

[†] $P < .01$.

[‡] $P < .001$.

Native Hawaiian women in Hawaii reported having a Pap smear during the past 3 years.¹⁶ In another study, 72% of Latinas and 93% of non-Latino white women in southern California reported having a Pap smear within that time frame.¹⁷ Others have reported the rates of recent Pap smear screening among American Indian/Alaska Natives¹⁸ and Vietnamese-American women¹⁹ as 82% and 74%, respectively.

Most of the predictors of Pap smear screening, such as income levels, years of formal education, and health insurance status, were similar to those of other economically disadvantaged groups.^{20,21} Several additional factors may also contribute to the very low screening rates among American Samoans. On the islands, where screening rates were lowest, all residents are entitled medical care funded by the government; however, this care is mostly episodic with little emphasis on prevention. Moreover, Pap smear slides must be sent to Hawaii for interpretation. The inefficiency and cost of this referral program has not encouraged regular screening for cervical cancer. Adding to these practical problems, is the lack of culturally sensitive cancer prevention programs for American Samoans in any of the study sites. Indeed, prior to this study, few cancer education materials had even been translated into the Samoan language, the first language of the majority of American Samoans.

We reported previously that American Samoans had many misconceptions about common cancers, including cervical cancer.⁸ However, in the current analysis, knowledge and attitudes about cervical cancer were not significant predictors of Pap smear screening after

adjusting for demographic variables. These findings are compatible with previous studies that pointed out the relatively weak independent influence of health beliefs on Pap smear screening.²² Indeed, conceptual frameworks, such as the Health Belief Model,²³ stress the importance of enabling and other factors that influence health related behaviors in addition to knowledge and attitudes.

Before discussing the study's implications, we wish to point out several limitations. First, the data came from self-reports and were subject to recall and desirability response bias. Because of the tendency for subjects to answer questions the way they think the interviewer would prefer (desirability response bias), they may have overestimated the frequency of Pap smear screening. If this was the case, more accurate reporting would have made the study findings even more striking. Second, we did not evaluate all beliefs about cervical cancer, and it is possible that unmeasured beliefs could have altered the results.

In summary, the rate of screening for cervical cancer among American Samoan women was very low. It is likely that the low screening rate explains, at least in part, the high site-specific incidence of cervical cancer in this population. Our research group is currently evaluating culturally appropriate educational programs designed to improve Pap smear screening rates. Others are studying the diagnostic accuracy of telepathology for the interpretation of Pap smears²⁴ and the efficacy of visual inspection for cervical cancer screening,²⁵ approaches that would address the lack of a cytopathologist in geographically isolated regions such as American Samoa. We believe that these approaches have the potential to decrease the cervical cancer burden among American Samoan women.

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REFERENCES

1. Bureau of the Census: Census of population (1990): Asians and Pacific Islanders in the United States. Washington, DC: US Dept. Of Commerce, Economics and Statistics Administration, Bureau of the Census, 1993.
2. Janes CR. Migration, Social Change, and Health. Stanford, Calif: Stanford University Press; 1990.
3. Crews DE. Cause-specific mortality, life expectancy, and debilitation in aging Polynesians. *Am J Hum Biol.* 1989;1:347-53.
4. Mishra SI, Luce-Aoelua P, Wilkens LR, Bernstein L. Cancer among American-Samoans: site-specific incidence in California and Hawaii. *Int J Epidemiol.* 1996;25:713-21.
5. La Vecchia C, Franceschi S, Decarli A, Fasoli M, Gentile A, Tognoni G. "Pap" smear and the risk of cervical neoplasia: quantitative estimates from a case-control study. *Lancet.* 1984;2:779-82.
6. Herrero R, Brinton LA, Reeves WC, et al. Screening for cervical cancer in Latin America: a case-control study. *Int J Epidemiol.* 1992;21:1050-6.
7. Benedet JL, Anderson GH, Matisic JP. A comprehensive program for cervical cancer detection and management. *Am J Obstet Gynecol.* 1992;166:1254-9.

8. Mishra SI, Luce-Aoelua P, Hubbell FA. Knowledge and attitudes about cancer among American Samoans. *Cancer Detect Prev*. 2000;24:186-95.
9. National Health Interview Survey. US Dept. of Commerce. Washington, DC: Bureau of the Census; 1992.
10. National Health Interview Survey Supplement Booklet on Cancer Control. U.S. Dept. of Commerce. Washington, DC: Bureau of Census; 1992.
11. Blalock HM. *Social Statistics*. New York, NY: McGraw-Hill; 1979.
12. Lang TA, Secic M. *How to Report Statistics in Medicine*. Philadelphia: American College of Physicians; 1997.
13. Lemeshow S, Hosmer DW. Estimating odds ratio with categorically scaled covariates in multiple logistic regression analysis. *Am J Epidemiol*. 1984;119:147-51.
14. Simon R. Confidence intervals for reporting results of clinical trials. *Ann Intern Med*. 1986;105:429-35.
15. Mishra SI, Dooley D, Catalano R, Sexner S. Telephone health surveys: potential health bias from noncompletion. *Am J Public Health*. 1993;83:94-9.
16. Matsunaga DS, Enos R, Gotay CC, et al. Participatory research in a Native Hawaiian community. The Wai'anae Cancer Research Project. *Cancer*. 1996;78(7 Suppl):1582-6.
17. Hubbell FA, Chavez LR, Mishra SI, Burciaga Valdez R. Beliefs about sexual behavior and other predictors of Papanicolaou smear screening among Latinas and Anglo women. *Arch Intern Med*. 1996;156:2353-8.
18. Coughlin SS, Uhler RJ, Blackman DK. Breast and cervical cancer screening practices among American Indian and Alaska Native women in the United States, 1992-1997. *Prev Med*. 1999;29:287-95.
19. McPhee SJ, Stewart S, Brock KC, Bird JA, Jenkins CN, Pham GQ. Factors associated with breast and cervical cancer screening practices among Vietnamese American women. *Cancer Detect Prev*. 1997;21:510-21.
20. Calle EE, Flanders WD, Thun MJ, Martin LM. Demographic predictors of mammography and Pap smear screening in US women. *Am J Public Health*. 1994;83:53-60.
21. Harlan LC, Bernstein AB, Kessler LG. Cervical cancer screening: who is not screened and why? *Am J Public Health*. 1991;81:885-90.
22. Hill D, Gardner G, Rassaby J. Factors predisposing women to take precautions against breast and cervix cancer. *J Appl Soc Psychol*. 1985;15:59-79.
23. Rosenstock IM. The health belief model and preventive health behavior. *Health Educ Monogr*. 1974;2:354-86.
24. Ziol M, Vacher-Lavenu MC, Heudes D, et al. Expert consultation for cervical carcinoma smears. Reliability of selected-field videomicroscopy. *Anal Quant Cytol Histol*. 1999;21:35-41.
25. Visual inspection with acetic acid for cervical-cancer screening: test qualities in a primary-care setting. University of Zimbabwe/JHPIEGO Cervical Cancer Project. *Lancet*. 1999;353:869-73.