

POPULATIONS AT RISK

Utilization of Papanicolaou Smears by South Asian Women Living in the United States

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OBJECTIVES: Papanicolaou (Pap) smears are an underutilized screening modality among racial and ethnic minorities. However, no data exist on Pap smear utilization among South Asians, a rapidly growing population in the United States, whose country of origin includes India, Pakistan, Bangladesh, and Sri Lanka. We determined rates and identified variables associated with Pap smear receipt by South Asians.

DESIGN: A self-administered survey instrument was mailed to a random sample of South Asians nationwide over a 3-month time period. South Asian households were identified by surnames that were used to search white pages in telephone directories, Department of Motor Vehicle records, and voter registries. Questions regarding Pap smear receipt were taken from the 1999 National Health Interview Survey. Socio-demographic information and measures of acculturation were obtained.

PARTICIPANTS: A nationwide nonprobability sample of South Asian women.

INTERVENTION: Cross-sectional observational study.

MEASUREMENTS AND MAIN RESULTS: The overall response rate was 42%. In this sample, South Asians belonged to a high socioeconomic strata (SES), with 45% having a household income of >\$80,000 and 42% having a master's degree. Three quarters of the respondents (73%) reported having a Pap smear in the last 3 years. In multivariate logistic regression analysis, South Asian women had greater odds of having had a Pap smear if they were married ($P < .001$), more educated ($P = .004$), had a usual source of care ($P = .002$), and were more acculturated ($P = .004$).

CONCLUSIONS: Despite the high SES of South Asian women, their rates of Pap smear receipt were lower than national recommendations. Marital status, socioeconomic status, and acculturation are all associated with Pap smear receipt. South Asian communities should be targeted for outreach to promote Pap smear utilization.

KEY WORDS: Pap smear; cervical cancer screening; South Asians; utilization.

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Papanicolaou (Pap) smears have been shown to detect early cervical cellular abnormalities, thereby reducing morbidity and mortality from cervical cancer.¹ Despite their efficacy, however, Pap smears are an underutilized screening tool, especially among minority women.² Racial and ethnic minorities have been shown to have lower rates of receipt of Pap smear screening compared to whites.^{3,4} Not surprisingly, inadequate screening has led to disparities in outcomes for cervical cancer. For example, although 54% of cervical cancer lesions in white women are localized at diagnosis, only 40% are localized in African Americans.⁵ The highest age-adjusted incidence rate of cervical cancer (43 per 100,000) occurs among Vietnamese women living in the United States.⁶

Although numerous studies have examined barriers to cervical cancer screening for the general U.S. population,^{7,8} comparatively little research has been done with the Asian and Pacific Islander community or its subgroups. Nevertheless, several salient conclusions can be drawn.

First, demographic and socioeconomic variables have been found to be important predictors of Pap smear screening among Asians, as they are for the general U.S. population. A study of Koreans in California found marital status, employment status, and frequency of contact with the health care system to be important predictors of Pap smear receipt.⁹ Another study of Vietnamese women found that those with low education and lack of a usual source of care were less likely to have received Pap smear screening.¹⁰ In addition, acculturation has been shown to predict Pap smear receipt among Asians, with more recent immigrants and those with English language barriers reporting less-frequent receipt of Pap smears.⁹ Finally, knowledge, attitudes, and beliefs regarding cervical cancer correlate with Pap smear receipt for Cambodians,¹¹ Vietnamese,¹⁰ and Koreans.⁹

To our knowledge, there are no data on the receipt of cervical cancer screening among South Asian women, a rapidly growing population in the United States. Census data indicate that there are over 1.3 million persons living in the U.S. who were born in South Asia. The large majority of these persons are of Indian origin. The U.S. population of

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persons of Indian origin more than doubled between 1990 and 2000. Furthermore, this population is expected to quadruple in size by the year 2050. Of note is that the current data do not include second- and third-generation South Asians, for which there is no Census information.¹²

Paucity of data is due in part to the lack of a specific ethnic identifier for South Asians, who in this study are defined as individuals originating from India, Pakistan, Bangladesh, and Sri Lanka. Although U.S. data are lacking, the World Health Organization reports that cervical cancer is the second most common malignancy among Indian women, who now account for one fifth of the worldwide burden of this preventable disease.¹³ It is believed that lack of organized screening programs have contributed to the high rates of cervical cancer in the Indian subcontinent.¹⁴

This study describes Pap smear receipt among a nationwide sample of South Asian women and examines variables associated with its use. We hypothesized that despite the relatively high socioeconomic status of this group, their rates of Pap smear receipt would be low. We used the Behavioral Model for predicting health services use as the theoretical framework for our study.¹⁵ We hypothesized that predisposing and enabling variables would be important predictors of Pap smear receipt, as they are for other ethnic groups. Finally, we assessed if acculturation improves the explanatory power of a model predicting Pap smear receipt while controlling for predisposing and enabling variables.

METHODS

Sample Identification

We purchased a list of South Asian surnames from a proprietary market research company (Survey Sampling, Inc., Fairfield, Conn) that has been collecting names, addresses, and telephone numbers for a variety of ethnic groups for over 20 years. Using surnames, this company conducts a nationwide search of telephone directories, Department of Motor Vehicle records, and voter registries nationwide. South Asian physicians reviewed this list and excluded 4 names that they believed would not be sufficiently specific to identify South Asians (i.e., Das, Dutt, Dargon, and Seth). A total of 1,913 names, addresses, and telephone numbers were obtained representing a nonprobability sample of South Asians across the country. South Asian surnames have been shown to be 90% sensitive and specific to this population and have been used as a sampling strategy in previous studies of South Asians in England.^{16,17}

Survey Development

We developed a self-administered survey instrument assessing use of a variety of health services. All items pertinent to Pap smear receipt were taken from the 1999 National Health Interview Survey (NHIS).¹⁸ We asked

female respondents if they had had a Pap smear in the last 3 years and included an explanation of Pap smears next to the question.

Demographic information collected included age, marital status, country of birth, and religious affiliation. Socioeconomic variables included income and education. Access to care variables included insurance status and having a usual source of care. Acculturation was measured by calculating the proportion of the respondent's lifetime spent in the United States,¹⁹ and the language the respondents most often think, speak, or use to converse with their friends.⁹ Citizenship status also was assessed.

The survey instrument was developed in English only. It was cognitively tested in the "Little India" section of Los Angeles among 20 people to ensure comprehension and ease of use. Cognitive testing involved reviewing each question in the survey with each participant to determine readability, comprehension, pertinence, and language.²⁰ Minor revisions in the formatting and text of the survey were made as needed after each round of cognitive testing. Pilot testing was undertaken with surveys distributed to another 20 individuals. The NHIS has shown high reliability in its 40 years of use nationwide.²¹

Design

We mailed our survey along with ten dollars in cash, a cover letter explaining the purpose of the study, and a letter of endorsement from the Indian Medical Association and the Association of Pakistani Physicians of North America. Surveys were mailed to South Asian households. However, cover letters inside the survey asked specific individuals to fill out the survey. Because this study was a part of a larger survey of general health services utilization among South Asian women and men, half of our surveys were sent with a cover letter asking the oldest female in the household to reply and the other half asked the oldest male in the household to reply. If that person was not available, we asked the next oldest member of the family to reply regardless of gender. For example, if no female lived in the household, the oldest male was instructed to respond to the survey and vice versa. After 1 month, a reminder letter and survey were sent to those who had not responded. After 2 months, a reminder postcard was sent. Overall, administration of the survey took place between April 1 and July 1 of 2001. This study was approved by the UCLA Institutional Review Board. All participants provided informed consent.

Theoretical Model

We used the Andersen Behavioral Model of Health Services Utilization as the theoretical framework for our study.¹⁵ The model describes predisposing, enabling, and need variables that may predict access to or use of health services. For example, predisposing variables include biological imperatives, such as age and gender. Enabling

variables have included factors such as health insurance, income, and education. Finally, need variables include both self-assessed need (i.e., self-reported health status) and evaluated need (i.e., physician recommendation). The domains and variables that have been included in the Andersen model have steadily expanded since its formulation in 1968. Of note is the addition of acculturation into the predisposing domain of the Andersen model for vulnerable populations. This model has been applied to racial and ethnic minorities including Asian and Pacific Islanders.²²

Data Analysis

Our outcome of interest was whether a woman reported having had a Pap smear within the last 3 years. We used the χ^2 statistic to assess differences in Pap smear receipt according to predisposing, enabling, and need variables. To account for multiple comparisons, we used a Bonferroni-corrected significance level of $P \leq .01$.

We used logistic regression analyses to find variables independently associated with the receipt of Pap smears. We entered all variables that were significant on bivariate analysis into our original model one by one. Our baseline model included predisposing variables only. Model 2 added enabling variables and Model 3 added acculturation measures. Multicollinearity was assessed by noting the change in standard error and confidence intervals after each new variable was added. Correlations also were performed to find variables highly correlated at ≥ 0.6 .

Model 1 included the following predisposing variables: age, marital status, religion, and country of birth. Due to multicollinearity between religion and country of birth ($r > .6$, with an increase in confidence interval by at least 20%), the latter variable was dropped.

Model 2 added the following enabling variables: education, health insurance status, and usual source of care. Due to multicollinearity between insurance status and having a usual source of care, insurance was dropped from the model ($r > .6$, with an increase in confidence interval by at least 20%). Need variables were not entered, because all women in this sample would have an evaluated "need" for a Pap smear in the last 3 years, because Pap smear screening is a common modality recommended by several authorities, including the American Cancer Society, the U.S. Preventive Services Task Force, the American College of Obstetricians and Gynecologists, and the American Academy of Family Physicians.²³⁻²⁶

Model 3 added our measures of acculturation, including citizenship status and proportion of life spent in the United States. Language variables (i.e., language the respondent most often thinks in, speaks at home, or speaks with friends) were not significant on bivariate analysis and therefore were not entered into our model. Citizenship status was highly correlated with proportion of lifetime spent in the United States and therefore was dropped from our final model.

Of note, using our alternative predisposing (country of birth), enabling (insurance status), and acculturation measures (citizenship status or language the respondent most often thinks in/speaks at home/speaks with friends) did not change the overall results of our model.

We added our 3 variable domains in a sequential order during logistic regression, as has been done in previous studies, using the Andersen model. These studies have started with predisposing variables, then added enabling variables, and finally need variables.²⁷

Because we were interested in the effect acculturation had on the full model, we added this variable last. We calculated the probability of Pap smear receipt for the "average" woman in our sample as well as the change in probability that resulted from modifying the independent variables in our logistic regression. These predicted probabilities were calculated by setting the values of the continuous covariates in the model to their mean values and the categorical covariates to 0 or 1. Variables of interest were changed to find the "risk" difference in receipt of a Pap smear compared to the sample's "average" woman. All analyses were performed using STATA (version 7.0; Stata Corp., College Station, Tex).

RESULTS

We mailed out 1,913 surveys to South Asian households across the country. Of these, 405 were returned because of incorrect addresses. Of the remaining 1,508 surveys, 615 persons responded, for an overall response rate of 42%. Of these, 225 were women. It should be noted that an exact response rate for women is not possible to calculate because we allowed the oldest member of each household (regardless of gender) to respond to our survey if a female was not present or unavailable. The proportion of our sample who were women (36%) corresponded roughly to the proportion of U.S. South Asians who are women (45%).²⁸

Table 1 displays the demographic information for our sample of 225 women. Where possible, 1990 Census data information also is provided for comparison. The 1990 Census is the latest year for which data on Indians and Pakistanis are available. Data for smaller subgroups such as Bangladeshis and Sri Lankans are not readily available secondary to small population size and/or Census undercounting of various minorities.^{29,30}

The median age was 38 years (range 15–83; SD, 11.7), with almost half having a master's degree or beyond and a household income over \$80,000. Almost three quarters were married and had lived in the United States for an average of 16 years (range 0–39 years; SD, 9.7). Almost two thirds (63%) were U.S. citizens. Most were born in India (59%), followed by Pakistan (15%), the United States (9%), and other countries (16%). Participants included Hindus (56%), Muslims (24%), Sikhs (10%), Christians (3%), and others (7%). Because we randomly sampled the entire United States, those states with a greater number of South Asians (i.e., New York) were more likely to be represented in

Table 1. Characteristics of South Asian Women Living in the United States

| | Study Sample, (N = 225) | 1990 Census* | 1999 NHIS† | P Value |
|------------------------------------|-------------------------------|------------------------------|-------------------------------|---------|
| Average age, y ± SD | 38 ± 11.7 (range 15 to 82) | 26 ± 15.4 (range 0 to 99) | 47 ± 18.6 (range 18 to 99) | <.001 |
| Marital status—married, % | 73 | 70 | 45 | <.001 |
| Country of birth, % | | | | |
| India | 59 | 85 | | |
| Pakistan | 15 | 15 | | |
| United States | 9 | | | |
| Other | 16 | | | |
| Religion, % | | | | |
| Hindu | 56 | — | | |
| Muslim | 24 | — | | |
| Sikh | 10 | — | | |
| Christian | 3 | — | | |
| Other | 7 | — | | |
| Education level, % | | | | |
| Bachelor's degree | 35 | 25 | 78 | <.001 |
| ≥Master's degree | 42 | 15 | | |
| Household income, % | | | | |
| Less than \$40,000 | 24 | 39 (for income ≤35K) | | |
| \$40,000–\$79,000 | 31 | 39 (for income 35K–75K) | | |
| \$80,000 or more | 45 | 22 (for income 75K) | | |
| Average years in the United States | 16 | 40% in U.S. ≥10 years | | |
| U.S. Citizen, % | 63 | 50 | | |
| State of residence, % | | | | |
| Calif | 16 | 19 | | |
| NY | 15 | 17 | | |
| NJ | 8 | 10 | | |
| Ill | 8 | 8 | | |
| Tex | 6 | 7 | | |
| Fla | 4 | 4 | | |
| Mich | 7 | 3 | | |
| Other | 35 | 32 | | |
| Health insurance, % | 90 | — | 84 | <.001 |
| Regular source for care, % | 74 | — | 78 | .007 |
| Saw MD in last 2 years, % | 88 | — | 94 | <.001 |
| Received Pap smear in last 3 y, % | 73 | — | 83 | <.001 |

* Latest census data available for Indians and Pakistanis only; smaller groups not available.

† National Health Interview Survey data for general U.S. population.

—, Not applicable.

our sample than were states with a smaller South Asian population (e.g., Wyoming). As expected, the distribution of state of residency matched that of the 1990 U.S. Census. There was no statistical difference in Pap smear receipt by state of residence (Table 1).

The large majority had health insurance (90%) with three quarters reporting a usual source of care. Most had seen a doctor within the last 2 years, and 73% reported having had a Pap smear in the last 3 years. Compared to women participating in the 1999 NHIS, South Asian women were less likely to have received Pap smears (73% vs 83%, $P < .001$), to have a usual source of care (74% vs 78%, $P = .007$), or to have seen this provider in the last 2 years (88% vs 94%, $P < .001$) despite having higher insurance rates (90% vs 84%, $P < .001$). It should be noted that 77% of women in the 1999 NHIS were white. Compared to our sample, women in the 1999 NHIS were older (47 years vs 38 years, $P < .001$), and less likely to be married (45% vs 73%, $P < 0.001$; Table 1).

On bivariate analysis, we compared those who had received a Pap smear and those who had not by predisposing, enabling, and acculturation variables. Women who had received a Pap smear were more likely to be married ($P < .001$), have higher incomes and education ($P < .001$), have a usual source of care ($P < .001$) or health insurance ($P = .005$), to have spent at least 25% of their lifetime in the United States ($P = .005$), and to be U.S. citizens ($P = .03$; Table 2).

Multivariate logistic regression was performed against predisposing variables alone, then against predisposing and enabling variables, and finally by adding measures of acculturation.

Table 3 shows the results of our multiple logistic regression along with significance tests and confidence intervals. The area under the receiver operating curve, a measure of sensitivity and specificity at various cutoff points, was 0.78, indicating good overall estimation for our model.³¹ We note that married women with higher

Table 2. Bivariate Analysis of Pap Smear Receipt Among South Asian Women (N = 225)

| | Distribution Within Sample, n | Received Pap, % | P Value |
|-----------------------------|-------------------------------|-----------------|---------|
| Predisposing characteristic | | | |
| Age | | | |
| ≥40 | 106 | 82 | |
| <40 | 119 | 83 | |
| Marital status | | | |
| Married | 161 | 81 | <.001 |
| Not married | 64 | 55 | |
| Country of birth | | | |
| India | 133 | 77 | |
| Not India | 92 | 67 | |
| Religion | | | |
| Hindu | 123 | 75 | |
| Not Hindu | 102 | 70 | |
| Enabling characteristics | | | |
| Education | | | |
| ≥Bachelor's | 174 | 79 | <.001 |
| <Bachelor's | 51 | 55 | |
| Income | | | |
| ≥\$40K/y | 176 | 78 | <.001 |
| <\$40K/y | 49 | 55 | |
| Health insurance | | | |
| Yes | 198 | 76 | .005 |
| No | 21 | 48 | |
| Usual source of care | | | |
| Yes | 163 | 80 | <.001 |
| No | 56 | 54 | |
| Acculturation | | | |
| % Lifetime in United States | | | |
| ≥25% | 169 | 78 | .005 |
| <25% | 56 | 59 | |
| Citizenship status | | | |
| Citizen | 142 | 78 | .03 |
| Not citizen | 83 | 65 | |
| Language speak w/ friends | | | |
| English | 150 | 74 | |
| Not English | 75 | 72 | |
| Language speak at home | | | |
| English | 80 | 79 | |
| Not English | 145 | 70 | |
| Language think in most | | | |
| English | 111 | 75 | |
| Not English | 114 | 72 | |

education and a usual source of care all had significantly higher odds of having had a Pap smear in the last 3 years. Women who had spent at least 25% of their lifetime in the United States also showed higher odds of having had a Pap smear (Table 3). Although the interaction term between marital status and acculturation was not significant, it must be highlighted that our outcome was common, which by itself may explain the lack of effect. The effect of all other variables remained unchanged (data not shown).

Table 3. Variables Associated with Receipt of Pap Smear in South Asian Women (N = 225)

| Variables | Odds Ratio | 95% Confidence Interval | P Value |
|--|------------|-------------------------|---------|
| Predisposing model | | | |
| Age | 1.0 | 0.98 to 1.03 | .50 |
| Married | 3.3 | 1.71 to 6.59 | <.001 |
| Muslim | 0.7 | 0.35 to 1.53 | .41 |
| Predisposing + enabling model | | | |
| Age | 1.0 | 0.97 to 1.03 | .90 |
| Married | 3.4 | 1.62 to 7.0 | <.001 |
| Muslim | 1.0 | 0.42 to 2.27 | .42 |
| Bachelor's degree | 3.1 | 1.50 to 6.60 | .002 |
| Usual source of care | 3.6 | 1.8 to 7.2 | <.001 |
| Predisposing + enabling + acculturation model* | | | |
| Age | 1.0 | 0.97 to 1.03 | .90 |
| ¹ Married | 5.0 | 2.22 to 11.3 | <.001 |
| ² Muslim | 0.9 | 0.39 to 2.70 | .81 |
| ³ Bachelor's degree | 3.1 | 1.43 to 6.56 | .004 |
| ⁴ Usual source of care | 3.2 | 1.55 to 6.64 | .002 |
| ⁵ 25% of lifetime in U.S. | 3.3 | 1.47 to 7.43 | .004 |

* Referent groups: ¹ not married; ² not Muslim; ³ less than Bachelor's degree; ⁴ no usual source of care; ⁵ less than 25% of lifetime in U.S.

The probability for receipt of Pap smear was 92% for a 38-year-old married female who had spent at least 25% of her lifetime in the United States, had a usual source of care, and had a bachelor's degree. The probability decreased to 71% if the woman was unmarried, 80% if she had less than a bachelor's degree, 80% if she did not have a usual source of care, and 79% if she had lived less than 25% of her life in the United States (Table 4).

DISCUSSION

South Asians are a rapidly growing immigrant group in the United States whose population increased by 110% between 1990 and 2000. Furthermore, the population is

Table 4. Probability of Receipt of Pap Smear by Change in Each Independent Variable

| | Probability of Pap in Last 3 Years | Change in Probability |
|-------------------------------|------------------------------------|-----------------------|
| "Average" woman in sample | 0.92 | — |
| Unmarried | 0.71 | -.21 |
| Less than Bachelor's degree | 0.80 | -.12 |
| No usual source of care | 0.80 | -.12 |
| Less than 25% of life in U.S. | 0.79 | -.13 |

* Probability of Pap smear receipt in the last 3 years is 92% for an "average" woman in this sample (38-year-old married woman with a Bachelor's degree education and a usual source of care who has lived at least 25% of her life in the U.S.). Changes in probability are a reflection of the "average female" with only the listed factor changed. For example, keeping all other variables the same but changing marital status to "unmarried" lowers the probability of Pap smear receipt from 92% to 71%.

expected to quadruple in size in the coming years.^{32,33} However, despite its rapid growth, little is known about the health care needs of this population. In order for the health care system to provide high quality care to an increasingly multiethnic society, the health status and health care needs of diverse groups of patients need to be understood. Our study is the first to examine the provision of cervical cancer screening to South Asian women in the United States.

We found that Pap smear screening was lower than one would expect, given the relatively high socioeconomic status of this group. By these self-reported rates, South Asians did not meet the *Healthy People 2000* national objectives for cervical cancer screening, which aimed for 85% of all women to have received a Pap smear in the last 3 years.³⁴ It should be noted that goals for *Healthy People 2010* are even higher, aiming for 97% of the U.S. female population to have received a Pap smear in the last 3 years.³⁵

Compared to the general U.S. population participating in the National Health Interview Survey, South Asians had significantly lower rates of Pap smear receipt, perhaps because they were less likely to report a usual source of care. Interestingly, South Asian women in our survey had higher rates of health insurance than women in the NHIS. This implies that merely providing health insurance is not enough to promote cervical cancer screening in this population. For instance, cultural barriers, and cervical cancer knowledge, attitudes, and beliefs may need to be studied in this population.

Not surprisingly, we find that marital status and socioeconomic factors are all strong predictors of Pap smear receipt for South Asians, as they are for many other ethnic groups. Married women had an odds ratio of over 3 for having had a Pap smear in the past 3 years (Table 3). Keeping other variables the same but changing marital status from married to unmarried lowered the probability of having had a Pap smear by 21 percentage points (Table 4). Marriage may be a surrogate for sexual activity in our sample and/or an access point to obstetric care, as has been suggested for other minority groups.^{36,37} It may be likely that South Asian women who get Pap smears in their homelands do so generally after marriage,³⁸ and that this behavior has carried over in U.S. immigrants, although there are no data to support or refute this hypothesis.

After adding enabling variables to our model, we found that education and having a usual source of care were strong predictors of Pap smear receipt (Table 3). By changing each of these independent variables, we changed the probability of having had a Pap smear. For example, having less than a bachelor's degree lowered the probability of having had a Pap smear by 12 percentage points. Similarly, having no usual source of care lowered the probability of Pap smear receipt by 12% (Table 4). Again, education and having a usual source of care have been well-documented predictors in prior studies of Pap smear receipt.^{23,39} It is interesting that these variables retain their

significance even in a high-socioeconomic-strata (SES) sample such as ours.

Adding in our measure of acculturation (proportion of lifetime in the United States) was also found to be highly significant. However, this variable did not diminish the significance of marital status, education, or usual source of care, which all remained highly significant at $P = .001$ to $.004$. Women who had lived in the United States for less than 25% of their lifetime were 13% less likely to have reported receiving a Pap smear in the past 3 years.

A lower proportion of lifetime spent in the United States is a negative predictor of Pap smear receipt for Vietnamese women.⁴⁰ Similarly, other measures of acculturation based on acculturation scores have found that acculturation predicts Pap smear receipt for Native Americans and Hispanics,^{41,42} while language barriers and fewer years in the United States negatively affect access to the health care system for Chinese Americans.⁴³ Thus, our study supports prior research noting the positive correlation between acculturation and Pap smear receipt for Asian women.

Unlike previous studies, ours did not find age to be an important predictor of Pap smear receipt.⁴⁴ This may have been due to the small number of elderly women in our cohort, which limited the power of our study to effectively assess the impact age may have on Pap smear receipt.

There are several limitations to our study. First, our sample represents a high SES. Those who responded to our survey had higher incomes and educational levels than South Asians responding to the Census. Therefore, our results are not generalizable to the entire South Asian population in the United States. In addition, we studied only English-speaking individuals. However, according to the 1990 Census, less than 10% of South Asians report being "linguistically isolated," indicating that language was not a significant limitation in this study.²⁸

Our response rate of 42% was modest, but nevertheless provides a good starting point for future work among this understudied population.⁴⁵ This response rate is based on the number of surveys successfully delivered. It should be noted that although we encouraged the oldest female in the household to respond to the survey, if this person was unavailable, the oldest member of the family (regardless of gender) was instructed to send the survey back, allowing us to calculate an overall response rate of 42%, but not a response rate specifically for women.

Our survey did not assess variables such as knowledge, attitudes, or health beliefs that may have played a role in predicting use of Pap smears in this population. Finally, as is typical of most mail surveys, our study is prone to self-report bias, which has been shown to overestimate the rates of Pap smear receipt when compared to chart review.^{46,47}

Several strengths must be acknowledged as well. According to the Presidential Asian Pacific Islander Initiative, more research on Asian subgroups needs to be done⁴⁸ and, to our knowledge, this is the first study examining

health services utilization among South Asians. Second, our study was nationwide in design with the distribution of residence in our sample matching that of the Census data. Finally, we chose to study a community-based sample rather than rely on a sample of patients, which is so often the case when studying minority populations.

In conclusion, we find that South Asian women have not met national health objectives for Pap smear screening set forth by *Healthy People 2000*. Traditional predictors of Pap smear receipt including marital status, SES, and acculturation also influence receipt of Pap smears for South Asian women. In order to achieve the even loftier goal of 97% rate of Pap smear receipt set out by *Healthy People 2010*,³⁵ South Asians should be targeted for cervical cancer screening. This is especially true for high-risk South Asians, including unmarried women of lower SES who have spent smaller proportions of their lives in the United States.

On the basis of our findings, we recommend that public health efforts, including community health fairs and cervical cancer awareness campaigns, be undertaken in areas with large South Asian populations, such as Jackson Heights, New York, Cerritos, California, and Jersey City, New Jersey. Ethnic newspapers and television programs could advertise the importance of cervical cancer screening in South Asian communities. Such efforts have shown success in other ethnic and minority communities^{11,49,50} and can serve as a model for outreach in the South Asian community as well.

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