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## Cervical cancer screening among Chinese Americans

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### Abstract

**Study purpose**—Chinese women in North America have high rates of invasive cervical cancer and low levels of Papanicolaou (Pap) testing use. This study examined Pap testing barriers and facilitators among Chinese American women.

**Basic procedures**—A community-based, in-person survey of Chinese women was conducted in Seattle, Washington during 1999. Four hundred and thirty-two women in the 20–79 years age-group were included in this analysis. The main outcome measures were a history of at least one previous Pap smear and Pap testing within the last 2 years.

**Main findings**—Nineteen percent of the respondents had never received cervical cancer screening and 36% had not been screened in the previous 2 years. Eight characteristics were independently associated with a history of at least one Pap smear: being married, thinking Pap testing is necessary for sexually inactive women, lack of concerns about embarrassment or cancer being discovered, having received a physician or family recommendation, having obtained family planning services in North America, and having a regular provider. The following characteristics were independently associated with recent screening: thinking Pap testing is necessary for sexually inactive women, lack of concern about embarrassment, having received a physician recommendation, having obtained obstetric services in North America, and having a regular provider.

**Principal conclusions**—Pap testing levels among the study respondents were well below the National Cancer Institute's Year 2000 goals. The findings suggest that cervical cancer control interventions for Chinese are more likely to be effective if they are multifaceted. © 2002 International Society for Preventive Oncology. Published by Elsevier Science Ltd. All rights reserved.

### Keywords

Chinese Americans; Cervical cancer; Papanicolaou testing

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## 1. Introduction

Within 50 years, Asians will comprise 10% of the United States population [1]. However, they remain one of the most poorly understood minorities and their health care problems have received little attention [1,2]. Census Bureau information indicates there were 1.6 million ethnic Chinese living in the US in 1990, and Chinese are now the largest Asian sub-group [3]. Over the last four decades, Chinese immigration has increased dramatically [4,5]. Therefore, North America's ethnic Chinese population is heterogeneous and largely foreign-born [3].

Several studies have suggested that Chinese women living in North America have higher cervical cancer incidence rates than the general population [6,7]. According to Los Angeles data, the rates of invasive cervical cancer among Chinese and non-Latina White women are 12.3 and 7.2 per 100,000, respectively [6]. Chinese in British Columbia also have twice the cervical cancer risk of Whites [7]. Further, Chinese Americans are more likely to be diagnosed with regional or distant disease than their White counterparts [8]. Few reports have addressed Papanicolaou (Pap) testing levels among Chinese in North America. However, 45% of Chinese women who participated in an ethnically focused behavioral risk factor survey conducted in Oakland during 1989–1990 had never been screened for cervical cancer (compared to 5% of the total California female population), and only 37% of respondents to a 1994 San Francisco survey were routinely obtaining Pap smears [9,10].

We are currently conducting a randomized controlled trial to evaluate the impact of a cervical cancer control intervention targeting Seattle's ethnic Chinese population. As part of this project, a community-based survey of Chinese Americans was conducted during 1999. We hypothesized that Chinese Americans' cervical cancer screening behavior may differ from the behavior of other races/ethnicities [11]. Our goal was to provide information about Pap testing barriers and facilitators that could be used to develop intervention strategies for Chinese women. In this analysis, we used our baseline survey data to examine variables associated with the following indicators of screening participation: at least one previous Pap smear and Pap testing within the last 2 years.

## 2. Materials and methods

### 2.1. Study sample

In Seattle, the Chinese population is concentrated in the central and southern regions of the city [12]. We sought to recruit a representative sample of Chinese women living in these areas. Two complementary methods were used to identify Chinese households within our target zip codes. First, we used multiple data sources (e.g. published articles and cancer registry data) to compile a comprehensive list of Chinese surnames. We then used this list to abstract potentially Chinese households from the 1998 Seattle telephone book [13,14]. Second, we purchased a commercially available listing of Chinese households from the American List Council of New Jersey. This marketing company uses driver's license, car and voter registration lists as well as warranty card information, market research survey data, and telephone books to identify sub-groups of the population (e.g. individuals of a certain race/ethnicity) (personal communication: Joseph Borelli; American List Council of New Jersey). To eliminate duplicates, records were merged by street address. A total of 1945 addresses were selected for inclusion in the survey sample.

Our survey aimed to examine multiple preventive behaviors (e.g. Pap testing and mammography) while minimizing participant burden. Therefore, study households were randomly assigned to one of three versions of our survey instrument (addressing different

preventive behaviors). Two-thirds of the sample were asked to complete the version that included questions about Pap testing barriers and facilitators.

## 2.2. Survey recruitment

This work was approved by the human subjects review board of Fred Hutchinson Cancer Research Center. We publicized the survey through Chinese-language posters distributed in community settings (e.g. Chinese-owned grocery stores and restaurants), followed by a mailing to each of the study households. The introductory letter, printed in both Chinese and English, was signed by two physicians from Seattle's International Medicine Clinic. All interviews were conducted in respondents' homes by bicultural Chinese American women. Households were offered a small stipend payment of US\$ 10 as a token of appreciation for their time, and were given the option of completing the survey in Cantonese, Mandarin, or English.

Women were eligible to complete the interview if they were 20 years of age or older. Due to cost constraints, the small proportion of women who did not speak Cantonese, Mandarin (the two most common Chinese dialects), or English were excluded. When a household included two or more age-eligible women, interviewers asked to speak with the oldest woman. However, if the oldest woman refused or was unavailable, the interviewer asked if a younger household member would complete the survey. We used this approach, rather than a random selection algorithm, because attempts to enumerate household members in the field have been shown to reduce response rates in Asian immigrant communities (personal communication: Stephen McPhee, University of California, San Francisco). Our survey workers made at least five attempts (including at least one daytime, one evening, and one weekend attempt) at contacting each household.

## 2.3. Questionnaire development

Eyton and Neuwirth have suggested that qualitative methods should routinely be applied during the development of survey instruments for less acculturated immigrant groups [15]. Our selection of survey questions was guided by an earlier qualitative study addressing cervical cancer screening barriers and facilitators among Chinese women. The qualitative data collection effort allowed us to identify factors relevant to Pap testing among Chinese within the context of the diagnostic component of the PRECEDE framework (which was originally taken from Andersen's model of behavioral factors in health care utilization) [16–18]. PRECEDE specifies that factors affecting behavior can be broadly classified as predisposing, reinforcing, and enabling, but also recognizes that the three categories are not always mutually exclusive. We chose to use this conceptual framework because, unlike most behavioral models, it assumes that factors affecting health choices are culturally determined, and does not specify that the same variables (e.g. perceived risk of disease) are determinants of behavior across all population sub-groups [18]. When appropriate, given the results of our qualitative study, survey items were adapted from the pathways to early detection questionnaire which has previously been successfully used in several Asian American populations [10,19,20]. The survey instrument was developed in English, translated into Chinese, back-translated to ensure lexical equivalence, reconciled, and pre-tested [11,15].

## 2.4. Survey content

Authorities recommend regular Pap testing at intervals of 1–3 years depending on a woman's risk for disease and previous screening history [21]. In this survey, respondents were asked whether they had ever had a Pap smear and, if so, whether they had been screened within the last 2 years. Because there is a lack of consensus about the need for Pap testing among women without uteri, we also asked each woman if she had a history of hysterectomy [21,22]. Women were asked about their age, marital status, educational level, household income, and housing

type (owned, rented, or government-subsidized). They also specified how many years they had lived in US and whether they spoke English fluently.

The results of our earlier qualitative study indicated that traditional (versus biomedical) orientations toward health and disease, as well as beliefs about Pap testing, might be important predisposing factors. Therefore, women were asked whether they thought each of the following statements were true: getting cancer is a matter of karma or fate, cancer can be prevented by faith (in God or Buddha), cancer can be caused by an imbalance of yin (cold) and yang (hot), cancer can be caused by poor qi and blood circulation (a fundamental concept in Chinese medical thinking), and Pap smears can help prevent cancer. Other questions addressed beliefs about the necessity of Pap testing for women who are without symptoms, sexually inactive, or post-menopausal. In addition, respondents were asked whether embarrassment, pain or discomfort, and fear of cancer being discovered prevented them from getting Pap smears. Our qualitative interview participants reported that in many Asian countries, gynecologists routinely provide all women's health services and, consequently, some women are uncomfortable seeing a primary care physician for Pap smears. Therefore, we asked women whether they believed Pap tests should be done by gynecologists. We also considered three reinforcing factors identified by our qualitative work: previous recommendation for cervical cancer screening by a physician, family member, or friend.

Enabling factors included past medical history variables as well as difficulties accessing health care. Specifically, each survey respondent was asked if she had ever received family planning or obstetric services in US, whether she had a regular health care provider, and if she had health insurance coverage. Our qualitative data indicated that two provider characteristics may affect Chinese women's cervical cancer screening behavior. First, a shortage of female doctors was considered a barrier to Pap testing. Second, women reported that many Chinese Americans choose ethnic Chinese physicians who were trained in Asia, and that some of these providers do not offer Pap testing services. Therefore, we asked women with a regular provider to specify his or her gender as well as ethnicity. Finally, participants were asked whether their access to health care was limited by concerns about cost, problems finding a medical interpreter, problems getting routine medical appointments, and transportation difficulties.

Some Chinese immigrants have little formal education. Therefore, we made the response options for our PRECEDE items as simple as possible. Specifically, with a few exceptions (e.g. the gender and ethnicity of a woman's health care provider), the response options were yes, no, and do not know/not sure.

## 2.5. Data analysis

We compared the characteristics of women who reported at least one prior Pap smear and those who had never been screened. In a second analysis, we compared women who had and had not received recent screening (i.e. within the last 2 years). Because authorities do not generally recommend routine screening of women aged 80 and older, we excluded these women from our analysis of cervical cancer screening behavior [21]. Answers to items with response options of yes, no, and do not know/not sure were dichotomized into yes versus other. Proportion of life in US (which is considered to be a good measure of acculturation) was calculated from women's responses to questions about current age and age at immigration [23]. The  $\chi^2$ -test and, when necessary, Fisher's exact test were used to assess statistical significance in bivariate comparisons [24]. We used unconditional logistic regression models to summarize the independent effects of sociodemographic and other items on cervical cancer screening participation [25]. As a tool to build a summary model relevant to intervention planning, we used a forward variable selection method; that is, we entered the most important variables (in terms of deviance change) sequentially into our models until no other variable changed the deviance significantly [26].

### 3. Results

#### 3.1. Study group

A total of 710 women participated in the survey. Our response rate calculations are summarized in Table 1 and have been reported in detail elsewhere [27]. In summary, the total estimated household response rate was 64%, and the cooperation rate (i.e. response among reachable and eligible households) was 72%. Four hundred and seventy-three participants completed the questionnaire version that included the cervical cancer screening barrier and facilitator items used in this analysis. Five women who reported a personal history of invasive cervical cancer, 21 women in their eighties, and 10 women with missing data for age were excluded. Another five participants were excluded because they did not answer the Pap testing history questions, leaving 432 women. Table 2 gives detailed information about the characteristics of the study group.

#### 3.2. Pap testing behavior

Three hundred and forty-eight (81%) of the 432 women in our study sample reported that they had received cervical cancer screening on at least one occasion and 277 (64%) had been screened within the last 2 years. In the bivariate analyses, being married, higher income, home ownership, and greater proportion of life in US were associated with both Pap testing history variables (Table 2). Pap testing levels were similar among women with and without uteri. The bivariate analyses showed significant relationships between the following predisposing factors and both Pap testing history variables: believing Pap smears can help prevent cancer; thinking Pap testing is necessary for asymptomatic, sexually inactive, or post-menopausal women; and lack of concerns about embarrassment, pain or discomfort, and cancer being discovered. Women who had not been screened recently were more likely to believe Pap testing should be done by a gynecologist. All three of the reinforcing factors were associated with both Pap testing history variables. Four enabling factors were associated with both Pap testing history variables: having received family planning or obstetric services in US and having a regular provider, and concern about cost. Women who reported transportation difficulties were less likely to have had at least one Pap smear.

Our multiple logistic regression results are given in Table 3. Eight variables were independently associated with a history of at least one Pap test: being married, thinking Pap testing is necessary for sexually inactive women, not having concerns about embarrassment or cancer being discovered, having received a physician or family member recommendation, having received family planning services in US, and having a provider. The following variables were independent correlates of recent screening: thinking Pap testing is necessary for sexually inactive women, lack of concern about embarrassment, having received a physician recommendation, having received obstetric services in US, and having a provider.

### 4. Discussion

We found that 19% of the women who participated in our community-based survey had never been screened for cervical cancer, and over one-third (36%) had not been screened within the previous 2 years. Multiple studies have demonstrated that Pap testing rates among Asian American populations do not even approach the National Cancer Institute's Year 2000 goal (i.e. 95% of women should have received at least one screening) [11,19,28,29]. For example, the pathways to early detection project recently conducted surveys of five communities in Northern California. Very few of the White (1%) and Black (2%) respondents had never been screened, compared to 24% of Latina, 33% of Chinese, and 58% of Vietnamese respondents [19]. Similarly, Wismer et al. [11] found that 37% of Korean American women from Alameda and Santa Clara counties, California had never obtained Pap testing. Finally, we have



previously shown that nearly one-quarter (24%) of Cambodian immigrants living in Seattle have not been screened for cervical cancer [28].

A strong association between physician recommendation and women's use of cancer screening tests has been documented in diverse populations [28,30,31]. It is of note that, in this study, women who had received a physician recommendation had a 2.6 higher odds of having ever been screened, and a 2.9 higher odds of having received a recent Pap test.

Many of the factors that we previously found to be associated with Pap testing use among Cambodian American women in Seattle were also associated with Pap testing use among Chinese American women [28]. For example, our findings indicate that physician recommendation and beliefs about the necessity of Pap smears are important in both populations. However, we also found some important differences. Cambodians (but not Chinese) who believed in karma or fate, and who reported problems finding medical interpreters were less likely to participate in cervical cancer screening. In contrast, concerns about pain and costs were associated with screening use among Chinese but not Cambodian survey respondents.

There are several limitations to this study. First, we chose to only include areas of Seattle with a high density of Chinese residents in our community-based survey. It is unknown to what extent our findings are generalizable to other geographic areas or Chinese who do not live in neighborhoods with a high proportion of Asian Americans. Second, women were only eligible for inclusion in the study if they lived in a household with a listed telephone number (with address information) or that was included in the marketing company list. Single women may be more likely to be unlisted in the telephone book and, if listed, less likely to report an address. Additionally, lower income households are less likely to appear in marketing company lists. Third, we systematically selected the oldest woman in each household for survey participation rather than using a random selection algorithm. Fourth, self-reports of Pap testing use may be faulty due to inaccurate recall or acquiescence bias (i.e. over-reporting of a behavior others perceive as desirable). Fifth, it is possible that our survey respondents had different cervical cancer screening histories than those who were unreachable or refused to participate. Last, due to the cross-sectional nature of this analysis, it is unclear whether beliefs (e.g. that Pap testing is painful or uncomfortable) influence behavior or whether receipt of a Pap test influences beliefs [30].

In summary, this study provides information about the cervical cancer screening behavior of Chinese American women. We used PRECEDE as a conceptual framework for our survey measures; this approach allowed us to classify factors identified by our earlier qualitative work systematically, and facilitates the application of study findings to program planning [18,32]. It is of note that multiple predisposing, reinforcing, and enabling factors were associated with Pap testing use. Our findings suggest that cancer control interventions targeting ethnic Chinese women are more likely to be effective if they are multifaceted. For example, educational efforts might usefully include information about the importance of routine Pap smears for all women, the availability of female health care providers, and how to request screening tests from a physician. We are currently conducting a randomized controlled trial to evaluate two alternative cervical cancer screening interventions for Chinese women: an outreach worker intervention which includes home visits, the use of audiovisual and print materials, and logistic assistance accessing screening services; and a direct mailing of a video and pamphlets.

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**Table 1**

## Summary of survey response

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<i>Addresses attempted</i>	
A. Not a residential address	163
B. Eligibility not established (no contact after five attempts)	196
C. Verified to be ineligible	598
D. Eligible but refused	278
E. Completed	710
<i>Estimates<sup>a</sup></i>	
F. Estimated proportion of eligibles among households where eligibility was not established (%)	62
G. Estimated number of eligibles among households where eligibility was not established	122
<i>Response rates<sup>b</sup></i>	
H. Estimated total households response rate (%)	64
I. Cooperation rate (%)	72

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$$^a F = (D + E)/(C + D + E); G = F \times B.$$

$$^b H = E/(D + E + G); I = E/(D + E).$$

**Table 2**  
Pap testing behavior in relation to sociodemographic characteristics and PRECEDE factors

Variable	Ever screened (%)		P-value	Recently screened (%)		P-value	All women (%) (n = 432)
	Yes (n = 348)	No (n = 84)		Yes (n = 277)	No (n = 155)		
<i>Sociodemographic characteristics</i>							
Age (years)							
20–39	20	21	0.108	21	18	0.686	20
40–59	49	37		47	47		47
60–79	31	42		32	35		33
Marital status							
Never married	3	7	<0.001	4	10	0.009	6
Currently married	84	63		83	73		80
Previously married	13	20		13	16		14
Education (years)							
<6	14	24	0.074	13	21	0.101	16
6–11	47	41		48	42		46
≥12	39	35		39	38		38
Household income (US\$)							
<10000	20	36	0.007	20	29	0.046	23
10000–19999	16	27		16	21		18
20000–29999	24	7		25	12		21
≥30000	40	31		39	38		39
Housing type							
Owned	87	72	0.003	88	77	0.015	83
Rented	7	18		7	14		9
Subsidized	6	10		5	9		7
Proportion of life in US (%)							
<25	36	58	<0.001	35	49	0.014	40
25–49	38	33		38	35		37
50–74	18	6		19	11		16
≥75	8	4		8	5		7
Speaks English fluently	17	10	0.090	17	12	0.158	16
Previous hysterectomy	9	5	0.207	8	8	0.821	8
<i>Predisposing factors</i>							
Believed getting cancer is a matter of karma or fate	15	9	0.110	16	11	0.129	14
Believed cancer can be prevented by faith	7	8	0.631	6	9	0.247	7
Thought cancer can be caused by an imbalance of yin and yang	14	19	0.323	15	15	0.883	15
Thought cancer can be caused by poor qi and blood circulation	28	29	0.794	31	23	0.083	28
Believed Pap smears can help prevent cancer	77	62	0.005	77	68	0.028	74
Thought Pap testing is necessary for asymptomatic women	86	52	<0.001	88	66	<0.001	80
Thought Pap testing is necessary for sexually inactive women	74	36	<0.001	77	49	<0.001	67
Thought Pap testing is necessary for post-menopausal women	84	57	<0.001	87	64	<0.001	79
Concerned about embarrassment	7	31	<0.001	6	22	<0.001	12
Concerned about pain or discomfort	7	18	<0.002	7	14	0.008	9
Concerned about cancer being discovered	3	12	<0.001	2	8	0.003	4
Believed Pap testing should be done by gynecologists	58	64	0.309	54	68	0.004	59
<i>Reinforcing factors</i>							
Physician recommendation	70	29	<0.001	74	42	<0.001	62
Recommendation by a family member	23	7	<0.001	24	13	0.004	20
Recommendation by a friend	20	10	0.024	22	12	0.009	18
<i>Enabling factors</i>							

Variable	Ever screened (%)		P-value	Recently screened (%)		P-value	All women (%) (n = 432)
	No (n = 84)			No (n = 155)			
	Yes (n = 348)	No (n = 84)		Yes (n = 277)	No (n = 155)		
Received family planning services in US	32	5	<0.001	33	16	<0.001	27
Received obstetric services in US	45	15	<0.001	48	25	<0.001	40
Regular provider							
Chinese man	19	29	<0.001	16	29	<0.001	21
Chinese woman	7	0		8	1		5
Non-Chinese man	23	14		26	12		21
Non-Chinese woman	31	10		35	13		27
None	21	47		15	44		26
Health insurance coverage	92	88	0.232	93	89	0.183	91
Concerns about cost	22	33	0.028	21	30	0.024	24
Problems finding interpreters	35	39	0.419	34	38	0.404	36
Problems getting routine appointments	30	35	0.388	29	34	0.229	31
Transportation difficulties	13	26	0.003	14	19	0.152	16

Table 3

Logistic regression results<sup>a</sup>

Variable	Ever screened (n = 414)		Recently screened (n = 418)	
	OR	95% CI	OR	95% CI
<i>Sociodemographic characteristics</i>				
Marital status				
Currently married	5.23	1.67–17.43		
Previously married	2.98	0.82–11.40		
Never married	1.00			
<i>Predisposing factors</i>				
Thought Pap testing is necessary for sexually inactive women	4.36	2.30–8.55	2.55	1.56–4.21
Concerned about embarrassment	0.15	0.06–0.36	0.28	0.13–0.58
Concerned about cancer being discovered	0.21	0.06–0.78		
<i>Reinforcing factors</i>				
Physician recommendation	2.60	1.33–5.16	2.92	1.79–4.78
Recommendation by a family member	2.91	1.09–9.06		
<i>Enabling factors</i>				
Received family planning services in US	6.29	2.19–23.70	2.05	1.23–3.47
Received obstetric services in US				
Regular provider				
Chinese man	1.34	0.62–2.97	1.69	0.90–3.22
Chinese woman	∞	1.08–∞	7.51	1.93–50.11
Non-Chinese man	2.13	0.89–5.33	4.31	2.17–8.87
Non-Chinese woman	4.40	1.67–12.88	4.61	2.39–9.15
None	1.00		1.00	

<sup>a</sup> OR: odds ratio; CI: confidence interval.