



## Demographic predictors of cervical cancer screening in Chinese women in New Zealand

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### Abstract

**Objective** This pilot study examined the cervical cancer screening practices of Chinese women living in Auckland and the association with social demographic factors.

**Methods** A community-based survey was conducted and 234 questionnaires were administered to ascertain the uptake of cervical screening. Participants were asked whether they had ever been screened in New Zealand and whether it had occurred in the previous 3 years.

**Results** One hundred and fifty-two (65.0%; 95% CI: 58.5–71.1) respondents reported having been screened in New Zealand and 56.0% (95% CI: 49.4–62.4) reported they were screened in the last 3 years. Factors independently associated with cervical cancer screening practice included age and duration of residence in New Zealand. The most frequently cited reason for never having had a smear test was that “thought it is unnecessary” (39%), followed by “don’t know where to go” (36.6%).

**Conclusion** The uptake of cervical cancer screening is lower among women migrants from Mainland China living in New Zealand than that of the national New Zealand average. In addition, it is lower than that of Chinese women living in North America. The study highlights the information needs of new immigrants and older or younger women.

The Asian ethnic group was New Zealand's fourth largest major ethnic group after European, Māori, and Other ethnicity, totalling 9.2% in 2006. Two-thirds of people who identified with the Asian ethnic group lived in the Auckland Region; that is, almost 20% people in the Auckland Region identified with Asian ethnic group, the highest proportion of all the regions, and the second largest ethnic group in the Auckland region.<sup>1</sup> According to 2001 census data, the Chinese are the largest Asian group, making up 45% of all Asian people in the Auckland region.<sup>2</sup>

Cancer of the cervix uteri is the second most common cancer among women worldwide.<sup>3</sup> Invasive cervical cancer is the second leading cancer among women in mainland China.<sup>4</sup> Studies have suggested that Chinese women living in North America have higher cervical cancer incidence rates than the general population,<sup>5,6</sup> and that this higher prevalence is due in part to inadequate cervical screening.<sup>7,8</sup>

Some barriers to cervical screening appear to be universal for most women, such as perceptions that a cervical smear test is unnecessary, fear of a cancer diagnosis, embarrassment with the test procedure, and the lack of a physician referral.<sup>9</sup> However, it has been demonstrated that individual barriers to screening, and their relative importance, differ markedly between population groups.<sup>10</sup>

International studies have found that 76% to 81% Chinese women reported ever having a cervical smear test, and 57% to 61% reported having a smear test within the last 2 years.<sup>7,8,11</sup> Several sociodemographic factors were identified to be associated with having fewer smear tests, including older age, single marital status, being born in mainland China, lower education, lower household income, and less acculturation.<sup>7,8,11</sup>

New Zealand National Cervical Screening Programme (NCSP) reported a screening coverage of 73% overall for the last 5 years. However, the coverage varied by ethnic groups with the lowest coverage of 45% or so among Asian women.<sup>12</sup> Despite this low coverage, there are no published statistics on cervical cancer in Asian or Chinese immigrant women in New Zealand.

Women from mainland China have very little experience of screening because there is no organised population health programme in China, although some women are screened through annual health examinations arranged by their employers.

In response to the lack of research on the details of screening uptake and the reasons for the low rates of uptake of cervical screening in Asian population in New Zealand, we conducted a pilot study focusing on mainland Chinese women to investigate the:

- Cervical screening practices in Chinese immigrants;
- Barriers of and facilitators to cervical screening that could be used to develop intervention strategies for Chinese women; and
- Knowledge of cervical screening and cervical cancer risk factors in this immigrant population.

This brief report focuses on the description of cervical screening practice in the study population and the association with social demographic factors.

## Methods

This was a community-based pilot survey that was followed up with a focus group interview.

**Study sample**—We aimed to recruit 260 women with the consideration of a 20% dropout rate. This was based on the finding of the screening rate of 45% for Asian women.<sup>11</sup> We allowed 15% of the desired margin of error, with 95% probability that the estimate was within the margin of error of the population value, thus establishing that two-hundred and ten women were needed for this study.

**Survey recruitment**—We partnered with the Chinese New Settlers Services Trust (CNSST), a local non-government organisation, to assist in the principal method for recruiting participants through access to their database. The researchers also utilised their considerable personal networks and affiliations in ethnic community organisations.

To promote the survey and enhance recruitment, information about the study was publicised in Chinese-language posters distributed in community settings and in Chinese newspapers. Women were eligible to participate in the study if they were (1) born in mainland China; (2) currently resided in Auckland New Zealand; (3) were aged 20 to 69.

The survey was conducted between November 2006 and February 2007. Once potential participants were identified, phone contact was made to confirm the address with potential participants, check the eligibility and invite them to participate in the study if eligible. The eligible women were asked to complete the self-administered survey and return the completed form to CNSST or to AUT using a postage-paid envelope. Ethics approval from AUT Ethics Committee was obtained before the recruitment started.

**Survey instrument**—The survey questions were developed in English, translated into Chinese, piloted, revised, and back translated to ensure lexical equivalence. Sociodemographic information were

collected regarding the woman's age, marital status, educational level, employment, income, and housing status (owned, rented), duration of residence in New Zealand and their fluency of English speaking.

Participants were asked whether they had ever been screened with a cervical smear test in China and in New Zealand, and, if so in New Zealand, whether they had been recently screened (within the last 3 years). They were also asked the reasons for never being screened or not being screened recently.

A pilot test of the survey questionnaire was conducted with eight Mainland Chinese women (they were not recruited as participants in the final study) and the questionnaire was further refined with input and feedback from Women's Nursing, Education and Health Promotion (WONS) and the NSCP team.

**Statistical analysis**—Descriptive analysis was conducted to summarise the characteristics of the sample. Primary analyses included the comparison of ever being screened with a cervical smear test of women with different sociodemographic characteristics. In a second analysis, we compared the proportion of being recently screened. The Chi-squared test and, when necessary, Fisher's exact test was used to assess statistical significance in bivariate comparisons. Multiple logistic regression analysis was performed to summarise the independent effects of sociodemographic factors on cervical cancer screening participation while adjusting for the possible confounding factors; specifically, due to the relatively small sample size, a method of forward selection of variables was used. The crude and adjusted odds ratios and 95% confidence intervals were reported for the effects. A significance level of  $\alpha=0.05$  was used to determine statistical significance for all calculations.

## Results

Two hundred and sixty questionnaires were sent to eligible participants and 234 were received. Of these 234, 190 were recruited through CNSST, 33 through personal networks, and 11 through an advertisement. The mean age (SD) of the participants was 41 (10.6) with the range of 20 to 69, 80.3% reported legally married, 80.7% had tertiary or postgraduate education, 47% were employed, 62.4% could converse in English, 38% had religion beliefs, the mean duration of living in New Zealand was 6 years (SD=3.8).

**The rate of uptake of cervical screening**—Ninety-eight respondents (41.9%; 95% CI: 35.5–48.5) reported ever being screened with a cervical smear test in China. 152 (65.0%; 95% CI: 58.5–71.1) reported ever being screened in New Zealand and 56.0% (95% CI: 49.4–62.4) reported they were recently screened in New Zealand. There was no statistical difference for the rate of ever being screened in New Zealand between women who were screened in China and who were not (64.3% vs 64.7%,  $p=0.953$ ); no difference was found for being recently screened between these two groups (55.1% vs 55.6%,  $p=0.935$ ).

**Associations between having ever been screened with a cervical smear test in New Zealand and socio-demographic factors**—In the bivariate analyses, statistically significant associations were found between women who had ever being screened in New Zealand and most of the sociodemographic variables examined in Table 1 except for education level, employment, and religion beliefs. Compared with women who were less than 30 years of age, middle-age women (30–49 years old) were more likely to report having ever being screened (77.6% vs 20.8%; OR: 13.19, 95% CI: 4.61–37.80); odds ratio of 1.65 for women aged 50 years old suggested an increased odds of being screened but it was not statistically significant.

**Table 1. Numbers (row percentages), and crude and adjusted odds ratios of reporting ever being screened with cervical smear test in New Zealand by sociodemographic variables**

Variable	Category	Total	Ever screened		Crude		Adjusted	
			N	n	%	OR	(95% CI)	OR
Age (years)	20–29	24	5	20.8	1.00		1.00	
	30–49	161	125	77.6	13.19	(4.61–37.80)‡	9.65	(3.16–29.49)‡
	50+	33	10	30.3	1.65	(0.48–5.67)	0.97	(0.26–3.65)
	unknown	16	12	75.0	11.40	(2.54–51.11)‡	8.95	(1.59–50.47)*
Marital status	Married	188	130	69.1	1.00			
	Unmarried/single	36	16	44.4	0.36	(0.17–0.74) †		
	Unknown	10	6	60.0	0.67	(0.18–2.46)		
Education	Secondary or under	31	17	54.8	1.00			
	Tertiary or above	189	126	66.7	1.65	(0.76–3.56)		
	Unknown	14	9	64.3	1.48	(0.40–5.45)		
Income (weekly)	\$0–\$400	100	53	53.0	1.00			
	\$401–\$600	33	22	66.7	1.77	(0.78–4.04)		
	>\$600	36	30	83.3	4.43	(1.70–11.59)†		
	Unknown	65	47	72.3	2.32	(1.18–4.53)*		
House tenure	Owned	121	92	76.0	1.00			
	Rented	113	60	53.1	0.36	(0.20–0.62) ‡		
Employment	Unemployed	91	53	58.2	1.00			
	Employed	110	78	70.9	1.75	(0.97–3.14)		
	Unknown	33	21	63.6	1.26	(0.55–2.86)		
Years lived in NZ	0–4	98	44	44.9	1.00		1.00	
	5–9	75	55	73.3	3.38	(1.77–6.45) ‡	4.15	(1.95–8.85) ‡
	10+	53	47	88.7	9.61	(3.76–24.57)‡	7.28	(2.63–20.10)‡
	Unknown	8	6	75.0	3.68	(0.71–19.15)	1.78	(0.25–12.43)
Can converse in English	No	77	40	51.9	1.00			
	Yes	146	104	71.2	2.29	(1.29–4.06) †		
	Unknown	11	8	72.7	2.49	(0.61–10.01)		
Religion	No	134	87	64.9	1.00			
	Yes	89	58	65.2	1.01	(0.58–1.77)		
	Unknown	11	7	63.6	0.95	(0.26–3.40)		
Age at immigration	0–39 years	163	117	71.8	1.00			
	40+ years	52	20	38.5	0.25	(0.13–0.47) ‡		
	Unknown	19	15	78.9	1.47	(0.47–4.68)		
Screened in China	No	133	86	64.7	1.00			
	Yes	98	63	64.3	0.98	(0.57–1.70)		

\*P<0.05; † P<0.01; ‡ P<0.001

Single, never married, divorced, or separated women had a decreased odds of reporting having ever been screened compared to currently married women (44.4% vs 69.1%; OR: 0.36; 95% CI: 0.17–0.74). Women who were renting a property, who immigrated into New Zealand at the age of 40 years old or older were less likely to be screened.

The odds of having ever been screened increased for women who had a higher income (\$600 or above weekly), and for those who could converse in English. A dose-response relationship was identified for the duration of residence in New Zealand, the odds were 3.38 (95% CI: 1.77–6.45) and 9.61 (95% CI: 3.76–24.57), respectively, for

women living in New Zealand for 5–9, and 10 years or more compared to those living in New Zealand for less than 5 years.

**Table 2. Numbers (row percentages), and crude and adjusted odds ratios of reporting being recently screened with cervical smear test in NZ by sociodemographic variables**

Variable	Category	Total	Ever screened		Crude		Adjusted	
		N	n	%	OR	(95% CI)	OR	95% CI
Age (years)	20–29	24	5	20.8	1.00		1.00	
	30–49	161	109	67.7	7.97	(2.82–22.51)‡	6.55	(2.28–18.83)‡
	50+	33	7	21.2	1.02	(0.28–3.72)	0.73	(0.19–2.80)
	unknown	16	10	62.5	6.33	(1.54–26.00)†	5.83	(1.24–27.43)†
Marital status	Married	188	112	59.6	1.00			
	Unmarried/single	36	14	38.9	0.43	(0.21–0.90)*		
	Unknown	10	5	50.0	0.68	(0.19–2.42)		
Education	Secondary or under	31	14	45.2	1.00			
	Tertiary or above	189	109	57.7	1.65	(0.77–3.55)		
	Unknown	14	8	57.1	1.62	(0.45–5.78)		
Income (weekly)	\$0–\$400	100	45	45.0	1.00			
	\$401–\$600	33	20	60.6	1.88	(0.84–4.19)		
	>\$600	36	23	63.9	2.16	(0.99–4.75)		
	Unknown	65	43	66.2	2.39	(1.25–4.56) †		
House tenure	Owned	121	82	67.8	1.00			
	Rented	113	49	43.4	0.36	(0.21–0.62) ‡		
Employment	Unemployed	91	47	51.6	1.00			
	Employed	110	65	59.1	1.35	(0.77–2.37)		
	Unknown	33	19	57.6	1.27	(0.57–2.84)		
Years lived in NZ§	0–4	98	43	43.9	1.00		1.00	
	5–9	75	46	61.3	2.03	(1.10–3.74) *	2.10	(1.16–3.80) *
	10+	53	37	69.8	2.96	(1.46–6.01) †		
	Unknown	8	5	62.5	2.13	(0.48–9.42)	1.08	(0.19–6.26)
Can converse in English	No	77	36	46.8	1.00			
	Yes	146	89	61.0	1.78	(1.02–3.11)*		
	Unknown	11	6	54.5	1.37	(0.38–4.86)		
Religion	No	134	76	56.7	1.00			
	Yes	89	49	55.1	0.94	(0.55–1.60)		
	Unknown	11	6	54.5	0.92	(0.27–3.15)		
Age at immigration	0–39 years	163	101	62.0	1.00			
	40+ years	52	17	32.3	0.30	(0.15–0.58) ‡		
	Unknown	19	13	68.4	1.33	(0.48–3.68)		
Screened in China	No	133	74	55.6	1.00			
	Yes	98	54	55.1	0.98	(0.58–1.65)		

\*P<0.05; † P<0.01; ‡ P<0.001; §The adjusted OR was calculated by combing the two middle groups of “5–9” and “10+”.

Multiple logistic regression analyses generated two variables in the final step, namely, age and years lived in New Zealand. The adjusted OR and 95% confidence intervals are presented in Table 1. After controlling for confounding factors, women aged 30–49 years old were nearly 10 times more likely to report being screened in comparison with the young group (20–29 years of age). A fourfold and sevenfold odds of having

been screened were found for women living in New Zealand for 5–9 years and 10 years or more in comparison with those living in New Zealand for less than 5 years.

**Associations between being recently screened in New Zealand and sociodemographic factors**—As seen above, age, marital status, income, house type, duration of residence in New Zealand, age at immigration and English ability were found to be statistically associated with having been recently screened. The dose-response relationship for the duration of residence in New Zealand was not evident in the multivariable analysis. Thus, a group of ‘5+’ was redefined to combine ‘5–9’ and ‘10+’ and the new category was used for the multiple logistic regression.

Again, age and the duration of residence in New Zealand were selected into the final multiple Logistic regression model. Table 2 shows that an adjusted odds ratio of 6.55 (95% CI: 2.28–18.83) was found for women of 30 to 49 years of age relative to women aged 20–29; the odds of be recently screened with cervical smear test doubled for the women who had lived in New Zealand for more than 5 years in comparison with those recent immigrants (<5 years) after controlling for age.

**Table 3. Reasons reported never being screened with a cervical smear test (N=82)**

Reason	N	%	(95% CI)
Feel embarrassed	6	7.3	(2.7–15.2)
It might be painful	7	8.5	(3.5–16.8)
Thought it is unnecessary	32	39.0	(28.4–50.4)
Scared about the results	2	2.4	(0.3–8.5)
Can't afford it	6	7.3	(2.7–15.2)
Unable to attend due to work	14	17.1	(9.7–27.0)
Language barrier	11	13.4	(6.9–22.7)
Don't know where to go	30	36.6	(26.2–48.0)
No woman GP / nurse smear-taker	1	1.2	(0–6.6)
Other	6	7.3	(2.7–15.2)

**Reasons for never being screened or not being recently screened in New Zealand**—Reasons reported for never being screened with cervical smear test were wide ranging. Table 3 shows that of those who had never had a smear test, the most frequently cited reason was that “thought it is unnecessary” (39%), followed by “don't know where to go” (36.6%), “unable to attend due to work” (17.1%), and “language barrier” (13.4%).

Twenty-one respondents reported that they had at least one smear test, but the test was not undertaken within the last 3 years. The main reasons were “thought it is unnecessary” (23.8%) and “unaware it is needed every 3 years” (19%). See Table 4.



**Table 4. Reasons that cervical smear test was not conducted within the last 3 years (N=21)**

Reason	N	%	(95% CI)
Pregnant	0	0	NA
Unable to attend due to work	2	9.5	(1.2–30.4)
Thought it is unnecessary	5	23.8	(8.2–47.2)
Unaware it is needed for every 3 years	4	19.0	(5.4–41.9)
Can't afford it	1	4.8	(0.1–23.8)
Had a bad experience with the last test	0	0	NA
Language barrier	1	4.8	(0.1–23.8)
Don't know where to go	2	9.5	(1.2–30.4)
No woman GP / nurse smear-taker	2	9.5	(1.2–30.4)
Other	0	0	NA

## Discussion

We found that over one-third (35%) of the women who participated in this community-based survey had never been screened for cervical cancer in New Zealand, and 44% had not been screened within the last 3 years. The uptake is not only lower than that of the national level in New Zealand,<sup>12</sup> but also lower than that of Chinese women living in North America.<sup>7,11</sup>

In New Zealand, one of the goals of the New Zealand Health Strategy is to monitor the health of all New Zealanders and monitor inequalities in health between ethnic groups.<sup>13</sup> Much progress has been made over the past decade towards monitoring the health of Māori, European, and Pacific ethnic groups, but little has been conducted for Asian peoples.<sup>14</sup> The available research conducted in late 2004 to inform the development of communication strategies to promote greater use of cervical screening services omitted the Asian population.<sup>15</sup>

The different uptake between our sample and Chinese women living in North America might possibly be, in part, due to the different sampling methods. We only included Chinese immigrants who came from Mainland China. These women were relatively new immigrants with a mean duration of living in New Zealand of 6 years. It is likely that they were less acculturated into traditional New Zealand life in comparison with their counterparts who had lived in North America for a longer period of time<sup>11</sup> and who had immigrated from mainland China and other countries. In addition, it is envisaged that in North America, extensive and tailored educational programs and research to target underserved communities may have played a major role in reducing the gap across ethnic communities.<sup>16–18</sup>

Our findings that age and duration of residence are the most important factors associated with both having ever been screened and being recently screened are in line with other studies.<sup>7,19</sup> Women aged under 30 or above 50 years old were less likely to be screened compared to their middle-age group counterparts. A possible explanation is that women in the middle-age group were more likely to be integrated into the dominant culture through study, work and social activities. Through our focus group interview, it was also apparent that for many women aged between 40 to 50 the beginning of physical symptoms was a catalyst for being proactive about their

wellbeing. Some viewed taking care of their personal health as a prerequisite for being able to look after the whole family including the care of children and ageing parents.

The finding that young women had the lowest uptake of cervical screening could be related to their perceived view that they are relatively healthy and not at risk for cervical cancer or other gynaecologic problems. Another possible reason could be that some of them are not sexually active. Unfortunately, our survey did not contain information on sexual activity. If underuse of screening is limited to young women who are not sexually active, it may not represent a public health problem.

Internationally, it has been suggested that unmarried Asian immigrants are less sexually active than unmarried US-born women;<sup>20</sup> however, a recent domestic study has showed that 56% of Chinese students living in New Zealand had their first sexual experience between 16–24 years old.<sup>21</sup> It is possible that some single and sexually active women simply did not want to attend the cervical screening programme to avoid people's awareness of their sexual behaviour.

Duration of residence appeared to be an important factor in screening uptake. The strong dose-response relationship suggested that new immigrants may be less aware of the cervical screening programme and the resources available to them for health care maintenance in their new country. Our findings that neither educational level nor whether being screened in China was significantly associated with the uptake in New Zealand suggested that it is not critically important whether women were aware of cervical cancer and related health services before immigration, but more important that information is available and accessible to them.

Although not entered into the multiple regression models, marital status, age at immigration, income, housing tenure as well as English ability were all significantly associated with cervical screening in the bivariate analysis. Studies have shown that these are very important predictors,<sup>7,11</sup> reflecting the association between socioeconomic status and screening participation. One possible explanation for the fact that age at immigration was not independently associated with the uptake of cervical screening programme in our study might be due to its co-linearity with the current age.

Of the 152 women who had ever been screened, 21 (13.8%) did not follow the screening time frame, that is, they did not get screened when they were due for a new smear test. One of the most important reasons they gave was same as the one given by those who had never been screened, that is, they thought it was unnecessary. The second important reason of 'don't know where to go' given by those who never had a smear test and of being 'unaware it is needed for every 3 years' given by those who were not followed up regularly with the screening programme suggested the lack of appropriate information provided for Chinese women and the need for a sound reminder process.

The strengths of this study include the community-based sampling method that included Chinese community services providers and a focus group as a component of the study. However, several limitations should be acknowledged. First, we only included women living in Auckland regional area, where there is a high density of Chinese residents. It is unknown to what extent our findings can be generalised to other geographic areas, where there are fewer Chinese residing.



Second, our principal method of recruitment via CNSST networks could have caused a selection bias. It is possible that our respondents had different uptakes of cervical screening compared to those who are not engaged with an ethnic community organisation and were less visible or to those who were approached but refused to participate.

Third, there may have been measurement error as a result of using a self-reported assessment of screening. A previous study found that there was a concordance of 78% between the patient report and medical record. Most discordance was from women who reported having had a test but had no record of testing.<sup>22</sup> The possible bias could partly explain the higher uptake rate in our sample compared to government statistics.<sup>14</sup>

Fourth, self-administered questionnaire may have also acted as a bias, because this method may have excluded women who may have found difficult to answer a questionnaire, even if it was in their own language. Last, as a pilot study, our sample size was small, which limited the power to identify the independent effects of some important socio-demographic factors.

In conclusion, our study has provided valuable baseline data of the uptake of cervical cancer screening among Chinese women in the Auckland area. It is hoped that the findings contribute to further research, health promotion and making services more accessible and acceptable. Efforts should be made to encourage enrolment and retention in the screening programme for all Chinese women between 20–69 years of age and increase the levels of understanding for the need for screening. The study highlights the information needs of new immigrants and older or younger women.

**Competing interests:** None known.

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