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ORIGINAL PAPER

Recent Survey Findings on Smoking and Cessation Behaviors Among Asians in New York City

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Abstract
Cigarette smoking has declined among New York City (NYC) adults since 2002, but research has shown that NYC tobacco control policies may be less impactful among Asian communities, particularly Chinese. In order to better target this subgroup, we explored smoking and cessation behaviors among Chinese-speaking Asian smokers compared with English-speaking Asian smokers and all other smokers. We used combined 2015–2016 data from the NYC Community Health Survey (CHS), an annual dual landline/cellphone survey of about 9000 adults to analyze smoker demographics, and 2010–2012 and 2016 CHS samples to compare quit attempts, advice, and aids used among Asian smokers who took the survey in Chinese, Asian smokers who took the survey in English and all other smokers at two points in time. We used multivariable logistic regression to compare outcomes between groups. In 2015–2016, English-speaking Asians (11.2%, p = .004) and all other adults (13.6%, p = .029) were less likely to be current smokers compared with Chinese-speaking Asians (16.9%). In 2010–2012 there was no difference in odds of current smoking by race/interview language, while in 2016 the odds of smoking among English-speaking Asians and all other respondents were 51% and 32% lower, respectively, than Chinese-speaking Asians. Odds of NRT use did not differ in 2010–2012 but in 2016 odds of NRT use among all other smokers were 2.63 times higher than among Chinese-speaking Asian smokers. Results indicate the need for tailored smoking cessation programs towards Chinese-speaking Asian smokers to encourage NRT use, reduce cigarette consumption, and decrease disparities.

Keywords Smoking cessation · Chinese smokers · Asian smokers · Health disparities

Introduction

Cigarette use is the leading cause of preventable death in the United States (US), responsible for 480,000 deaths per year [1]. Over the past 15 years tobacco regulations, anti-smoking advertising campaigns, and the availability and promotion of smoking cessation services have led to a decrease in cigarette use nationally and in New York City (NYC) [2, 3]. However research suggests that, for reasons such as high rates of tax avoidance and linguistic isolation, NYC tobacco control policies may not be reaching Asian and, specifically, Chinese communities [4, 5].

The failure of NYC's tobacco control efforts to reach Asian smokers is concerning in several ways. First, Asians comprise a growing portion of the city's population. Asians accounted for 14.1% of the population in 2016, up from 12.7% in 2010 [6], with the highest proportion of foreign born residents, many immigrating from China [7]. In 2010 in China, 52.9% of men and 2.4% of women used cigarettes and smoking was estimated to cause 20% of deaths among men [8, 9]. This suggests that in the absence of robust tobacco control efforts in China, influx of Asians to NYC may continue to contribute to high smoking rates. Second, patterns of Asian smoking may contribute to overall disparities, not only with respect to race/ethnicity but also with respect to sex and education. National data from 2016 showed 14.0% of Asian men and 4.6% of Asian women smoked [3]. NYC data in 2016 showed the disparity in smoking by sex was similar to national data, however the prevalence among Asian men was much higher, with 23.5% of Asian men smoking compared with 3.1% of Asian women [2]. In addition, Asian New Yorkers have a lower median annual income and prevalence of attaining at least a Bachelor's degree compared with non-Hispanic white New Yorkers and Asians

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nationally [7]. Research shows smoking is correlated with educational attainment; prevalence of current smoking is higher among those with less than a college degree compared with those with at least a Bachelor's degree [2, 10]. Moreover, the consequences of smoking among Asians in NYC are becoming more pronounced. For example, lung cancer deaths increased 70% among Chinese New Yorkers between 2000 and 2014 and lung cancer mortality rates are higher among Chinese men compared with men overall [11].

Acculturation may also be a factor in these disparities. There are a number of ways to measure acculturation and its effect on health outcomes including interview language, perceived English proficiency, language spoken at home, age at immigration, years in the US, ethnicity of social contacts and cultural participation [12]. Studies show Asian adult males with high measures of acculturation have a lower rate of smoking than those with lower measures of acculturation, while the opposite is true among Asian adult females and Asian youth [5, 13–16].

This study focuses on smoking in NYC among Asians broadly, as well as among the Chinese subgroup of Asian ethnicity specifically. The Chinese are the largest Asian subgroup residing in NYC. In 2016, Chinese made up 48.9% of Asian residents and 6.9% of NYC residents overall [6, 17]. In order to understand how to best target the Chinese speaking Asian subgroup, a subgroup with a disproportionately high rate of smoking, we explored predictors of smoking and cessation among Chinese-speaking Asian smokers compared with English-speaking Asian smokers and all other smokers. We analyzed our data by interview language, an indicator of acculturation strongly correlated with health outcomes and access to care among Asian Americans [18]. Additionally, language is an important consideration in communicating tobacco control strategies such as media, educational campaigns and cessation services content. Our objectives were: to determine whether smoking prevalence has declined among Asians and whether trends have been different by sex; and to examine smoking behaviors and access to care and use of NRT among NYC Asians.

Methods

Data on cigarette smoking, demographics and access to health care and cessation services were collected using the NYC Community Health Survey (CHS), a yearly population based telephone survey beginning in 2002 of about 9000 randomly sampled NYC residents aged 18 years and older. To produce citywide estimates, CHS used a stratified random sample. Eligible households were contacted using landlines and cellphones with an NYC exchange (starting in 2009). Surveys were conducted using a computer-assisted telephone interviewing (CATI) system and interviews were held in four languages including English, Spanish, Russian and Chinese (Mandarin and Cantonese). All data were self-reported. Weights to account for probability of selection and post-stratification were applied to the survey data. Post-stratification weighting weights each record to the population of the UHF neighborhood while taking the respondent's age, gender and race into account. Response rates ranged from 39 to 40% in 2010–2012 and 42.5–44.3% in 2015–2016 (the American Association for Public Opinion Research [AAPOR] revised its Standard Definitions in 2016. According to the new definitions the response rates in 2015 and 2016 were 17.4% and 17.3%, respectively.) [19].

We calculated prevalence of cigarette smoking by sex overall and among Asians for the years 2002–2016. Current smokers were defined as those who responded yes to the question "Have you smoked at least 100 cigarettes in your entire life?" and "some days" or "everyday" to the question "Do you now smoke cigarettes: everyday, some days, or not at all?" Trend analysis for smoking prevalence was conducted during these years. Prevalence of demographic and health care variables were calculated among Asians who were interviewed in Chinese (CLAs), Asians who were interviewed in English (ELAs) and all other smokers (race/interview language) using a 2015–2016 combined year sample. Prevalence of smoking cessation activities among those who smoked less than 12 months ago by race/interview language were calculated using a 2010–2012 combined year and 2016 sample. Those who smoked less than 12 months ago included current smokers and those who quit in the past 12 months. Cessation services assessed were "received quit advice from a medical provider" and "NRT use". Those who received quit advice were those who answered yes to the question "During the last 12 months has a doctor, nurse or other health professional advised you to quit smoking?" NRT use was defined as answering yes to the question "During the past 12 months, did you use any of the following aids to help quit? A nicotine patch, nicotine gum, nicotine lozenge, nicotine nasal spray or nicotine inhaler?" Cessation services questions are not routinely available; they were unavailable for survey years 2013–2015. Race/interview language categories were compared using *t* tests. All comparisons reported in the results section were statistically significant ($p < .05$) unless otherwise noted.

We used multivariable logistic regression models to calculate the adjusted odds ratio of current smoking and received quit advice from a medical provider and NRT use by race/interview language. We adjusted for a priori selected covariates based on clinical relevance and used a backward elimination model-building strategy [20]. All outcomes were first analyzed using an unadjusted model (model 1). For current smoking, we used a model adjusting for age, sex, educational attainment, employment status, marital status and insurance type (model 2). We adjusted the received quit

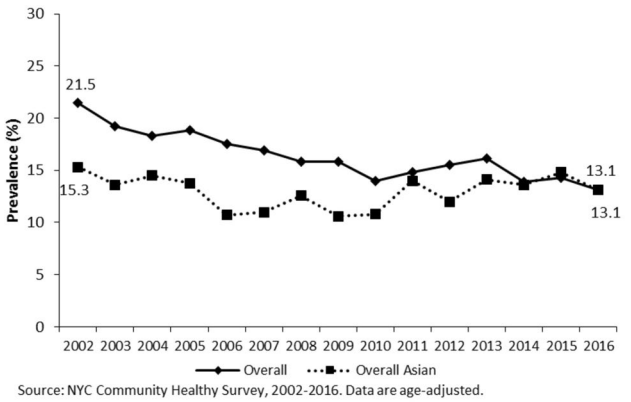

Fig. 1 Current smoking among NYC adults (18+), overall and among Asians, 2002–2016

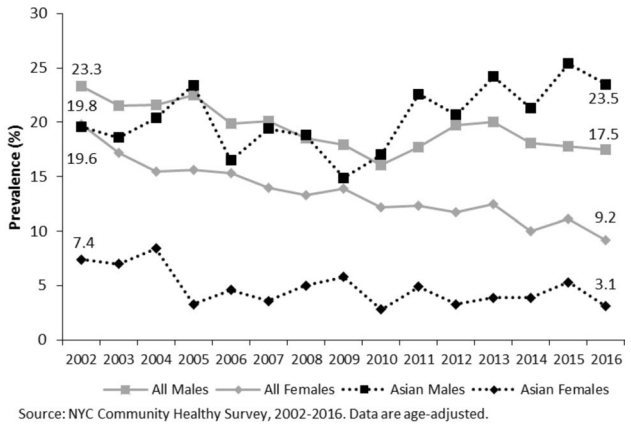

Fig. 2 Current smoking among NYC adults (18+), by sex and Asian race, 2002–2016

advice from a medical provider and NRT use models for age, sex, employment status and insurance type (model 3), due to better model fit. We ran each model using both 2010–2012 combined year and 2016 samples. To account for the complex survey design of the CHS, all analyses were conducted using SAS-callable SUDAAN version 11.0.1.

Results

Between 2002 and 2016 overall smoking prevalence significantly decreased from 21.5% to 13.1%, but remained flat among Asians (15.3% to 13.1%) (Fig. 1). In 2016, 17.5% of males overall were current smokers compared to 23.5% of Asian males. Conversely, 9.2% of females overall were current smokers compared to 3.1% of Asian females. Asian females (7.4% to 3.1%) saw a downward trend in smoking since 2002, while an upward trend was seen among Asian males (19.6% to 23.5%) (Fig. 2).

Table 1 shows the 2015–2016 prevalence of CLA smokers, ELA smokers, and all other smokers. Overall, CLAs (16.9%) had a higher prevalence of smoking compared with ELAs (11.2%) and all others (13.6%). CLA males (32.6%) were approximately twice as likely to be smokers as ELA males (17.1%) and all other males (16.3%). Employed CLAs (23.6%) were more likely to smoke compared with employed ELAs (11.7%) and all others who were employed (12.9%). CLAs who were married (21.5%) were almost twice as likely to smoke as all others who were married (11.2%). Among those with private health insurance, CLAs (15.2%) were more likely to smoke compared with ELAs (7.5%).

Table 2 shows prevalence of receipt of cessation services by race/interview language using 2010–2012 combined and 2016 data. In 2010–2012 there was no difference in smoking less than 12 months ago between groups; however in 2016 prevalence among CLAs (20.9%) was higher than among ELAs (9.1%) and all others (14.6%). There was no difference by race/interview language in being advised by a medical professional to quit in 2010–2012 or 2016. In both 2010–2012 and 2016, CLA smokers were less likely to use NRT to quit (7.9% and 12.6%) compared with all other smokers (20.6% and 21.2%). There was no difference in NRT use between CLAs and ELAs.

In the adjusted models (Table 3), there was no difference in odds of being a current smoker between race/interview language categories in 2010–2012, while in 2016 odds were 51% and 32% lower among ELAs and all others compared with CLAs (model 2). Model 3 showed no difference in odds between race/interview language categories for receiving quit advice from a medical provider in 2010–2012 or 2016. In 2010–2012 there was no difference in odds of NRT use between race/interview language categories; however, in 2016 all other smokers had 2.63 times higher odds of using NRT than CLA smokers (model 3). Unadjusted models (model 1) showed similar results compared with the adjusted models (models 2 and 3).

Conclusion

In NYC, smoking overall has declined since 2002 while it has remained steady among Asians and increased among Asian men. In 2015–2016, CLAs were more likely to be current smokers compared with ELAs and all others. CLA males were nearly twice as likely to smoke compared with ELA males and all other males. In adjusted analyses, we saw shifts in odds of both current smoking and use of NRT over time, by 2016, ELAs and all others had lower odds of smoking and all others had higher odds of using NRT compared with CLAs. The differences in model years show encouraging progress in smoking cessation and NRT use among all others compared with CLAs and suggest that, while all

Table 1 Prevalence of current smoking by demographic variables among Chinese language Asians (CLAs), English language Asians (ELAs) and all other adults (18+), New York City, CHS 2015–2016

	CLA smokers			ELA smokers				All other smokers			
	Pop. estimate	%	95% CI	Pop. estimate	%	95% CI	p-value[1]	Pop. estimate	%	95% CI	p-value[1]
Overall	74,000	16.9	(14.2, 19.9)	56,000	11.2	(8.8, 14.2)	**.004**	777,000	13.6	(12.9, 14.4)	**.029**
Type of smoker											
Non-daily	25,000	34.0	(26.4, 42.5)	27,000	42.5	(33.2, 52.4)	–	319,000	23.5	(16.9, 31.6)	–
Light daily (≤ 10 cigs)	30,000	50.8[a]	(37.5, 64.0)	22,000	36.7[a]	(25.3, 49.7)	–	294,000	12.5	(6.9, 21.7)	–
Heavy daily (> 10 cigs)	19,000	40.5	(37.5, 43.5)	6000	37.0	(34.1, 40.0)	–	164,000	22.5	(20.0, 25.2)	–
Age											
18–24	4000	12.1[a]	(5.4, 25.0)	15,000	13.3	(8.1, 21.1)	.835	79,000	11.1	(8.9, 13.8)	.844
25–4	44,000	24.2	(19.2, 30.3)	31,000	14.3	(10.5, 19.0)	**.005**	356,000	16.1	(14.7, 17.6)	**.005**
45–64	23,000	16.4	(12.7, 21.0)	7000	7.8[a]	(3.9, 14.9)	**.011**	281,000	15.4	(14.2, 16.7)	.636
65+	3000	4.1[a]	(2.0, 8.4)	2000	8.6[a]	(4.3, 16.7)	.182	60,000	6.6	(5.6, 7.7)	.129
Sex											
Male	70,000	32.6	(28.0, 37.5)	40,000	17.1	(13.1, 22.0)	**< .001**	432,000	16.3	(15.1, 17.5)	**< .001**
Female	4000	2.1[a]	(1.0, 4.5)	15,000	5.7	(3.5, 8.9)	**.024**	344,000	11.2	(10.3, 12.2)	**< .001**
Poverty											
< 200% FPL	66,000	18.1	(15.1, 21.5)	28,000	14.4	(10.2, 19.9)	.211	404,000	15.2	(14.1, 16.4)	.094
≥ 200% FPL	8000	10.5	(6.2, 17.3)	28,000	8.9	(6.4, 12.4)	.628	373,000	12.4	(11.4, 13.5)	.498
Education (age 25+)											
Less than high school	29,000	16.2	(12.4, 20.9)	3,000	10.3[a]	(3.8, 24.9)	.278	150,000	17.5	(15.4, 19.9)	.577
High school graduate	29,000	21.5	(16.5, 27.5)	11,000	18.2	(10.3, 30.2)	.571	190,000	16.9	(15.2, 18.9)	.126
Some college/technical school	6000	16.4	(9.9, 25.8)	11,000	17.1	(10.5, 26.6)	.905	169,000	15.3	(13.6, 17.2)	.801
College graduate	4000	10.7	(6.5, 17.2)	15,000	8.0	(5.3, 11.9)	.397	184,000	9.8	(8.8, 10.9)	.740
Employment											
Employed	64,000	23.6	(18.1, 30.1)	40,000	11.7	(8.4, 16.0)	**.001**	462,000	12.9	(12.0, 14.0)	**.001**
Not employed	4000	32.9[a]	(19.0, 50.6)	6000	16.8[a]	(8.0, 31.8)	.114	85,000	18.7	(15.9, 21.9)	.092
Not in labor force	6000	4.4[a]	(2.4, 7.9)	10,000	8.3	(4.8, 14.0)	.131	226,000	14.4	(12.7, 16.2)	**< .001**
Marital status											
Married/partnered	56,000	21.5	(14.4, 31.0)	25,000	12.5	(8.4, 18.2)	.067	303,000	11.2	(10.1, 12.3)	**.015**
Divorced/widowed/separated	9000	24.5[a]	(14.5, 38.2)	2000	8.5[a]	(3.6, 18.7)	**.024**	150,000	15.5	(13.0, 18.3)	.149
Never married	9000	19.0[a]	(10.2, 32.8)	29,000	11.1	(6.8, 17.7)	.212	320,000	16.9	(15.4, 18.4)	.708
Self-reported health status											
Excellent	2000	13.1[a]	(5.6, 27.7)	6000	6.9[a]	(3.4, 13.6)	.296	99,000	9.1	(7.8, 10.6)	.465
Very good	19,000	17.3	(12.2, 23.8)	18,000	12.6	(7.9, 19.5)	.258	199,000	12.1	(10.8, 13.5)	.086
Good	22,000	18.8	(13.4, 25.6)	26,000	13.2	(9.3, 18.6)	.155	278,000	14.9	(13.5, 16.3)	.219
Fair	26,000	15.5	(11.7, 20.4)	6,000	13.9	(7.7, 24.0)	.723	130,000	16.9	(14.4, 19.7)	.594
Poor	4000	20.4[a]	(9.6, 38.2)	1000	[b]	[b]	[b]	67,000	20.1	(15.0, 26.4)	.973

Table 1 (continued)

	CLA smokers			ELA smokers				All other smokers			
	Pop. estimate	%	95% CI	Pop. estimate	%	95% CI	p-value[1]	Pop. estimate	%	95% CI	p-value[1]
Insurance type											
Private	11,000	15.2	(10.1, 22.2)	19,000	7.5	(4.7, 11.7)	**.029**	324,000	11.9	(10.8, 13.0)	.287
Medicare	5000	15.4[a]	(7.0, 30.6)	7000	21.7[a]	(10.4, 39.9)	.513	85,000	15.1	(11.6, 19.4)	.951
Medicaid	40,000	16.9	(13.3, 21.2)	12,000	10.9	(6.4, 18.0)	.089	220,000	16.6	(15.1, 18.3)	.911
Other	[b]	[b]		4000	17.3[a]	(6.3, 39.5)	**.037**	30,000	20.4	(15.2, 26.9)	**< .001**
Uninsured	16,000	22.9	(15.7, 32.0)	11,000	15.2	(9.1, 24.2)	.174	109,000	15.3	(13.2, 17.7)	.081
Has 1 or more primary care providers											
Yes	57,000	16.5	(13.4, 20.0)	40,000	10.4	(7.9, 13.7)	**.007**	609,000	13.0	(12.2, 13.9)	**.045**
No	16,000	31.1	(24.0, 39.2)	15,000	16.6	(9.4, 27.6)	**.016**	163,000	16.7	(14.8, 18.8)	**< .001**
Needed medical care in the last 12 months and didn't get it											
Yes	3000	16.8[a]	(7.2, 34.5)	8000	10.6[a]	(5.4, 19.7)	.422	111,000	17.6	(15.3, 20.3)	.904
No	70,000	17.1	(14.3, 20.2)	45,000	10.7	(8.2, 13.7)	**.002**	663,000	13.1	(12.3, 13.9)	**.011**
Place you go when sick or need advice about health											
Doctor/health center/clinic	70,000	17.0	(14.3, 20.2)	47,000	11.4	(8.8, 14.6)	**.007**	584,000	12.7	(11.9, 13.6)	**.005**
ED/urgent care/no usual place/other	3000	15.3[a]	(6.9, 30.7)	9000	9.5	(5.2, 16.5)	.368	189,000	17.8	(15.9, 20.0)	.681

Source NYC Community Health Survey (CHS) 2015–2016. CHS has included adults with landline phones since 2002 and, starting in 2009, also has included adults who can be reached only by cell-phone

CHS 2015–2016 data are weighted to the adult residential population per the American Community Survey, 2013–2014

Data are age-adjusted to the US 2000 Standard Population

Weighted n population estimates are rounded to the nearest thousand

[1]Reference group—CLA smokers. Comparison made using *t* test

[a]Estimate should be interpreted with caution. Estimate's relative standard error (a measure of estimate precision) is greater than 30% or the sample size is less than 50, making the estimate potentially unreliable

[b]Unreliable estimate. Data suppressed

Table 2 Prevalence of smoking and cessation activities among Chinese language Asians (CLAs), English language Asians (ELAs), and all other adults (18 +) who smoked less than 12 months ago, New York City, CHS 2010–2012, 2016

	CLA smokers			ELA smokers				All other smokers			
	Pop. estimate	%	95% CI	Pop. estimate	%	95% CI	p-value[1]	Pop. estimate	%	95% CI	p-value[1]
Smoked less than 12 months ago (2010–2012)	45,000	16.7	(12.8, 21.3)	70,000	12.3	(10.1, 15.0)	.084	929,000	17.4	(16.6, 18.2)	.741
Smoked less than 12 months ago (2016)	79,000	20.9	(16.9, 25.7)	52,000	9.1	(6.6, 12.4)	**< .001**	832,000	14.6	(13.5, 15.8)	**.007**
Advised by a medical professional to quit (2010–2012)	25,000	56.0[a]	(43.4, 67.8)	27,000	51.6	(43.3, 59.7)	.564	574,000	62.7	(60.4, 65.0)	.295
Advised by a medical professional to quit (2016	47,000	59.2[a]	(47.0, 70.4)	23,000	64.0[a]	(50.3, 75.8)	.594	504,000	62.0	(58.1, 65.7)	.662
Used NRT to help quit (2010–2012)	4000	7.9[a]	(3.5, 17.1)	9000	12.4	(7.4, 20.2)	.326	196,000	20.6	(18.8, 22.6)	**< .001**
Used NRT to help quit (2016)	8000	12.6[a]	(6.5, 22.0)	4000	15.2[a]	(5.9, 34.1)	.741	175,000	21.2	(18.1, 24.8)	**.049**

Source NYC Community Health Survey (CHS) 2010–2012, 2013, 2016. CHS has included adults with landline phones since 2002 and, starting in 2009, also has included adults who can be reached only by cell-phone

CHS 2010–2012 combined year analyses are weighted to the NYC adult residential population as per Census 2010 and the 2010–2011 American Community Survey. CHS 2013 data are weighted to the adult residential population per the American Community Survey, 2012. CHS 2016 data are weighted to the adult residential population per the American Community Survey, 2015

Analyses were restricted to CHS 2010–2012 combined data unless otherwise noted

Data are age-adjusted to the US 2000 Standard Population

Population estimates are rounded to the nearest thousand

[1]Reference group—CLA smokers. Comparison made using t-test

[a]Estimate should be interpreted with caution. Estimate's Relative Standard Error (a measure of estimate precision) is greater than 30% or the sample size is less than 50, making the estimate potentially unreliable

Table 3 Adjusted odds ratio (AOR) of current smoking and cessation activities among adults (18+) who smoked less than 12 months ago by race/interview language, New York City, CHS 2010–2012, 2016

	Current smoker (2010–2012)		Current smoker (2016)		Received quit advice from a medical provider (2010–2012)		Received quit advice from a medical provider (2016)		Used nicotine replacement therapy (2010–2012)		Used nicotine replacement therapy (2016)	
	AOR	95% CI	AOR	95% CI	AOR	95% CI	AOR	95% CI	AOR	95% CI	AOR	95% CI
Race/interview language (model 1)												
Asian/Chinese language interview	Ref.	–	Ref.	–	Ref.	–	Ref.	–	Ref.	–	Ref.	–
Asian/English language interview	.90	.62–1.30	**.45**	**.28–.71**	.52	.27–1.03	.56	.24–1.27	1.56	.52–4.68	.82	.24–2.85
All other respondents	1.21	.90–1.62	**.63**	**.47–.85**	1.33	.78–2.28	1.08	.64–1.82	**2.70**	**1.08–6.77**	**2.48**	**1.15–5.32**
Race/interview language (model 2)												
Asian/Chinese language interview	Ref.	–	Ref.	–	–	–	–	–	–	–	–	–
Asian/English language interview	1.00	.67–1.50	**.49**	**.30–.79**	–	–	–	–	–	–	–	–
All other respondents	1.30	.95–1.78	**.68**	**.50–.93**	–	–	–	–	–	–	–	–
Race/interview language (model 3)												
Asian/Chinese language interview	–	–	–	–	Ref.	–	Ref.	–	Ref.	–	Ref.	–
Asian/English language interview	–	–	–	–	.75	.35–1.59	.89	.32–2.46	1.67	.53–5.24	1.09	.29–4.06
All other respondents	–	–	–	–	1.36	.73–2.55	.88	.46–1.66	2.52	.96–6.64	**2.63**	**1.10–6.31**

Source NYC Community Health Survey (CHS) 2010–2012, 2013, 2016. CHS has included adults with landline phones since 2002 and, starting in 2009, also has included adults who can be reached only by cell-phone

CHS 2010–2012 combined year analyses are weighted to the NYC adult residential population as per Census 2010 and the 2010–2011 American Community Survey. CHS 2013 data are weighted to the adult residential population per the American Community Survey, 2012. CHS 2016 data are weighted to the adult residential population per the American Community Survey, 2015

Data are age-adjusted to the US 2000 Standard Population

Model 1 is unadjusted

Model 2 is adjusted for age, sex, educational attainment, employment status, marital status and insurance type

Model 3 is adjusted for age, sex, employment status, and insurance type

groups are as likely to receive advice to quit, greater NRT use may be one contributing factor to the disproportionate improvement seen among non-Asian smokers.

Attitudes about smoking cessation and NRT among Chinese are mixed. A qualitative study of Chinese and Vietnamese families living in California found that most smokers believed "will power" is most important when quitting smoking. Many were also concerned about the side effects of NRT [21]. Key informant interviews with stakeholders from the NYC Chinese community found that in many Chinese families, wives are charged with making medical appointments for their husbands. NRT and cessation service distribution may be more successful if wives could call the quitline on their husband's behalf [22]. Most quitlines, including the New York State Smokers' Quitline, do not allow proxy callers. The New York State quitline also does not provide direct service in Chinese or other Asian languages. Smokers in need of Chinese language services are transferred to the Asian Smokers' Quitline operated out of California.

In contrast with some prior regional and national studies [23–26], we found that CLAs were as likely to receive quit advice, suggesting access to at least minimal provider cessation activity. Evidence shows provider advice to quit, cessation counseling and NRT use are all highly effective in helping smokers quit among the population overall, including the Asian population [27–29].

On the other hand, a 2004 survey of physicians in China found that many doctors did not believe smokers would follow their cessation advice and less than 10% used NRT to help smokers quit and less than 5% used a prescription aid [30]. A similar 2009 survey of physicians and nurses in China found that about half had received training on how to advise patients to quit smoking but 55% had never heard of NRT [31]. While both provider training and patient uptake of cessation information may have improved since then, these findings give clues as to why Chinese-speaking smokers living in NYC are less likely to use NRT or prescription pills to quit than other New Yorkers.

Our results indicate the need to tailor smoking cessation programs towards Chinese men who prefer speaking Chinese. In 2016 CLA men had a higher prevalence of smoking and smokers were less likely to use NRT compared with all other respondents. This disparity was not seen in 2010–2012, showing that elements of NYC's tobacco

control efforts are not reaching the Chinese speaking Asian subgroup. Barring changes to immigration patterns, NYC will continue to face a steady influx of Chinese smokers, many of whom will not be aware of or responsive to the city's tobacco control efforts. Previous pilot studies of cessation programs in Chinese enclaves located in NYC have proven effective in reducing smoking and increasing NRT use [28, 32, 33]. There is also evidence that in NYC Chinese enclaves, community-based programs combined with tobacco control policies are more effective than tobacco control policies alone [33]. In 2010 the NYC Department of Health posted a Chinese language online application on its website to facilitate NRT distribution and access to cessation services for smokers with low English fluency. The application was promoted through letters sent to Chinese speakers from 2010 to 2012, through translated existing English language print ads in 2011, through an ad specifically tailored to the Chinese community in 2012 and also by engaging a Cantonese- and Mandarin-speaking liaison to provide phone-assisted enrollment for Chinese speakers. The Chinese language phone number was promoted by newspaper ads and the liaison helped develop community partnerships. Enrollment of Chinese speakers was low and did not change between 2010 and 2011, but doubled in 2012, indicating both the reluctance of Chinese smokers to use these online cessation services and the effectiveness of culturally tailored print advertisements and a Chinese-speaking liaison to the Chinese community [22]. These piloted small-scale, short-term activities were grant funded and therefore difficult to sustain.

Limitations of our study include use of cross-sectional, self-reported data, which only provides a population snapshot and may underestimate true smoking prevalence. Additional limitations include the lack of non-Chinese Asian survey languages, using interview language as a proxy for acculturation as opposed to a multidimensional, validated scale, and the unavailability of cessation activities data from other CHS years. Strengths include access to a large, multilingual survey sample representative of NYC and outcomes with multiple time points.

Our study highlights the importance of developing strategies which address barriers to cessation services access within the NYC Chinese community. In conjunction with tobacco control policies, culturally tailored smoking cessation services, educational programs and media campaigns specifically targeting Chinese speaking men will hopefully increase uptake of services and reduce cigarette use and its related health burdens among this high-risk population.

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Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

References

1. U.S. Department of Health and Human Services. (2014). The health consequences of smoking: 50 years of progress. A report of the surgeon general. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.
2. New York City Department of Health and Mental Hygiene. Epiquery: NYC Interactive Health Data System—Community Health Survey, 2002–2016. Retrieved December 1, 2018, from https://nyc.gov/health/epiquery.
3. Jamal, A., Phillips, E., Gentzke, A. S., et al. (2018). Current cigarette smoking among adults—United States, 2016. *Morbidity and Mortality Weekly Report, 67,* 53–59.
4. Cantrell, J., Hung, D., Fahs, M. C., & Shelley, D. (2008). Purchasing patterns and smoking behaviors after a large tobacco tax increase: a study of Chinese Americans living in New York City. *Public Health Reports, 123*(2), 135–146.
5. Li, S., Kwon, S. C., Weerasinghe, I., Rey, M. J., & Trinh-Shevrin, C. (2013). Smoking among Asian Americans acculturation and gender in the context of tobacco control policies in New York City. *Health Promotion Practice, 14*(Supp 1), 18S–28S.
6. New York City Department of City Planning. American Community Survey (ACS). (2015). Retrieved December 1, 2018 from https://www1.nyc.gov/site/planning/data-maps/nyc-population/american-community-survey.page.
7. Burden, A. M., Barth, R, Hornick, S, et al. Socioeconomic Characteristics by Race/Hispanic Origin and Ancestry Group, in NYC 2010: Results from the 2010 American Community Survey 2010, New York City Department of City Planning. Retrieved December 1, 2018, from https://www1.nyc.gov/assets/planning/download/pdf/data-maps/nyc-population/acs/acs_socio_10_nyc.pdf.
8. Li, Q., Hsia, J., & Yang, G. (2011). Prevalence of smoking in China in 2010. *New England Journal of Medicine, 364*(25), 2469–2470.
9. Chen, Z., Peto, R., Zhou, M., et al. (2015). Contrasting male and female trends in tobacco-attributed mortality in China: Evidence from successive nationwide prospective cohort studies. *The Lancet, 386*(10002), 1447–1456.
10. Jamal, A., King, B. A., Neff, L. J., Whitmill, J., Babb, S., & Graffunder, C. (2016). Current cigarette smoking among adults—United States, 2005–2015. *Morbidity and Mortality Weekly Report, 2016*(65), 1205–1211.
11. Li, W., Sun, Y., Huynh, M. (2017). Mortality among Chinese New Yorkers. New York City Department of Health and Mental Hygiene. *Epi Data Brief*. Retrieved December 1, 2018, from https://www1.nyc.gov/assets/doh/downloads/pdf/epi/databrief91.pdf.
12. Salant, T., & Lauderdale, D. S. (2003). Measuring culture: a critical review of acculturation and health in Asian immigrant populations. *Social Science and Medicine, 57*(1), 71–90.
13. Ma, G. X., Tan, Y., Toubbeh, J. I., Su, X., Shive, S. E., & Lan, Y. (2004). Acculturation and smoking behavior in Asian-American populations. *Health Education Research, 19*(6), 615–625.
14. An, N., Cochran, S. D., Mays, V. M., & McCarthy, W. J. (2008). Influence of American acculturation on cigarette smoking

behaviors among Asian American subpopulations in California. *Nicotine & Tobacco Research, 10*(4), 579–587.
15. Shelley, D., Fahs, M., Scheinmann, R., et al. (2004). Acculturation and tobacco use among Chinese Americans. *American Journal of Public Health, 94*(2), 300–307.
16. Fu, S. S., Ma, G. X., Tu, X. M., Siu, P. T., & Metlay, J. P. (2003). Cigarette smoking among Chinese Americans and the influence of linguistic acculturation. *Nicotine & Tobacco Research, 5*(6), 803–811.
17. U.S. Census. (2012). The Asian population: 2010. Retrieved December 1, 2018, from https://www.census.gov/prod/cen2010/briefs/c2010br-11.pdf.
18. Lee, S., Nguyen, H. A., & Tsui, J. (2011). Interview language: A proxy measure for acculturation among Asian Americans in a population-based survey. *Journal of Immigrant and Minority Health, 13*(2), 244–252.
19. New York City Department of Health and Mental Hygiene. Community Health Survey Methodology. Retrieved from https://www1.nyc.gov/site/doh/data/data-sets/community-health-survey-methodology.page.
20. Hosmer, D. W., & Lemeshow, S. (2000). *Applied logistic regression*. New York: Wiley.
21. Tsang, I. K., Tsoh, J. Y., Wong, C., et al. (2014). Understanding and use of nicotine replacement therapy and nonpharmacologic smoking cessation strategies among Chinese and Vietnamese smokers and their families. *Preventing Chronic Disease, 11,* 130299.
22. Quinn, E. C., Sacks, R., Farley, S. M., & Thihalolipavan, S. (2016). Development of culturally appropriate support strategies to increase uptake of nicotine replacement therapy among Russian-and Chinese-speaking smokers in New York city. *Journal of Community Health, 42*(3), 431–436.
23. Tong, E. K., Tang, H., Chen, M. S., & McPhee, S. J. (2011). Provider smoking cessation advice among California Asian-American smokers. *American Journal of Health Promotion, 25,* S70–S74.
24. Babb, S., Malarcher, A., Schauer, G., Asman, K., & Jamal, A. (2017). Quitting smoking among adults—United States, 2000–2015. *Morbidity and Mortality Weekly Report, 65,* 1457–1464.
25. Mukherjea, A., Wackjowski, O., Lee, Y. O., & Delnevo, C. D. (2014). Asian American, native Hawaiian and Pacific Islander tobacco use patterns. *American Journal of Health Behavior, 38*(3), 362–369.
26. Ma, G. X., Shive, S., Tan, Y., Toubbeh, J. I., Fang, C. Y., & Edwards, R. L. (2005). Tobacco use, secondhand smoke exposure and their related knowledge, attitudes and behaviors among Asian Americans. *Addictive Behaviors, 30*(4), 725–740.
27. Agency for Healthcare Research and Quality. (2008). Treating tobacco use and dependence: 2008 update. Retrieved December 1, 2018 from http://www.ahrq.gov/professionals/clinicians-providers/guidelines-recommendations/tobacco/index.html.
28. Shelley, D., Nguyen, N., Peng, C., Chin, M., Chang, M., & Fahs, M. (2010). Increasing access to evidence-based smoking cessation treatment: Effectiveness of a free nicotine patch program among Chinese immigrants. *Journal of Immigrant and Minority Health, 12*(2), 198–205.
29. Zhu, S., Cummins, S. E., Wong, S., Gamst, A. C., Tedeschi, G. J., & Reyes-Nocon, J. (2012). The effects of a multilingual telephone Quitline for Asian smokers: A randomized controlled trial. *Journal of the National Cancer Institute, 104*(4), 299–310.
30. Jiang, Y., Ong, M. K., Tong, E. K., et al. (2007). Chinese physicians and their smoking knowledge, attitudes, and practices. *American Journal of Preventive Medicine, 33*(1), 15–22.
31. Klink, K., Lin, S., Elkin, Z., & Strigenz, D. (2011). Smoking cessation knowledge, attitudes, and practice among community health providers in China. *Family Medicine, 43*(3), 198–200.
32. Wu, D., Ma, G. X., Zhou, K., Zhou, D., Liu, A., & Poon, A. N. (2009). The effect of a culturally tailored smoking cessation for Chinese American smokers. *Nicotine & Tobacco Research, 11*(12), 1448–1457.
33. Shelley, D., Fahs, M., Yerneni, R., et al. (2008). Effectiveness of tobacco control among Chinese Americans: A comparative analysis of policy approaches versus community-based programs. *Preventive Medicine, 47*(5), 530–536.