

Letters

RESEARCH LETTER

Changes in Smoking Prevalences Among Health Care Professionals From 2003 to 2010-2011

Smoking by health care professionals is a barrier to tobacco interventions with patients.¹ From 2003 to 2006-2007,² smoking prevalences among health care professionals demonstrated no significant declines, with the highest prevalence among licensed practical nurses (20.55%) and the lowest prevalence among physicians (2.31%). With the release of 2010-2011 data, we updated these findings to assess changes in smoking status.

Methods | We obtained publicly available data from self-respondents to the Tobacco Use Supplement (response rate, 63%) to the Current Population Survey (response rate, 93% for self-respondents and proxies) to compare smoking prevalences among health care professionals from 2003 to 2010-2011.³ Questions about smoking status were the same for each survey. Stratified probability sampling provided representative estimates of the population by occupation, includ-

ing physicians, registered nurses, licensed practical nurses, pharmacists, respiratory therapists, and dental hygienists. We excluded dentists and physician assistants from analysis because the sample sizes for current smokers were too small.

Smoking status was defined as never smokers (smoked < 100 cigarettes lifetime), former smokers (smoked ≥ 100 cigarettes lifetime but answered “not at all” to the question “Do you now smoke cigarettes everyday, some days, or not at all?”), and current smokers (smoked ≥ 100 cigarettes lifetime and responded “everyday” or “some days” to the above question).

Statistical analyses were performed using SAS (SAS Institute), version 9.3, and SUDAAN (Windows Network SAS-Callable), version 9.1. Estimates of smoking prevalence were calculated using self-response weights. Associated standard errors were calculated using replicate weights to account for the complex sampling design and to construct 95% CIs. All tests were 2-sided, *P* values less than .05 were considered significant. A weighted Cochran-Mantel-Haenszel test controlling for survey years was used to test for differences in smoking status among professionals across surveys. To determine the overall proportion of those who ever

Table 1. Changes in Estimated Prevalences of Current Smokers Among Health Care Professionals, Tobacco Use Supplement, Current Population Survey, 2003 (n=3877), 2006-2007 (n=3870), and 2010-2011 (n=2975)^a

Year	Current Smokers ^b			% Change (95% CI)	
	2003	2006-2007	2010-2011	2003 – 2010-2011 ^c	2006-2007 – 2010-2011 ^d
National prevalence, %	18.90	18.49	16.08	-14.92	-13.03
Health care professionals					
Physician	11 (2.16) [1.14 to 4.06]	17 (2.31) [1.31 to 4.05]	11 (1.95) [1.04 to 3.62]	-9.72 (-90.05 to 70.61)	-15.58 (-86.31 to 55.13)
<i>P</i> value				.92	.69
Registered nurse	272 (11.14) [9.77 to 12.67]	254 (10.73) [9.39 to 12.24]	116 (7.09) [5.68 to 8.82]	-36.36 (-52.48 to -20.23)	-33.92 (-50.77 to -17.08)
<i>P</i> value				<.001	.001
Licensed practical nurse	116 (23.48) [19.77 to 27.65]	111 (20.55) [16.64 to 25.11]	115 (24.99) [20.51 to 30.08]	6.43 (-20.54 to 33.40)	21.61 (-12.44 to 55.65)
<i>P</i> value				.35	.16
Pharmacist	16 (8.36) [4.66 to 14.55]	7 (3.25) [1.41 to 7.33]	8 (3.02) [1.30 to 6.85]	-63.88 (-100.26 to -27.49)	-7.08 (-115.94 to 101.80)
<i>P</i> value				.13	.90
Respiratory therapist	18 (15.46) [9.52 to 24.12]	15 (19.28) [11.35 to 30.82]	10 (11.60) [5.91 to 21.54]	-24.97 (-84.87 to 34.94)	-39.83 (-89.16 to 9.49)
<i>P</i> value				.43	.20
Dental hygienist	10 (6.99) [3.94 to 12.09]	15 (12.29) [7.54 to 19.42]	9 (7.00) [3.45 to 13.70]	0.14 (-88.85 to 89.13)	-43.04 (-90.79 to 4.70)
<i>P</i> value				.31	.19
Total	443 (10.90) [9.87 to 12.02]	419 (10.33) [9.31 to 11.44]	269 (8.34) [7.26 to 9.58]	-23.42 (-36.45 to -10.52)	-19.26 (-33.17 to -5.36)
<i>P</i> value				.004	.01

^a Actual sample size; population estimates are 268 142 physicians, 617 168 registered nurses, 176 263 licensed practical nurses, 96 438 pharmacists, 42 898 respiratory therapists, and 52 241 dental hygienists.

^b Indicates testing for no change in the distribution of current smokers among health care professionals across survey years, *P* < .001.

^c *P* values indicate testing for no change in the proportion of current smokers

across all 3 survey years from 2003 to 2010-2011 using a weighted χ^2 test. The 95% CIs are for percentage change in prevalence between 2003 and 2010-2011.

^d *P* values indicate testing for no change in the proportion of current smokers between the survey years 2006-2007 and 2010-2011 using a weighted χ^2 test. The 95% CIs are for percentage change in prevalence between 2006-2007 and 2010-2011.

Table 2. Changes in Estimated Prevalences of Former and Never Smokers Among Health Care Professionals, Tobacco Use Supplement, Current Population Survey, 2003 (n=3877), 2006-2007 (n=3870), and 2010-2011 (n=2975)^a

Year	Former Smokers ^b					Never Smokers ^b				
	No. (%) [95% CI]			% Change (95% CI)		No. (%) [95% CI]			% Change (95% CI)	
	2003	2006-2007	2010-2011	2003 - 2010-2011 ^c	2006-2007 - 2010-2011 ^d	2003	2006-2007	2010-2011	2003 - 2010-2011 ^c	2006-2007 - 2010-2011 ^d
National prevalence, %	20.09	20.04	18.59	-7.47	-7.24	61.02	61.48	65.34	7.08	6.28
Health care professionals										
Physician	96 (14.23) [11.03 to 18.16]	82 (13.07) [10.50 to 16.15]	65 (8.52) [6.45 to 11.16]	-40.13 (-62.24 to -18.01)	-34.81 (-57.48 to -12.14)	505 (83.61) [79.72 to 86.88]	501 (84.62) [81.30 to 87.45]	501 (89.53) [86.54 to 91.93]	7.08 (2.03 to 12.13)	5.80 (0.85 to 10.75)
P value				.01	.02				.01	.02
Registered nurse	513 (20.80) [18.86 to 22.89]	432 (17.59) [15.75 to 19.59]	279 (16.77) [14.59 to 19.21]	-19.38 (-32.85 to -5.90)	-4.66 (-21.28 to 11.96)	1556 (68.06) [66.02 to 70.03]	1587 (71.68) [69.34 to 73.91]	1109 (76.14) [73.51 to 78.60]	11.87 (6.60 to 17.14)	6.22 (1.34 to 11.10)
P value				.02	.60				<.001	.01
Licensed practical nurse	81 (15.51) [12.12 to 19.64]	102 (17.75) [14.34 to 21.77]	62 (12.02) [9.12 to 15.70]	-22.50 (-50.54 to 5.54)	-32.28 (-55.38 to -9.18)	290 (61.00) [55.83 to 65.95]	276 (61.70) [56.65 to 66.50]	266 (62.99) [57.45 to 68.20]	3.26 (-8.86 to 15.38)	2.09 (-9.83 to 14.01)
P value				.08	.03				.87	.72
Pharmacist	26 (9.36) [5.72 to 14.97]	24 (13.47) [8.52 to 20.65]	20 (10.94) [6.71 to 17.33]	16.88 (-62.02 to 95.78)	-18.78 (-71.38 to 33.81)	161 (82.28) [75.55 to 87.46]	161 (83.28) [75.94 to 88.72]	197 (86.04) [79.05 to 90.97]	4.57 (-6.18 to 15.32)	3.31 (-7.23 to 13.86)
P value				.55	.52				.66	.53
Respiratory therapist	19 (18.96) [11.44 to 29.77]	24 (24.50) [15.67 to 36.16]	17 (14.26) [8.28 to 23.44]	-24.79 (-78.05 to 28.47)	-41.80 (-80.68 to -2.91)	61 (65.58) [53.95 to 75.61]	46 (56.22) [44.13 to 67.62]	66 (74.14) [62.45 to 83.17]	13.05 (-12.89 to 38.99)	31.87 (-1.63 to 65.38)
P value				.28	.11				.10	.03
Dental hygienist	29 (22.57) [15.26 to 32.06]	30 (23.36) [15.64 to 33.40]	21 (14.69) [9.18 to 22.69]	-34.91 (-72.98 to 3.15)	-37.11 (-74.23 to 0.004)	97 (70.44) [61.31 to 78.19]	96 (64.35) [54.23 to 73.33]	103 (78.30) [69.22 to 85.27]	11.16 (-7.78 to 30.09)	21.70 (-0.31 to 43.71)
P value				.19	.12				.11	.04
Total	764 (18.37) [16.85 to 20.00]	694 (16.94) [15.54 to 18.43]	464 (13.71) [12.30 to 15.26]	-25.37 (-35.60 to -15.13)	-19.07 (-30.14 to -8.00)	2670 (70.73) [69.11 to 72.30]	2667 (72.73) [71.10 to 74.31]	2242 (77.94) [76.11 to 79.67]	10.19 (6.68 to 13.71)	7.16 (3.78 to 10.55)
P value				<.001	.003				<.001	<.001

^a Actual sample size; population estimates are 268 142 physicians, 617 168 registered nurses, 176 263 licensed practical nurses, 96 438 pharmacists, 42 898 respiratory therapists, and 52 241 dental hygienists.

^b Indicates testing for no change in the distribution of former and never smokers among health care professionals across survey years, $P < .001$.

^c P values indicate testing for no change in the proportion of former and never smokers

across all 3 survey years from 2003 to 2010-2011 using a weighted χ^2 test. The 95% CIs are for percentage change in prevalence between 2003 and 2010-2011.

^d P values indicate testing for no change in the proportion of former and never smokers between the survey years 2006-2007 and 2010-2011 using a weighted χ^2 test. The 95% CIs are for percentage change in prevalence between 2006-2007 and 2010-2011.

smoked and quit by profession, we calculated the following using weighted estimates: (former smokers) / (current smokers + former smokers). Differences in smoking status and quitting for each period by group were evaluated using weighted χ^2 tests.

Results | The 2010-2011 survey data from 2975 health care professionals indicated that 8.34% (95% CI, 7.26%-9.58%) were current smokers (Table 1). Current smoking ranged from 1.95% (95% CI, 1.04%-3.62%) among physicians to 24.99% (95% CI, 20.51%-30.08%) among licensed practical nurses. There was a decline in prevalence of current smoking among these health care professionals from 2003 to 2010-2011, but the only group with a significant decline from 2006-2007 to 2010-2011 and from 2003 to 2010-2011 was registered nurses (from 11.14% to 7.09%; 36.36% decline [95% CI, 20.23%-52.48%], $P < .001$).

There were significant changes in prevalences of former and never smokers (Table 2). The only significant changes in proportions of those who quit by profession from 2006-2007 to 2010-2011 were among registered nurses (from 62.10% to 70.29%; 13.17% increase [95% CI, 0.52% to 25.83%], $P = .04$), and among licensed practical nurses (from 46.35% to 32.48%; 29.92% decrease [95% CI, 11.27% to 48.57%], $P = .02$).

Discussion | The majority of health care professionals continued as never smokers. In 2010-2011, current smoking among these health care professionals, excepting licensed practical nurses, was lower than the general population (16.08%). Recent declines in smoking among health care professionals may reflect the impact of national tobacco control policies^{4,5} and efforts focused on reducing smoking among registered nurses.⁶

After little change in prevalence from 2003 to 2006-2007,¹ the drop in smoking among registered nurses was more than twice that of the 13% decrease in the population, and the proportion who have quit was higher than the general population estimate (53.62%). Continued smoking and diminished quitting among licensed practical nurses remains a serious concern. Health care professionals are expected to be well-informed about health issues, but nicotine is highly addictive.

Although a nationally representative sample, the Current Population Survey³ may not be representative of each health care professional group. Although the weighted samples were large, the sample size of some cells was small. Smoking status was not biochemically verified, and time since quitting was not available for these cross-sectional data.

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Obtained funding: Sarna.

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Conflict of Interest Disclosures: All authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest. Dr Sarna reports consulting for the International Society for Nurses in Cancer Care and receiving grant funding from Pfizer Independent Grants for Learning and Change. No other disclosures were reported.

Funding/Support: This study was funded in part by the University of California, Los Angeles (UCLA) School of Nursing endowment to the lead author.

Role of the Sponsor: The University of California, Los Angeles had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication.

Additional Contributions: Marjorie Wells, PhD (UCLA School of Nursing), assisted with manuscript preparation but did not receive compensation.

1. Fiore MC, Jaén CR, Baker TB, et al. Treating tobacco use and dependence. <http://www.ncbi.nlm.nih.gov/books/NBK63952/>. Accessed December 4, 2013.

2. Sarna L, Bialous SA, Sinha K, Yang Q, Wewers ME. Are health care providers still smoking? *Nicotine Tob Res*. 2010;12(11):1167-1171.

3. US Department of Commerce. Tobacco Use Supplement to the Current Population Survey. <http://appliedresearch.cancer.gov/studies/tus-cps/>. Accessed December 4, 2013.

4. Koh HK. Realizing the vision for tobacco control. *Am J Prev Med*. 2012;43(5)(suppl 3):S264-S265.

5. Centers for Disease Control and Prevention. Quitting smoking among adults—United States, 2001-2010. *MMWR Morb Mortal Wkly Rep*. 2011;60(44):1513-1519.

6. Sarna L, Bialous S, Barbeau E, McLellan D. Strategies to implement tobacco control policy and advocacy initiatives. *Crit Care Nurs Clin North Am*. 2006;18(1):113-122, xiii.

COMMENT & RESPONSE

Prevalence of Diabetes in Chinese Adults

To the Editor Dr Xu and colleagues¹ estimated the prevalence of diabetes among a representative sample of Chinese adults at 11.6% and the prevalence of prediabetes at 50.1%. According to the Chinese National Nutrition and Health Survey (CNNHS) in 2002,² the prevalence of diabetes was 2.6% among Chinese adults. Although the difference in the prevalence of diabetes might be partly explained by an increase in diabetes during the 8 years between the studies, we question the current diabetes prevalence among Chinese adults.

One of the criteria for the diagnosis of prediabetes in the study was the hemoglobin A_{1c} (HbA_{1c}). However, there is still debate about the use of HbA_{1c}. Moreover, there is no convincing evidence or validation to support applying HbA_{1c} values based on a Western population to the Chinese population. There are racial and ethnic differences in the relationship between HbA_{1c} and blood glucose.³ The potential population differences in HbA_{1c} between the Western and Chinese populations should be addressed.

The sampling method in the study depended on the Chinese Center for Disease Control and Prevention National Disease Surveillance Point System,⁴ which used probability proportionate to population size sampling to select a city or county. The sampling was based on 1982 census data, although the distribution of sample points was updated in 2000. The percentage of people who lived in urban areas was 20.43% in 1982 and 49.68% in 2010.⁵

Nonresidents (migrant workers, college students, and military personnel) are an important population that was not included in the study. For example, there were 229.78 million migrant workers in China in 2009.⁵ These workers were more likely to be healthy young men with less diabetes. Such potential systemic selection bias could overestimate the prevalence of diabetes among young Chinese men. This could partly explain why men younger than 50 years had higher diabetes prevalence in the study.

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Conflict of Interest Disclosures: The authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest and none were reported.

1. Xu Y, Wang L, He J, et al: 2010 China Noncommunicable Disease Surveillance Group. Prevalence and control of diabetes in Chinese adults. *JAMA*. 2013;310(9):948-959.

2. Li LM, Rao KQ, Kong LZ, et al: Technical Working Group of China National Nutrition and Health Survey. A description on the Chinese national nutrition and health survey in 2002 [in Chinese]. *Zhonghua Liu Xing Bing Xue Za Zhi*. 2005;26(7):478-484.

3. Herman WH, Cohen RM. Racial and ethnic differences in the relationship between HbA_{1c} and blood glucose: implications for the diagnosis of diabetes. *J Clin Endocrinol Metab*. 2012;97(4):1067-1072.

4. Yang G, Hu J, Rao KQ, Ma J, Rao C, Lopez AD. Mortality registration and surveillance in China: history, current situation and challenges. *Popul Health Metr*. 2005;3(1):3.