

Tobacco Cessation Training Among Dental and Other Health Professions Students in Eight Low- and Middle-Income Countries

Israel T. Agaku, D.M.D., M.P.H.; Olalekan A. Ayo-Yusuf, B.D.S., M.P.H., Ph.D.;
Gregory N. Connolly, D.M.D., M.P.H.

Abstract: This study assessed differences among health professions students in exposure to didactic tobacco cessation training in asking about patients' tobacco use status ("ask") and assisting smoking patients to quit by providing educational materials ("assist"). Data from the 2005-08 Global Health Professions Student Survey were analyzed for 28,420 medical, dental, nursing, and pharmacy students in eight low- and middle-income countries. Country-specific prevalence of exposure to training in tobacco cessation was calculated for each profession category; differences were assessed using logistic regression analysis ($p < 0.05$). The proportion of dental students taught to implement the "ask" intervention ranged from 45.4 percent (Armenia) to 95.2 percent (Chile). Only about one-third of these dental students reported being taught to implement the "assist" intervention in most countries. After adjusting for survey year, country, gender, and tobacco use, the odds of dental students' being taught to implement the "ask" intervention were lower than for medical students (adjusted odds ratio [aOR]=0.63; 95% CI: 0.42-0.96). Similarly, the odds of being taught to implement the "assist" intervention were significantly higher for medical (aOR=1.65; 95% CI: 1.26-2.17), nursing (aOR=2.84; 95% CI: 2.37-3.40), and pharmacy students (aOR=1.36; 95% CI: 1.05-1.76) than for dental students. These findings underscore the need for enhanced measures to incorporate tobacco cessation training as a formal component of dental education globally.

Dr. Agaku conducts research at the Center for Global Tobacco Control, Department of Social and Behavioral Sciences, Harvard School of Public Health; Dr. Ayo-Yusuf is Associate Professor, Department of Community Dentistry, University of Pretoria, South Africa and a Visiting Scientist, Center for Global Tobacco Control, Department of Social and Behavioral Sciences, Harvard School of Public Health; and Dr. Connolly is Professor of the Practice of Public Health, Harvard School of Public Health and Director, Center for Global Tobacco Control, Department of Social and Behavioral Sciences, Harvard School of Public Health. Direct correspondence and requests for reprints to Dr. Israel Agaku, Center for Global Tobacco Control, Department of Social and Behavioral Sciences, Harvard School of Public Health, 677 Huntington Ave., Boston, MA 02115; 770-728-3220; iagaku@post.harvard.edu.

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Tobacco use is the most important modifiable risk factor to prevent morbidity and premature mortality.¹ For effective smoking cessation, a desire or intention to quit is necessary but not sufficient because of the neurobiological underpinnings of nicotine addiction.^{2,3} The role of health care professionals in motivating tobacco users to attempt quitting and assist with tobacco cessation has been well recognized.⁴⁻⁹ The U.S. Public Health Service Clinical Practice Guideline for treating tobacco use and dependence recommends that health care providers employ a five-step approach known as "5 As" to help patients quit tobacco use: 1) *ask* all patients whether they use tobacco; 2) *advise* all smokers to quit; 3) *assess* smokers' willingness to quit; 4) *assist* smokers with quitting; and 5) *arrange* follow-up contact to prevent relapse.¹⁰ Considerable effort has been expended over the past decade to integrate the "5 As" model into clinical practice through medical

education, enhanced health systems quality, improved counseling and medication treatments, and health plan benefit design.¹¹

Despite evidence indicating that implementing the "5 As" model helps in promoting quit attempts and smoking cessation,¹² uptake and implementation of multiple components of it appear to be low among some health professionals, including dentists.¹³ Factors such as lack of reimbursement, lack of awareness of best practices for nicotine dependence treatment, and pessimism about patients' reception to tobacco counseling have been suggested as contributing to this trend.^{8,14-19} However, it is possible that differences in the content of pedagogical materials and the process of teaching health professions students about smoking prevention and cessation may also play a part.

While previous research has explored receipt of tobacco cessation training among health professions students,²⁰ more information is needed on health

professions students' exposure to didactic training on specific aspects of tobacco cessation training such as those embodied in the "5As" model, especially in low- and middle-income countries. To determine the extent to which various health professions students are being taught the clinical importance of the "5As" model while in school, this study assessed differences in didactic school instruction of dental, medical, nursing, and pharmacy students in eight low- and middle-income countries on the "ask" and "assist" components of the five-tier model, using data from the 2005-08 Global Health Professions Student Survey (GHPSS).

Materials and Methods

The analyses performed in this study were performed on publicly available, de-identified GHPSS data and were deemed Institutional Review Board exempt as non-human subject research. The GHPSS is an anonymous, self-administered survey that collects information from third-year medical, dental, nursing, and pharmacy students on tobacco use and training received to provide patient counseling on cessation techniques.²⁰ The GHPSS was conducted in schools during regular lectures and class sessions. GHPSS uses standardized sampling, data collection, and data-processing procedures, which allows for cross-country comparison of estimates.

For this study, data were analyzed for 28,420 medical, dental, nursing, and pharmacy students combined, from 470 schools in eight countries for 2005 through 2008. These countries, which have all been parties to the World Health Organization (WHO) Framework Convention on Tobacco Control (FCTC) since 2006,²¹ were as follows: Chile (total number of all health professions students sampled $n=3,556$), Armenia ($n=930$), Bolivia ($n=5,822$), Serbia ($n=3,337$), Syrian Arab Republic ($n=3,187$), Thailand ($n=3,962$), India ($n=4,887$), and the Islamic Republic of Iran ($n=2,739$). These countries were selected based on their ability to provide information for students in all four health professions (i.e., medicine, dentistry, nursing, and pharmacy). Among all health professions students, the overall response rate ranged from 38.2 percent for nursing students in the Islamic Republic of Iran in 2007 to 99.3 percent for nursing students in Bolivia in 2006.

Education about the dangers of tobacco use was defined as a "yes" response to the following question: "During your (medical, dental, nursing, or pharmacy)

school training, were you taught in any of your classes about the dangers of smoking/chewing tobacco?" Education in school about the reasons for tobacco use was defined as a "yes" response to the following question: "During your (medical, dental, nursing, or pharmacy) school training, did you discuss in any of your classes the reasons why people smoke/chew tobacco?" Education in school on implementing the "ask" intervention was defined as a "yes" response to the following question: "During your (medical, dental, nursing, or pharmacy) school training, did you learn that it is important to record tobacco use history as part of a patient's general medical history?" Education in school on implementing the "assist" intervention was defined as a "yes" response to the following question: "During your (medical, dental, nursing, or pharmacy) school training, did you learn that it is important to provide educational materials to support smoking cessation to patients who want to quit smoking?"

Current use of any tobacco product was defined as a report by a student that he or she had smoked cigarettes or used any non-cigarette tobacco products (including smoked and smokeless tobacco products such as cigars, pipes, handmade cigarettes, water pipes, chewing tobacco, or other tobacco products) on ≥ 1 day in the past thirty days. Sociodemographic characteristics assessed included gender (male or female) and age (≤ 29 or ≥ 30 years).

Data for each country were weighted to account for the complex survey design. Prevalence estimates of tobacco use and cessation counseling measures were assessed, and variability of estimates was determined using 95 percent confidence intervals (CI). Within-group comparison of estimates was done using chi-square tests. All tests were two-tailed, and the level of statistical significance was set at $p < 0.05$. Estimates with relative standard error ≥ 30 percent were considered statistically unreliable.

The primary outcomes of interest were didactic classroom education in implementing the "ask" and "assist" interventions. To test for statistical differences among health professions students in these outcome measures first, country-specific multivariate logistic regression analyses were performed. A composite variable denoting the category of health professions students (medical, dental, nursing, or pharmacy) was treated as the primary predictor and adjusted for gender and current tobacco use status. Finally, an overall model was fitted for all countries combined for each of the primary outcome measures and adjusted for survey year, country, gender,

and current tobacco use status. All analyses were performed with Stata Version 11 (StataCorp, 2009, College Station, TX, USA).

Results

Among medical students, the proportion of females ranged from 38.1 percent (Syrian Arab Republic) to 72.9 percent (Armenia). Similarly, among dental students, the proportion of females ranged from 38.2 percent (Syrian Arab Republic) to 67.9 percent (Thailand). The composition of nursing

students was highly skewed towards females (range: 70.4 percent in Syrian Arab Republic to 92.8 percent in Thailand). The female distribution of pharmacy students ranged from 37.1 percent (India) to 81.2 percent (Bolivia) (Table 1). Over 90 percent of all health professions students were ≤ 29 years of age.

Education on Dangers of Tobacco Use and Reasons People Smoke

The proportion of dental students who reported being taught about the dangers of tobacco use ranged from 54.4 percent (Islamic Republic of

Table 1. Sample characteristics of health professions students in eight low- and middle-income countries, Global Health Professions Student Survey, 2005-08

Country (Sample n)	Category of Health Professions Students	Year	Number of Participating Schools	Number of Completed Surveys	Survey Coverage (Census or Sample)	Overall Response Rate	Percentage Females
Chile (n=3,556)	Medical	2008	23	1,075	Census	79.2%	44.5%
	Dental	2008	22	792	Census	72.2%	55.3%
	Nursing	2008	53	1,490	Census	75.5%	86.8%
	Pharmacy	2008	7	199	Census	64.9%	54.8%
Armenia (n=930)	Medical	2006	3	177	Census	90.0%	72.9%
	Dental	2006	3	149	Census	62.7%	58.7%
	Nursing	2006	5	506	Sample	42.0%	92.7%
	Pharmacy	2006	3	98	Census	87.7%	71.7%
Bolivia (n=5,822)	Medical	2006	10	2,380	Census	97.1%	49.0%
	Dental	2007	17	1,658	Sample	91.7%	59.8%
	Nursing	2006	6	602	Sample	99.3%	89.7%
	Pharmacy	2007	15	1,182	Census	97.7%	81.2%
Serbia (n=3,337)	Medical	2006	4	775	Census	81.6%	65.7%
	Dental	2006	3	212	Census	73.7%	41.5%
	Nursing	2006	12	2,069	Sample	80.9%	84.0%
	Pharmacy	2006	3	281	Census	72.5%	75.9%
Syrian Arab Republic (n=3,187)	Medical	2006	4	1,170	Census	90.7%	38.1%
	Dental	2006	4	475	Census	86.2%	38.2%
	Nursing	2006	18	989	Census	94.7%	70.4%
	Pharmacy	2006	4	553	Census	90.9%	69.7%
Thailand (n=3,962)	Medical	2006	13	781	Census	63.8%	53.4%
	Dental	2006	8	411	Census	96.1%	67.9%
	Nursing	2006	20	1,594	Census	88.9%	92.8%
	Pharmacy	2006	12	1,176	Census	84.0%	74.6%
India (n=4,887)	Medical	2005	15	1,176	Sample	66.9%	38.7%
	Dental	2005	25	1,339	Sample	89.4%	40.8%
	Nursing	2007	22	947	Sample	93.0%	87.4%
	Pharmacy	2007	25	1,425	Sample	84.8%	37.1%
Islamic Republic of Iran (n=2,739)	Medical	2007	41	1,065	Census	45.8%	69.3%
	Dental	2007	15	303	Census	58.7%	53.8%
	Nursing	2007	45	1,162	Census	38.2%	82.3%
	Pharmacy	2007	10	209	Census	51.2%	55.9%

Iran) to 97.2 percent (India). In India, the prevalence among dental students was significantly higher compared to medical (80.7 percent), nursing (87.7 percent), and pharmacy (70.3 percent) students ($p < 0.05$ all). Similarly, in Serbia, prevalence among dental students (87.5 percent) was significantly higher than pharmacy students (78.1 percent) ($p < 0.05$). Conversely, in Bolivia, the prevalences among medical (79.2 percent) and nursing students (81.7 percent) were both significantly higher than dental students (68.9 percent) ($p < 0.05$ both). Likewise, the

prevalence among nursing students in Syrian Arab Republic (86.5 percent) was significantly higher than dental students (61.9 percent) ($p < 0.05$) (Table 2). In most of the other countries, however, no significant differences were noted between dental students and other health professions students in didactic classroom education about the dangers of tobacco use. Only approximately ≤ 50 percent of dental students in most of the countries surveyed reported being taught about the reasons why people smoke.

Table 2. Tobacco education among health professions students in eight low- and middle-income countries, Global Health Professions Student Survey, 2005-08

Country	Health Professions Student Category	% Past Month Any Tobacco Use (Smoked or Smokeless) [†] (95% CI)	% Reported Being Taught About Dangers of Tobacco Use (95% CI)	% Reported Being Taught Reasons Why People Smoke (95% CI)
Chile	Medical	30.4% (25.8-35.1)	96.6% (94.3-99.0)	60.4% (54.4-66.5)
	Dental	45.5% (38.7-52.4)	95.1% (91.1-99.1)	53.5% (47.5-59.6)
	Nursing	46.8% (41.9-51.6)	97.1% (95.8-98.4)	76.9% (73.4-80.5)
	Pharmacy	30.1% (16.8-43.5)	86.0% (78.5-93.5)	41.1% (31.7-50.6)
Armenia	Medical	20.9% (1.2-40.7)	67.2% (40.7-93.6)	48.6% (27.6-69.5)
	Dental	28.9% (11.3-46.4)	60.2% (37.5-83.0)	43.4% (32.0-54.9)
	Nursing	6.0% (2.1-10.0)	67.6% (55.2-80.0)	49.3% (37.4-61.1)
	Pharmacy	18.0% (1.6-34.5)	84.7% (64.4-105.1)	67.8% (42.1-93.4)
Bolivia	Medical	42.0% (36.1-47.9)	79.2% (74.5-84.0)	53.0% (46.8-59.2)
	Dental	40.3% (29.0-51.6)	68.9% (65.8-72.0)	46.7% (40.7-52.8)
	Nursing	23.6% (3.6-43.5)	81.7% (75.6-87.9)	66.3% (58.2-74.5)
	Pharmacy	24.9% (20.0-29.7)	68.7% (64.8-72.5)	46.7% (41.8-51.6)
Serbia	Medical	34.7% (26.9-42.6)	84.8% (78.7-90.8)	53.4% (36.9-69.9)
	Dental	29.3% (1.2-61.6)	87.5% (84.0-91.1)	33.3% (-3.3-69.9)
	Nursing	34.1% (26.9-41.4)	92.8% (90.2-95.5)	77.1% (71.6-82.6)
	Pharmacy	30.0% (22.1-37.9)	78.1% (76.6-79.6)	43.9% (34.3-53.4)
Syrian Arab Republic	Medical	29.4% (17.5-41.2)	71.0% (39.2-102.9)	46.0% (21.8-70.1)
	Dental	37.9% (22.2-53.6)	61.9% (50.7-73.1)	40.9% (36.7-45.0)
	Nursing	29.6% (24.5-34.8)	86.5% (82.4-90.5)	56.9% (50.8-63.1)
	Pharmacy	25.9% (21.3-30.5)	62.4% (48.8-75.9)	44.4% (34.1-54.7)
Thailand	Medical	3.0% (0.1-6.1) [‡]	95.5% (93.6-97.4)	68.4% (61.4-75.3)
	Dental	3.9% (0.5-7.2)	94.9% (93.1-96.7)	50.0% (44.2-55.7)
	Nursing	1.8% (1.0-2.5)	96.0% (94.0-98.0)	80.1% (77.5-82.7)
	Pharmacy	2.2% (1.0-3.4)	92.4% (88.5-96.2)	64.0% (60.1-67.8)
India	Medical	13.6% (9.9-17.3)	80.7% (72.8-88.6)	49.8% (44.7-54.9)
	Dental	12.3% (8.7-15.9)	97.2% (95.5-98.9)	78.9% (74.2-83.7)
	Nursing	5.4% (2.9-7.9)	87.7% (85.9-89.5)	69.2% (65.1-73.4)
	Pharmacy	18.2% (15.8-20.6)	70.3% (67.0-73.6)	57.1% (53.6-60.7)
Islamic Republic of Iran	Medical	12.3% (8.1-16.5)	58.5% (44.5-72.6)	21.4% (13.7-29.2)
	Dental	20.0% (7.5-32.5)	54.4% (37.6-71.1)	14.4% (7.1-21.7)
	Nursing	10.2% (7.9-12.6)	55.8% (48.8-62.8)	31.7% (26.1-37.2)
	Pharmacy	14.4% (5.9-23.0)	43.6% (31.6-55.7)	16.9% (8.6-25.1)

[†]In the Islamic Republic of Iran and Syrian Arab Republic, the only tobacco products assessed were cigarettes and water pipe. All other countries assessed use of cigarettes, cigars, pipes, handmade cigarettes, and chewing tobacco.

[‡]Relative standard error $\geq 30\%$; hence, estimate is statistically unreliable.

Education on Implementing the “Ask” Intervention

The proportion of dental students who reported being taught to implement the “ask” intervention ranged from 45.4 percent (Armenia) to 95.2 percent (Chile). Prevalence among dental students was significantly higher than pharmacy students in Chile, Bolivia, Serbia, Syrian Arab Republic, and Thailand. Conversely, prevalence among dental students was significantly lower compared to both medical and nursing students in Bolivia and Syrian Arab Republic. In addition, prevalence was significantly lower among dental students in Thailand compared to their nursing counterparts.

Country-specific logistic regression analyses indicated that after adjusting for gender and current tobacco use status, dental students had significantly lower odds of being taught to implement the “ask” intervention compared to their medical counterparts in Chile, Bolivia, and Syrian Arab Republic (Table 3). No significant differences between dental and medical students were observed in the other countries surveyed. Excluding Armenia, pharmacy students in all surveyed countries were less likely to be taught to implement the “ask” intervention compared to medical students.

Results from the overall model with all countries combined indicated that, after adjusting for survey year, country, gender, and current tobacco use, the odds of being taught to implement the “ask” intervention among dental students were lower compared to medical students (adjusted odds ratio [aOR]=0.63; 95% CI: 0.42-0.96), but higher compared to pharmacy students (aOR=2.59; 95% CI: 1.94-3.47). No significant differences between dental and nursing students were observed. In addition, among all health professions students, males were less likely to report being taught to implement the “ask” intervention compared to females (aOR=0.83; 95% CI: 0.71-0.96). By country, health professions students in Chile had the highest odds of being taught to implement the “ask” intervention compared to all other countries in the study (Table 4).

Education on Implementing the “Assist” Intervention

In most of the countries surveyed, about a third of dental students reported being taught to implement the “assist” intervention (range: 22.9 percent in the Islamic Republic of Iran to 49.7 percent in

Armenia). There was no significant difference in prevalence between dental students and both medical and pharmacy students in all the countries surveyed. In contrast, dental students had significantly lower prevalence compared to their nursing counterparts in Chile, Bolivia, and Syrian Arab Republic (Table 3).

After adjusting for gender and current tobacco use status, Chile medical (aOR=1.73; 95% CI: 1.14-2.63) and nursing (aOR=9.44; 95% CI: 5.83-15.31) students were more likely to report being taught to implement the “assist” intervention compared to Chile dental students. Nursing students in Bolivia and India were significantly more likely to be taught to implement the “assist” intervention compared to medical students, whereas pharmacy students in Chile and India were less likely to be taught compared to medical students. In all other countries, no significant differences were observed among different health professions students (Table 3).

The overall model with all countries combined indicated that, after adjusting for survey year, country, gender, and current tobacco use status, the likelihood of being taught to implement the “assist” intervention was significantly higher among medical (aOR=1.65; 95% CI: 1.26-2.17), nursing (aOR=2.84; 95% CI: 2.37-3.40), and pharmacy students (aOR=1.36; 95% CI: 1.05-1.76) compared to dental students. In addition, male health professions students were more likely to report being taught to implement the “assist” intervention than females (aOR=1.14; 95% CI: 1.03-1.27) (Table 4). By country, health professions students in India had higher odds of being taught to implement the “assist” intervention compared to Chile (aOR=1.50; 95% CI: 1.09-2.05), whereas health professions students in Bolivia (aOR=0.60; 95% CI: 0.37-0.99) and Islamic Republic of Iran (aOR=0.24; 95% CI: 0.15-0.39) had lower odds relative to Chile. No significant differences were observed between other countries and Chile.

Current Use of Tobacco Products

Over one of five dental students were current users of tobacco in six out of the eight countries surveyed (Table 2). With the exception of Chile where rates of tobacco use were significantly higher among dental as compared to medical students, no differences in tobacco use were observed among dental students compared to both medical and pharmacy students in all countries surveyed. Significantly more dental than nursing students used tobacco in India and Armenia. No significant differences between dental and nursing students were observed elsewhere.

Table 3. Health professions student training in tobacco cessation in eight low- and middle-income countries, Global Health Professions Student Survey, 2005-08

Country	Health Professions Student Category	Ask All Patients Whether They Use Tobacco		Assist Smokers with Quitting	
		% Reported Being Taught Importance of Asking Patients' Smoking Status During History Taking (95% CI)	Effect of Health Professions Student Category on Didactic Classroom Exposure to "Ask" Interventions Adjusted Odds Ratios [†] (95% CI)	% Reported Being Taught Importance of Providing Educational Materials to Assist Smokers to Quit (95% CI)	Effect of Health Professions Student Category on Didactic Classroom Exposure to "Assist" Interventions Adjusted Odds Ratios [†] (95% CI)
Chile	Medical	98.7% (98.0-99.4)	Referent	49.1% (41.4-56.7)	Referent
	Dental	95.2% (92.3-98.2)	0.22 (0.09-0.53)*	35.1% (28.1-42.2)	0.58 (0.38-0.88)*
	Nursing	95.1% (93.5-96.7)	0.19 (0.09-0.37)*	82.3% (76.9-87.6)	5.49 (3.36-8.95)*
	Pharmacy	59.6% (41.5-77.8)	0.02 (0.01-0.04)*	30.3% (20.5-40.1)	0.46 (0.26-0.83)*
Armenia	Medical	54.2% (42.6-65.7)	Referent	53.3% (44.9-61.7)	Referent
	Dental	45.4% (35.5-55.3)	0.67 (0.34-1.32)	49.7% (47.0-52.3)	0.9 (0.62-1.31)
	Nursing	38.7% (25.0-52.4)	0.55 (0.27-1.11)	56.4% (44.3-68.6)	1.19 (0.72-1.96)
	Pharmacy	42.6% (30.1-55.1)	0.68 (0.33-1.39)	66.7% (49.4-83.9)	1.80 (0.74-4.39)
Bolivia	Medical	78.6% (75.0-82.2)	Referent	37.6% (31.4-43.8)	Referent
	Dental	68.6% (66.1-71.1)	0.58 (0.45-0.75)*	33.4% (30.2-36.5)	0.84 (0.63-1.13)
	Nursing	83.4% (81.3-85.5)	1.21 (0.91-1.63)	59.2% (45.3-73.1)	2.46 (1.34-4.49)*
	Pharmacy	58.4% (54.4-62.4)	0.35 (0.26-0.46)*	34.1% (24.8-43.5)	0.89 (0.55-1.42)
Serbia	Medical	79.6% (62.3-96.9)	Referent	44.3% (19.2-69.4)	Referent
	Dental	82.8% (56.3-109.3)	1.19 (0.14-10.11)	33.9% (16.0-51.8)	0.59 (0.16-2.17)
	Nursing	59.3% (51.3-67.3)	0.38 (0.13-1.16)	52.8% (48.1-57.5)	1.43 (0.54-3.80)
	Pharmacy	47.4% (41.4-53.3)	0.23 (0.08-0.67)*	30.1% (26.9-33.3)	0.52 (0.19-1.41)
Syrian Arab Republic	Medical	84.7% (76.3-93.1)	Referent	61.7% (34.7-88.8)	Referent
	Dental	72.4% (70.7-74.2)	0.48 (0.25-0.94)*	36.5% (35.1-37.9)	0.36 (0.12-1.12)
	Nursing	89.1% (86.4-91.8)	1.44 (0.70-2.95)	61.1% (55.8-66.4)	0.96 (0.31-3.00)
	Pharmacy	68.4% (66.7-70.1)	0.38 (0.19-0.76)*	58.1% (33.9-82.3)	0.85 (0.19-3.77)
Thailand	Medical	77.6% (72.9-82.2)	Referent	46.3% (35.1-57.6)	Referent
	Dental	72.2% (65.6-78.8)	0.72 (0.46-1.12)	39.2% (24.9-53.6)	0.75 (0.35-1.62)
	Nursing	84.2% (80.8-87.5)	1.43 (0.94-2.18)	51.1% (47.5-54.6)	1.23 (0.74-2.03)
	Pharmacy	46.0% (33.9-58.2)	0.24 (0.13-0.42)*	41.3% (33.6-49.1)	0.83 (0.46-1.49)
India	Medical	93.1% (89.2-96.9)	Referent	69.1% (65.9-72.2)	Referent
	Dental	n/a	n/a	n/a	n/a
	Nursing	91.1% (88.5-93.6)	0.72 (0.37-1.42)	75.0% (70.7-79.4)	1.45 (1.1-1.92)*
	Pharmacy	66.0% (61.9-70.2)	0.15 (0.08-0.27)*	62.5% (59.2-65.8)	0.74 (0.6-0.91)*
Islamic Republic of Iran	Medical	61.1% (49.3-73.0)	Referent	23.1% (10.2-36.0)	Referent
	Dental	54.4% (42.4-66.4)	0.80 (0.39-1.64)	22.9% (7.0-38.7)	0.94 (0.30-2.90)
	Nursing	70.5% (63.9-77.0)	1.40 (0.77-2.55)	30.0% (22.3-37.8)	1.49 (0.66-3.37)
	Pharmacy	26.1% (19.1-33.2)	0.23 (0.13-0.43)*	20.1% (2.1-38.2)	0.81 (0.22-3.04)

[†]Country-specific logistic regression models. Multivariate models adjusted for gender and current tobacco use.

*Statistically significant adjusted odds ratios (p<0.05).

n/a=data not available

In the country-specific analyses, after adjusting for gender and health professions category, current tobacco users in Armenia (aOR=0.55; 95% CI: 0.32-0.96) and Syrian Arab Republic (aOR=0.84; 95% CI: 0.75-0.94) were less likely to report being

taught to implement the "ask" intervention compared to non-tobacco users. Similarly, current tobacco users in Armenia (aOR=0.41; 95% CI: 0.20-0.85) and Serbia (aOR=0.70; 95% CI: 0.55-0.89) were less likely to report being taught to implement the

Table 4. Logistic regression model of all countries combined, assessing effect of health professions student category on tobacco cessation training in eight low- and middle-income countries, Global Health Professions Student Survey, 2005-08

Characteristic	“Ask” All Patients Whether They Use Tobacco Adjusted Odds Ratios [†] (95% CI)	“Assist” Smokers With Quitting Adjusted Odds Ratios [†] (95% CI)
Health professions student category		
Medical	Referent	Referent
Dental	0.63 (0.42-0.96)*	0.60 (0.46-0.79)*
Nursing	0.86 (0.68-1.08)	1.72 (1.33-2.22)*
Pharmacy	0.24 (0.17-0.35)*	0.82 (0.56-1.20)
Survey year		
2005	Referent	Referent
2006	0.80 (0.37-1.77)	0.75 (0.46-1.20)
2007	0.84 (0.43-1.66)	0.85 (0.59-1.23)
2008	0.60 (0.30-1.21)	0.90 (0.58-1.39)
Gender		
Females	Referent	Referent
Males	0.83 (0.71-0.96)*	1.14 (1.03-1.27)*
Current tobacco use status		
Non-user	Referent	Referent
Current user	0.95 (0.81-1.11)	0.96 (0.85-1.07)
Country		
Chile	Referent	Referent
Armenia	0.03 (0.01-0.07)*	0.84 (0.40-1.76)
Bolivia	0.14 (0.07-0.30)*	0.60 (0.37-0.99)*
Serbia	0.07 (0.03-0.16)*	0.64 (0.31-1.33)
Syrian Arab Republic	0.23 (0.08-0.64)*	1.17 (0.55-2.48)
Thailand	0.15 (0.06-0.35)*	0.68 (0.35-1.32)
India	0.37 (0.23-0.60)*	1.50 (1.09-2.05)*
Islamic Republic of Iran	0.06 (0.03-0.12)*	0.24 (0.15-0.39)*

[†]Combined logistic regression model including all countries. Multivariate model adjusted for all other factors listed in table.

*Statistically significant adjusted odds ratios (p<0.05).

“assist” intervention compared to non-tobacco users. In Chile, however, current tobacco users were more likely to report being taught to implement the “ask” intervention (aOR=1.47; 95% CI: 1.02-2.10) compared to non-tobacco users. No differences by tobacco use status were observed in other countries. The overall model with all countries combined indicated that, among all health professions students, current use of tobacco products was not associated with self-reported didactic classroom exposure to the “ask” or “assist” interventions (Table 4).

Discussion

This study showed that, overall, dental students were significantly less likely to be taught to implement the “ask” intervention compared to medical

students and also had significantly lower odds of being taught to implement the “assist” intervention compared to medical, nursing, and pharmacy students. These findings underscore the need to incorporate tobacco cessation training as an integral component of dental education. While primary health care physicians have traditionally been the main focus for smoking cessation efforts, evidence shows that smoking cessation interventions are effective when delivered by a variety of health professionals including physicians and non-physician clinicians.^{9,13}

Dentists and other oral health professionals such as dental hygienists are well suited to engage patients in tobacco cessation counseling because of the relative ease with which they can detect signs of tobacco use during oral examinations and the relatively shorter period in which these lesions develop, particularly with the use of oral tobacco. This

probably explains why the “ask” intervention among dental students was highest in India where over a quarter of all adults use oral tobacco products.²²

Country-specific differences observed in didactic classroom exposure to the “ask” and “assist” interventions may be attributable to differences in national prevalence of tobacco use, burden of tobacco-attributable diseases, and strength of government tobacco control policies and interventions. This may explain why health professions students in Chile—which has the highest adult daily smoking prevalence (34 percent) relative to the other countries in the study²²—were more likely to be taught to implement the “ask” intervention. Interestingly, in this study also, Chile health professions students had a higher prevalence of tobacco use compared to other countries: close to half of Chile dental and nursing students were current tobacco users. Taken together, these findings may suggest that health professionals may be more motivated to implement an intervention if the problem is perceived as a national crisis.

Similarly, India with its high incidence of lip and oral cancer (approximately six times that of Chile)²³ was the only country with significantly higher odds than Chile for didactic classroom exposure to the “assist” intervention. India has in recent times been more progressive in tobacco control as a whole when compared to the rest of the countries in the study. Within its National Tobacco Control Program, the government of India allocates approximately U.S. \$5 million annually to anti-tobacco mass media educational campaigns.²² Such population-based tobacco control measures may increase the availability of educational materials for clinicians and health professions students to educate patients on dangers of tobacco use, and this might explain the difference between Chile and India in “assist” interventions.

The American Academy of Oral Medicine recommends that clinicians routinely examine patients for oral signs of and changes associated with tobacco use.²⁴ Common intraoral lesions suggestive of tobacco use include stomatitis nicotina, gingival bleeding, gingival recession, juvenile periodontitis, acute necrotizing ulcerative gingivitis, increased dental calculus formation, halitosis, and dental stains.²⁵ However, consistent with the recommendations in the implementation guidelines to Article 14 (treatment for tobacco dependence) of the WHO FCTC,²⁶ dental and other health professions students should be mandated to ask *all* patients about their tobacco use status and to record the status in medical notes, regardless of presence of oral, perioral, or systemic

signs or symptoms of tobacco use. Meanwhile, dental students should be discouraged from simply asking about patients’ tobacco use status by rote without follow-up advice to quit smoking or assistance to help smokers quit. The assistance provided may depend on the available resources. For example, in resource-limited settings where telephone quit lines may not be available, dental and other health professions students could be encouraged to refer smokers to Internet websites that provide information on how to quit. With the explosion of mobile technology in several low- and middle-income countries, uptake of mobile health (mHealth) interventions for health promotion has become increasingly popular²⁷ and may be used to assist smokers to quit. Pharmacological treatment may also be indicated for individuals with nicotine dependence.

These findings underscore the need to formally introduce classes to train health professions students on tobacco cessation techniques.²⁸ Such classes could be tailored specifically to be relevant to the clinical specialty on tobacco issues and could also discuss the reasons why people use tobacco and the dangers of tobacco use.²⁹ For example, dental public health classes could be used to teach students the role of tobacco in the etiology of oral diseases and tobacco cessation counseling techniques. The training materials could include information on the burden of tobacco use in each country as a way to motivate professionals to intervene in tobacco counseling.

In the United States, the role of dentists in tobacco cessation interventions has been acknowledged and incorporated into the Healthy People 2020 objectives (Objective TU-9.3: increase tobacco screening in dental care settings).³⁰ A related objective (TU-10.1) is to increase tobacco cessation counseling in office-based ambulatory care settings to 21.2 percent.³⁰ Appropriate and evidence-based training of dental students in tobacco cessation interventions is required if these targets are to be achieved in a sustainable manner. While about 80 percent of dental schools in the United States have introduced tobacco cessation counseling as part of their curricula,³¹ no study to date has assessed the effect of such didactic training on self-efficacy of dental students in implementing tobacco cessation interventions or in helping patients quit.

Monitoring and evaluating the impact of current tobacco control-related training and materials could help to formulate evidence-based recommendations regarding the content and pedagogical techniques for training health professions students

in tobacco cessation in a variety of cultural and economic environments.²⁹ Such evidence-based guidelines could be universally adopted and modified to fit local circumstances. In one attempt to establish a precedent for integrating tobacco cessation training into U.S. dental schools, for example, the Boston University Henry M. Goldman School of Dental Medicine received a 2007 grant from the American Dental Education Association (ADEA) Council of Sections Project Pool to guide expansion of the school's Prevention and Cessation Program in useful directions.³²

The findings in our report are subject to at least three limitations. First, because GHPSS respondents were third-year health professions students who have not had substantial interaction with patients, results may not be generalizable to practicing clinicians in the respective countries. Second, information on tobacco use and didactic exposure to cessation training was self-reported and may have been subject to recall bias. Finally, all the countries assessed in this study were low- and middle-income countries as categorized by the World Bank based on their 2011 gross national incomes, so the results may not be generalizable to health professions students from high-income countries.

Conclusion

This study showed that dental students in eight low- and middle-income countries were significantly less likely to be taught to implement the "ask" intervention compared to medical students. Also, dental students had significantly lower odds of being taught to implement the "assist" intervention compared to all other health professions students in those countries. These findings underscore the need for enhanced measures to incorporate education on tobacco cessation methods as a formal component of dental training.

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