

# US Health Policy Related to Hookah Tobacco Smoking

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A hookah, also known as a water pipe, consists of a head, body, bowl, and hose. Moist, sweetened, flavored tobacco is placed in the head, and lit charcoal is placed on it. Users inhale through the mouthpiece, drawing smoke through the hookah. This practice is associated with substantial inhalation of smoke. For example, the World Health Organization<sup>1</sup> has estimated that a hookah smoker may inhale as much smoke during 1 standard hookah tobacco smoking (HTS) session as a cigarette smoker would from 100 cigarettes. Other studies have suggested that, compared with a single cigarette, 1 hookah smoking session may expose the user to more inhaled tar, carbon monoxide, nicotine, and polycyclic aromatic hydrocarbons.<sup>1-5</sup> In vivo studies have shown HTS to be associated with plasma nicotine concentrations comparable to those seen with cigarette smoking and increases in carbon monoxide levels that are much higher than those typically observed with cigarette smoking.<sup>6</sup> Secondhand smoke exposure from a hookah may also be a concern. Although more study is needed, a published report<sup>7</sup> has suggested that expired air from nonsmokers in a hookah tobacco café had a higher concentration of carbon monoxide than expired air from nonsmokers in a regular bar allowing cigarette smoking.

The increase in HTS in the United States<sup>8-13</sup> has coincided with a decrease in the rate of cigarette smoking to its lowest level in nearly 60 years.<sup>14,15</sup> The rate of HTS is highest among young people, with 30% of college students having ever used and 10% having used in the past 30 days, making HTS nearly as common as cigarette use.<sup>8,9,11,16</sup> The rate of HTS has also increased substantially among high school students and noncollege populations,<sup>10,13,17</sup> and it is popular across gender, age, race, geographic location, and socioeconomic status.<sup>9,11,16,18</sup> Although some hookah users also smoke cigarettes, as many as half of users would have otherwise been naïve to nicotine.<sup>12,13</sup>

Clean air policies have successfully curbed cigarette smoking in certain regions of the

**Objectives.** Although US cigarette smoking is decreasing, hookah tobacco smoking (HTS) is an emerging trend associated with substantial toxicant exposure. We assessed how a representative sample of US tobacco control policies may apply to HTS.

**Methods.** We examined municipal, county, and state legal texts applying to the 100 largest US cities. We developed a summary policy variable that distinguished among cities on the basis of how current tobacco control policies may apply to HTS and used multinomial logistic regression to determine associations between community-level sociodemographic variables and the policy outcome variable.

**Results.** Although 73 of the 100 largest US cities have laws that disallow cigarette smoking in bars, 69 of these cities have exemptions that allow HTS; 4 of the 69 have passed legislation specifically exempting HTS, and 65 may permit HTS via generic tobacco retail establishment exemptions. Cities in which HTS may be exempted had denser populations than cities without clean air legislation.

**Conclusions.** Although three fourths of the largest US cities disallow cigarette smoking in bars, nearly 90% of these cities may permit HTS via exemptions. Closing this gap in clean air regulation may significantly reduce exposure to HTS. (*Am J Public Health.* 2012;102:e47–e51. doi:10.2105/AJPH.2012.300838)

United States. As of July 1, 2011, 35 states and thousands of local municipalities had passed smoke-free laws. Whether HTS is affected by laws such as these or whether provisions included in these laws may have intentionally or unintentionally exempted HTS is, however, not known.<sup>19,20</sup> Because of the importance of HTS establishments in promoting use of these products, these exemptions are likely to contribute to the prevalence of HTS.<sup>15,16</sup>

Thus, a systematic assessment of extant clean air laws, with special attention paid to implications for HTS, would be valuable. Moreover, determining what community factors are associated with HTS policy status may be valuable; this information may ultimately help focus interventions on communities in which the need is greatest. The purposes of this study were to assess how a representative sample of US tobacco control policies may apply to HTS and to determine associations between community-level sociodemographic factors and HTS policy status.

## METHODS

We obtained data on tobacco-related policies from the US Tobacco Control Laws Database maintained by the American Nonsmokers' Rights Foundation. This database of 8795 policies categorizes each US municipality, county, and state law relating to tobacco, including clean air, youth access, advertising, and taxation. Laws included in the database are identified through a variety of means, including systematic scanning of tobacco control publications, Web sites and e-mail discussion lists, biannual solicitation of tobacco control professionals, and partnerships with the National Association of City and County Health Officials and the National Association of Local Boards of Health. Senior staff members use standardized guidelines and codebooks to abstract the tobacco control laws identified. The American Nonsmokers' Rights Foundation reports and data have been instrumental in guiding implementation of policies shown to reduce tobacco use.<sup>21</sup> For this study, we

focused on clean air legislation. Although factors such as taxation and advertising regulations are also relevant to HTS, clean air laws seem to be the largest policy-related contributor to public health.<sup>13,19,20,22</sup>

### Selection of Municipalities

We assessed tobacco-related clean air policies for each of the 100 most populous US cities, according to the 2010 census. As have others in similar policy analyses,<sup>23</sup> we used this approach to maintain feasibility while still assessing policies that apply to a substantial population (59 849 899 individuals). For each city, we examined laws at the municipal, county, and state levels. We also assessed which laws were dominant in each municipality; for example, although many municipal laws are stronger than state laws, some state laws preempt municipal legislation.<sup>22</sup>

### Abstraction Process

American Nonsmokers' Rights Foundation staff had previously obtained the legislative documents, which included municipal, county, and state laws for all 100 cities, for prior assessment. Two research team members developed a codebook for assessing new variables that focused on components of clean air laws relevant to HTS, such as restriction of smoking in bars and the presence of exemptions to these laws that may apply to HTS. American Nonsmokers' Rights Foundation staff then reexamined all texts using the codebook. Four research team members met after the initial abstraction to refine the codebook and determine whether extraction of additional variables was necessary. Via this iterative approach, a final codebook was developed, and final codes were confirmed by reexamining the texts.

### Measures

**Clean air regulations.** Clean air laws vary widely in terms of whether they apply to private workspaces, public workspaces, restaurants, or freestanding bars (i.e., a bar not attached to a restaurant). We focused on freestanding bars because current concerns related to HTS seem to center on HTS establishments that are similar to freestanding bars.<sup>7,19,20</sup> We developed 3 separate dichotomous variables assessing whether comprehensive clean air regulations

currently prohibit tobacco smoking in freestanding bars on the municipal, county, and state levels. To be coded as comprehensive clean air legislation, the law had to be unambiguous and without qualifications. For example, many clean air laws provide for "mostly" clean air but allow for a fully enclosed and separately ventilated smoking room. For the purposes of this analysis, we did not consider these laws strong enough to be considered comprehensive because in practice this situation still exposes both patrons and staff to secondhand smoke.

**Special exemptions.** When a municipal, county, or state law did provide for comprehensive clean air in freestanding bars, we generated dichotomous variables describing whether the law allowed exemptions for HTS mentioned by name: tobacco retail establishments or cigar bars, or both. These latter 2 categories were the major exemption categories.<sup>20</sup>

**Composite clean air variables.** On the basis of the basic policy-related variables, we developed relevant composite variables. Specifically, we used 3 dichotomous variables to assess the overall policy environment in that city (i.e., when any municipal, county, or state law was present, we coded it as 1; otherwise, we coded it as 0). We used 3 other variables to assess whether exemptions existed on any policy level (municipal, county, or state) for HTS, tobacco retail establishments, and cigar bars.

**Final dependent variable.** For ultimate use in the analyses, we developed a single summary policy variable that distinguished cities without clean air legislation preventing cigarette smoking or HTS in freestanding bars; with anti-smoking legislation exempting HTS by name; with antismoking legislation providing for a different exemption under which HTS may fall; and with antismoking legislation and no clear exemption governing HTS. We developed this variable because of its strong face validity in comparing different types of policy environments. For example, we felt it was important to compare cities that specifically exempted HTS by name (category 2) with those that had general exemptions under which HTS might fall (category 3). However, we did not deem it relevant to differentiate whether the laws specifically exempted tobacco retail establishments, cigar bars, or both.

**Independent variables.** We searched 2010 US census records to categorize each city

according to population. Because population density figures were not yet available for 2010, we used 2000 census data for this variable. We also used data from the US Census Bureau for the years 2004–2009 to determine median income, median age, and racial and ethnic diversity.

### Analysis

We computed the number of cities for each policy type and summarized sociodemographic characteristics (e.g., population, mean age, percentage Hispanic) for each group of cities. We used multinomial logistic regression to determine associations between sociodemographic independent variables and our summary outcome policy variable. We used cities without clean air legislation comprehensively preventing cigarette or HTS in freestanding bars as the reference group. For the 1 categorical predictor variable (geographic region), we used  $\chi^2$  testing to determine whether an overall association existed between geographic region and policy type. We defined statistical significance using a 2-tailed  $\alpha = .05$ .

## RESULTS

According to the 2010 US census, 59 849 899 individuals lived in the 100 cities of our sample. Of these 100 cities, 27 had no clean air legislation comprehensively preventing cigarette or HTS in freestanding bars (Table 1). The remaining 73 cities had comprehensive anti-tobacco legislation in place on the municipal, county, or state level that disallowed tobacco smoking in freestanding bars. In 65 of these 73 cities (89.0%), the law provided for specific exemptions for tobacco retail establishments, cigar bars, or both, under which HTS may fall. In 4 of these 73 cities (5.5%), comprehensive anticigarette legislation exempted HTS by name. The 4 remaining cities had comprehensive anticigarette legislation and no clear exemption under which HTS seemed to fall.

A summary of community sociodemographic characteristics across policy variables are given in Table 2. Compared with cities with no comprehensive clean air laws, the 4 cities in which HTS was specifically exempted by name were denser (odds ratio [OR] = 1.46; 95% confidence interval [CI] = 1.11, 1.92,

**TABLE 1—Categorization of 100 Largest US Cities by Clean Air Policy Type**

Policy Environment Label	Description of Policy	Cities, No.	Specific Cities <sup>a</sup>
Smoking legal	No comprehensive clear air legislation related to any type of tobacco use in bars	27	Jacksonville, FL; Indianapolis, IN; Fort Worth, TX; Memphis, TN; Nashville, TN; Las Vegas, NV; Oklahoma City, OK; Virginia Beach, VA; Atlanta, GA; Miami, FL; Tulsa, OK; Arlington, TX; New Orleans, LA; Tampa, FL; Pittsburgh, PA; Henderson, NV; St. Petersburg, FL; Orlando, FL; Lubbock, TX; Baton Rouge, LA; Garland, TX; Reno, NV; Hialeah, FL; Chesapeake, VA; North Las Vegas, NV; Irving, TX; Birmingham, AL
HTS exempt	Comprehensive legislation disallowing cigarette smoking in bars; however, HTS specifically exempted by name	4	Chicago, IL; Boston, MA; Albuquerque, NM; Long Beach, CA
TRE exempt	Comprehensive legislation disallowing cigarette smoking in bars; however, HTS exempted via a generic exemption for TRES or cigar bars	65	New York, NY; Los Angeles, CA; Houston, TX; Philadelphia, PA; Phoenix, AZ; San Antonio, TX; San Diego, CA; Dallas, TX; San Jose, CA; San Francisco, CA; Austin, TX; Columbus, OH; Charlotte, NC; Detroit, MI; El Paso, TX; Baltimore, MD; Washington, DC; Denver, CO; Portland, OR; Tucson, AZ; Fresno, CA; Sacramento, CA; Kansas City, MO; Mesa, AZ; Colorado Springs, CO; Omaha, NE; Raleigh, NC; Cleveland, OH; Oakland, CA; Minneapolis, MN; Wichita, KS; Bakersfield, CA; Honolulu, HI; Anaheim, CA; Aurora, CO; Santa Ana, CA; St. Louis, MO; Corpus Christi, TX; Riverside, CA; Cincinnati, OH; Lexington, KY; Stockton, CA; Toledo, OH; St. Paul, MN; Newark, NJ; Greensboro, NC; Buffalo, NY; Plano, TX; Lincoln, NE; Fort Wayne, IN; Jersey City, NJ; Chula Vista, CA; Norfolk, VA; Chandler, AZ; Laredo, TX; Madison, WI; Winston-Salem, NC; Durham, NC; Glendale, AZ; Scottsdale, AZ; Fremont, CA; Irvine, CA; Rochester, NY; San Bernardino, CA; Spokane, WA
Strict	Comprehensive legislation disallowing cigarette smoking in bars; HTS does not seem to be exempt from this legislation	4	Seattle, WA; Louisville, KY; Milwaukee, WI; Anchorage, AK

Note. HTS = hookah tobacco smoking; TRE = tobacco retail establishments.  
<sup>a</sup>Cities are listed in order of population, from highest to lowest.

where each unit represents an additional 1000 people per square mile). Compared with cities with no comprehensive clean air laws, the 65 cities with generic retail tobacco store exemptions were denser (OR = 1.29; 95%

CI = 1.02, 1.62, where each unit represents an additional 1000 people per square mile). We found a significant association between geographic region and the summary policy variable ( $\chi^2 [df=9] = 23.3; P = .006$ ). For

example, 53% of cities in the South were in category 1 (no comprehensive clean air legislation), whereas only 6%, 13%, and 14% of cities in the Midwest, Northeast, and West, respectively, fell into this category (Table 3).

**TABLE 2—Sociodemographic Characteristics of 100 Largest US Cities With Differing Policy Types Related to HTS**

Sociodemographic Characteristic	All (n = 100), Mean (SD)	Smoking Legal (n = 27), Mean (SD)	HTS Exempt (n = 4), Mean (SD)	TRE Exempt (n = 65), Mean (SD)	Strict (n = 4), Mean (SD)
Population	598 499 (921 037)	390 358 (197 042)	1 080 325 (1 078 718)	659 943 (1 097 187)	523 164 (154 343)
Population density, persons/square mile	4603 (3977)	3116 (2482)	9184 (4453)*	4986 (4250)*	3861 (3396)
Median income, US \$/y	48 196 (12 710)	45 758 (10 342)	48 683 (3151)	49 144 (13 616)	48 768 (19 106)
Median age, y	33 (3)	34 (3)	33 (1)	33 (3)	34 (3)
Race/ethnicity, %					
White	60 (16)	62 (15)	53 (12)	60 (17)	63 (10)
Black	21 (18)	26 (19)	16 (10)	19 (18)	21 (17)
Asian	7 (9)	4 (3)	7 (4)	8 (11)	6 (5)
Hispanic	23 (21)	21 (22)	35 (13)	25 (21)	8 (6)

Note. HTS = hookah tobacco smoking; TRE = tobacco retail establishments. Smoking legal = no comprehensive clear air legislation related to any type of tobacco use in bars. HTS exempt = comprehensive legislation disallowing cigarette smoking in bars, but HTS specifically exempted by name. TRE exempt = comprehensive legislation disallowing cigarette smoking in bars; however, HTS exempted via a generic exemption for TRES or cigar bars. Strict = comprehensive legislation disallowing cigarette smoking in bars; HTS does not seem to be exempt from this legislation.  
 \*P < .05 for multinomial logistic regression analyses respectively comparing each of policy types 2, 3, and 4 (HTS exempt, TRE exempt, and strict) with policy type 1 (smoking legal).

**TABLE 3—Clean Air Policy Types Related to HTS by US Geographic Region**

Geographic Region	Smoking Legal (n = 27), %	HTS Exempt (n = 4), %	TRE Exempt (n = 65), %	Strict (n = 4), %
Midwest (n = 17)	6	6	82	6
Northeast (n = 8)	13	13	75	0
South (n = 38)	53	0	45	3
West (n = 37)	14	5	76	5

Note. HTS = hookah tobacco smoking; TRE = tobacco retail establishments. Smoking legal = no comprehensive clear air legislation related to any type of tobacco use in bars. HTS exempt = comprehensive legislation disallowing cigarette smoking in bars; however, HTS specifically exempted by name. TRE exempt = comprehensive legislation disallowing cigarette smoking in bars; however, HTS exempted via a generic exemption for TREs or cigar bars. Strict = comprehensive legislation disallowing cigarette smoking in bars; HTS does not seem to be exempt from this legislation. Row percentages may not sum to 100 because of rounding. For the overall table,  $\chi^2$  ( $df = 9$ ) = 23.3;  $P = .006$ .

## DISCUSSION

We found that although 73 of the largest US 100 cities disallowed cigarette smoking in bars, nearly all (n = 69) of these cities may allow HTS via exemptions. We also found that, of the sociodemographic variables measured, only population density and geographic location were associated with HTS policy environment.

These findings are consistent with those of other researchers who have pointed out that many US policies that apply to cigarette smoking do not similarly apply to HTS.<sup>19,20,24</sup> However, our study extended previous findings in 3 ways. First, we systematically examined the most populous cities in the United States to quantify the extent of dissimilarity in policy related to cigarette smoking and HTS. The study is also the first, to our knowledge, to investigate policies on all levels (municipal, county, state) to determine the specific policy in effect for each location. Finally, this study is the first, to our knowledge, to systematically assess which sociodemographic community characteristics were associated with an overall clean air policy environment.

Compared with cigarette smoking, HTS may be associated with similar or even greater inhalation of toxicants.<sup>2–4,7</sup> Thus, our findings that most policies enacted to reduce cigarette smoking may not apply to HTS highlight the need for improved US health care policy related to HTS. These findings may be valuable to researchers, lawmakers, health policy officials, and advocacy group leaders seeking to improve policy in this area.

Four municipalities specifically exempted HTS from clean air legislation. Investigating the

reasons for these exemptions with lawmakers, public health officials, and antitobacco advocates involved in this legislation would be valuable. If any of these individuals display important knowledge gaps regarding HTS toxin exposures, the opportunity for intervention may prove valuable.

We also found 4 municipalities with comprehensive clean air laws for which no specific exemptions seemed to apply to HTS. However, on the basis of Web searches, we found that HTS establishments did seem to exist in these locations.<sup>25,26</sup> It is possible that we missed or misinterpreted language in these legal codes. However, it is also possible that HTS establishments were illegal in these communities but that the law was not being sufficiently enforced. Further investigation specific to each of these locations may clarify the law and assist health department officials and public health advocates with enforcement.

In addition to lawmakers and public health officials, these data will be important to advocates, thought leaders, and the lay public, whose understanding of a potentially harmful loophole in prior legislation may increase pressure to update it. However, the aesthetic appeal of HTS—including the sweet-smelling smoke, attractive apparatus, exotic associations, mildness of HTS relative to cigarette smoking, and the belief that the water somehow filters toxins—may make it challenging to persuade laypeople of its potential harm and addictiveness.

Our study focused on clean air legislation addressing freestanding bars because current concerns related to HTS seem to center on HTS bars and cafés.<sup>7,19,20</sup> However, examining

clean air legislation relating to other environments such as outdoor locations may be valuable. Also valuable would be a systematic assessment of how current policies may apply differently to cigarette smoking and HTS with regard to taxation and labeling. Taxation on cigarettes is now substantial and increasing in many communities, and the Food and Drug Administration has recently introduced grisly new warning labels for cigarettes. However, HTS is generally not affected by regulations such as these.

Among the sociodemographic community factors we assessed, only population density and geographic region were significantly associated with policy environment. Although the 27 communities without antismoking policies had an average of 3116 individuals per square mile, communities in which HTS was exempted by name or might be exempted via a generic clause were denser (9184 and 4986 individuals per square mile, respectively). Although the reason for this difference is unclear, denser communities may possibly have more frequent market turnover and more community elements interested in supporting new businesses such as HTS establishments. The relative lack of antitobacco legislation in the South may be related to this region's historical and current involvement in growing tobacco. Knowing prior associations such as these may assist future studies linking policy to behavior, because researchers may want to control for community factors, such as population density and geographic region, which are potentially associated with both policy environment and substance use behavior.

## Limitations

We did not assess the impact of policies on behavior, which is an important area for future work. In particular, assessing whether past changes in policy environment have been associated with changes in HTS rates may be valuable. If unintended consequences of clean air legislation result in increased HTS, this information will be important for not only those involved in future legislation but also the lay public. This type of research may be difficult, however, because of how recent the HTS phenomenon is in the United States; few systematically collected, national data are currently available on HTS behavior, and

much of extant clean air legislation was passed before the proliferation of HTS.

This study was also limited in that we reviewed only the top 100 most populous cities. Because small cities have historically been the first to pass strong, innovative clean air laws, systematically assessing smaller jurisdictions may be valuable. Additionally, interpretation of legal texts is a complex and often subjective process. This subjectivity remains a limitation even though we used established data sources and coders highly familiar with interpretation of these texts. Finally, we should note that we did not assess whether the laws we found were being appropriately enforced.

## Conclusions

Despite these limitations, we systematically assessed clean air policies as they related to HTS, which is associated with high toxicant exposures. We found that about 90% of cities with comprehensive policies disallowing cigarette smoking in freestanding bars may allow HTS via exemptions. We also found that community population density is associated with HTS policy environment. These results may be valuable to researchers, lawmakers, health policy officials, and advocacy group leaders seeking to improve policy in this area. ■

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**Note.** Pinney Associates provides consulting services to GlaxoSmithKline Consumer Healthcare on issues related to the treatment of tobacco dependence.

## Contributors

B. A. Primack originated the study. M. Hopkins and C. Hallett obtained and coded the data. B. A. Primack and K. H. Kim conducted statistical analyses. B. A. Primack wrote the first draft. M. V. Carroll, M. Zeller, and K. Dachille wrote additional sections of the article.

J. M. Donohue and M. J. Fine provided supervision. All authors edited the article for important intellectual content. All authors approved the final version.

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## Human Participant Protection

No institutional review board approval was needed because no human participants were involved.

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