Published in final edited form as:

Am J Prev Med. 2017 April ; 52(4): 507–512. doi:10.1016/j.amepre.2016.10.015.

Patterns of Waterpipe Tobacco Smoking Among U.S. Young Adults, 2013–2014

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Abstract

Introduction—Patterns of waterpipe smoking and associated other tobacco use were assessed among U.S. young adults (aged 18–24 years).

Methods—A descriptive analysis of baseline data (2013–2014) from the Population Assessment of Tobacco and Health Study was conducted in 2016.

Results—The study included 9,119 young adults—44% ever and 11% past—30 day waterpipe smokers (12% of men and 9% of women were past—30 day smokers). Among past—30 day smokers, waterpipe smoking frequency was distributed as follows: 4% daily, 23% weekly, 36% monthly, and 37% less than monthly. The average session exceeded 30 minutes for 79% of respondents. In this age group, 29% were exclusive waterpipe smokers, 16% were dual (waterpipe/cigarette) smokers, 8% were dual (waterpipe/e-cigarette) users, 19% were waterpipe/cigarette/e-cigarette users, and 28% presented with other combinations of poly use.

Conclusions—Waterpipe smoking is widespread among U.S. young adults. Although waterpipe patterns are predominantly intermittent, the average smoking session provides prolonged exposure. Waterpipe smoking among young adults is primarily characterized by the use of flavored tobacco, the café culture, and poly tobacco use. Rising trends in waterpipe smoking among U.S. youth warrant a strong regulatory response to prevent future waterpipe-related morbidity and mortality.

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SUPPLEMENTAL MATERIAL

Supplemental materials associated with this article can be found in the online version at <http://dx.doi.org/10.1016/j.amepre.2016.10.015>.

INTRODUCTION

Cigarette smoking prevalence among U.S. youth has declined over the past decade, whereas alternative tobacco use is rising.¹ Waterpipe (hookah) smoking is the second most popular tobacco product among young adults,^{2,3} with evidence of its concentration around college campuses.⁴ Although waterpipe is perceived as less harmful and addictive than cigarettes,⁵ evidence shows that it can lead to dependence,⁶ and many known smoking-related diseases, including cancer and cardiovascular disease.⁷

Despite the rise in waterpipe smoking, its use patterns in the general population are not well understood.⁸ National survey data from 247,118 college students indicate predominantly intermittent waterpipe smoking patterns.⁹ However, detailed waterpipe smoking patterns in the general young adult population are lacking, including the role of waterpipe smoking in the context of poly tobacco use. This information is important to identify groups at risk for waterpipe smoking and guide development of waterpipe prevention and cessation programs.

Waterpipe smoking has only been recently assessed nationally, with limited questions dedicated to this tobacco use method. Therefore, population-level patterns of waterpipe smoking are typically limited to ever and current waterpipe smoking.¹⁰ The Population Assessment of Tobacco and Health (PATH) Study, a landmark national study on tobacco use, provides an opportunity to understand major waterpipe patterns and inform effective control strategies. Thus, an analysis of baseline data from PATH (2013–2014) was conducted to provide a detailed description of waterpipe smoking patterns among young adults, and their co-occurrence with use of other tobacco and nicotine products.

METHODS

Data were analyzed in 2016 from Wave 1 of the PATH Study, collected between September 2013 and December 2014. PATH is a household-based, nationally representative, longitudinal cohort study of 45,971 adults and youth in the U.S. Additional details of PATH methodology are reported elsewhere.¹¹ The current study was limited to young adults in PATH (aged 18–24 years, $n=9,116$).

The following demographic characteristics of participants were included: gender, age (in years), race/ethnicity, sexual orientation, education level, household income relative to the poverty level, and U.S. Census region. Participants responded to questions about ever and past–30 day use of tobacco products, including waterpipe, cigarettes, and e-cigarettes (Appendix, available online). For past–30 day waterpipe smokers, responses to detailed questions about patterns of use were analyzed, including: age of waterpipe initiation (first use, in years), waterpipe smoking frequency (i.e., daily, weekly, or monthly), average length of a waterpipe session (in minutes), usual place of waterpipe smoking (i.e., home or a friend's house, hookah bar or café, or other), ownership of waterpipe device, and use of flavored waterpipe tobacco at time of initiation.¹² Waterpipe smokers were further classified as either exclusive waterpipe smokers or poly users (with cigarettes, e-cigarettes, or any other tobacco product).

For this study, SAS, version 9.3 survey procedures accounted for weighting and calculated proportions with 95% CIs for all measures except age of initiation and average number of smoked waterpipes, for which means with SDs were reported. Statistically significant differences between demographic categories were assessed using chi-square tests. This study was deemed exempt by the University of Florida IRB.

RESULTS

Table 1 describes the weighted frequency of ever (44.2%) and past-30 day (10.7%) waterpipe smoking among young adults, by demographic characteristics.

Among past-30 day young adult waterpipe smokers (Table 2), median age at waterpipe initiation was 17.4 years. Cigarette smoking initiation most often occurred prior to waterpipe initiation (50.8%), though it occurred later (17.4%) or at the same age (14.8%) for portions of the sample. In terms of past-30 day waterpipe frequency, 37.5% self-reported less than monthly smoking, 36.2% monthly, 22.9% weekly, and 3.4% daily smoking. Higher rates were reported among certain demographics: 7.3% of blacks reported daily smoking (vs 2.6% in whites), whereas 25.2% of Hispanics/Latinos and 29.8% without college education reported weekly smoking (vs 22.2% in whites). The average length of a waterpipe smoking session was <30 minutes (20.8%), 30 to <60 minutes (45.7%), 1 to 2 hours (26.5%), and >2 hours (6.9%). Thirty-five percent of participants reported usually smoking waterpipe at home or a friend's house, 22.7% at a hookah bar or café, and 42.1% both in homes and at hookah bars or cafés. Hookah bars and cafés were reported as a usual place to smoke among 59.1% of men and 72.6% of women. Finally, 38.4% owned a waterpipe and 92.9% smoked flavored tobacco the first time they smoked waterpipe.

Among this sample, 29.3% did not use other tobacco products in the past 30 days. There was a significant difference in exclusive waterpipe smoking by gender (23.4% of men vs 37.5% of women) and education (34.9% college vs 21.4% <college). Meanwhile, 15.6% also smoked cigarettes, 5.9% used e-cigarettes, and an additional 9.0% used both cigarettes and e-cigarettes, and 40.3% had other combinations of poly tobacco use, all within the past 30 days.

DISCUSSION

This is the first study to describe the detailed patterns of waterpipe tobacco smoking among a nationally representative sample of young adults in the U.S. The study findings confirm that waterpipe smoking is a common tobacco use method in this age group, with the majority of past-30 day smokers reporting intermittent use. Despite the intermittent use patterns, these results confirm that the majority of waterpipe smokers spend between 30 minutes and 2 hours per session, exposing them to higher doses (relative to a standard cigarette smoking session) of harmful constituents and nicotine, which facilitates addiction.^{5,6} In addition, almost half of past-30 day waterpipe smokers had not smoked cigarettes prior to waterpipe initiation, suggesting that waterpipe smoking may serve as a gateway to cigarettes. Other salient features of waterpipe smoking include the widespread

waterpipe café culture, the predominant use of flavored tobacco, and poly tobacco use among waterpipe smokers.

Waterpipe smoking patterns were similar across genders, with two notable exceptions: Women more frequently reported smoking waterpipe at hookah bars and cafés and more frequently reported being exclusive waterpipe smokers, compared with men. Whereas other tobacco use behaviors are typically male-dominated, women seem to be equally attracted to waterpipe smoking as men, perhaps owing to its highly social context of consumption and acceptability, misperceptions about harm reduction, and tobacco flavoring.⁸ These results confirm prior reports that waterpipe smoking has become widespread among young adults^{9,10} and its use patterns are consistent with global trends.⁸ As with prior studies, one limitation was the use of self-reported data with the potential for recall bias. Despite this limitation, this report presents unique, nationally representative findings about a serious and growing public health problem.

CONCLUSIONS

Waterpipe smoking has become a U.S. public health problem that primarily impacts young people, with documented health risks associated with its use and its potential as a gateway to cigarettes and other tobacco products.^{6,7} Although adolescence is typically considered the stage with the highest risk for tobacco experimentation and initiation, waterpipe smoking initiation is more common in late adolescence and young adulthood, with a median age of initiation of 17 years. Despite intermittent waterpipe smoking patterns among young adults, more frequent waterpipe smoking was reported among vulnerable groups (e.g., blacks, Latinos, and less educated). The direct and indirect health consequences and the potential links to other tobacco use warrant a serious regulatory response to mitigate larger public health burden in the future.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

This research was supported in part by grant 4KB16 from the Florida Department of Health (James and Esther King Biomedical Research Program). Dr. Maziak is supported by the National Institute on Drug Abuse at NIH under awards R01 DA035160 and R01 DA042477. The sponsors had no part in the design and conduct of the study; collection, management, analysis and interpretation of the data; preparation, review, or approval of the manuscript; or decision to submit the manuscript for publication.

No financial disclosures were reported by the authors of this paper.

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Table 1

Weighted Frequencies of Ever and Past-30 Day Waterpipe Smoking: Young Adults (18–24 Years) by Select Demographics

Characteristics	n	Waterpipe tobacco smoking	
		Ever, % (95% CI)	Past–30 day, % (95% CI)
Gender			
Female	4,500	41.5 (39.2, 43.9)	9.0 (7.9, 10.1)
Male	4,616	46.8 (44.3, 49.4)	12.4 (11.1, 13.7)
Age			
18–20 years	3,756	38.8 (36.4, 41.3)	12.7 (11.2, 14.1)
21–24 years	5,360	47.9 (45.5, 50.4)	9.3 (8.4, 10.2)
Race/ethnicity			
White, non-Hispanic	4,716	46.6 (43.5, 49.8)	10.0 (8.7, 11.3)
Black, non-Hispanic	1,379	35.2 (31.9, 38.4)	10.2 (8.2, 12.2)
Asian, non-Hispanic	319	35.8 (29.8, 41.8)	10.2 (6.9, 13.5)
Other, non-Hispanic	571	47.7 (41.4, 54.0)	11.9 (7.9, 15.9)
Hispanic/Latino	2,131	45.8 (43.0, 48.7)	12.8 (11.4, 14.2)
Sexual orientation ^a			
Heterosexual/straight	8,092	43.5 (41.4, 45.7)	10.5 (9.5, 11.4)
LGB+	916	53.4 (49.3, 57.6)	14.2 (11.5, 17.0)
Education			
Less than high school	1,692	36.8 (33.7, 39.8)	11.1 (9.2, 13.0)
High school graduate	2,804	36.8 (34.5, 39.2)	9.7 (8.6, 10.8)
Some college or associate degree	3,670	48.9 (45.9, 51.9)	11.8 (10.4, 13.2)
Bachelor degree	866	55.5 (50.8, 60.2)	8.9 (7.1, 10.7)
Graduate degree	84	33.4 (21.5, 45.3)	5.9 (1.5, 10.3)
Household income ^b			
Less than poverty level	4,106	42.4 (39.7, 45.1)	11.5 (10.1, 12.9)
At or near poverty level	1,676	45.9 (42.2, 49.6)	10.3 (8.5, 12.0)
Twice poverty level or above	2,284	49.0 (46.3, 51.7)	10.4 (9.1, 11.6)
Region			
Northeast	1,393	46.6 (43.1, 50.0)	11.0 (9.0, 12.9)
South	2,060	44.7 (41.2, 48.3)	9.8 (8.7, 11.0)
Midwest	3,464	39.5 (36.6, 42.3)	9.3 (8.3, 10.5)
West	2,199	49.4 (42.6, 56.3)	13.3 (10.0, 16.6)
Total	9,116	44.2 (42.1, 46.3)	10.7 (9.7, 11.7)

^a n=9,008 due to missing values.

^b n=8,066 due to missing values.

LGB+, lesbian, gay, bisexual, or something else.

Table 2

Patterns of WP Smoking: Young Adults (18–24 Years) Who Were Past-30-Day WP Smokers

Past–30-day WP smokers	Total (n=1,247)	Male (n=717)	Female (n=530)	Age 18-20 years (n=631)	Age 21-24 years (n=616)	White, NH (n=605)	Black, NH (n=177)	Hispanic (n=334)	Other, NH (n=131)	College (n=666)	No college (n=581)
Age at WP initiation, years, M±SD	17.8±0.1	17.7±0.1	17.9±0.1	17.1±0.1	18.5±0.1	17.6±0.1	18.7±0.2	17.9±0.1	17.9±0.2	18.1±0.1	17.5±0.1
Cigarette initiation											
After WP initiation	16.7 (14.4, 19.0)	18.1 (15.0, 21.2)	14.7 (11.6, 17.8)	14.3 (11.3, 17.3)	19.0 (15.4, 22.6)	15.9 (12.8, 19.1)	14.2 (8.0, 20.5)	13.7 (9.9, 17.5)	29.0 (19.1, 38.9)	18.7 (15.6, 21.9)	13.9 (11.3, 16.5)
At same age	14.7 (12.5, 16.9)	15.1 (12.0, 18.2)	14.1 (11.0, 17.2)	15.1 (12.5, 17.7)	14.3 (11.2, 17.4)	18.9 (15.5, 22.4)	12.0 (7.3, 16.7)	11.6 (8.3, 15.0)	5.2 (0.4, 10.0)	17.0 (13.6, 20.3)	11.5 (9.2, 13.8)
Before WP initiation	50.6 (47.3, 53.8)	52.2 (48.2, 56.1)	48.3 (43.2, 53.4)	48.9 (44.9, 52.9)	52.2 (47.1, 57.2)	48.4 (43.8, 53.0)	49.8 (42.2, 57.4)	55.2 (49.8, 60.5)	51.1 (39.2, 63.0)	44.5 (40.6, 48.5)	59.0 (54.8, 63.1)
Never cigarettes	18.1 (15.4, 20.7)	14.6 (11.5, 17.7)	22.9 (18.8, 27.0)	21.7 (17.6, 25.8)	14.5 (11.4, 17.7)	16.7 (13.1, 20.3)	24.0 (16.2, 31.7)	19.5 (14.3, 24.7)	14.7 (6.6, 22.8)	19.8 (16.3, 23.3)	15.7 (12.2, 19.1)
WP smoking frequency											
Daily	3.4 (2.4, 4.4)	3.8 (2.3, 5.2)	2.9 (1.5, 4.3)	3.1 (1.5, 4.7)	3.7 (2.2, 5.2)	2.6 (1.2, 4.0)	7.3 (3.0, 11.6)	1.9 (0.4, 3.4)	5.9 (1.3, 10.5)	3.3 (2.2, 4.5)	3.5 (1.8, 5.2)
Frequency, M±SD ^a	4.6±2.3	5.9±3.6	2.1±0.5	7.8±5.3	2.0±0.4	2.0±0.4	3.5±1.3	18.5±16.3	1.5±0.2	1.4±0.1	8.8±5.3
Weekly	22.9 (20.2, 25.6)	26.6 (22.8, 30.3)	17.9 (14.1, 21.6)	24.1 (20.3, 27.9)	21.8 (18.1, 25.5)	22.2 (18.1, 26.3)	15.2 (10.5, 19.9)	25.2 (20.5, 29.8)	29.8 (20.4, 39.2)	20.7 (17.2, 24.3)	26.0 (21.8, 30.2)
Frequency, M±SD ^b	3.0±0.3	2.7±0.2	3.7±1.1	2.5±0.2	3.6±0.5	2.7±0.3	3.1±0.3	3.9±1.3	2.6±0.3	2.9±0.6	3.1±0.3
Monthly	36.2 (32.8, 39.5)	37.3 (33.5, 41.1)	34.6 (29.6, 39.6)	37.7 (33.6, 41.8)	34.7 (30.4, 39.0)	38.9 (34.3, 43.5)	30.1 (22.1, 38.1)	35.0 (29.4, 40.5)	33.0 (23.5, 42.5)	37.0 (32.1, 41.8)	35.1 (31.0, 39.2)
Frequency, M±SD ^c	3.0±0.2	3.0±0.2	3.1±0.2	3.1±0.2	3.0±0.2	2.9±0.2	3.3±0.5	3.5±0.6	2.7±0.3	2.6±0.1	3.6±0.3
Less than monthly	37.5 (34.1, 40.9)	32.4 (28.3, 36.4)	44.6 (39.8, 49.5)	35.1 (30.3, 39.9)	39.8 (34.8, 44.8)	36.3 (31.8, 40.8)	47.4 (39.3, 55.5)	38.0 (32.4, 43.5)	31.3 (21.1, 41.4)	39.0 (33.9, 44.0)	35.4 (31.0, 39.8)
Length of average session											
<30 minutes	20.8 (18.2, 23.5)	20.3 (17.0, 23.6)	21.6 (17.4, 25.7)	21.4 (17.5, 25.2)	20.3 (16.6, 23.9)	16.9 (13.6, 20.2)	30.2 (22.5, 38.0)	24.4 (19.6, 29.2)	20.4 (12.0, 28.8)	16.9 (13.5, 20.3)	26.3 (22.4, 30.2)
30 to <60 minutes	45.7 (42.6, 48.8)	46.4 (42.1, 50.6)	44.9 (40.3, 49.4)	46.4 (42.2, 50.5)	45.1 (41.0, 49.3)	49.9 (45.4, 54.4)	37.2 (28.5, 45.9)	43.4 (37.2, 49.7)	41.2 (30.3, 52.2)	46.1 (41.8, 50.3)	45.3 (41.1, 49.5)
1 to 2 hours	26.5 (24.3, 28.8)	27.2 (24.1, 30.4)	25.6 (21.6, 29.6)	25.3 (21.8, 28.9)	27.7 (23.8, 31.6)	26.7 (23.2, 30.1)	23.9 (17.0, 30.8)	26.2 (22.0, 30.4)	29.6 (19.8, 39.3)	30.2 (26.3, 34.0)	21.5 (18.1, 24.8)
>2 hours	6.9 (5.4, 8.4)	6.2 (4.3, 8.0)	8.0 (5.3, 10.7)	6.9 (4.7, 9.1)	6.9 (4.8, 9.0)	6.5 (4.5, 8.5)	8.7 (4.3, 13.0)	6.0 (3.2, 8.7)	8.8 (3.4, 14.2)	6.9 (4.8, 9.0)	6.9 (4.7, 9.1)
Usual place											
Home/friend's	35.2 (31.5, 38.9)	40.8 (36.6, 45.1)	27.4 (22.5, 31.2)	36.3 (31.6, 40.9)	34.2 (29.4, 38.9)	36.1 (30.8, 41.4)	28.3 (19.9, 36.8)	35.1 (29.3, 40.8)	38.9 (27.8, 50.0)	30.5 (26.1, 34.9)	41.7 (36.8, 46.7)
Hookah bar/café	22.7 (19.8, 25.6)	21.0 (17.6, 24.4)	25.0 (20.6, 29.4)	22.7 (18.8, 26.6)	22.7 (18.7, 26.7)	17.3 (14.2, 20.4)	39.8 (30.8, 48.8)	24.7 (19.0, 30.4)	24.0 (13.8, 34.3)	22.7 (18.7, 26.6)	22.7 (18.9, 26.6)
Home/friend's and bar/café/other	42.1 (38.3, 45.9)	38.1 (34.0, 42.4)	47.6 (42.2, 53.1)	41.0 (35.6, 46.5)	43.1 (38.5, 47.8)	46.6 (41.3, 51.8)	31.9 (23.7, 40.1)	40.2 (35.1, 45.3)	37.1 (27.1, 47.1)	46.8 (42.0, 51.5)	35.5 (30.8, 40.2)
Own/owned a WP	38.4 (34.4, 42.4)	37.6 (32.8, 42.4)	39.5 (34.5, 44.4)	37.0 (31.8, 42.2)	39.7 (34.7, 44.7)	40.1 (34.1, 46.2)	24.6 (18.2, 31.1)	38.0 (31.1, 44.9)	46.0 (35.0, 56.9)	37.2 (31.8, 42.6)	40.0 (35.3, 44.6)
Flavored WP tobacco	92.9 (91.2, 94.6)	91.6 (89.3, 94.0)	94.7 (92.5, 96.9)	92.4 (90.3, 94.4)	93.4 (90.9, 95.9)	95.0 (93.2, 96.8)	82.9 (77.8, 87.9)	91.3 (87.6, 95.1)	97.5 (95.1, 99.9)	95.2 (93.4, 97.0)	89.6 (86.9, 92.4)

Post-30-day WP smokers	Total (n=1,247)	Male (n=717)	Female (n=530)	Age 18-20 years (n=631)	Age 21-24 years (n=616)	White, NH (n=605)	Black, NH (n=177)	Hispanic (n=334)	Other, NH (n=131)	College (n=666)	No college (n=581)
Exclusive WP smoker	29.3 (26.2, 32.3)	23.4 (20.0, 26.7)	37.5 (31.9, 43.1)	28.6 (24.1, 33.0)	30.0 (25.9, 34.1)	25.0 (21.1, 28.9)	32.9 (24.9, 40.9)	37.5 (30.7, 44.2)	27.0 (17.7, 36.3)	34.9 (30.6, 39.3)	21.4 (17.4, 25.4)
Poly user (with WP)											
Dual user, cigarettes	15.6 (13.3, 17.8)	14.7 (12.1, 17.3)	16.8 (12.8, 20.9)	14.2 (11.0, 17.5)	16.9 (13.7, 20.0)	16.2 (13.2, 19.3)	9.1 (4.2, 13.9)	14.9 (10.8, 19.1)	21.1 (12.2, 30.0)	14.9 (11.8, 18.1)	16.5 (13.0, 20.0)
Dual user, e-cigarettes	5.9 (4.2, 7.6)	4.2 (2.5, 5.8)	8.2 (4.9, 11.6)	5.6 (3.4, 7.8)	6.1 (3.4, 8.8)	5.4 (3.6, 7.2)	2.5 (0.2, 4.8)	6.0 (2.7, 9.4)	11.2 (3.5, 18.9)	5.9 (3.5, 8.4)	5.8 (3.5, 8.0)
With cigarettes/e-cigarettes	9.0 (7.3, 10.7)	9.3 (7.0, 11.6)	8.6 (6.2, 10.9)	8.2 (5.7, 10.6)	9.7 (7.1, 12.4)	10.1 (7.9, 12.2)	4.4 (0.8, 8.1)	7.8 (4.8, 10.8)	11.3 (4.7, 17.9)	8.8 (6.4, 11.2)	9.2 (6.7, 11.7)
All other poly use	40.3 (37.0, 43.6)	48.5 (44.3, 52.7)	28.9 (24.3, 33.5)	43.4 (38.7, 48.2)	37.3 (33.1, 41.5)	43.3 (38.3, 48.4)	51.1 (43.0, 59.2)	33.8 (27.9, 39.7)	29.4 (20.1, 38.7)	35.4 (31.3, 39.5)	47.2 (42.6, 51.8)

Note: Data are % (95% CI) unless otherwise noted. Boldface indicates statistically significant difference ($p<0.05$).

^a Among daily WP smokers only.

^b Among weekly WP smokers only.

^c Among monthly WP smokers only.

NA, not available (suppressed); NH, non-Hispanic; WP, waterpipe.