

# Secondhand Smoke Exposure in Waterpipe Venues in Russia

## Fact Sheet

Waterpipe tobacco smoking (also known as hookah and as *calean* in Russia) is increasing in Russia.<sup>1</sup> In 2012, 4.2 million adults (3.8%) smoked waterpipes in Russia, with use highest among individuals under age 25.<sup>2</sup>

There is a common misperception that waterpipe tobacco smoking is less harmful than cigarette smoking.<sup>3</sup> Russia banned the use of tobacco products in some public places in 2013; in June 2014 restrictions were expanded to hospitality venues, including the use of tobacco in waterpipes. This study quantifies the magnitude and content of tobacco smoke exposure from waterpipes and demonstrates the need for continued consideration of waterpipe venues in smoke-free legislation.

## Methods

To evaluate exposure to waterpipe tobacco smoking in the environment and by employees, researchers conducted a survey of waterpipe venues and their employees in Moscow, Russia between December 2012 and May 2013. Venues were required to have at least one non-smoking employee. Air samples in the venues and biomarkers from employees were collected and analyzed (Table 1).

Table 1. Secondhand Smoke Constituents Measured in Air and Exposure Biomarkers Measured in Venue Employees

Air Markers	⇒	⇒	Exposure Biomarkers
Nicotine			Nicotine (hair) Cotinine (urine, saliva)
Polycyclic aromatic hydrocarbons (PAHs)			1-hydroxypyrene (1-OHPG) (urine)
Carbon monoxide (CO)			Carbon monoxide (CO) (exhaled breath)
Nicotine-derived nitrosamine ketone (NNK)			Nicotine-derived nitrosamine alcohol (NNAL) (urine)
Particulate matter <2.5 µm (PM <sub>2.5</sub> )			

## Venue and Employee Characteristics

Fieldworkers observed venue characteristics during peak business activity and asked about smoking histories and other factors that may contribute to biomarker levels (Table 2). Venue and employee participation rates were 34 percent and 95 percent, respectively.

Table 2. Venue and Employee Characteristics

Venue Characteristics (N = 17)	Employee Characteristics (N = 104)
<b>Indoor smoking policy</b>	Age, mean (SD) 35 (11)
Allowed in some indoor areas 24%	Male 50%
Allowed everywhere 77%	<high school education 54%
<b>Customers smoking waterpipe inside</b>	# hours worked/week, mean (SD) 47 (13)
<24% 82%	Current waterpipe smoker <sup>‡</sup> 25%
25-49% 18%	<b>Smoking status</b>
<b>Observations during peak activity</b>	Current smoker <sup>†</sup> 55%
# people, mean (SD)* 22 (13)	Former smoker <sup>‡</sup> 4%
# cigarette smokers, mean (SD) 4 (2)	Never smoker 41%
# waterpipe smokers, mean (SD) 4 (2)	<sup>‡</sup> Reported waterpipe smoking in the past three months (daily, <daily or "just a few puffs")
* SD = standard deviation	<sup>†</sup> Reported cigarette, waterpipe or pipe smoking in the past three months (daily, <daily or "just a few puffs")
	<sup>‡</sup> Reported past tobacco use >3 months ago

## Air Markers

- The median PM<sub>2.5</sub> level was 66 µg/m<sup>3</sup>, exceeding the World Health Organization (WHO) 24-hour PM<sub>2.5</sub> standard of 25 µg/m<sup>3</sup>.
- The median CO level was 1.5 ppm, below the Environmental Protection Agency (EPA) 8-hour standard of 10 ppm, although some venues had CO levels above this standard.
- The median PAH level was 23 ng/m<sup>3</sup>.
- The median air nicotine level was 2.5 µg/m<sup>3</sup>, ranging from 0.02 µg/m<sup>3</sup> to 22 µg/m<sup>3</sup>.
- The median NNK concentration was 1 ng/m<sup>3</sup>, ranging from 0.19 ng/m<sup>3</sup> to 8.47 ng/m<sup>3</sup>.
- There are no standards for PAH, air nicotine and NNK, but the concentrations found were consistent with substantial exposure to tobacco smoke.<sup>4</sup>

<sup>1</sup> Morton J, Song Y, Fouad H, El Awa F, El Naga RA, Zhao L, et al. Cross-country comparison of waterpipe use: Nationally representative data from 13 low and middle-income countries from the Global Adult Tobacco Survey (GATS). *Tobacco Control*. 2014; 23(5):419-427.

<sup>2</sup> Global Adult Tobacco Survey Russian Federation 2009 country report. Ministry of Health and Social Development of the Russian Federation. World Health Organization Tobacco Free Initiative. [http://www.who.int/tobacco/surveillance/en/tfi\\_gats\\_russian\\_countryreport.pdf](http://www.who.int/tobacco/surveillance/en/tfi_gats_russian_countryreport.pdf)

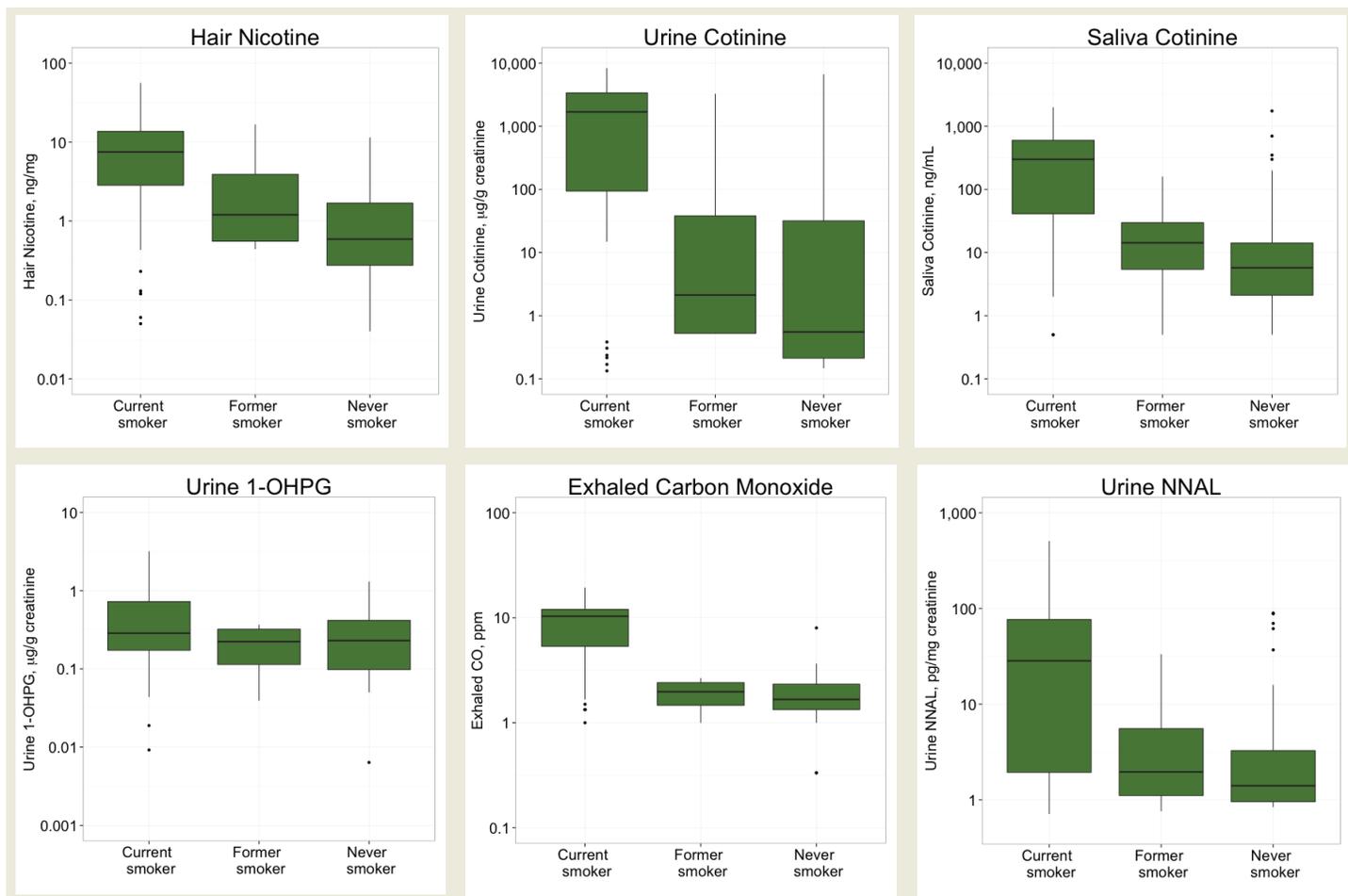
<sup>3</sup> American Lung Association. An emerging deadly trend: Waterpipe tobacco use. Washington: American Lung Association, 2007. [http://www.lungusa2.org/embargo/slati/TrendAlert\\_Waterpipes.pdf](http://www.lungusa2.org/embargo/slati/TrendAlert_Waterpipes.pdf)

<sup>4</sup> Jones MR, Wipfli H, Shahrir S, Avila-Tang E, Samet JM, Breyse PN, et al. Secondhand tobacco smoke: An occupational hazard for smoking and non-smoking bar and nightclub employees. *Tobacco Control*. 2013; 22(5):308-314.

## Biomarkers in Venue Employees

Fifty-five percent of venue employees were current smokers, 4 percent were former smokers and 41 percent never smoked (Table 2).

- Median hair nicotine levels were 7.5 ng/mg for current smokers, 1.5 ng/mg for former smokers and 0.6 ng/mg for never smokers.
- Median urine cotinine levels were 1709 µg/g creatinine for current smokers, 4.6 µg/g for former smokers and 0.6 µg/g for never smokers.
- Median saliva cotinine levels were 300 for current smokers, 14.5 for former smokers and 5.8 for never smokers.
- Median urine 1-OHPG levels were 0.27 µg/g creatinine for current smokers, 0.24 µg/g for former smokers and 0.23 µg/g for never smokers.
- Median exhaled CO levels were 10.3 ppm for current smokers, 2 ppm for former smokers and 1.7 ppm for never smokers.
- Median urine NNAL levels were 28.4 pg/mg for current smokers, 2.2 pg/mg for former smokers and 1.4 pg/mg for never smokers.



## Conclusion

There were high concentrations of PM<sub>2.5</sub>, CO, PAHs, air nicotine and NNK in waterpipe venues. Nicotine was found in the air, indicating exposure to tobacco smoke in waterpipe venues, although we cannot distinguish between cigarette and waterpipe smoke. The combined active smoking status and elevated occupational exposure of waterpipe venue employees resulted in extremely high levels of tobacco-related biomarkers in waterpipe venue employees.

These results confirm the importance of including waterpipe tobacco in smoke-free legislation and provide a baseline to evaluate the impact of the 2014 extension of the smoke-free legislation to include waterpipe venues in Russia. Additional analyses will evaluate the relationship between air markers and biomarkers of waterpipe tobacco smoke.

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