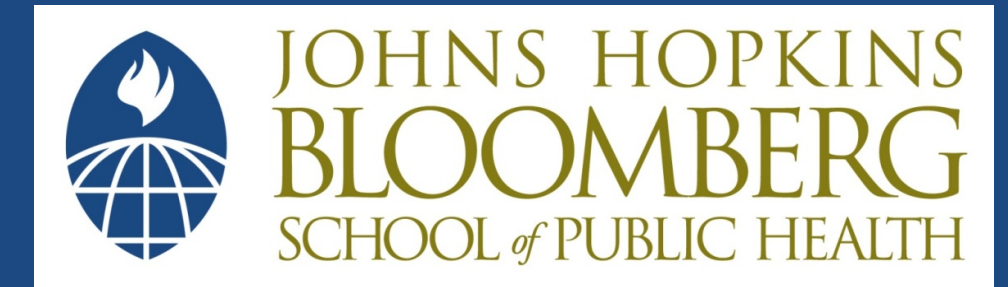


# Indoor and Outdoor PM<sub>2.5</sub> Concentrations in Bars and Night Clubs in 12 Turkish Cities

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## INTRODUCTION:

Secondhand smoke exposure poses significant health risks for non-smokers. Relatively few studies have quantified secondhand tobacco smoke (SHS) exposure in outdoor areas. In 2008, Turkey passed its smoke-free legislation prohibiting smoking in indoor public spaces; but smoke-free legislation is only as effective as its level of compliance. Few studies, moreover, have quantified SHS exposure in outdoor areas in hospitality venues from Turkey.

## OBJECTIVE:

We evaluated air pollution exposures related to SHS exposure in indoor and outdoor areas of bars and nightclubs in 12 cities in Turkey.

## METHODS

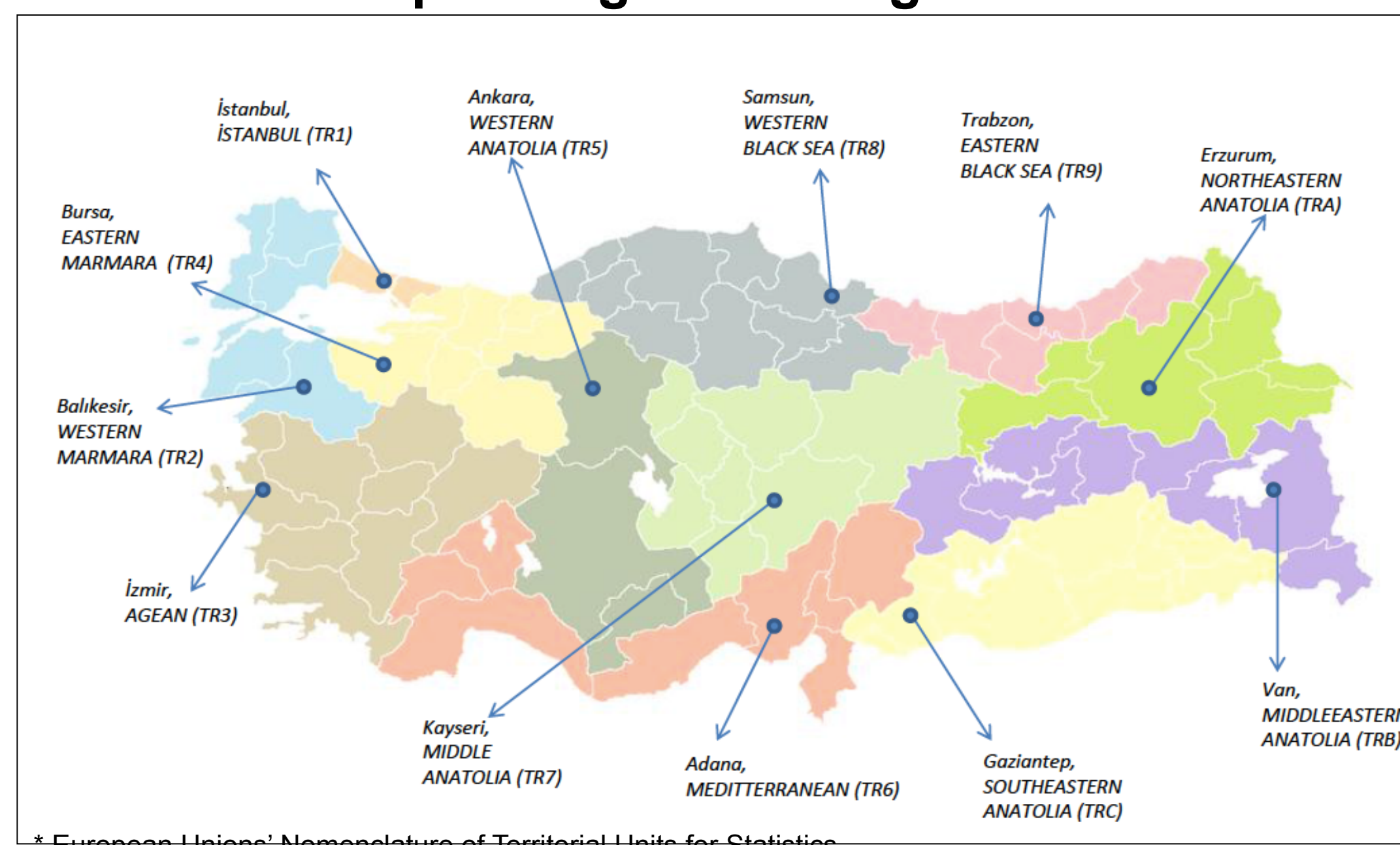
### Recruitment

- In each city, the Turkish Institute of Statistics identified 5/10 central sampling points using a random sampling strategy.
- We visited 79 bars/nightclubs between December 2012 and July 2013. They were the closest venues located near 5/10 randomly selected sampling points in each city. In 73 venues, we clandestinely measured air concentrations of particulate matter <2.5 µm (PM<sub>2.5</sub>).

### Air Sampling

- We measured air concentrations of particulate matter <2.5 µm (PM<sub>2.5</sub>) using a *TSI SidePak AM510 Personal Aerosol Monitor*. The SidePak continuously measured and recorded the particle concentrations every minute in a discrete manner.
- For each venue, air was sampled for 5 minutes outside of the venue (far from the entrance), 20 minutes in the main bar area, 5 minutes on the patio or terrace (if present), and finally 5 minutes outside (near the entrance).
- For each sampling location, the number of people and smokers, information on ventilation and other sources of burning, and the exact date and time air monitoring started and finished was recorded.

Provinces Covered by the SHELТ study and their corresponding NUTS\* regions and codes



## RESULTS

Number of venues, locations, people, mean number of people smoking and percentages of presence of smoking, ashtrays, cigarette butts and "No Smoking" signs observed across indoor and outdoor public places in Turkey

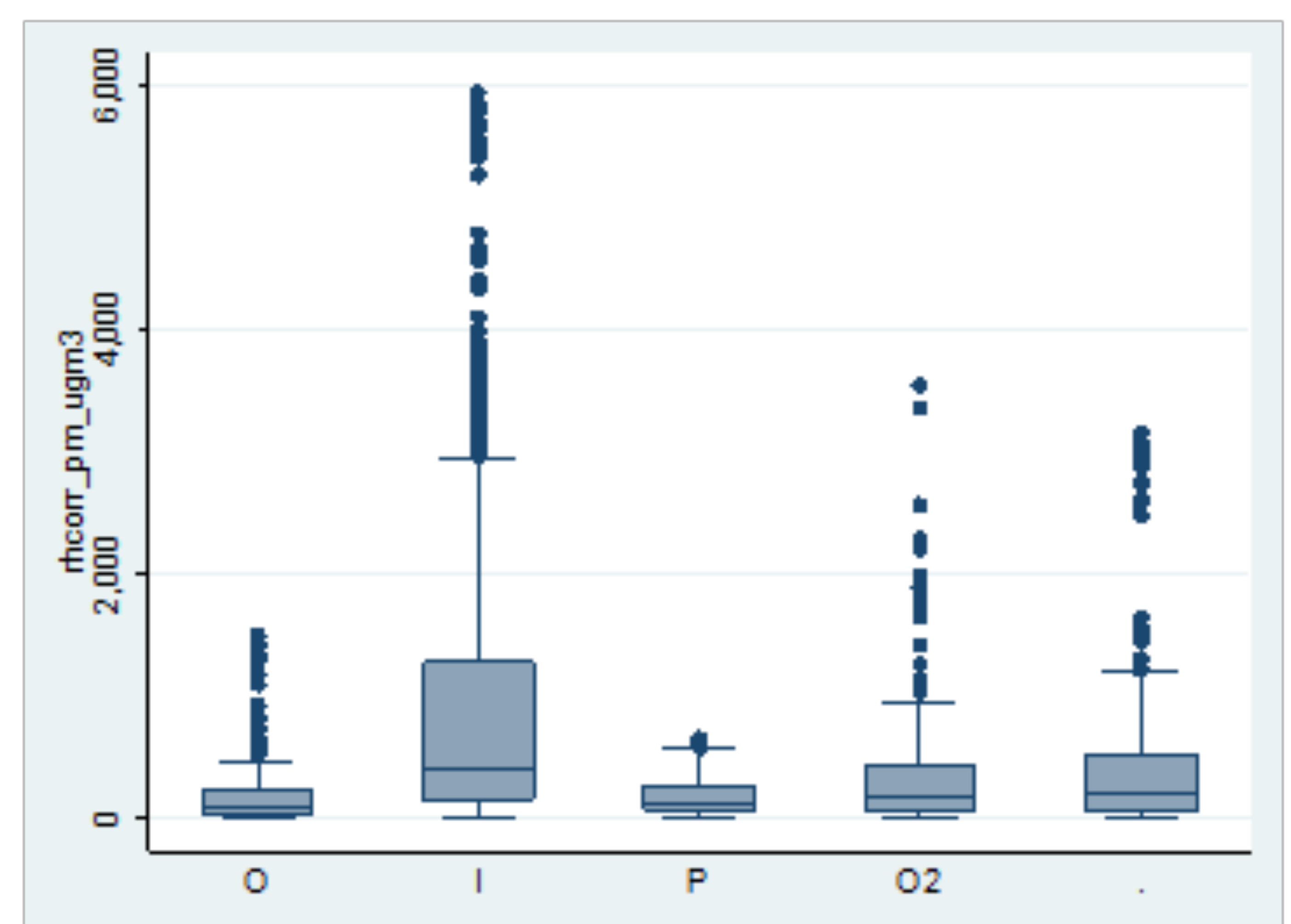
	No. Venues	No. Locations	No. People	Mean No. Smokers	% Smoking	% Ashtrays	% Cigarette butts	% "No smoking" signs
Overall	884	5,017	49,140	2.6	38.6	29.0	53.6	--
Indoor	884	3,661	34,651	1.4	16.4	16.3	18.7	71.2
Universities	37	262	1,816	0.5	2.7	8.1	10.8	67.6
Schools	134	960	7,192	0.1	5.2	6.7	10.5	54.5
Government Buildings	135	660	4,972	0.3	5.9	6.7	8.2	72.6
Malls	52	273	5,187	0.6	7.7	5.8	17.3	84.6
Hospitals	89	513	7,297	1.2	21.4	21.4	27.0	74.2
Restaurants	171	393	2,789	0.8	7.0	6.4	5.9	72.5
Cafés/patisseries	67	154	799	0.2	6.0	6.0	7.5	62.7
Coffee/tea Houses	120	180	2,004	1.5	22.5	19.2	20.8	85.8
Bars/Clubs	79	266	2,595	9.0	79.8	79.8	79.8	68.4
Outdoor	884	1,356	14,489	3.8	60.9	41.6	88.5	--
Universities	37	77	1,329	5.6	70.3	62.2	86.5	--
Schools	134	268	4,042	1.1	43.3	3.7	92.5	--
Government Buildings	135	148	721	1.6	56.3	31.9	87.4	--
Malls	52	113	1,515	8.6	76.9	61.5	90.4	--
Hospitals	89	156	3,199	10.6	86.5	64.0	98.9	--
Restaurants	171	230	1,112	1.8	49.7	36.3	77.8	--
Cafés/patisseries	67	96	413	1.6	44.8	41.8	77.6	--
Coffee/tea Houses	120	164	1,190	4.7	74.2	75.0	96.7	--
Bars/nightclubs	79	104	968	5.1	72.2	35.4	91.1	--

### Spearman correlation coefficients for smoking and smoking-related variables

	No. of smokers	Ashtrays	Cigarette butts	"No Smoking" signs
Indoor areas (N=3,661)				
No. of smokers	1.00			
Ashtrays	0.85*	1.00		
Cigarette butts	0.82*	0.78*	1.00	
"No Smoking" signs	0.08*	0.09*	0.05*	1.00
PM <sub>2.5</sub> **	0.32*	0.12	0.14*	-0.02
Outdoor areas (N=1,356)				
No. of smokers	1.00			
Ashtrays	0.49*	1.00		
Cigarette butts	0.37*	0.17	1.00	
PM <sub>2.5</sub> **	0.55*	0.08	0.13*	NA

In bars/nightclubs, PM<sub>2.5</sub> concentrations in outdoor air (near main entrances and on patios/terraces) was moderately correlated with the number of smokers (r=0.55).

Distribution of PM<sub>2.5</sub> Concentrations by Sampling Area



PM<sub>2.5</sub> concentrations were highest in indoor areas, showing the lack of compliance with the smoke-free law in bars and nightclubs

in outdoor air, the median concentrations were higher near the entrance, followed by patio/terraces, and lower in areas far from the entrances

## CONCLUSIONS

- Increased PM<sub>2.5</sub> concentrations were associated with the presence of smoking in patios/terraces and near venue entrances in outdoor areas. Indoors, smoking was common and resulted in elevated PM<sub>2.5</sub> concentrations.
- Better enforcement of the indoor smoking ban and additional legislation for outdoor areas are needed to protect workers and customers from SHS exposure in bars/nightclubs in Turkey.