SIMPOSIUM 8

INDOOR SMOKING POLLUTION LEVEL IN RESTAURANTS AND NUMBER OF CHILDREN EXPOSED DURING RAMADHAN IN DKI JAKARTA, INDONESIA

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Abstract

In Ramadhan2014, indoor air quality was measured after 6 pm in 43 restaurants in DKI Jakarta that still allow indoor smoking and in five that does not. We visited several venues in each of five districts of DKI Jakarta (North, South, Central, East, West Jakarta). Air quality was measured using a TSI Sidepak AM510 Personal Aerosol Monitor (TSI, Inc, St. Paul MN, USA) with calibration of 0.32, to provide a measure of particulate matter of 2.5 microns or less ($PM_{2.5}$). Researchers discretely collected air quality data and counted the number of children and visitors present in each venue during each visit. In restaurants that still allow indoor smoking, children are exposed with pollution level in average of 89.51ug/m^3(max= 333 ug/m^3, min= 19 ug/m^3), higher than the WHO recommended safe level of 25 micro/m^3. Average number of children exposed to high indoor pollution was 12 (min=0 and max=20). DKI Jakarta Government and all the stakeholders, including civil society, NGOs, restaurants owner, and private sectors need to work together in enforcing the Smoke Free Law in DKI Jakarta to protect children from the harm of tobacco smoke.

Key words: Indoor pollution, Ramadhan, DKI Jakarta, children exposed, second hand smoke.

1. BACKGROUND

Second hand smoke (SHS), one of the most preventable cause of death in the world that prematurely killed hundreds of thousands non-smokers, are highly exposed to children and unborn babies.[1,2]Because of the early exposure, cigarette smoke exposure causes higher premature disability and deaths when exposed to children.[3] Legislation that ban smoking in public and in-door places has been widely implemented to protect people from the risks of SHS and the potential harm of third hand smoke.[3,4] Many low and middle-income countries, including Indonesia, have implemented a smoke free law to protect its people.[5,6,7] Yet, enforcement of the smoke-free law is a common problem, resulting high SHS exposure among children.[4,5]

In Indonesia, at least 97 million people are regularly exposed to SHS with most of its youth are highly exposed at public places and home.[8,9]Indonesia's central-government legislation regulates smoke free areas (PP 109/2012) but still allows smoking area with access to open air.[6,7,10] Province level government is responsible to enforce the smoke free law.[6] DKI Jakarta Province, the capital city of Indonesia, is one the leading Provinces that enacted comprehensive

smoke-free law.[6] However, even with better enforcement after the removal of allocated smoking zones inside buildings in 2012,[10]compliance Jakarta remains a problem.

Air quality monitoring has been widely used to document contribution of smoking to indoor air pollution.[11,12] Tobacco smoking releases large quantities of particulate matter of ≤ 2.5 μg ($PM_{2.5}$) that are commonly used as SHS marker. As the international health standard, World Health Organization (WHO) proposes a maximum daily mean exposure of 25 $\mu g/m^3$ for ambient $PM_{2.5}$ pollution.[13] The results of air quality monitoring are commonly used to educate government, community organizations, and civil society about the benefit and importance of implementing comprehensive smoke free area.[10,12]

In some religious country, SHS monitoring during religious observance like Ramadhan are used to enhance compliance of smoke free law.[11] Indonesia is the country with the most Muslim population in the world, in where religion plays an important role in shaping smoking behavior. In 2010, when Indonesia's second largest Muslim organization, Muhammadiyah, declared Fatwa Haram that states smoking is against Islamic laws, most of its followers obey this non-binding law.[6] This situation shows a unique opportunity for Indonesia to enforce smoking law within its Islamic environment.

In Indonesia, holy month of Ramadhan are annually celebrated in when many people bring their family to break abstinence in restaurants or cafes. Thus, Ramadhan creates an opportunity to show indoor air pollution level in venues with poor compliance and the importance of enforcingthe enacted comprehensivesmoke free lawto protect children. The study aim to investigate the indoor pollution level and to calculate the number of children exposed to SHS during and after Ramadhan in greater Jakarta area.

2. METHODOLOGY

Indoor air quality was measured in 43restaurantsthat allow indoor smoking in Jakarta, Indonesia, during Ramadhan 2014. Venues were selected based on convenience sampling with considerations of proximity to research staff, popularity, safety, and confirmation of active cigarette smoking. We visited six to twelve venues in each of five districts of Jakarta Province (North, South, Central, East, West Jakarta). We excluded Thousand Islands district because of the difficult access and excluded venues that allow waterpipe smoking to reduce variability in types of SHS emission. Wevisited five venues that does not allow indoor smoking as a control.

In each venue, air quality was measured using a TSI Sidepak AM510 Personal Aerosol Monitor (TSI, Inc, St. Paul MN, USA) that draws air through the device where the particulate matter in the air scatter the light from a laser. Particulate matter with a mass median aerodynamic diameter less than 2.5 μm, or $PM_{2.5}$, was measured for minimum of 30 minutes indoor and for minimum of 10 minutes outdoor. We used calibration of 0.32 to provide accurate estimation of SHS.[12]

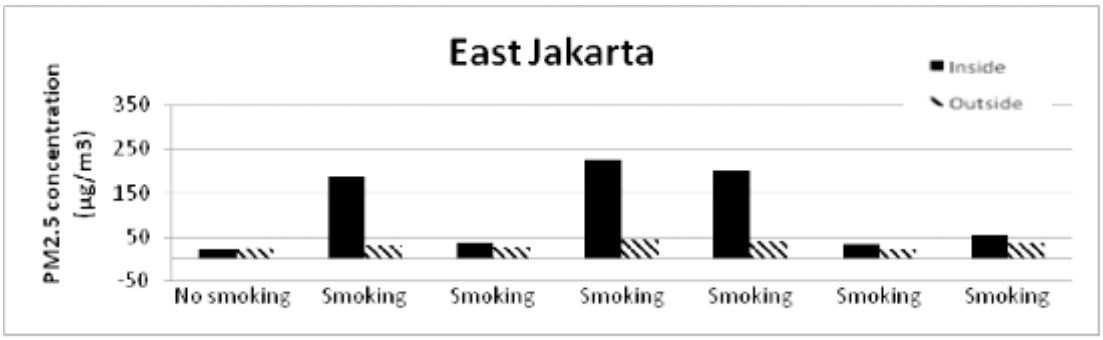
We measured the indoor pollution level by seating in the non-smoking area and counted the number of children and visitors during measurement. We collected data after ifthar during Ramadhan.Data and measurement were collected discreetly to avoid changes of behavior among employees and visitors. Data were analyzed descriptively, and analyzed with independent samples t-test with 95 % Confidence interval.

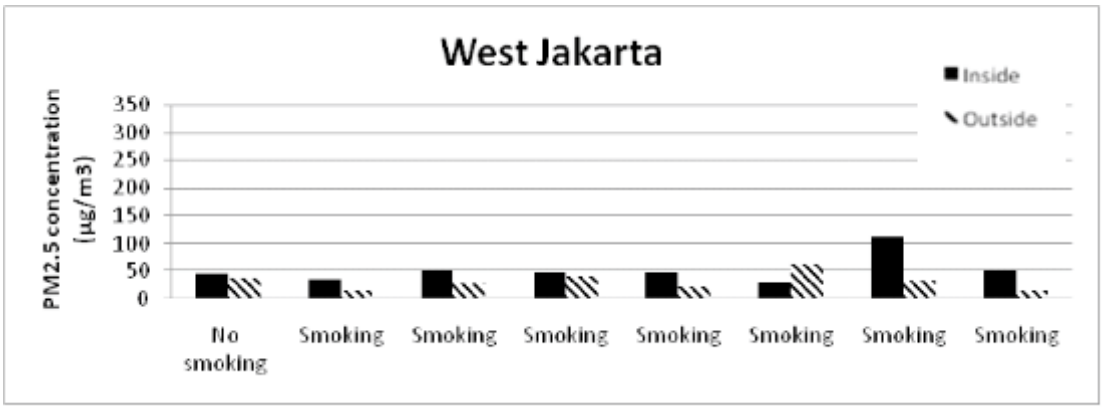
Tabel 1. Summary volume , $PM_{2.5}$ level, and number of smokers in each visited venues in DKI Jakarta by region

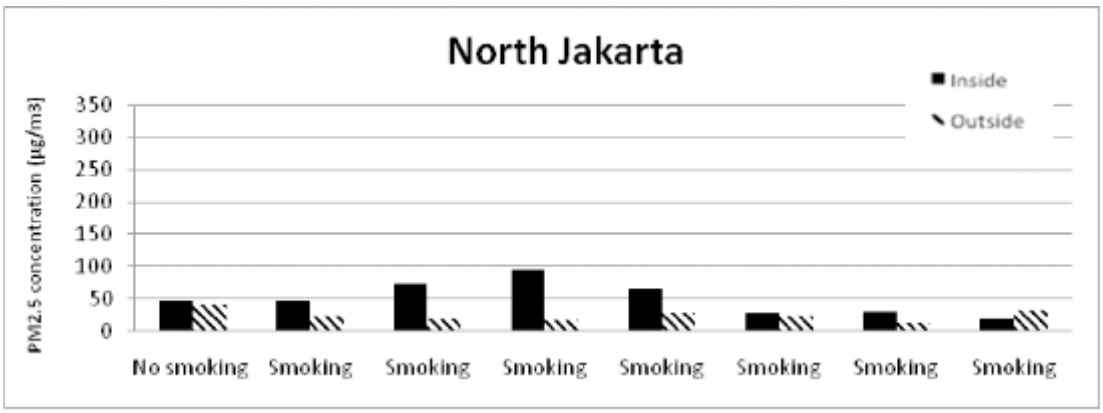
District	Allow indoor smoking	Average PM 2.5 (ug/$m^{3)}$		Venue volume ($m^{3)}$	Mean number of			Mean number of smokers /100m^3
		Indoor	Outdoor		Active smoker	Children	People	
Central	Yes	47	19	438	6	2	19	1
	Yes	55	41	907	9	5	36	1
	Yes	30	16	2079	19	8	48	1
	Yes	31	23	580	6	4	41	1
	Yes	129	36	1166	4	1	48	0
	Yes	333	40	582	25	1	31	4
	Yes	38	41	153	2	2	27	1
	Yes	80	53	376	5	3	37	1
	Yes	101	34	139	9	0	34	6
	Yes	76	36	4108	11	1	30	0
	No	18	30	1238	0	2	22	0
South	Yes	169	120	195	16	1	47	8
	Yes	80	88	318	12	3	19	4
	Yes	115	14	1008	13	0	51	1
	Yes	112	31	1399	18	0	44	1
	Yes	55	36	910	23	10	70	2
	Yes	121	46	669	45	4	94	7
	Yes	179	20	425	16	0	54	4
	Yes	98	55	277	10	1	25	3
	Yes	123	18	567	18	4	50	3
	Yes	45	27	422	37	7	96	9
	Yes	38	22	216	7	18	95	3
	Yes	107	48	151	12	9	37	8
	Yes	213	26	442	38	0	45	8
	Yes	20	34	499	0	2	11	0
North	Yes	48	23	256	7	3	20	3
	Yes	73	19	382	9	4	11	2
	Yes	95	17	867	8	3	26	1
	Yes	66	27	504	11	2	28	2
	Yes	27	23	605	4	1	13	1
	Yes	30	12	375	1	3	12	0
	Yes	19	33	468	3	0	7	1
	No	48	41	181	0	0	7	0
West	Yes	35	15	1496	8	9	39	1
	Yes	50	27	300	4	0	12	1
	Yes	47	40	304	2	1	24	1
	Yes	49	23	504	6	6	67	1
	Yes	31	64	2390	4	5	16	0
	Yes	111	33	449	3	8	42	1

3. RESULT

During Ramadan, the averageindoor $PM_{2.5}$ level in venues that allow indoor smoking (n=33) was 89.51ug/m^3 (max= 333 ug/m^3, min= 19ug/m^3). Indoor pollution level in smoking venues was significantly higher than the meanoutdoor $PM_{2.5}$ level (34.12ug/m^3; max= 120ug/m^3, min= 12 ug/m^3; p-value 0.001).The median $PM_{2.5}$ level outdoor smoking venues was 31ug/m^3.







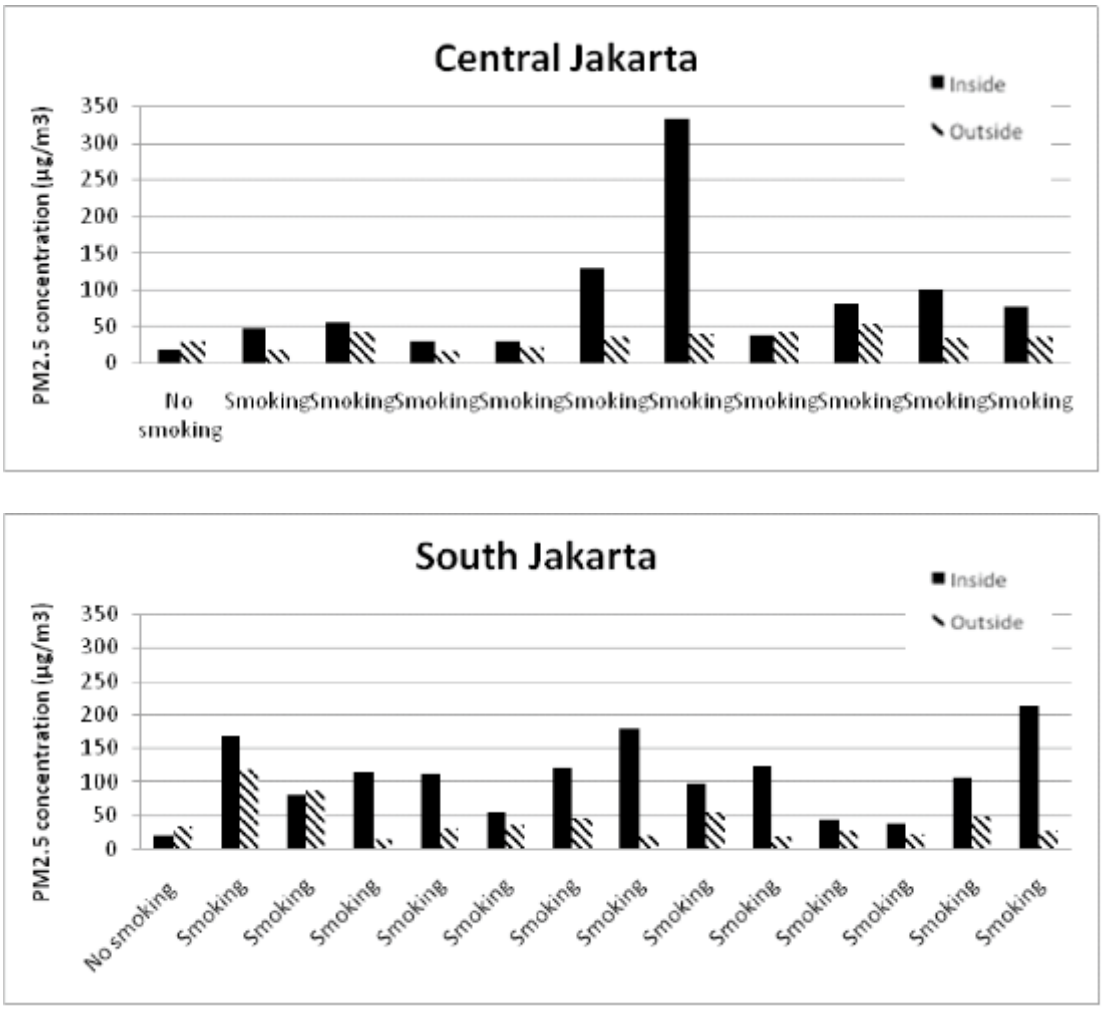


Figure 1. Particulate Matter ($PM_{2.5}$) levels inside and outside smoking (n= 43) and inside and outside no-smoking (n=5) venues by districts in DKI Jakarta during Ramadhan

venues, which might result from higher cooking emission level or high outdoor pollution level. However, other researches has shown that indoor smoking mainly contribute for the undafe level of indoor praticulate matter and elimination of indoor smoking may decrease the indoor pollution up until 90%[4].

This study emphasize the health concerns because of SHS exposure to people and children in restaurantsthat still allow indoor smoking. Religious occasion and highlights in the right to protect children may be used as strong moral justifications and a strategy to enhance the compliance of smoke free area.[11]Findings in this study can be used by community organization, local government, and civil society to educate and enforce the enacted comprehensive smoke free law in order to protect its people and children from the harm of tobacco smoke all year long.

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REFERENCE

1. Oberg M, J. M. (2011). Worldwide burden of disease from exposure to second-hand smoke: a retrospective analysis of data from 192 countries. . *Lancet , 377*, 139–46.
2. Michael Eriksen, J. M. (2012, March 23). *Smoke free areas*. Retrieved February 17, 2015, from Tobacco Atlas : http://tobaccoatlas.org/solutions/smokefree_areas/smokefree_areas/
3. WHO. (2013). *WHO report on the global tobacco epidemic 2013.* WHO.
4. World Health Organization. (n.d.). *Smoke-free legislation must be enacted to reduce involuntary exposure to tobacco smoke, especially in children. People should be informed about the risks of secondhand smoke and the potential harms of thirdhand smoke.* Retrieved May 20, 2014, from http://www.tobaccoatlas.org/topic/secondhand-smoke/.
5. Koh HK, J. L. (2007). Making smoking history worldwide. . *N Engl J Med , 356*, 1496–8.
6. Euromonitor International. (2013). *Passport Tobacco in Indonesia.* Euromonitor International.
7. SEATCA. (2012). *Indonesia Report Card: Status of Tobacco Use and Its Control.* Retrieved May 11, 2015, from www.ino.searo.who.int/.../Tobacco_Initiative_Indonesia_Country_Profil...
8. World Health Organization. (2012). *GLOBAL ADULT TOBACCO SURVEY: INDONESIA REPORT 2011 .* World Health Organization, Regional Office for South East Asia .
9. World Health Organization. (2009). *GYTS Fact Sheet Indonesia.* Retrieved 12 06, 2014, from www.searo.who.int/.../ino_gyts_fs_2009.pdf
10. Byron MJ, S. D. (2013). Secondhand tobacco smoke in public venues in three Indonesian cities. *Med J Indones,22*, 232-7.
11. Ramahi I, S. A. (2012, August). Secondhand smoke emission levels in enclosed public places during Ramadan. *European Journal of Public Health* , 1-4.
12. Hyland A, T. M. (2008). A 32-country comparison of tobacco smoke derived particle levels in indoor public places. . *Tob Control 2008, 17*, 159-65.
13. World Health Organization. (2005). *WHO Air quality guidleines for particulate matter, ozone, nitrogen dioxide, and sulfur dioxide.* Retrieved from http://whqlibdoc.who.int/hq/2006/WHO_SDE_PHE_OEH_06.02_eng.pdf