

BACKGROUND

- Globally, second-hand smoke (SHS) attributes to 1.2 million deaths among non-smokers annually¹.
- Atmospheric particulate matter with diameter $\leq 2.5 \mu\text{m}$ ($\text{PM}_{2.5}$) is a major component of SHS and cigarette smoke².
- In Singapore, smoking has been banned in most public areas but not in multi-unit residential homes³.
- There is a rise in complaints from residents due to neighbour's SHS exposure during the COVID-19 pandemic as 'Work From Home' becomes the norm⁴.

OBJECTIVE

To measure and compare the air quality of households that are exposed to SHS and unexposed households among smoking and non-smoking households in Singapore.

MATERIALS & METHODS

Participants

- Recruited using snowball sampling in 2021.
- Sample size: 26 households [20 smoking households (16 were with neighbour SHS and 4 were without neighbour SHS), 6 non-smoking households (5 were with neighbour SHS, 1 was without neighbour SHS)].

Data collection

- $\text{PM}_{2.5}$ concentration was measured using a calibrated air quality sensor placed in the common area of each participating household for a period between 7 to 16 days.
- Information on socio-demographic and household $\text{PM}_{2.5}$ exposures were collected.

Data analysis

- Descriptive statistics and time-series plots were used to compare the $\text{PM}_{2.5}$ concentration of different household types.
- Per household analysis includes households with mostly SHS exposure.

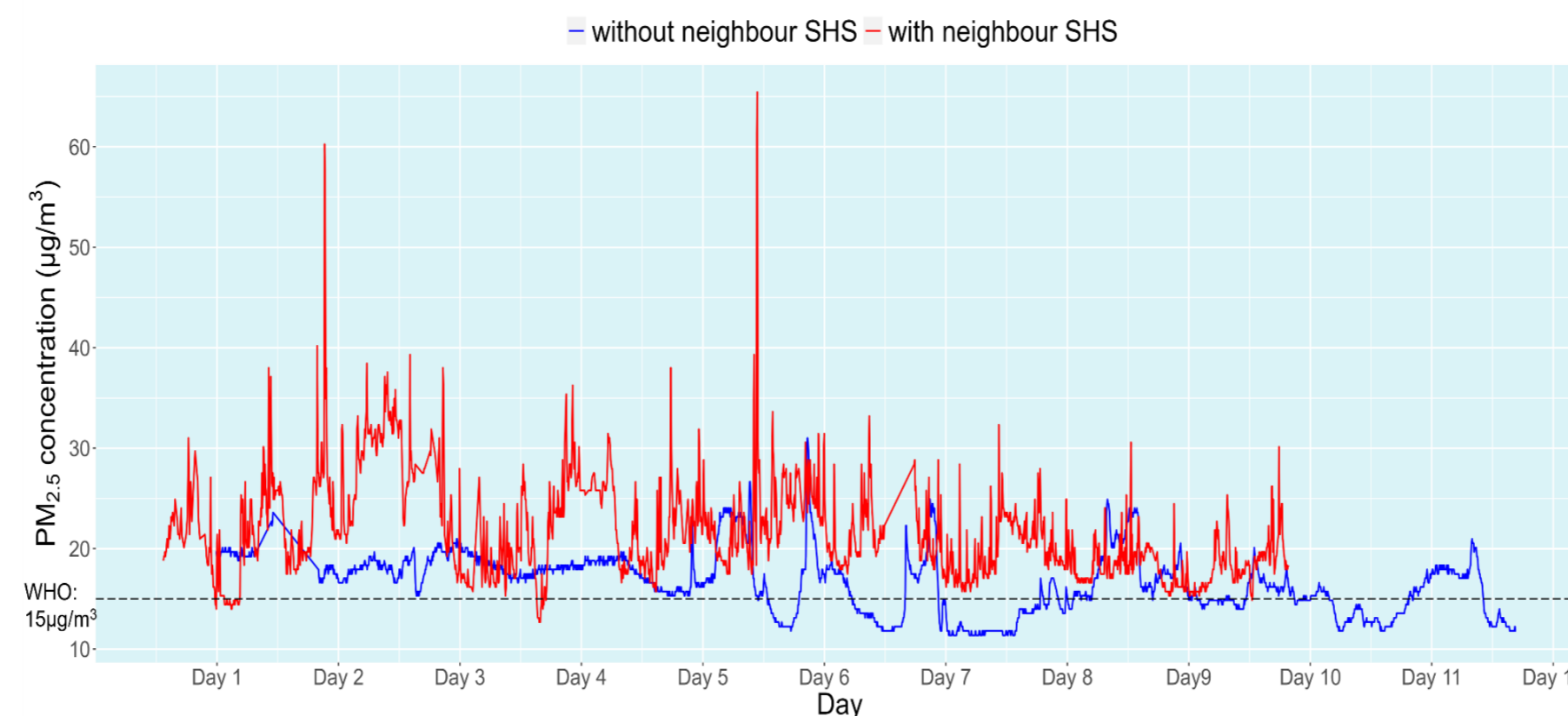
RESULTS

Descriptive statistics of $\text{PM}_{2.5}$ concentration by household types					
Descriptive statistics	All households	Smoking households with neighbour SHS	Smoking households without neighbour SHS	Non-smoking households with neighbour SHS	Non-smoking household without neighbour SHS
No. of household	26	16	4	5	1
Mean (SD)	23.1 (14.9)	22.2 (13.9)	30.5 (23.1)	22.0 (8.6)	16.6 (3.0)
Min – max	11.4 – 278.0	11.4 – 278.0	11.4 – 274.4	12.2 – 255.7	11.4 – 31.0
IQR	7.9	7.0	9.2	9.2	3.9
n (%) above WHO healthy threshold ^a	47240 / 54348 (86.9%)	27917 / 32805 (85.1%)	7843 / 8186 (95.8%)	9894 / 11032 (89.7%)	1586 / 2325 (68.2%)

^aExposure to $\geq 15 \mu\text{g}/\text{m}^3$ of $\text{PM}_{2.5}$ out of total recorded exposure (in seconds)

IQR = Inter Quartile Range; SD = Standard Deviation; SHS = Secondhand Smoke; WHO = World Health Organization

$\text{PM}_{2.5}$ concentration in non-smoking households (per household analysis)



DISCUSSION

- Neighbour SHS exposure using real-time $\text{PM}_{2.5}$ concentration level was found among non-smoking households.
- $\text{PM}_{2.5}$ concentration level at non-smoking households tend to exceed the World Health Organization's recommended healthy threshold level of $15 \mu\text{g}/\text{m}^3$ (24-hour mean)⁵.
- Future studies should explore the respiratory health impact of $\text{PM}_{2.5}$ concentration from SHS exposure in multi-unit housing.

IMPLICATION TO PUBLIC HEALTH & POLICY

A smoke-free policy in multiunit housing is necessary to curb SHS exposure in order to protect others from the ill-health effects from SHS exposure.

REFERENCES

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FUNDING SOURCES

This work was jointly funded by a Tier 1 Academic Research Fund from the Singapore Ministry of Education and a start-up fund from the National University of Singapore.

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