Ambient Air Pollution and the Health-related Quality of Life of Older Adults in China

Jialong Tan[1], Nuo Chen[1], Jing Bai[1], Peizhe Yan[1], Chen Chen[2*], Jian Wang[1*]

[1] Dong Fureng Institute of Economic and Social Development, Wuhan University, Wuhan, China
[2] School of Public Health, Wuhan University, Wuhan, China

INTRODUCTION

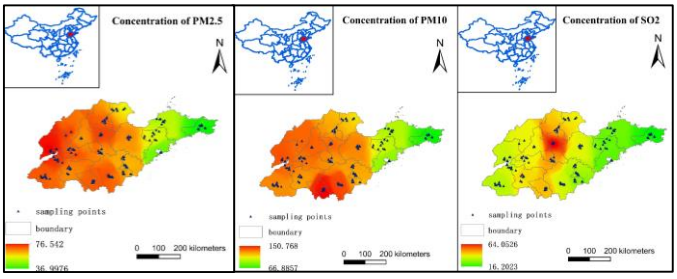
- Ambient air pollution is a major public health concern impacting all aspects of human health.
- There is a lack of studies on the impact of ambient air pollution on health-related quality of life of older Chinese adults.
- We address this gap by using the EQ-5D-3L to measure HRQoL for older-age Chinese, examining the relationship between long-term exposures to ambient air pollutants and HRQoL.

OBJECTIVES

- How concentrations of ambient air pollutants are associated with HRQoL among older adults in China?
- What are the possible mechanisms through which ambient air pollution affects HRQoL?

METHODS

- From the 2018 National Health Service Survey, we sampled 5722 individuals aged 65 years or older residents for the eastern province of Shandong, China.
- Data on individual exposures to $PM_{2.5}$ and PM_{10} (particulate matter with diameter less than or equal to 2.5 μm and 10 μm) and sulfur dioxide (SO_2) were collected from the China High Air Pollutants (CHAP) datasets.



5-year average concentrations of $PM_{2.5}$, PM_{10}, SO_2

- Mixed-effects Tobit regression models and mixed-effects ordered Probit regression models were employed to examine the associations of long-term exposure to ambient air pollution with EQ-5D-3L scale comprising mobility, self-care, usual activities, pain or discomfort, and anxiety or depression. Socioeconomic, demographic and behavioral factors relating to HRQoL were also examined.

Jialong Tan, Post doctoral researcher at Wuhan University, China
E-mail: jialongtan@whu.edu.cn
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RESULTS

- The table shows each 1 μg/m3 increase, EQ-5D-3L scores fell 0.002 for $PM_{2.5}$; 0.001 for PM_{10} and 0.002 for SO_2.

	EQ-5D score		
Variables	(1)	(2)	(3)
Sex (base=Male)	0.008 (0.012)	0.008 (0.012)	0.009 (0.012)
Age (base=65-75 years old)			
75-85 years old	-0.093*** (0.011)	-0.093*** (0.011)	-0.093*** (0.011)
85+ years old	-0.169*** (0.022)	-0.169*** (0.022)	-0.169*** (0.022)
Marital status (base=Unmarried)	0.045*** (0.012)	0.046*** (0.012)	0.044*** (0.012)
Residence (base=Rural)	0.032** (0.01)	0.034** (0.01)	0.05*** (0.012)
Educational level (base=Illiterate)	0.037** (0.011)	0.037** (0.011)	0.04*** (0.011)
Income (base=Low)			
Medium	0.052*** (0.011)	0.053*** (0.011)	0.052*** (0.011)
High	0.084*** (0.012)	0.086*** (0.012)	0.084*** (0.012)
Smokers (base=Never)	-0.016 (0.013)	-0.016 (0.013)	-0.016 (0.013)
Drinkers (base=No)	-0.079*** (0.013)	-0.079*** (0.013)	-0.079*** (0.013)
Exercise (base=No)	0.147*** (0.01)	0.146*** (0.01)	0.147*** (0.01)
Chronic disease (base=No)	-0.167*** (0.01)	-0.167*** (0.01)	-0.167*** (0.01)
BMI (base=Underweight)			
Normal weight	0.057** (0.018)	0.057** (0.018)	0.056** (0.018)
Overweight	0.068*** (0.019)	0.068*** (0.019)	0.068*** (0.019)
Obese	0.014 (0.022)	0.015 (0.022)	0.016 (0.022)
$PM_{2.5}$	-0.002** (0.001)		
PM_{10}		-0.001** (0)	
SO_2			-0.002** (0.001)

* p < 0. 05, ** p < 0.01, *** p < 0.001.

- Long term exposure to $PM_{2.5}$, PM_{10} and SO_2 were also associated with increased prevalence of pain or discomfort and anxiety or depression.
- The reduced HRQoL effects of ambient air pollution were exacerbated by higher socioeconomic status (affluent, urban and higher level of education).
- We used 1- to 4-year average exposure to check the consistency. The regressions remained robust.

DISCUSSION & CONCLUSION

- HRQoL of older Chinese adults was not only associated with demographic, socioeconomic, and health-related factors, but also negatively correlated with air pollution, especially through increased pain or discomfort and anxiety or depression.
- Stronger adverse health effects of long-term air pollution exposure were observed for those older adults living in urban communities, in the high-income group and with a higher education level. The results were generally reverse to the findings in most western literature where higher SES was found to play a role of mediating the adverse effects of air pollution. The difference reflects different cultural, political, industrialization and urbanization characteristics.