



Characterizing profiles of exposures to multiple sources of air pollution and their impact on respiratory health (ongoing work).

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Structure

- Background and rationale
- Aims and objectives
- Methods
- Preliminary results
- Acknowledgements

Background and rationale

Adverse health effects of air pollution

- There is evidence of associations between exposure to different sources of air pollution and respiratory health:
 - Ambient/traffic related air pollution: PM10, PM2.5, NO2, distance to major road
 - Indoor air pollution: type of heating/cooking, smoking, etc
 - Occupational exposure to vapours/gases/dusts/fumes and organic solvents



Gaps and potential room for further research:

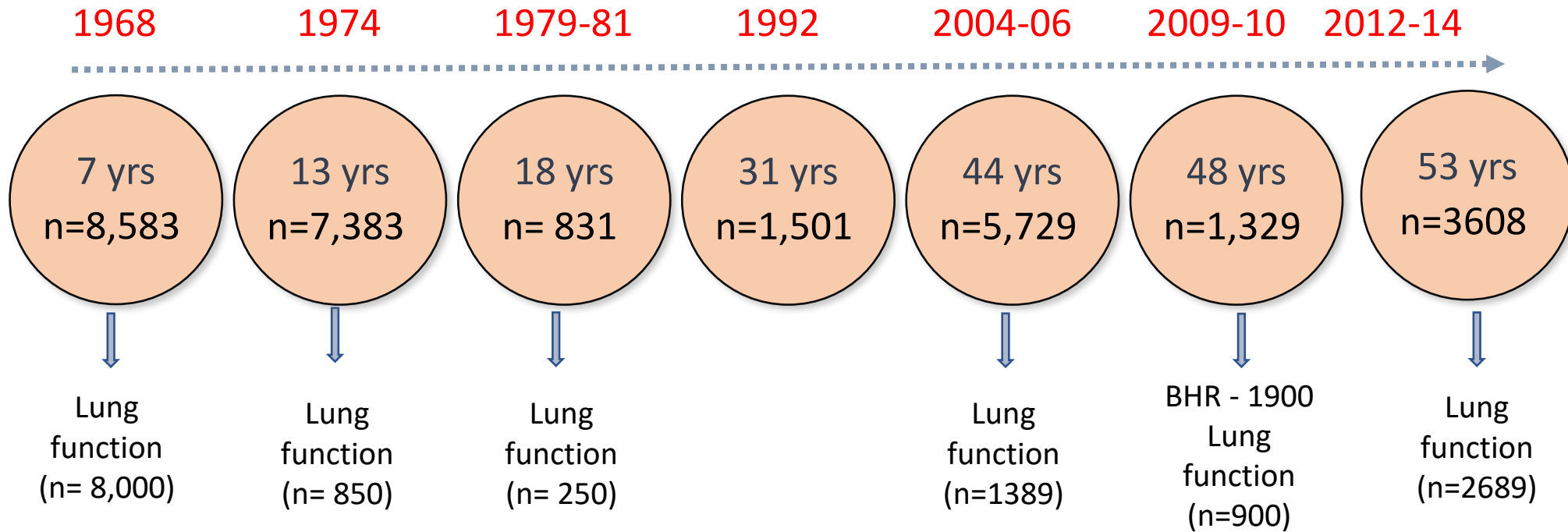
- Previous studies have mostly focused on the effects of single source of exposure
- An individual may be exposed to different sources
- Complex interplay between exposures to different sources if they coexist

Hypothesis:

- Latent class analysis can identify distinct profiles of exposures to different sources
- Different profiles are differently associated with respiratory health

Aim:

- To identify profiles of exposures to different sources of air pollution and investigate their associations with respiratory health outcomes in middle age



TAHS provides the best platform to achieve these goals given its unique longitudinal data on exposures and health outcomes over decades

This analysis was based on cross-sectional data collected at 53 years

Data on exposures

- Ambient air pollution:
 - Participants' home address was geocoded
 - PM2.5 & NO2 levels were estimated using LUR
- Data on indoor pollution exposures
 - Types of heating and cooking, presence of mould, cat, dog, passive and active smoking
- Data on occupational exposures
 - Lifetime job history collected at 53 years
 - Exposure assessment: JEM

TAHS data

Health outcomes at 53 years

- Asthma
- Lung function
- Respiratory symptoms
- Multimorbidities



Analytical methods

Identify profiles of exposures to different sources

- Indicator variables used: 14 variables for ambient, occupational and indoor exposures
 - PM2.5 NO2 traffic
 - gas dust solven insecticide
 - cooking heater cat dog mould passivesmoke activesmoking
- We used Latent Class Analysis

Investigate associations between profiles of exposures and respiratory outcomes

Profiles of exposures identified from LCA

	Class 1	Class 2	Class 3	Class 4	Class 5
Q4_PM2.5	0.488095	0.220414	0.162786	0.155374	0.444039
Q4_NO2	0.735478	0.157545	0.071092	0.178214	0.65702
Proximity to main road	0.408563	0.208419	0.234473	0.240577	0.373032
Gas/fume	0.033581	0.037562	0.975791	0.066303	0.961772
Dust	0.05308	0.044236	0.936328	0.041413	0.862897
Aromatic solven	0.002805	2.29E-05	0.22944	0.004792	0.270002
Insecticide	3.36E-05	8.00E-06	0.158533	3.03E-05	0.031733
Gas cooking	0.812119	0.178093	0.1879	0.273798	0.414782
Gas heating	0.604322	0.058717	0.016764	0.082606	0.353679
Wood heating	0.129622	0.056261	0.55049	0.389138	0.082622
Cat owning	0.301016	0.359425	0.388904	0.432859	0.292558
Dog owning	0.580762	0.573765	0.599041	0.579737	0.53019
Mould in house	0.280246	0.360097	0.348392	0.299098	0.310172
Passive smoking	0.06205	0.015796	0.238999	0.713961	0.195087
Past smoke	0.405848	0.421108	0.407242	0.300171	0.325965
Current smoke	0.065582	0.07071	0.226792	0.488213	0.222414

Class 1: Both ambient pollution and highly exposed to indoor air gas N=435 (12.1%)

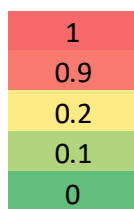
Class 2: No or least exposure N=1588 (44.1%)

Class 3: Occupational exposures and highly exposed to indoor wood heating N=1026 (28.5%)

Class 4: Passive and active smoking & moderately exposed to wood heating N=304 (8.4%)

Class 5: Ambient pollution, occupational exposure and moderately exposed to indoor gas N=248 (6.9%)

Probability of having each exposure



Characteristics of profiles of exposures

	1.Both ambient pollution and highly exposed to indoor air gas N=435 (12.1%)	3.Occupational exposures and highly exposed to indoor wood heating N=1026 (28.5%)	4.Passive and active smoking & moderately exposed to wood heating N=304 (8.4%)	5.Ambient pollution, occupational exposure and moderately exposed to indoor gas N=248 (6.9%)	2.No or least exposure N=1588 (44.1%)
Male sex, %	46.6	61.7	46.4	52.4	41.2
Smoking status, %					
Never	53	35.8	20.8	44.5	50.7
Past	41.6	39.6	27.8	29.9	41.2
Current	5.3	24.5	51.3	25.5	8.0
Education levels, %					
Grade 1-11	16.8	43.1	44.9	34.4	30.3
Grade 12 to diploma	35.6	45.7	43.6	41.8	41.5
University or higher	47.5	11.1	11.4	23.7	28.1
Childhood asthma	15.8	17.5	13.3	18.8	18.2
Current asthma	14.2	12.5	9.9	12.1	10.3
Current wheeze	15.5	23.7	28.8	24.1	18.5
Attack of shortness of breath at rest	8.4	8.7	7.7	8.5	7.5
Attack of shortness of breath after exercise	17.4	21.2	30.8	21.9	16.1
Chest tightness at night	9.8	7.7	9.8	8.9	7.0
Attack of shortness of breath	8.4	7.9	9.5	6.5	7.4
Cough	22.6	27.4	35.2	27.5	20.5
Sputum	9.0	15.3	19.7	14.9	10.4

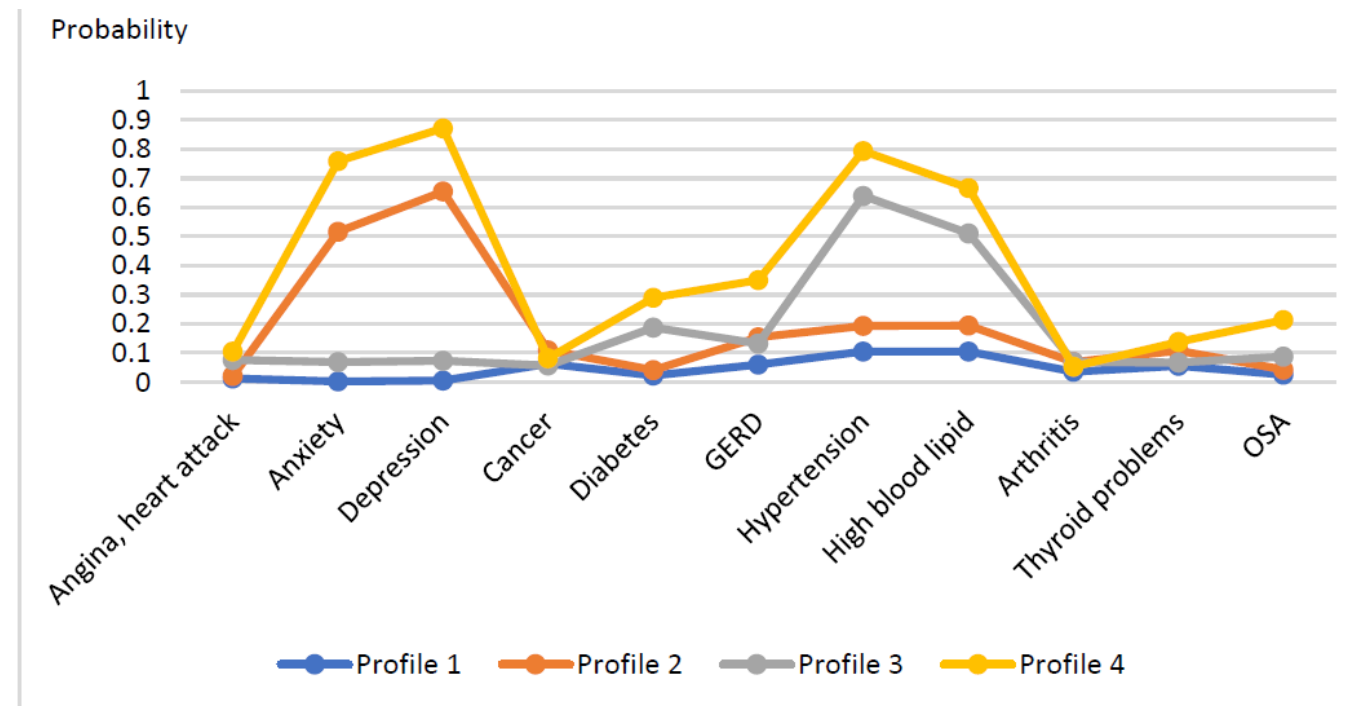
Associations between profiles of exposure and asthma and lung function at 53 years

	1. Both ambient pollution and highly exposed to indoor gas	3. Occupational exposures and highly exposed to indoor wood heating	4. Passive and active smoking & moderately exposed to wood heating	5. Ambient pollution, occupational exposure and moderately exposed to indoor gas	2. No or least exposure
Current asthma (OR, 95%CI) †	1.5(1.1, 2.1)*	1.4(1.1, 1.8)**	0.9(0.6, 1.5)	1.2(0.8, 1.9)	Ref
Post-BD lung function at 53 years					
FEV1, mL	-45(-103, 13)	-102(-146, -58)***	-139(-208, -69)***	-149(-22, -75)***	Ref
FVC, mL	-66(-132, 1)	-63(-113, -13)*	-106(-185, -27)**	-124(-207, -40)**	Ref
FEV1/FVC, %	0.2(-0.5, 1.0)	-1.3(-1.9, -0.7)**	-1.5(-2.4, -0.6)**	-1.4(-2.4, -0.4)**	Ref

Adjusted for age, sex, height, childhood asthma, education levels

Summary to date

- Air pollutants interact in a synergistic way
- This work highlights the importance of investigating multiple sources of exposure together and focusing on a comprehensive strategy to reduce exposure to all sources of pollution
- **Further analyses**
- Interaction between profiles and other factors
- Other health outcomes: e.g. mental health disorders, clusters of multimorbidities (published)





Thank you!



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- Supervisor: Prof Shyamali Dharmage
- Achievements in the last 12 months
 - 13 papers including 1 in Lancet Respiratory Medicine
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