

INTRODUCTION

- Lung cancer is the leading cause of cancer-related death worldwide, with increasing incidence among **persons with no smoking history (PNSH)**.
- Low-dose CT (LDCT) screening reduces lung cancer mortality by ~25%, but current eligibility is largely limited to people with a smoking history.
- Effective screening strategies for PNSH remain a critical unmet need.
- Geographic risk-based screening, incorporating environmental exposures such as residential radon levels and 20-year PM_{2.5} exposure estimates, may offer a practical strategy to identify high-risk PNSH populations.

Objective: Evaluate the feasibility of integrating LDCT screening in high-risk geographic areas, based on environmental exposures.

METHODS

Pilot low-dose CT (LDCT) lung cancer screening study among **persons with no smoking history (PNSH)** at two sites in British Columbia: **Greater Vancouver Area (GVA)** and the **Interior Region (IR)**. The IR was selected as a second site due to high radon levels.

Eligibility, aged 50-74 years, with ≥ 1 risk factor:

- Residential radon ≥ 800 Bq/m³
- Family history of lung cancer
- Occupational exposure (firefighting or asbestos)

All participants underwent LDCT screening, completed 3-month home radon testing using alpha-track detectors during the fall/winter season, and provided a detailed residential history to estimate 20-year outdoor PM_{2.5} exposure.

RESULTS

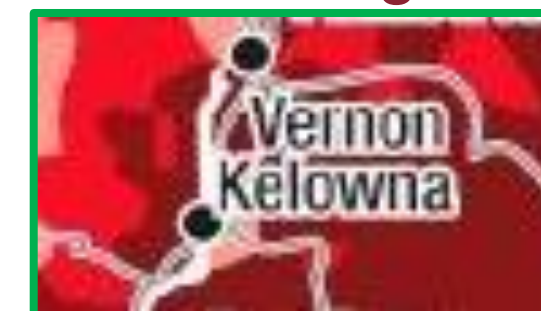
A total of **252 participants were enrolled**, with **35 (13.8%)** requiring pulmonary nodule follow-up after LDCT (**24 Greater Vancouver and 11 Interior Region**). The IR had significantly higher residential radon concentrations (median [IQR]: 63 [27-103] vs. 15 [15-24] Bq/m³). 26 homes exceeded the WHO reference level of 100 Bq/m³, 85% located in the Interior Region.

Characteristic	Vancouver (n = 173)	Kelowna (n = 79)	Total (n = 252)
Sex, n (%)			
Female	72 (41.6)	20 (25.3)	92 (36.5)
Male	97 (56.1)	59 (74.7)	156 (61.9)
Ethnicity, n (%)			
European/White	117 (67.6)	77 (97.5)	194 (77.0)
Asian	54 (31.2)	1 (1.2)	55 (21.8)
Other / PNTA	2 (1.2)	1 (1.3)	3 (1.2)
Born in Canada, n (%)			
Yes	116 (67.1)	72 (91.1)	188 (74.6)
Education, n (%)			
Post High School	161 (93.1)	70 (88.6)	231 (91.6)
Cancer History, n (%)			
Personal History of Cancer	18 (10.4)	10 (12.7)	28 (11.1)
Risk Factor, n (%)			
Firefighter	77 (44.5)	62 (78.6)	139 (55.2)
Asbestos Exposure	8 (4.6)	0 (0)	8 (3.2)
Elevated Radon	3 (1.7)	14 (17.7)	17 (6.7)
Family History	85 (49.2)	3 (3.7)	88 (34.9)
Air Pollution Exposure, n (%)			
Single Year PM _{2.5} ≥ 10 µg/m ³	23 (13.3)	46 (58.2)	69 (27.4)
Household Radon			
Median [IQR] Bq/m ³	15 [15-24]	63 [27-103]	23 [15-46]
Exceeded WHO limit 100 Bq/m ³ (%)	4 (2.3)	22 (27.8)	26 (10.3)

Relative Radon Hazard

- Zone 1 – High
- Zone 2 – Elevated
- Zone 3 – Guarded

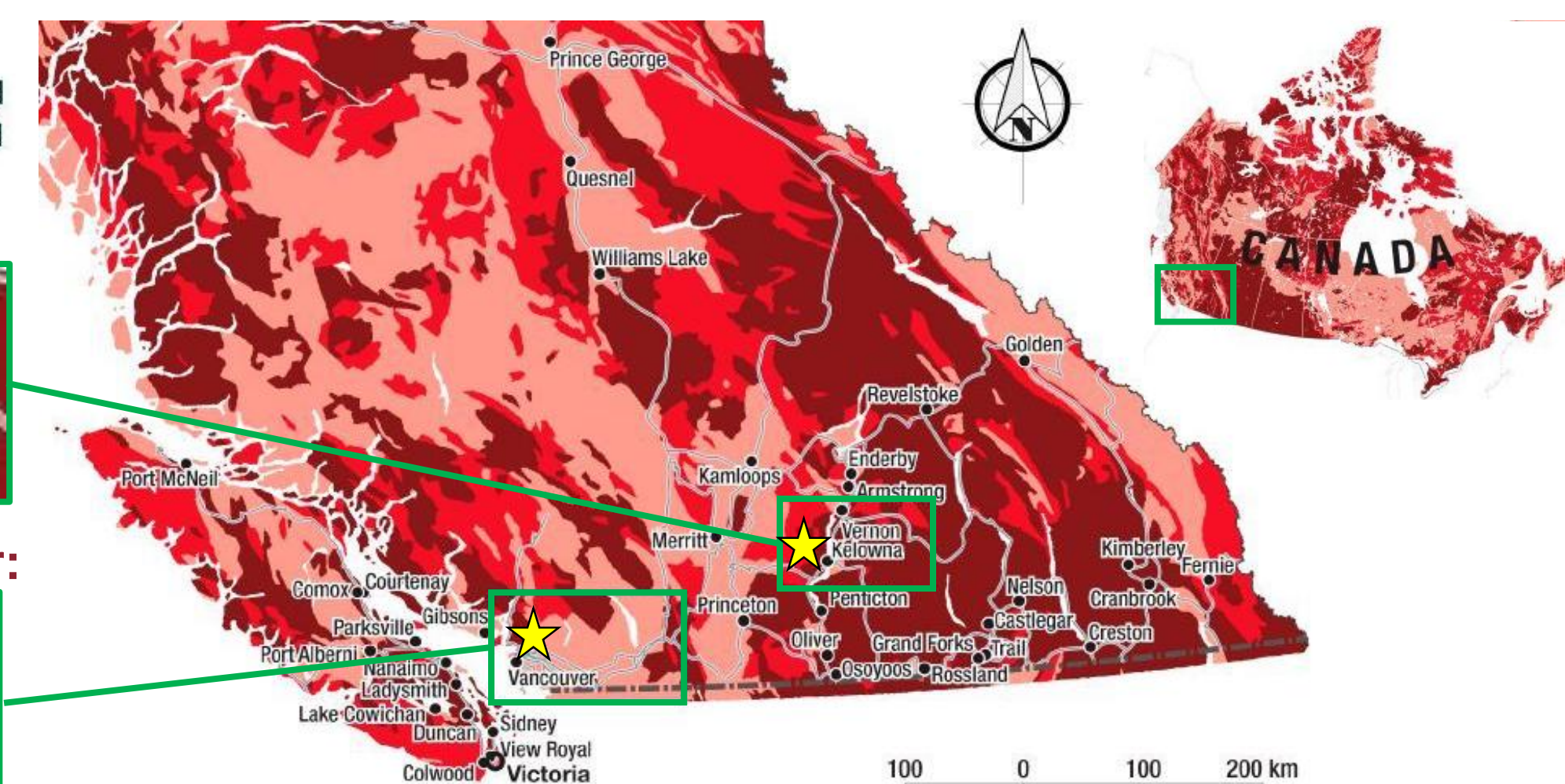
Interior Region:



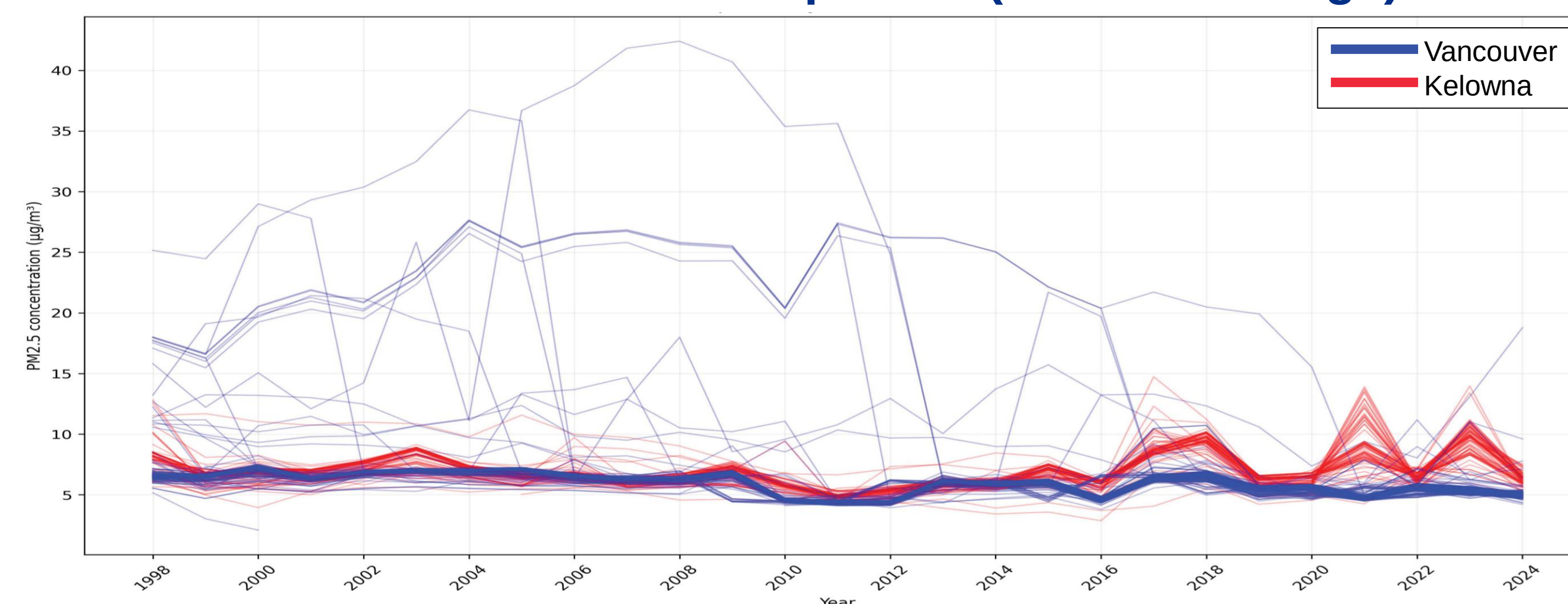
Greater Vancouver:



Radon Potential Map British Columbia



20-Year Outdoor PM_{2.5} Exposure (Annual Average)



DISCUSSION AND CONCLUSION

The two screening populations demonstrated distinct risk profiles.

- Participants from the GVA were more likely to be foreign-born Asian females with a family history of lung cancer.
- Participants from the IR were predominantly Canadian-born, Caucasian males with greater occupational risk, significantly higher residential radon exposure, and more years of elevated PM_{2.5} exposure.

Takeaway Message: Geographic and environmental factors meaningfully shape lung cancer risk in PNSH populations. Risk-based screening that incorporates radon and air pollution warrants further evaluation.