

P3:023: Risk Factors for Lung Cancer Among Asian American Females Who Never Smoked: The California Female Asian Never Smokers (FANS) Study

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IASLC 2026 World
Conference on Lung Cancer

SEPTEMBER 12 – 15, 2026
SEOUL, REPUBLIC OF KOREA

INTRODUCTION

- Lung cancer is a leading cause of cancer mortality among Asian American females in the U.S., a striking pattern given the low prevalence (<5%) of smoking.
- >50% of Asian American females with lung cancer have never smoked, as high as 80% among Chinese and Asian Indian Americans.^{1,2}
- Rates of lung cancer among Asian Americans who have never smoked are increasing in the U.S.^{3,4}
- Little is known about the factors underlying this high disease burden, nor if the risk factors from studies in Asia are applicable to Asian Americans.⁵
- The FANS (Female Asian Never Smokers) Study is the first U.S. population-based study investigating lung cancer risk factors among Asian Americans exclusively.**

METHODS

Lung cancer cases

- Incident lung cancer cases identified from cancer registries within 18 months of diagnosis; n=518
- Residing in California (San Francisco Bay Area, Southern California, Sacramento)

Matched controls

- Controls (no history of cancer) frequency-matched on Asian ethnicity and age group; n=696
- Recruited through multiple approaches, monitored to reflect at-risk population

Community advisory board

- Patients, caregivers, and community representatives provided input and opportunities for community outreach

Data collection

- Survey:** established & putative risk factors, over the lifecourse
- Saliva samples:** DNA extraction and genotyping for genome-wide SNPs
- Lung tumor tissue:** whole-exome sequencing for mutational profiles
- Residential history geocoding:** PM2.5, neighborhood socioeconomic status, Asian ethnic enclave

Statistical analysis

- Multivariable unconditional logistic regression models were used to estimate lung cancer risk

DISCUSSION & CONCLUSION

Overall Conclusions

- Generally, few associations between established risk factors and lung cancer risk in the FANS Study
- Increased risk with secondhand smoke & occupational kitchen exposures

Future Directions

- Continue to examine established risk factors
 - Critical windows of exposure over the life course
 - Effect modification by Asian ethnicity, immigration and acculturation factors, and socioeconomic status
- Potential driver mutations & role of EGFR mutations
- Associations with polygenic risk scores
- Explore novel risk factors

RESULTS

Distributions (%) of demographic characteristics by case-control status, FANS Study, California	Control N=696	Case N=518
Asian American ethnic group		
Chinese only ¹	49.9	57.6
Filipina only	13.2	12.0
Indian only	3.3	3.5
Japanese only	3.7	2.7
Korean only	4.5	2.9
Taiwanese only	4.6	4.3
Vietnamese only	13.1	8.5
Multiethnic & other	7.8	8.5
Birthplace*		
US Born	22.8	12.2
Not US Born	77.2	87.8
English proficiency* ²		
Low (score =<15)	27.7	52.0
Medium (score 15-19)	19.7	16.0
High (score =20)	36.8	21.1
Only speaks English	15.8	10.9
Educational attainment*		
High school or less	14.6	30.8
Some college	11.5	17.3
Bachelor's degree	32.8	28.0
Graduate education	41.1	24.0
Household income (annual, USD)*		
<\$36,000	20.0	33.1
\$36,000 - \$99,999	26.4	23.4
\$100,000 - \$149,999	15.1	11.1
\$150,000+	38.5	32.3



*p-value<0.05 for chi-square comparing cases and controls
1 Of the 644 individuals who self-identified as Chinese only, the most commonly reported birthplaces were as follows: 53.6% China, 18.8% US, 14.4% Hong Kong, 5.3% Taiwan
2 English proficiency index: summarized proficiency with speaking, understanding, reading, and writing English.

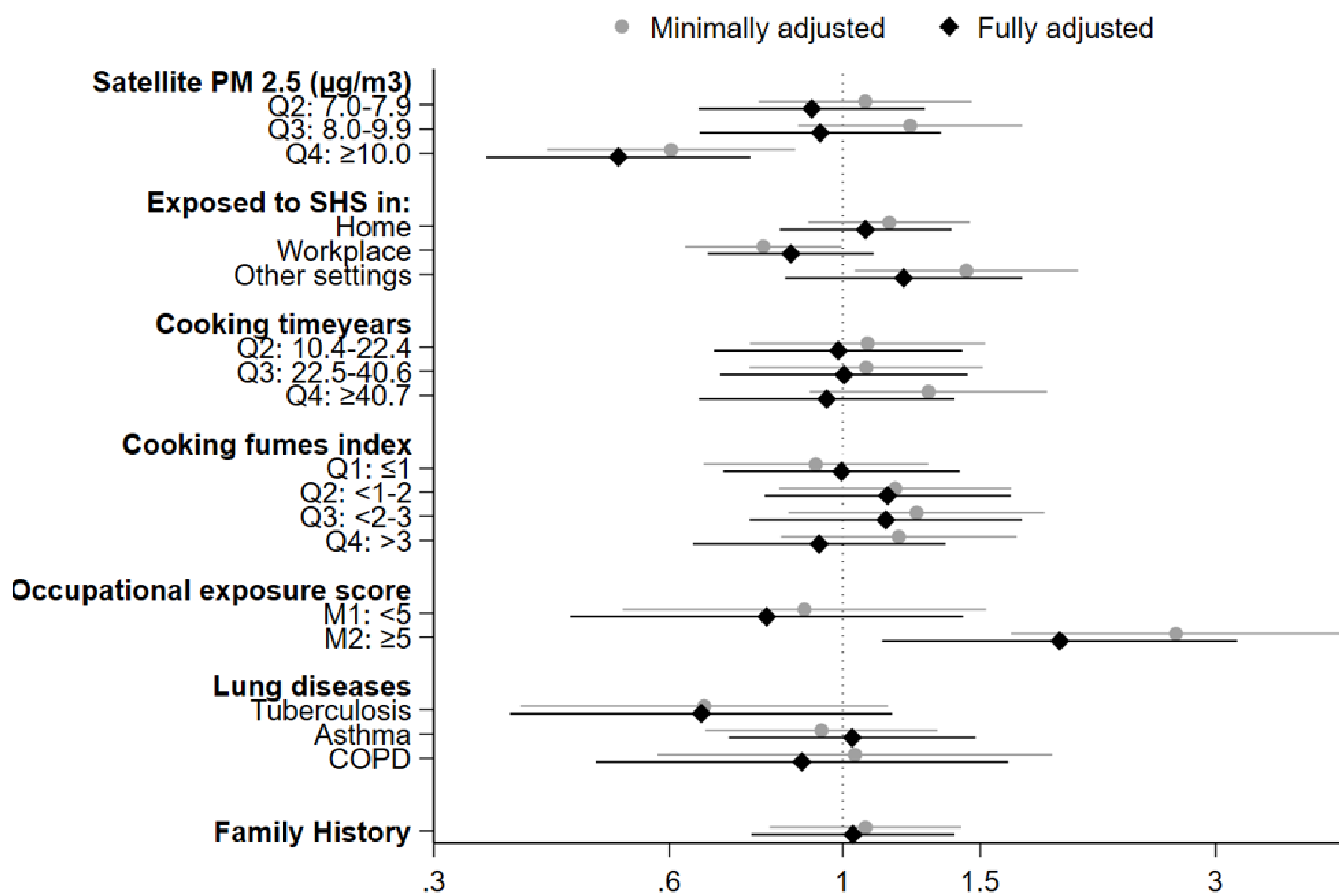
RESULTS

Distributions (%) of risk factors by case-control status, FANS Study, California

Risk factors	Control N=696	Case N=518	Risk factors	Control N=696	Case N=518
First degree family with lung cancer			Lifetime cooking time-years ¹		
None	77.6	76.8	Q1: <10.4 ²	25.1	21.0
At least one	20.3	21.8	Q2: 10.4-22.4	23.3	21.4
Number of prior lung conditions			Q3: 22.5-40.6	26.0	25.1
0	59.6	59.9	Q4: ≥40.7	25.3	30.3
1	25.0	27.2	Lifetime cooking oil smoke fumes index ^{1,3}		
2 or more	13.5	9.1	0	30.5	33.2
Tuberculosis	6.2	4.1	Q1: ≤1	18.3	21.8
Asthma	14.1	12.7	Q2: <1-2	18.3	17.1
COPD	3.0	3.7	Q3: <2-3	14.3	11.9
Air pollution (PM2.5, baseline, µg/m ³)* ¹			Q4: ≥3	18.5	16.0
Q1: <7.0	23.1	24.9	Lifetime occupational kitchen exposure score* ^{1,4}		
Q2: 7.0-7.9	28.5	32.1	0	89.8	84.0
Q3: 8.0-9.9	22.1	27.4	< median (5)	5.6	4.6
Q4: ≥10.0	24.7	14.7	≥ median	3.9	10.0
Lifetime secondhand smoke exposure (any)					
Home	60.6	63.7			
Work*	53.7	47.9			
Other settings*	12.2	16.4			

*p-value<0.05 for chi-square comparing cases and controls
1 Quartiles or median among controls
2 Includes participants with zero cooking timeyears
3 Index derived from scoring five smoke fumes measures (oil smoke before cooking, fume hood use, cooking area separate from living and sleeping areas, air smoky, and eyes irritated) within each age period and summing up the scores for total lifetime exposure
4 Occupational kitchen exposure score based on duration (years) and an intensity score (which assigned a higher weight to participants who not only worked in a kitchen but also worked at the stove) within each age period and summed up the score for total lifetime exposure

Associations (Odds ratios & 95% confidence intervals) of selected factors and lung cancer risk, FANS Study, California



Minimally adjusted models adjusted for age (continuous) and Asian ethnicity
Fully adjusted models adjusted for age (continuous), Asian ethnicity, nativity, current English proficiency, educational attainment, and household income

Summary of results

- 12% cases diagnosed at age<50, 67% at age 60+
- 33% localized & 43% distant stage; 64% adenocarcinoma
- Cases more likely than controls to be:
 - Not US born, lower English proficiency
 - Lower socioeconomic status
- Risk factors with higher prevalence in cases than controls:
 - Lifetime secondhand smoke in other settings
 - Lifetime cooking & oil fumes
 - Occupational kitchen exposure
- No significant associations between most risk factors and lung cancer risk
- Increased risk associated with secondhand smoke in other settings (OR=1.44; 95% CI: 1.04-2.00) that was fully attenuated in fully adjusted model, and lifetime duration spent working in a kitchen (fully adjusted OR=1.91 (95% CI: 1.14-3.22))

REFERENCES & ACKNOWLEDGEMENTS

References

- DeRouen MC, Thompson CA, Canchola AJ, Jin A, Nie S, Wong C, Jain J, Lichtensztajn DY, Li Y, Allen L, Patel MI, Daida YG, Luft HS, Shariff-Marco S, Reynolds P, Wakelee HA, Liang SY, Waitzfelder BE, Cheng I, Gomez SL. Integrating Electronic Health Record, Cancer Registry, and Geospatial Data to Study Lung Cancer in Asian American, Native Hawaiian, and Pacific Islander Ethnic Groups. Cancer Epidemiol Biomarkers Prev. 2021;30(8):1506-16.
- DeRouen MC, Canchola AJ, Thompson CA, Jin A, Nie S, Wong C, Lichtensztajn D, Allen L, Patel MI, Daida YG, Luft HS, Shariff-Marco S, Reynolds P, Wakelee HA, Liang SY, Waitzfelder BE, Cheng I, Gomez SL. Incidence of Lung Cancer Among Never-Smoking Asian American, Native Hawaiian, and Pacific Islander Females. Journal of the National Cancer Institute. 2022;114(1):78-86.
- Sakoda LC, Alabaster A, Sumner ET, Gordon NP, Quesenberry CP Jr, Velotta JB. Trends in Smoking-Specific Lung Cancer Incidence Rates Within a US Integrated Health System, 2007-2018. Chest 2023 Sep;164(3):785-795
- Pinheiro PS, Callahan KE, Medina HN, Koru-Sengul T, Kobetz EN, Gomez SL, de Lima Lopes G. Lung cancer in never smokers: Distinct population-based patterns by age, sex, and race/ethnicity. Lung Cancer. 2022;174:50-6.
- Gomez SL, DeRouen M, Chen MS, Wakelee H, Velotta JB, Sakoda LC, Shariff-Marco S, Reynolds P, Cheng I. Elevated risk of lung cancer among Asian American females who have never smoked: an emerging cancer disparity. J Natl Cancer Inst. 2024.

Funding

The FANS Study is funded by the National Institutes of Health (R01MD014859, MPI: SL Gomez, M Chen, I Cheng), and the Francis Yee Fund at the UC Davis Comprehensive Cancer Center.

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