# *Biomarkers of Air Pollution and Asthma Medication Use: Addressing Temporal Limitations of Environmental Health Analyses Within NHANES*

**Stephen Uong, MPH**[1], Stephanie Lovinsky-Desir, MD, MS[2], Jeanette Stingone, PhD, MPH[1]
[1]Columbia University, Department of Epidemiology
[2]Columbia University, Vagelos College of Physicians and Surgeons

**BACKGROUND:** Within cross-sectional studies like the U.S. National Health and Nutritional Examination Survey (NHANES), previous studies have used ever having an asthma diagnosis as an outcome when examining associations with polycyclic aromatic hydrocarbon (PAH) exposure. Following recent PAH exposure, short-acting beta agonist (SABA) or systemic corticosteroid use may be a more temporally appropriate outcome compared to ever asthma diagnosis in cross-sectional analyses.

**HYPOTHESIS**: Markers of PAH exposure are positively associated with 30-day SABA or systemic corticosteroid use, an indicator for recent asthma symptoms.

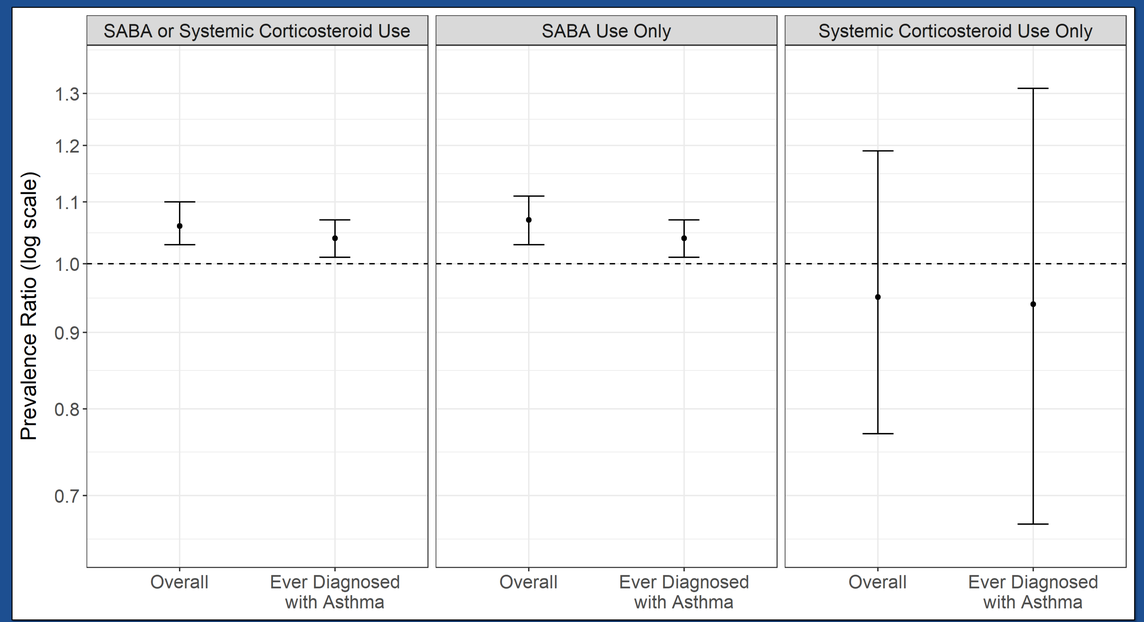
## METHODS

**Study Population**: N=16,550 participants across multiple waves of NHANES (2005-2016) with laboratory data.

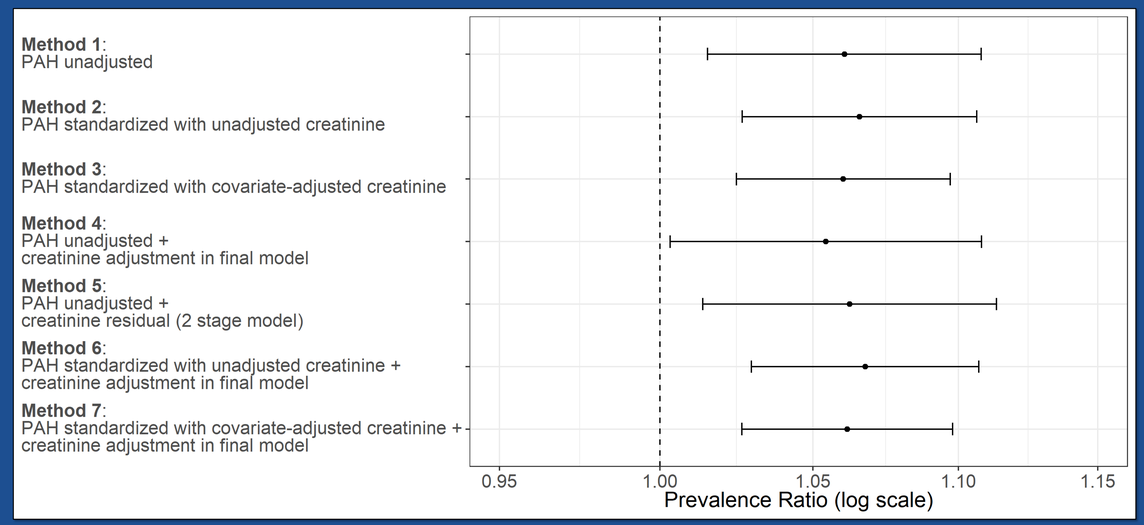
**Quasi-Poisson regression analysis:**

- Independent variable: PAH metabolite, urinary 1-hydroxypyrene
- Dependent variable: SABA or systemic corticosteroid use
- Confounders: Age, female/male designation, race/ethnicity, poverty, insurance coverage, and serum cotinine
- Effect Modifiers: Age, controller medication
- Sensitivity Analyses:
  - Those ever diagnosed with asthma
  - Different urine creatinine dilution adjustment methods

# PAH exposure was ***positively associated*** with short-acting beta agonist (SABA) asthma medication use.




# The ***association*** between PAH exposure and SABA or systemic corticosteroid use was ***consistent across*** various urine creatinine ***dilution adjustment methods***.




COLUMBIA | MAILMAN SCHOOL OF PUBLIC HEALTH
VAGELOS COLLEGE OF PHYSICIANS AND SURGEONS

## RESULTS

- An increase of one standard deviation of PAH exposure was associated with 1.06 (95% CI 1.03-1.10) times the prevalence of SABA or systemic corticosteroid use.
- No effect modification by age (*p-interaction* = 0.56) or controller medication use (*p-interaction* = 0.82).
- Similar associations:
  - Among those ever diagnosed with asthma (PR = 1.04, 95% CI 1.01, 1.07).
  - Across different urine creatinine dilution adjustment methods.
  - For SABA use only as an outcome (PR = 1.07, 95% CI 1.03, 1.11), but not for systemic corticosteroid use only (PR = 0.95, 95% CI 0.77, 1.19).

## CONCLUSIONS

- Positive association between PAH with SABA or systemic corticosteroid use, a more temporally appropriate outcome compared to ever asthma diagnoses used in previous studies.
- It is important to ensure appropriate temporality between exposures and outcomes in cross-sectional studies.
- Results were robust across various urine dilution adjustment methods. We recommend future studies to perform similar sensitivity analyses to address potential for residual confounding.

**Take a picture** to **download** the **poster**

This study was supported by the National Institutes of Health, National Institute of Environmental Health Grants T32 ES007322 (PI: G. Miller) and R00 ES027022 (PI: J. Stingone).