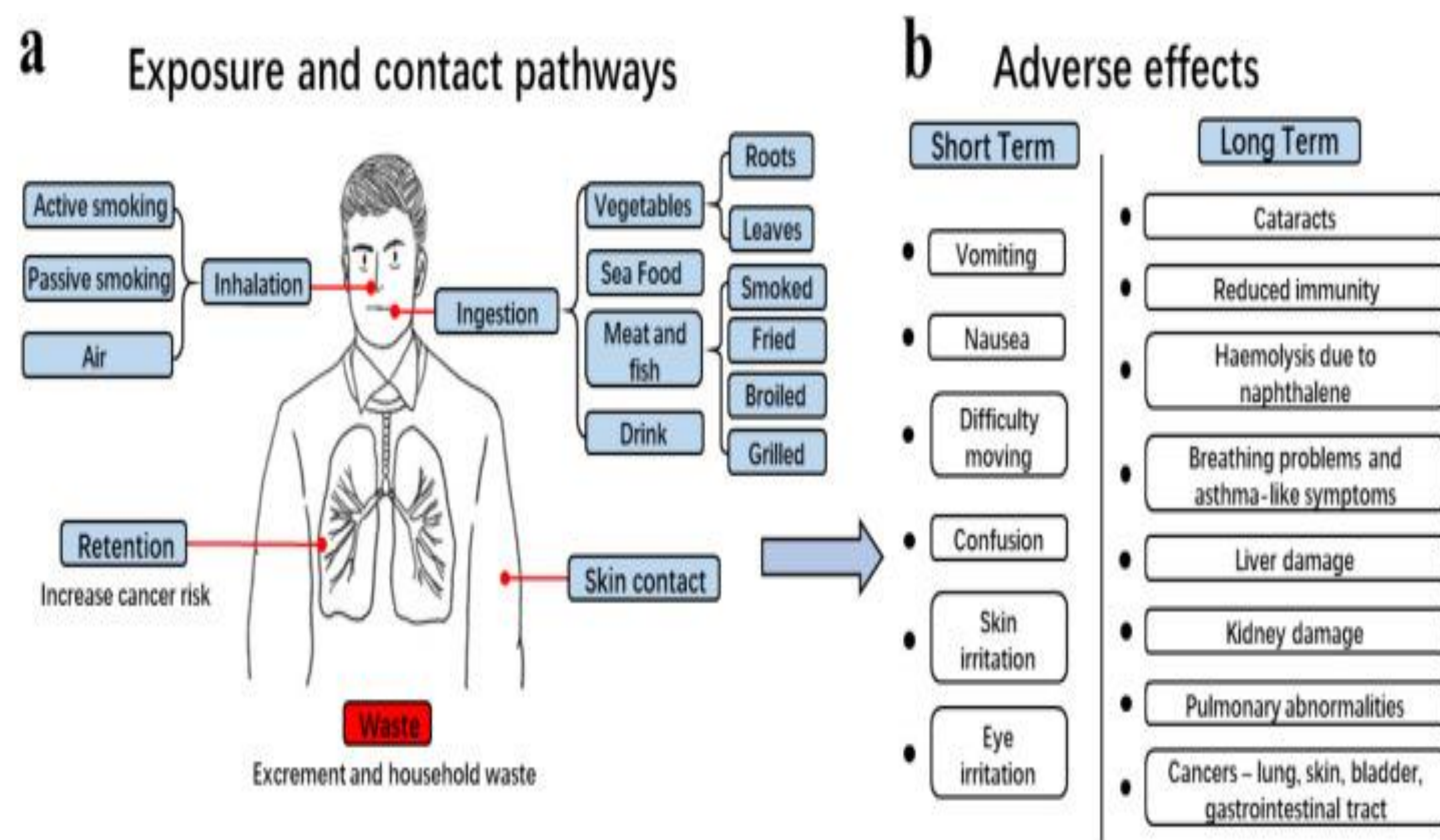


Background

Polycyclic aromatic hydrocarbons (PAHs) represent a diverse group of environmental pollutants generated primarily through incomplete combustion processes. Their widespread presence in air, water, soil, and various consumer products has raised concerns about potential health risks, particularly their association with cancer development. It is difficult to assess the long-term effects of PAHs in humans directly. While increased incidences of lung, skin, and bladder cancers have been shown to be associated with occupational exposure to PAHs, evidential data for similar associations in non-occupational settings have been less persuasive.

Objectives

To assess basic relationships between total PAH chemical concentration exposure from air and some cancer types in Louisiana using census tract-level data.

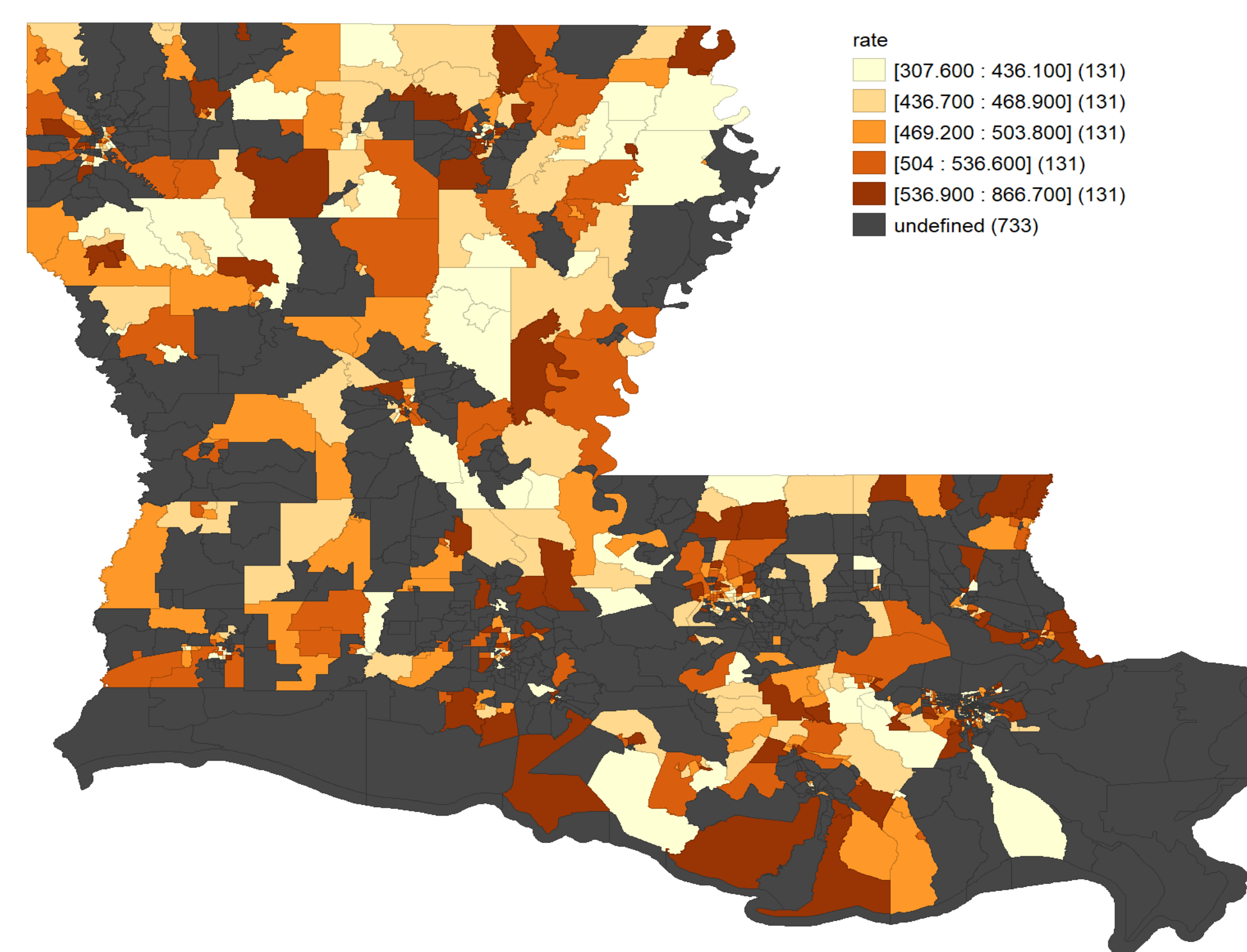


Methods

Louisiana Tumor Registry (LTR) data was used to obtain the 2009-2018 census tract-level cancer incidence rates.

2011 AirToxScreen data from United States Environmental Protection Agency (EPA) was utilized to derive the census tract-level total PAH concentration.

The total PAH concentration was dichotomized into low and high using the median value. We compared the age-adjusted cancer incidence rates, as well as unadjusted rates, between the PAH groups using Student's t tests.



Age-adjusted incidence rates by LA census tracts, all types combined, 2009-2018

Results

The average total PAH concentration was 0.00201 mg/m³ (SD= 0.00080) across 1193 census tracts in Louisiana, with a median of 0.00187 mg/m³.

Age-adjusted bladder cancer, lung cancer, leukemia and other various cancer incidence rates did not significantly differ between the low and high PAH exposure groups.

Results (Cont.)

However, age-adjusted prostate cancer incidence rates were notably higher in the high PAH exposure group compared to the low PAH exposure group, with a p-value of 0.0039.

Cancer Type	Low PAH	High PAH	p-value
Prostate	142.1 (35.5)	152.1 (36.2)	0.0039
Lung and bronchus	71.93 (16.70)	69.46 (20.63)	0.0600
Breast	125 (26.4419)	128.7 (22.1467)	0.0903
Colon and rectum	50.5836 (13.0169)	50.8319 (14.9098)	0.8232
Kidney and renal pelvis	27.5537 (7.0354)	27.2375 (6.9912)	0.7771
NH lymphoma	26.508 (6.2873)	26.6447 (5.4636)	0.9025
Bladder	26.2114 (5.8025)	27.2324 (8.0057)	0.49
Melanoma	31.6279 (10.0581)	30.3727 (7.5973)	0.4279
Pancreas	21.2071 (21.2071)	22.9333 (5.6797)	0.4365
Oral cavity and pharynx	20.6739 (4.4210)	21.6167 (6.3851)	0.6746
Leukemia	19.3414 (4.1422)	22.0000 (4.4786)	0.0947
Thyroid	22.4941 (5.5716)	22.6250 (6.1298)	0.9459
Liver	23.7167 (5.7154)	25.5500 (4.1719)	0.6967

Conclusions

The age-adjusted incidence rates for prostate cancer were significantly higher in areas with elevated PAH concentrations compared to those with lower levels. These findings suggest a potential association between PAH exposure and prostate cancer incidence, warranting further investigation into the mechanisms underlying this relationship and its implications for public health policies and interventions aimed at reducing PAH exposure.

References

Sun, K., Song, Y., He, F., Jing, M., Tang, J., & Liu, R. (2021). A review of human and animals exposure to polycyclic aromatic hydrocarbons: Health risk and adverse effects, photo-induced toxicity and regulating effect of microplastics. *Science of The Total Environment*, 773, 145403.