The Effects of Particulate Matter on Lower Respiratory Tract Infections: **A Population-Based Study**



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Background	Results	Results		
Lower Respiratory Tract Infections (LRTIs) are one of the major contributors to mortality across the globe.		Table 1: Odds ratio coefficients for the PM2.5, NoX, & SO2 multivariat models. These multivariate models are not significant; however, there is a age effect for all except PM2.5. Bolded value		
Globally, about 489 million occurrences & 2.4 million deaths occurred due to LRTIs in 2019 (Safiri et al., 2023).		with * denotes (p < 0.05)		

✤ In Ghana, LRTIs are a top concern, as 53.5 deaths per 100,000 people occurred in 2019 (World Health Organization, n.d.).

A risk factor for LRTIs is poor air quality; however, very few studies have examined the effects of particulate matter (PM) on LRTIs.



	※ ※ ※ う!	Variables	PM2.5 Model	NoX Model	SO2 Model
		18-29 (ref.)	1.00	1.00	1.00
Prevalence of LRTIs		30-39	0.65	0.77	0.78
91.66	5%	40-49	1.97	1.68	1.69
		50-59	2.18	2.53*	2.56*
8.34%		60-69	2.78*	2.98*	3.01*
Has LRTI Does not have LRTI		70+	4.43*	4.84*	4.93*
		No School (ref.)	1.00	1.00	1.00
Figure 1: Semi-circle pie chart showing the percentage of the sample that has LRTIs. The red portion represents the percentage of those who have a LRTI, and the blue portion represents the percentage of those who do not have a LRTI.		Primary	0.75	0.65	0.66
		Secondary	0.73	0.96	0.96
		Tertiary	0.45	0.32*	0.33*
	PM10 Model	PM2.5	1.07	_	_
Tertiary	0.33*	NoX		1 00	
Secondary	0.95	INOX		1.00	
Primary	0.66	SO2			1.00
No School (ref.)	1				
70+	2.88*	Conclusions			
E 60-69	2 96*				

Additionally, the biosocial, sociocultural, and lifestyle factors of LRTIs are understudied especially amongst the elderly.

Objectives

Examine how exposure to short-lived climate pollutants (SLCPs) such as PM, has consequences for LRTIs.

Assess the effects of biosocial, sociocultural, & lifestyle risk factors on LRTIs in those aged 50+.

Methods

Study Setting:

- ✤ Data: Wave 2 of 2014-2015 World Health Organization Study on Global AGEing and Adult Health (SAGE) conducted in Ghana (N = 5,707)
- Source of satellite telemetry data: Emissions Database for Global Atmospheric Research (EDGAR)

Exposure to particulate matter namely, PM10 & CO2 increased the odds of experiencing LRTIs.

Outcome:

LRTIs assessed using self-reported measures in the last 12 months:

- Shortness of breath at rest while awake
- Coughing or wheezing for ≥ 10 minutes at a time
- Coughing up sputum or phlegm for most days of the month for at least 3 months
- Wheezing attacks or whistling breathing
- Tightness in the chest



Covariates:

- Biosocial factors
- Age, ethnicity, & living in a rural settlement
- Sociocultural factors
 - Education level & wealth status



Figure 2: Clustered bar graph showing age and education as significant covariates associated with PM10 & LRTIs in the multivariate model. Black bars represent age & blue bars represent education. Ref. stands for the reference category. Bolded values with an * denotes (p<0.05)



Older age significantly increased the odds of experiencing LRTIs.

Higher education significantly reduced the odds of experiencing LRTIs.

We need interventions aimed at improving ambient air quality, which has the potential to reduce LRTIs.

✤ We recommend that the government create policies that protect vulnerable older adults.

✤ Additionally, we propose the creation of educational programs focusing on the risks, symptoms, and treatment options of LRTIs

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Lifestyle factors

Physical activity & smoking status

Data Analysis:

Statistical Analyses:

- Bivariate logistic regression analysis between LRTIs and SLCPs.
- Multivariate logistic regression analysis between LRTIs and SLCPs while controlling for covariates.

• Only covariates significant (p < 0.05) at the bivariate level were included

Figure 3: Clustered bar graph showing age and education as significant covariates associated with CO2 & LRTIs in the multivariate model. Black bars represent age & blue bars represent education. Ref. stands for the reference category. Bolded values with an * denotes (p<0.05)

Odds Ratio







0



Project?

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