University of Lynchburg

Association Between Mold and Asthma in Minority Children in the Urban Setting

Judith K. Muir
Master of Public Health Candidate, University of Lynchburg, Lynchburg, VA

Introduction

Asthma Risk

Asthma can affect individuals of an age, but the onset of asthma is most typical in childhood. The prevalence of asthma is highest in minorities, especially Puerto Ricans and African Americans. The risk is also elevated when living in an urban setting due to substandard outdoor and indoor air quality, poverty conditions and poor access to health care (Asthma and Allergy Foundation, n.d.; Bryant-Stephens, 2009; Kercsmar, et al., 2006).

Indoor Mold

Building dampness and mold can increase the risk of asthma and other related respiratory illnesses by 30 to 50%. Approximately 21% of all asthma cases are attributable to housing dampness and mold which leads to an annual cost $3.5 billion dollars (Mendell et al., 2011).

Purpose

This literature review will examine mold exposure in urban children in order to determine if mold leads to the increased risk of asthma, especially in children of minority renter households in urban settings.

Methods: EPA Process

EPA Risk Assessment Process

This literature revise followed the EPA process for conducting a human health risk assessment as shown to the right (EPA, n.d.).

Literature Search Parameters

Google Scholar was searched for studies published in English after 2000 using the keywords: mold, dampness, asthma, risk, triggers, minority, children, urban, tenant, landlord, remediation, public health. A total of 20 articles were reviewed.

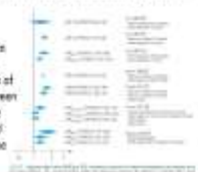
Hazard Identification

Fungal Species and Growth Conditions

Fungal genera most associated with the development and exacerbation of asthma include: *Aspergillus, Penicillium, Alternaria, Stachybotrys*, and *Cladosporium*. Mold may grow inside houses and rental properties when warm, moist conditions exist (Caillaud et al., 2018; Mendell et al., 2011).

Mold as a Risk Factor for Asthma

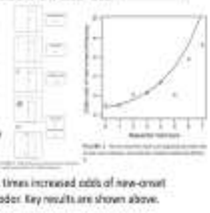
The risk for asthma due to mold is documented in numerous evidence-based studies. Caillaud and colleagues (2018) conducted a systematic search of peer-reviewed asthma literature published between 2006 and 2017 and concluded that the collective data support a causal relationship between mold and asthma in children. A graphic depiction of the adjusted odds ratios from the various studies examined are shown to the right.



Dose-Response Assessment

Mold Dose-Response

A case-control study by Shorter and colleagues (2017) was conducted in 150 children (ages 1 – 7 years) with new-onset wheeze. Each child was matched to two control children with no history of wheezing. Visible mold and mold odor were associated with new-onset wheezing in a dose-dependent manner when observed by researchers, an independent building assessor and parents. The strongest mold odor and highest levels of mold were associated with ~14 times increased odds of new-onset wheezing compared to homes with no mold or odor. Key results are shown above.



Other Mold & Asthma Relationships

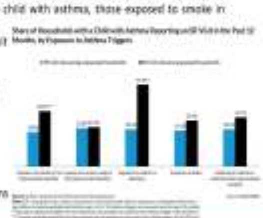
Accumulation of Asthma Triggers - Cumulative risk for asthma is higher in minority children in the urban setting due to elevated environmental triggers such as mold, tobacco smoke, rodents and cockroaches. Elevated triggers may lead to more hospitalizations / ER visits and missed school days (Ganesh et al., 2015).

Health Care for Asthmatic Children - Cumulative effect of risk factors is reflected in the ER visits of minority children with asthma. Prevalence of asthma and ER-related asthma visits is going up for all children; however, ER visitation rate is 4x greater in Black vs White children. This health disparity is worsened by the fact that White asthmatic children use primary care physicians 150% more often than Black asthmatic children (Basch, 2011).

Exposure Assessment

Renters in the Urban Setting

Dampness and mold may be a greater concern in urban areas where the households have an increased percentage of renters and minorities. When looking specifically at renting versus owning, renters were much more likely to have asthma triggers (smoke, musty odors, leaks, mold, pests) in their households than individuals that owned their residence. After examining the 2015 American Housing Survey, Skopec, 2017 noted that "renter-occupied households with school-age children with asthma were more than twice as likely as owner-occupied households to be exposed to smoke, musty smells, and evidence of cockroaches or rodents at least monthly over the past year. Among households with a school-age child with asthma, those exposed to smoke in the home at least monthly were more likely to report an ER or urgent care visit for their youngest child with asthma (30.1 vs 18.8 percent), as were those exposed to mold in a bedroom during the past year (44.4 vs 20.2 percent)". Key results are shown to the right.



Children spend significant time in their rooms and asthma can be particularly troublesome at night, so documenting mold in their bedrooms demonstrates elevated exposure risk (Basch, 2011; Ganesh et al., 2015).

Risk Characterization

Overall Statement of Risk

Mold and dampness are known risk factors for childhood asthma that is backed by evidence from multiple epidemiologic studies (Caillaud et al., 2018; Ganesh et al., 2015; Mendell, et al., 2011; Skopec, 2017). The association between indoor mold and childhood asthma cannot be overlooked.

Risks for Minority Children in Urban Areas

Renters are vulnerable to the overlooked risks of mold, dampness and smoke in the urban households. According to the 2015 American Housing Survey, renters with children are more likely to have asthma triggers in their homes than owners and are more likely to have at least one child with asthma (Ganesh, et al., 2015). The elevated prevalence of asthma in the urban setting may impact educational outcomes. Poorly controlled asthma results in inferior sleep quality which may alter the ability to concentrate and learn, may make children less likely to attend extracurricular activities and may lead to an increase in absences from school. This results in poor test scores, less of a connection to school activities and loss of time in the academic setting. This poor academic performance may have life-long impacts on future employment and financial prospects (Basch, 2011).

Risk Management & Recommendations

Prevention and Remediation of Mold

Homeowners, landlords and tenants must do all they can to reduce dampness as it is a critical step in reducing indoor mold and other dampness related issues.

Homeowners & Landlords Advice - 1) eliminate all leaks, 2) remove & replace building materials damaged by dampness and mold, 3) maintain gutters properly, 4) vent bathroom fans, stoves and dryers, 5) properly maintain heating & cooling systems, and 6) provide dehumidifiers or require tenants purchase one.

Tenants Advice - 1) report all leaks, mold growths or musty odors, 2) use indoor bathroom and stove fans, 3) use a dehumidifier, and 4) throw out old books and newspapers (Kercsmar, et al., 2006; Mahoney and Spear, 2003).

Public Health Recommendations

Until technology can rapidly identify mold, a team approach of scientists, doctors, epidemiologists, and engineers should assist public health officials in providing guidance to homeowners, landlords, and tenants about the dangers of mold and how to deal with contamination to reduce the risk of asthma in urban setting.

References

Comparing Source-Specific $PM_{2.5}$ Between Rush Hour vs. Sporadic Commuters

Charlotte Joannidis, Jenna R. Krall, Karlin D. Moore – Department of Global and Community Health – George Mason University

tr-$PM_{2.5}$

- traffic-related fine particulate matter = tr-$PM_{2.5}$
- Fine particulate matter ($PM_{2.5}$) – any particle that is less than 2.5 micrometers in diameter (Figure 1)
- $PM_{2.5}$ is traffic-related when sourced from traffic (including particles from brake/tire wear, road dust, and tailpipe emissions)

Figure 1. $PM_{2.5}$ Image (source epa.gov)

Introduction

- tr-$PM_{2.5}$ has been associated with adverse health outcomes such as cardiopulmonary morbidity and mortality
- In-vehicle tr-$PM_{2.5}$ exposure contributes to total personal pollution exposure
- Trip characteristics, such as time of day, day of the week, and traffic congestion, are associated with increased in-vehicle $PM_{2.5}$ exposures
- Previous studies have identified commute characteristics associated with pollution
- Previous studies have used K-means clustering approaches to analyze commute data
- It was hypothesized that commuter characteristics, such as whether commuters travel during rush hour, would also be associated with increased tr-$PM_{2.5}$ exposures.

Objectives & Methods

Objectives: to cluster commuters by type and to identify associations with increased tr-$PM_{2.5}$ exposure

Methods:

- Commute data consisted of unscripted personal vehicle trips of 46 commuters in the Washington, D.C. metro area over 48-hours, with a total of 320 trips
- Commuter types were identified using sparse K-means clustering
- Source-specific $PM_{2.5}$ was estimated using Positive Matrix Factorization
- Linear regression was used to estimate differences in source-specific $PM_{2.5}$ by commute cluster

Results

- **Clusters 1-3 were combined to create two commuter clusters:** rush hour commuters (primarily travelled during rush hour) and sporadic commuters (travelled throughout the day) **(Figure 2)**
- Integrated Black carbon (BC) was higher for rush hour commuters (median = 3.1 μg/m³ (IQR = 1.5)) compared to sporadic commuters (2.0 μg/m³ (IQR = 1.9))
- Mixed mobile $PM_{2.5}$, consisting primarily of tailpipe emissions and brake/tire wear, was higher for rush hour commuters (2.9 μg/m³ (IQR = 1.6)) compared to sporadic commuters (2.1 μg/m³ (IQR = 2.4)), though this difference was not statistically significant (Figure 3)

Figures

Figure 2. Average minutes spent in-vehicle for each hour of day per participant, with participants grouped by cluster.

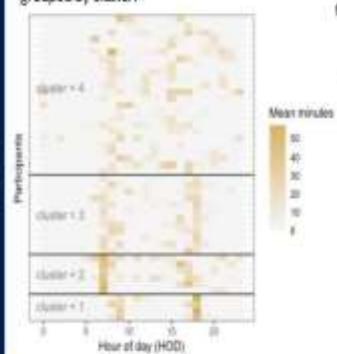
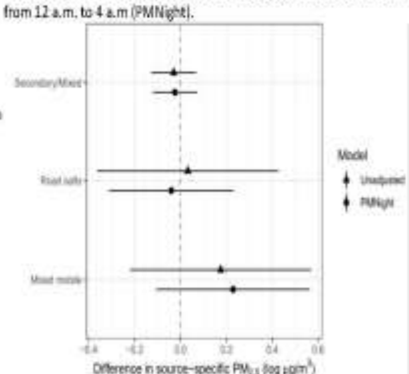


Figure 3. Difference in source-specific $PM_{2.5}$ in log μg/m³ (95% confidence intervals) between rush hour and sporadic commuters using linear models without adjustment (Unadjusted) as well as adjusted for residential $PM_{2.5}$ from 12 a.m. to 4 a.m (PMNight).



Discussion/Conclusions

- This study is unique as it identifies the association of commuter characteristics with pollution through clustering commuter types with sparse K-means.
- Mixed mobile $PM_{2.5}$ and integrated BC were higher for rush hour commuters compared to short trip commuters.
- Further research may elucidate whether commuter characteristics are an efficient way to identify individuals with highest tr-$PM_{2.5}$ exposures associated with commuting
- The time of vehicle commute is a modifiable behavior
- If the type of commuter with the highest exposure can be identified and these commuter characteristics are modifiable, more effective air pollution exposure mitigation strategies can be developed.

Acknowledgements

Special thanks to Dr. Krall for her leadership and guidance throughout this project and to my team member, Karlin, for her support and collaboration. Thank you to co-authors: Dr. Yi-Ching Lee, Dr. Anna Z. Pollack, Dr. Michelle McCombs, Dr. Jonathan Thornburg, and Dr. Sivaraman Balachandran, as well. This work was supported by a multidisciplinary seed grant from George Mason University and The Thomas F. and Kate Miller Jeffress Memorial Trust, Bank of America, Trustee.

References

RADFORD UNIVERSITY

Exploration of the Spatial Relationships between Lead and Pesticide Exposures and Neurodegenerative Disease Age-Adjusted Mortality Risk in North Carolina

Maci Keaton, Kathleen Poole, Ph.D., RD, MCHES, Ashley Stoop, MPH
Department of Health and Human Performance, Radford University, Virginia 24142

RADFORD UNIVERSITY

Introduction & Data

Neurodegenerative diseases, Parkinson's disease, Alzheimer's disease, & Amyotrophic Lateral Sclerosis (ALS), are progressive disorders that affect the motor neurons of the brain and spinal cord. Genetics accounts for a small to moderate portion of causal factors, but the rest is left to be explained by environmental toxins.

(1) Combine the three neurodegenerative diseases to look for clusters.
(2) What is the strength of the relationship between all three diseases and exposure to lead and paraquat?

Data is provided by CDC Wonder, NC Vital statistics, US Census Bureau, State Center for Health Statistics Childhood Lead Poisoning Prevention Program, and Pesticide National Synthesis Project.

Neurodegenerative Diseases

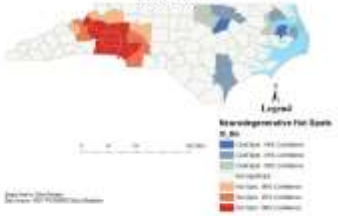
Spatial autocorrelation is confirmed with a Moran's I value of 0.418 at 0.0 sig. level, meaning the pattern within the data is not random.

North Carolina
Neurodegenerative Age-Adjusted Mortality Risk
2008-2017

Neurodegenerative Disease Clustering

The bright red area indicates neurodegenerative disease clustering, warranting further investigation.

North Carolina
Neurodegenerative Hot Spots
2008-2017



Lead Exposure

Children are exposed by ingesting lead paint from a home or from a parent due to an occupational hazard. Exposure to pesticides, in conjunction with lead, led to a severe increase in risk for neurodegenerative disease development by at least 50 percent (Gunnarsson & Bodin, 2019).

North Carolina
Childhood Blood Lead Surveillance Data
2013-2017

The researcher considers occupational, chronic lead exposure in adults, but needs original data from the CDC ABLES Program to add to the analysis.

Pesticide Exposure

Pesticides are chemicals used on plants or crops to kill insects, weeds, rodents, bacteria, or fungi. The herbicide paraquat is used by farmers.

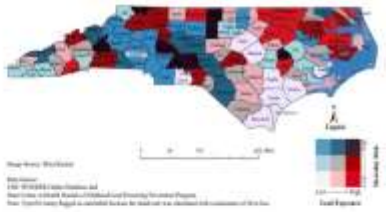
North Carolina
Paraquat Use Low Estimates
2008-2017

Gunnarsson, L., & Bodin, L. (2019). Occupational exposures and neurodegenerative diseases—A systematic literature review and meta-analyses. *International Journal of Environmental Research and Public Health, 16*(3), 337. doi:10.3390/ijerph16030337

Funding Supported by the Office of Undergraduate Research and Scholarship

Results & Conclusions

North Carolina
Neurodegenerative Age-Adjusted Mortality Risk 2008-2017
And
Child Blood Lead Levels 2013-2017



Linear Regression Analysis - Lead
Adjusted R Squared: 0.045 at 0.018 sig. level ($p<0.5$)

Order Least squares Regression - Lead and Paraquat
Adjusted R Squared: 0.054 at .026 sig. level ($p<0.5$)

The results successfully explained 5.4% of the variation in neurodegenerative disease age-adjusted mortality risk by exposure to lead and paraquat.

Evaluating the Impact of Work Environments on ADHD Presentation in Adults

Adam Moore, MS, Master of Public Health Candidate
University of Lynchburg, Lynchburg, VA

Introduction

Four out of every one-hundred American adults live with Attention-Deficit/Hyperactivity Disorder, or ADHD.[1] ADHD is a neurodevelopmental disorder characterized by continuous, disruptive patterns of inattention and/or hyperactivity.[2] Compared to those in children, ADHD symptoms in adults present differently, as restlessness and impulsivity are often internalized.[2,3] Even so, ADHD negatively affects work and educational outcomes, as well as personal life decisions.[1] *Total Worker Health* (TWH) initiatives are policies and programs that advocate for worker health by protecting from work hazards and promoting illness and injury prevention. TWH recognizes that work is a social determinant of health and that any positive change in work environments or conditions can improve overall health.[4] The purpose of this study was to determine how vocational settings impact the mentality and behavior of workers with ADHD, in order to improve their overall health and success.

Methodology

A risk assessment was conducted following the Environmental Protection Agency's (EPA) human health risk assessment process. This method is depicted in Figure 1.[5] Information and data utilized in the risk assessment was obtained through a review of existing literature. Articles and studies were found by searching "adhd adults," "occupational environment," and "manifestation of adhd" in Google Scholar and the National Institute of Health's PubMed database. Searches were restricted to sources from 2000 – 2020. Sources were restricted to free-access and subscriptions obtained through the University of Lynchburg.

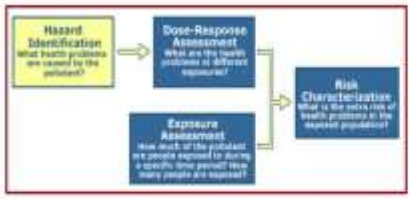


Figure 1. EPA's Human Health Risk Assessment Process

Findings

Environments that feed symptoms of inattention, restlessness, impulsivity, and distractibility pose a unique hazard to ADHD-burdened workers. These symptoms manifest in many ways, as depicted in **Figure 2**.[6]

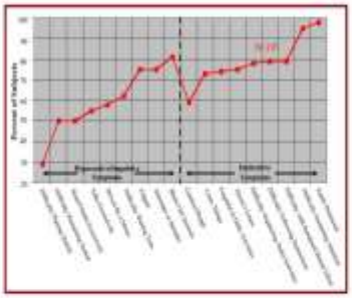


Figure 2. Symptoms and Respective Prevalence in Adults with ADHD

Based on TWH principles, four work environment hazards were identified as threats to workers with ADHD through the Health Risk Assessment Process:[7]

Sedentation
- Sedentary behavior is characterized by duration, pattern of behavior, and context of behavior.[8]

High-Demand Tasks
- Includes time pressure, number of tasks, work overload, and emotional demands.[9]

Work Environment
- The principle of "heterarchy" suggests that aspects of one's environment are linked to a person's whole dynamic.[10]

Distractions
- Contributors include lack of meaning, mental underload, constriction of personal behavior, and monotonous jobs.[9]

Risk Characterization

ADHD adult workers may be at increased risk of experiencing negative health effects from some occupational environments. Sedentation increases restlessness in ADHD adults, which can lead to poor work performance and/or job loss.[2] Long-term sedentary behavior can contribute to the development of mental illness, many of which ADHD individuals are predisposed to.[11] Workers with ADHD have a difficult time attending to key details and completing routine tasks under timed conditions. Difficulty accomplishing these tasks puts these workers at risk for burnout.[3] Work environments impact psychosocial health and work engagement. Work engagement is directly related to productivity.[12] Distractions, attributed to boredom and inattentiveness, decrease mood and increase irritability. This can lead to personal distress, substance abuse, and occupational accidents.[9]

Risk Management & Recommendations

Sedentary behavior should be interrupted every 20-30 minutes by switching tasks or moving to a standing position.[8] Giving workers more control over their job can reduce stress and burnout.[12] Counselors can teach workers better organizational techniques and habits to counter their ADHD symptoms.[13] Headphones and optimizing workspaces can reduce distractions and improve mental stimulation.[10] Finally, *Total Worker Health* policies should be implemented in all workplaces to improve worker health, safety, and productivity.

References

1. Faber et al. 2015. *NEJ*, 17(8), 491-495.
2. CDC. 2020. *Symptoms and Diagnosis of ADHD*
3. Fried et al. 2012. *Psychiatry research*, 200(2-3), 949-956.
4. NIOSH. 2020. *What is Total Worker Health?*
5. EPA. 2017. *Conducting a Human Health Risk Assessment*
6. Wilens et al. 2008. *The Journal of clinical psychiatry*, 70(10), 1557-1562.
7. Schabr. 2017. *Total Worker Health: Missing Pieces to the Employee Well-Being Puzzle*. St. Louis, MO: St. Louis Area Business Health Coalition.
8. Straker et al. 2016. *Sedentary work: Evidence on an emergent work health and safety issue*, 1-79.
9. Peters et al. 2014. *An introduction to contemporary work psychology*. Wiley Blackwell. 295-320.
10. Adamou et al. 2013. *BMC Psychiatry*, 13, 59
11. Agnew-Blais et al. 2016.*The British journal of psychiatry: the journal of mental science*, 210(3), 526-534.
12. Nagata et al. 2019. *Frontiers in Psychiatry*, 10, 1-7.
13. NIMH. 2018. *Attention-Deficit/Hyperactivity Disorder.*

University of Lynchburg

Outdoor Air Pollution and Cancer in African American Men

Megan Coles, MPH Candidate
University of Lynchburg

University of Lynchburg

Introduction & Purpose

African American men have the highest death rate and the lowest survival rate for most cancers (Desantis et al., 2019). Some of the highest cancer death rates in the US are found in Louisiana. Outdoor air pollution and particulate matter is considered carcinogenic to humans and has been linked to lung, bladder, and kidney cancer (Turner et al., 2017). The purpose of this literature review was to investigate the relationship between outdoor air pollution and increased incidence of cancer in African American men.

Methodology

A literature review was conducted using Pubmed and Google Scholar to search for peer reviewed articles. Key terms were: Residential Segregation, Discrimination, African American Men, Cancer, Outdoor Air Pollution. A total of 14 articles were reviewed using the EPA's Risk Assessment Process.

Figure. 1. EPA Risk Assessment Process. (EPA, 2017)

Findings: Hazard Identification

Industrial factories are located near low income and minority communities, which may lead to disproportionate health effects for residents due to air toxins (James et al., 2012). The communities in these areas are also predominantly African American (Terrell & James, 2020). High cancer rates among African American men in Louisiana may be connected to the industrial belt referred to as "Cancer Alley". This is an area along the Mississippi River between Baton Rouge and New Orleans, which contains numerous industrial plants near predominately Black communities.

Fig. 2. Map of Louisiana's industrial belt. (Wildgen, 1998)

Findings: Dose-Response Assessment

Outdoor particulate matter can come from many different primary and secondary sources such as industrial processes, vehicles and coal-fired power plants. Factors such as exposure duration and individuals' susceptibilities to other diseases determine how harmful outdoor air pollution will be. Studies have shown that there is a 9% increase in risk for lung cancer per 10 ug/m3 increase in PM2.5 concentrations in the outdoor air and an 8% increase in risk for lung cancer per 10 ug/m3 increase in PM10 in the outdoor air (Turner et al., 2020). Studies have also shown that chronic exposure to air pollution is associated with increased CVD risk and mortality (Erqou et al., 2018).

Findings: Exposure Assessment

A study conducted by Kravitz-Wirtz et al. (2016) found that Black and Latino neighborhoods had concentrations of PM2.5 and PM10 that were between 7% and 32% higher than in White neighborhoods. A study by Erqou et al. (2018) found that African Americans had significantly higher exposures to air pollutants in a community-based cohort of adults in Western Pennsylvania. African Americans tend to live in areas with greater exposure to air pollution due to decades of residential segregation (American Lung Association, 2020).

Table 1. This table presents descriptive statistics, by race/ethnicity, for all the variables in the analysis. (Kravitz-Wirtz et al., 2016)

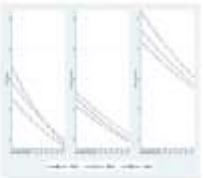


Fig. 3. Block-level exposure to NO_2, $PM_{2.5}$, and PM_{10}, respectively, by race/ethnicity and time. (Kravitz-Wirtz et al., 2016)

Conclusion & Risk Characterization

Black communities and African American men are disproportionately affected by outdoor air pollution and cancer and is linked to residential segregation and increased risk for exposures from industrial plants and factories. According to Baurick et al. (2019), new industrial plants are being planned for the industrial belt in the Baton Rouge area of Louisiana. Many companies locate their plants and factories in disadvantaged areas because the residents do not have the political power to oppose their placement. Since these residents lack political power, they lack advocates or lobbyists representing them at the national level (James et al., 2012). Predominantly black and poor communities also deal with other social issues such as crime, drugs, and poverty. Because of this, the community residents aren't likely as focused on environmental issues. Residents of these communities cannot easily relocate due to economic, educational, and social barriers (James et al., 2012); thus, continuing their exposure to outdoor air pollution and increased risk for cancer.

Risk Management & Recommendations

- Prevent industrial factories from being built in the industrial belt of Louisiana and near other predominately Black communities
- Create stricter air pollution standards for industrial factories
- Encourage residents to limit time outdoors when pollution levels are elevated (Laumbach, 2010)
- Encourage citizen involvement in environmental policy
- Create more mixed income communities (Rice et al., 2014).

References

Baurick et al. (2019, October 30). Welcome to "Cancer Alley," Where Toxic Air Is About to Get Worse. Retrieved October 02, 2020, from https://trib.gg/32Vdd7
Desantis et al. *CA: A Cancer Journal for Clinicians.* **2019**, *69*, 3.
Erqo et al. *Arteriosclerosis, Thrombosis, and Vascular Biology.* **2018**, *38*, 4.
James et al. *International Journal of Environmental Research and Public Health.* **2012**, *9*, 12.
Kravitz-Wirtz et al. *Du Bois Review: Social Science Research on Race.* **2016**, *13*, 2.
Laumbach. Outdoor Air Pollutants and Patient Health. *Am Fam Physician.* **2010**, *81*, 1
Rice et al. *International Journal of Environmental Research and Public Health.* **2014**, *11*, 5.
Terrell & James. *Environmental Justice.* **2020**, doi:10.1089/env.2020.0021
Turner et al. *CA: A Cancer Journal for Clinicians.* **2020**, doi:10.3322/caac.21632
Turner et al. *Environmental Health Perspectives.* **2017**, *125*, 8.
Wildgen, J. (1998). Environmental Justice in Louisiana's Industrial Corridor. Retrieved November 14, 2020, from https://trib.gg/vkjbod

Particulate Matter Concentration Around Lamberts Point & Railroad, Norfolk, VA

Shobha Subedi
College of Health Sciences, Old Dominion University, Norfolk, VA

Introduction

Particulate Matter (PM) is a mixture of microscopic solid or liquid particles suspended in the atmosphere. According to Norfolk Southern, the Lamberts Point coal terminal located on the eastern shore of Elizabeth river has an annual capacity of up to 48 million tons of coal transloading. Continuous blending, dumping, and ship-loading of thousands of tons of coal occur from trains to ships at this location. This process leads to the emission coal dust in the environment. These fine coal dust particles in the atmosphere can be inhaled during respiration and impact respiratory health.

The main objective of air sampling in these sites was to monitor the PM concentration in the community around the coal terminal and find if PM concentration levels were within the EPA regulations.

Sampling Instruments & Procedures

Devices Used: GRIMM Spectrometer and The TSI model 3007 condensation Particulate Counter used to measure total PM count, a lab notebook and a laptop.

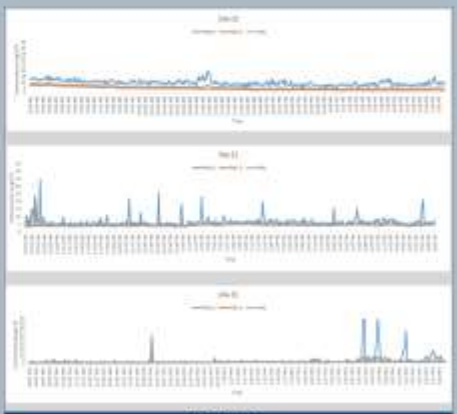
- 5 sampling sites were selected within the community and in close proximity to the coal loading area (to monitor coal dust emissions in the surroundings).
- Study Duration: 4 months (June- October, 2018)
- Sampling: Continuous measurements-one site per day.
- Data collection: Between 8.00 am-8.30 pm, 4 hours or 8 hours shift.
- Each site was monitored at least twice for data accuracy.

Table 1: Location

S. No.	Site	PoAction Source	Location	Latitude	Longitude
1	A1	community	624 Maryland Ave, 23508	36.883500	-76.290740
2	A2	community	624 Maryland Ave, 23508	36.883500	-76.290740
3	B1	Traffic	4608 Hampton Blvd, 23529	36.885890	-76.302050
4	B2	Traffic	4608 Hampton Blvd, 23529	36.885890	-76.302050
5	C1	Traffic	Child study center, 23508	36.886780	-76.296400
6	C2	Traffic	Child study center, 23508	36.886780	-76.296400
7	D1	Traffic	4803 Powhatan Ave, 23508	36.886890	-76.313000
8	D2	Traffic	4803 Powhatan Ave, 23508	36.886890	-76.313000
9	E1	Community	2616W 28th Street, 23508	36.877209	-76.305748
10	E2	Community	2616W 28th Street, 23508	36.877209	-76.305748

Community map with sampling sites

Results: PM_{10}, $PM_{2.5}$ & PM_1 concentration in community sites



Conclusion

- EPA's 24-hour average regulation levels for PM_{10} and $PM_{2.5}$ weren't exceeded by any of the above sites.
- PM_{10} ranged from (6.50-19.30) µg/m³, $PM_{2.5}$ ranged from (2.90-14.03) µg/m³ and PM_1 ranged from (1.26-12.26) µg/m³.
- Site B showed increase in PM concentration during traffic rush hours in Hampton Blvd.
- Site E showed continuous changes in the PM_{10} concentration. This site is within 25 feet of railroad track. The fluctuation in PM_{10} concentration throughout the day shows need for regular air quality monitoring along with the track of movement of the coal trains around the location.

Table 2: EPA National Air Quality Standards for Particulate Matter

Particulate matter Type	Primary or Secondary	Averaging time	Level	Form
PM_{10}	Primary and Secondary	24 hours	35µg/m³	98th percentile averaged over 3 years
$PM_{2.5}$	Primary and Secondary	24 hours	150µg/m³	Not to be exceeded more than once per year on average over 3 years

Further Suggestions

- Increase number of sampling sites.
- Monitor throughout the year for annual average PM concentration and effect of weather on PM concentration.
- Record keeping of the coal transportation time and PM concentration analysis is suggested to determine the association between coal transportation and PM concentration near railroad track and coal storage location.

Acknowledgements

I would like to thank my faculty advisor Dr. Anna Jeng, for my practicum project and air sampling devices. This project would not be complete without the help of Pat, Kim, and community members who supported my project by providing access to the sampling site within and around their properties.

The Utility of Perceived Neighborhood Environments as a Predictor of Childhood Obesity

Kavya V. Iyer, Bryn M. Haden, & Elizabeth I. Ackley, Ph.D.
Center for Community Health Innovation · Roanoke College, Salem VA

Background

- Past research has shown that individual neighborhood environments play a role in youth weight status.
- Both food environments and physical activity environments have been considered to understand caloric balance in youth.
- Saelens et al. (2012) demonstrated that food and physical activity environments played a role in youth weight status, but the study only considered objective measures of the environment. These included GIS audits of neighborhood proximity to parks and other recreational facilities and to supermarkets and fast-food restaurants.
- By only researching objective measures of access to healthy resources, there is the potential to miss the influence of social determinants of health on youth weight status.
- Carroll-Scott et al. (2013) proposed that the utilization of ***perceived*** access to resources supporting healthy living allowed for insight into the impact of social determinants of health on youth weight status, but nutritional environments were not considered.

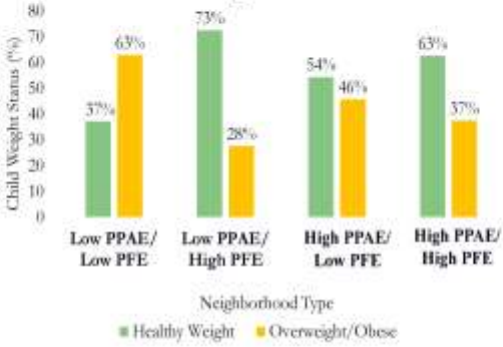
Purpose

The purpose of this study was to explore the relationship between perceived neighborhood physical activity environments (PPAE) and perceived food environments (PFE) on weight status in youth.

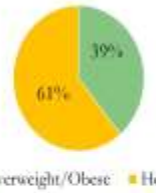
Methodology

- Perceptions of neighborhood access to physical activity and food resources, along with objective measures of BMI-for-age, were gathered from the 2017 Roanoke Valley Community Healthy Living Index.
- Responses to prompts such as "Food stores offering healthy foods are in walking/biking distance from home or are easy to get to by bus" and "Parks and other areas are available for people of all ages to be active in the neighborhood" were used to thematically code neighborhood PPAE and PFE as low or high.
- Chi-square analysis was used to analyze the relationship between joint PPAE/PFE environments and youth BMI-for-age.

Child Overweight/Obesity Status by Perceived Neighborhood Access



Weight Distribution Amongst Youth



Perceived Access to Neighborhood Resources

Results

- Complete data was available for 574 students (age = 7.27 ± 1.77 years).
- Children who perceive they live in a low food/physical activity environment are more likely to be overweight or obese than children who perceive they live in environments with high levels of access to both resources, or some combination of high/low access (X^2 (3, N = 574) = 12.933, p = .005, Cramer's V = .15).

Conclusions

- Students that perceived that they had higher access to resources supporting physical activity and healthy eating tended to have a lower BMI-for-age.
- The magnitude of difference in obesity rates between Low PPAE/Low PFE and High PPAE/High PFE was 26%; Saelens et al. (2012) found an 8% difference between objectively measured high and low physical activity and food environments.
- Variability in the magnitude of difference could indicate that studying perceived access to resources supporting healthy living may play a better role in understanding the impact of social determinants of health on youth weight status.

Future Directions

- Our data suggests that utilizing perceived access to neighborhood healthy-living resources may provide a more robust understanding of the impact of social determinants of health on youth weight status.
- These findings indicate the usefulness of studying perceived neighborhood environments and may be used to guide localized policies to reduce youth overweight and obesity.