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Respiratory Health Risks for Children Living Near a Major Railyard

Rhonda Spencer-Hwang[1] · Sam Soret[1] · Synnove Knutsen[1] · David Shavlik[1] · Mark Ghamsary[1] · W. Lawrence Beeson[1] · Wonha Kim[1,2] · Susanne Montgomery[3]

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Abstract Inland southern California is a region of public health concern, especially for children, given the area's perennially poor air quality and increasing sources of local pollution. One elementary school specifically is located only a few hundred yards from the San Bernardino Railyard, one of the busiest goods movement facilities in California, potentially increasing respiratory problems. Through ENRRICH (Environmental Railyard Research Impacting Community Health) Project, we assessed association of proximity to a major freight railyard on adverse respiratory health in schoolchildren. Respiratory screening was provided for children at two elementary schools: one near the railyard and a socio-demographically matched comparison school 7 miles away. Screening included testing for airway inflammation ($F_{E_{NO}}$), lung function (peak expiratory flow, PEF) and parent reported respiratory symptoms. Parental questionnaires collected additional information. Log-binomial and linear regression assessed associations. Children attending school near the railyard were more likely to exhibit airway obstruction with higher prevalence of abnormal PEF (<80 %): prevalence ratio (PR) = 1.59 (95 % CI 1.19–2.12). The association with inflammation was less clear. Children at the exposure school, who had lived 6 months or longer at their current address (vs. all children at that school) were more likely to have values suggesting inflammation ($F_{E_{NO}} > 20$ ppb) (PR = 1.44, 95 % CI 1.02–2.02) and present with a trend for increased adverse respiratory symptoms. Children attending school near the railyard were significantly more likely to display respiratory health challenges. Ideally these low-income, low resource communities should be supported to implement sustainable intervention strategies to promote an environment where children can live healthier and thrive.

Keywords Air pollution · Children · Respiratory · Railyard · Health professionals

Abbreviations

CARB	California Air Resource Board
$F_{E_{NO}}$	Fractional exhaled nitric oxide
CS	Control school
PEF	Peak expiratory flow
DPM	Diesel particulate matter
PR	Prevalence ratio
ES	Exposure school
SBR	San Bernardino Railyard

Background

The impacts of international trade and the accompanying nationwide movement of goods by ship, plane, train, or truck, are generally seen as positive as they are believed to promote employment opportunities and cheaper goods. Relatively little attention has been given to possible health threats to the mainly low income and minority communities located in close proximity to the goods movement

✉ Rhonda Spencer-Hwang
rspencer@llu.edu

1 School of Public Health, Loma Linda University, Nichol Hall Room 1201, Loma Linda, CA 92354, USA

2 School of Medicine, Loma Linda University, Loma Linda, CA, USA

3 Behavioral Health Institute, School of Behavioral Health, Loma Linda University, Loma Linda, CA, USA

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network, including railyards and rail lines. Near freight rail facilities, residents are likely to be exposed to high levels of diesel exhaust particles and other airborne pollutants at potentially even greater levels than those from major freeways.

Children are a sensitive sub-population at risk for adverse health effects associated with air pollution due to a number of biological factors including their developing lungs, increased breathing rates, their smaller body size, and tendency to spend more time outdoors compared to adults [23]. Already, scientific evidence has linked automobile-related air pollution to increased respiratory symptoms, increased asthma-related hospitalizations, and even initial development of asthma, clearly establishing air pollution as a considerable health threat for children [2, 5, 20, 29, 30, 36]. However, less is known about the potential additional risks associated with pollutants from global goods movement, particularly in communities near intermodal rail facilities located at inland port hubs [33, 37] where they are already exposed to high levels of automobile/freeway related pollution. Thus, the primary aim of this research was to explore the association between respiratory function, airway inflammation and adverse respiratory health symptoms in young children living and attending school near a major freight railyard facility.

Materials and Methods

Study Setting

The San Bernardino Railyard (SBR) is located in a densely populated area in inland southern California characterized by notoriously poor air quality for ozone and particulate pollution. The area which surrounds the SBR is home to predominantly young, low-income, Hispanic populations. Emission sources at this 24/7 intermodal rail facility include locomotives, on-road and off-road machinery and vehicles. Diesel PM (DPM) is the dominant toxic air contaminant although other air toxics (e.g., benzene, 1,3-butadiene) are also emitted [12]. The SBR is the largest source of air pollution in the immediately adjacent populated areas, with an estimated 22 tons of diesel particulate matter (DPM) emitted annually [12].

Study Design

We used a cross-sectional design to compare two socio-demographically matched elementary schools; the exposure school (ES) was located 500 meters downwind from the SBR; and the comparison school (CS) was located seven miles west. The CS was selected among a group of candidates that were located in neighborhoods that matched the GIS-derived socio-demographic profile of children attending the ES. After obtaining Institutional Review Board (IRB) and school district approval, an explanatory letter, consent form and a short questionnaire were sent to the parents of the children. School-based respiratory health screenings were then conducted during late February 2012 with all students (grades K-5) with parental consent.

Screening Clinics

Children's peak expiratory flow (PEF) and fractional exhaled nitric oxide ($\mathrm{FE_{NO}}$) measurements were collected as were height and weight to determine each child's body mass index (BMI). PEF was assessed using a peak flow meter (Mini Wright, Medline, Mundelein, IL). The highest of three readings was used and transformed into the percent of the predicted PEF according to the child's height based on manufacturer's guidelines. Nitric oxide (NO) in exhaled breath reflects the redox state of the airway and has been proposed as a biomarker of lung tissue injury and inflammation [17]. $\mathrm{FE_{NO}}$ was measured once with the child in a sitting position using a NIOX MINO® instrument (Aerocrine AB, Solna, Sweden). The screenings were conducted in partnership with the San Bernardino County's Breathmobile® (mobile respiratory health clinic) Program. All children who exhibited respiratory values outside normal PEF range or per the parental survey reportedly had asthma, received additional spirometry testing by the medical staff of the Breathmobile® Program and were offered follow-up medical care through the mobile clinic.

Potential Confounders

Potential confounders were identified based on relevant literature and included the following variables: (1) *From the parental questionnaire* we assessed socio-demographic, residential and health history information: sex (male/female); age (years); grade (kindergarten, 1st, 2nd, 3rd, 4th, 5th); race (Non-Hispanic White, Non-Hispanic Black, Hispanic, Other); furry pets in the home (yes/no); time spent outdoors (<12 h per week, 12–24 h per week, 24+ h per week); exposure to environmental tobacco smoke (ETS; yes/no); type of home heating system (gas, wood burning stove/fireplace, coal/oil, other); length of time at current address (months); physician diagnosis of asthma for their child (yes/no); use of asthma inhaler medication (yes/no) and lack of access to medical care (yes/no). (2) *From the Census,* we derived neighborhood characteristics. Using GIS, we created several variables to characterize population density, housing indicators, and median household income at the census block group (BG) level using 2010 census data. These neighborhood-level indicators were assigned to study participants according to their residential location. (3)

Traffic and DPM related air pollution exposures. We modeled proximity to major roadways as a proxy for residential and school exposure to traffic emissions. Distance from the subjects' residential to nearest major roads (freeway, highway, and arterials) was estimated through GIS mapping methods described previously [35, 42]. To account for exposures to DPM emissions from local (stationary and mobile) sources other than the SBR, we used data from the Multiple Air Toxics Exposure Study III (MATES-III), a regional emissions inventory of air toxics developed by the South Coast Air Quality Management District [31]. Using GIS we linked the local DPM emissions to the address of each subject.

Statistical Analysis

Descriptive and summary estimates were assessed and compared between the two schools using Chi-square and *t* tests. The association of school location with the two respiratory health measures, PEF (<80 % vs. 80+) and $F_{E_{NO}}$ ($\geq$20 vs. <20 ppb), and the adverse respiratory symptoms (chronic cough, wheezy sounding breathing, shortness of breath walking, parent reported physician diagnosis for asthma and use of emergency room services for asthma) were studied separately using log-binomial regression models for dichotomous outcomes which allowed the calculation of prevalence ratios (PRs) and 95 % confidence intervals (95 % CIs). Additionally, PEF and $F_{E_{NO}}$ were modeled using linear regression with calculations of PRs and CIs for each. The final model in addition to the school variable included age, gender, race/ethnicity, environmental tobacco smoke (ETS), time spent outdoors, block group annual median household income, proximity to nearest major road, and total diesel pollution from local sources. In addition, sensitivity analyses were conducted limiting the study population to students who had lived 6+ months at their current address (N = 765). All analyses were conducted utilizing SAS version 9.3 (SAS Institute, Cary, NC).

Results

Of 1440 children attending the schools, 1066 (74 % overall participation, with 70 % CS and 79 % ES) students participated in the respiratory health screening (n = 531 ES; n = 535 CS). Two-thirds of participating children lived within <0.6 miles of their campus and most were Hispanic (83 %). Schools were similar with respect to gender, race/ethnicity, BMI category, and time spent outdoors. A total of 877 children (ES, n = 435; CS, n = 442) had complete information on all variables thus constituting our analytic study population (Table 1). Overall 21 % of students had PEF results below 80 % of the predicted value and 16.3 % had high $F_{E_{NO}}$ values, indicative of airway obstruction and/or lung inflammation, respectively. Children from the ES had poorer test results (26 % with PEF < 80 % of predicted and 18 % with $F_{E_{NO}} \geq 20$ ppb) compared to children from the CS (17 % PEF < 80 % of predicted and 15 % $F_{E_{NO}} \geq 20$ ppb).

Association between respiratory outcomes and proximity to the SBR are shown in Tables 2 and 3. Both the log-binomial and linear regression analyses revealed consistent findings across the crude, adjusted, and sensitivity analysis models, indicating that children from the ES exhibited an increased prevalence of poorer PEF results compared to the comparison school. After adjusting for age, sex, race/ethnicity, ETS, time spent outdoors, median household income, proximity to nearest major road, and local DPM emissions, the ES children experienced a statistically significant 59 % increase in the prevalence of reduced PEF, compared to the CS children (PR = 1.59, 95 % CI 1.19–2.12). Sensitivity analyses with children who resided 6 months or longer at their current address confirmed the earlier PEF results (PR = 1.41, 95 % CI 1.03–1.92). Results with low PEF and inhaler use showed a similar pattern and were statistically significant for all children and for the sensitivity analyses. The findings for $F_{E_{NO}}$ were less clear. No association was found using the linear regression model. However, when using the recommended cutoff of 20 ppb, children in the ES were 33 % more likely to have an abnormal value (PR = 1.33, 95 % CI 0.95–1.85) compared to CS children. In the sensitivity analyses the estimate became stronger and statistically significant (PR = 1.44, 95 % CI 1.02–2.02). Results from analysis of all the adverse respiratory health symptoms indicated similar trends across symptoms, with children attending the ES more likely to exhibit adverse respiratory conditions than those at the CS. Chronic cough (PR = 1.80, 95 %CI 1.14–2.85) and wheezy sounding breathing (PR = 1.74, 95 % CI 1.25–2.42) were also significantly higher in ES versus CS children.

Discussion

Even when compared to demographically matched CS children living in high pollution environments, children attending the school near the railyard had reduced lung function and increased airway inflammation. Results were even more pronounced in children who had lived at their address for at least 6 months, with a 41 % increase in prevalence of low PEF (indicating a significant increase in airway obstruction) and a 44 % increase in airway inflammation. Additionally, adverse respiratory symptoms

Table 1 Basic characteristics and main outcomes of participating children

	By school of enrollment		
	All subjects (n = 877)	Exposure school (n = 435)	Comparison school (n = 442)
Age [years (mean ± SD)]	7.96 ± 1.8	7.97 ± 1.8	7.95 ± 1.8
Race/ethnicity [n (%)]			
Non-Hispanic White	42 (4.8)	19 (4.4)	23 (5.2)
Hispanic	732 (83.4)	356 (81.8)	376 (85.1)
African American	48 (5.5)	32 (7.4)	16 (3.6)
Other	55 (6.3)	28 (6.4)	27 (6.1)
Gender [male, n (%)]	414 (47.2)	201 (46.2)	213 (48.2)
Grade [n (%)]			
Kindergarten	128 (14.6)	74 (17.0)	54 (12.2)
1st	145 (16.5)	57 (13.1)	88 (19.9)
2nd	161 (18.4)	77 (17.7)	84 (19.0)
3rd	139 (15.9)	71 (16.3)	68 (15.4)
4th	156 (17.8)	81 (18.6)	75 (17.0)
5th	148 (16.9)	75 (17.2)	73 (16.5)
BMI [n (%)]			
Underweight (<18.5 kg/m^2)	39 (4.5)	28 (6.4)	11 (2.5)
Normal (18.5–24.9 kg/m^2)	481 (54.8)	233 (53.6)	248 (56.1)
Overweight (25.0–29.9 kg/m^2)	144 (16.4)	71 (16.3)	73 (16.5)
Obese (>30 kg/m^2)	213 (24.3)	103 (23.7)	110 (24.9)
Peak expiratory flow (PEF)[a]			
Mean ± SD (L/min)	207 ± 61.8	201 ± 60.5	214 ± 62.4
<80 % of predicted [n (%)]	188 (22.4)	112 (25.8)	76 (17.2)
Exhaled nitric oxide $F_{E_{NO}}^{b}$			
Mean ± SD (ppb)	13.3 ± 15.1	13.7 ± 15.6	12.9 ± 14.6
≥20 ppb [n (%)]	141 (16.3)	76 (17.5)	65 (14.7)
Median household income ± SD	43,726 ± 13,679	38,755 ± 12,704	48,618 ± 12,826
Diesel exposure [kg/day, mean ± SD]	7.96 ± 1.47	7.73 ± 1.81	8.19 ± 0.98

[a] Sample size = 840, [b] sample size = 867

reported by the parents (chronic cough, wheezy sounding breathing, shortness of breath, and use of emergency room services) were higher in children attending the ES. This strong pattern of adverse effects suggests that proximity to the railyard increases respiratory risk for children, even in a region with overall poor air quality.

Our biological respiratory tests provide important information that is not burdened by self-report. Others have used PEF when studying traffic-related air pollution and ambient PM and found significant decreases in PEF values for children associated with increase in air pollutants [25, 27, 40] and $F_{E_{NO}}$ has been used in assessing traffic related air pollution and ambient PM [16, 40]. $F_{E_{NO}}$ is a sensitive screening method for early respiratory risk of asthma and for assessing asthma aggravation in asthmatic children [8, 11]. In fact, it may be a more sensitive indicator of adverse air pollution effects than traditional measures of ventilatory function [14]. In a recent study where children (ages 7–10) were followed for 3 years, those in the highest $F_{E_{NO}}$ quartile had more than a two-fold increased risk of new-onset asthma compared to those with the lowest quartile (hazard ratio 2.1, 95 % CI 1.3–3.5) [4]. Together, the respiratory tests and the parent reports provide a picture of troubling health challenges for children living in close proximity to the examined intermodal rail facility.

Physiological mechanisms of action for the ambient air pollutants, lends credence to the observed findings. Emissions from the SBR are dominated by diesel exhaust, which is composed of vapors, gases, and fine particles. Diesel exhaust components aggregate into particles 0.1–0.5 μm in diameter, which are readily inhalable and can penetrate deep into the more distal branches of a growing child's lungs and eventually gain entry to cells and tissues, and alter or disrupt normal cellular function [7, 28]. Because of

Table 2 Log binomial regression modeling results of children at the exposure elementary school (ES) experiencing adverse respiratory related health outcomes in contrast with the comparison elementary school (CS)

Health outcomes	All subjects				Sensitivity analysis[b]		
	N	Events	Crude PR (95 % CI)	Adjusted[a] PR (95 % CI)	N	Events	Adjusted[a] PR (95 % CI)
Low PEF (<80 %)	877	188	1.50 (1.16, 1.94)	1.59 (1.19, 2.12)	765	161	1.41 (1.03, 1.92)
High $Fe_{NO} \geq 20$ ppb	867	141	1.19 (0.88, 1.61)	1.33 (0.96, 1.86)	759	129	1.44 (1.02, 2.02)
Parent reported asthma	877	141	1.41 (1.04, 1.92)	1.31 (0.94, 1.84)	783	127	1.26 (0.89, 1.79)
Chronic cough	448	111	1.75 (1.25, 2.45)	1.80 (1.14, 2.85)	404	103	1.97 (1.21, 3.20)
Shortness of breath walking	793	401	1.04 (0.91, 1.20)	1.06 (0.91, 1.23)	709	358	1.05 (0.89, 1.22)
Wheezy breathing	835	147	1.70 (1.25, 2.31)	1.74 (1.25, 2.42)	748	134	1.76 (1.24, 2.49)
Emergency room visit	847	50	1.25 (0.73, 2.15)	1.53 (0.84, 2.79)	759	47	1.55 (0.84, 2.88)

PR prevalence ratio, *95 % CI* 95 % confidence interval, *PEF* peak expiratory flow, Fe_{NO} fractional exhaled nitric oxide

[a] Model = school, age, gender, race, environmental tobacco smoke (ETS), time spent outdoors, median household income, proximity to nearest major road, total diesel pollution

[b] Sensitivity analysis included only subjects residing more than 6 months at their current address

[c] Endpoint defined as low PEF/high Fe_{NO} and/or inhaler use

Table 3 Linear regression modeling

Health outcomes	All subjects			Sensitivity analysis[b]	
	N	Crude β (95 % CI)	Adjusted[a] β (95 % CI)	N	Adjusted[a] β (95 % CI)
Linear regression analyses					
PEF test results	877	−12.8 (−21.0, −4.66)	−14.9 (−22.2, −7.58)	765	−13.0 (−20.8, −5.20)
Fe_{NO}^{c}	867	0.0 (−0.10, 0.11)	−0.01 (−0.13, 0.11)	759	0.03 (−0.10, 0.16)
PEF_{-inh}	877	−16.4 (−25.6, −7.17)	−17.4 (−25.6, −9.25)	608	−15.3 (−24.0, −6.54)

Results of children at the exposure elementary school (ES) experiencing adverse respiratory related health outcomes in contrast with the comparison elementary school (CS)

β regression coefficient, *95 % CI* 95 % confidence interval, *PEF* peak expiratory flow, Fe_{NO} fractional exhaled nitric oxide, PEF_{-inh} peak expiratory flow excluding subjects with parent-reported inhaler use, $Fe_{NO\ -inh}$ fractional exhaled nitric oxide excluding subjects with parent-reported inhaler use

[a] Model = school, age, gender, race, environmental tobacco smoke (ETS), time spent outdoors, medium household income, proximity to nearest major road, total diesel pollution

[b] Sensitivity analysis included only subjects residing more than 6 months at their current address

[c] Log of $Fe_{NO} + 1$

the large number of hazardous chemicals associated with DEPs, the possibility exists that the particles are capable of promoting a wide array of pathological effects; especially in the maturing lungs of children, who are particularly vulnerable due to their higher activity/breathing levels [9]. DEPs can act as nonspecific airway irritants at high levels, while at lower levels, promote the release of allergic and inflammatory response mediators as well as reactive oxygen species in the upper and lower airway that lead to oxidative injury, and induce DNA damage, eventually compromising lung function [15, 34]. In addition, DEPs appear to enhance the immunological effects of environmental allergens, providing an explanation for the increased risk for asthmatic symptoms and respiratory dysfunction in children living near major sources of diesel pollution [13, 32].

Public Health Implications

Freight logistics systems provide many benefits; however, such benefits should not obscure the potential for health and societal impacts such as air pollution, noise, stress, loss of land and blight. The prospect that residents, especially children, who live near ports, rail yards, and distribution centers could be disproportionally affected by higher levels of ambient air pollution has prompted the State of California to implement emission reduction strategies specifically focused on goods movement [22]. Our study

Table 4 Suggestions for positive change promoting awareness and increased respiratory health for children residing in region with chronic poor air quality

Key stakeholders	Suggestions for improvement
Policy development	Development of local, state and federal level policies to address exposure to children from community based railyard industries
	Encourage air quality monitoring around schools near major railyard sources
School districts and boards	Consider development of vegetation borders for schools near major pollution source; strategic planning, urban vegetation has been shown to reduce atmospheric pollutants
	Encourage planting of allergen friendly plants for landscaping. Contact local Masters Gardner Programs or American Horticulture Society (www.ahs.org)
	Contact a local Breathmobiles® mobile clinic in your area and have the school as a designated site, or work with local medical institutions to provide follow-up care for those in need. Mobile clinics are effective in reaching underserved communities and providing cost-effective preventive health services
	Promote "allergy and asthma friendly" school campuses through best practices to eliminate asthma triggers. The U.S. Department of Health and Human Services has more information: (http://www.nhlbi.nih.gov/health/prof/lung/asthma/asth_sch.pdf)
	Implement higher efficiency filtration for use within schools, to help reduce pollutants from exposing children inside the building
Principals	Work with local American Lung Association (ALA), county health departments, medical and academic institutions to increase educational opportunities for students, parents and school personnel
	Routine monitoring of daily air quality measurements (www.airnow.gov). Use air quality levels to determine outdoor activities and if needed modify such as encouraging a walking recesses (i.e. no basketballs distributed or equipment that encourages running) or indoor recess
Teachers	Encourage allergen free environments in the classroom, to reduce likelihood of encountering asthmatic triggering agents.
School health care providers	Offer routine, annual respiratory screening for all children, through validated screening survey
	Offer referrals for children in need of additional medical support
	Encourage linking of families in need to educational and resource support for managing respiratory conditions
Local community physicians	Physicians, especially pediatricians and family practice providers, potentially offer more routine screening for children in areas with chronic poor air quality. Alarmingly, studies have identified that as many as 15 % of children in urban settings may experience undiagnosed asthma
	Work with school districts on referrals for children identified through the annual school health screening as potentially having a respiratory condition
	Provide trainings for school personnel to keep current on best practices for respiratory health in their school
	Provide local health fairs to increase awareness, respiratory screening and resource linkage for those in need
Academic/research institutions	Conduct larger scale follow-up studies to assess for potential health impacts (i.e. respiratory, cognitive function, behavioral health, obesity)
	Develop and implement creative strategies to promote health and wellness for the community; providing a major resource for promoting a resilient community

represents one of the first investigations into the concerns about the health effects of railyard-related emissions in children. Our findings are consistent with previous exposure studies that indicate that proximity to traffic sources can negatively impact respiratory health in children. Current CARB guidelines recommend avoiding construction of new schools and homes within a mile of a railyard [10]. In 2003, the California Legislature passed SB 352, which requires that a school district verify that any railyard within a quarter mile of a new school will not present a public health threat. However, decades ago when the schools were first built, little was known about the health effects of air pollution and thus older schools are not covered by this legislation. Public health professionals have a responsibility to nevertheless consider the impact of these environmental conditions on growing children, especially on children from low income, minority households who often already live stressful lives and are, according to emerging evidence, at even greater respiratory health effects of traffic-related air pollution [18, 24, 38]. We know that air quality control policies are effective as evidenced by a recently published study by Gauderman et al. [19], which indicates long-term improvements in air quality is associated with improvements in lung function in children.

The findings from this study have implications for school personnel and local health professionals, especially pediatricians in areas with air quality challenges and in coastal and inland port cities where, due to the increasing international trade, new goods movement hubs, including intermodal rail facilities, are being planned. Since air pollutants were shown to promote development of asthma in children and exacerbate asthma symptoms, routine asthma screening should be offered at any point of health care provider contact in areas with increased burden of air pollutants [29]. Diagnosis and proper management of asthma is key to keeping children healthy and well enabling them to attend school. Asthma is one of the leading causes of school absenteeism, especially among children from a lower income household [1]. Table 4 provides recommendations for improving the local environment as well as promoting the health of children living and attending school in an area encompassed by poor air quality.

Strengths and Limitations

Our study has a number of strengths. Screening was offered to all children with parental consent and we had a high participation rate (74 %). We used objective biological measurements (PEF and FE_{NO}) to assess respiratory health. The CS school was socio-demographically matched to the ES to allow robust comparisons. Both schools are subject to virtually the same levels of regional air pollution, allowing us to assess the additional risk of the railyard. Results are likely conservative as the data collection was conducted during a winter month when ambient air pollution is lowest in the region.

Our research also had some limitations. School location was used as a surrogate of exposure and no on-site monitoring data of ambient air pollution levels was available. Furthermore data collection was conducted cross-sectionally. Future research should attempt to collect individual exposure measurements such as equipping children with backpacks that measure air pollution [39, 41], arguably a challenging but important next step. Another limitation is isolating the exposures to railyard-related emissions from other off-site sources of pollution. However, previous research established that the railyard accounts for 66 % of the on- and off-site DPM emissions [12]. In any case, these limitations relate to cause or attribution and do not negate our findings of increased respiratory risk for our participating children who clearly require a medical and public health response to protect them from further declines in health.

Conclusion

The results from this study support the hypothesis that proximity to a busy goods movement railyard negatively impacts the respiratory health of children, even in an area already afflicted by poor regional air quality. Previous research and subsequent regulatory efforts have focused on ports and roadways and not on goods movement rail facilities. More research is needed from prospective studies to assess the long term impact of rail facilities on children's respiratory health. Additional research is also needed to explore co-morbidities (i.e. obesity, increased blood pressure, mental health) and explore these effects in especially vulnerable subpopulations of children (ie. children with sickle cell disease) [3, 6, 21, 26]. Since these children live in low resourced communities it is critical for regional professionals to partner with these communities to promote sustainable policy changes well as screening, referral and interventions to promote a healthier environment, where children can live and thrive.

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