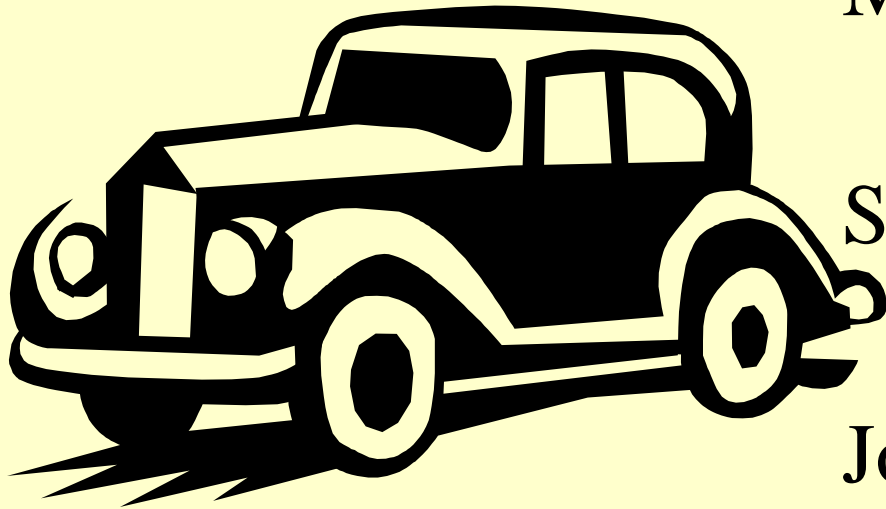


Traffic as a Risk Factor for Childhood Asthma in Alaska



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Research Question

Does living close to high traffic areas increase the risk of being diagnosed with asthma for children age five to seven years old?

Study Design

- 1100 surveys received from parents of children in kindergarten and first grade in 13 schools regarding asthma diagnoses, symptoms, demographics, family history, home environment. All socioeconomic classes represented.
- Nearest intersection to residence is determined. Only those who have lived more than one year at current location were entered.

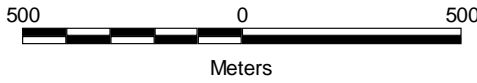
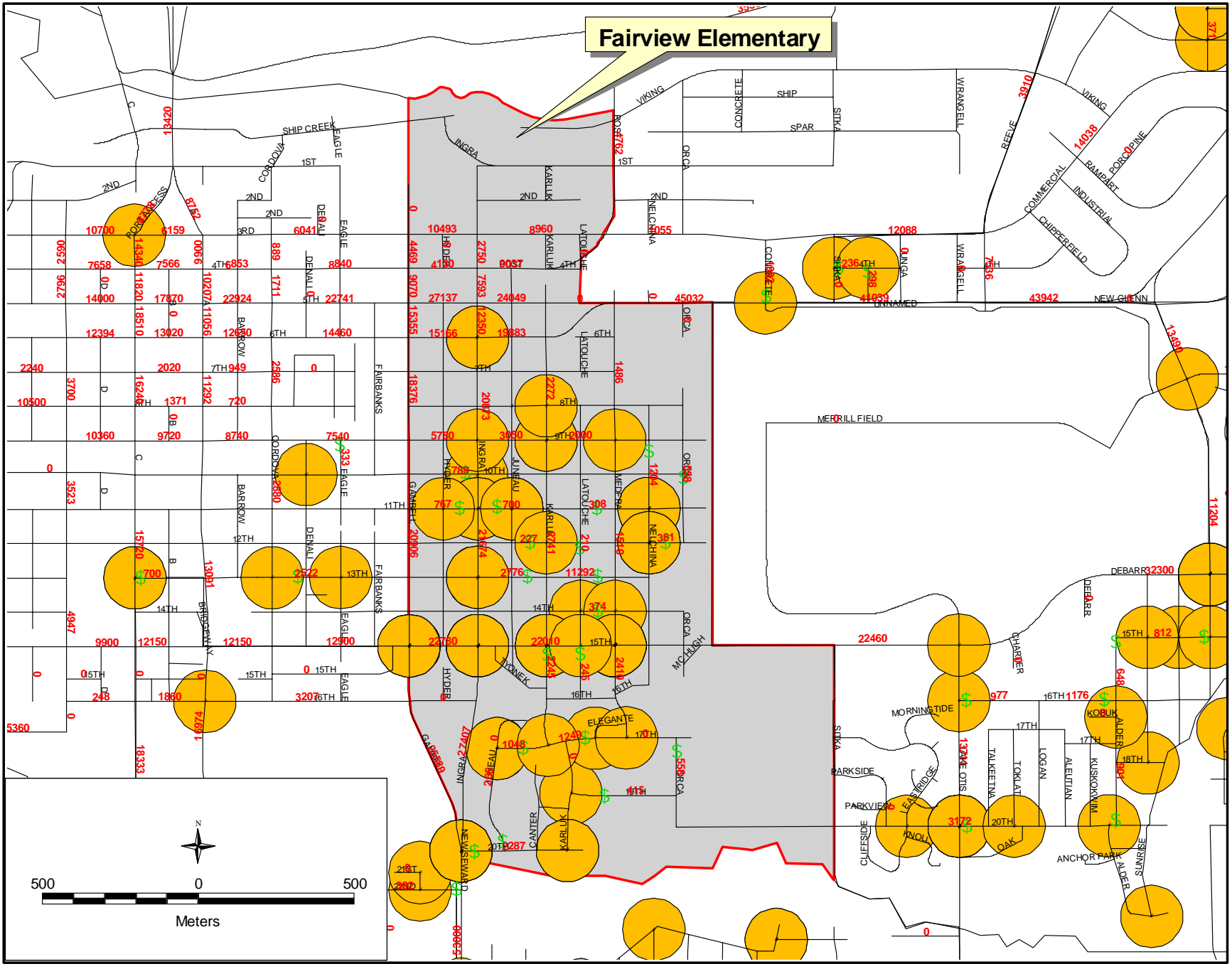
Specific Location Characteristics

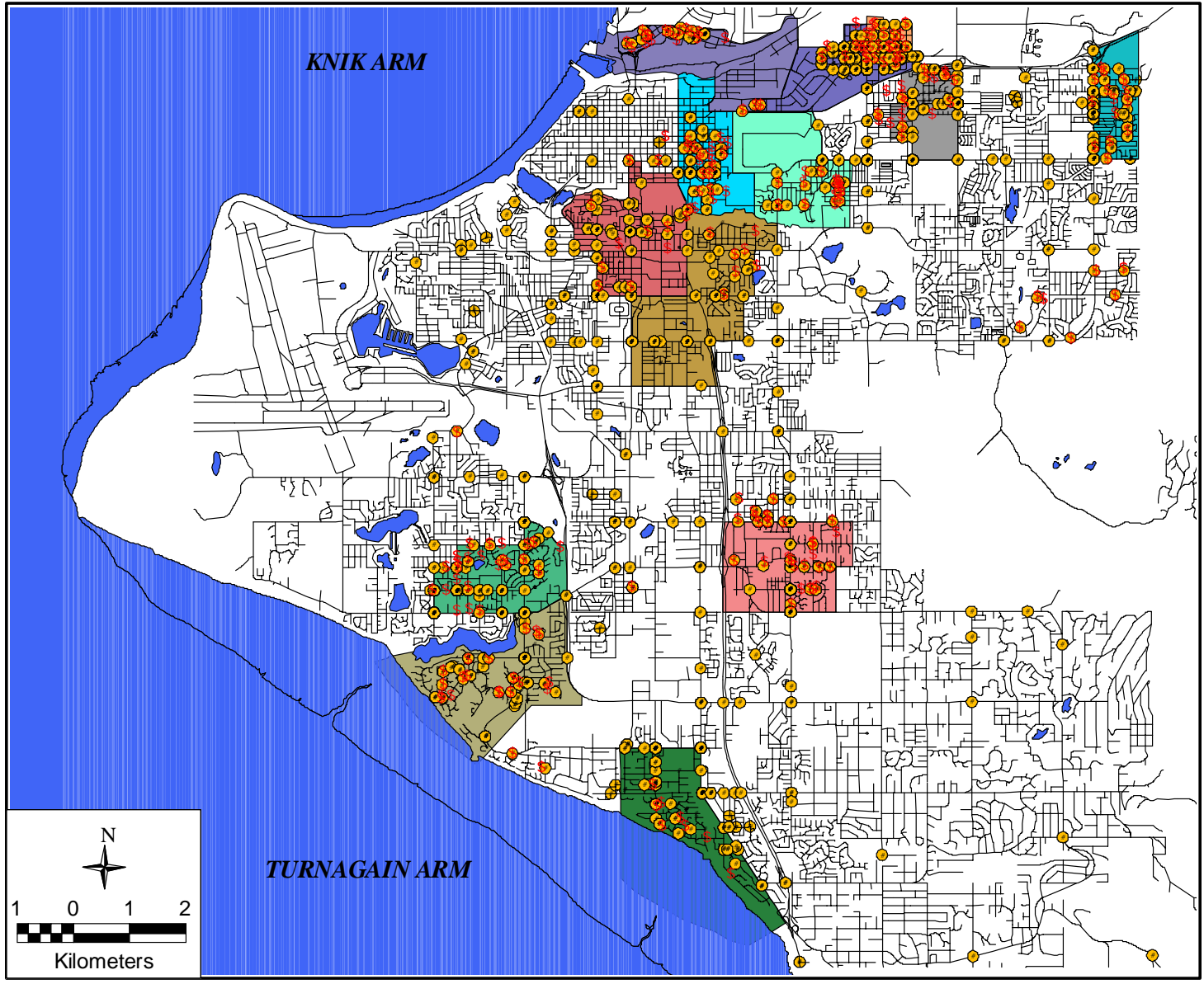
- 260K population with low diesel usage.
- Alaskan gasoline has high aromatic content (35-50%), with 5% benzene.
- Low levels of fine particulates
- Non-existent ozone
- High coarse particulates
- Both VOC and PM associated with roads

Geographical Information Systems Assessment for Traffic Exposure

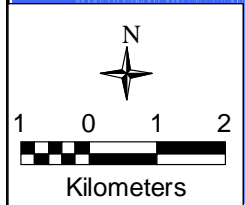
- Traffic data collected from state
- Traffic measured on roads with no data. Nearest intersection to home is located on GIS map.
- Buffer zone 100 meters around intersection is drawn and the length of each road falling within buffer is measured.
- The length within the buffer is multiplied by the average daily traffic on that road in that segment.

Fairview Elementary

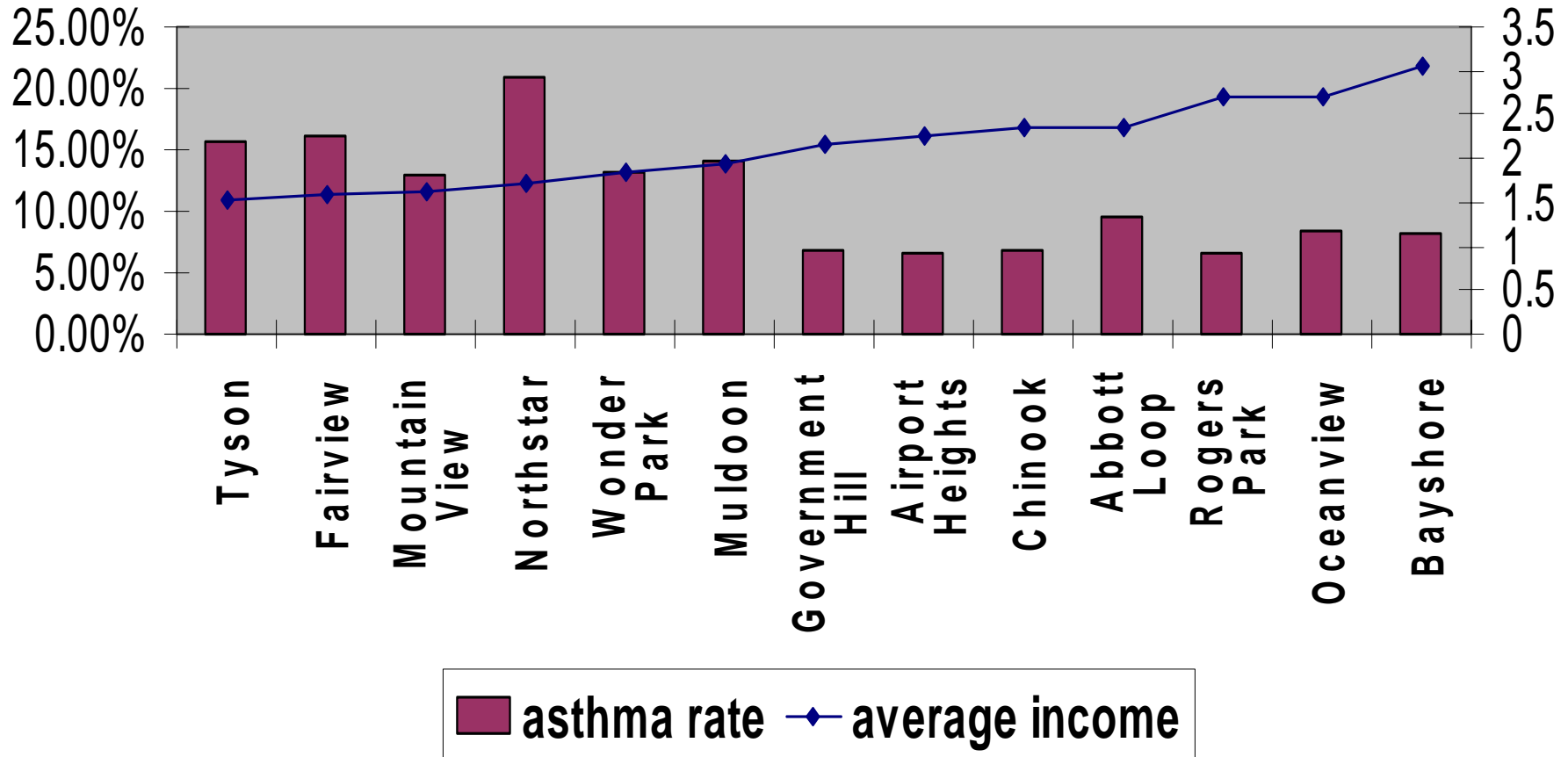




- * Subject Location
- \$ UAA Counter Locations
- 100 m Subject Buffer
- School Attendance Zones**
- ABBOTT LOOP
- AIRPORT HEIGHTS
- BAYSHORE
- CHINOOK
- FAIRVIEW
- GOVERNMENT HILL
- MT VIEW
- MULDOON
- NORTH STAR
- OCEAN VIEW
- ROGERS PARK
- TYSON
- WONDER PARK



Asthma Rates in Schools



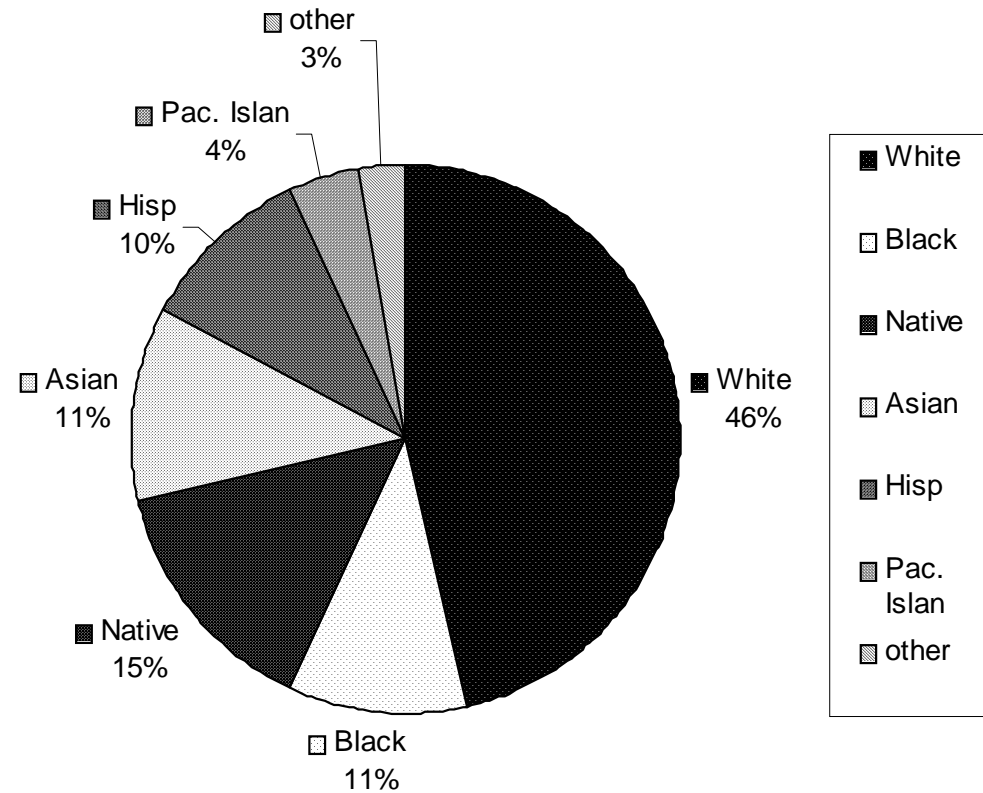
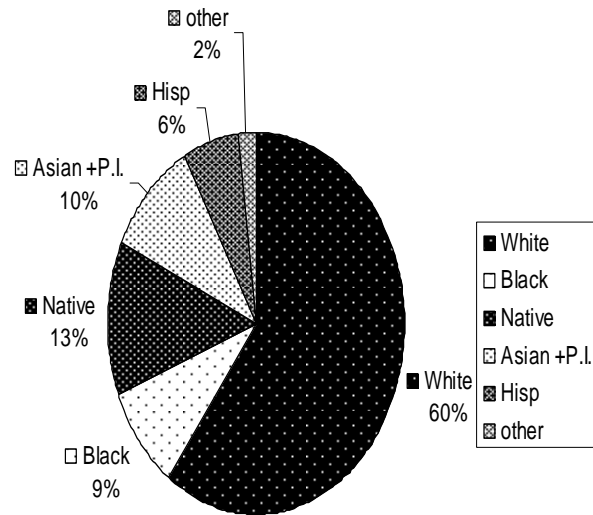
**Baseline Characteristics of Children between 5 and 7 years
who have lived > 1 year at current address.**

	<i>No Asthma</i>	<i>Asthma</i>	<i>Asthma rate</i>	<i>p-value</i>
Parental Asthma				<0.001
No	545	36	6.2%	
Yes	100	35	25.9%	
Smoker in Home				0.276
No	475	52	9.9%	
Yes	195	28	12.6%	
Family Income				0.031
<\$20K	119	24	16.8%	
\$20-49K	278	35	11.2%	
\$50-100K	195	14	6.7%	
>\$100K	49	7	12.5%	
Gender				0.702
male	355	40	10.1%	
female	316	39	11.0%	

Racial & Ethnic Distribution

Racial and Ethnic Distribution of Participants

Anchorage School District Distribution



**Categorization of Traffic Exposure
at 100-meter Buffer for children living for
more than 1 yr at current location**

	No Asthma	Asthma	Total	Asthma rate
Exposure				
Low	471	49	520	9.4%
Medium	161	21	182	11.5%
High	44	10	54	18.5%
Total	676	80	776	

Unadjusted results of 100 meter exposure

	Unadjusted (n=756)	
	OR (95% CI) *	p-value †
Traffic Exposure		0.139
Low	Referent	
Medium	1.25 (0.73, 2.15)	
High	2.19 (1.04, 4.60)	

*Maximum likelihood estimates and Wald-based 95% Confidence intervals for logistic regression models.

†p-values are based on likelihood ratio tests for the inclusion of the entire factor.

Logistic Regression Results of 100-meter buffer

	<i>OR (95%CI)</i>	<i>p-value</i>
Traffic Exposure		<u>0.056</u>
Low	Referent	
Medium	1.40 (0.77, 2.55)	
High	2.83 (1.23, 6.51)	
Parental Asthma		<0.001
No	Referent	
Yes	5.14 (3.01, 8.78)	
Smoker in home		0.439
No	Referent	
Yes	1.25 (0.72, 2.16)	
Family Income		0.143
<\$20K	Referent	
\$20-49K	0.61 (0.32, 1.16)	
\$50-100K	0.40 (0.18, 0.89)	
>\$100K	0.75 (0.26, 2.14)	
Gender		0.843
male	Referent	
female	1.06 (0.62, 1.78)	

Interactions Analysis

Interaction Variable	Exposure Level	OR (95% CI)*	Overall p-value
Parental asthma			0.010
No	Medium	2.43 (1.12, 5.28)	
	High	5.34 (2.08, 13.74)	
Yes	Medium	0.66 (0.25, 1.74)	
	High	0.67 (0.12, 3.69)	
Household smoker			0.055
No	Medium	1.72 (0.83, 3.56)	
	High	1.85 (0.60, 5.73)	
Yes	Medium	0.87 (0.28, 2.67)	
	High	5.58 (1.59, 19.61)	

Conclusions from our Study

Children exposed to high traffic volumes may have greater risk of being diagnosed with asthma.

Children without a family history of asthma are at highest risk.

Traffic exposure is a risk factor independent of family income and family history.

More research is needed to confirm these findings.

Additional Findings

- Overall asthma rate based on 1100 surveys was 11% for this age group.
- Adding symptoms of asthma to the outcome variable increased the rate of asthma to 12.6%.
- 27% of children diagnosed with asthma had more than five respiratory illnesses per year versus only 8% of those without asthma had 5 or more.

Limitations of this study

- The exposure measure was an approximation of the location of the residence (nearest cross streets).
- The exposure metric did not take into account landscaping around some roadways that may reduce the pollutant exposure.
- The high VOC content of Alaskan gasoline may be affecting the outcome.

Local Considerations

- Outdoor air pollution from combustion and traffic causes disproportionate problems in the Arctic because of strong temperature inversions. Traffic is the major source of air pollution in Anchorage.
- Indoor air pollution may be contributing to respiratory disease in Arctic homes due to indoor sources, attached garages and tight home construction.