

CHAPS

Children's Health & Air Pollution Study



CalEnviroScreen and Potentially Preventable Childhood Morbidity in Central California

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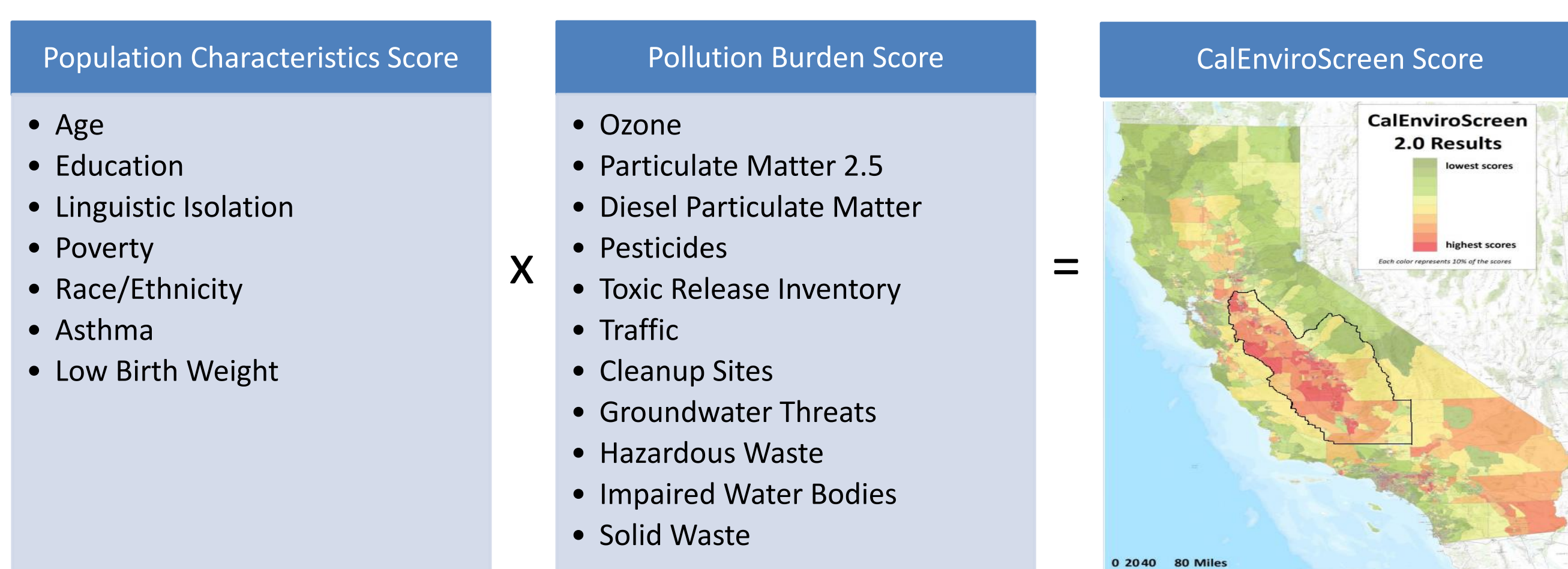
BACKGROUND

CalEnviroScreen is a screening tool developed by the California Environmental Protection Agency. This tool is used to identify communities that are disproportionately burdened by pollution and population characteristics. This study examined the utility of this screening tool in identifying communities at risk for avoidable hospitalizations. Does the CalEnviroScreen identify poor health outcomes in children? If so, which components of the CalEnviroScreen are associated with childhood morbidity?

METHODS

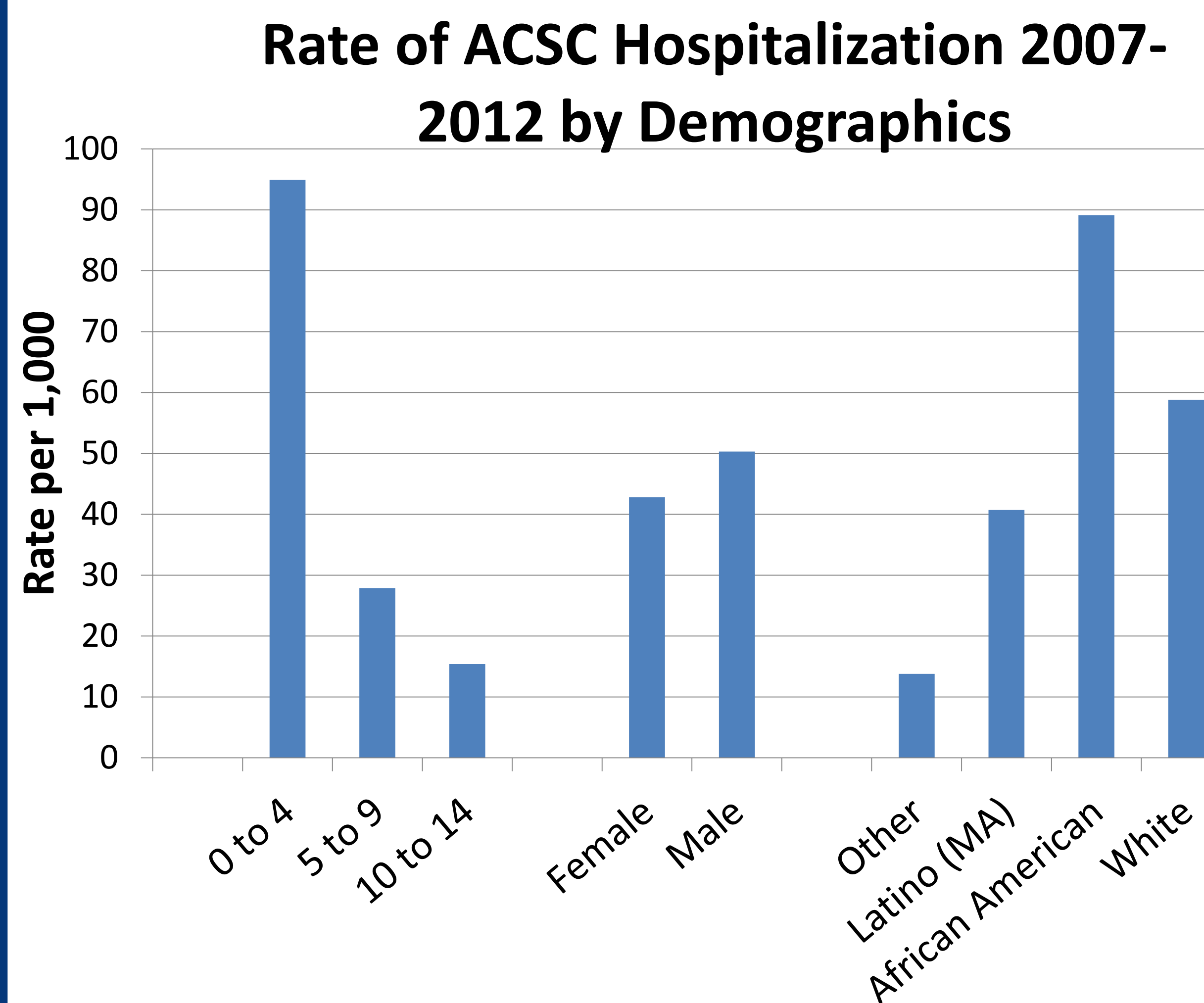
The dependent variable was hospitalization for ambulatory care-sensitive conditions (ACSC) including asthma, respiratory infection, and pneumonia. Included in the analyses were children younger than 15 years of age residing in the San Joaquin Valley. Independent variables included individual-level age, gender, and race/ethnicity, and zip code-level CalEnviroScreen v1.0 components. US Census Bureau data were used to estimate the population at risk per zip code. Statistical analyses developed hierarchical generalized non-linear models.

CalEnviroScreen Score Components



RESULTS

A total of 45,810 ACSC hospitalizations were observed between 2007 and 2012. Children aged 0 to 4 are at highest risk for hospitalization with a rate of 94.9 per 1,000. Males are at increased risk for hospitalization compared to females with rates of 50.3 and 42.8, respectively. African-American children have the highest ACSC hospitalization rate of 89.1 per 1,000 of any racial/ethnic group.



CalEnviroScreen Score & ACSC Rates

Multilevel analysis demonstrated that ACSC rates vary by 23% between zip codes. The overall CalEnviroScreen score accounted for 23% of the variance in ACSC hospitalization rates and was positively associated, $p < 0.001$. Separately, pollution burden score explained 1%, $p = .074$, and population characteristics score explained 31%, $p < 0.001$ of the variation in ACSC hospitalizations.

CalEnviroScreen Score Components Significantly Associated with ACSC Hospitalization Rates

Population Characteristic Score	Pollution Burden Score
<ul style="list-style-type: none"> • Age • Education • Linguistic Isolation • Poverty • Race/Ethnicity 	<ul style="list-style-type: none"> • Diesel Particulate Matter

After controlling for individual demographics, the indicators shown above were, independently associated with ACSC rates. Poverty had the strongest association and was highly correlated with all other components of the population characteristics score.

Final Explanatory Multilevel Model of CalEnviroScreen Components, Individual-level Indicators & ACSC Hospitalization

Zip Code and Individual-Level Indicators	Coefficient	Rate Ratio	Confidence Interval	p-value
intercept, γ_{00}	-5.733	0.003	(0.003,0.004)	<0.001
DIESEL PARTICULATE MATTER, γ_{01}	0.007	1.007	(1.003,1.011)	<0.001
POVERTY, γ_{02}	0.012	1.012	(1.007,1.018)	<0.001
Male, γ_{10}	0.166	1.181	(1.142,1.221)	<0.001
African American, γ_{20}	-0.144	0.866	(0.743,1.011)	0.068
Latino, γ_{30}	-0.216	0.805	(0.612,1.060)	0.122
POVERTY, γ_{31}	-0.008	0.992	(0.986,0.999)	0.023
Other Race/Ethnicity, γ_{40}	0.111	1.117	(0.792,1.575)	0.528
POVERTY, γ_{41}	-0.032	0.968	(0.960,0.977)	<0.001
Under 5, γ_{50}	0.999	2.716	(2.390,3.087)	<0.001
POVERTY, γ_{51}	0.005	1.005	(1.002,1.007)	<0.001
Ten to Fourteen, γ_{60}	-0.600	0.549	(0.521,0.579)	<0.001

DISCUSSION

The CalEnviroScreen is associated with rates of ACSC hospitalization. As expected, poverty is strongly associated with rates of hospitalization. Components of the population characteristic score such as poverty, education, and linguistic isolation are associated with ACSC rates and are highly correlated with one another. The only pollution burden component associated with ACSC rates is diesel particulate matter. Although diesel particulate matter has a small effect size, this finding represents an association beyond poverty and it's interaction with individual-level characteristics. Neighborhood poverty accounts for all of the explanatory power found in different racial/ethnic groups.

CONCLUSION

The CalEnviroScreen is a screening tool that can be used to identify neighborhoods that are at greater risk for health related effects of environmental injustice. But more detailed analysis of the specific neighborhood features associated with specific health outcomes may be needed for preventive policy and program development.

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