2019

Environmental Justice Index

Bureau of Assessment, Statistics & Epidemiology

Allegheny County Health Department

542 4th Ave., Pittsburgh, PA 15219

Prepared by:

Kathleen Shedlock, MPH

LuAnn Brink, PhD, MPH

August 2019

PREFACE

Nationally, issues of environmental justice have become more pressing with the looming threat of climate change, and persistent racial and socioeconomic inequities. Throughout the United States the burden of disease is not distributed evenly across the population. Too often, differences in community infrastructure, geography, and racial composition lead to health inequities. These are often greatest among lower income populations and people of color[1,2]. Thus, social determinants of health have come into greater focus to aid in untangling complex health disparities that cannot be explained by individual factors alone[2]. The creation of an environmental justice index sought to highlight the populations that are more vulnerable to health issues based on who they are or where they live.

In 2017 the Allegheny County Health Department, in partnership with local stakeholders, created the original Environmental Justice Index to expand upon existing efforts by the state defined areas of environmental inequity by race and poverty alone. The overall score consisted of a series of ten community-identified metrics that fell under the wide umbrella of socio-demographic issues; such as race, income, and proximity to high density commercial, industrial, or traffic areas. The results of that report were invaluable in identifying high priority areas in the county to make individualized recommendations based upon their unique, diverse structures. It also succeeded in creating a sustainable method for evaluating environmental need over time.

This current update sought to expand and build upon the original work to identify any changes over time and to connect results to relevant health outcomes. Notably, the previous evaluation was conducted at the census tract level. To be meaningful to municipal leaders, this update was conducted at the municipality and neighborhood level. Ultimately, the goal remains the same: to identify high priority areas to target interventions with the most community centered, recent data available.

TABLE OF CONTENTS

Methods

Data Sources

The original index used 10 community-identified metrics of community health. In this update, there were two deletions: traffic density and impaired streams. In addition, we now used median household income rather than percentage in poverty, and there are now eight indicators*:

- Median Household Income (MHINC)
- Diesel Particulate Matter (DPM)
- Particulate Matter ≤ 2.5 μm ($PM_{2.5}$)
- Percent of the population identified as a racial minority
- Proximity to Greenspace
- Educational Attainment
- Miles of Railroad Track Coverage
- Housing Vacancy

Score Calculation

Data were compiled at the census tract level and aggregated to municipality and neighborhood. Aggregation of the data was done in SAS 9.4. For values represented as a percent, the numerator and denominators were summed by area and then divided to obtain the final percent. Other values such as PM2.5, DPM, and Median Household Income were determined as an average of the census tracts that made up a given area.

Raw values for each metric were sorted into deciles and ranked on a scale of 1-10. This scoring assumes that each indicator is equally important, and the overall score is a simple mean of each indicator score. For indicators for which a higher decile represents a lower need (MHINC, greenspace, HS attainment), ranks were computed in a descending order. So, the highest decile of MHINC would be ranked as a 1 as opposed to a 10, and so on.

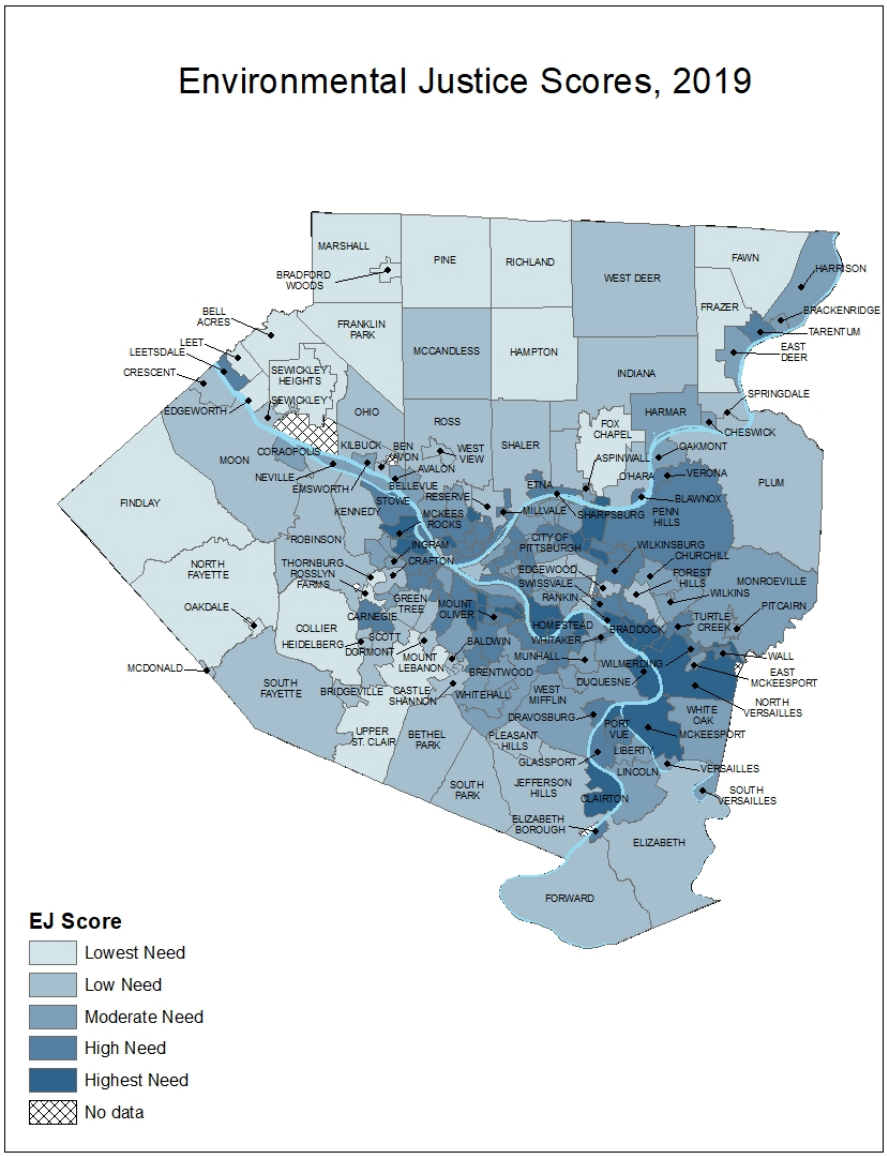
*Fine particulate matter, miles of track and greenspace data came from the previously used data. Socio-demographics data, MHINC, percent minority population, and educational attainment, came from the American Community Survey 2017 5-year estimates. Air quality data, DPM and $PM_{2.5}$, came from 2014 National Air Toxics Assessment estimates. Housing vacancy data came from the United States Postal Service 2017 estimates

Key Findings

Overall Scores

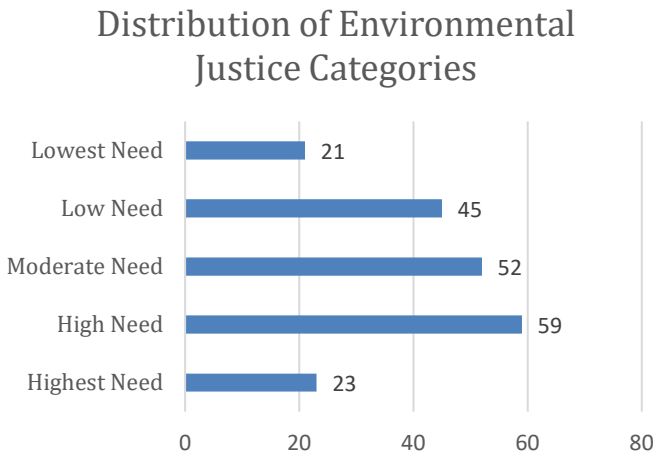
Scores were sorted into five categories of need based upon the overall score distribution, from lowest to highest environmental need. The median overall score in the county was 5.38, indicating an overall moderate need. The scores ranged from 2 to 8.63. Typically, the higher priority areas fell along the major rivers in the county (Figure 1). The mean score from the areas with the top ten highest proportion of racial minorities fell within the highest need category at 7.44, while those with the ten smallest proportion of white residents fell with the low need category at 4.14.

Figure 1 Allegheny County Environmental Justice Index



Of the 200 locales included in this analysis, 30% were of either low or lowest need, 26% were of moderate need, and 41% were of high or highest need (Figure 2).

Figure 2 Environmental Justice Score locale breakdown



Areas with the top five highest scores are given below in Table 1, tied scores list each area at that score. Compared to the previous index, many of the same areas, such as Duquesne City, McKeesport, and East Pittsburgh, remained within the top five highest priority areas, though a few additional areas were identified in this update. However, the two that did not make the top five in the current index, Rankin and Knoxville, had some of the worst values for educational attainment, median household income, proximity to greenspace, and housing vacancy rates. Thus, the same communities have remained high priority areas in the past two years.

Table 1 The top five highest scoring areas within Allegheny County

Area	Score
Duquesne City	8.625
Braddock Borough Clairton City North Braddock	8.25
East Pittsburgh Borough Homewood South Rankin	8.125
McKeesport City	8.00
Allentown Larimer Lincoln-Lemington-Belmar North Versailles	7.875

Conclusions

Social determinants of health and environmental burden have become more important in the context of public health practice. The root cause of a number of health issues relies in part on where an individual lives and the makeup of that community[1,2].

Areas that this metric identified as high priority areas also experience higher than average rates of health issues such as elevated blood lead level rates, infant mortality, and asthma emergency room visits. Often, these areas tend to be low income and with a high concentration of minorities, and their high rates of health issues cannot be explained solely by individual factors. Table 2 demonstrates that mostly minority communities fare worse than both the median score in Allegheny and their mostly racial majority counterparts. Specifically, these communities have a mean overall score of approximately 40% greater than the county median and 80% greater than the mostly white areas.

This analysis comes with limitations. The decision to score based on accepted community boundaries has the benefit of maintaining a level of community identity lost when relying solely on census tracts. However, many census tracts overlap between two or three communities when there may be more variability in the actual make up of those different areas. Furthermore, the housing vacancy rates reflect only the first quarter of 2017 and may not be stable for the long term. Another metric, greenspace, measures proximity within 0.25 miles of an address. Allegheny County is known for its unique geography that includes steep hills and rivers, and it is difficult to account for this variety in basic measures.

Despite its limitations, this index makes clear that future programs and funding should be allocated to support areas of high environmental need. Future analyses will need to quantify the importance of individual metrics to specific health issues.

References

1. Chakraborty, Jayajit et al. "Environmental Justice Research: Contemporary Issues and Emerging Topics." *International journal of environmental research and public health* vol. 13,11 1072. 1 Nov. 2016, doi:10.3390/ijerph13111072
2. Corburn, J. "Concepts for Studying Urban Environmental Justice." *Methods in Environmental Epidemiology.* vol 4. March 2017, doi:10.1007/s40572-017-0123-6
3. Kothari, Catherine L et al. "The interplay of race, socioeconomic status and neighborhood residence upon birth outcomes in a high black infant mortality community." *SSM - population health* vol. 2 859-867. 1 Oct. 2016, doi:10.1016/j.ssmph.2016.09.011