

SUPERSEDED on August 29, 2019

For historical reference only

Consult handle for current version: <http://hdl.handle.net/2027.42/149105>

Assessing the State of Environmental Justice in Michigan

University of Michigan School for Environment and Sustainability (SEAS)
in Partnership with the Michigan Environmental Justice Coalition (MEJC)

July 2019

Authors: Laura Grier, M.S., Delia Mayor, M.S., and Brett Zeuner, M.S., University of Michigan SEAS
Faculty Advisor: Dr. Paul Mohai, Ph.D., Professor of Environment & Sustainability, University of Michigan SEAS
Research Partner: Michigan Environmental Justice Coalition

Executive Summary

Introduction

This study sought to address the question, “What is the state of environmental justice in Michigan?” In the process of answering this broad question, the research team assessed the feasibility of developing a Michigan-specific online screening tool. This tool would present social and environmental data in an accessible format and could inform advocacy efforts and policy decisions. Developing such a tool to evaluate cumulative impacts was one of the 33 recommendations the Environmental Justice Work Group delivered to Governor Rick Snyder in 2018.¹ In assessing the feasibility of creating such a tool, the team investigated the data and methodologies used in three sets of existing screening tools: EJScreen used by the US Environmental Protection Agency (US EPA); CalEnviroScreen used by the California Environmental Protection Agency (CalEPA); and Story Map and What’s in My Neighborhood, both used by the Minnesota Pollution Control Agency (MPCA).

The research study used two distinct methodologies, one qualitative and one quantitative. First, semi-structured interviews with thirty environmental justice scholars, community advocates, and professionals in the state were conducted and analyzed. Second, an “environmental justice score” for each census tract in the state was calculated using publicly accessible environmental and social data and methodology informed by the three sets of screening tools that were investigated. The calculation of these scores and subsequent ranking of Michigan census tracts relied heavily on indicators and calculations CalEPA uses to identify “disadvantaged communities” in California.² In addition, an online screening tool was developed that displays these scores and rankings.

Literature Review

The report first presented a literature review that framed the context and importance of environmental justice. This chapter included sections on definitions and history of environmental justice, evidence and methods of environmental justice research, and information specific to the Michigan context. It also described data, methodology, and policy used in the three sets of spatial analysis tools listed above. The literature review concluded with definitions that the US EPA, CalEPA, MPCA, and the Michigan Department of Environment, Great Lakes, and Energy (formerly the Michigan Department of Environmental Quality) currently use to define environmental justice and distinguish communities disproportionately burdened with environmental harms.

¹ Environmental Justice Work Group. (2018, March). *Environmental Justice Work Group Report*. Commissioned by the Office of Governor Rick Snyder, State of Michigan. Retrieved from https://www.michigan.gov/documents/snyder/Environmental_Justice_Work_Group_Report_616102_7.pdf

² Faust, J., L. August, K. Bangia, V. Galaviz, J. Leichty, S. Prasad... and L. Zeise. (2017, January). Update to the California Communities Environmental Health Screening Tool CalEnviroScreen 3.0. Retrieved from OEHHA website <https://oehha.ca.gov/media/downloads/calenviroscreen/report/ces3report.pdf>

The analysis of interview data also yielded a number of themes and subthemes that provided information to assess the state of environmental justice in Michigan, as well as how environmental justice leaders view and utilize data tools to advance environmental justice. Environmental justice leaders characterized affected communities as resilient despite adversity, and cited a myriad of environmental, social, and health impacts, including lack of air and water quality, gentrification, asthma, and cancer. They also spoke to the psychological impacts of not only being personally affected or witnessing these issues, but also of fighting what seemed like “an insurmountable battle for justice.” Additionally, participants described numerous barriers to achieving environmental justice of which lack of political will and the erosion of democratic processes were notable. Participants disclosed utilizing a variety of tools to advance environmental justice and expressed a desire for a Michigan-specific tool to measure cumulative impacts. However, they expressed that the tool needs to be accompanied by strong state-level environmental justice policy in order to be effective. Table 1 displays themes, subthemes, and most common codes from the thirty interviews.

Themes	Subthemes	Most Frequently Mentioned Code	
Community Assets	Recent Wins	<i>Increased community engagement/action</i>	
	Community Strengths	<i>Positive community relationships</i>	
	Resources	<i>Community organizations</i>	
Community Vulnerabilities	Risks and Impacts	Environmental Impacts	<i>Poor air quality</i>
		Socioeconomic Risks and Impacts	<i>Gentrification</i>
		Health Risks and Impacts	<i>Cancer</i>
	Forms of Environmental Injustice	Procedural Injustice	<i>Lack of government transparency</i>
		Distributive Injustice	<i>Pollution in communities of color</i>
		Corrective Injustice	<i>Lack of prosecution of polluters</i>
	Barriers to Advancing Environmental Justice		<i>Lack of funding</i>
Tools	Existing Tools	<i>EJScreen</i>	
	EJScreen Use	<i>Has not used</i>	
	Michigan Tool Recommendation	<i>In favor of tool</i>	
	Reporting Mechanisms	<i>MDEQ emergency hotline</i>	

Table 1: Summary of all themes, subthemes, and most frequently mentioned codes from interviews.

Quantitative Component

In addition to qualitative research, quantitative methods were used to assess the state of environmental justice in Michigan. The study sought to determine what data could be used in the assessment, how accessible those data were, and what gaps were present in the data. To gather this information, environmental justice tools and policies utilized in California and Minnesota as well as at the federal level were investigated.

This process helped identify relevant data from the United States Environmental Protection Agency, Department of Housing and Urban Development, and Census Bureau. Those data were used to calculate an environmental justice score for each census tract in Michigan using analytical methods adapted from the California Environmental Protection Agency. Aspects of Minnesota's environmental justice policy were also incorporated into the assessment, such as the inclusion of racial and ethnic data and tribal communities. The resulting environmental justice scores represented cumulative risks and impacts consisting of eleven environmental indicators and six social indicators. A high environmental justice score means that a community has both a high risk of exposure to environmental hazards and a high vulnerability due to social factors.

The eleven environmental indicators used in the study were: air toxics cancer risk, air toxics respiratory hazard index, diesel particulate matter (PM), ozone level, PM2.5 level, traffic proximity and volume, lead paint indicator, proximity to National Priority List sites, proximity to risk management plan facilities, proximity to treatment storage and disposal facilities, and a wastewater discharge indicator. The six social indicators used in the study were: percent minority residents, percent of households living below twice the federal poverty level, unemployment rate, percent of residents with less than a high school education, percent of households living in linguistic isolation, and percent housing-burdened low-income households.

Environmental justice scores were then analyzed in ESRI ArcGIS to explore statewide patterns of environmental injustice. The resulting data were then uploaded into ESRI ArcGIS Online to demonstrate the feasibility of creating a Michigan-specific environmental justice screening tool. Additional results of the quantitative analysis included tables and maps that helped visualize these rankings. Table 2a-d, located on pages 8 through 11 of this executive summary, shows the top-scoring percentile of Michigan census tracts (n=28). In addition to environmental justice scores, the individual values for each indicator are provided for each of the 28 census tracts, as well as the average for the top 1%, top 5%, top 10%, top 25%, and the state overall average. Figure 3, shown on the following page, provides a map displaying the distribution of environmental justice scores across Michigan.

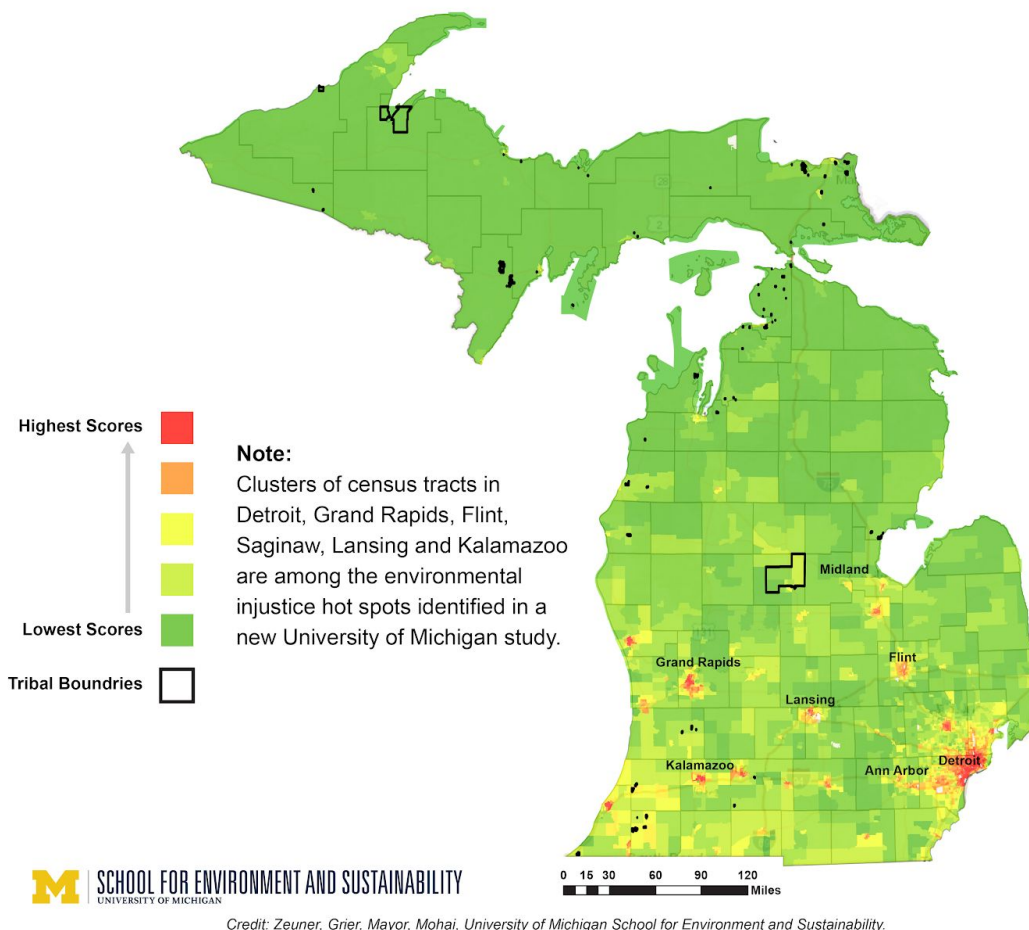


Figure 3: Map showing the distribution of environmental justice scores across Michigan’s census tracts.

Key Findings

The synthesis of the results from qualitative and quantitative analyses yielded three key findings. First, environmental injustice exists in Michigan. Interview data spoke to the disproportionate environmental exposure and lack of access to environmental goods residents of low-income and minority communities experience, including living in areas with poor air quality, drinking contaminated water, and failing to receive the same levels of economic investment as other communities in the state.

The maps displaying environmental justice scores revealed hotspots of disproportionate impact. Areas on this map with high environmental justice scores are census tracts with high concentrations of people who are minorities, have low educational attainment, are unemployed, are less likely to speak English, live below twice the federal poverty level, and are severely burdened by housing costs. For example, the average percent minority for the top 1% of tracts is 86.0%, compared to the state average of 29.2%. Similarly, the average percent living below twice the federal poverty line for the top 1% of tracts is 69.9%, compared to the state average of 30.8%. These are also areas that have the greatest concentrations of environmental burdens, such as high traffic proximity and volume, high estimated diesel particulate matter, high estimated cancer risk, high estimated respiratory risk, high number of hazardous sites, and others. For example, the average estimated diesel particulate matter concentration for the top 1% of tracts is 1.34 $\mu\text{g}/\text{m}^3$, compared to the state average of 0.76 $\mu\text{g}/\text{m}^3$. Similarly, the average estimated cancer risk for the top 1% of tracts is 44.8 per million people, compared

to the state average of 31.8 per million. Indeed, these patterns are consistent: the higher the environmental justice scores, the larger the values are for the social vulnerability and environmental burden indicators.

The distribution of environmental justice (EJ) scores also revealed the prevalence of environmental injustice. The team examined the statewide distribution of EJ scores comparing and contrasting the distances of percentile scores from the statewide median. Figure 4 reveals that the *least* disadvantaged census tracts have EJ scores that are much lower and much closer to the median than the *most* disadvantaged census tracts which have EJ scores much higher and much further from the median. An equitable distribution of environmental justice scores would be one in which there is little variation from the median across all percentiles (i.e. an almost horizontal line). One potential way to measure progress in environmental justice is by comparing the results of this graph over time. In a state of perfect social and environmental equality, the distance of every percentile's environmental justice score from the median environmental justice score would be zero, resulting in a flat line instead of a curve on this graph.

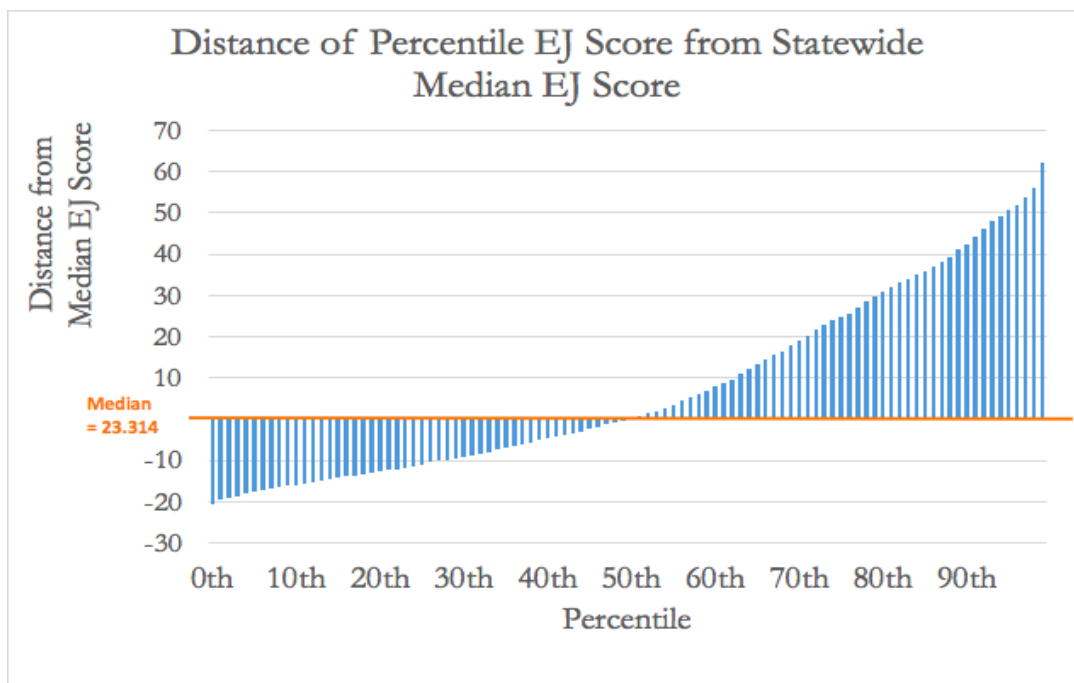


Figure 4: Graph showing the distance of the average environmental justice (EJ) score of each percentile from the statewide median EJ score.

The study also highlighted existing policies for identifying areas burdened by environmental justice issues. Borrowing thresholds from the California EPA's policy on identifying disadvantaged communities, the team looked at which census tracts fell within the top quartile in terms of their environmental justice scores. CalEPA designates the highest scoring 25% of census tracts from CalEnviroScreen as "disadvantaged communities" in addition to 22 census tracts that score in the highest 5% of CalEnviroScreen's Pollution Burden, but do not have an overall CalEnviroScreen score because of unreliable data.³ The State of Michigan should consider a similar standard for designating communities vulnerable to environmental justice concerns.

The second key finding was that creating a Michigan-specific online screening tool is both feasible and desired by environmental justice leaders in the state. After comparing methodologies used by US EPA, CalEPA,

³ Faust, J., L. August, K. Bangia, V. Galaviz, J. Leichty, S. Prasad... and L. Zeise. (2017, January). Update to the California Communities Environmental Health Screening Tool CalEnviroScreen 3.0. Retrieved from OEHHA website <https://oehha.ca.gov/media/downloads/calenviroscreen/report/ces3report.pdf>

and MPCA, the team developed a map and a tool (http://bit.ly/MI_EJscreen) that uses best practices from all agencies. Interview data also showed that community members and environmental justice leaders interviewed are in support of creating a tool that evaluates cumulative impact, as they would find it helpful and informative. This tool must incorporate input from these and other community members and leaders, as other states have done. Developing a screening tool would require the State to collect and make available raw social and environmental datasets.

The third key finding was that creating a tool alone is not enough to advance environmental justice in Michigan. A screening tool must work with state-level policy and be used to inform policy and funding distribution decisions. A model to which Michigan can look is California where CalEnviroScreen is used to inform environmental policy decisions, such as allocating funding from the state's cap-and-trade program.

Conclusion

Developing a screening tool that displays demographic and environmental data would allow community members, advocates, and policymakers to continually assess the state of environmental justice in Michigan. A screening tool was recommended by the Governor's Environmental Justice Working Group and desired by environmental justice leaders in the state. The State should look to California and Minnesota, where environmental and social data are collected and made public. The State also must seek input from community members in developing a screening tool and enacting strong state-level environmental justice policy.

Rank	Tract	EJ Score	Percentile	County	NATA Diesel PM (μg per meters cubed)	NATA Cancer Risk	NATA Respiratory Hazard Index	Traffic Proximity & Volume (average annual daily traffic per meter of road)
1	0039	93.9945	99.9%	KENT	1.231	46.802	2.233	4,327.28
2	0002	91.9467	99.9%	KALAMA ZOO	1.048	41.275	1.854	393.77
3	0003	90.1726	99.9%	KALAMA ZOO	1.230	46.196	2.269	518.65
4	0038	89.5012	99.8%	KENT	1.047	46.560	2.195	1,832.73
5	0040	87.7397	99.8%	KENT	0.859	41.223	1.869	2,389.54
6	0036	87.6325	99.8%	KENT	1.043	48.300	2.392	918.03
7	0026	87.4281	99.7%	KENT	0.957	43.980	2.041	1,554.54
8	5061	87.2077	99.7%	WAYNE	1.485	44.631	2.060	2,345.82
9	5055	86.9241	99.7%	WAYNE	1.622	41.125	1.930	5,852.55
10	5162	86.6946	99.6%	WAYNE	1.389	40.285	1.754	1,706.87
11	0028	86.4647	99.6%	KENT	1.004	44.675	2.057	2,732.17
12	5051	85.8678	99.5%	WAYNE	1.671	41.567	1.964	1,352.94
13	5189	85.2947	99.5%	WAYNE	1.836	46.368	2.121	6,060.61
14	5050	84.7682	99.5%	WAYNE	1.295	39.307	1.685	1,083.72
15	0001	84.7631	99.4%	KALAMA ZOO	0.928	40.652	1.880	611.12
16	5032	84.7490	99.4%	WAYNE	1.576	43.205	1.894	1,469.20
17	5238	84.3339	99.4%	WAYNE	1.305	54.409	1.534	3,034.32
18	0037	84.1566	99.3%	KENT	1.090	46.268	2.217	1,110.57
19	2638	83.9774	99.3%	MACOMB	1.535	44.379	2.065	3,397.49
20	5159	83.7271	99.3%	WAYNE	2.126	45.293	2.509	4,970.51
21	5047	83.6454	99.2%	WAYNE	1.618	40.511	1.955	2,775.18
22	5110	83.3282	99.2%	WAYNE	1.434	40.566	1.854	2,414.28
23	0009	83.2441	99.1%	KALAMA ZOO	1.213	43.795	2.081	620.99
24	5054	83.1436	99.1%	WAYNE	1.652	42.260	1.983	2,045.80
25	5250	82.4909	99.1%	WAYNE	1.076	63.501	1.439	1,732.57
26	5142	81.0785	99.0%	WAYNE	1.775	41.482	1.925	2,463.29
27	5243	80.7583	99.0%	WAYNE	1.005	50.253	1.349	1,931.65
28	2639	80.7419	99.0%	MACOMB	1.504	46.840	1.896	1,156.88

	NATA Diesel PM	NATA Air Toxics Cancer Risk	NATA Respiratory Hazard Index	Traffic Proximity & Volume
Top 1% Average for Indicators	1.341	44.847	1.964	2,242.97
Top 5% Average for Indicators	1.379	43.008	1.836	2,365.62
Top 10% Average for Indicators	1.342	41.703	1.792	2,084.35
Top 25% Average for Indicators	1.219	39.686	1.793	1,639.22
State Average for Indicators	0.764	31.789	1.361	687.84

Table 2a: Michigan census tracts with environmental justice scores that fall in the top percentile (1%).

Rank	Tract	County	Waste water Discharge (concentration of toxic chemicals per kilometer of stream)	Superfund National Priority List Sites (number of facilities)	Risk Management Plan Sites (number of facilities)	Hazardous Waste Facilities or TSDFs (number of facilities)
1	0039	KENT	0.010	1.016	3.000	4.227
2	0002	KALAMAZOO	0.021	2.393	2.318	2.694
3	0003	KALAMAZOO	0.008	1.158	1.552	2.847
4	0038	KENT	0.004	0.889	2.133	3.848
5	0040	KENT	0.009	1.086	2.523	3.331
6	0036	KENT	0.002	0.587	1.586	4.235
7	0026	KENT	0.006	1.130	3.698	4.454
8	5061	WAYNE	0.000	0.085	5.000	2.859
9	5055	WAYNE	0.000	0.075	2.388	4.569
10	5162	WAYNE	0.000	0.056	0.854	4.923
11	0028	KENT	0.002	0.614	1.794	4.850
12	5051	WAYNE	0.000	0.083	3.360	2.800
13	5189	WAYNE	0.000	0.047	0.545	5.304
14	5050	WAYNE	0.000	0.084	2.887	2.975
15	0001	KALAMAZOO	0.014	2.466	1.779	2.396
16	5032	WAYNE	0.000	0.096	2.241	3.415
17	5238	WAYNE	0.343	0.042	2.925	5.451
18	0037	KENT	0.003	0.585	1.437	4.062
19	2638	MACOMB	0.000	0.057	3.623	4.099
20	5159	WAYNE	0.000	0.051	1.201	3.917
21	5047	WAYNE	0.000	0.071	1.675	3.358
22	5110	WAYNE	0.000	0.062	1.864	3.525
23	0009	KALAMAZOO	0.000	1.676	1.766	3.578
24	5054	WAYNE	0.000	0.077	1.459	1.918
25	5250	WAYNE	2.576	0.034	3.089	9.643
26	5142	WAYNE	0.000	0.062	1.183	3.460
27	5243	WAYNE	0.490	0.044	3.760	6.519
28	2639	MACOMB	0.000	0.098	3.132	4.333
			Waste water Discharge	Superfund National Priority List Sites	Risk Management Plan Sites	Hazardous Waste Facilities (TSDFs)
		Top 1% Average for Indicators	0.125	0.526	2.313	4.057
		Top 5% Average for Indicators	0.040	0.247	1.926	3.204
		Top 10% Average for Indicators	0.023	0.200	1.508	2.649
		Top 25% Average for Indicators	0.178	0.181	1.049	1.984
		State Average for Indicators	0.178	0.128	0.545	0.872

Table 2b: Michigan census tracts with environmental justice scores that fall in the top percentile (1%).

Rank	Tract	County	Ozone (parts per billion)	PM 2.5 (µg per meters cubed)	Lead Paint Indicator (% of housing built before 1960)	Percent Minority (100% less % non-Hispanic White)	Educational Attainment (% of adults with less than a high school diploma)
1	0039	KENT	43.528	11.026	78.7%	91.9%	60.5%
2	0002	KALAMAZOO	44.772	11.338	78.1%	96.5%	-
3	0003	KALAMAZOO	44.777	11.360	69.0%	90.6%	27.0%
4	0038	KENT	43.523	11.028	77.5%	91.5%	55.6%
5	0040	KENT	43.584	11.073	76.9%	87.8%	48.2%
6	0036	KENT	43.449	11.030	64.6%	88.8%	40.1%
7	0026	KENT	43.468	11.003	69.0%	89.1%	46.3%
8	5061	WAYNE	44.182	11.003	93.1%	93.5%	31.8%
9	5055	WAYNE	44.019	11.027	90.2%	94.3%	23.2%
10	5162	WAYNE	43.696	11.072	90.1%	98.0%	-
11	0028	KENT	43.395	11.015	49.9%	84.8%	31.1%
12	5051	WAYNE	44.248	10.996	70.6%	93.9%	-
13	5189	WAYNE	43.494	11.085	-	98.1%	34.4%
14	5050	WAYNE	44.286	10.995	100.0%	100.0%	-
15	0001	KALAMAZOO	44.779	11.354	77.2%	80.4%	22.1%
16	5032	WAYNE	44.299	10.993	87.9%	92.0%	-
17	5238	WAYNE	42.800	11.152	90.2%	80.8%	35.1%
18	0037	KENT	43.470	11.031	86.2%	85.1%	27.5%
19	2638	MACOMB	44.185	11.004	79.7%	54.9%	24.2%
20	5159	WAYNE	43.862	11.057	88.3%	98.7%	17.9%
21	5047	WAYNE	43.949	11.038	92.5%	98.2%	23.7%
22	5110	WAYNE	43.953	11.046	73.5%	98.2%	39.2%
23	0009	KALAMAZOO	44.768	11.355	95.4%	44.8%	21.6%
24	5054	WAYNE	44.223	11.009	86.7%	96.3%	17.4%
25	5250	WAYNE	42.803	11.164	96.2%	60.3%	50.8%
26	5142	WAYNE	43.874	11.055	78.0%	99.9%	25.9%
27	5243	WAYNE	42.658	11.145	87.0%	78.9%	51.9%
28	2639	MACOMB	44.222	10.993	74.1%	40.6%	26.1%
			Ozone	PM 2.5	Lead Paint Indicator	Percent Minority	Educational Attainment
		Top 1% Average for Indicators	43.867	11.087	81.5%	86.0%	34.0%
		Top 5% Average for Indicators	43.806	11.028	78.3%	82.5%	29.2%
		Top 10% Average for Indicators	43.725	10.991	78.1%	80.5%	27.8%
		Top 25% Average for Indicators	43.511	10.866	70.5%	67.1%	21.9%
		State Average for Indicators	42.764	10.198	42.5%	29.2%	10.9%

Table 2c: Michigan census tracts with environmental justice scores that fall in the top percentile (1%). The “-” symbol denotes missing data for an indicator in a specific census tract.

Rank	Tract	County	Housing Burdened Low-Income Households (% of low-income households spending more than 50% of income on housing)	Linguistic Isolation (% limited English speaking households)	Poverty (% of households making less than 200% of Federal Poverty Level)	Unemployment (% of working population that is unemployed)
1	0039	KENT	28.2%	46.5%	71.3%	15.9%
2	0002	KALAMA ZOO	27.9%	-	64.3%	28.9%
3	0003	KALAMA ZOO	23.9%	-	59.8%	24.8%
4	0038	KENT	21.4%	45.9%	75.3%	14.5%
5	0040	KENT	21.3%	40.4%	69.4%	14.4%
6	0036	KENT	28.7%	20.6%	67.7%	18.8%
7	0026	KENT	20.3%	34.1%	75.1%	13.5%
8	5061	WAYNE	36.6%	-	65.0%	23.5%
9	5055	WAYNE	38.8%	-	72.8%	29.5%
10	5162	WAYNE	33.8%	-	74.9%	34.9%
11	0028	KENT	23.4%	22.1%	81.5%	15.0%
12	5051	WAYNE	36.7%	-	73.2%	33.2%
13	5189	WAYNE	33.8%	-	76.3%	37.2%
14	5050	WAYNE	27.9%	-	69.4%	36.9%
15	0001	KALAMA ZOO	20.1%	-	67.7%	14.9%
16	5032	WAYNE	27.8%	-	75.6%	19.5%
17	5238	WAYNE	29.7%	29.4%	72.0%	14.9%
18	0037	KENT	27.8%	-	58.5%	11.0%
19	2638	MACOMB	40.1%	-	69.2%	28.0%
20	5159	WAYNE	34.7%	-	71.9%	27.8%
21	5047	WAYNE	25.8%	-	65.7%	26.9%
22	5110	WAYNE	26.4%	-	70.6%	41.9%
23	0009	KALAMA ZOO	18.4%	-	73.8%	11.6%
24	5054	WAYNE	27.6%	-	81.3%	35.2%
25	5250	WAYNE	40.5%	-	83.6%	20.9%
26	5142	WAYNE	27.4%	-	52.6%	28.1%
27	5243	WAYNE	22.9%	26.3%	59.8%	25.7%
28	2639	MACOMB	34.0%	-	57.5%	21.3%

	Housing Burdened Low-Income Households	Linguistic Isolation	Poverty	Unemployment
Top 1% Average for Indicators	28.8%	33.2%	69.9%	23.9%
Top 5% Average for Indicators	28.0%	29.5%	66.7%	21.9%
Top 10% Average for Indicators	27.2%	26.1%	64.9%	20.9%
Top 25% Average for Indicators	24.4%	15.6%	56.0%	16.7%
State Average for Indicators	14.3%	3.5%	30.8%	8.8%

Table 2d: Michigan census tracts with environmental justice scores that fall in the top percentile (1%).⁴
The “-” symbol denotes missing data for an indicator in a specific census tract.

⁴ Source of definitions for the environmental indicators can be found at:

<https://www.epa.gov/ejscreen/overview-environmental-indicators-ejscreen>

Source of definitions for the demographic indicators (except Percent Minority) can be found at:

<https://www.epa.gov/ejscreen/overview-demographic-indicators-ejscreen>

Source of definition for Percent Minority can be found at:

<https://www.epa.gov/ejscreen/glossary-ejscreen-terms>