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RESEARCH BRIEF

Clean Wisconsin Environmental Health Initiative

Informing Effective Place-Based Interventions: Assessing Drivers of Environmental Burden in Wisconsin

By Kayla Rinderknecht, MPH & Paul Mathewson, Ph.D.

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SUMMARY – Different Wisconsin communities face different environmental quality challenges and exposures that drive inequitable pollution exposures. In order to effectively address environmental drivers of health disparities, it is important to understand community-specific challenges and opportunities. To assess the different exposures that communities face, this brief explores the individual drivers of environmental burden disparities in various Wisconsin urban areas.

This analysis extends our previous brief looking at overall environmental pollution exposure burden, which provided a starting point for understanding environmental determinants of health in Wisconsin. Here we investigate exposures to specific pollution exposures within environmental health indices to better understand what is driving overall environmental burden and related health disparities for communities in Wisconsin. It also explores the importance of community-based interventions and their role in addressing different drivers of environmental burden and related health disparities.

Key takeaways from this analysis include:

- Consistent with our prior statewide analysis, non-white and lower income populations experience a higher overall environmental exposure burden within most urban areas analyzed.
- Milwaukee, Green Bay, and Appleton/Oshkosh urban areas had the largest overall environmental burden racial/ethnic disparities.
- The most important drivers, for both racial/ethnic and socioeconomic disparities, varied between urban areas but there were some consistently important drivers.
- Lead paint exposure, traffic-related air pollution, proximity to hazardous air pollution sources, and impermeable surface cover were all among the most important drivers of racial/ethnic and socioeconomic disparities statewide and in 6 of the 7 urban areas analyzed.
- Targeted, place-based interventions are tailored to specific community needs. Statewide initiatives, although necessary, may not accurately target the different disparities that urban areas are experiencing.

Definitions

- **Environmental Burden**: Overall impact to human health that occurs from the combination of pollution, poor environmental conditions, pre-existing health conditions, and social factors.[1]
- **Environmental Health Disparities**: Differences in health outcomes that are closely linked to environmental factors and social inequities.[2]
- **Environmental Metrics**: Various environmental exposures that drive potential environmental health disparities.
- **Placed-Based Interventions**: Aim to improve quality of life and access to opportunity for an entire community, and address issues existing at the neighborhood level.[3]

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Background

The connections between places, communities, and health have been well-documented through research over time.[4] Different communities possess different strengths and weaknesses, which leads to existing health disparities between communities.[4] For example, neighboring zip code areas of 53217 (Whitefish Bay) and 53206 in the Milwaukee area experience a 12-year life expectancy difference, at 83.2 years compared to 71.3 years.[5]

As different communities experience different health outcomes, they also face different environmental exposures and threats. In Wisconsin, neighborhoods with lower income and higher percentage of minority residents experience significantly poorer environmental quality and are exposed to more environmental pollution.[6] To develop a comprehensive understanding of how pollution and climate change are impacting public health in Wisconsin, further investigation was needed to look at individual drivers of environmental burden and related disparities in various Wisconsin communities.

This brief aims to show the importance of the differences in environmental health exposures that Wisconsin communities face, and how they impact health equity. It also highlights the need for targeted, place-based interventions, as communities face different environmental drivers that impact the health of Wisconsinites.

Our statewide analysis of cumulative environmental health indices found increasing environmental burden with increasing percent of non-white residents, as well as an increased burden in the top 20% of socioeconomically vulnerable census tracts in Wisconsin. The vast majority of the highest burdened census tracts (71%) were in the southeast region urban areas, despite these tracts only accounting for 43% of all census tracts in the state. The remainder were scattered throughout the state, including Appleton, Beloit, Green Bay, Janesville, and Madison urban areas.

Here, we take this analysis a step further by breaking down the cumulative environmental burden and looking at the individual metrics from the cumulative burden indices to assess the key drivers behind the environmental burden that Wisconsinites are experiencing. This includes quantifying racial/ethnic and socioeconomic disparities so we can understand how different communities are disproportionately impacted.

This step is crucial to addressing the overall burden gap we identified in the previous brief, as we need to know the biggest contributors to inform effective interventions. Effective interventions may change from area to area as we look at drivers both statewide and within individual urban areas.

Community-Based Interventions

Various health entities agree that community involvement in public health policy, practice, and research is crucial to reducing health disparities and improving health equity.[7] This analysis illustrates how each community has different needs and experiences varying environmental health disparities. Placed-based interventions and community-based participatory research are a few frameworks that can enable efforts in community planning to improve health.

Place-based interventions, or community-based interventions, are important complements to generic regulations, especially for public and environmental health services.[8] Place-based interventions allow for localized knowledge, provide culturally relevant solutions, encourage community engagement, and build trust and communication.

Targeted, place-based interventions include engaging with stakeholders and partners across all sectors and building on community's strengths that feature local skills and resources.[9] Other research has shown that

interventions that use community engagement can be used for successful local decision-making and create better outcomes for historically marginalized neighborhoods.[10]

Other forms of community engagement in local interventions includes community-based participatory research (CBPR). CBPR includes collaborators who bring their respective strengths to the partnership and aims to overcome specific challenges that will improve health outcomes and reduce health disparities.[11] CBPR obtains three main components that create success: community partner engagement at all stages of research, exchanging knowledge between stakeholders, and achieving a balance between research and action.[7]

As we dive into the key drivers of environmental burden throughout the state, the importance of place-based interventions and CBPR should remain at the forefront of policy discussions and potential solutions. Understanding specific environmental drivers in an area can identify the biggest needs in a community and inform targeted interventions. This analysis aims to identify individual drivers of environmental burden disparities in various Wisconsin urban areas and inform future community-based interventions.

Analysis

We analyzed disparities in environmental heath metrics included in the Environmental Justice Index (EJI) developed by the CDC, and the Climate Vulnerability Index (CVI) developed by Texas A&M. [12,13] After excluding metrics not relevant to Wisconsin (e.g., proximity to active oil and gas wells) the EJI includes 11 metrics and the CVI includes 40 metrics.

In addition to a statewide analysis, we also analyzed disparities in several urban areas (as defined by the US Census Bureau) experiencing the most environmental burden identified in the previous brief. These urban areas include Appleton-Oshkosh, Green Bay, Madison, Milwaukee, Janesville-Beloit, Kenosha, and Racine. As seen in **figure 1**, all 7 areas, except Madison, experience higher overall environmental burden compared to the state's average (50th percentile) when using both the EJI and CVI.

Within each geographic analysis, each census tract was assigned a percentile for all environmental exposure metrics to compare relative exposure. We then compared the average percentile for each metric in the 30% of most white census tracts to the average percentile in the 30% of least white census tracts for the racial/ethnic disparities.[i]

Similarly, we compared the average percentile for each metric in the top 30% highest socioeconomic status census tracts to the lowest 30% socioeconomic status census tracts for socioeconomic status disparities. Socioeconomic status is defined by the CDC's Environmental Justice Index, where socioeconomic status includes measures of poverty, no high school diploma, unemployment, housing tenure, housing burdened lower-income households, lack of health insurance, and lack of broadband access.

[i] Used 30% to ensure at least 10 census tracts for each urban area in the most/least white census tract groups.

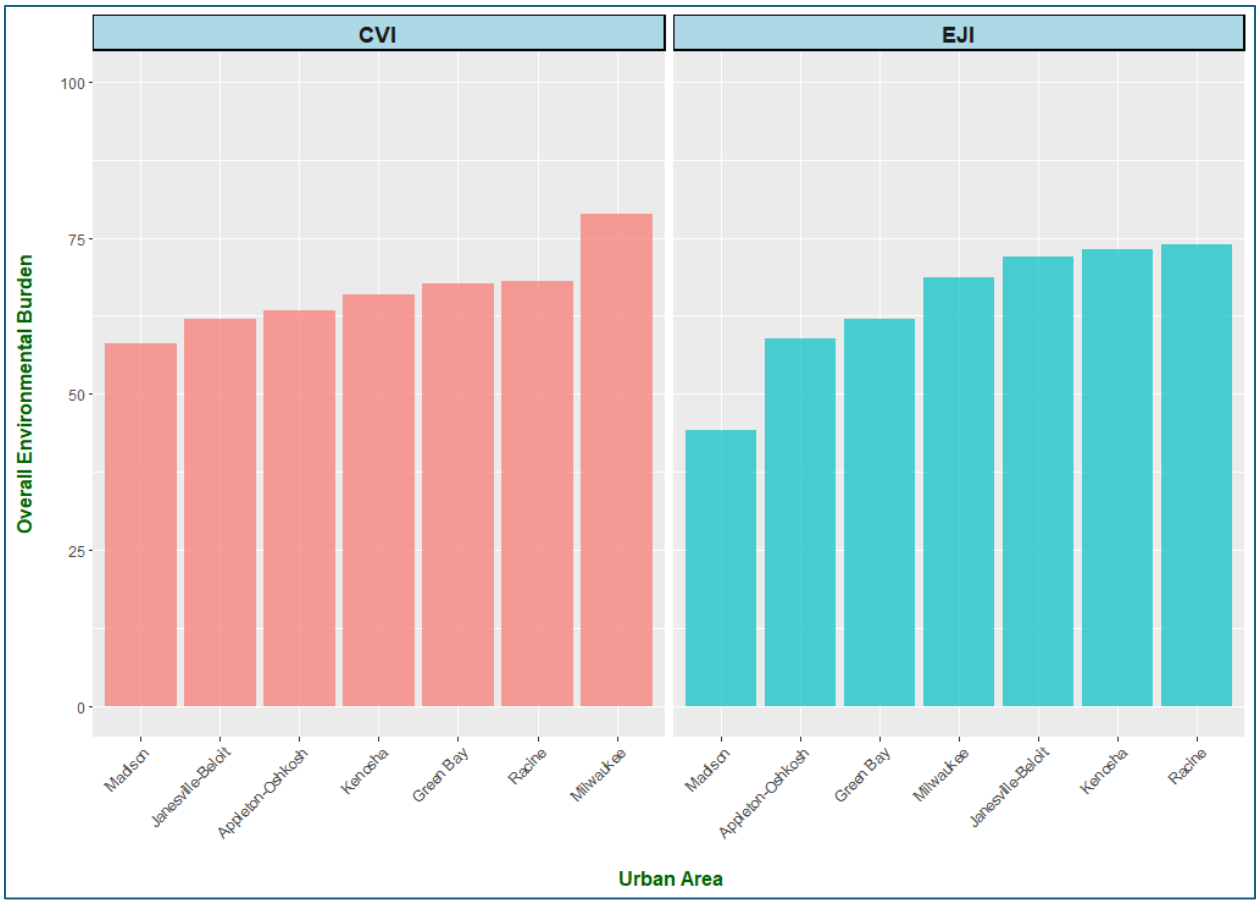
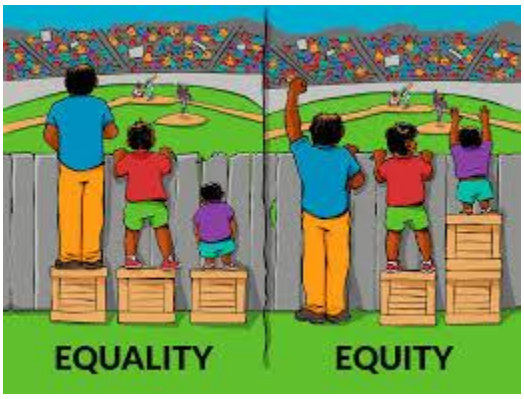


Figure 1. Average overall environmental burden index percentile for statewide census tracts in each urban area, where the 50th percentile indicates the state average.

This analysis highlights the main burdens faced by non-white and lower socioeconomic status populations compared to their white and higher socioeconomic status counterparts. In some urban areas, the disparities are reversed, with non-white and lower socioeconomic status populations experiencing fewer burdens than their comparison groups. However, overall, the least white census tracts and lower socioeconomic status populations generally face higher disparities and increased environmental burden than their counterparts across various urban areas.



Drivers of Racial/Ethnic Disparities

Our companion brief, *Using Cumulative Impacts to Assess Environmental Burden in Wisconsin,* at a statewide level, the least white census tracts had a significantly higher overall environmental pollution burden than the most white census tracts. This trend holds mostly true when looking within individual urban areas (Figure 2). However, some urban areas like Janesville-Beloit (and Madison, when using the EJI index), there is reverse relationship where the most white census tracts have a higher overall environmental burden. Although the disparity size depends on the index used (CVI vs. EJI), the largest racial/ethnic disparities are found in Milwaukee, Green Bay, and Appleton/Oshkosh (Figure 2).

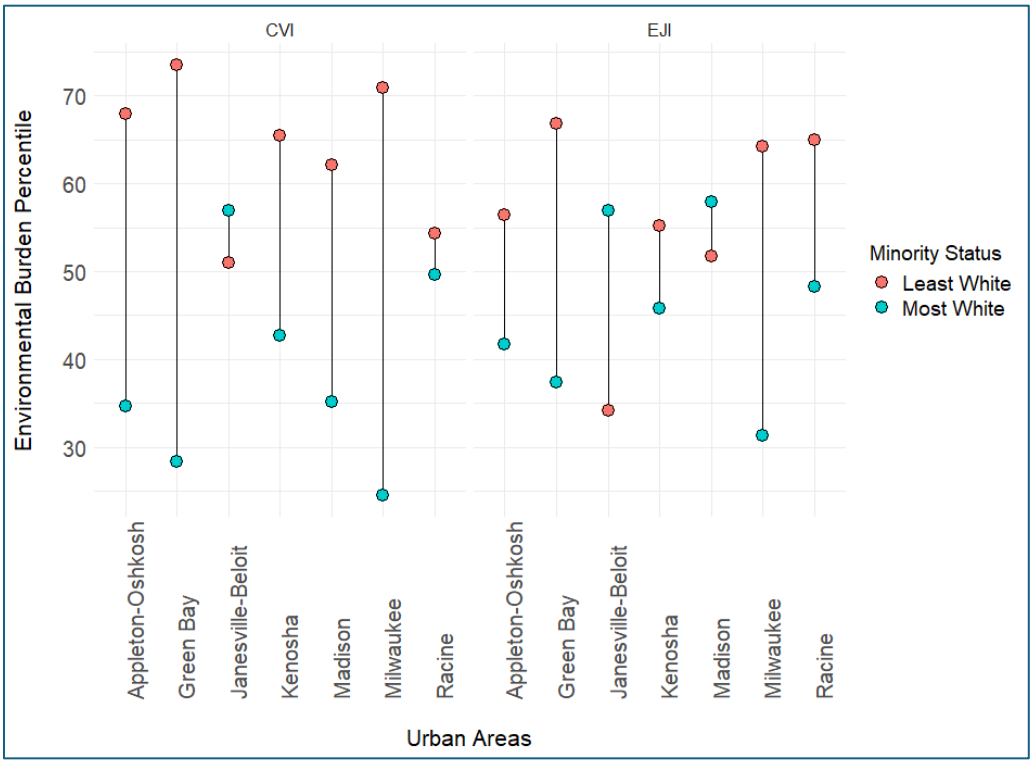


Figure 2. Overall environmental burden percentile index (EJI & CVI) percentile for each urban area by minority status. Most white indicates census tracts in the <30th percentile ranking of non-white residents. Least white indicates census tracts in the >70th percentile ranking of non-white residents.

Environmental metrics with the top 10 racial/ethnic disparities by urban area are summarized in **Table 1**.

The top environmental exposure gaps vary between urban areas, with no single metric in the top 3 for all cities. However, some metrics show up as important drivers of environmental burden disparities in most areas. Potential lead paint exposure has the largest racial/ethnic disparity in 4 of the 7 urban areas (Milwaukee, Madison, Green Bay, and Kenosha) and is in the top 10 for all 7 areas. Similarly, traffic pollution exposure and impermeable surface cover were both in the top 10 of disparity drivers for all 7 areas. Exposure to hazardous air pollution sources and proximity to brownfield sites were both important drivers with a difference of 40-percentile-points or greater in 4 of the 7 areas (Milwaukee, Green Bay, Racine, Janesville-Beloit).

Table 1. Top 10 environmental metrics with the largest racial/ethnic disparity gaps statewide and in selected urban areas. The summary table is based on the individual metric plots in *Appendix B*. Metrics bolded and italicized indicate that the disparity has a 40-percentile-point difference or greater between the "most white" and "least white" census tracts, highlighting the most substantial disparities. Definitions for each abbreviated metric can be found in *Appendix A*.

	Statewide (WI)	Milwaukee	Madison	Racine	Kenosha	Appleton-Oshkosh	Janesville-Beloit	Green Bay
Top 10 Individual Metric Racial/Ethnic Disparities	***Imperm. Surf.***	***Lead Paint***	***Lead Paint***	***Metal Recyclers***	***Lead Paint***	Forest Land Cover	***Facilities w/ Violations***	***Lead Paint***
	Traffic Proximity & Volume	***Brownfield Sites***	Imperm. Surf.	***Lead Paint***	***Traffic Proximity & Volume***	Diesel PM	***Metal Recyclers***	***RMP Facilities***
	Brownfield Sites	***Metal Recyclers***	Air Toxics Resp.	***Brownfield Sites***	Brownfield Sites	Traffic Proximity & Volume	***Air Toxics Thyroid***	***Traffic Proximity & Volume***
	Diesel PM	***Impaired Surf. Water***	Traffic Proximity & Volume	***Days Over Ozone Limit***	Imperm. Surf.	NPL Facilities	***Lead Paint***	***Brownfield Sites***
	Air Toxics Develop.	***TSDF sites***	Air Toxics Immunological	***TRI Sites***	TRI Sites	TSCA Facilities	***Days Over PM2.5 limit***	***Imperm. Surf.***
	Air Toxics Reprod.	***Imperm. Surf.***	Air Toxics Develop.	***Imperm. Surf.***	Air Toxics Develop.	TSDF sites	***Annual PM2.5***	***Air Toxics Reprod.***
	Air Toxics Kidney	***Air Toxics Develop.***	Diesel PM	***Traffic Proximity & Volume***	Metal Recyclers	Lead Paint	Annual NO2 Concentration	***Air Toxics Develop.***
	Metal Recyclers	***Traffic Proximity & Volume***	Air Toxics Reprod.	Impaired Surf. Water	Forest Land Cover	RMP Facilities	Forest Land Cover	Railway Proximity
	Annual NO2 Concentration	***Facilities w/ Violations***	Truck VMT per Capita	TSDF sites	Impaired Surf. Water	Imperm. Surf.	Imperm. Surf.	High-Volume Road
	TSDF Sites	***Chem Mfg Facilities***	Parks & Green Space	Annual NO2 Concentration	Parks & Green Space	Air Toxics Reprod.	Parks & Green Space	Major Ports
Total Metrics with > 40-point gap	10	10	1	7	2	0	6	7

KEY	Hazardous Air
Potentially Hazardous & Toxic Site	Water Quality
TRAP	Built Environment

Bolded & Italicized = > 40-percentile-point gap

Drivers of Socioeconomic Disparities

The "lower socioeconomic status" neighborhoods are experiencing higher environmental burden and exposure on average for all urban areas analyzed, except for the Janesville Beloit Area when using the EJI index (figure 3). Like racial/ethnic disparities, different areas have different magnitudes of disparity. For example, Milwaukee, Madison, Green Bay, and Appleton/Oshkosh all experience larger socioeconomic disparity gaps in terms of overall environmental exposure burden.

The top environmental exposure gaps for socioeconomic disparities vary between urban areas, with no single metric in the top 3 for all cities (Table 2). However, there are some consistently important drivers of disparities. Potential lead paint exposure, brownfield site proximity, impermeable surface cover, traffic air pollution, and exposure to hazardous air pollution sources were all in the top 10 of largest gaps statewide and for 6 of the 7 urban areas.

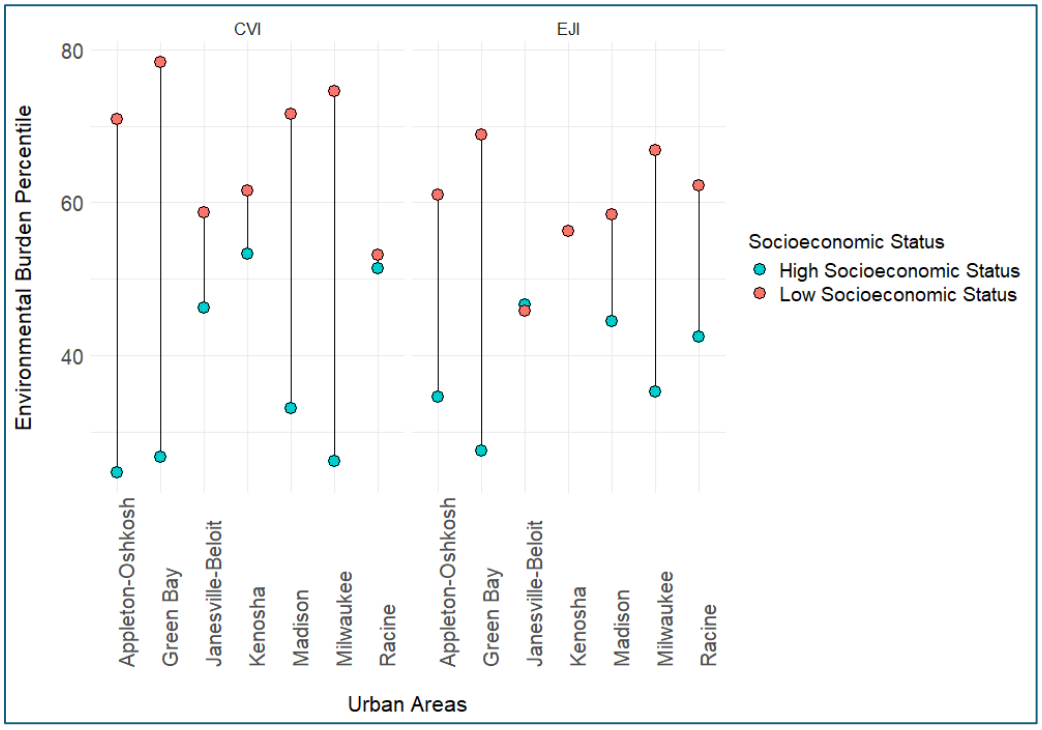


Figure 3. Overall environmental burden percentile index (EJI & CVI) percentile for each urban area by socioeconomic status. High socioeconomic indicates census tracts in the <30th percentile ranking of lower SES residents. Low socioeconomic status indicates census tracts in the >70th percentile ranking of lower SES residents.

This analysis indicates that lead paint in housing, traffic-related air pollution, brownfield site proximity, hazardous air pollution sources, and impermeable surfaces are consistently important drivers of inequitable environmental burden throughout the state. The health concerns for each of these are summarized in **Table 3**.

Table 2. Top 10 environmental metrics with the largest socioeconomic disparity gaps for all urban areas. The summary table is based on the individual metric plots in *Appendix C*. Metrics bolded and italicized indicate that the disparity has a 40-percentile-point difference or greater between the "higher socioeconomic status" and "lower socioeconomic status" census tracts, highlighting the most substantial disparities. Definitions for each abbreviated metric can be found in *Appendix A*.

	Statewide (WI)	Milwaukee	Madison	Green Bay	Racine	Kenosha	Appleton-Oshkosh	Janesville-Beloit
Top 10 Individual Metric Socioeconomic Disparities	***Lead Paint***	***Lead Paint***	***Traffic Proximity & Volume***	***Lead Paint***	***Brownfield Sites***	***Brownfield Sites Proximity***	***Impermeable Surfaces***	***Metal Recyclers Proximity***
	Brownfield Sites	***Metal Recyclers***	***Lead Paint***	***Imperm. Surf.***	***Imperm. Surf.***	***Lead Paint***	***Diesel PM Exposure***	***Impaired Surface Water***
	Metal Recyclers	***Imperm. Surf.***	***Imperm. Surf.***	***Superfund Sites***	***Lead Paint***	***Imperm. Surf.***	***Traffic Proximity & Volume***	***High-Volume Road***
	Traffic Proximity & Volume	***Brownfield Sites***	Facilities w/ Violations	***RMP Facilities***	***TRI Sites***	***Annual NO2 Concentration***	***Forest Land Cover***	***Imperm. Surf.***
	Imperm. Surf.	***TSDF Sites***	Brownfield Sites	***Railway Proximity***	***Days Over Ozone Limit***	***Railway Proximity***	***Brownfield Sites***	***RSEI Stream Toxicity***
	TRI Sites	***Traffic Proximity & Volume***	High-Volume Road	***Major Ports***	***Forest Land Cover***	Traffic Proximity & Volume	RMP Facilities	***TRI Sites***
	Facilities w/ Violations	***Impaired Surf. Water***	Air Toxics Develop.	***Traffic Proximity & Volume***	***Traffic Proximity & Volume***	TRI Sites	TRI Sites	***Lead Paint***
	Railway Proximity	***Facilities w/ Violations***	Railway Proximity	***Air Toxics Reprod.***	***Impaired Surf. Water***	Forest Land Cover	Railway Proximity	***Forest Land Cover***
	RMP Facilities	***Annual NO2 Concentration***	Annual NO2 Concentration	***NPL Facilities***	***Railway Proximity***	Impaired Surf. Water	TSDF Sites	***Brownfield Sites***
	TSDF Sites	***Chemical Mfg Facilities***	Air Toxics Reprod.	***TRI Sites***	***TSDF Sites***	Diesel PM	Annual NO2 Concentration	Railway Proximity
Total Metrics with > 40-point gap	1	10	3	10	10	5	5	9

KEY	Hazardous Air
Potentially Hazardous & Toxic Site	Water Quality
TRAP	Built Environment

Bolded & Italicized = > 40-percentile-point gap

Table 3. Public health concerns related to the top drivers of inequitable environmental burden throughout Wisconsin urban areas. Top drivers include lead paint in housing, traffic-related air pollution, brownfield site proximity, hazardous air pollution sources, and impermeable surfaces.

Lead Paint in Housing	Traffic-Related Air Pollution	Brownfield Site Proximity	Hazardous Air Pollution Sources	Impermeable Surfaces/ Canopy cover (heat island)
Lead exposure is known to cause serious harm to a child's health. Childhood lead poisoning can cause damage to the brain and nervous system, slowed growth and development, learning and behavior problems, and hearing and speech problems.[14]	Long-term exposure to TRAP has a strong association with heart disease, lung cancer mortality, development of asthma in adults and children, and acute respiratory infections in children.[15]	Individuals living near brownfield sites are associated with poorer self-reported health, increased mortality rates, and increased birth defects. Brownfield sites also contain soil and groundwater contamination that can pose as a health threat to nearby residents through water and air quality.[16,17]	Exposure to hazardous air pollution is associated with increased chances of cancer, damage to the immune system, neurological and developmental problems, reduced fertility, and increased chance of respiratory diseases.[18,19]	Increased impermeable surfaces and lower canopy cover can lead to locally higher temperatures in what is known as the urban heat island effect. These higher temperatures can result in breathing difficulties, heat cramps, heat stroke, worsening air quality, increased energy burden from air conditioner usage, and heat-related deaths.[20]

Policy Recommendations

The different drivers behind the environmental burden that Wisconsin communities face can inform targeted, place-based interventions.[21] Highly localized information on environmental health disparities and the exposures community members are facing can be more easily brought to the attention of the public and to policymakers. This can increase the potential awareness of environmental threats and encourage community action.[22] Policy recommendations include:

- Uphold and sustain the implementation of the Inflation Reduction Act, the Justice40 initiative, and other federal policies that address environmental injustice.[23]
- Increase funding for targeted, place-based interventions aimed at addressing environmental burden and its disproportionate impact on health outcomes in the state of Wisconsin and its local communities.
- Encourage cross-sector collaboration between non-governmental environmental health organizations, healthcare organizations, and local or state health departments to address environmental health disparities through grants and policy.
- Invest in community organizing groups that can build resident power and create long-term funding that supports resident engagement and voice in the environmental health space.[3]
- Advocate for community-based participatory research opportunities to better measure environmental quality of marginalized communities.
- Support the development and integration into regulatory frameworks of novel air quality monitoring and modeling approaches such as satellite-derived estimates, mobile sensors, and low-cost censors that can help to characterize air pollution and evaluate policy effectiveness at the neighborhood level.[24]
- Local and county health departments should consider utilizing prominent environmental health indicators throughout community health assessments to allow more meaningful, measurable, and consistent data that can inform policymakers and targeted interventions.

Conclusions

Compared to the state, each urban area faces different environmental health threats that most contribute to existing environmental health disparities. The top environmental exposures, for both racial/ethnic and socioeconomic disparities, vary between urban areas. This demonstrates the need for targeted, place-based interventions that are tailored to specific community needs. Statewide initiatives, although necessary, may not accurately target the disparities that urban areas are experiencing.

Disparities in cumulative environmental burden observed at the state level persist even when limiting the analysis to individual urban areas. Milwaukee, Green Bay, and Appleton/Oshkosh urban areas had the largest overall environmental burden disparities, highlighting the need to prioritize these urban areas when developing environmental health policy in WI aimed at reducing inequities. Key drivers of environmental health must be targeted to close these gaps and improve health equity. Environmental exposures that tend to be the most consistent across all urban areas include lead paint exposure, impermeable surface cover, traffic-related pollution exposure, proximity to brownfield sites, and exposures to hazardous air pollution).

While there are similarities between environmental exposures that drive health disparities across the state, no two urban areas are the same. Community engagement and targeted interventions are important frameworks to the success of improving environmental health in Wisconsin. Urban areas experience different drivers of environmental burden that disproportionately impact the well-being of Wisconsinites. Utilizing these frameworks will help us better understand the environmental quality in overburdened communities and connect these exposures to health outcomes going forward.

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Additional Resources

Clean Wisconsin: https://www.cleanwisconsin.org/

Environmental Justice Index: https://www.atsdr.cdc.gov/placeandhealth/eji/eji-data-download.html

Climate Vulnerability Index: https://climatevulnerabilityindex.org/

CDC's Community Based Participatory Research & Engagement Guide: https://www.atsdr.cdc.gov/community-engagement/media/pdfs/2024/07/PCE_Report_Chapter_1_SHEF.pdf

WI Department of Health Services Environmental Public Health Tracking: https://www.dhs.wisconsin.gov/epht/data.htm

Appendix A – Individual Metrics Definitions

Definitions of each individual metric used in analysis. This includes the full metric label used and the description of data.

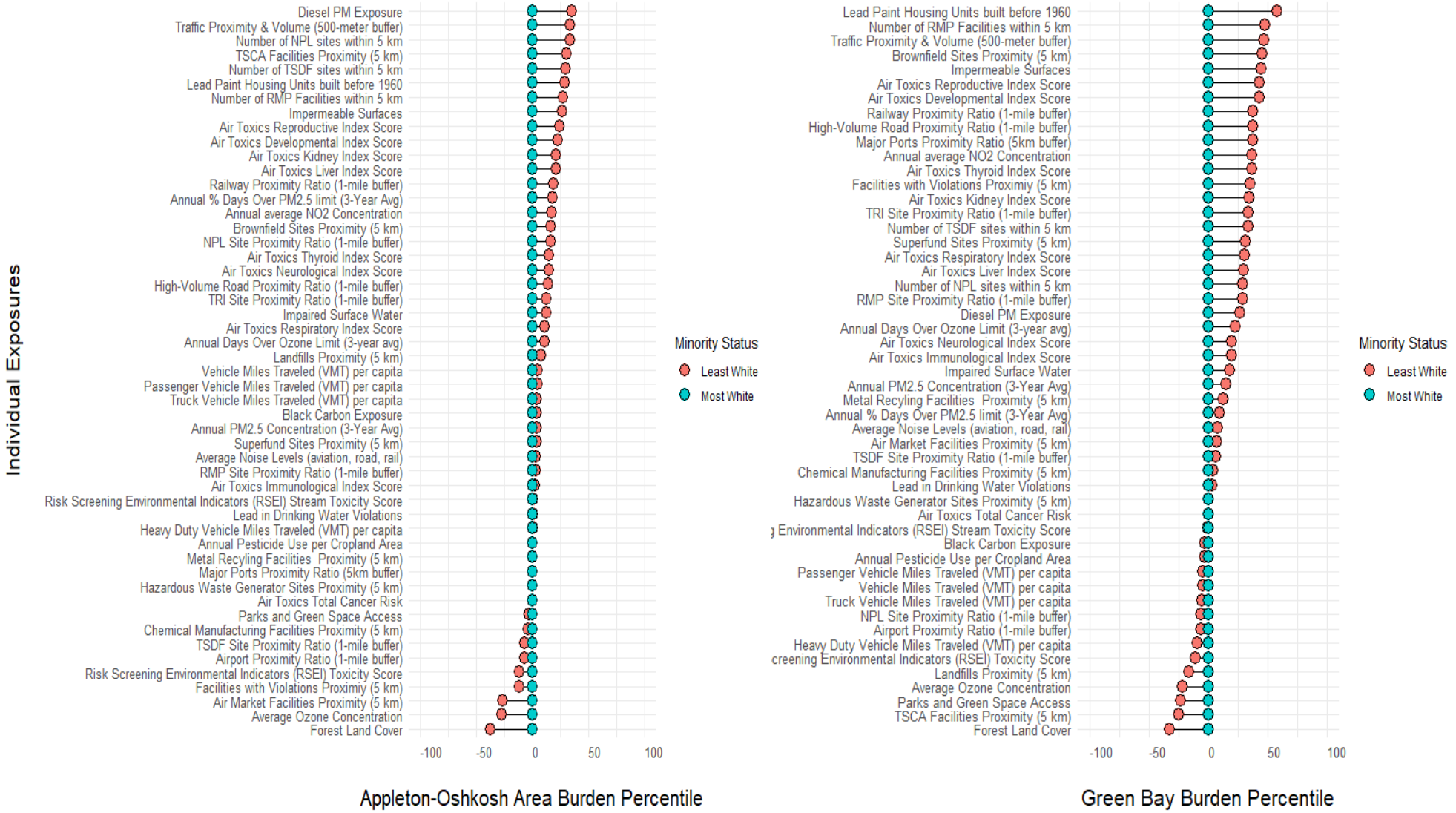
Metric Abbreviation	Full Metric Label	Data Description
Air Market Facility	Air Market Facilities Proximity (5 km)	Proximity to facilities participating in air markets (5km centroid radius)
Air Toxics Develop.	Air Toxics Developmental Index Score	Hazard index for developmental health effects from air toxics and diesel PM
Air Toxics Immun.	Immunological Index Score	Hazard index for immunological health effects from air toxics and diesel PM
Air Toxics Kidney	Air Toxics Kidney Index Score	Hazard index for kidney health effects from air toxics and diesel PM
Air Toxics Liver	Air Toxics Liver Index Score	Hazard index for liver health effects from air toxics and diesel PM
Air Toxics Neuro.	Air Toxics Neurological Index Score	Hazard index for neurological health effects from air toxics and diesel PM
Air Toxics Reprod.	Air Toxics Reproductive Index Score	Hazard index for reproductive health effects from air toxics and diesel PM
Air Toxics Resp.	Air Toxics Respiratory Index Score	Hazard index for respiratory health effects from air toxics and diesel PM
Air Toxics Thyroid	Air Toxics Thyroid Index Score	Hazard index for thyroid health effects from air toxics and diesel PM
Air Toxics TCR	Air Toxics Total Cancer Risk	Hazard index for cancer health effects from air toxics and diesel PM
Airport Proximity	Airport Proximity Ratio (1-mile buffer)	Proportion of tract area within 1-mi buffer of an airport
Days Over PM2.5 Limit	Annual % Days Over PM2.5 Limit (3-year Avg)	Mean annual percent of days with daily 24-hour average PM2.5 concentrations over the National Ambient Air Quality Standard (NAAQS), averaged over three years
Annual NO2 Concentration	Annual Average NO2 Concentration	NO2 annual average concentration
Days Over Ozone Limit	Annual Days Over Ozone Limit (3-year Avg)	Mean annual number of days with maximum 8-hour average ozone concentration over the National Ambient Air Quality Standard (NAAQS), averaged over three years
Pesticide Use	Annual Pesticide Use per Cropland Area	Annual agricultural pesticide use per cropland area, by county (lbs/acre), 2013-17
Annual PM2.5	Annual PM2.5 concentration (3-year Avg)	PM 2.5 annual average concentration - 3 year average
Noise levels	Average Noise Levels (aviation, road, rail)	Modeled estimates of average noise from aviation, road and rail
Ozone Concentration	Average Ozone Concentration	Ozone Concentration
Black Carbon	Black Carbon Exposure	Percent of black carbon as a percentage of PM2.5 as µg/m3, nationally in 0.01° x 0.01° resolution

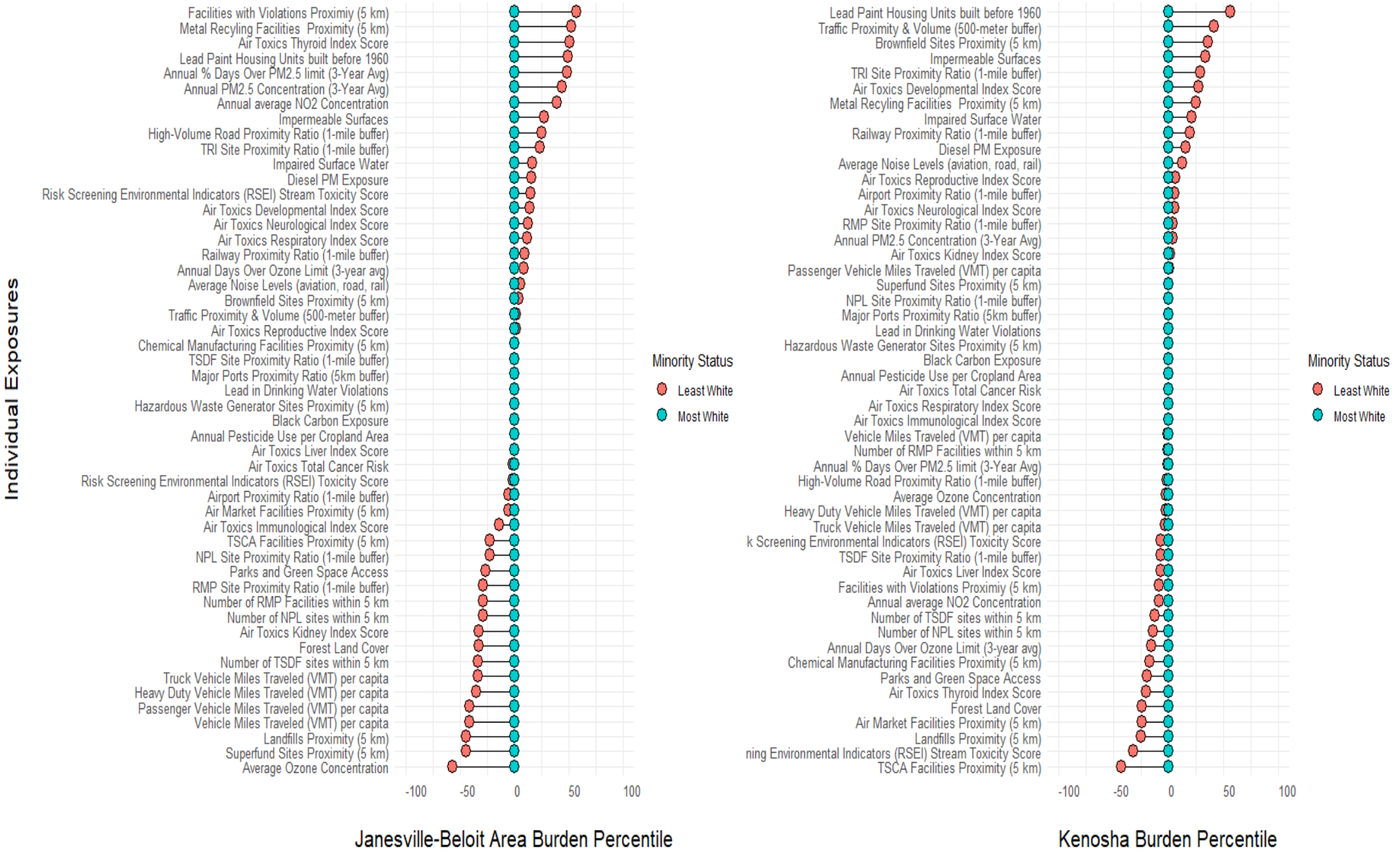
Brownfield Sites	Brownfield Site Proximity (5 km)	Proximity to brownfield sites (5km centroid radius)
Chem Mfg Facilties	Chemical Manufacturing Facilities Proximity (5 km)	Proximity to Chemical Manufacturing Facilities (5km centroid radius)
Diesel PM	Diesel PM Exposure	Diesel particulate matter concentrations in air, µg/m3
Facilties w/ Violations	Facilities with Violations Proximity (5 km)	Proximity to Facilities with Enforcement/Violation (5km centroid radius)
Forest Land Cover	Forest Land Cover	percent of land covered by forest
Haz. Waste Sites	Hazardous Waste Generator Sites Proximity (5 km)	Proximity to a Hazardous Waste Generator/Incinerators site (5km centroid radius)
Heavy Duty VMT per Capita	Heavy Duty Vehicle Miles Traveled (VMT) per Capita	Combination Truck (HDV) VMT per capita
High-Volume Road	High-Volume Road Proximity Ratio (1-mile Buffer)	Proportion of tract area within 1-mi buffer of a high-volume street or road
Impaired Surf. Water	Impaired Surface Water	Percent of tract watershed area classified as impaired
Imperm. Surf.	Impermeable Surfaces	percent of developed imperviousness
Landfills	Landfills Proximity (5 km)	Proximity to Landfills (5km centroid radius)
Lead in Drinking Water	Lead in Drinking Water Violations	Number of drinking water systems with an Action Level Exceedance for lead
Lead Paint	Lead Paint Housing Units Built Before 1960	Percent of housing units built before 1960 per census tract
Major Ports	Major Ports Proximity Ratio (5 km buffer)	Proximity to Major Ports (5km centroid radius)
Metal Recyclers	Metal Recycling Facilities Proximity (5 km)	Proximity to Metal Recycling Facilities (5km centroid radius)
NPL Facilities	NPL Site Proximity Ratio (1-mile Buffer)	Proportion of tract area within 1-mi buffer of EPA National Priority List (NPL) sites
NPL Facilities	Number of NPL Sites within 5 km	Count of proposed and listed NPL sites within 5 km (or nearest one beyond 5 km), each divided by distance in km
RMP Facilities	Number of RMP Facilities within 5 km	Proximity to RMP facilities. Count of RMP (potential chemical accident management plan) facilities within 5 km (or nearest one beyond 5 km), each divided by distance in km, 2020.
TSDF Sites	Number of TSDF Sites within 5 km	Count of hazardous waste management facilities (TSDFs and LQGs) within 5 km (or nearest one beyond 5 km), each divided by distance in km
Parks & Green Space	Parks and Green Space Access	Number and area of parks in each census tract
Pass. VMT per Capita	Passenger Vehicle Miles Traveled (VMT) per Capita	Passenger vehicle (LDV) VMT per capita
Railway Proximity	Railway Proximity Ratio (1-mile Buffer)	Proportion of tract area within 1-mi buffer of a railway
RSEI Stream Toxicity	Risk Screening Environmental Indicators (RSEI) Stream Toxicity Score	Stream Toxicity Risk-Screening Environmental Indicators (RSEI). RSEI modeled Toxic Concentrations at stream segments within 500 meters, divided by distance in kilometers (km)

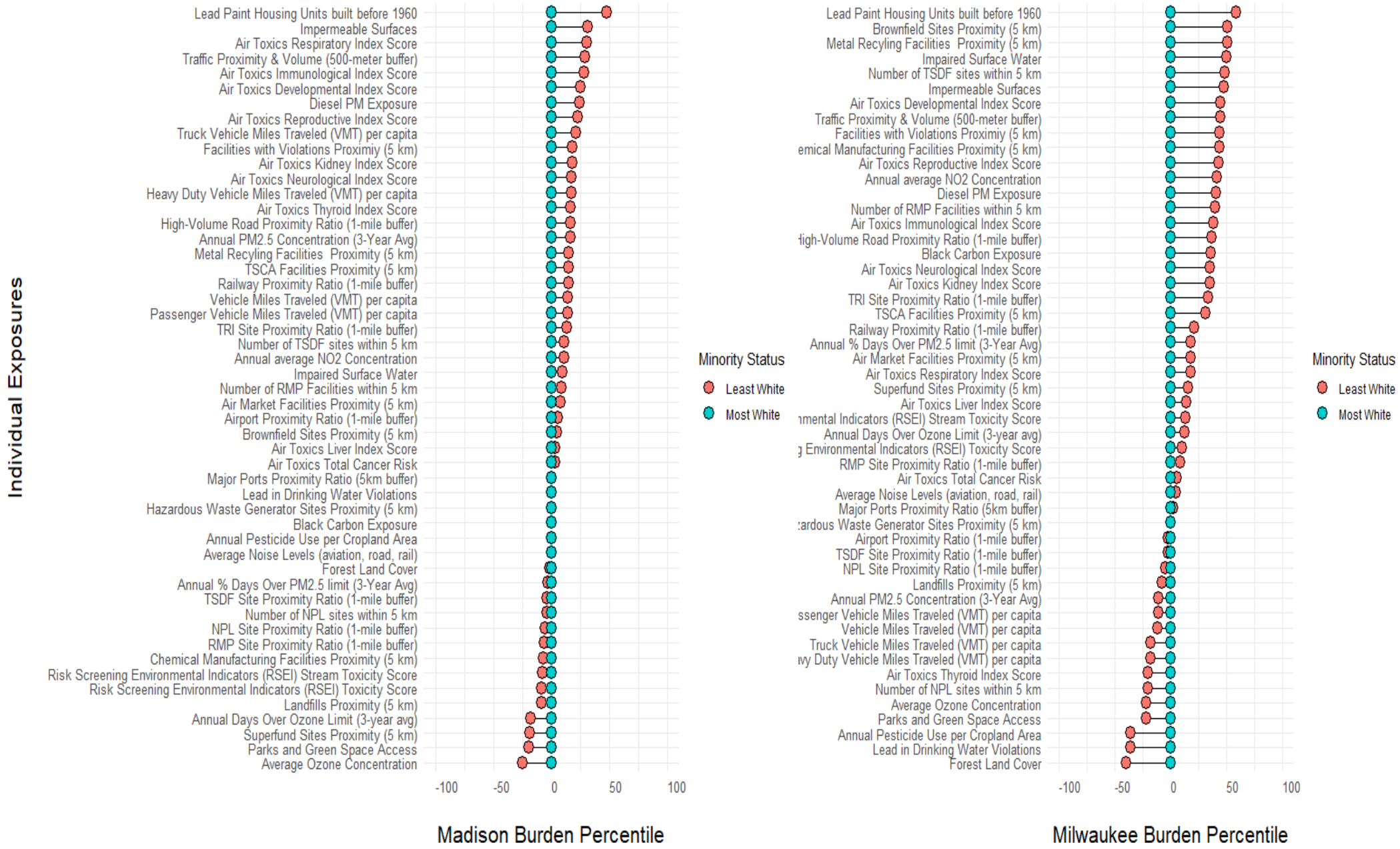
RSEI Toxicity	Risk Screening Environmental Indicators (RSEI) Toxicity Score	Aggregated toxicity-weighted concentration
RMP Sites	RMP Site Proximity Ratio (1-mile Buffer)	Proportion of tract area within 1-mi buffer of EPA Risk Management Plan (RMP) sites
Superfund Sites	Superfund Sites Proximity (5 km)	Proximity to superfund/NPL sites (5km centroid radius)
Traffic Proximity & Volume	Traffic Proximity & Volume (500-meter Buffer)	Count of vehicles (AADT, avg. annual daily traffic) at major roads within 500 meters, divided by distance in meters (not km)
TRI Sites	TRI Site Proximity Ratio (1-mile Buffer)	Proportion of tract area within 1-mi buffer of Toxic Release Inventory (TRI) sites
Truck VMT per Capita	Truck Vehicle Miles Traveled (VMT) per Capita	Single unit truck (MDV) VMT per capita
TSCA Facilities	TSCA Facilities Proximity (5 km)	Proximity to Toxic Substances Control Act (TSCA) Facilities, unweighted (5km centroid radius), 2015-2019.
TSDF Sites	TSDF Site Proximity Ratio (1-mile Buffer)	Proportion of tract area within 1-mi buffer of EPA Treatment, Storage, and Disposal Facilities (TSDF)
Total VMT per Capita	Vehicle Miles Traveled (VMT) per Capita	Total VMT per capita

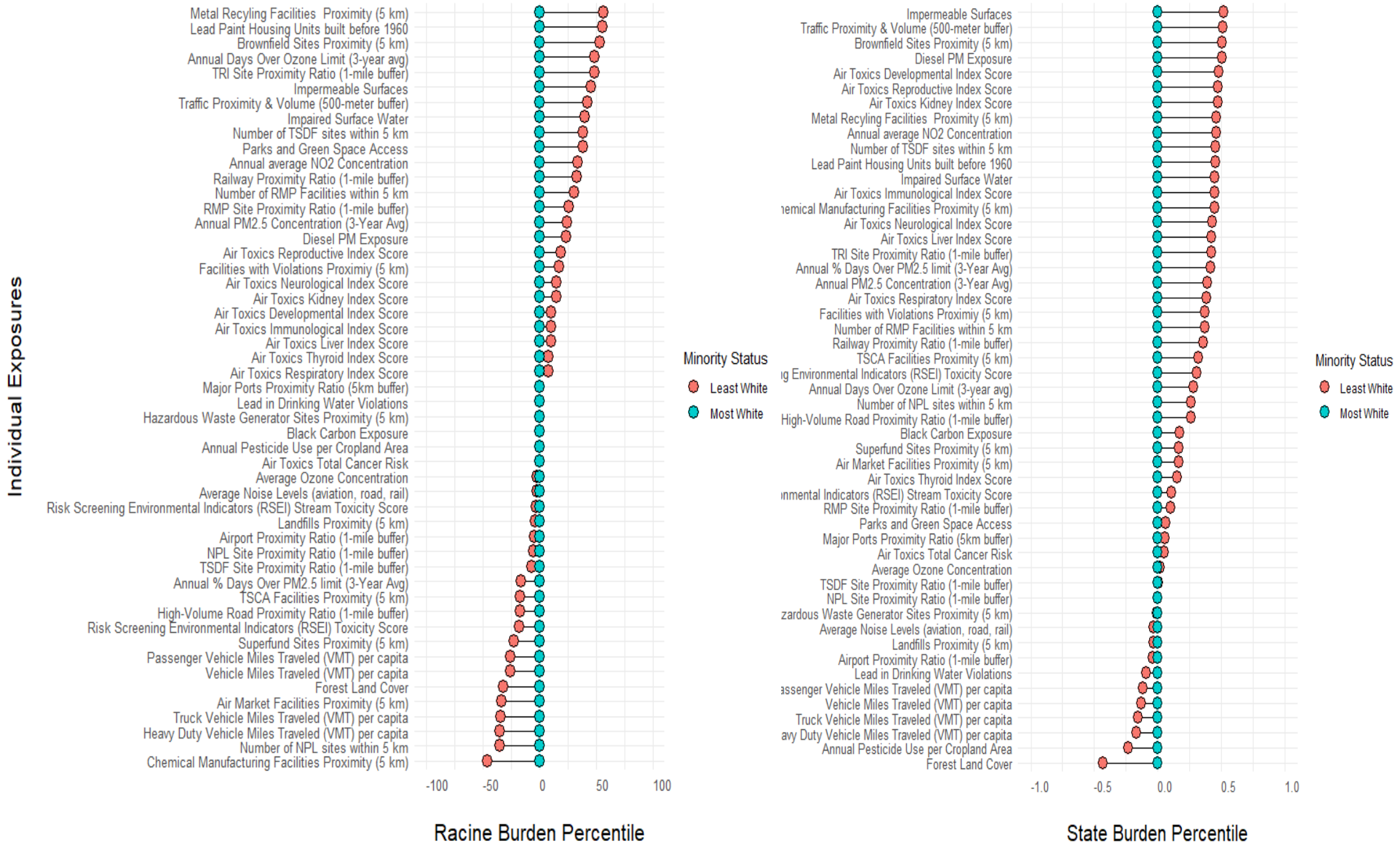
Appendix B – Individual Metric Racial/Ethnic Disparity Graphs

Environmental metrics for each urban area by minority status. Red dots are the “least white” census tracts and blue dots are the “most white” census tracts. The red dots to the right of the blue indicate the “least white” census tracts experiencing higher burden/more exposure compared to the “most white” census tracts. The red dots to the left of the blue indicate the “least white” census tracts experience less burden/exposure.



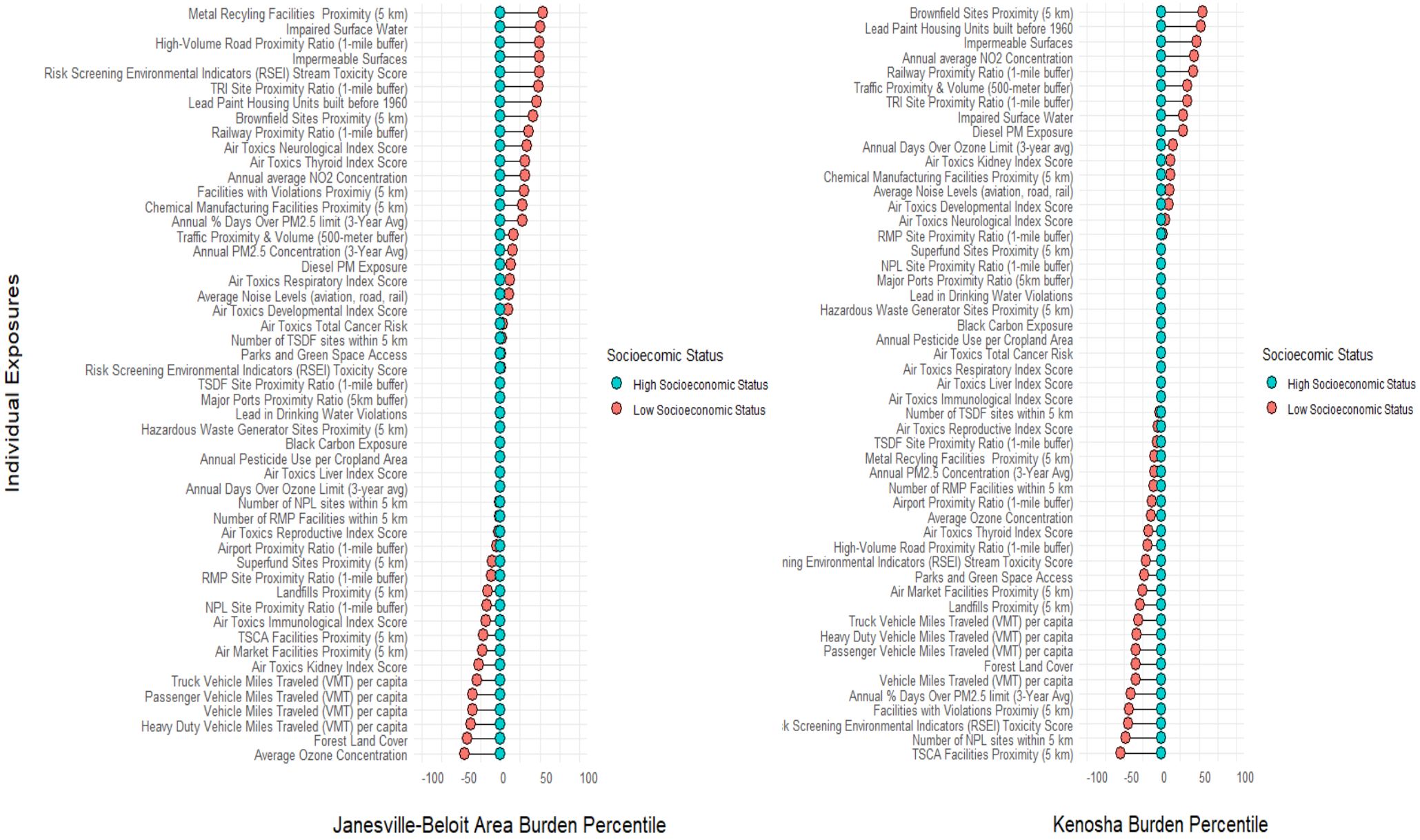

Individual Exposures
Facilities with Violations Proximiy (5 km)
Metal Recyling Facilities Proximity (5 km)
Air Toxics Thyroid Index Score
Lead Paint Housing Units built before 1960
Annual % Days Over PM2.5 limit (3-Year Avg)
Annual PM2.5 Concentration (3-Year Avg)
Annual average NO2 Concentration
Impermeable Surfaces
High-Volume Road Proximity Ratio (1-mile buffer)
TRI Site Proximity Ratio (1-mile buffer)
Impaired Surface Water
Diesel PM Exposure
Risk Screening Environmental Indicators (RSEI) Stream Toxicity Score
Air Toxics Developmental Index Score
Air Toxics Neurological Index Score
Air Toxics Respiratory Index Score
Railway Proximity Ratio (1-mile buffer)
Annual Days Over Ozone Limit (3-year avg)
Average Noise Levels (aviation, road, rail)
Brownfield Sites Proximity (5 km)
Traffic Proximity & Volume (500-meter buffer)
Air Toxics Reproductive Index Score
Chemical Manufacturing Facilities Proximity (5 km)
TSDF Site Proximity Ratio (1-mile buffer)
Major Ports Proximity Ratio (5km buffer)
Lead in Drinking Water Violations
Hazardous Waste Generator Sites Proximity (5 km)
Black Carbon Exposure
Annual Pesticide Use per Cropland Area
Air Toxics Liver Index Score
Air Toxics Total Cancer Risk
Risk Screening Environmental Indicators (RSEI) Toxicity Score
Airport Proximity Ratio (1-mile buffer)
Air Market Facilities Proximity (5 km)
Air Toxics Immunological Index Score
TSCA Facilities Proximity (5 km)
NPL Site Proximity Ratio (1-mile buffer)
Parks and Green Space Access
RMP Site Proximity Ratio (1-mile buffer)
Number of RMP Facilities within 5 km
Number of NPL sites within 5 km
Air Toxics Kidney Index Score
Forest Land Cover
Number of TSDF sites within 5 km
Truck Vehicle Miles Traveled (VMT) per capita
Heavy Duty Vehicle Miles Traveled (VMT) per capita
Passenger Vehicle Miles Traveled (VMT) per capita
Vehicle Miles Traveled (VMT) per capita
Landfills Proximity (5 km)
Superfund Sites Proximity (5 km)
Average Ozone Concentration
-100
-50
0
50
100
Janesville-Beloit Area Burden Percentile
Minority Status
Least White
Most White
Lead Paint Housing Units built before 1960
Traffic Proximity & Volume (500-meter buffer)
Brownfield Sites Proximity (5 km)
Impermeable Surfaces
TRI Site Proximity Ratio (1-mile buffer)
Air Toxics Developmental Index Score
Metal Recyling Facilities Proximity (5 km)
Impaired Surface Water
Railway Proximity Ratio (1-mile buffer)
Diesel PM Exposure
Average Noise Levels (aviation, road, rail)
Air Toxics Reproductive Index Score
Airport Proximity Ratio (1-mile buffer)
Air Toxics Neurological Index Score
RMP Site Proximity Ratio (1-mile buffer)
Annual PM2.5 Concentration (3-Year Avg)
Air Toxics Kidney Index Score
Passenger Vehicle Miles Traveled (VMT) per capita
Superfund Sites Proximity (5 km)
NPL Site Proximity Ratio (1-mile buffer)
Major Ports Proximity Ratio (5km buffer)
Lead in Drinking Water Violations
Hazardous Waste Generator Sites Proximity (5 km)
Black Carbon Exposure
Annual Pesticide Use per Cropland Area
Air Toxics Total Cancer Risk
Air Toxics Respiratory Index Score
Air Toxics Immunological Index Score
Vehicle Miles Traveled (VMT) per capita
Number of RMP Facilities within 5 km
Annual % Days Over PM2.5 limit (3-Year Avg)
High-Volume Road Proximity Ratio (1-mile buffer)
Average Ozone Concentration
Heavy Duty Vehicle Miles Traveled (VMT) per capita
Truck Vehicle Miles Traveled (VMT) per capita
k Screening Environmental Indicators (RSEI) Toxicity Score
TSDF Site Proximity Ratio (1-mile buffer)
Air Toxics Liver Index Score
Facilities with Violations Proximiy (5 km)
Annual average NO2 Concentration
Number of TSDF sites within 5 km
Number of NPL sites within 5 km
Annual Days Over Ozone Limit (3-year avg)
Chemical Manufacturing Facilities Proximity (5 km)
Parks and Green Space Access
Air Toxics Thyroid Index Score
Forest Land Cover
Air Market Facilities Proximity (5 km)
Landfills Proximity (5 km)
ning Environmental Indicators (RSEI) Stream Toxicity Score
TSCA Facilities Proximity (5 km)
-100
-50
0
50
100
Kenosha Burden Percentile
Minority Status
Least White
Most White


Individual Exposures
Lead Paint Housing Units built before 1960
Impermeable Surfaces
Air Toxics Respiratory Index Score
Traffic Proximity & Volume (500-meter buffer)
Air Toxics Immunological Index Score
Air Toxics Developmental Index Score
Diesel PM Exposure
Air Toxics Reproductive Index Score
Truck Vehicle Miles Traveled (VMT) per capita
Facilities with Violations Proximiy (5 km)
Air Toxics Kidney Index Score
Air Toxics Neurological Index Score
Heavy Duty Vehicle Miles Traveled (VMT) per capita
Air Toxics Thyroid Index Score
High-Volume Road Proximity Ratio (1-mile buffer)
Annual PM2.5 Concentration (3-Year Avg)
Metal Recyling Facilities Proximity (5 km)
TSCA Facilities Proximity (5 km)
Railway Proximity Ratio (1-mile buffer)
Vehicle Miles Traveled (VMT) per capita
Passenger Vehicle Miles Traveled (VMT) per capita
TRI Site Proximity Ratio (1-mile buffer)
Number of TSDF sites within 5 km
Annual average NO2 Concentration
Impaired Surface Water
Number of RMP Facilities within 5 km
Air Market Facilities Proximity (5 km)
Airport Proximity Ratio (1-mile buffer)
Brownfield Sites Proximity (5 km)
Air Toxics Liver Index Score
Air Toxics Total Cancer Risk
Major Ports Proximity Ratio (5km buffer)
Lead in Drinking Water Violations
Hazardous Waste Generator Sites Proximity (5 km)
Black Carbon Exposure
Annual Pesticide Use per Cropland Area
Average Noise Levels (aviation, road, rail)
Forest Land Cover
Annual % Days Over PM2.5 limit (3-Year Avg)
TSDF Site Proximity Ratio (1-mile buffer)
Number of NPL sites within 5 km
NPL Site Proximity Ratio (1-mile buffer)
RMP Site Proximity Ratio (1-mile buffer)
Chemical Manufacturing Facilities Proximity (5 km)
Risk Screening Environmental Indicators (RSEI) Stream Toxicity Score
Risk Screening Environmental Indicators (RSEI) Toxicity Score
Landfills Proximity (5 km)
Annual Days Over Ozone Limit (3-year avg)
Superfund Sites Proximity (5 km)
Parks and Green Space Access
Average Ozone Concentration
-100
-50
0
50
100
Madison Burden Percentile
Minority Status
Least White
Most White
Lead Paint Housing Units built before 1960
Brownfield Sites Proximity (5 km)
Metal Recyling Facilities Proximity (5 km)
Impaired Surface Water
Number of TSDF sites within 5 km
Impermeable Surfaces
Air Toxics Developmental Index Score
Traffic Proximity & Volume (500-meter buffer)
Facilities with Violations Proximiy (5 km)
emical Manufacturing Facilities Proximity (5 km)
Air Toxics Reproductive Index Score
Annual average NO2 Concentration
Diesel PM Exposure
Number of RMP Facilities within 5 km
Air Toxics Immunological Index Score
ligh-Volume Road Proximity Ratio (1-mile buffer)
Black Carbon Exposure
Air Toxics Neurological Index Score
Air Toxics Kidney Index Score
TRI Site Proximity Ratio (1-mile buffer)
TSCA Facilities Proximity (5 km)
Railway Proximity Ratio (1-mile buffer)
Annual % Days Over PM2.5 limit (3-Year Avg)
Air Market Facilities Proximity (5 km)
Air Toxics Respiratory Index Score
Superfund Sites Proximity (5 km)
Air Toxics Liver Index Score
ımental Indicators (RSEI) Stream Toxicity Score
Annual Days Over Ozone Limit (3-year avg)
g Environmental Indicators (RSEI) Toxicity Score
RMP Site Proximity Ratio (1-mile buffer)
Air Toxics Total Cancer Risk
Average Noise Levels (aviation, road, rail)
Major Ports Proximity Ratio (5km buffer)
:ardous Waste Generator Sites Proximity (5 km)
Airport Proximity Ratio (1-mile buffer)
TSDF Site Proximity Ratio (1-mile buffer)
NPL Site Proximity Ratio (1-mile buffer)
Landfills Proximity (5 km)
Annual PM2.5 Concentration (3-Year Avg)
ssenger Vehicle Miles Traveled (VMT) per capita
Vehicle Miles Traveled (VMT) per capita
Truck Vehicle Miles Traveled (VMT) per capita
ıvy Duty Vehicle Miles Traveled (VMT) per capita
Air Toxics Thyroid Index Score
Number of NPL sites within 5 km
Average Ozone Concentration
Parks and Green Space Access
Annual Pesticide Use per Cropland Area
Lead in Drinking Water Violations
Forest Land Cover
-100
-50
0
50
100
Milwaukee Burden Percentile
Minority Status
Least White
Most White

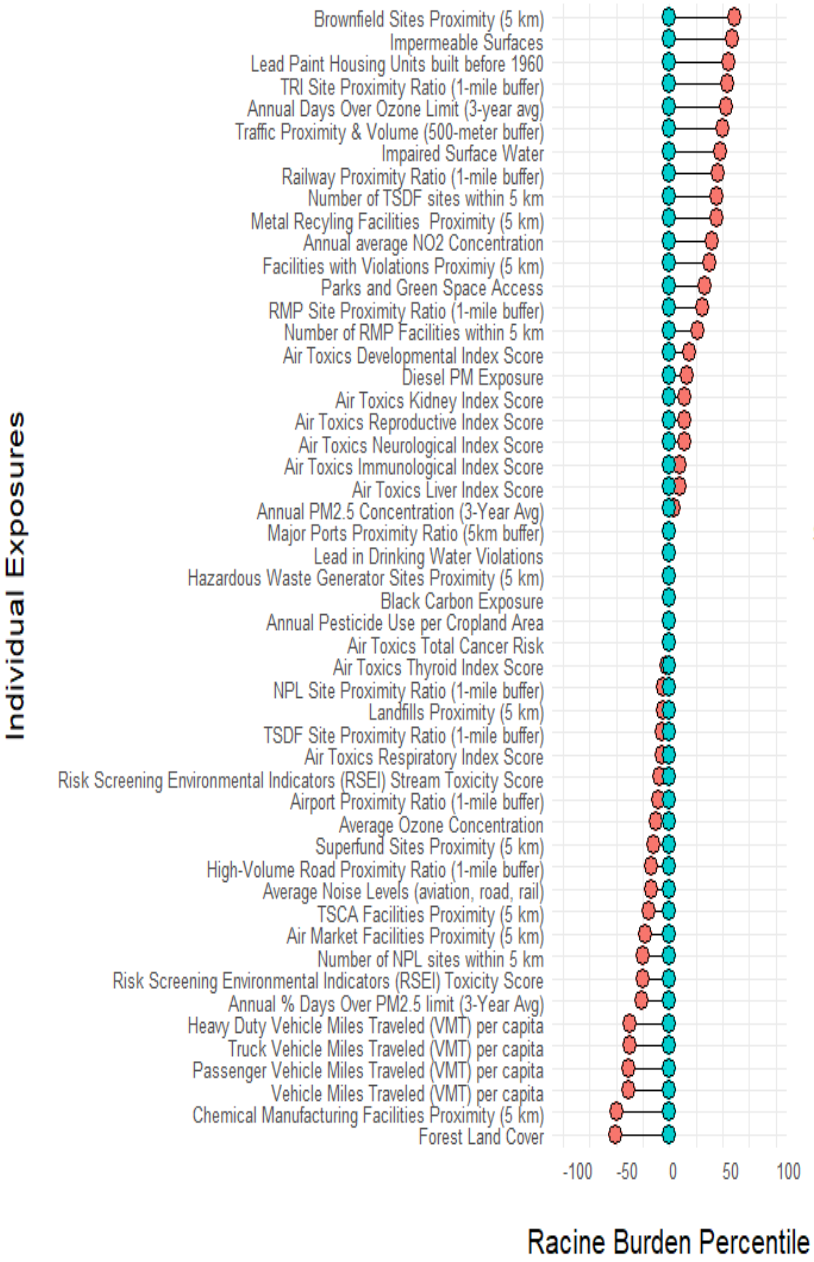

Individual Exposures
Metal Recyling Facilities Proximity (5 km)
Lead Paint Housing Units built before 1960
Brownfield Sites Proximity (5 km)
Annual Days Over Ozone Limit (3-year avg)
TRI Site Proximity Ratio (1-mile buffer)
Impermeable Surfaces
Traffic Proximity & Volume (500-meter buffer)
Impaired Surface Water
Number of TSDF sites within 5 km
Parks and Green Space Access
Annual average NO2 Concentration
Railway Proximity Ratio (1-mile buffer)
Number of RMP Facilities within 5 km
RMP Site Proximity Ratio (1-mile buffer)
Annual PM2.5 Concentration (3-Year Avg)
Diesel PM Exposure
Air Toxics Reproductive Index Score
Facilities with Violations Proximiy (5 km)
Air Toxics Neurological Index Score
Air Toxics Kidney Index Score
Air Toxics Developmental Index Score
Air Toxics Immunological Index Score
Air Toxics Liver Index Score
Air Toxics Thyroid Index Score
Air Toxics Respiratory Index Score
Major Ports Proximity Ratio (5km buffer)
Lead in Drinking Water Violations
Hazardous Waste Generator Sites Proximity (5 km)
Black Carbon Exposure
Annual Pesticide Use per Cropland Area
Air Toxics Total Cancer Risk
Average Ozone Concentration
Average Noise Levels (aviation, road, rail)
Risk Screening Environmental Indicators (RSEI) Stream Toxicity Score
Landfills Proximity (5 km)
Airport Proximity Ratio (1-mile buffer)
NPL Site Proximity Ratio (1-mile buffer)
TSDF Site Proximity Ratio (1-mile buffer)
Annual % Days Over PM2.5 limit (3-Year Avg)
TSCA Facilities Proximity (5 km)
High-Volume Road Proximity Ratio (1-mile buffer)
Risk Screening Environmental Indicators (RSEI) Toxicity Score
Superfund Sites Proximity (5 km)
Passenger Vehicle Miles Traveled (VMT) per capita
Vehicle Miles Traveled (VMT) per capita
Forest Land Cover
Air Market Facilities Proximity (5 km)
Truck Vehicle Miles Traveled (VMT) per capita
Heavy Duty Vehicle Miles Traveled (VMT) per capita
Number of NPL sites within 5 km
Chemical Manufacturing Facilities Proximity (5 km)
-100
-50
0
50
100
Racine Burden Percentile
Minority Status
Least White
Most White
Impermeable Surfaces
Traffic Proximity & Volume (500-meter buffer)
Brownfield Sites Proximity (5 km)
Diesel PM Exposure
Air Toxics Developmental Index Score
Air Toxics Reproductive Index Score
Air Toxics Kidney Index Score
Metal Recyling Facilities Proximity (5 km)
Annual average NO2 Concentration
Number of TSDF sites within 5 km
Lead Paint Housing Units built before 1960
Impaired Surface Water
Air Toxics Immunological Index Score
emical Manufacturing Facilities Proximity (5 km)
Air Toxics Neurological Index Score
Air Toxics Liver Index Score
TRI Site Proximity Ratio (1-mile buffer)
Annual % Days Over PM2.5 limit (3-Year Avg)
Annual PM2.5 Concentration (3-Year Avg)
Air Toxics Respiratory Index Score
Facilities with Violations Proximiy (5 km)
Number of RMP Facilities within 5 km
Railway Proximity Ratio (1-mile buffer)
TSCA Facilities Proximity (5 km)
g Environmental Indicators (RSEI) Toxicity Score
Annual Days Over Ozone Limit (3-year avg)
Number of NPL sites within 5 km
High-Volume Road Proximity Ratio (1-mile buffer)
Black Carbon Exposure
Superfund Sites Proximity (5 km)
Air Market Facilities Proximity (5 km)
Air Toxics Thyroid Index Score
nmental Indicators (RSEI) Stream Toxicity Score
RMP Site Proximity Ratio (1-mile buffer)
Parks and Green Space Access
Major Ports Proximity Ratio (5km buffer)
Air Toxics Total Cancer Risk
Average Ozone Concentration
TSDF Site Proximity Ratio (1-mile buffer)
NPL Site Proximity Ratio (1-mile buffer)
zardous Waste Generator Sites Proximity (5 km)
Average Noise Levels (aviation, road, rail)
Landfills Proximity (5 km)
Airport Proximity Ratio (1-mile buffer)
Lead in Drinking Water Violations
assenger Vehicle Miles Traveled (VMT) per capita
Vehicle Miles Traveled (VMT) per capita
Truck Vehicle Miles Traveled (VMT) per capita
avy Duty Vehicle Miles Traveled (VMT) per capita
Annual Pesticide Use per Cropland Area
Forest Land Cover
-1.0
-0.5
0.0
0.5
1.0
State Burden Percentile
Minority Status
Least White
Most White

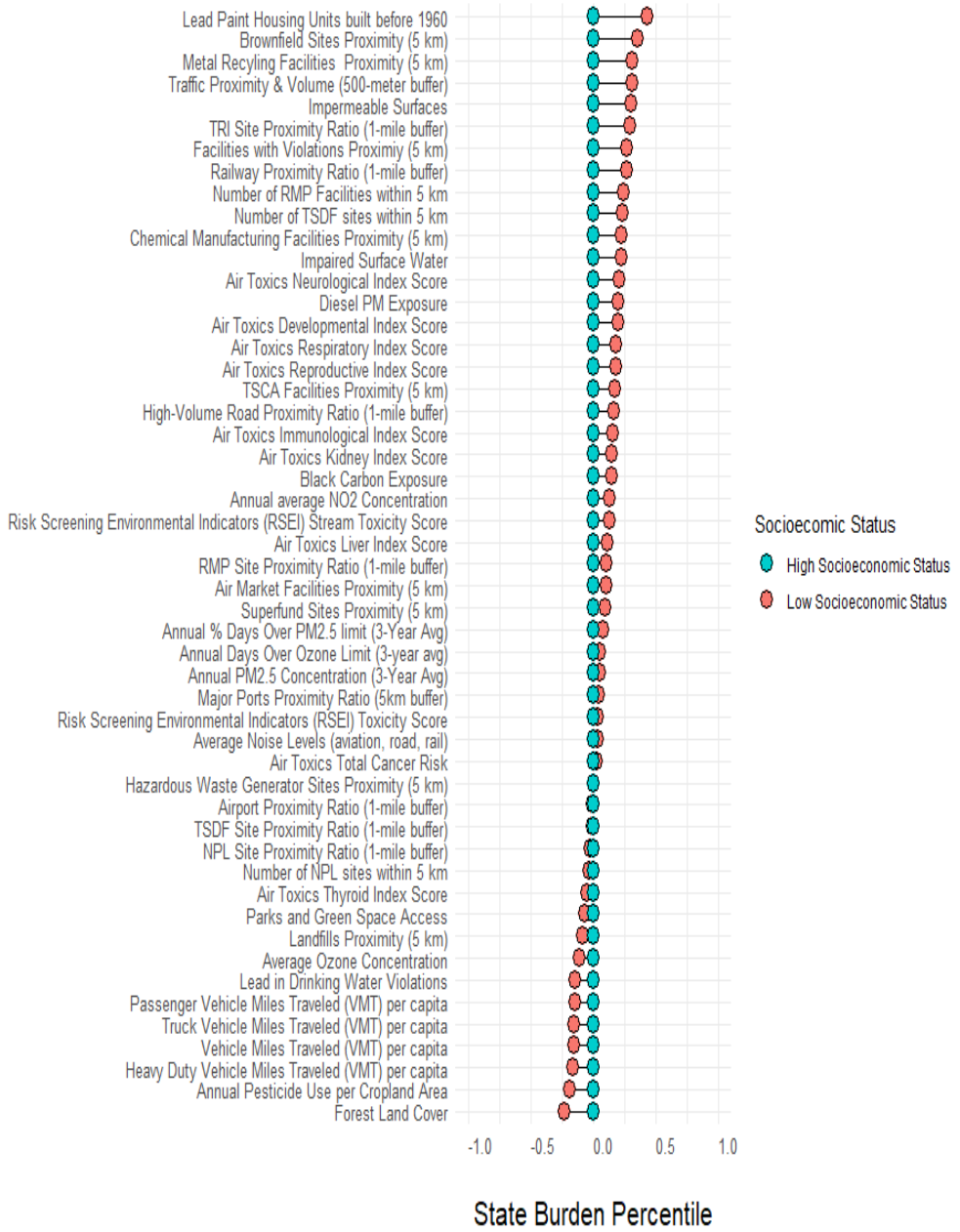
Appendix C – Individual Metric Socioeconomic Disparity Graphs

Environmental metrics for each urban area by socioeconomic status. Red dots are the "lower socioeconomic status" census tracts and blue dots are the "higher socioeconomic status" census tracts. The red dots to the right of the blue indicate the "lower socioeconomic status" census tracts experiencing higher burden/more exposure compared to the "higher socioeconomic status" neighborhoods. The red dots to the left of the dots indicate the "lower socioeconomic status" census tracts experience less burden/exposure.


Individual Exposures
Metal Recyling Facilities Proximity (5 km)
Impaired Surface Water
High-Volume Road Proximity Ratio (1-mile buffer)
Impermeable Surfaces
Risk Screening Environmental Indicators (RSEI) Stream Toxicity Score
TRI Site Proximity Ratio (1-mile buffer)
Lead Paint Housing Units built before 1960
Brownfield Sites Proximity (5 km)
Railway Proximity Ratio (1-mile buffer)
Air Toxics Neurological Index Score
Air Toxics Thyroid Index Score
Annual average NO2 Concentration
Facilities with Violations Proximiy (5 km)
Chemical Manufacturing Facilities Proximity (5 km)
Annual % Days Over PM2.5 limit (3-Year Avg)
Traffic Proximity & Volume (500-meter buffer)
Annual PM2.5 Concentration (3-Year Avg)
Diesel PM Exposure
Air Toxics Respiratory Index Score
Average Noise Levels (aviation, road, rail)
Air Toxics Developmental Index Score
Air Toxics Total Cancer Risk
Number of TSDF sites within 5 km
Parks and Green Space Access
Risk Screening Environmental Indicators (RSEI) Toxicity Score
TSDF Site Proximity Ratio (1-mile buffer)
Major Ports Proximity Ratio (5km buffer)
Lead in Drinking Water Violations
Hazardous Waste Generator Sites Proximity (5 km)
Black Carbon Exposure
Annual Pesticide Use per Cropland Area
Air Toxics Liver Index Score
Annual Days Over Ozone Limit (3-year avg)
Number of NPL sites within 5 km
Number of RMP Facilities within 5 km
Air Toxics Reproductive Index Score
Airport Proximity Ratio (1-mile buffer)
Superfund Sites Proximity (5 km)
RMP Site Proximity Ratio (1-mile buffer)
Landfills Proximity (5 km)
NPL Site Proximity Ratio (1-mile buffer)
Air Toxics Immunological Index Score
TSCA Facilities Proximity (5 km)
Air Market Facilities Proximity (5 km)
Air Toxics Kidney Index Score
Truck Vehicle Miles Traveled (VMT) per capita
Passenger Vehicle Miles Traveled (VMT) per capita
Vehicle Miles Traveled (VMT) per capita
Heavy Duty Vehicle Miles Traveled (VMT) per capita
Forest Land Cover
Average Ozone Concentration
-100
-50
0
50
100
Socioecomic Status
High Socioeconomic Status
Low Socioeconomic Status
Janesville-Beloit Area Burden Percentile
Brownfield Sites Proximity (5 km)
Lead Paint Housing Units built before 1960
Impermeable Surfaces
Annual average NO2 Concentration
Railway Proximity Ratio (1-mile buffer)
Traffic Proximity & Volume (500-meter buffer)
TRI Site Proximity Ratio (1-mile buffer)
Impaired Surface Water
Diesel PM Exposure
Annual Days Over Ozone Limit (3-year avg)
Air Toxics Kidney Index Score
Chemical Manufacturing Facilities Proximity (5 km)
Average Noise Levels (aviation, road, rail)
Air Toxics Developmental Index Score
Air Toxics Neurological Index Score
RMP Site Proximity Ratio (1-mile buffer)
Superfund Sites Proximity (5 km)
NPL Site Proximity Ratio (1-mile buffer)
Major Ports Proximity Ratio (5km buffer)
Lead in Drinking Water Violations
Hazardous Waste Generator Sites Proximity (5 km)
Black Carbon Exposure
Annual Pesticide Use per Cropland Area
Air Toxics Total Cancer Risk
Air Toxics Respiratory Index Score
Air Toxics Liver Index Score
Air Toxics Immunological Index Score
Number of TSDF sites within 5 km
Air Toxics Reproductive Index Score
TSDF Site Proximity Ratio (1-mile buffer)
Metal Recyling Facilities Proximity (5 km)
Annual PM2.5 Concentration (3-Year Avg)
Number of RMP Facilities within 5 km
Airport Proximity Ratio (1-mile buffer)
Average Ozone Concentration
Air Toxics Thyroid Index Score
High-Volume Road Proximity Ratio (1-mile buffer)
ning Environmental Indicators (RSEI) Stream Toxicity Score
Parks and Green Space Access
Air Market Facilities Proximity (5 km)
Landfills Proximity (5 km)
Truck Vehicle Miles Traveled (VMT) per capita
Heavy Duty Vehicle Miles Traveled (VMT) per capita
Passenger Vehicle Miles Traveled (VMT) per capita
Forest Land Cover
Vehicle Miles Traveled (VMT) per capita
Annual % Days Over PM2.5 limit (3-Year Avg)
Facilities with Violations Proximiy (5 km)
k Screening Environmental Indicators (RSEI) Toxicity Score
Number of NPL sites within 5 km
TSCA Facilities Proximity (5 km)
-100
-50
0
50
100
Socioecomic Status
High Socioeconomic Status
Low Socioeconomic Status
Kenosha Burden Percentile


Individual Exposures
Traffic Proximity & Volume (500-meter buffer)
Lead Paint Housing Units built before 1960
Impermeable Surfaces
Facilities with Violations Proximiy (5 km)
Brownfield Sites Proximity (5 km)
High-Volume Road Proximity Ratio (1-mile buffer)
Air Toxics Developmental Index Score
Railway Proximity Ratio (1-mile buffer)
Annual average NO2 Concentration
Air Toxics Reproductive Index Score
Air Toxics Kidney Index Score
TRI Site Proximity Ratio (1-mile buffer)
Diesel PM Exposure
Number of TSDF sites within 5 km
Metal Recyling Facilities Proximity (5 km)
Air Market Facilities Proximity (5 km)
Air Toxics Respiratory Index Score
Air Toxics Neurological Index Score
Air Toxics Liver Index Score
Annual % Days Over PM2.5 limit (3-Year Avg)
Air Toxics Immunological Index Score
Impaired Surface Water
Air Toxics Thyroid Index Score
Number of RMP Facilities within 5 km
Annual PM2.5 Concentration (3-Year Avg)
Chemical Manufacturing Facilities Proximity (5 km)
Average Noise Levels (aviation, road, rail)
Number of NPL sites within 5 km
Truck Vehicle Miles Traveled (VMT) per capita
Vehicle Miles Traveled (VMT) per capita
Passenger Vehicle Miles Traveled (VMT) per capita
Airport Proximity Ratio (1-mile buffer)
Heavy Duty Vehicle Miles Traveled (VMT) per capita
Annual Days Over Ozone Limit (3-year avg)
NPL Site Proximity Ratio (1-mile buffer)
Major Ports Proximity Ratio (5km buffer)
Lead in Drinking Water Violations
Hazardous Waste Generator Sites Proximity (5 km)
Black Carbon Exposure
Annual Pesticide Use per Cropland Area
Air Toxics Total Cancer Risk
RMP Site Proximity Ratio (1-mile buffer)
Risk Screening Environmental Indicators (RSEI) Stream Toxicity Score
TSCA Facilities Proximity (5 km)
TSDF Site Proximity Ratio (1-mile buffer)
Superfund Sites Proximity (5 km)
Risk Screening Environmental Indicators (RSEI) Toxicity Score
Average Ozone Concentration
Forest Land Cover
Landfills Proximity (5 km)
Parks and Green Space Access
-100 -50 0 50 100
Madison Burden Percentile
Socioecomic Status
high Socioeconomic Status
low Socioeconomic Status
Lead Paint Housing Units built before 1960
Metal Recyling Facilities Proximity (5 km)
Impermeable Surfaces
Brownfield Sites Proximity (5 km)
Number of TSDF sites within 5 km
Traffic Proximity & Volume (500-meter buffer)
Impaired Surface Water
Facilities with Violations Proximiy (5 km)
Annual average NO2 Concentration
Chemical Manufacturing Facilities Proximity (5 km)
Air Toxics Developmental Index Score
Diesel PM Exposure
TRI Site Proximity Ratio (1-mile buffer)
Number of RMP Facilities within 5 km
Air Toxics Reproductive Index Score
Air Toxics Immunological Index Score
High-Volume Road Proximity Ratio (1-mile buffer)
Air Toxics Kidney Index Score
TSCA Facilities Proximity (5 km)
Air Toxics Neurological Index Score
Black Carbon Exposure
Railway Proximity Ratio (1-mile buffer)
Air Market Facilities Proximity (5 km)
Risk Screening Environmental Indicators (RSEI) Stream Toxicity Score
Superfund Sites Proximity (5 km)
Annual % Days Over PM2.5 limit (3-Year Avg)
Air Toxics Respiratory Index Score
Annual Days Over Ozone Limit (3-year avg)
Air Toxics Liver Index Score
RMP Site Proximity Ratio (1-mile buffer)
Air Toxics Total Cancer Risk
Risk Screening Environmental Indicators (RSEI) Toxicity Score
Major Ports Proximity Ratio (5km buffer)
Average Noise Levels (aviation, road, rail)
Hazardous Waste Generator Sites Proximity (5 km)
Airport Proximity Ratio (1-mile buffer)
Annual PM2.5 Concentration (3-Year Avg)
TSDF Site Proximity Ratio (1-mile buffer)
Landfills Proximity (5 km)
NPL Site Proximity Ratio (1-mile buffer)
Passenger Vehicle Miles Traveled (VMT) per capita
Vehicle Miles Traveled (VMT) per capita
Heavy Duty Vehicle Miles Traveled (VMT) per capita
Truck Vehicle Miles Traveled (VMT) per capita
Parks and Green Space Access
Air Toxics Thyroid Index Score
Average Ozone Concentration
Number of NPL sites within 5 km
Lead in Drinking Water Violations
Annual Pesticide Use per Cropland Area
Forest Land Cover
-100 -50 0 50 100
Milwaukee Burden Percentile
Socioecomic Status
high Socioeconomic Status
low Socioeconomic Status


Individual Exposures
Brownfield Sites Proximity (5 km)
Impermeable Surfaces
Lead Paint Housing Units built before 1960
TRI Site Proximity Ratio (1-mile buffer)
Annual Days Over Ozone Limit (3-year avg)
Traffic Proximity & Volume (500-meter buffer)
Impaired Surface Water
Railway Proximity Ratio (1-mile buffer)
Number of TSDF sites within 5 km
Metal Recyling Facilities Proximity (5 km)
Annual average NO2 Concentration
Facilities with Violations Proximiy (5 km)
Parks and Green Space Access
RMP Site Proximity Ratio (1-mile buffer)
Number of RMP Facilities within 5 km
Air Toxics Developmental Index Score
Diesel PM Exposure
Air Toxics Kidney Index Score
Air Toxics Reproductive Index Score
Air Toxics Neurological Index Score
Air Toxics Immunological Index Score
Air Toxics Liver Index Score
Annual PM2.5 Concentration (3-Year Avg)
Major Ports Proximity Ratio (5km buffer)
Lead in Drinking Water Violations
Hazardous Waste Generator Sites Proximity (5 km)
Black Carbon Exposure
Annual Pesticide Use per Cropland Area
Air Toxics Total Cancer Risk
Air Toxics Thyroid Index Score
NPL Site Proximity Ratio (1-mile buffer)
Landfills Proximity (5 km)
TSDF Site Proximity Ratio (1-mile buffer)
Air Toxics Respiratory Index Score
Risk Screening Environmental Indicators (RSEI) Stream Toxicity Score
Airport Proximity Ratio (1-mile buffer)
Average Ozone Concentration
Superfund Sites Proximity (5 km)
High-Volume Road Proximity Ratio (1-mile buffer)
Average Noise Levels (aviation, road, rail)
TSCA Facilities Proximity (5 km)
Air Market Facilities Proximity (5 km)
Number of NPL sites within 5 km
Risk Screening Environmental Indicators (RSEI) Toxicity Score
Annual % Days Over PM2.5 limit (3-Year Avg)
Heavy Duty Vehicle Miles Traveled (VMT) per capita
Truck Vehicle Miles Traveled (VMT) per capita
Passenger Vehicle Miles Traveled (VMT) per capita
Vehicle Miles Traveled (VMT) per capita
Chemical Manufacturing Facilities Proximity (5 km)
Forest Land Cover
-100
-50
0
50
100
Racine Burden Percentile
Socioecomic Status
high Socioeconomic Status
low Socioeconomic Status


Lead Paint Housing Units built before 1960
Brownfield Sites Proximity (5 km)
Metal Recyling Facilities Proximity (5 km)
Traffic Proximity & Volume (500-meter buffer)
Impermeable Surfaces
TRI Site Proximity Ratio (1-mile buffer)
Facilities with Violations Proximiy (5 km)
Railway Proximity Ratio (1-mile buffer)
Number of RMP Facilities within 5 km
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Annual % Days Over PM2.5 limit (3-Year Avg)
Annual Days Over Ozone Limit (3-year avg)
Annual PM2.5 Concentration (3-Year Avg)
Major Ports Proximity Ratio (5km buffer)
Risk Screening Environmental Indicators (RSEI) Toxicity Score
Average Noise Levels (aviation, road, rail)
Air Toxics Total Cancer Risk
Hazardous Waste Generator Sites Proximity (5 km)
Airport Proximity Ratio (1-mile buffer)
TSDF Site Proximity Ratio (1-mile buffer)
NPL Site Proximity Ratio (1-mile buffer)
Number of NPL sites within 5 km
Air Toxics Thyroid Index Score
Parks and Green Space Access
Landfills Proximity (5 km)
Average Ozone Concentration
Lead in Drinking Water Violations
Passenger Vehicle Miles Traveled (VMT) per capita
Truck Vehicle Miles Traveled (VMT) per capita
Vehicle Miles Traveled (VMT) per capita
Heavy Duty Vehicle Miles Traveled (VMT) per capita
Annual Pesticide Use per Cropland Area
Forest Land Cover
-1.0
-0.5
0.0
0.5
1.0
State Burden Percentile
Socioecomic Status
High Socioeconomic Status
Low Socioeconomic Status