MD EJSCREEN v2.0: A Tool for Mapping Environmental Justice in Maryland

Jan-Michael Archer, M.S.
Sacoby Wilson, Ph.D.

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EPA EJSCREEN exists—Why not just use that?

Utilize local data

Customize to local community concerns (E.g. California highlights pesticide use)

Make a tool that is useful for STATE, COUNTY, AND MUNICIPAL policymaking
State mapping tools allow users to:

• Explore factors of environmental justice concern and community relevant scales,
• Determine/Compare ‘Score’ of different census tracts in the state, and
• View additional context layers relevant to their area of concern or the story they would like to tell.
Scoring Methodology
Borrowed from CalEnviroScreen

- Population Characteristics: Sensitive Populations
- Population Characteristics: Socioeconomic Factors

Pollution Burden: Exposure
Pollution Burden: Environmental Effects

Environmental Justice

* Average of Exposures and Environmental Effects

CalEnviroScreen Score

Average of Sensitive Populations and Socioeconomic Factors
MARYLAND'S EJ SCREEN

EJ SCREEN DATA LAYERS
LAYERS & WEIGHTING OF MODEL

- Pollution Burden Exposure
  - Geographic Proximity
  - Ex. Air Toxins Hazards
- Pollution Burden Environmental Effects
  - Effects that could be mitigated
  - Ex. Proximity to Water Discharge, Lead Paint
- Sensitive Populations
  - Population Characteristics with Health Disparities
- Socioeconomic Factors
  - Population Characteristics

Pollution Burden Exposure
25%

Socioeconomic Factors
25%

Environmental Effects
25%

Sensitive Populations
25%
### Pollution Burden: Exposure

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Indicators</strong></td>
<td><strong>Description</strong></td>
</tr>
<tr>
<td><strong>Pollution Burden: Exposure</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Portal Scale Air Toxics Air Toxics Cancer Risk</strong></td>
<td>Lifetime risk of developing cancer from inhalation of air toxins. Reported as risk per lifetime per million people.</td>
</tr>
<tr>
<td><strong>Air toxics respiratory hazard index. This is the sum of hazard indices for those air toxics with reference concentrations based on respiratory endpoints, where each hazard index is the ratio of exposure concentration in the air to the health-based reference.</strong></td>
<td></td>
</tr>
<tr>
<td><strong>ATA Diesel Particulate Matter (DPM)</strong></td>
<td>Levels of diesel particulate matter in air. Reported as micrograms per cubic meter (µg/m³).</td>
</tr>
<tr>
<td><strong>ATA Particulate Matter (PM2.5)</strong></td>
<td>Levels of particulate matter with a diameter of 2.5 micrometers or smaller in air. Reported as micrograms per cubic meter (µg/m³).</td>
</tr>
<tr>
<td><strong>Ozone</strong></td>
<td>Summer seasonal average of the maximum daily 8-hour concentration of ozone in air in parts per billion.</td>
</tr>
<tr>
<td><strong>Traffic Proximity and Volume</strong></td>
<td>Count of vehicles (average annual daily traffic) at major roads within 500 meters or close to 500 meters, divided by distance in meters.</td>
</tr>
</tbody>
</table>
## Pollution Burden: Environmental Effects

<table>
<thead>
<tr>
<th>Lead Paint Indicator</th>
<th>Percent of houses built before 1960, which likely contain lead paint.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proximity to Risk Management Plan (RMP) Sites</td>
<td>Count of RMP (potential chemical accident management plans) facilities within 5 kilometers or close to 5 kilometers, divided by distance in kilometers.</td>
</tr>
<tr>
<td>Proximity to Treatment Storage and Disposal Facilities (TSDF)</td>
<td>Count of TSDF (hazardous waste management facilities) within 5 kilometers or closest to 5 kilometers, divided by distance in kilometers.</td>
</tr>
<tr>
<td>Proximity to National Priorities List (NPL) Sites</td>
<td>Count of NPL/Superfund sites (polluted sites that pose a risk to human health and/or the environment) within 5 kilometers or close to 5 kilometers, divided by distance in kilometers.</td>
</tr>
<tr>
<td>Proximity to Major Direct Water Discharges</td>
<td>Toxic concentrations in stream segments within 500 meters, divided by distance in kilometers (km). Standards modeled after Risk-Screening Environmental Indicators (RSEI).</td>
</tr>
<tr>
<td>Watershed Failure</td>
<td>Percent of each census tract’s watershed that exceeds levels of phosphorus and/or nitrogen.</td>
</tr>
</tbody>
</table>
### Population Characteristics: Sensitive Populations

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<tr>
<td><strong>Asthma Emergency Discharges</strong></td>
</tr>
<tr>
<td>Count of patients released from the hospital after being admitted for asthma or asthma-related distress.</td>
</tr>
<tr>
<td><strong>Myocardial Infarction Discharges</strong></td>
</tr>
<tr>
<td>Patients released from the hospital after being admitted for a heart attack or heart attack symptoms.</td>
</tr>
<tr>
<td><strong>Low Birth Weight Infants</strong></td>
</tr>
<tr>
<td>Babies born weighing less than 5.5 pounds.</td>
</tr>
<tr>
<td><strong>Asthma Emergency Visits</strong></td>
</tr>
<tr>
<td>Patients admitted to the emergency room for asthma or asthma-related distress.</td>
</tr>
</tbody>
</table>

- Health effects data at the zip code level was scaled down to the census tract level using geographically weighted scaling.
# Population Characteristics: Socio-Economic Factors

<table>
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<tbody>
<tr>
<td>Percent Non-White</td>
<td>Percentage of individuals who define themselves as any race/ethnicity besides non-Hispanic White.</td>
</tr>
<tr>
<td>Percent Low-Income</td>
<td>Percentage of individuals whose household income in the past 12 months is less than two times below the federal poverty level.</td>
</tr>
<tr>
<td>Less than high school education</td>
<td>Percentage of individuals 25 and older who lack a high school diploma.</td>
</tr>
<tr>
<td>Linguistic Isolation</td>
<td>Percentage of households in which no one 14 years old and older speaks English &quot;very well&quot;, or households which speak only English.</td>
</tr>
<tr>
<td>Individuals under age 5</td>
<td>Percentage of people under the age of 5.</td>
</tr>
<tr>
<td>Individuals over age 64</td>
<td>Percentage of people over the age of 64.</td>
</tr>
<tr>
<td>Unemployment</td>
<td>Percentage of the population over the age of 16 that is unemployed and eligible for the labor force. Excludes retirees, students, homemakers, institutionalized persons except prisoners, those not looking for work, and military personnel on active duty.</td>
</tr>
</tbody>
</table>
Legend (and layer drawers) provide scores in **PERCENTILES**

- \(0.91 = 91^{st} \text{ percentile} = \text{higher than 91}\% \text{ of the state}
- The lightest areas show least environmental justice concern (not “no concern at all”)
- Why not use natural breaks?
New Additions in v2.0
1. LEGEND
2. SELECT TOOL
3. PRINT TOOL
4. SIDE-BY-SIDE VIEWER
5. BASEMAP SELECTOR
1. MD EJSCREEN EJ Score
2. Pollution Burden: Exposure
3. Pollution Burden: Env. Effects
5. Population Characteristics: Sociodemographic Factors
6. Context Layers
7. User Guide
8. Other Mappers
"SELECT/CHART" Tool: Simple Stats Toggle

- Shows **bar graphs** that compare scores of select tract(s) to county and state scores
- NOTE: When a selection crosses multiple counties, averages for each county are shown for comparison

Advanced Stats Toggle

- Shows **box plots (and desc. stats)** that compare the spread of the data so users can identify whether outliers are present.
Side-by-Side Map Viewer

- Allows user to view two map layers at once in order to compare overlaps
- Can change color ramp to display natural breaks.
- Here we see older adults vs walkability.
Future Additions

- Inclusion of environmental health permitting and policy data:
  - Facilities holding Clean Water Act/National Pollution Discharge Elimination System/ Clean Air Act permits,
  - facilities with permits in progress,
  - facilities found to have violated previous or existing permits.

- EPA-funded restoration projects:
  - Brownfields and Land Revitalization program,
  - Supplemental Environmental Projects program,

- §319(h) Grants program at the Maryland state level

- Integration of MD Environmental Public Health Tracking Data

- Integration with AirNow.gov and PurpleAir for hyperlocal monitoring

- Public participation interface
Live: https://p1.cgis.umd.edu/mdejscreen/

• Data layers available via GitHub - https://github.com/gisumd/EJScreen
Partners

• Many thanks to our collaborators at the National Center for Smart Growth, Maryland Department of Natural Resources, and UMD CGIS.

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