



How TRI Data are Used by Academics and Other Researchers

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Toxics Release Inventory Program

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What makes TRI data unique?

Statutory Authorities:

- Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) § 313
 - Each year, facilities in certain industrial sectors must report to EPA and the states the quantities of certain chemicals they release to air, water, and land or otherwise manage as waste.
 - EPA must maintain the data and make it available to the public.
- Pollution Prevention Act of 1990 (PPA)
 - Facilities must also report progress in reducing waste generation and moving towards safer waste management alternatives.
 - Section 8 of the Form R



What makes TRI data unique?

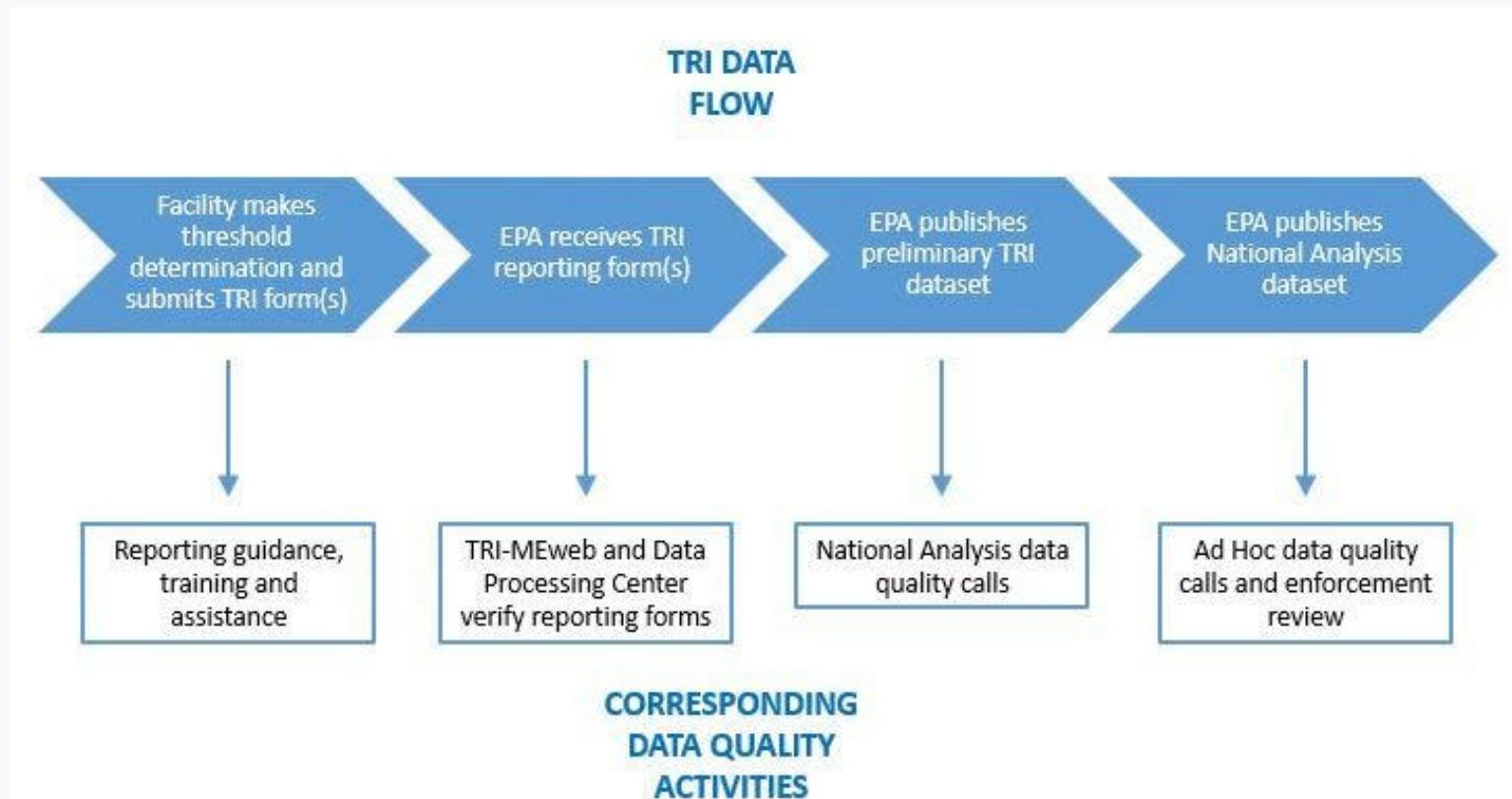
- Annual – more frequent data than many other programs
- Multimedia – only multimedia dataset from EPA
- P2 and waste management information – more than just releases
- TRI data help to complete the picture





What makes TRI data unique?

Robust data quality program





TRI University Challenge

- Objectives:
 - Expose students to TRI information
 - Support development of a diverse portfolio of innovative projects using TRI data
 - Create a “force multiplier” for TRI
- Outcomes:
 - Partnered with 20 schools
 - Interacted with over 200 students
 - Journal articles, university awards, publicly-accessible data tools, YouTube data use tutorials

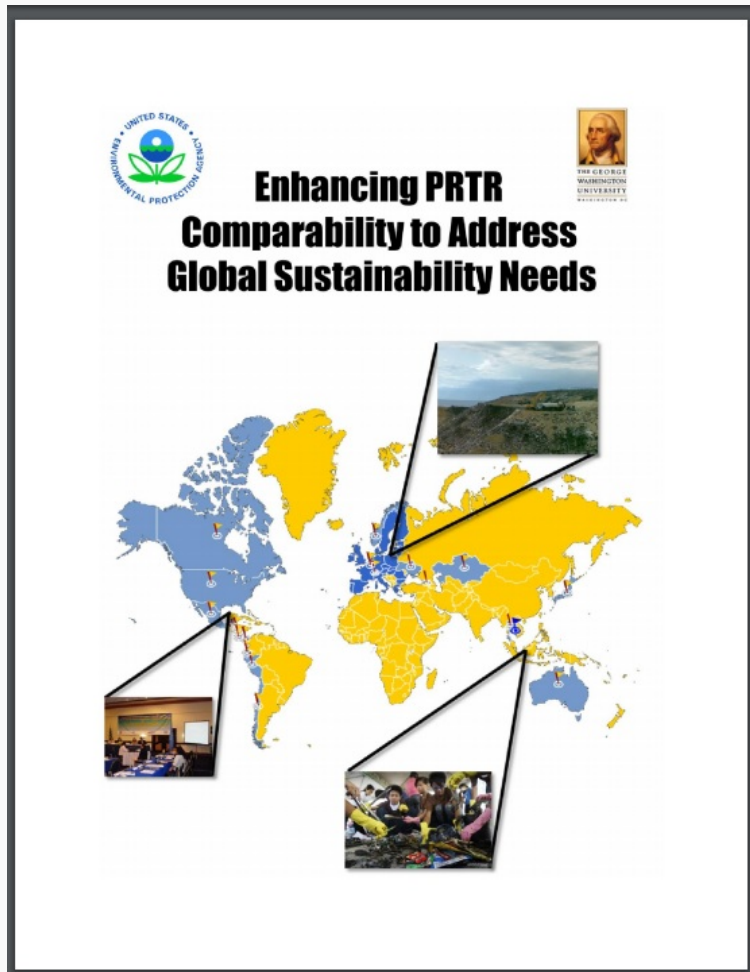


Disclaimer

The TRI data uses referenced in the projects and materials discussed in the slides that follow are provided as examples. Mention of these projects and materials does not constitute an EPA endorsement of their use, or of the individuals, groups, and organizations who developed them or their conclusions.



TRI University Challenge Projects



George Washington University International Analysis:

Master's students from GWU's Environmental Resource Policy Program identified recommendations for enhancing the comparability of data from TRI-like programs (known as Pollutant Release and Transfer Registers) around the world.



TRI University Challenge Projects

PUBLIC AWARENESS AND USE OF THE
TOXICS RELEASE INVENTORY:

Program and Community Engagement
Recommendations in Three New York Communities



Cornell Institute for Public Affairs,
Cornell University

Binghamton group: L. Cunneen, L. Majani, K. Qiang

Syracuse group: T. Akinlawon, C. Qiu, X. Hu

Ithaca group: L. Bent, X. Li

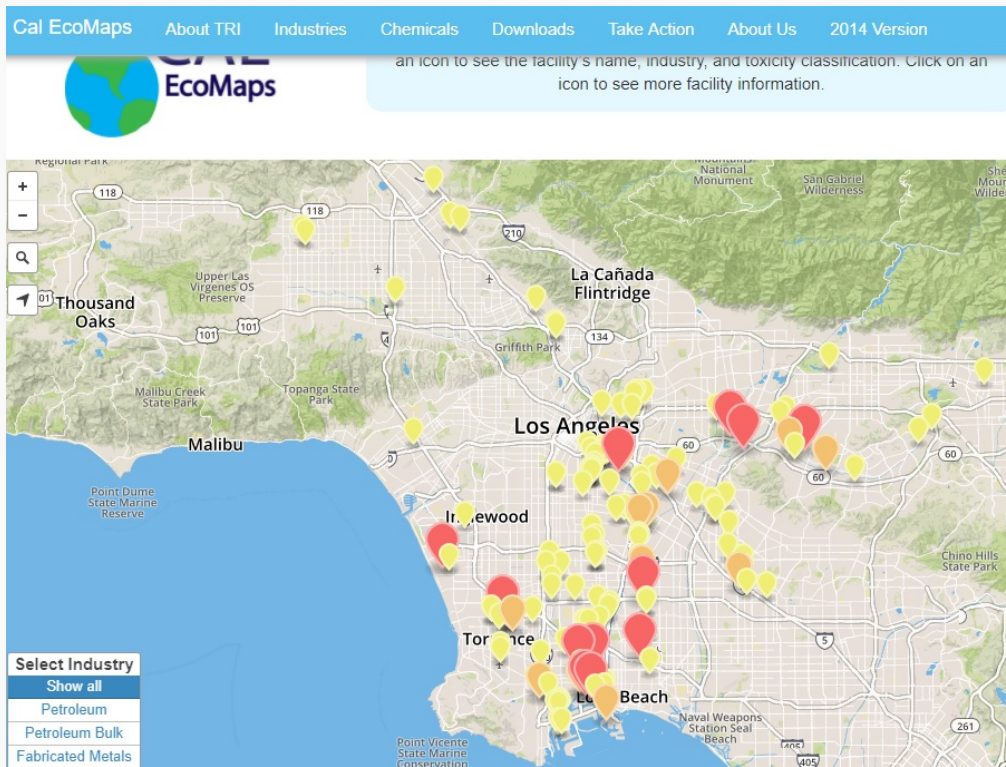
CIPA Domestic Capstone Spring 2012

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Cornell Institute for Public Affairs, Cornell University Capstone Fellows at the Cornell Institute for Public Policy researched potential uses of TRI data by EPA and other stakeholders. Students conducted research in three communities in central New York: Binghamton, Syracuse and Ithaca.



TRI University Challenge Projects



University of California, Los Angeles

Undergraduates developed the Cal EcoMaps website to highlight TRI reporting facilities in the Los Angeles Basin through an interactive map. Users are able to see information on profiled facilities from the petroleum, fabricated metals, primary metals, and chemicals sectors. The information includes total toxic releases per facility, releases per \$1000 of revenue, percent of waste treated through preferred management practices, and an estimate of associated cancer risks.



TRI University Challenge Projects

Brown School for Social Work and Public Health, Washington University in St. Louis

A Master's student used TRI data to conduct an asthma incidence study in the St. Louis area. The purpose was to determine the strength of association between toxic point sources reported to TRI and asthma hospitalization outcomes at the ZIP code level, and to examine toxic air releases alongside socio-demographic and asthma indicators to identify disparities in exposure to air pollution and asthma outcomes.

GEORGE WARREN BROWN SCHOOL
of Social Work

Background

The St. Louis region has a number of industrial operations and an extensive network of interstates and roads, all of which contribute to air pollution and public health outcomes, including asthma.

- Regularly, 140 facilities report air emissions with effects on respiratory health to the Toxics Release Inventory (TRI).
- 50% of regional commuters drive alone to work, logging over 20 million miles per day.

Regional disparities in exposure to pollutants in combination with access to care contribute to poor outcomes for vulnerable groups, such as elevated emergency room visits for asthma in the region. A number of public data sources are available to examine potential relationships between regional air pollution, social demographic, and health outcomes.

Research Aims

- Determine strength of association between toxic point sources reported to TRI and asthma hospitalization outcomes at the ZIP code level.
- Examine toxic air releases alongside socio-demographic and asthma indicators to identify disparities in exposure to air pollution and asthma outcomes.

Methods

This TRI University Challenge Project uses publicly available data to examine social and environmental predictors of asthma in eight counties in the St. Louis Region.

Figure 1. Study Area

Locations and air releases (in lbs) for facilities reporting respiratory health-related air releases to TRI at ZIP codes in the eight-county region were mapped for the year 2010. Point-source emissions were compared to the 2000 National Air Toxics Assessment (NATA).

Socio-demographic indicators were from the 2010 Census and the 2011 American Community Survey. 3-year estimates were mapped at the ZIP code level.

Asthma hospitalizations by ZIP code (primary diagnosis, ages 15+) for the year 2010 came from Missouri and Illinois state health departments.

Cluster and spatial analysis using GIS was supplemented with linear regression and independent samples analysis to determine any significant environmental or social predictors of asthma hospitalization in the region.

Additional statistics: Percent African American, median household income, percent poverty, percent unemployed, percent in rental housing, distance to TRI and interstates (mi). 10 nearest-related air releases (2010).

Dependent variable: Asthma hospitalizations (per pop. 10,000)

Place, Pollution, and Health: Environmental and Social Predictors of Asthma Hospitalization in the St. Louis Region
Rebecca Gernes, MPH & MSW Candidate (*14)

Figure 2. Asthma Hospitalization Cluster, 2010. Asthma hospitalizations are significantly clustered in ZIP codes in St. Louis City, north St. Louis County, and western Madison, Monroe, and St. Clair Counties (Moran's I=0.51, p<0.01).

Figure 3. Asthma Hospitalization Cluster, TRI Facilities, and Percent African American. Asthma hospitalizations were positively associated with majority African American ZIP codes (p<0.001).

Figure 4. Asthma Hospitalization Cluster, TRI Facilities, and Air Releases. Asthma hospitalization clustered ZIP codes were closer on average to TRI facilities, but had lower average TRI releases. This may show the facilities reporting the highest respirator-related air releases.

Figure 5. NATA Estimated Respiratory Risk, St. Louis Region 2005.

Figure 7. Total 2010 Air Releases, St. Louis Region 2005-2010.

Figure 8. NATA Estimated Respiratory Risk, St. Louis Region 2005.

Figure 9. Asthma Hospitalization Cluster, TRI Facilities, and Air Releases. Mapping and analyzing TRI with health and socio-demographic trends is a replicable approach expanding the use and application of publicly accessible environmental and health data. The project is transdisciplinary in its data sources, analysis, and implications for policy and programs addressing community health.

Results will be shared with community educators, researchers, and policy makers in the region, including Metro East Community Air Project, Missouri Department of Health and Senior Services, Illinois Department of Public Health, East Third Gateway Council of Governments, Illinois State Asthma Partnership, US Environmental Protection Agency, Washington University in St. Louis, and the University of Illinois.

Table 1. Descriptive Statistics

Variable	Regional Mean (SD)	Mean within cluster (SD)	Mean within cluster (SD)
Asthma hospitalizations	11.0	1.9	22.8**
African American (%)	23.0	6.4	49.1***
Unemployment (%)	6.0	4.0	8.2***
African National Poverty (%)	11.1	0.1	22.8***
Asthma hospitalizations (per 10,000)	16.70	16.20	46.00***
African American (%)	21.06	16.70	23.00
Distance to TRI sites from ZIP code centroid (mi)	21.40	20.64	1.88***
Distance to interstates from ZIP code centroid (mi)	17.06	18.52	1.62***

***dependent variable from regression model. **p<0.05. *p<0.10. **p<0.01.

Table 2. Model Coefficients

Variable	Beta	p
African American (%)	0.498	1.63E-07**
Below Federal Poverty Level (%)	0.187	1.67E-07**
Distance to interstates (mi)	0.002	1.38

Model: $F(3, 1) = 4.62$

The population within the asthma hospitalization cluster differed significantly from the population outside the cluster on social and environmental indicators.

ZIP codes inside the cluster have higher percentages of African Americans, higher percent poverty and unemployment, lower median household income, and are closer on average to TRI facilities and highways than ZIP codes outside the cluster.

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Note: The work presented here was done for the purposes of a course and is not my thesis or dissertation.



TRI University Challenge Projects



State University of New York at Plattsburgh
The team of undergraduates created “Toxic Release!”, an eco-educational simulation game that demonstrates the various dynamics between stakeholders that are impacted by industrial chemical releases. The purpose of the game is to use TRI data to make the invisible dynamics associated with toxic releases more tangible. Players assume the roles of industry professionals, community members concerned with environmental and human health, and government regulators. These stakeholders then use computer models founded upon TRI data, role play, and environmental problem-solving frameworks to manage a toxic release scenario.



TRI University Challenge Projects



Indiana University-Bloomington

Faculty researchers merged TRI data with data from the Centers for Disease Control and Prevention and the Area Health Resource File, and made this merged dataset available to the public as Excel, STATA, and SAS files. This dataset has proven useful to broadly explore releases of chemicals from TRI facilities alongside socio-demographic and health data at the county level. The researchers published an article in the journal Environmental Research about this project.



International Organizations that Use TRI Data

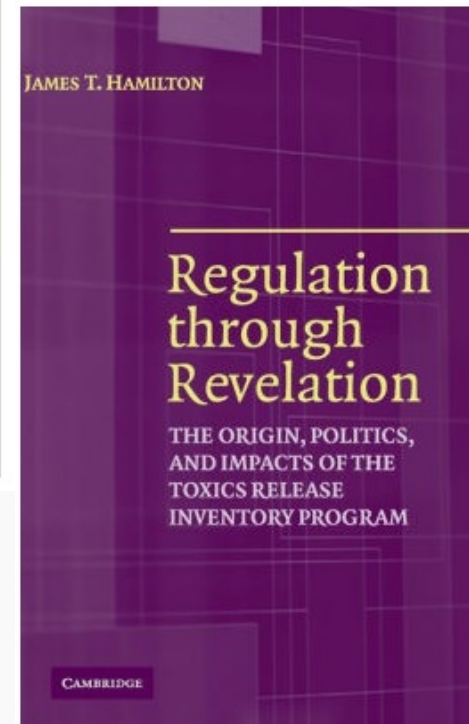
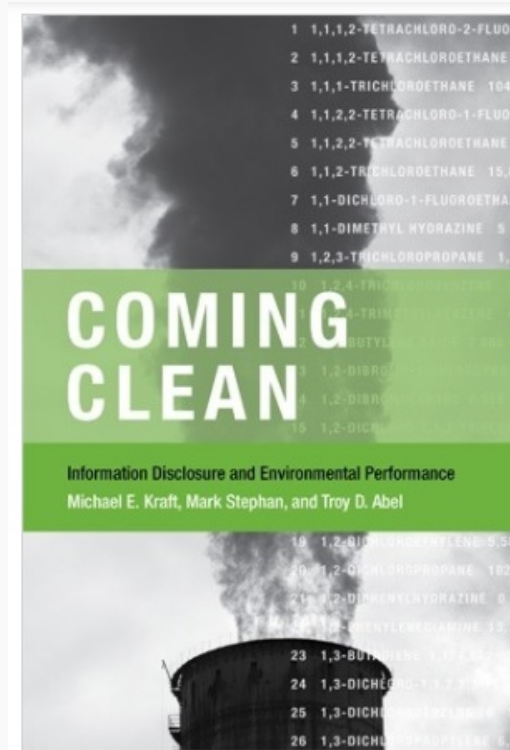
- Commission for Environmental Cooperation in North America (CEC) “Taking Stock” report
- Organization for Economic Co-operation and Development (OECD) Pollutant Release and Transfer Register (PRTR) activities
- UN Environment Programme (UNEP) and UN Institute for Training and Research (UNITAR)
- UN Sustainable Development Solutions Network (UNSDSN) development of tracking indicators





Research about TRI

Researchers have looked at the TRI program as a subject unto itself to investigate the impact of information disclosure as a means to achieve environmental policy outcomes.





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