Information Disclosure Policy:
Do States' Data Processing Efforts Help More than the Information Disclosure Itself?

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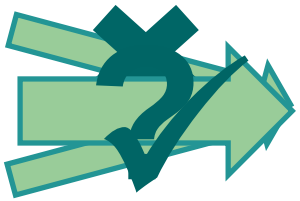
Overview

- Information Disclosure Policy
  - "Command-and-Control" →"Regulation-through-Information"
- Toxic Release Inventory (TRI) in the US
  - Massive/ Complex/ Misleading Information
- How the limitations affect policy outcomes?
  - ➢ Raw TRI Data
  - ➢ Processed Information



➢ Policy Goal
(Reducing Health Risks)

Background

- Toxic Release Inventory (TRI)
  - EPCRA in 1986
  - Requires plants to report their toxic releases to the EPA every year
  - After processing data, the EPA discloses the TRI data to the public
- Drive plants to improve their environmental performance to avoid adverse reactions by markets and the public

Background

- Limitation of TRI Information Disclosure
  - Massiveness/Complexity
  - Inaccurate indicator: Reports the number of pounds of chemicals released, not health risk (“true” quantity of interest)

→More noise than signal

→Generating information processing burden

Lessons from Health Care

- Utilization issues raised in Health Care
  - People don't use the information (Mennemeyer et al. 1997)
  - People ignore the information with an poor measure (Grant, 2005)
  - Improvement only in what the information reports (Dranove et al., 2003)

→How to measure determines what we get as policy outcomes

Information Overload (MIS)

- Too much and too complex information that exceeds recipients'' processing capacity
- Information overload degrades decision quality
- Value-added/structured information mitigate information overload

Example of Misuse

Pennsylvania is the 5th most polluted state based on industry-reported data from the U.S. manufacturing sector.

Coal & Oil Electric Utilities Are Major Polluters

- In fact,
  - PA is #1 in toxic risk
  - Metal industry is the major polluter

States' TRI Programs

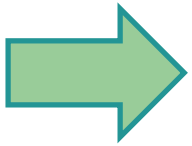
- Disseminate raw TRI data
  - Provision of EPA document, Data provision to libraries, Reading room, Bulletin board, Provision of EPA diskettes
- Process TRI data
  - State's annual reports, Health effect/ Risk analysis, Trend/Ranking analyses, Disaggregated/Aggregated level of analyses

Research Design

- Evaluate two types of States' TRI program with two policy outcome measures

➢ Data Dissemination Efforts
(Inaccurate Information)

➢ Data Processing Efforts
(Accurate Information)



➢ Toxic Release Level
(Skewed policy outcome)

➢ Toxic Risk
(True policy outcome)

- County-level Panel Data Analysis Using Fixed Effects

Variables and Data

- States TRI Program Variables
  - States TRI Program Assessment Survey by NCSL
  - 1995, 1996, 1997 and 1999

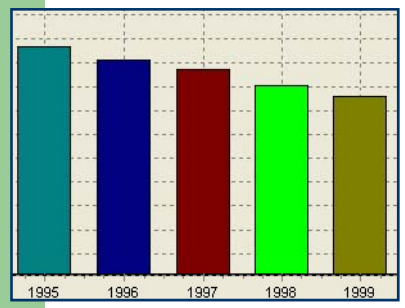
Data Dissemination Efforts	Data Processing Efforts
EPA's TRI data document	State's own data analysis
EPA's TRI data diskette	Annual TRI reports
TRI data reading room	Other state TRI documents

States Toxic Release Trend (95-99)

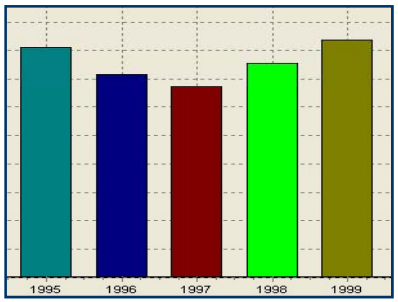
Always dissemination
Never processing

Sometimes dissemination
Always processing

OH

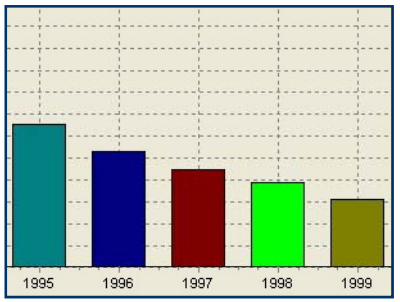


Toxic Release Level

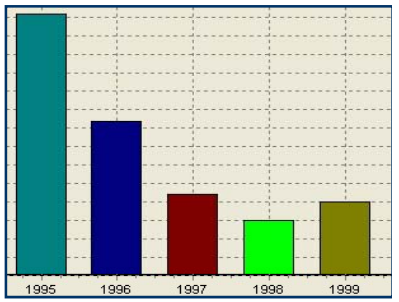


Toxic Risk

MA

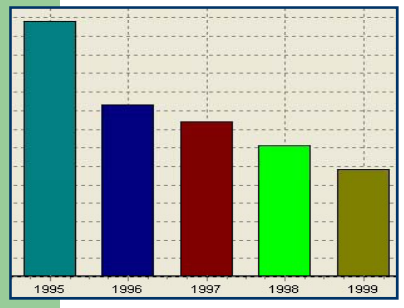


Toxic Release Level

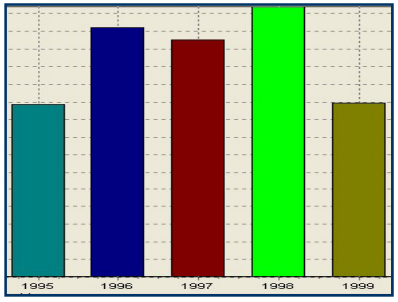


Toxic Risk

NE

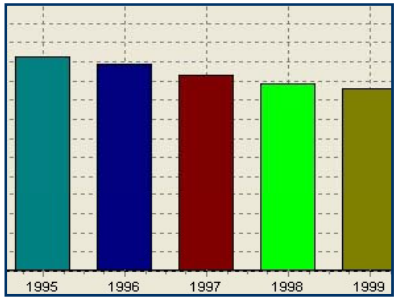


Toxic Release Level

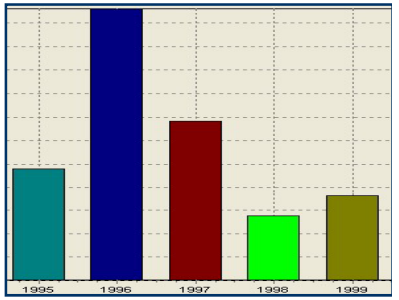


Toxic Risk

OK



Toxic Release Level



Toxic Risk

Variables and Data

- **Dependent Variables**
  - Toxic Release Level
    - Total quantity of chemicals released in pounds
  - Toxic Risk
    - Toxicity-weighted human health risk measure (EPA's RSEI)

- **Control Variable**
  - % Hispanic (Census – County Level)
  - % African American (Census – County Level)
  - Medan Household Income (SAIPE – County Level)
  - Unemployment Rate (Bureau of Labor Statistics – County Level)
  - States' Per Capita Health Expenditure (Census – State Level)
    → Spending for air and water pollution controls and environmental regulations

Regression Model

$$\ln(Y)_{i,t} = \beta_{1.0} + \beta_{1.1}\text{Dissemination}_{i,t-1} + \beta_{1.2}\text{Processing}_{i,t-1} + \beta_{.1.3}\%Hisp_{i,t-1} + \beta_{1.4}\%Black_{i,t-1}$$

$$+ \beta_{1.5}Income_{i,t-1} + \beta_{1.6}\%College_{i,t-1} + \beta_{1.7}Health_{i,t-1} + \beta_{1.8}Unemploy_{i,t-1}$$

$$+ \beta_{1.9-1.11}Year_{t-1} + \beta_{1.12-1.1710}County_{i} + error_{i,t-1}$$

Where Y= *Toxic release level* or *Toxic Risk.*
i=Counties
t=1994, 1995, 1996, 1998

- Log of Dependent Variable /Lagged Explanatory Variable
- County Fixed Effects
- Year Dummies

Model Estimation

* Significant at p<0.1
** Significant at p<0.05
***Significant at p<0.01

	Toxic Release Level		Toxic Risk	
Variables	Coefficient	Robust Std. Error	Coefficient	Robust Std. Error
Data Dissemination	-0.1032***	0.0320	-0.0439	0.0434
Data Processing	0.0425	0.0460	-0.1353**	0.0624

- States data dissemination efforts reduced toxic release level by 10.3% but had no effect on toxic risk
- States data processing efforts reduced toxic risk by 13.5%
- Dissemination of inaccurate information ended up with improvement in wrong policy outcome
- States' processing efforts to provide accurate information contributed to true improvement

Summary and Conclusion

- Making information available is not enough.
- Inaccurate information skews policy outcome
- Information processing is valuable as it provides a more accurate information
- Important to provide accurate information with true quantity of interest and consider users' information processing capacity

Comments & Questions?

Model Estimation

* Significant at p<0.1
** Significant at p<0.05
***Significant at p<0.01

Model	Baseline		Any TRI Program		Index		No Fixed effects		State Policy Controls	
Outcome Measure	Level	Risk	Level	Risk	Level	Risk	Level	Risk	Level	Risk
Dissemination	-0.103*** (0.032)	-0.044 (0.043)	-0.116** (0.050)	0.189*** (0.066)			-0.079 (0.082)	0.158 (0.101)	-0.108*** (0.033)	0.046 (0.044)
Processing	0.043 (0.046)	-0.135** (0.062)					0.171** (0.081)	0.289*** (0.097)	0.039 (0.047)	-0.124** (0.063)
Index					-0.017 (0.012)	-0.028* (0.016)				
Health	-0.002* (0.001)	-0.001 (0.001)	-0.002* (0.001)	-0.001 (0.001)	-0.001* (0.001)	-0.001 (0.001)	0.003*** (0.001)	0.004*** (0.001)	-0.002* (0.001)	-0.001 (0.001)
Park									-0.001 (0.002)	0.004 (0.004)
Natural Resource									0.000 (0.001)	0.001 (0.003)
Conservation Score									-0.001 (0.002)	-0.002 (0.002)
Non-attainment									0.035 (0.057)	0.009 (0.075)
Fixed Effects	Yes		Yes		Yes		No		Yes	

Toxic Risk

- The number of pounds multiplied by the toxicity weight for the appropriate exposure pathway (e.g. inhalation toxicity weight for an air release).
- Toxicity Weights
  - Using EPA-established standard methodologies.
  - Toxicity weight is a proportional numerical weight applied to a chemical based on its toxicity
  - Range: 0.01 (Sulfuric acid: oral) to 1,000,000 (Asbestos:Inhal)
  - Exposure Route: Oral/Inhalation
  - Health Effect: Cancer/Non-cancer

Toxic Risk

- Cancer Health Effect- Oral Slope Factors and Inhalation Unit Risks
  - Oral Slope Factor represents the upper-bound estimate of the slope of the dose-response curve in the low-dose region for carcinogens. The Inhalation Unit Risk is the upper-bound excess lifetime cancer risk estimated to result from continuous exposure to an agent at a concentration of 1 µg/m3 in air.
- Non Cancer Health Effect- Reference Doses (RfDs) and Reference Concentrations (RfCs)
  - RfDs and RfCs are estimates (with uncertainty spanning perhaps an order of magnitude) of daily exposure [RfD], or continuous inhalation exposure [RfC], to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious noncancer effects during a lifetime.

RSEI's toxicity only allow for relative rankings that do not address critical questions such as whether the releases increase cancer risk or whether they result in risk levels that exceed statutory standards

RSEI toxicity weights don't separately address cancer and noncancer effects in examining chronic human health end points. The weights are based on the single most sensitive end point for the inhalational or oral exposure pathway (earlier versions considered the inhalational pathway only). Carcinogens and noncarcinogens can be examined separately, but they are linked by an equivalency in the toxicity weights, which allows them to be scored together.

According to Hassur, the weights are based upon the toxicity information used to generate existing toxicity values, such as reference doses and cancer slope factors, which OPPT researchers obtain from a number of sources. Among them are the EPA's Integrated Risk Information System, the California Environmental Protection Agency, and the Agency for Toxic Substances and Disease Registry. Some high-priority chemicals (so designated in terms of their exposure volume or toxicity) lacked published toxicity values. In these cases, OPPT researchers calculated toxicity weights for the model if existing toxicological data in the scientific literature were sufficient to do so.

Prior TRI Studies

- Evaluate EPA's TRI establishment
  - Housing/Stock Markets
    - Hamilton, 1995; Konar and Cohen, 1997; Khanna et al., 1998; Bui and Mayer, 2003
  - Toxic release reduction after TRI establishment
    - Shapiro, 2005; Hamilton, 2005
    - Unable to isolate the effect of the TRI itself since toxic release data prior to the TRI is not available

Prior Studies

- Evaluate states TRI programs
  - O'Toole et al., 1997 – Ineffective on toxic release level
  - Shapiro, 2000 – Effective on toxic risk
  - Grant & Jones, 2004 – Ineffective on toxic release level
- Inconsistent results on effectiveness of TRI program
- No investigation on nature of disclosed information/types of states' TRI program
- Cross-sectional data analyses