

# Reporting and signage: How transparency and disclosure affect compliance

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# Environmental transparency and disclosure

- The scope and scale of information provision for environmental oversight has grown dramatically in recent decades.
- Information provision for the environment now comes in a bewildering number of forms:
  - Advisories and warnings
  - Pollution release registries
  - Product labeling programs
  - ‘Name and shame’ / ‘Name and proclaim’ programs
  - Social comparisons
  - Self-certification programs
  - Reporting and signage programs

# Outline

- Disclosure and transparency: The big picture
- Disclosure, signage, and self-certification to enhance environmental compliance
- Some examples of successful environmental disclosure programs
- An example of a disclosure program evaluation

# The ideas

- Innovative transparency and disclosure tools may:
  - Help inform public and help the public report problems
  - Leverage private market and legal forces
  - Leverage economic psychology compliance motivations

# The promise

- Transparency and disclosure tools may be:
  - Inexpensive relative to traditional regulatory approaches
  - Quick to implement
  - Appropriate when regulatory authority is unresolved
  - Appropriate or politically expedient when socially desirable levels of pollution are unclear or controversial
  - Flexible
    - Disclosure respects basic notions of ‘freedom of choice’
    - Transparency can be targeted to specific groups

# The theory

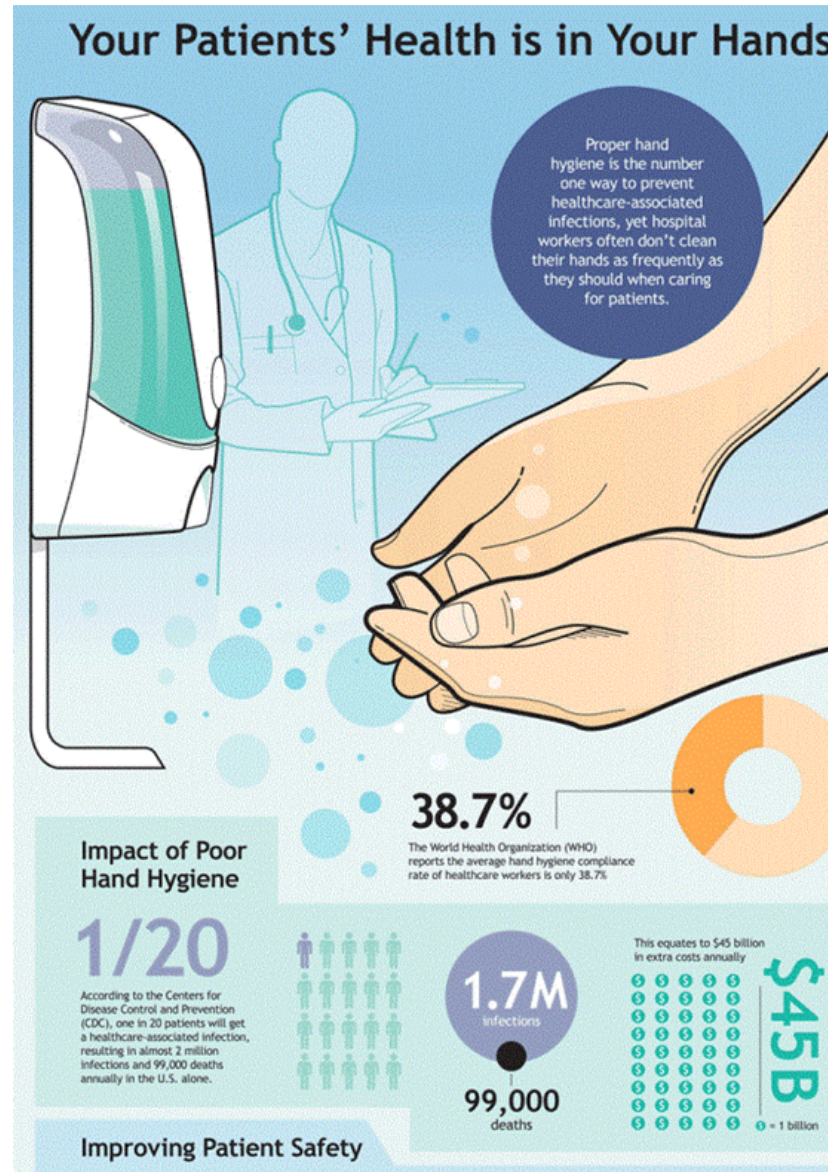
- A large social sciences literature suggests information tools *can* impact performance and compliance outcomes.

# Mechanism 1: Expected costs and benefits

- Disclosure may inform stakeholders about the sources and extent of environmental harm.
- Thus, disclosure may affect facilities' EB and EC of their own pollution and compliance choices through...
  - Activist and community pressure
  - Citizen complaints, monitoring, and lawsuits
  - Employee loyalty, consumer WTP, costs of capital
  - Perceptions about regulatory attention

## Mechanism 2a: Reminder and Reassurance Functions

- The act of information provision may prompt disclosers to believe:
  - Prosocial behaviors matter
  - Noncompliance or other socially undesirable behaviors will be detected
  - Their organization values compliance and prosocial acts.
- “The Telltale Heart Effect”
- See Duval and Wicklund 1973; Wicklund 1975; Mazar et al. 2008; Hayley and Fessler 2005; Bateson et al. 2006; Pruckner & Sausgruber 2013)







Mechanism 2b:  
Objective self-  
awareness

- Subtle cues of being watched increase prosocial behaviors in the lab and field.
- Disclosing noncompliance or undesirable behavior may threaten decision-makers' self-concepts as honest people working for honest organizations.
- See Thornton et al. 2005; Hindin & Silberman 2016; Pittet et al. 2000; Lowry & Joslyn 2014.

# But ...

- To be effective, disclosed information - or the act of disclosure itself - may need to be:
  - New and Novel
  - Trusted
  - Salient
- Limited attention and information overload are ubiquitous in modern society.
- According to political scientists, trust in public authorities has been declining for four decades.

# Transparency can be counterproductive.

- If stakeholders incorrectly estimate risks or harm in the absence of information, transparency can be counterproductive
  - See Viscusi 1990; Loewenstein et al. 2014.
- Psychology can also lead disclosure programs to generate unintended consequences.
  - Ostrich effect (Galai and Sade 2006; Karlsson et al. 2009)
  - Optimism bias (Sharot 2011; Shepperd et al. 2013)
  - Moral licensing (Cain et al. 2005; Cain et al. 2011; Loewenstein et al. 2014)
- Environmental information disclosure increases incentives for concealment and strategic reporting.

# Transparency and disclosure can be hard.

- Disclosure outcomes can be sensitive to small and sometimes even minute details in framing and design.
- Social norms influence reactions to information.
- Disclosure outcomes can vary dramatically across organizational structures.
- The typical presumption that more information is better relies on strong assumptions about ...
  - how target audiences access, understand, trust, and process information.
  - how disclosers themselves are influenced – psychologically and organizationally – by the act of providing information.

# The empirical evidence

- Pessimistic results, on average, for:
  - corporate finance; campaign finance; medical malpractice; conflict of interest; homeland security threat warnings; emergency preparedness advisories; environmental health hazard advisories
- More mixed results, on average, for:
  - Product labeling and warnings, quasi-regulatory performance registries like the TRI
- This is just about effectiveness; ‘favorable results’ from this evidence still says little about cost effectiveness or efficiency relative to alternatives.

However, the literature also shows...

- More favorable results, on average, for “*name and shame*” or “*name and proclaim*” programs.
- Here, transparency leverages and **complements** formal regulation instead of replacing it.



# Name and shame example 1: OSHA press releases (Johnson 2020)

- One notable recent study found that OSHA press releases about severe health and safety violations:
  - Led to a 73 percent fewer OSHA violations at peer facilities within 5km of the publicized facility.
  - Led to smaller effects on compliance of facilities located further away, but effects persist up to 50km away.
  - Fewer workplace injuries.
  - OSHA would have to conduct an additional 210 inspections to elicit the same improvement in compliance as those sparked by a single press release.

## Name and shame example 2: CAA Watch List (Evans 2016)

| Facility ID | Facility Name                       | Facility Street    | Facility City | Facility State | Facility Zip |
|-------------|-------------------------------------|--------------------|---------------|----------------|--------------|
| 3913900007  | AK STEEL CORP                       | 913 BOWMAN ST.     | MANSFIELD     | OH             | 44901        |
| 3809900003  | ALCHEM, LTD. LLLP                   | 35 E. DIVISION ST. | GRAFTON       | ND             | 58237        |
| 4805700002  | ALCOA LAVACA BAY                    | 1472 FM 1593 S     | POINT COMFORT | TX             | 77978        |
| 1812700085  | AMERICAN IRON OXIDE COMPANY (AMROX) | 6300 US 12         | PORTAGE       | IN             | 46368        |

Relative to a counterfactual, the probability of a violation at listed facilities fell between 10 and 25 percentage points as a result of listing and public release.

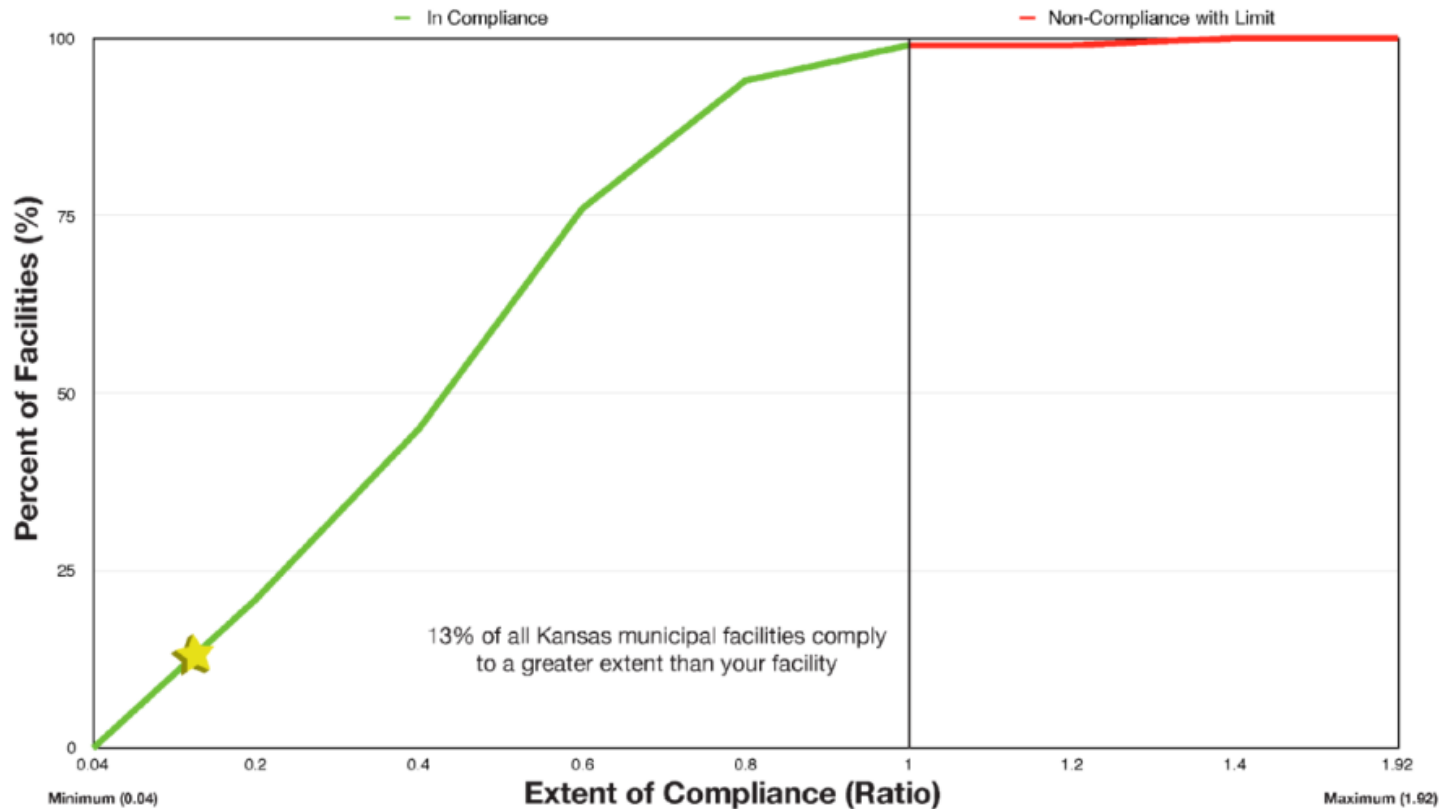


# Violation reporting example: SDWA CCRs (Benneer and Olmstead 2008)

| Contaminants                            | MCLG or MRDLG | MCL, TT or MRDL | Your Water | Range |      | Sample Date | Violation | Typical Sources  |
|---|---------------|-----------------|------------|-------|------|-------------|-----------|--|
|   |               |                 |            | Low   | High |             |           |  |
| Disinfectant Residual                   |               |                 |            |       |      |             |           |  |
| Chloramine (as Cl <sub>2</sub> ) (mg/L) | 4             | 4               | 1          | 1     | 3    | 2008        | No        | Water additive to control microbes.  |
| Inorganic Contaminants                  |               |                 |            |       |      |             |           |  |
| Fluoride (ppm)                          | 4             | 4               | 2          | 1     | 2    | 2008        | No        | Erosion of natural deposits; water additive which promotes strong teeth; discharge from fertilizer and aluminum factories. |

Larger water utilities required to mail CCRs to customers reduced total violations by between 30% and 44% as a result of this policy ... and reduced more severe health violations by 40-57%.

# Social comparisons as a compliance tool? (Earnhart and Ferraro 2020)



Peer comparisons reduced a common measure of discharges by ~9%

# Self-certification as a compliance tool?

- Does requiring regulated sources to certify compliance to regulators affect compliance?
- It seems direct evidence here may be more limited.
  - A large and growing literature explores the accuracy of self-reported pollution data, but that seems a different question.
  - A literature on facility self-audits is relevant, and supportive of the idea that self-assessment can improve environmental performance...
  - ... but, it is not always clear whether it is the process of self-study, the process of self-certification to a regulator, or both driving outcomes.
- One concern is that self-certification may backfire by:
  - Leading to significant reporting bias.
  - Leading to costly concealment and cover-up.
  - Lowering performance via to “moral licensing” or via the psychological sense that stakeholders have been warned

# Signage as a compliance tool?

For example, do requirements that water polluters post signs containing permit and contact information at discharge points influence compliance and emissions?

# Some years ago, EPA OECA colleagues...

- Introduced me a mandatory signage program in Ohio
- Wondered if I had thoughts on likely impacts
- Wondered if I had thoughts on how innovative programs like this might be evaluated
- Noted Ohio's data availability and data quality

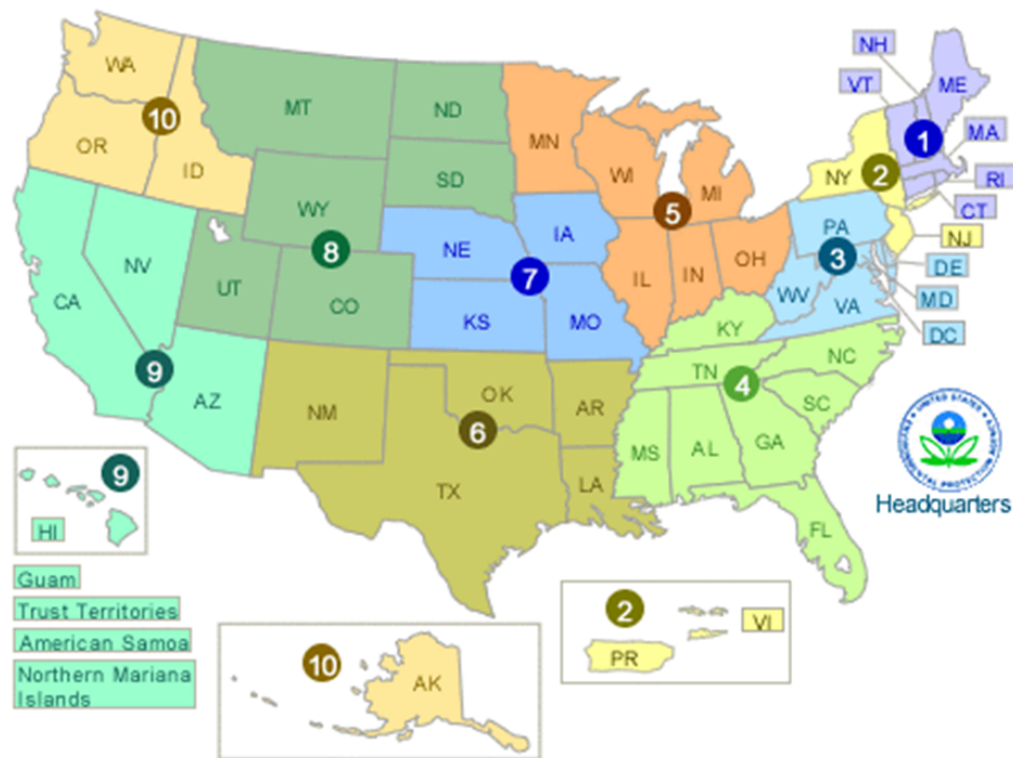


# A post-doctoral researcher and I thought: how might we evaluate a program like this?

- Could we plausibly assign causal attribution with an ex-post evaluation using observational data?
  - Programs may be implemented along with other policy changes
  - Programs may be instituted in response to changing compliance
  - Programs may be correlated with other factors that also directly influence pollution and compliance outcomes
- It could be seriously misleading to collect data on facilities with signs and explore before vs. after policy changes in pollution.
- Also, are useful data available?

# Research Design

- We explored a “*natural experiment*”
- We compared changes over time for a “experimental” group of facilities to changes over time for a “control” group of facilities.
- We then exploited an institutional quirk of the program....



# Intuition of the research design

- We compared:
  - before vs. after program effective date for OHIO (the treatment state)
    - After netting out ....
  - before vs. after program effective date for control states.
    - the effects of a permit status change after program effective date for OHIO
      - After netting out ....
    - the effects of a permit status change after program effective date for controls
  - the effects of a permit status change after program effective date for OHIO
    - After netting out ....
  - the effects of a permit status change after program effective date for controls
  - the effects of a permit status change within Ohio prior to effective date



# We collected preexisting data ...

- Facility-by-month CWA (PCS-ICIS) data
  - Facility characteristics
  - DMR monthly discharges and limits for BOD and TSS
  - Permit events
  - Inspections and enforcement actions
- Supplemental Data
  - Demographics and weather data at the zip-code level
- Sample facilities
  - All NPDES “major” facilities in Region 5

# Preliminary results

- Violations for conventional water pollutants BOD or TSS fell significantly relative to a counterfactual.
- Average BOD and TSS pollution fell about 5% relative to a counterfactual.

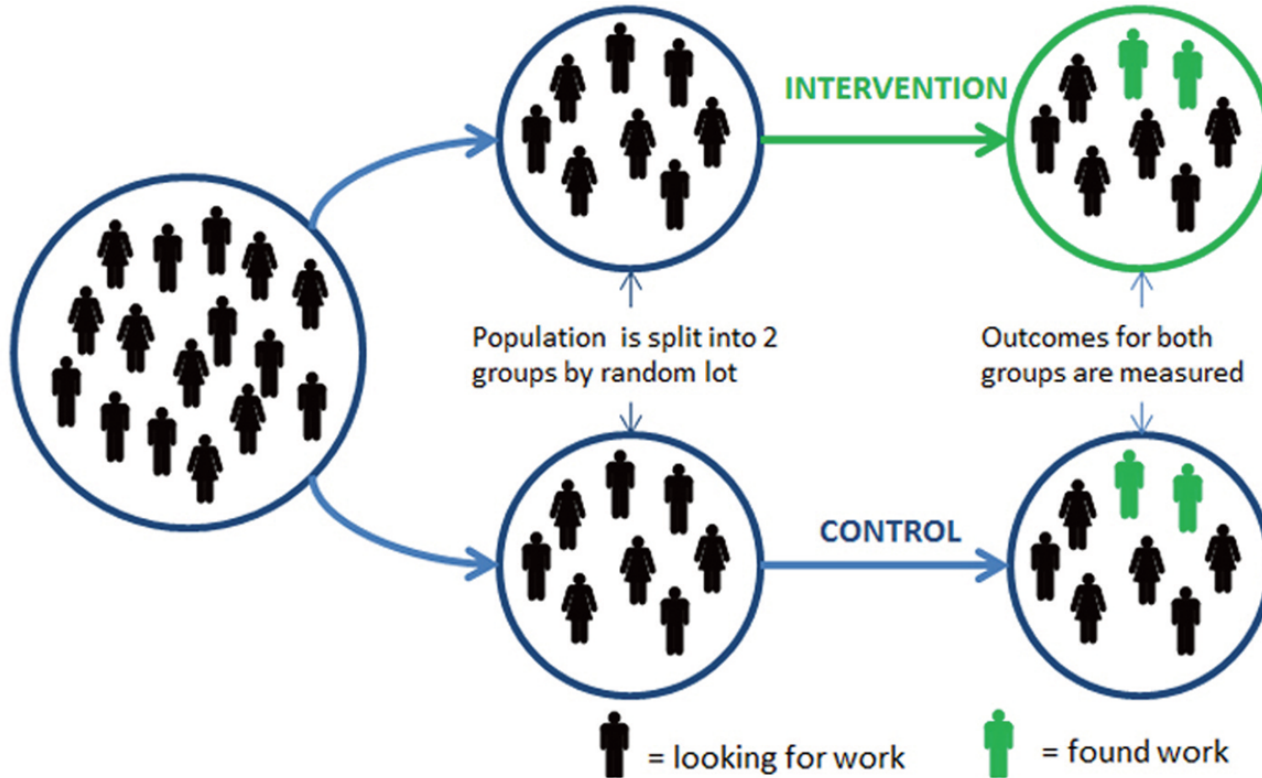
# Are these meaningful results?

- Results remain preliminary.
- Assessing the full benefits and costs (including facilities' compliance costs) is not feasible at this time.
- But ...
  - Direct implementation costs were low. We estimate typical compliance costs of < \$600 one-time outlay per facility.
  - Associated changes in pollution and compliance were meaningful for at least some facilities.
  - Regulatory impact analyses apply social benefit estimates of \$300 - \$2000 / ton BOD or TSS avoided.
  - With virtually any assumption asserting that reducing water pollution is a socially beneficial activity, signage programs are likely be cost effective relative to other water pollution programs (holding abatement costs constant across programs).

# Some lessons

- This has been a productive and fun project!
- However, an evaluation partnership (beginning before the program was implemented) would have been preferable.
- This is generically true ...
  - Better two-way communication between researchers and agencies.
  - Agencies get feedback on policy design and implementation ex-ante.
  - Agencies and researchers get a more reliable evaluation.
  - Researchers get credible institutional knowledge and better data.
  - Faster evaluation results.
- In this case, a simple RCT would have been faster, inexpensive, and more reliable.

# Randomized Controlled Trials (RCTs)



Source – In 2012, Laura Haynes, Owain Service, Ben Goldacre & David Torgerson “Test, Learn, Adapt: Developing Public Policy with Randomised Controlled Trials,” as cited in Paul Ferraro (2017), “Evidence-based programs to improve compliance: testing ideas with experimental project designs.”

Worth remembering: all agencies run many experiments every year....



- Source – McCracken, Teresa, as cited in Paul Ferraro (2017), "Evidence-based programs to improve compliance: testing ideas with experimental project designs."

# QUESTIONS or COMMENTS?

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- [www.jayshimshack.com](http://www.jayshimshack.com) .
- I will post a written information disclosure overview, with full citations, in the next day or so. The title will be “Information Provision.”