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TRUTH-TELLING IN THIRD-PARTY AUDITS

Changing the market for environmental audits to incentivize accurate reporting in Gujarat, India made auditors more likely to report the truth about industrial plants' pollution levels and, in response, industrial plants polluted less.

Featuring an evaluation by Esther Duflo, Michael Greenstone, Rohini Pande, and Nicholas Ryan

VIPIN AWATRAMANI

Rapid industrial growth in countries like China and India has greatly reduced poverty, but it has also led to severe air and water pollution, which cause people to lead shorter and sicker lives. The World Health Organization estimates that urban air pollution causes 1.3 million deaths worldwide per year, most of which are in middle-income countries. According to the World Bank, the annual cost of environmental degradation in India amounts to nearly 6 percent of the country's 2009 gross domestic product.

One way to curb such pollution is through third-party audits. Around the world, governments use third-party audits to monitor compliance with regulations in health, safety, finance, and the environment. Yet in virtually all cases, auditors are paid by and report to the company they are auditing, creating a conflict of interest for the auditor. Auditors may have incentives to distort or falsify their reporting to maintain business in such a system. Moreover, if auditors do not report the truth, there is no reason for the parties being regulated to try to comply, since regulators do not have the information necessary to punish violators.

In 1996, the Indian state of Gujarat sought to strengthen its environmental regulatory framework by introducing the first third-party environmental audit system in India. The initial system, however, was found to produce unreliable information about pollution. Recognizing this problem, the Gujarat Pollution Control Board (GPCB) sought out researchers to help reform the audit market in 2009. The goal of reform was to improve the accuracy of audit reports and, ultimately, compliance with environmental regulation.

The GPCB and researchers jointly designed and evaluated a reform in which auditors were randomly assigned to industrial plants, paid from a common pool, monitored for accuracy, and paid a bonus for accurate reports. The research team was led by J-PAL affiliates Esther Duflo (MIT), Michael Greenstone (MIT), and Rohini Pande (Harvard), along with Nicholas Ryan (Harvard).

When auditors were hired and paid by the firms they were auditing, as is the case in the status quo audit system, false reporting and pollution were high. Auditors systematically reported plant emissions just below the government standard, although true emissions were typically higher. For example, for particulate matter—a harmful air pollutant—auditors reported that only 7 percent of industrial plants violated the government standard when in reality 59 percent were emitting more than the standard.

The new audit system led auditors to report pollution more truthfully and substantially lowered the number of plants that were falsely reported as compliant with pollution standards. In the restructured auditor market, the accuracy of auditor reports increased significantly: the auditors were 23 percentage points (80 percent) less likely to falsely report a pollution reading as in compliance with the relevant regulatory standard. Additionally, their reported pollution readings were 50–70 percent higher than those of auditors working in the status quo system.

Industrial plants reduced pollution in response to more accurate audits. Plants facing the new audit system reduced pollution by 0.21 standard deviations on average. These pollution reductions came from the highest-polluting plants, which historically were the most likely to be penalized for violating pollution standards.

EVALUATION

Gujarat is one of India's fastest growing industrial states. Since 1992, net state domestic product has grown at 8 percent per year on average. It produces about one-fifth of the country's manufacturing output. Industrial growth has been accompanied by air and water quality degradation, which persist in some industrial areas despite strict statutory regulations.

Over the past decade, Gujarat has made strong commitments to sustainable development, making large investments in environmental infrastructure and building a robust regulatory framework to limit pollution. The Gujarat Pollution Control Board (GPCB) is responsible for enforcing national pollution laws and regulations within the state. In 1996, the High Court of Gujarat instituted a third-party audit system to help the GPCB better enforce pollution limits. All plants with high pollution potential are required to submit a yearly environmental audit conducted by an external auditing firm hired and paid for by the plant. Auditors measure plants' air and water pollution three times a year and submit an annual report of their findings to the GPCB.

The GPCB can issue a variety of penalties if companies violate pollution standards, from warnings and fines to plant closure and disconnection of water and electricity for the worst violators. The GPCB has indeed often used these penalties when there is clear evidence of violations; for example, almost 10 percent of plants had had their utilities disconnected for at least some period of time in the year before the evaluation. Yet, before this evaluation was conducted in 2009, auditors, industrial plants, and the GPCB agreed that the audit system was providing unreliable information about pollution emissions.

Researchers partnered with the GPCB to test the effectiveness of an improved third-party audit system on audit accuracy and pollution. From a sample of 473 industrial plants in Ahmedabad and Surat, the two largest cities in Gujarat, 233 were randomly assigned to receive a new audit system in which auditors were randomly assigned to the industrial plants they would monitor, paid from a common pool, and monitored for accuracy. The remaining 240 plants served as the comparison group and remained in the status quo audit system.

To measure audit accuracy, researchers compared the pollution readings from auditors' reports to the pollution readings from the independent backchecks. Auditors and backcheckers used the same technology and standardized procedures to measure pollution, looking at six water pollutants, including biochemical oxygen demand, chemical oxygen demand, and total dissolved and suspended solids, and three air pollutants: sulfur dioxide, nitrogen oxides, and suspended particulate matter. Backchecks were conducted in a random subset of plants soon after auditors had measured pollution in those plants in 2009 and 2010. They were also conducted in all plants one year after the new audit system was in place. This allowed researchers to directly measure auditors' accuracy under the status quo and new systems as the difference between the auditor and backcheck pollution readings. This measurement is unique as it is generally not possible to observe the truthfulness of auditor reports in other contexts.

	COMPARISON GROUP: STATUS QUO AUDIT SYSTEM	TREATMENT GROUP: NEW AUDIT SYSTEM
AUDITOR SECTION	Plants selected and paid their own auditors.	Auditors were randomly assigned to the plants that they would monitor.
AUDITOR FEES	Plants paid auditors directly and negotiated the price of the audit.	Auditors were paid a fixed fee of 45,000 rupees per audit from a common pool.
MONITORING	Auditors' reports were not verified for accuracy.	Twenty percent of auditor pollution readings were randomly selected to be **double checked, or "backchecked,"** by the technical staff of independent engineering colleges. Auditors were aware that they might be backchecked, but were not told when.
ACCURACY INCENTIVES	None.	In year two, auditors were also given incentive payments for accurate reports.

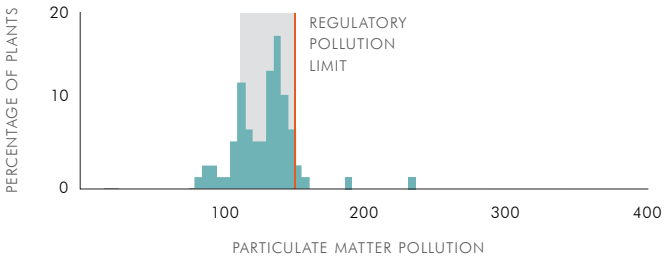
RESULTS

When auditors were hired and paid by the firms they were auditing, as in the status quo audit system, false reporting and pollution were high. Auditors in status quo plants were paid about 24,000 rupees per audit on average, which is well below the average cost of conducting a full audit at 40,000 rupees. This suggests that many auditors did not conduct all the tests needed to complete an audit properly.

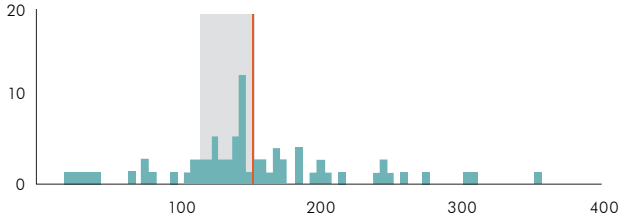
Twenty-nine percent of audit reports in comparison plants falsely reported pollution as below the relevant regulatory standard. For particulate matter pollution, auditors reported that 7 percent of plants violated the standard, while in fact 59 percent were in violation. They also reported that nearly three-quarters of plants polluted just below the standard, but the independent backchecks reveal that only 19 percent of plants polluted in this narrow range. This shows that auditors systematically reported firms as being narrowly compliant with national pollution standards (Figure 1, Graph a).

FIGURE 1. AUDITOR AND BACKCHECK REPORTS FOR PARTICULATE MATTER POLLUTION

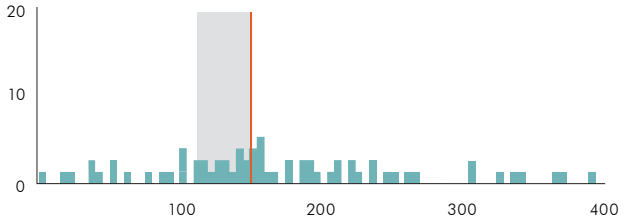
A. PLANTS WITH STATUS QUO AUDIT SYSTEM



B. PLANTS WITH NEW AUDIT SYSTEM



C. INDEPENDENT BACKCHECKS IN PLANTS WITH STATUS QUO AUDIT SYSTEM

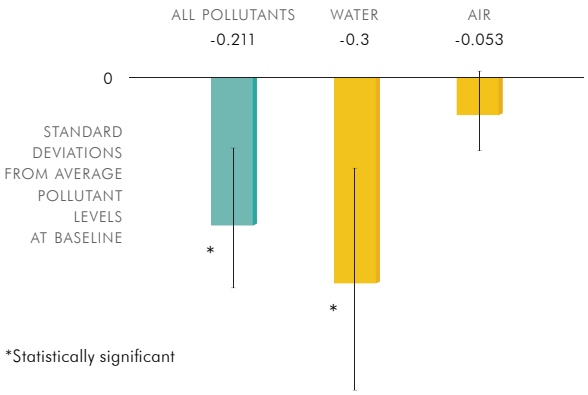


The new audit system led auditors to report pollution more truthfully and substantially lowered the number of plants that were falsely reported as compliant with pollution standards. Relative to auditors in comparison plants, auditors working under the new system reported much higher pollution. They were also 23 percentage points (or 80 percent) less likely to falsely report a pollution reading as compliant with the relevant regulatory standard. Auditors working under the new system also reported that far fewer plants were polluting right below the standard (Figure 1, Graph b). However, their reports still bunched a little beneath the standard, relative to the true pollution readings (Figure 1, Graph c).

Since some auditors worked in both treatment and comparison plants, researchers were able to compare their behavior under both audit systems. They found that the same auditors reported pollution more accurately under the new system than they did in comparison plants that they were auditing at the same time. This shows that the increased accuracy was due to the new audit system and not to treatment plants having better auditors or auditing firms with more financial resources.

Industrial plants reduced pollution in response to more accurate audits. Plants facing the new auditing system reduced pollution by 0.21 standard deviations on average (Figure 2). This reduction is driven by an even larger reduction in water pollution, which is a top regulatory priority for the GPCB. The pollution reductions came from the highest-polluting plants. In practice, the GPCB reserves the harshest penalties, like plant closure, for plants with readings that significantly exceed the standard. This is reflected in the fact that the dirtiest plants responded by reducing emissions the most.

FIGURE 2. NEW AUDIT SYSTEM LED PLANTS TO REDUCE POLLUTION



POLICY LESSONS

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When auditors are chosen and paid by the firms they are auditing, third-party audit systems may yield very inaccurate reports. In Gujarat, when auditors were hired and paid by the plants they were auditing, they did not provide regulators with reliable information about pollution. There is evidence that many auditors did not even conduct all the tests necessary to complete a full audit. If they are to be an effective policy tool for enforcing regulation, third-party audit systems must be designed to incentivize accurate reporting.

Resolving this conflict of interest can lead to more accurate reporting. Randomly assigning auditors to industrial plants, paying them a fixed fee from a central pool, and double checking their accuracy led auditors to report industrial pollution much more accurately.

When the environmental regulator received better information about pollution levels, industrial plants responded. In response to more accurate pollution audits, the dirtiest industrial plants reduced their emissions substantially. This suggests that plants may also change their behavior if the regulator obtained more accurate information through other means, such as its own inspections or better emissions monitoring technologies.

Eliminating conflicts of interest for auditors could improve third-party audit systems in other sectors beyond environmental regulation. The core problem in Gujarat's environmental audit system—that auditors had poor incentives to report pollution levels accurately when they were chosen and paid by the firms they audited—exists in virtually all other third-party audit systems. This evaluation provides the first-ever findings on removing the fundamental conflict of interest that characterizes third-party audit markets. It seems reasonable to assume that a version of these reforms adapted to the particular institutional features of other third-party audit markets would produce similar results.

Featured Evaluation: Duflo, Esther, Michael Greenstone, Rohini Pande, and Nicholas Ryan. 2013. "Truth-Telling by Third-Party Auditors and the Response of Polluting Firms: Experimental Evidence from India." *The Quarterly Journal of Economics* 128(4): 1-49.

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