CHAPTER TWENTY-THREE

CANADA'S SYDNEY TAR PONDS: CONFLICTING INTERESTS RESULTING IN A CASE OF SUPPRESSION BIAS AND SOCIAL INJUSTICE?

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"Industry's offensive against the regulation of health and safety hazards uses academics to downplay or deny the seriousness of the hazards..."
—Clayson and Halpern, 1983

The Problem

In this case study from Sydney, Cape Breton Island, Nova Scotia, Canada, the wanton disregard for environmental safeguards — through coal mining, coking operations and steel production effluents discarded over many decades into the Sydney area and harbour — has served to create the Sydney Tar Ponds. For decades, Sydney has remained one of Canada's worst industrially contaminated sites.

The ownership of these industrial operations has been held in more recent decades by provincial and federal authorities whose jurisdiction also includes public health.

This chapter exposes conflicting interests and raises profound questions of social injustice in Canada. Despite knowledge and awareness of carcinogenic hazards to both workers and the local community, no analytical health studies — normative at that time — were ever undertaken to our knowledge, thereby suppressing the opportunity to develop compelling evidence in response to expressed community health concerns.

Justice now is being sought in Nova Scotia's first environmental class action law suit, a process that has taken some seven years thus far, but, at time of this writing, remains at the class action certification stage.

Historical Context

Why is Context Important in a Case Study?

Coal, coking and steel manufacturing are large-scale industrial undertakings that can bring great prosperity. However, as with any economic activity, near-sighted planning can bring untoward consequences. Profit-seeking and political kowtowing can obscure the vision and well-being of a whole province, its leaders and its citizens. Lessons learned from past experiences can serve to pave the way for preventing future harms, especially if we can influence change at the policy level.

In this ethical-legal analysis of the Sydney Tar Ponds, consideration of context is essential for understanding normative frameworks prevailing in the period under review, stakeholder viewpoints and actions, and the present status of the case.

The Historical Context of Cape Breton's Steel Industry, According to Abbass (2006)

Cape Breton Island, re-annexed to the province of Nova Scotia in 1820, was recognised in 1672 as the first place in North America for its coal reserves. With Cape Breton's trade in coal beginning as a regular, authorised and systematic business in 1766, General Mining Association Limited (**GMA**) was organised in 1825. By 1827, GMA held possession of all of Nova Scotia's mines and minerals, including Cape Breton and, as a company, pioneered coal mining, not only in Cape Breton, but in all of Canada. Coal became the basis for Nova Scotia's prosperity, and the basis for successful manufacturing enterprises in both Nova Scotia and throughout Canada.

Between 1830 and 1834, GMA opened coal mines, built a foundry and built a railway three miles in length, from the Sydney-area coal mines to their newly-built, coal-shipping pier in North Sydney. In 1858, the final and complete transfer of authority over the mineral wealth of the province of Nova Scotia was transferred from the Imperial Government to the Provincial Government of Nova Scotia, and the mines were again leased to the GMA.

After Cape Breton's first economic boom, the town of Sydney was incorporated in 1885 (population 2,300). The opening of a coal mine in Reserve, and building a railway to Sydney, provided a port for shipments of coal abroad; the town further developed through the exploitation of the broader region's coal reserves for the production of steel in Sydney. At the

turn of the century (1900), industrial developments continued, with Sydney becoming a major provider of its products to North America and Great Britain, and also to the West Indies, South America and Germany.

Incorporation of the Dominion Coal Company (**Domco**) was effected in 1893 by Boston financier Henry Whitney with a syndicate of American and Canadian investors. Domco constructed the Sydney & Louisbourg Railway, connecting all of the various mines to piers at Sydney and Louisbourg, Nova Scotia.

In 1900, Nova Scotia Steel Company purchased the Sydney Mines assets of the GMA. They enlarged their name to Nova Scotia Steel and Coal Company Limited (**Scotia**) and continued with major industrial expansion as the hub of economic activity and growth in the region, coal and steel production being the major single employer. By 1900, a steel plant was being built in Sydney with close ties to business interests in Boston, Massachusetts, USA.

With the rapid development of expanding coal and steel manufacturing operations around the Sydney industrial base and harbour, the first blast furnace of the newly-established Dominion Iron & Steel Company (**Disco**) was lit on December 19, 1900. Disco created employment at good wages that led to an enormous influx of carpenters, masons, bricklayers, machinists and labourers. Nova Scotians who had sought work in the USA were able to return home, and the eyes of the world were on Sydney. On February 3, 1903, Sydney was incorporated as a city with a population of about 16,000. By 1904, technical innovations led to tar being used for fuel in the open hearth furnaces.

With the backdrop of feedstock quality challenges, business conflicts and financial investment opportunities, a new corporation was formed by 1907, the **Dominion Steel Corporation**, which was by no means independent of Disco and Domco interests. Indeed, Disco was producing almost half of all steel used across Canada. Based upon investor interest in 1917, control was taken of Scotia and a merger with Disco was attempted.

Until 1920, the Sydney steel plant was the focus of attention for American, British and Canadian investors. Disco, owned by the Dominion Steel Company (which also controlled Domco), had become a huge conglomerate. In April 1921, British Empire Steel Corporation (**Besco**) was incorporated, uniting Disco and Scotia to become the largest consolidation in the British Empire, and second only to US Steel Corporation on the American continent. This was an all-British corporation including English, Canadian, Australian, Indian and South African investors.

The post-World War I years brought falling prices for coal, ore and steel, with intense competition for Canada from the USA and Europe.

Attempts to reduce the workers' wages led to industrial strife in Nova Scotia until 1925. Provincial and federal police in strike actions were aligned with Besco. In 1923 and 1925, pitched battles raged between workers and police.

Workers died in Canada's first coal mine disaster in Nova Scotia in 1873; between 1917 and 1969, 234 men died in the Pictou County pits alone.

Fiscal turbulence describes the steel markets and the questionable economic viability of the Nova Scotia steel industry from the end of World War I through 1928, when control of Dominion Steel Corporation was purchased by Toronto investors. In 1930, investors from central Canada reorganised Disco as the Dominion Steel & Coal Company Limited (**Dosco**), implementing significant expansion to its production facilities over the next several years.

In 1942, the Federal Government of Canada provided funds for further expansion to the facilities; by 1949, 50 years into the plant's existence, still more spending was required to modernise it. In 1951, all steel-makers in Canada initiated big expansion programmes to meet the rising demand for steel. Throughout, the production capacity was significantly increased.

By 1957, with a payroll including some 4,500 employees, the profitable Sydney steel plant, Dosco, was about to set a yearly production record. Then, **Hawker Siddeley**, a company based in the United Kingdom and one of Canada's fastest growing holding companies, was preparing to acquire control of Dosco through its Canadian subsidiary, **A.V. Roe (Canada)**. Sydney was then the eastern Canadian steel capital. A.V. Roe (Canada), in its 12 years of operations, never paid any dividends to parent company Hawker Siddeley and, instead, reinvested to grow the company. Blast furnaces, spewing an average of 150 tons of dust each month on parts of the Whitney Pier area, painted rainbows on windows, ruined hanged clothes and stripped paint off houses (Abbass, 2006). Had a $6 million cindering plant been installed, these effects could have been mitigated. The Sydney steel plant occupied 546 acres and consumed on average 60,000 net tons of coal each month. By 1960, Dosco had emerged as a great industrial empire.

The More Recent Context: Decline and Demise of an Industry, According to Abbass (2006)

Since 1960, no new technology was introduced into the steel plant, and no new diversification took place. By 1966, with a new steel plant in Quebec employing some 2,500 workers, layoffs took place in Sydney,

reducing the workforce to some 3,000. The Sydney plant was left producing only semi-finished steel. In April 1966, Dosco announced the closure of all coal mining operations. In response, the federal government created the Cape Breton Development Corporation (**Devco**) to assume control of the coal mines. When the coal mines closed later that year in Newfoundland, the provincial government took them over, but did not operate them.

In October 1967, Hawker Siddeley announced the formal shutdown of the Dosco Sydney steel plant, which had been the engine of Cape Breton's economy since 1900. Hawker Siddeley was under no obligation to further develop the industry or the region in the national interest, or for the common good. It thus made no effort to take the economic development of Nova Scotia into account. Faced with the prospect of seeing the local area become a ghost town, the Province of Nova Scotia took ownership of the Sydney steel plant in 1967, with the federal government providing an operating grant. A **crown corporation** was formed, and in 1968, all ties between Hawker Siddeley and the now named Sydney Steel Corporation (**Sysco**) were severed. New markets were found in Mexico, Chile, South Korea and the USA, and an operating profit was announced that year (and through 1970), resulting in a government grant for further expansion despite production levels being lower than what they had been four years previously.

From 1972-1975, Sysco underwent a multi-million dollar modernization. Sysco invested in an oxygen plant, a lime burning plant, installed vacuum degassing equipment and bought two new casters, among other expensive investments in equipment. It turned out that the performance efficiency of any new environmental equipment was undermined by the absence of basic oxygen furnaces which had been recommended by consultants. Millions of dollars had been wasted along with a continuing absence of control over industrial emissions.

The Nova Scotia government tried to further facilitate expansion of the steel industry in the region after the permanent workforce was reduced to 2,150 in 1980. With the federal government investing 80% and the province 20%, phase one of a 10-year modernization plan began in 1981, but by 1986, with market uncertainties, the future of Sysco came into doubt. However, the plan went ahead and operations were in full cycle in 1990. At this time, Sysco employed 1,350 full-time workers. However, beset with design and management issues, the Sydney steel pant was closed in 2000. It is claimed that Sysco cost the taxpayers $3 billion over 33 years.

Despite community appeals to keep a reduced-sized plant in operation, the province liquidated Sysco's capital assets between 2001 and 2004. The plant required $10 million to tear down most of the remaining structures, and to clean up chemicals left on the grounds of the 450 hectare site in the heart of the city. Taxpayers had to contribute some $23 million to the clean-up. Workers removed 50,000 kg of PCBs placed for containment in the plant's brick house, 600,000 kg of asbestos-tainted material, two bunker fuel storage tanks, 3 km of underground fuel and coke oven tar lines, and 1.4 million kg of other potentially toxic chemicals.

Omissions of Note in Abbass (2006)

First, while alluded to in Abbass (2006), early stakeholders were mostly preoccupied with profit and were given relative free rein by the provincial government to operate. Then, when profits began to fluctuate, the government took over as the main stakeholder for political reasons. At no point in time did anyone appear to entertain a global or long-term vision of the impacts of this industry on the province or its people.

Second, in addition to deaths from mining accidents, morbidity and mortality associated with exposures to toxic pollutants from the region's industrial activities were not accounted for in considering the human toll of economic growth.

Third, no mention of which we are aware is made of any likely community health concerns (which we now know were prevalent, including concerns about risks of cancer, adverse reproductive outcomes, respiratory disease and other adverse health outcomes), except to note the role of government in protecting environmental and human health and that this ought to have been on record. Indeed, community health started to be formally investigated in the 1970s, which must have been triggered by some expressed concerns. Although formal exposure assessments and air pollution studies started in the late 1950s, human health research was not initiated until the late 1970s. It was only later in the 1990s and early 2000s that more intensive enquiry into both exposure assessment and human health effects took place.

Fourth, and finally, various immigrant communities of all ethnicities and cultures from around the world came to work in Sydney. These groups were economically disadvantaged, and came seeking employment and opportunities for their families. Most egregious is the fact that there was no regard for environmental protections from the disposal of industrial wastes and, exposures long-established as definitive human carcinogens, were permitted to saturate these communities over decades.

Background to Scientific Considerations

The discipline of epidemiology is the science basic to informing policy relating to the protection of public health. Epidemiology is the field that investigates the causes of health problems, and provides the evidence for polices aimed at reducing harms by preventing disease and premature mortality at the community level. However, policy is influenced by many forces/interests that the epidemiologist must recognise. In particular, it is the role of applied sciences, such as epidemiology, to submit the best possible replicable assessments into the policy debate.

Environmental epidemiology is a sub-specialty of epidemiology in which the health effects on populations from exposures to physical, chemical and biological agents external to the human body are studied. We try to clarify the relationships between exogenous factors and host susceptibility factors.

Any organisation, group or individual whose primary interests are not consistent with those of public health can obstruct the advancement of knowledge. Forces that support the *status quo* can operate to influence whether a research question is pursued, or the nature of the questions that scientists ask, leading to Suppression/Oppression Bias. Research Suppression (or Oppression) is the act of obstructing the conduct of a study or the release of its findings, an unethical activity when imposed for reasons other than concern for scientific validity and objectivity (Porta, 2008). "Suppression Bias" undermines public health because it distorts and delays the discovery of scientific information on health risks.

Research suppression operates at the interest group level such as from government, industry, the scientific community, or by any other group or individual with a vested interest in maintaining the *status quo*. Suppression can be motivated, for instance, by financial or ideological interests that a topic not be researched or reported on, or even by professional jealousy.

Such acts deny the fundamental principle of advancing scientific knowledge, namely that of research in pursuit of the public interest. Research suppression can lead to:

- an absence of evidence;
- bias in a purported risk factor-disease association in the literature; and
- a decrease in the precision of that association's estimate of risk.

Certainly as taught since the 1960s, epidemiological leads may be generated from numerous sources, including anecdotal evidence, case studies and descriptive analyses, which then can be verified through the rigorous application of analytic epidemiological methods (Figure 23-1).

Figure 23-1. Hierarchy of Epidemiology Study Designs*

Descriptive/Observational Studies (hypothesis generating)
- ❖ Population-based (correlation studies)
- ❖ Individual-based
  - Case/anecdotal reports
  - Case series
  - Cross-sectional/prevalence surveys

Analytic Studies (hypothesis testing)
- ❖ Controlled observational studies
  - Case-control studies
  - Cohort studies (retrospective/prospective)
- ❖ Controlled intervention studies
  - Randomised controlled trials (RCTs)

* The lower down on the chart, the greater the complexity and cost. Most often, RCTs are unethical in environmental epidemiology.

The epidemiological method requires prudent approaches to research by first taking advantage of existing data sources resulting in more descriptive research. These methods are generally cheaper and quicker than more sophisticated research, warranted when the index of suspicion about potential contaminants is further confirmed by descriptive studies. Where further research is called for to test hypotheses, this can take the form of more complex study designs such as case-control or cohort studies.

Figure 1, however, does present an early paradigmatic approach for reducing uncertainties in building a body of evidence about cause and effect. Since then, our body of knowledge about disease mechanisms has grown such that the need to replicate the findings from studies done elsewhere on local populations subjected to similar exposure circumstances is less justified for informing health policy. Certainly, more research is almost always beneficial to advance scientific understanding and to reduce uncertainties, but it has no place in public health policy. For policy, prudence requires that we err on the side of caution, particularly with established carcinogens, when there is no justification to believe that local

populations would be immune from what has impacted populations elsewhere. Hence, even in the absence of epidemiological data at the local level, but in the presence of knowledge about the exposure circumstance of a population, action based on knowledge gleaned elsewhere is the responsible approach to be taken locally. To do otherwise is to delay action at the expense of both local environmental and community health and well-being.

This more robust approach to applying the epidemiological method brings into focus even more starkly the suppression of evidence. Consideration of the epidemiological tools available to environmental epidemiologists is relevant to this analysis of the Sydney Tar Ponds in two ways: (1) the types of studies that should have been conducted, given the nature of the contaminants and the extent of contamination; and (2) the data that were evaluated in our weight of evidence analysis of the relationship between exposures and disease risk in this community.

Method

The authors were retained as expert witnesses/consultants on behalf of the community (plaintiffs) to evaluate and opine about the community's position that it has suffered harm due to exposures sustained from the Sydney Tar Ponds. We accessed and reviewed the published and grey literature pertaining to health effects of exposure among occupational cohorts and communities to the hazardous substances that have polluted the area of Sydney for the past some 100 years. In addition, we reviewed exposure assessment reports, epidemiological studies and all relevant health research relating specifically to the population of Sydney. The exposures that were sustained by workers in the industrial facilities in Sydney, as well as by the general population in the community, have been recognised for decades — and in some cases for over 200 years — to be highly toxic and carcinogenic. These contaminants include soots, tars, petroleum by-products, polycyclic aromatic hydrocarbons, particulate matter, polychlorinated biphenyls, heavy metals and volatile organic compounds.

In the evaluation of reports or studies specific to the Sydney community, each accessible report was evaluated according to its methodological strengths and weaknesses, and its place in the hierarchy of epidemiological study designs, ranging from descriptive (hypothesis generating) to more complex analytical (hypothesis testing) study designs. In considering the weight of the evidence, we were concerned with the following questions: (1) What do we know from the general epidemiological and toxicological literature about the health risks of exposure to the contaminants of concern? (2) What should the entities with authority over industrial and public health activities have done in order to protect the health of the public, evaluate health status/risks and monitor the community, in light of the exposures sustained? (3) What is the state of evidence, including presence/absence of data from the affected community, about health risks?

More so in the past, the epidemiological framework of study designs, from anecdotal evidence, to observational studies, to experimental studies, as noted above, provides a framework for advancing knowledge about exposures that could be damaging to public health. Epidemiologists play an important role in communicating to public health agencies and other authorities about the need to conduct more sophisticated studies, if justified from findings derived from designs lower in the hierarchy (Fig.1).

Analysis and Results

Despite the large body of general epidemiological evidence for human health harms due to exposures from the Sydney Tar Ponds, long-known to be carcinogenic, risk evaluations conducted by governmental agencies, consultants hired by the government and academic researchers over decades generally carried out only anecdotal and descriptive assessments, all designed at the lower end of the hierarchy of epidemiology enquiry. Based upon the failure to conduct more definitive analytical epidemiological assessments of worker cohorts, or of community health impacts, despite having been proposed, our review revealed that the scientific body of evidence to demonstrate health effects in this specific community remains unnecessarily incomplete.

A total of six epidemiological studies relating to Sydney and Cape Breton County, Nova Scotia, were conducted over the period 1985 through 2006 (Band et al, 1998; Burra et al, 2006, Dodds and Seviour, 2001; Veugelers and Guernsey, 1999; Guernsey et al, 2000; and Mao et al, 1985). Three of the studies were ecologic mortality studies (Band et al, 1998; Veugelers and Guernsey, 1999; and Mao et al, 1985); there were two studies of reproductive outcomes (Burra et al, 2006; and Dodds and Seviour, 2001); and there was one ecologic study of cancer incidence rates (Guernsey et al, 2000). All six studies demonstrated increased risk of disease in Sydney/Cape Breton County compared to reference populations (Nova Scotia or Canada), and four studies showed that closer proximity to the Tar Ponds was associated with increased risk of disease. Despite the consistency of these finding, and the voluminous epidemiological literature about the health risks of exposure to the contaminants in the

community, the findings of elevated risks of disease were dismissed by public health authorities as inconclusive, or were attributed to other factors.

Applied in the context of environmental determinants of health, epidemiology has been subjected to pressures that result in work that is not in the public interest; and, also in the failure to conduct research that ought to have been done to address a public health concern. These pressures can emerge from "Suppression Bias" which results from actions aimed at obstructing the conduct or publication of research. A bias is thereby produced in the available evidence on the relationships between exposures and health outcomes. An organization, a group or an individual whose priority interests are not consistent with those of public health can be obstructive to advancing knowledge. Suppression bias may, in turn, lead to publication bias. It undermines public health because it distorts and delays the discovery of scientific knowledge on health risks, and it compromises credibility in science and administrative processes for assessing and preventing exposure to hazards or risks. In the realm of litigation, such as toxic and environmental tort cases, the absence or paucity of epidemiological evidence may preclude the establishment of a causal link between exposure and disease, thereby enabling the continuation of harmful exposures or obstructing fair compensation for harm.

Today, it is recognised that descriptive studies in the context of the full body of knowledge can, indeed, carry significant weight in deliberating the evidence for health harms. At the time of writing, and some seven years after its initiation, the Sydney Tar Ponds case continues to seek judicial approval to be heard as a class action law suit. In fact, in our view this process needed to be decided much more expeditiously, and thus raises questions of both conflicting interests and social injustice.

Conclusions and Implications

Any organization, group or individual whose primary interests are not consistent with those of public health can exercise influence by obstructing the advancement of knowledge. "Suppression Bias" can result. This undermines public health because it distorts and delays the discovery of scientific information on health risks.

The scientific evidence base for the relationship between exposure(s) and outcome(s) is often contested by industries or other actors that have vested interests in causal links between harmful exposures and outcomes not being established, sufficiently doubted or deemed irrelevant (Davis, 2007; Davis, 2010; Lewis et al, 1992; Markowitz and Rosner, 2002; McCulloch and Tweedale, 2008; McGarity and Wagner, 2008; Mehlman, 2009). The history of the tobacco industry since the middle of the 20th century provides a classic case of a prolonged effort to discredit the science which, even several decades ago, was demonstrating that smoking causes lung cancer. However, other industries have employed similar tactics of "manufacturing uncertainty" (Michaels, 2008); these include the lead industry, the chemicals and the plastics industries, and the asbestos industry (Michaels and Monforton, 2007).

Numerous tactics are used to discredit the science of determining exposure-effect relationships and/or to affect policy or regulation that attempts to limit or mitigate the exposure and its putative or actually established outcome(s). These tactics include claiming that cause-and-effect relationships have not been established; claiming that statistical data do not provide the answers; and affirming that more research is needed. Often the scientific base or individual studies are labelled "junk science" when no clear definition of this term is provided. Early advice to the tobacco industry by the company Hill and Knowlton is generally characteristic of these tactics (Oreskes and Conway, 2010).

At a time when descriptive studies were deemed less compelling than analytical studies, by funding only descriptive epidemiological research and by not facilitating the conduct of higher-level analytical studies of exposed workers and citizens, epidemiological evidence was denied to the Sydney community. This suppression of research in the exposed community occurred during a time when there was awareness among public health and industry officials of the dangers of exposure to the contaminants of concern, and of health concerns in the exposed population. Exposure assessments, descriptive and ecological studies, primarily carried out in the 1980s through the mid-2000s, demonstrated excess rates of various cancers and other health outcomes, and increased levels of dangerous pollutants, including particulates and benzo(a)pyrene, compared to control communities with coke ovens (Atwell et al, 1984; Lambert and Lane, 2004; Lambert et al, 2006). Health risks in the community were evident in the studies that were conducted, despite the low power of the studies, inappropriate control groups and other methodological weaknesses that diminished the ability of the studies to detect statistically significantly elevated rates of disease.

The fact that no occupational studies are known to have been undertaken is particularly indicative of suppression bias, especially in light of the known toxicity of the exposures, and the findings of Mao et al (1985) of excess mortality from pneumoconiosis among men in Cape Breton County during the period 1971-1983, using provincial mortality rates as the standard.

Furthermore, there was no regard for past, current or future environmental protection in the disposal of waste, which contained well-known human carcinogens. The Sydney harbour became an industrial dump site, infamously known as, if not the worst, one of Canada's most severely contaminated sites by cancer-causing substances recognised as such since Percival Pott's study of chimney sweeps over 200 years ago. Perhaps the motivation for technical innovations that might have respected the environment would have been stronger had the economic paradigm of the day required consideration, for instance, of the need to internalise costs related to the consequences of an environmental clean-up associated with the disposal of wastes into, among other locations, the Sydney Harbour, in the pricing of steel.

Continuing exposures, even after the plant was shut down, were well recognised even by the provincial and federal authorities. These hazardous substances could not possibly be limited to the Tar Ponds alone. Indeed, Band and Camus (1998) established extensive community exposure, not only in proximity to the Tar Ponds, but also through stack emissions to the broader Sydney community. Indeed, particulate pollution was dispersed over a wide geographical area.

Did conflicting interests interfere with governments' responsibility to protect public health? The provincial and federal governments misinformed workers and communities about the health effects associated with the high levels of industrial pollution that rained down on these communities for decades. Excess rates of disease have been dismissed by government authorities as attributable to "lifestyle factors" in the absence of adequately designed, controlled studies. By funding only descriptive epidemiological research and not facilitating/enabling the conduct of higher-level studies, epidemiological evidence was denied to the community. The Sydney community has been comprised of vulnerable immigrant populations seeking employment and safe haven. The question of environmental justice in this community must be considered, given the disadvantaged status of the population and workforce.

A critical aspect of conflicting interests in this case is the dual role of the government as owner of the industrial site, as well as the responsible authority regarding public health of Canadian citizens. The powerful interests and forces at work in the suppression/oppression of research are difficult to overcome, and great vigilance as well as personal integrity are required in order to follow ethical principles. This notion of integrity underlies the conduct of science, be it basic or applied. Because applied science has a more proximate relationship to the community in which the work has been done, there is a significant risk to the public when these

conflicts lead to biases, such as the suppression of evidence within this realm of research. Regardless of the nature of the conflicting interests, suppression bias threatens the validity of scientific evidence, the integrity of public health practitioners, and it undermines the credibility of public health policy.

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