MEDICINE AND SOCIETY

Corporate Vectors of Chronic Disease — Using Internal Industry Documents to Craft Counterstrategies

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Chronic or noncommunicable diseases, which include cancers, diabetes, neurocognitive disorders, and chronic respiratory disease, account for 74% of global deaths.[1,2] In the United States between 1990 and 2021, risk factors linked to commercial activity contributed to an increase by 175% in the incidence of cancer, 283% in diabetes, 133% in Parkinson's disease, and 75% in Alzheimer's disease or dementia.[1] Globally, five commercial products are key factors in 31% of all deaths each year: fossil fuels contribute to 8.1 million deaths, tobacco to 7.2 million, ultraprocessed foods to 2.3 million, chemicals (manufactured chemicals used in commerce and pesticides) to 1.8 million, and alcohol to 1.8 million.[1] An additional 600,000 deaths globally are attributable to drug use or overdose, primarily cases involving opioids.[3]

Transnational corporations that manufacture and market health-harming products are a primary vector for the global increase in mortality related to noncommunicable diseases. They make products (agents) and expose people (hosts) to these products or influence their consumption, which results in health harms.[4] Sales of such products have grown substantially, particularly in low- and middle-income countries (LMICs).[5] The World Health Organization (WHO) and some scholars, recognizing the complex, negative links between commercial industries and health, now speak of the "commercial determinants of health."[6] Economic globalization has intensified these adverse effects, which are exacerbating health inequities within and between countries. For example, 89% of ambient (outdoor) air pollution–related deaths occur in LMICs.[7]

Some commercial activity (e.g., the development and marketing of vaccines) benefits health. But publicly traded corporations, including those that make health-harming products, are legally obligated to maximize returns for their shareholders. Decades of legally recognized corporate "personhood" protected by the First Amendment of the U.S. Constitution have empowered companies in ways that harm both health and health policy.[8] U.S. campaign-finance laws place few restrictions on corporate donations to political parties and candidates that are responsible for reducing consumption or regulating health-harming commercial activity by such means as tobacco taxes[9,10] and air-quality standards.[11] Thus, the commercial determinants of health are closely linked to political determinants of health, the government actions (or inaction) that allow corporations to influence product regulation.[12]

We believe that the medical and health fields should prioritize research on, and communication about, risks to health associated with corporate activity.[13] Relevant empirical research can leverage internal industry documents obtained with the help of litigation, whistleblowers, and subpoenas under freedom-of-information laws. Research involving industry documents provides direct evidence in the form of firsthand accounts of industry workers regarding what they knew, when they knew it, and the tactics used to delay and prevent regulation and undermine existing regulations. Industry documents have shown, for example, that tobacco-company executives knew for decades that smoking caused cancer and that nicotine was addictive yet concealed this information from the public.[14] Research on commercial determinants of health using industry documents reveals that these tactics have also been deployed by multiple other health-harming industries.[15]

RESEARCH ON COMMON MECHANISMS

Research on the tobacco industry provides a blueprint for identifying and counteracting other corporate influences on health. For example, exami-

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nation of material archived in the University of California, San Francisco (UCSF), Industry Documents Library (IDL), which was created in 2002, has led to more than 1000 peer-reviewed scholarly publications, government reports, and news articles that were instrumental in bringing about changes to tobacco policy.[16] Tobacco-documents research led to sweeping policy changes in the United States, including federal and state tax increases, state and local smoke-free policies, policies to end sales of flavored tobacco products, the 1998 Master Settlement Agreement, and a federal lawsuit that found the major tobacco companies in violation of the Racketeer Influenced and Corrupt Organizations Act (RICO).[17,18] They also led to the WHO Framework Convention on Tobacco Control, including a provision (Article 5.3) limiting policymakers' engagement with the tobacco industry when they are developing tobacco-related health policies.[19] As a result, smoking prevalence has declined in several high-income countries and is declining in LMICs, and more than 37 million lives have been saved to date.[20] Similar conventions could be developed for other industries.[12]

The UCSF IDL has expanded to include documents from numerous other health-harming industries, becoming a vast, full-text–searchable, public archive.[16] It contains more than 24 million documents from six health-harming industries: tobacco, drug (pharmaceutical), opioid, fossil fuel, food, and chemical (Table S1 in the Supplementary Appendix, available with the full text of this article at NEJM.org). By enabling researchers to uncover the mechanisms and tactics commonly used by corporations in health-harming industries, it can facilitate the development of approaches to reducing or eliminating the health harms in question. These wide-ranging harms include cancers, adverse birth outcomes, cardiovascular disease, diabetes, and neurodevelopmental and neurodegenerative disorders[21-26] — many of which are increasing in incidence.

Industry documents show that three key mechanisms are commonly deployed by the six industries represented in the IDL: knowledge capture (influence over science exploring corporate products and their health effects),[27,28] regulatory or policy capture (influence over decision making, regulation, and agenda setting),[29,30] and shaping of the public narrative (influence over the public's preferences for products and perceptions of both harm and the role of personal responsibility)[31,32] (Table S2).[6,33]

KNOWLEDGE CAPTURE

Health-harming corporations use common tactics to corrupt scientific data, including influencing research questions, attacking and discrediting independent science and scientists who do not support the industry's position, suppressing scientific data on the health harms of their products, and sponsoring research that downplays those harms.[27,28]

For example, the primary U.S. manufacturers of perfluoroalkyl and polyfluoroalkyl substances (PFAS) — DuPont and 3M — used multiple tactics to downplay evidence of PFAS toxicity, including successfully suppressing for more than 20 years internal studies showing adverse effects of PFAS (Supplementary File 3, Study 1, in the Supplementary Appendix).[15] As early as 1961, the chief of toxicology for one DuPont brand knew that PFAS had "the ability to increase the size of the liver of rats at low doses" and recommended that the chemicals be handled with "extreme care."[34] In 1980, DuPont and 3M learned that two of eight DuPont employees who had been pregnant while working at the company gave birth to children with eye or facial defects.[35] DuPont hid this information from employees, claiming that "there has been no known evidence that our employees have been exposed to C-8 levels that pose adverse health effects" (C8 is perfluorooctanoic acid, or PFOA).[36] Suppression of these data allowed DuPont and 3M to continue to use PFOA and PFOS (perfluorooctanesulfonic acid) in the United States, and such use led to widespread human exposure. These chemicals were assumed to be safe until their phaseouts in 2015 and 2002, respectively, with U.S. manufacturers having eliminated PFOA emissions and product content.[15,37,38]

In another case of knowledge capture, the sugar industry funded scientists and research in the United States that concluded that saturated fat was the main nutritional cause of coronary heart disease, deflecting blame that should have been placed on sugar (Supplementary File 3, Study 2).[39] Sugar-sweetened beverages are now known driv-

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ers of obesity, with 59% of the global population being overweight or obese.[40]

REGULATORY AND POLICY CAPTURE

Many industries also seek to manipulate policy and regulation to create favorable environments for their products. Documented tactics include direct lobbying, including that done by "front groups" (seemingly independent organizations that are actually funded or controlled by another entity such as a corporation) and trade associations; the "revolving door" approach that allows officials to move back and forth between government and industry; and direct participation in governmental agencies.[29,30,41] Despite competing with one another in the marketplace, companies in health-harming industries often collaborate in efforts to prevent government from issuing regulations that might diminish their industries' overall power or reach.

The tobacco industry collaborated with the alcohol industry and trade groups and used front groups to undermine taxes and laws protecting the cleanliness of indoor air in the United States (Supplementary File 3, Study 3). The Tobacco Institute created the "Consumer Tax Alliance" to oppose a cigarette tax increase and proposed that the California Beer Association and other alcohol industry groups provide majority funding for the coalition, giving the impression that a broad coalition opposed the tax.[42] Although the tobacco industry failed to secure majority funding from the alcohol industry, it successfully fought federal excise taxes using front groups in the 1980s. In addition, the R.J. Reynolds brand worked with the National Liquor Store Association to speak out against laws for clean indoor air.[42]

The tobacco industry also formed a lobbying group to challenge a regulation proposed by the U.S. Environmental Protection Agency (EPA) to significantly lower the limit on phosphine, a fumigant used on stored tobacco and finished cigarettes to kill insects[43] — a measure that would have affected the industry financially (Supplementary File 3, Study 4). Because of the risks phosphine posed, applicators were advised to wear respirators and protective clothing, and warehouses were to be sealed to prevent hazardous leaks into the air that could harm nearby residents. Several case reports had documented fatal phosphine poisoning among workers and in the community. The group influenced the regulatory process using tactics such as lobbying Congress; attending EPA-sponsored stakeholder meetings, where they claimed that the proposed risk measures were not based on "sound science"; and hiring a former EPA scientist to publish an article downplaying phosphine's risks.[43] Ultimately, the EPA decided against adopting the new standard.

SHAPING THE PUBLIC NARRATIVE

Corporations have various tactics for influencing the public's beliefs about their products' benefits and harms. These include sophisticated and pervasive advertising and marketing campaigns; use of public relations companies, front groups, and think tanks; and capture of consumer groups.

For example, opioid manufacturers deployed particularly insidious advertising strategies for marketing opioids to vulnerable populations, such as recruiting youth coaches and school nurses to encourage opioid use by children, developing unbranded initiatives encouraging adolescents to ask clinicians for pain medications, promoting "safe opioids" for untreated pain in women, and distorting policy discussions of unmet needs for pain medication (Supplementary File 3, Study 5).[44] Globally, more than 600,000 deaths each year are attributable to drug use or overdose, the majority from opioids.[3]

In an example of translating pervasive marketing strategies from one health-harming product to another, between 1960 and 2010, America's largest tobacco companies, R.J. Reynolds and Philip Morris, owned some of the world's largest food companies, including Nabisco, Del Monte, and Kraft–General Foods (Supplementary File 3, Study 6).[45] In 1963, R.J. Reynolds acquired Pacific Hawaiian, whose only product was Hawaiian Punch, initially marketed as a cocktail mixer. Within a few years, R.J. Reynolds had reformulated and rebranded Hawaiian Punch as a children's beverage, offered in numerous colors and flavors and marketed with the cartoon character "Punchy."[45]

When Philip Morris bought General Foods in 1985, it installed tobacco executives to maximize technical and marketing "synergies" among its tobacco, food, and alcohol subsidiaries, focusing

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on leveraging product formulation from its cigarette-marketing tactics to develop dozens of Kool-Aid "line extensions," introducing 36 child-tested flavors.[45] Tobacco companies also reformulated their newly acquired ultraprocessed food products to make them more appealing to consumers, especially children[45]; ultraprocessed products now account for about 60% of foods purchased in the United States, increasing vulnerable populations' exposure to harmful chemical additives.[46]

DISCUSSION AND CONCLUSION

Although empirical research involving internal documents from the tobacco industry has led to a reduction in that industry's influence and in tobacco-related diseases, many other health-harming corporations remain unregulated, have financial stakes in multiple types of products, and actively collaborate with one another to advance common profit goals.[42,43]

A recent report from the Trump administration's Make America Healthy Again initiative highlights the roles of toxic chemicals and pesticides, ultraprocessed foods, and corporate influence on science in harming children's health.[47] But the report does not acknowledge the role of fossil fuels, which is the leading cause of death globally.[1] Furthermore, the administration has appointed former lobbyists and scientists from the chemical and petroleum industries to lead EPA offices responsible for regulating air pollution, toxic chemicals, and pesticides[48,49] — and plans to eliminate regulatory and other measures, which will lead to increased exposure to toxic chemicals and air pollutants, thereby increasing child health risks.[50,51] Clearly, much more remains to be done to address health-harming industries and the effects on children's health from fossil fuels, toxic chemicals, ultraprocessed foods, and corporate influence on science.

Although there is a robust literature outlining the tactics that have been used by some industries, more research is needed on others and on collaborations between industries. Continuing collection and examination of industry documents can help the public health and medical communities improve their understanding of this contemporary disease vector and develop strategies for preventing the diseases in question.

Findings from the tobacco and other industries have already permitted identification of some actions with great potential for reducing corporate influence and bias in science and decision making. One key approach is increasing transparency regarding corporate funding of research. Publicly mandated payment databases, for example, would allow researchers, policymakers, journalists, and the public to see records of industry payments to researchers and academic institutions and assess whether their study conclusions or opinions might be influenced by corporate funding. There is extensive evidence that studies and guideline-development efforts conducted by investigators or panelists with a financial conflict of interest provide results favorable to the funders' products.[52-54] One legislative model for a publicly accessible database of corporate spending that could be expanded is the Physician Payments Sunshine Act of 2013.[55] However, such databases have limitations, since mere disclosure does not mitigate the effects of funding bias.[56]

A second strategy is to hold corporations to academic standards of data sharing and open science, which we believe should be mandated by all countries as part of a globally binding treaty. In addition, if a corporation wants to bring a product to market, it should be required to register every study it plans to conduct so that the public can see the intended health end points of the study and other relevant study details. Such a record would limit a company's ability to hide unfavorable research results or entire studies.

Third, governments could prohibit financial ties between industry and researchers. A workshop report from the U.S. National Academies of Sciences, Engineering, and Medicine entitled *Sponsor Influences on the Quality and Independence of Health Research* argued that "to ensure research is not being influenced by a financial interest, both the research enterprise and the people conducting the research need to be publicly funded," and "an industry fee should be paid to an independent agency" to support such a model.[57] Funding could include industry fees that would be managed by the government to support research on the most important public health topics. This model has been used in Italy; the Italian Medicines Agency funds research on drug efficacy and safety with taxes paid by the pharmaceutical industry.[58]

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Fourth, policymaking should be safeguarded from corporate influence. Policies such as Article 5.3 of the Framework Convention on Tobacco Control, which limits government engagement with the tobacco industry, could be developed for other health-harming industries. Governments can implement such policies at the national level and need not wait for further international treaties before taking action.[59] These recommendations are consistent with those issued by civil society and other nongovernmental organizations focused on strengthening democracy by seeking to eliminate industry's financial links to scientists and policymakers.[60]

Finally, scientific peer-review bodies and scientific advisory committees should be free from conflicts of interest. The model implemented by the International Agency for Research on Cancer for selecting scientific experts could be adapted for global use.[61] In that model, invited specialists with a financial conflict of interest can contribute their unique knowledge to discussions but do not participate in evaluations or in formulating conclusions.

Corporations and their allies, both individually and collaboratively, have undermined science and policymaking to prioritize profits over health. Health practitioners, researchers, journalists, lawyers, and policymakers must be able to anticipate, identify, and counteract these corporate activities to address the growing burden of chronic diseases and health inequities.

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