

CASE STUDIES

Power, pollution, and ethics

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Abstract

Environmental problems are more urgent and serious than ever: climate change, air pollution, water pollution, shortages of freshwater, deforestation, over-fishing, antibiotic resistance, and more. Discussions in public health address these problems because they affect people's health and life prospects so profoundly. In this work, we add to the discussion by exploring the ethical aspects of a case scenario that involves pollution from a coal-fired power plant. After we note how the plant contributes to pollution, we discuss ethical issues of justice and responsibility. We show how the burdens of pollution and the benefits of the activities that generate pollution are unfairly distributed in this case. We also suggest that social justice demands certain forms of respect, consideration, and participation. Then we turn to issues of responsibility. We focus on responsibilities citizens have to try to change the social structures, background conditions, economic systems, and accepted practices that underlie the problem. We also consider responsibilities that physicians have, both collectively and individually. Taking responsibility for pollution is not a matter of following a medical protocol or legal requirement. It involves creativity, judgement, and a sense of what the situation calls for.

Introduction

In 1970, Van Rensselaer Potter coined the English term "bioethics" because he saw the need to bring together biological knowledge and ethical values (1). He hoped this new field would include ethical issues about the environment, but the field that appropriated the name "bioethics" tended to focus on ethical issues about the doctor-patient relationship, the conduct of research, and new developments in biotechnology. Around same time, environmental ethics tended to focus its attention on how human beings should relate to nature, including nonhuman animals and ecosystems. By and large, bioethics and environmental ethics went their separate ways.

Yet the environmental issues are more urgent and serious than ever: climate change, air pollution, water pollution, shortages of freshwater, deforestation, over-fishing, antibiotic resistance, and more. These problems have a profound impact on people's health, life expectancy, and life prospects. These problems also raise deep issues about social justice because people are affected by and contribute to the problems in systematically uneven ways. In other words, environmental problems raise issues about environmental justice (2).

Air pollution is a telling example. Ambient air pollution comes from coal fired power plants, industry, transportation, heating, incineration of waste, the burning of agricultural stubble, and other sources. Household air pollution comes chiefly from the use of solid cooking fuels – coal, charcoal, wood, animal dung, and agricultural residues. These forms of air pollution contribute to lower respiratory infections, chronic obstructive pulmonary disease, lung cancer, ischemic heart disease, stroke, diabetes, and cataracts. The Global Burden of Disease study found that air pollution in India contributes roughly as much to these diseases as tobacco use (3). This study attributed 1.24 million deaths to air pollution in India in 2017. It also found that air pollution contributes more to disease burden in India than any other risk factor except malnutrition.

Because air pollution affects mortality, morbidity, and people's quality of life so profoundly, public health researchers are giving the problem more attention (4). Public health advocates are discussing its ill effects on health, policies that would help to ameliorate it, and co-benefits that would arise by addressing it (4,5). Our purpose in this work is to add to the discussion by exploring the *ethical* aspects of a case scenario that involves pollution from a coal-fired power plant.

The case scenario draws on facts and research about the North Chennai Thermal Power Station (NCTPS) in Tamil Nadu. Although the case description is accurate and realistic, we have fictionalised it for two reasons. First, we want to respect the privacy of the individual people involved. Second, we want to formulate the case in a way that broaches ethical issues that range from how society should be organised to how an individual physician should respond.

Case description

To generate electricity, societies use various sources: coal, diesel fuel, natural gas, hydropower, tidal power, wind power, and solar power. Of all these sources, coal is the most polluting. In Tamil Nadu, 69% of all electricity generation uses coal (6). The NCTPS pulverises coal, burns it to heat water into steam, and

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uses the steam to drive turbines that produce electricity. This method of generating electricity results in considerable air pollution, solid waste, and water pollution.

The combustion of coal adds particulate matter, sulphur dioxide, nitrogen oxides, ozone, mercury, and lead to the atmosphere. These pollutants have profound impacts on health (5). Particulate matter contributes to respiratory and cardiac problems. Sulphur dioxide impairs lung function. Nitrogen oxides and ground-level ozone increase respiratory problems. Mercury enters the food chain, bio-accumulates, and causes neurological problems. Lead, which was added to petrol for many years, causes cancer and neurological problems. Furthermore, the carbon dioxide that is released into the atmosphere contributes greatly to climate change (5).

The chief solid waste is coal ash. All coal-fired plants must dispose of the coal ash that remains after combustion. Until 2002, the Ennore Thermal Power Station discharged coal ash slurry directly into the Bay of Bengal. This discharge had a large impact on the ecosystem and the fishermen who depended on that ecosystem (7). Now, the NCTPS makes the coal ash into slurry and pumps the slurry into impoundment ponds formed by dykes. An impoundment pond of 1100 acres is located next to the village of Seppakkam. Trucks, which are only partially covered, carry some of the coal ash from the pond to contractors who use it to make cement, bricks, and fertilisers. The truck traffic results in more air pollution, coal ash dust, and noise in the village.

Using coal to generate electricity also contributes to water pollution. Mining coal, operating steam generators, and disposing of coal ash uses large amounts of water. Over time, the coal ash slurry that leaks from pipelines and the coal ash sludge that is stored in ponds can contaminate aquifers, rivers, and lakes with heavy metals. A study in the United States found that 242 out of 265 coal-fired plants have contaminated groundwater with at least one toxin (8). The people who live in Seppakkam no longer trust their water sources (9). All the residents of this village now have to buy bottled water for drinking and cooking. Many avoid washing their faces, bodies, and clothes in the tap water.

The air pollution, coal ash, and water pollution from NCTPS have affected the health of the people who live in Seppakkam. They report a high rate of respiratory distress, cardiac stress, gastrointestinal problems, skin ailments, and other problems (9). When ill, some Seppakkam residents go to see Dr Priya Lakshmi (fictional character) in a nearby town. Over the years, Dr Lakshmi has seen a variety of problems that are probably related to the pollution. She always takes a careful history that includes alcohol and tobacco use, type of cooking fuel used in the household, and other possible sources of the health problems. Then she examines the patients, treats their problems, and advises them. On occasion, she has advised patients who work in the coal yards to find other employment.

In many ways, the residents of Seppakkam pay extra costs because of the pollution. Some see Dr Lakshmi as often as

once a month. They pay for the travel, consultation, tests, and medicines. When they are ill, they often have to take time off work without pay. All of them buy more bottled water than they used to. Although the power plant and the associated industries provide job opportunities for some residents, other residents have experienced diminished livelihoods and restricted opportunities, especially in agriculture. Furthermore, the pollution has impacted village life. Parents worry about children playing outside. People worry about their health and future. The feeling that their village was a hospitable, provident, and scenic place has changed into a widely shared desire to relocate the whole village.

To focus on the ethical aspects of this case, we will use the following four questions as a framework:

What does social justice demand? What responsibilities do citizens have? What should physicians do collectively? What should Dr. Lakshmi do individually?

Demands of social justice

The case describes a situation that involves conflicting concerns, open possibilities, and uncertainties about what should be done. In approaching this problematic situation, we want to avoid two extremes. One extreme is to appeal to comprehensive ethical theories or principles to derive a definitive answer or formulate a decision-making procedure. The other extreme is to eschew all abstract thinking and simply make a judgement about the particular case in the particular context. We have used ideas about justice and responsibility as tools or points of view in order to focus attention, articulate ethical concerns, and suggest ways to respond. This approach may clarify the ethically problematic situation, but it doesn't obviate the need for people to judge disparate concerns and take appropriate actions in practice.

This case is not only about what Dr Lakshmi should do individually or what physicians should do collectively, but also about what kind of society and public life we should strive to create. We want to start with those large ethical issues. To begin, we try to show how the environmental pollution in this case raises complex issues of justice (2). To do that, we consider how the burdens of pollution are distributed, who contributes to this pollution, and whether people have been allowed and encouraged to participate in relevant political processes.

All of us breathe air, but we are not equally exposed and susceptible to air pollution. Our exposure depends on where we live, work, and play; what activities we engage in; and what forms of transportation we use. Our susceptibility depends on our age, medical conditions, and genetics. People who work outdoors are exposed to more air pollution than people who work in offices. People with asthma are more susceptible to the effects of sulphur dioxide and ozone. Children are more susceptible to the effects of nitrogen oxides, lead, and mercury. Race, ethnicity, and income also make a difference in exposure. In the United States, the Environmental Protection Agency has created a mapping tool that focuses attention

on environmental justice. Of the six measures of air pollution that the tool registers, five are higher among low-income and minority groups (10). The factors at work in India seem similar: location, kind of work, age, medical conditions, ethnicity, and income. The case study illustrates how many of these factors disadvantage the people of Seppakkam.

We all contribute to pollution, but we don't contribute equally. Carbon emissions illustrate this point. The wealthiest 10% of people in the world are responsible for about 49% of carbon emissions (11). In general, the people of Seppakkam have relatively low carbon footprints and use relatively little electricity. Yet they bear many of the indirect costs and negative externalities. A negative externality is a cost or harm that is not reflected in the market price (12). Because of the pollution, the people of Seppakkam suffer more ill health, pay more in medical costs, pay for bottled water, and endure a diminished community life. In effect, they subsidise the electricity that is generated at NCTPS. Who benefits from this subsidised electricity? Consumers of electricity benefit from lower costs, middle-class people benefit from economic growth, and owners of industries benefit from higher profits. From an ethical point of view, the negative externalities are not only economic inefficiencies; they are also social injustices.

Although the burdens of pollution and the benefits of the activities that generate pollution are unfairly distributed in this case, justice demands more than a fair distribution. It demands certain forms of respect, consideration, and participation (13). Democratic equality has never meant that people are alike in all respects or that they must have exactly the same resources. It means that people deserve equal respect and consideration. Hence, social democracy aspires to ensure that basic rights are equal and worthwhile, and that ordinary people are encouraged and empowered to participate in reconstructing social conditions and structures. Democratic citizens need to listen to and take account of the lived experience of other citizens. Arrangements that result from meaningful participation often express more respect, recognise others as moral agents, integrate wider perspectives, and elicit more cooperation. In this case scenario, we don't see how the people were treated justly in terms of respect, concern, and participation.

Of course, some will argue that justice only requires property rights, contracts, and markets—that the people around Seppakkam sold property and entered into contracts. We've heard that argument ever since the industrial revolution began in England. This outmoded way of thinking doesn't help to address the current problems (14). It ignores pollution, market externalities, social determinants of health, and ideals of democratic equality. A broader view of justice would consider background conditions, social structures, and histories of exclusion. It would circumscribe and regulate markets, including energy markets, within a robust framework of social justice. Such a framework would also consider how social structures influence dispositions, political character, and the

quality of public life. Since all that is much easier to say than do, we need to turn our attention to issues of responsibility. We will consider responsibilities that people have as citizens as well as responsibilities that they have as physicians.

Responsibilities

Three sets of responsibilities seem particularly relevant to this case study. The first set of responsibilities is associated with Dr. Lakshmi's role as a citizen. Like other citizens, she should take some responsibility to address the social structures, background conditions, economic systems, and accepted practices that underlie the problem. These human constructs influence whether pollution occurs, how serious it is, which groups are affected, and what responses are available. Since these constructs are subject to human control, they are subject to ethical evaluation. When these human constructs unfairly disadvantage people, many citizens need to take some responsibility to address the injustices.

But why should Dr. Lakshmi and many of us take responsibility to address these injustices? The political philosopher Iris Marion Young discusses this point in her account of responsibility for structural injustice (15):

The ground of my responsibility lies in the fact that I participate in the structural processes that have unjust outcomes. These processes are ongoing and ought to be transformed so they are less unjust. Thus I share with others the responsibility to transform these processes to reduce and eliminate the injustice that they cause. My responsibility is essentially shared with others because the harms are produced by many of us acting together within accepted institutions and practices, and because it is not possible for any of us to identify just what in our own actions results in which aspects of the injustice that particular individuals suffer. (p 110)

Some of Dr Lakshmi's responsibilities arise from her relationship to the underlying problems. Along with many other people, she participates in and contributes to the social structures that disadvantage the people in Seppakkam. In her daily activities and medical office, she uses electricity that is generated by coal-fired plants. This electricity is subsidised by costs, including ill health, that are unfairly imposed on other people. Hence, she bears some responsibility to address the underlying injustices.

But how should she take responsibility? Appropriate changes might include cleaner forms of energy, carbon taxes, correction of externalities, pollution controls, enforcement of regulations, better disposal of the coal ash, compensated healthcare, or even relocation of the village. Changes like these require political action, in the best and broadest sense of that term. Political action is broader than governmental action. Young notes that those "who share responsibility for structural injustice may also find ways of making social changes, moreover, through collective action in civil society independent of or as a supplement to state policies and

programs" (15: p 112). Taking responsibility in this way and for this reason is not a matter of following a legal requirement or medical protocol. It involves creativity, judgement, and a sense of what the situation calls for.

The second set of responsibilities is associated with the collective responsibility of physicians. Although physicians form many associations for many purposes, the animating ethical purpose of physicians' collective work should be to promote health and improve healthcare. As a member of the profession, Dr Lakshmi has a duty to contribute to this collective effort. Since there are many concerns about health and healthcare, associations need to set priorities and devise effective ways to promote health and improve healthcare. Dr Lakshmi could act within an association to put the problem of pollution into the discussion. After all, air pollution in India contributes about as much to ill health as tobacco use (3).

This kind of collective work also involves creativity, judgement, and a sense of what the situation calls for. Dr Lakshmi can approach a local association of physicians, or can raise the issues at the state level. She can try to make pollution reduction a priority for an association that she already belongs to, or she can start a new association that collaborates with communities that are severely affected. The people of Seppakkam would probably welcome the involvement of healthcare professionals in addressing the problems.

The third set of responsibilities is associated with Dr Lakshmi's work of caring for individual patients. For the patients who seek her care, she has a responsibility to listen to their concerns, make accurate diagnoses, discuss reasonable options, and provide sound advice. The case description suggests that she is already doing that. She also has a responsibility to act as a sentinel for public health problems—to watch for and alert public health officers about emerging problems. If the law has outmoded or inadequate reporting requirements, then she should work with associations to change those requirements. Designing appropriate public health surveillance always requires balancing different ethical concerns, including concerns about privacy and confidentiality. But given the magnitude of the health risks posed by air pollution, more evidence and documentation may help to galvanise action.

In making these three sets of responsibilities explicit, we come to realise that an adequate response to the situation calls for a lot. In discussing these responsibilities, we don't mean to suggest that Dr Lakshmi should do it all alone. The health problems posed by modern pollution often require working

with many other people to address the underlying problems. As we noted, Dr Lakshmi will need creativity, judgement, and a sense of what the situation demands. She will also need a sense of how much involvement is ethically enough. An ethical response to pollution requires a lot of all of us. Many of us are probably not doing enough.

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