
Tobacco Smoke: The Double Standard

It has long been known that high levels of smoke from factory chimneys could cause illness and death during air pollution episodes and that elevated levels of smoke were epidemiologically implicated in chronic respiratory illness. For this reason, laws such as the Clean Air Act were passed in order to protect human health from the effects of air pollution; Section 112 of the Clean Air Act calls for regulation of airborne pollutants that may reasonably be anticipated to result in "an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness." Nowhere in the Act is it specified that the pollutant must be an outdoor one. But in the establishment of the National Ambient Air Quality Standards it was explicitly assumed that air external to buildings was the only problem, and that if this could be cleaned up, public health would be protected from the ravages of air pollution.

This assumption is false. The smoke pollution inhaled indirectly from cigarettes, pipes, and cigars indoors is not only chemically related to the smoke from factory chimneys, but routinely occurs at far higher levels indoors than does factory smoke or automobile exhaust outdoors. Controlled experiments and field studies have shown that in buildings where tobacco is smoked, substantial air pollution burdens are inflicted upon nonsmokers, far in excess of those encountered in smoke-free indoor environments, outdoors, or in vehicles on busy commuter highways. Daily exposure to tobacco smoke, it has been found, can cause air pollution levels corresponding to violations of the National Ambient Air Quality Standard for Total Suspended Particulates for exposed office workers (at typical building occupancies and ventilation rates) and amount to the single most important source of exposure of the population to this harmful kind of air pollution.

For many years reports of the Surgeon General have indicted mainstream tobacco smoke as a cause of cancers in many organs; bioassays show that sidestream smoke is more carcinogenic than mainstream smoke. Therefore, there is good reason to believe that nonsmokers might be exposed to the risk of smokers' diseases from routinely breathing indoor air pollution from tobacco smoke. In a pioneering paper published in 1980 in the prestigious *New England Journal of Medicine*, a physiologist and a physician at the University of California at San Diego concluded, after ten years of research on more than 2000 persons,

that long-term exposure to indoor tobacco smoke in the workplace was deleterious to the healthy normal nonsmoker and significantly reduced the functioning of small airways to the same extent as smoking one to ten cigarettes a day! This study was recently confirmed by workers in France.

Nearly a year later, the chief epidemiologist of the National Cancer Center Research Institute in Tokyo, Dr. Takeshi Hirayama, published an electrifying study on lung cancer mortality in 142,857 women, which reported that nonsmoking women with smoking husbands developed lung cancer at a rate nearly double that of women whose husbands did not smoke. These findings were corroborated by a similar study of several hundred Greek women. Research by Lawrence Garfinkel of the American Cancer Society, however, did not uncover a statistically significant correlation between lung cancer in nonsmoking women and their husbands' smoking habits; but Garfinkel's study was not originally designed to detect effects of passive smoking, and his analysis did not control for confounding variables, particularly exposure in the workplace. Recently three more studies of lung cancer and passive smoking have appeared in the United States, Germany, and Hong Kong. The former two are positive; the latter, negative. Thus the balance of the evidence, by a ratio of four to two, indicates that ambient tobacco smoke, like ambient factory emissions, increases the risk of cancer and respiratory disease.

Criteria for Regulation

The provisional policies developed by EPA for identifying, assessing, and regulating airborne substances that may pose a risk of cancer require two basic questions to be answered: What is the probability that the substance is a human carcinogen? What is the extent of human exposure? The scientific evidence cited above now indicts sidestream tobacco smoke as causing cancer in nonsmokers; since the average person spends more than 90 percent of the day indoors, and since one out of three adults smokes, many nonsmokers spend significant fractions of the day in an atmosphere contaminated by tobacco smoke. Ambient tobacco smoke might therefore be considered a prime candidate for listing as a hazardous air pollutant under the Clean Air Act, based solely on the criteria of carcinogenicity and exposure.

Once a hazardous air pollutant has been identified as an airborne carcinogen, the regulatory process calls



for the listed pollutant to undergo quantitative risk assessment. While cancer risk estimation is an imprecise endeavor involving many uncertainties, such estimation can often provide a rough measure of the magnitude of the carcinogenic risk of the substance.

A rough estimate of the magnitude of the risk from passive smoking can be obtained from Hirayama's 1981 study, which found that passive smoking by nonsmoking Japanese women whose husbands smoked on average increased their lung cancer death rate by about 8 cases per 100,000 population per year in the age group at risk of lung cancer. This comes out to an average of 3,700 annual lung cancer deaths per million U.S. residents, taken over all age groups, including those not at risk.

How does such a risk compare to other risks faced by the U.S. population? The average risk of death by tornado, for example, is 44 per million; by pregnancy, childbirth, and abortion, 220 per million; by firearm accidents, 1,100 per million; by drowning, 3,600 per million; by accidental falls, 8,500 per million; by homicide, 10,600 per million; and by motor vehicle accidents, 27,000 per million. This comparison indicates that the estimated risk of passive smoking is considerably in excess of many other involuntary risks and appears to be far from trivial.

Is the level of risk from passive smoking acceptable? Fatal risks greater than 10^{-2} (1 in a 100 chance of dying) are generally unacceptable to society; the risks of death from cancer and heart disease are in this range, and society maintains extremely expensive preventive and therapeutic medical institutions to mitigate them. Risks below 10^{-11} (1 in a hundred billion chance of dying) are below the threshold of concern. Risks below 10^{-6} (1 in a million) are often considered acceptable

by most individuals and tend to be below the societal threshold of risk aversion, with the exception of certain catastrophic risks that have generated public fear. The Environmental Protection Agency has regarded cancer risks of the order of 10^{-5} to 10^{-6} per year as an approximate guideline for the regulation of carcinogenic hazardous air pollutants; the Nuclear Regulatory Commission has proposed guidelines for acceptable cancer mortality risks from reactor accidents of the order of 10^{-6} per year.

The risk from passive smoking is in the range of 10^{-4} , or a 1 in 10,000 chance of death. Judged by these guidelines of societal acceptability for carcinogenic risks, an involuntary lung cancer risk of nearly 10^{-4} per year from passive smoking would appear to warrant social concern.

Society is sometimes willing to accept certain levels of risk greater than 10^{-6} because the costs of further reduction outweigh the benefits. This is typical for the air pollution risks associated with many industrial activities, which are perceived to be essential in some degree to society. But when the risks of passive smoking are balanced against the costs of controlling them, regulation seems clearly called for. First, the risks of passive smoking are evident; second, nonsmokers derive no evident benefit from others' smoke, and what benefits smokers derive from smoking are hardly comparable to the benefits society gains from retaining certain polluting industries; finally, the costs of reducing the risks to nonsmokers are not very burdensome.

Solutions

In public areas such as restaurants, measurements indicate that simply providing separate sections for

smokers and nonsmokers can halve the risk to nonsmokers at very small social expense. This solution can be considered "reasonably achievable control technology," although it does not eliminate the risk, as would a complete ban. In the workplace, the most promising solution is to use the "best available control technology": complete bans on smoking on the premises. As a number of studies have shown, this solution not only protects nonsmokers but results in dollar savings to employers as well, as the higher sick-leave and housekeeping costs caused by smokers disappear.

If ambient tobacco smoke were emitted from a polluting industry into the outdoor air, it would be judged to be both a toxic and a carcinogenic pollutant, subject to national hazardous air pollutant emission controls.

An increasing number of industries are successfully trying this approach. A survey of 3000 U.S. corporations in 1979 reported that 42 percent of blue-collar companies surveyed permitted smoking only in designated areas, and another 28 percent prohibited smoking completely. The corresponding percentages for white-collar companies were lower, 15 percent and 11 percent respectively. Thus 70 percent of the blue-collar companies and 26 percent of the white-collar companies have found restrictive control measures to be a practical solution. Recently, a city ordinance was passed in San Francisco requiring employers to make reasonable provision for clean air in the workplace, either by banning smoking altogether, or by segregating smokers and nonsmokers. A key provision mandates that if nonsmokers are dissatisfied by the seating arrangements, the employer has to ban smoking completely. A similar but stronger law was passed in Palo Alto, and similar laws are being considered in Los Angeles and the District of Columbia.

Conclusion

To sum up: if ambient tobacco smoke were emitted from a polluting industry into the outdoor air, it would be judged to be both a toxic and a carcinogenic pollutant, subject to national hazardous air pollutant emission controls. Thus a double standard is in existence that judges indoor air pollution from tobacco smoke differently from outdoor air pollution from diesel buses or coke ovens. Given the similarities of indoor air pollution from tobacco smoke to outdoor air pollution from other combustion sources, for which society has taken risk-averse action in the interest of public health, should smokers have an untrammelled right to pollute an indoor space such as a public building, workplace, or residence without the consent of the nonsmokers who must breathe the pollution?

At the least, if society yields smokers the right to smoke in public indoor spaces, including workplaces, it should require vastly increased ventilation or air cleaning measures in such buildings, using the same logic used to limit air pollution from factory smokestacks and automobiles. Just as it controls carcinogenic air pollutants from chemical plants, it should require self-extinguishing cigarettes, control of cigarette additives, and limitation on sidestream tar and nicotine content. The time has come to treat ambient tobacco smoke as the air pollutant it is and to subject the tobacco industry to the same sort of controls that *all* other polluting industry must bear.

It is increasingly difficult to argue that smokers have the moral right to cause harm in the form of physical irritation or carcinogenic risk to nonsmokers. Smokers who want to make this argument are invited to consider the following proposition: suppose that individual nonsmokers, in defense of their asserted right to breathe smoke-free indoor air, were to release a gas into indoor spaces where they were forced to breathe tobacco smoke. Suppose further that when sucked through the burning cone of a cigarette, pipe, or cigar this gas decomposed into irritating byproducts that caused moderate to intense discomfort to the smoker, much the way ambient tobacco smoke affects the nonsmoker. Would smokers feel that they had a right to gas-free air?

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Smokers are on the same moral ground as were spit-terers around the turn of the century when public health laws restricted spitting in public buildings. The nonsmokers' pursuit of healthful breathing air does not infringe upon the health of smokers (in fact, it may improve it to the extent that it forces them to cut down or quit the habit). The smokers' pollution does infringe upon the health of the nonsmokers. As the awareness of passive smoking risks grows, smokers will be increasingly, and accurately, viewed as playing Russian Roulette with non-smokers' health, a practice that can only invite increasing confrontation and social dissension.

—James Repace

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