Air Quality Measures and Public Health Policy

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Three recent large-scale studies suggest that the public health problem induced by ambient air contaminates may be serious.¹⁻⁴ The Six Cities study, the reevaluation of the American Cancer Society study, and the Olympics study show significant health impacts related to anthropologic air contamination. Others have found links between lung disease and proximity to heavy traffic.⁵ In contrast, reports based on economic analysis maintain that the costs of remediation are not justified by the health costs avoided. It appears that assessments based only on risk assessment methodology may capture only a portion of actual health damage. Thus, there is a need to validate the overall methodology or, failing that, to provide a more open statement to the public concerning the actual level of understanding with respect to the health hazards from hazardous air pollutants.

In this issue, Kyle and colleagues report on the evaluation of the public health significance of ambient air data in "Evaluating the Health Significance of Hazardous Air Pollutants Using Monitoring Data." [Public Health Reports, 2001;32-44] The authors propose a methodology for the timely analysis of currently available data measuring levels of hazardous air pollutants and the determination of health risk. The assessment of the public health relevance of current information for policy decisions would provide the guidance necessary to support regulatory steps to ameliorate ambient air risks.

From the perspective of actual human exposure, the largest and most complete ambient air datasets available exist in states due to state monitoring for regulatory compliance, or at the Environmental Protection Agency (EPA) due to modeling of air toxics based on assessment of inventories. There is a limited amount of regional monitoring focused on localized health concerns. This, together with the limited number of federal standards and guidelines established to date as reference points for evaluation of health risks, should raise public health concerns. With respect to actual measures of human health outcomes, little health information is presently available to assess the impact from hazardous air pollutants on health. The hazard estimates now used to direct current policy are based on quantitative risk assessments using animal toxicology, community epidemiology, or occupational health data.

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In response to this public health gap, attempts have been made in some states to compare their monitoring information with state established hazardous air pollutant (HAP) standards and to estimate the possible level of public health impact from individual materials.⁶ These studies find HAPs measured in ambient air that are 5 to 10 times the state health-based standards in urban, suburban, and even rural settings. Motor vehicles, area pollutants, and transport of pollutants are responsible for most of these HAP exposures.

National modeling studies provide estimates of annual average ambient air concentrations of HAPs at the state and county levels.7 When these estimates are compared to the state monitoring data on a chemicalby-chemical basis, most are validated. A slight tendency to underestimate actual exposure levels has been noted. These findings show that there is a national exposure problem with respect to HAPs. The validation by states shows the value of a coordinated state and federal assessment for potential public health problems, particularly when complex regional issues are involved. The potential value of regional, county, or air-shed validated estimates of 30 to 180 of the most important hazardous air pollutants toward the understanding of health impacts of hazardous air pollutants and the identification of policy strategies to address these risks can not be overstated.

For the compounds on the National Ambient Air Quality list and some other compounds of high concern, it has been possible to estimate the annual and, in some cases, shorter-term (8 to 24 hours) ambient air levels using available air monitoring data. Unfortunately, it is not possible to assess the actual health impact in local communities from any air pollutant using current health information. While there are some regional data on cancer risks, there is limited public health surveillance of lung disease in the US at either the federal or state level. This is because, in essence, the public health and environmental health systems operate as distinct and separate entities. For example, although rates of pediatric asthma in the US now reach near epidemic scale, there are no reliable studies to determine differences in asthma morbidity or mortality across regions or time periods. Thus, relationships between asthma and ambient air quality cannot be measured.

The current national strategy with respect to HAPs, even in the face of incomplete and imperfect information, is to assume that the "lack of information means lack of risk." This leads policy makers to such steps as the current de-listing process for HAPs, with possible removal of substances having demonstrated health impacts from the HAP list. Their removal will assure that there will be no information in the future to guide assessment of the HAP problem.

One thing is clear from the data available, at least with respect to the northeast section of the North American continent: human exposures to HAPs are so widespread that it is will be difficult to find any community free enough of exposures to use as a comparison group for measuring impact of HAPs on public health.

As shown by Kyle and colleagues, a coordinated public health and environmental agency commitment with a state and regional focus is needed to establish the science and a foundation for understanding the nature of the HAP problem or to compile the currently available information to address it. This approach requires three components:

- 1. An inventory of all resources and technical capacity available to public health agencies and environmental agencies in order to find, identify, and examine available datasets on hazardous air pollutant levels in urban, suburban, and rural locations.
- 2. An inventory of the data on human health outcomes combined with a determination of potential for application to community health assessments. It must be recognized that there are several barriers to this inventory, ranging from the health data confidentiality issue to the limited power of epidemiology data in ecologic applications. It is probable that new scientific methodologies will need to be developed for application of health department data to environmental hazard evaluation. Thus, it is important to clearly set forth the current limitations of epidemiology as a tool in assessing the relationships between chronic health conditions and ambient air quality.
- 3. A critical assessment of the current scientific strategies and tools being applied to the evaluation of public health impact and regional environmental pollutants:
 - Can the current approach using federal, academic, and private sector partnerships for environmental research assure that the public's health is secure?
 - Can or should the monitoring data collected by states be studied to further define the potential health risks and to provide more realistic exposure estimates for risk assessment exercises?
 - Can new tools, such as Geographic Information System software (GIS), be refined to

provide the policy level information needed to broaden the focus of the risk assessment from basic cost-benefit analysis?

• Can the approaches currently used by state scientists in the evaluation of individual and population health risks to local exposures be applied at a broader national level?

In 1998 David Ozonoff warned of the need for a full understanding of all the science when assessing the policy options for protecting the public from the hazards of byproducts from disinfection chemicals for regulatory decisions.⁸ Similarly, Kyle and colleagues have shown that there is a substantial cache of HAP data that should be included in analyses for the complete public health assessment of human health risk from HAPs. At another ethical level, it is important that the limitations in the current information for determination of health risk be clearly provided to the public, as a balance to the cost/benefit analyses which show minimal overall hazards to the population. Finally, the capacity to look at all of the information in new ways should be considered in assessment of the future risks from hazardous air pollutants.

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