

COMMENTARY

Parallels between community environmental health and occupational health

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Since September 11, 2001, there has been increased attention on what individuals and communities can do to minimize the effects of terrorist attacks, and other disasters, on the health and safety of our family, friends, and community.¹ The article by Mott and colleagues focuses on one such disaster—a forest fire. It provides retrospective data that can give us some idea about which interventions work and which do not in preventing respiratory health problems.

Unlike most disaster situations, the forest fire that occurred from August to November 1999 near the Hoopa Valley National Indian Reservation in northern California caused a gradual buildup of smoke concentration in the residential area of the reservation. This gradual buildup provided an opportunity for local health officials to implement health-protective measures. The results of a follow-up study, reported here, provide some guidance for health planning in fire-prone areas and more generally for response to other natural and human-made disasters.

Over the 7-week period of the fire, smoke particulate concentration (PM_{10}) exceeded $150 \mu g/m^3$ for 15 days and reached a peak of more than $500 \mu g/m^3$ for 3 days. The EPA has designated the health-based national air quality standard for PM_{10} as no more than $150 \mu g/m^3$ (measured as a daily concentration).² Hence, the PM_{10} in the study area reached hazardous levels. To reduce the health effects of the smoke exposure on susceptible members of the community, local health officials implemented four types of interventions: distributing respiratory protective masks, providing free vouchers to stay at hotels in nearby towns, providing portable HEPA filter units to residences, and releasing PSAs. After the fire, a study was conducted to determine the health effects of the fire and the effectiveness of the interventions.

The situation faced by these health officials is analogous to that frequently encountered in the field of industrial hygiene, so it is of interest to compare the approaches taken by community health officials with those used to address chemical exposures in industrial settings. The basic industrial hygiene paradigm includes three steps: recogni-

tion, evaluation, and control.³ The first step is to identify the contaminant. In the case of the forest fire, it was identified as smoke particulate, although irritating gases in the smoke—such as aldehydes—could also have been present. The evaluation step is a quantitative measurement of the environment and an assessment of the health risk it presents. This was done in Mott and colleagues' study by comparing air-monitoring data with EPA standards. The third step, to control the exposure to safe levels, was undertaken by the four interventions mentioned above.

In industrial hygiene, control methods are ranked hierarchically by efficacy and reliability.⁴ The best methods are engineering controls, such as substituting safer materials, isolating workers from the exposure, and ventilation. The analogy for this category would include evacuation and the use of HEPA filter units. Further down the list is modification of work practices, which include training in the nature of the hazard and what exposed persons can do to minimize their exposure. This is analogous to the PSAs that were disseminated. Finally, the least effective is personal protective equipment, in this case, respirators. Respirators are the least effective because it is difficult to get a good fit, they cannot be used effectively while eating or sleeping, and they cause considerable discomfort when worn for long periods.

In this study, how successful were the different interventions? Before we can answer this question, we need to be cautious in interpreting the data because they are observational and retrospective, so they are prone to confounding and bias. The data show associations between an intervention and an outcome, but there is no proof that the intervention caused the outcome. With this caveat in mind, the data do seem consistent with the industrial hygiene control hierarchy in that the use of HEPA air cleaners and the recollection of PSAs were both associated with reduced odds of reporting adverse respiratory effects. The possible protective effects of PSAs suggest that people are prepared to take steps to protect their health if they are informed of the risk and the steps to be taken to minimize that risk.

In the industrial hygiene control hierarchy, we would expect evacuations to be effective. Yet, evacuation in this case did not appear to be protective. It is unclear why. Particulate concentrations in the nearby communities are not reported in the study, and perhaps these were elevated. Also, only a few of the participants were evacuated for the entire period of highest concentration.

The study provides useful information for health planning in areas prone to forest fire. It also serves as a model for planning public health response to other types of natural and human-caused disasters. It underscores the need to

keep good records of the implementation of interventions for later analysis.

References

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