

Effectiveness of Environmental Health Policies: A New Frontier for Epidemiologists

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Lead toxicity in children is a well-recognized public health problem in the United States. Epidemiology has played a central role in identifying this problem. Careful longitudinal cohort studies have shown that children with elevated lead exposure are at risk for deficits in IQ, balance, hearing and growth.¹

Although average blood lead levels in children have been declining, elevated levels in some children are still relatively common.² With the removal of lead from gasoline, new plumbing, new paints, solder in food cans and other consumer products, the most stubborn and persistent threat is lead that remains in old paint. There are millions of houses and apartments in the United States with lead paint.³ Paint crumbles and mixes into house dust and soil, along with which it is unwittingly ingested by young children during normal hand-to-mouth behaviors. Also, airborne lead can be generated during renovation work, when paint is often sanded or burned into fine respirable particles.

These exposures can be prevented, but such prevention is not easy. It requires the safe removal of lead paint (or other forms of abatement), which, in turn, requires money and the cooperation of landlords and homeowners. Such cooperation is not often voluntary. As a result, the federal government as well as many states and cities have enacted mandatory measures to protect children from lead paint. Combined with reasonable incentives (such as tax relief and protection from liability), this regulatory framework provides essential leverage for the protection of children.

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One would hope that such policies would be particularly effective in settings in which governments are directly responsible for housing. Is this the case? Enter the study by Rabito *et al.*⁴ in this issue of EPIDEMIOLOGY. The authors' data suggest that federal legislation, at least in New Orleans, has been ineffective in protecting children in publicly owned housing. Rabito and colleagues⁴ found that children living in older public housing in New Orleans were just as likely to have elevated lead levels as children in private older housing. One can surmise alternative explanations—eg, children in public housing could have lower lead at home but disproportionately more exposure to lead outside the home, such as in day care centers or schools. Such alternatives, however, are speculative and unlikely.

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Furthermore, the prevalence of high lead levels among children living in older housing was nearly 10 times that of the general childhood population, and twice the national average for low-income children living in older housing.⁵ How is it that all children living in older housing in New Orleans are at such high risk compared with their counterparts elsewhere? The findings suggest specific risk factors—policy-related, environmental, behavioral or cultural—that need to be explored.

The study by Rabito *et al.*⁴ has broad implications for federal policy because significant lead paint hazards have been estimated to exist in 17% of all public housing.³ The comparison of public with private housing clearly deserves assessment in other cities. It may be that federal policy is not flawed as written but rather as imple-

mented. Policy is expressed in a complex interplay of laws, regulations and customary practices. However prudent, policy is impotent without the political will—and funding—to pursue it. Two recent studies compared states in which legislatures have enacted similar lead poisoning–prevention policies; enforcement capacity was strong in one and poor in the other.^{6,7} Children “exposed” to strong enforcement were substantially less likely to have elevated blood leads.

The findings by Rabito and colleagues⁴ should prompt health officials in New Orleans (and elsewhere) to give close attention to the process and efficacy by which federal regulations governing lead paint exposure and abatement in public housing are enforced. More generally, the study by Rabito *et al.*⁴ provides a cogent example of how epidemiology can be used in thoughtful and creative ways to study the effects associated with policy. Such studies have been commonly used in the assessment of health care delivery, but there have been relatively few applications in assessing health policies. Epidemiologic investigations can identify not only successful or failed policies but also the contribution of specific factors in the policy stream.

Health policies themselves, of course, are not developed or applied randomly. Policy studies must be designed and interpreted just as carefully as any other etiologic investigation. Epidemiologists need to work closely with colleagues in government and in the advocacy community to identify the critical questions and to turn them into workable hypotheses. The payoff, if such studies are successfully conducted, is in findings that

contribute to improvement of environmental health policy and ultimately to the improvement of environmental health itself.

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