Grading Lead in Schools

New Test Shows Safety

In this month's issue, investigators Charles V. Shorten and Marijane K. Hooven of West Chester University in Pennsylvania report on a method that may give a more realistic measure of the exposure of preschool children to lead-contaminated dust [*EHP* **108:663–666**].

Shorten and Hooven set out to assess the relationship between 168 preschool children attending Philadelphia Head Start programs and various methods used to determine their exposure to lead in their classrooms. The scientists chose these young children because they are most susceptible to the deleterious effects of lead poisoning; in addition, their hand-to-mouth activities can lead to ingestion of lead-contaminated dust, and they spend up to eight hours per day in the classrooms. Ten classrooms in five buildings, each with a confirmed presence of lead-based paint, were included in the assessment. The scientists sought to determine whether the children were at significant risk of lead exposure by their presence in rooms likely to contain lead-contaminated dust.

Defining the danger of dust. New research indicates that even though lead-contaminated dust may be present in classrooms, kids aren't necessarily exposed to dangerous levels of the metal unless they can reach it.

To do so, they went a step farther in their wipe sampling protocols than previous studies had—they analyzed wipe samples from the children's palms and from both accessible and inaccessible surfaces within the rooms. Previous studies had not made this crucial differentiation between accessible surfaces such as desktops, windowsills, and doorknobs, and inaccessible surfaces such as the tops of filing cabinets and light fixtures. While high concentrations of lead were found in the dust on the inaccessible surfaces, the concentrations on the children's palms and the accessible surfaces, which are cleaned daily, were uniformly low. Determinations of the children's blood lead concentrations taken before enrollment in Head Start and after six months of exposure to the study settings confirmed the sampling data—156 children experienced no change in blood lead concentration, while 12 experienced only a minimal increase.

The authors conclude that current cleaning methods are effective at preventing lead-contaminated dust exposure within these classrooms, and the higher concentrations of lead in the dust on the inaccessible areas does not automatically constitute a health hazard because there may not be a completed exposure pathway. Prior studies, which the researchers say assessed only the presence of lead-contaminated dust, assumed that children were necessarily exposed simply because lead was present in the rooms. Shorten and Hooven limit their conclusion to the assertion that "there is no completed exposure pathway for lead from the most contaminated surfaces to the children in these schools." **–Ernie Hood**

Arsenic Again

A Continuing Threat in Chile

Arsenic poisoning is serious business. Chronic exposure to high doses of the element in drinking water increases the risk of vascular diseases and skin, lung, and bladder cancers, and may be associated with diabetes mellitus. In addition, although less attention has been accorded to the effect of arsenic on reproduction, teratology in animals is well documented. In this month's issue, Claudia Hopenhayn-Rich of the University of Kentucky in Lexington and colleagues present findings concerning reproductive effects of arsenic in drinking water in two areas of Chile, and Allan H. Smith of the University of California at Berkeley and colleagues present findings concerning arsenic-induced skin lesions in a study of indigenous people who have resided in northern Chile for many centuries [*EHP* **108:667–673; 617–620**].

Hopenhayn-Rich's study compared infant mortality rates in two areas of Chile, Antofagasta (north) and Valparaíso (central). Antofagasta experienced a 12-year period of substantially high arsenic concentration in its drinking water starting in 1958, when the city incorporated the Toconce River as its main drinking water source. The geologic, natural sources of the element in the river drove drinking water arsenic concentrations to as high as 860 micrograms per liter (µg/L). This was largely remedied with the 1970 installation of an arsenic removal plant; today, the concentration is around 50 µg/L. Valparaíso, on the other hand, does not have any recorded history of elevated arsenic in drinking water.

The authors used several statistical methods to examine the effects of time and location on the infant mortality trends observed between 1950 and 1996. The data indicate general declines in late fetal and infant mortality in both Antofagasta and Valparaíso over time, probably because of other nonarsenic-related factors such as improvements in health care and standard of living that affected all the regions in Chile. However, the data also show elevations in late fetal, neonatal, and postneonatal mortality rates for Antofagasta compared with Valparaíso for a defined period of time reflecting the rather sudden and sharp rise in the concentration of arsenic in the city's public water supply.

Hopenhayn-Rich and colleagues point out that although there is suggestive evidence for the developmental effects of arsenic, a clear causal association cannot yet be established, although their findings of increased late fetal, neonatal, and postneonatal mortality rates lend further support to previous studies. The authors stress the need for further studies using individual-level data, well-designed methods of exposure assessment, and collection of data on potential confounders to examine a broad range of reproductive and developmental end points.

Smith's study focused on the village in Chiu Chiu in northern Chile, where the native Atacameño people, who have inhabited this extremely arid region for more than 9,000 years, drink water from rivers originating in the Andes Mountains. Many of these rivers contain high concentrations of inorganic arsenic; concentrations of arsenic in the drinking water can reach as high as 800 µg/L. Despite this fact, some earlier reports had suggested that the Atacameño were less affected by arsenic than other exposed populations, giving rise to the theory that centuries of exposure had built up their resistance to the effects of arsenic, including characteristic skin effects such as dark brown spots, darkening of skin on the limbs and trunk, and keratoses on the palms of the hands and soles of the feet.

The scientists selected 11 families of Chiu Chiu likely to have the greatest exposure to arsenic, as determined by factors including age of family members, how long they had lived in the area, and principal source of drinking water. A total of 45 people underwent skin exams by four different physicians. Six were found to have definite arsenic-induced skin effects, including 4 men with over 20 years of exposure to arsenic, 1 boy, and 1 girl. These prevalences are similar to those reported in studies in Taiwan and West Bengal. Furthermore, despite evidence from those studies that malnutrition might increase susceptibility to the effects of arsenic, the people of Chiu Chiu eat a wide range of fruits and vegetables and, on the average, consume red meat and chicken at least once a week. Women fared better, however, with no incidences of skin effects, for reasons still unknown.

The authors conclude that arsenic-induced skin effects persist among the Atacameño despite good nutrition and thousands of years of potential exposure. They recommend providing low-arsenic water to this population and note that as an interim solution the people of Chiu Chiu are now receiving water from the town of Calama, where the arsenic concentration has been lowered through treatment to 45 µg/L. **–Julian Josephson**

Assessing Risk in Russia
Room for Improvement

It's widely recognized that there has been an alarming deterioration in Russia's adult survival: in 1993–1994 the average life expectancy of a Russian male was only 57.7 years. Many factors including the country's widespread environmental pollution may have led to this state. In a report in this month's issue, Jouni J. K. Jaakkola and colleagues examine how the Russian Federation is addressing the challenge of determining the causes of adverse environmental health effects through the compilation and use of information on the environment and human health. They conclude that the extensive collection of such information offers great opportunity, but the uneven quality of the collected data limits their value when used to develop environmental policy that would improve public health [*EHP* **108:589–594**].

The report's international group of authors are from the Harvard School of Public Health, the Johns Hopkins School of Hygiene and Public Health, the National Institute of Hygiene in Warsaw, Poland, and the Environmental Epidemiology Component of the Environmental Management Project at the Center for Preparation and Implementation for Foreign Projects in Moscow, Russia, which was initiated by the Russian government in 1995 to help improve environmental conditions and associated human health. The Environmental Management Project has been charged in part with establishing systems for the transfer of information to environmental policy makers—in other words, to figure out how to let policy makers know what and where the real environmental problems are. The authors argue, however, that the information systems should be developed further in order to better serve the policy makers.

In 1996–1997, the authors tracked the flow of health- and environment-related information from the local level, where it is routinely collected from clinics and hospitals, up to the regional level, and finally to agencies in the federal government that are responsible for environmental health (particularly water, food, and air quality) and monitoring and enforcement (particularly of emissions from industry). Reports based on the data are then funneled back to regional and local decision makers for use in planning and policy.

Russia's centralized health care services and the hierarchy of its data collection are among the system's strengths. Local health care personnel are required by law to collect such generic health information as births and mortality and morbidity rates. In the industrial city of Cherepovets, for example, the authors found that the maternal and child health surveillance system is so highly organized that the resulting computerized database can be used for studying the effects of environmental factors during pregnancy. However, the information is ultimately incomplete—malformations are not clearly characterized, major diagnostic groups and criteria are not formally described, and perinatal disease is not considered. The data also lack environmental factors that might affect birth outcome and perinatal health such as the size and nature of the family's residence, sources of indoor air pollution, and information on parental smoking and alcohol consumption. In addition, the data are presented to regional and federal offices in aggregate form, making it difficult to link environmental factors with specific health outcomes.

Among numerous recommendations, the authors urge that new kinds of information be collected and combined with routine data to help better assess the influence of environmental exposures on disease. In the long run, this emphasis on data quality and completeness should lead to improved decisions at the local, regional, and federal policy level. **–Rebecca Clay**

Data block. Although extensive amounts of data exist on environmentally related health conditions in Russia, the uneven quality and format of the data preclude its being used to make sound public health decisions.