

valuing risk to health

CHILDREN ARE NOT LITTLE ADULTS

**Sandra Hoffmann and
Alan J. Krupnick**



When it comes to environmental health risks, children often have the worst of many worlds. Facing the same concentration of a pollutant, children's exposure may be greater than that of adults. Because they have a higher metabolism rate than adults, children take in more food, water, and air for their body weight. Next, they engage in activities—like crawling on the floor and playing in dirt—that may bring them into closer contact with toxins. Also, because their bodies are still developing, children can be more vulnerable to pollutants and less able to detoxify and excrete them. Finally, children also have more years of life ahead of them than adults, so they have longer to develop chronic diseases from exposure to environmental toxins.

Only in the past 20 years have policymakers faced up to these issues. In the mid-1980s, the scientific community began insisting that environmental regulations designed to protect adults (primarily adult men) were not adequate to protect children. Governments all over the world, including in the United States, are now recognizing the need to develop standards that specifically protect children. For example, the 1996 Food Quality Protection Act (FQPA), which amended federal pesticide law, explicitly required that a tenfold safety factor be used in setting pesticide tolerances in food because of their uncertainty about the impact on children. In the mid-1990s, the administrator of the U.S. Environmental Protection Agency (EPA) directed that risk assessments for all environmental regulations consider the specific needs of children. This summer, environmental ministers from the European Union member states are meeting to draft an action plan for legislation, research, implementation, and evaluation of new programs to protect children from environmental hazards.

existing approaches don't quite work

Health benefits valuation plays an important role in enabling environmental agencies and ministries to evaluate prospective and current programs. Environmental programs address health risks as different as cancer and asthma. Benefits valuation provides a common measure—based on people's preferences regarding different diseases and mortality risks—by which a wide range of physical outcomes can be compared. Environmental policymakers often want to gain a quantitative understanding of how the benefits of a program compare with its costs. Monetary valuation of health benefits makes this possible.



Techniques for determining adults' preferences for various health improvements and expressing them in monetary terms are reasonably well established, if controversial. However, these techniques cannot be directly applied to children nor can they be adapted simply.

Economists have used two basic approaches to valuing reductions in risk to adults' health. The human capital approach looks at direct financial costs associated with illness—primarily medical expenses and lost wages. This approach is relatively easy to implement, but provides an incomplete measure of the value of protecting health. A theoretically more satisfying measure is willingness to pay (WTP) to reduce health risks. WTP measures are based on the trade-offs individuals make, or are willing to make, between protecting their health and other things they need or want.

Both approaches have obvious flaws when applied to children. Human capital measures can be even more incomplete or challenging to use because it can be more difficult to estimate the value of the time young children lose to illness because they are not engaged in the labor market. Estimates of WTP are conventionally based on adults' actions or statements reflecting their judgments about the worth of protecting their own health. As anyone who has chased after a three-year-old running toward a busy street knows, however, children do not have mature judgments about their own health.



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finding better approaches

Government agencies in the United States and other industrialized countries have been working with economists to develop more appropriate measures of the benefits of environmental regulation to children's health. In 1999, EPA brought together in a workshop leading economists working on environmental health valuation to identify major problems and research needs. A follow-up conference was held in 2003 at which economists presented research on family decisionmaking regarding children's health, valuing protection of fetal and infant health, variation of health valuation estimates by age, and valuation of the benefits of asthma reduction policies. In conjunction with the 2003 conference, EPA published its *Children's Health Valuation Handbook*. Because valuation of children's health is a rapidly developing area of knowledge, the *Handbook* is specifically designed to be an easily updateable reference tool, rather than a prescriptive guide. And in fall 2003, the OECD (Organisation for Economic Co-operation and Development) Environment Directorate held a workshop to help it design guidance for its member countries.

major questions identified

While these efforts have resolved many questions, several basic ones are still being debated. One of the most basic is whose benefits should be counted. The goal of any effort to value the benefits of a public program is always to reflect its full value to all in society who benefit from it. In valuing benefits from programs that protect adult environmental health, standard practice is to measure only the direct benefit to affected individuals. Counting the preferences of others who care about affected individuals' well-being would lead to double counting under certain circumstances. In the case of children, some economists argue that what should be counted is not only the direct benefit to children themselves, but also the benefit to others, such as parents or even general taxpayers, who care about children's health outcomes. One thing everyone agrees upon is that the value to the child itself of improved health is an important part of total benefits. The problem is how to accurately measure these benefits, which is true for both WTP and human capital measures.

At first glance it may seem difficult to apply the human capital approach to reduction in risk to children's health, because children don't work and their life outcomes are highly uncertain. But at a population level it is possible to project expected longevity, income, and disease rates and to estimate how they change in response to illness induced by environmental hazards. Because children's environmental health policy is often concerned with chronic disease, birth defects, or permanent disabilities over an entire lifetime, there may be greater uncertainty about these estimates than for an adult population. More attention may also need to be given to economic trends. For example, there is some evidence that exposure to neurotoxins, like lead, in early childhood is associated with an increased risk of not graduating from high school. But the economic consequences of not graduating from high school are greater today than they were in 1950 and can be expected to be even greater in the future.

With WTP measures, the problem is who should speak for children. EPA's practical solution is that their parents should. On its face, this seems like a commonsense solution. After all, parents bear the emotional, financial, and time costs of caring for their ill children. They are personally affected when their children are ill. But it is difficult to know what is captured in parents' valuation of children's health. Several empirical studies have resulted in the consistent finding that parents' WTP to reduce children's health risk is two times adult WTP to reduce their own health risk. No one yet knows quite what this result means. Do they perceive children's health to be twice as valuable as their own, or are parents



counting the impact on their children and the impact on themselves? One possibility is that adults' retrospective preferences for protecting their own health as children should be used or that it is worth reexamining a bit more deeply whether, after all is said and done, adults' WTP to protect their own health may not be a reasonable measure of the benefit of protecting health in childhood.

Even if there were agreement on whose benefits count and whose assessment of those benefits should be measured, serious questions remain about how to get reliable estimates of those measures. Research is being developed along several lines. A significant amount of work is being done to better understand parents' WTP to reduce their children's health risk (see sidebar next page). Other work is examining methods of valuing prevention of disease with long latency peri-



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family decision-making about risks to children's health: does father know best?



ederal agencies, such as the U.S. Environmental Protection Agency (EPA), must quantify the benefits of major regulations both for OMB and for Congress. To do this, EPA frequently relies on studies that estimate how much people would be willing to pay to protect themselves from environmental health hazards, such as exposure to lead paint. But what do you do if the person protected is a young child? One of EPA's answers is to turn to the child's parents. After all, parents hold the family purse strings and have legal responsibility for their children's health.

Most existing studies of parents' willingness to pay to reduce children's risk from exposure to environmental hazards assume the household has one decisionmaker who determines how all of the family's financial and time resources are allocated. This is called a unitary model of household decisionmaking. But this "Father Knows Best" view of how decisions are made does not seem to fit today's family—if it ever did.

Research on household economics, pio-

neered by 1992 Nobel Laureate Gary Becker, has led to the development of alternative models of how families choose to spend money and time. These models of household decisionmaking treat the family as a collection of individuals each with influence on the family's decision. The basic premise is that the adults in a family pool their financial resources and think about time available to the family as a shared resource. However, the adults are considered to have their own ideas of what is best for the family and bargain to reach a mutually agreeable allocation of resources.

Children's health is of particular concern because individual parents may have different attitudes toward children's health risks, be affected differently by children's illnesses and have responsibility for different parts of the household budget. Cognitive psychology studies show fairly consistently that women are more risk averse than men with regard to health and safety hazards. If this were coupled with women generally having greater responsibility for childcare or expenditures affecting children's health,



current valuation methods that do not take this into account could result in inaccurate (and possibly low) estimates of parental willingness to pay (WTP) to protect children from environmental health hazards.

We are conducting a study to see if there is a difference in estimates of parents' WTP to protect children's health using a unitary or collective model. The study, conducted with Ann Bostrom from Georgia Institute of Technology and Victor Adamowicz of the University of Alberta, focuses on parental decisions to protect children from lead paint hazards. It is one of the first to use a survey of individual's statements about their preferences to estimate a collective household model.

Our goal is to gain a better understanding of differences in parents' perception of risks their children face from environmental hazards and of the role each parent plays in family decisions about protecting children from these risks. We focus on lead poisoning from paint because it remains a serious public health concern for children, even though lead paint was banned for residential use in 1978 and because it primarily affects children.

Looking at how each member influences family decisionmaking is more complicated than looking at the household as an aggregate unit. As a result, we are using an innovative multidisciplinary approach that combines the theory of "mental models"—meaning the way people perceive the world and model it in their heads—with more standard surveys. The first stage of the study involves in-depth interviews with a small number of couples to examine parents' perception of risk to the child, their definition of prevention alternatives, and their priorities as individuals and as a couple. The results of this phase will be used as the basis for the second phase of the research: developing a survey of parents' willingness to pay to reduce children's risk from lead paint.

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ods, such as cancer. The OECD is sponsoring studies in several member countries to examine how values differ across countries. In the United States, the Department of Health and Human Services and EPA are planning a major long-term epidemiological effort, the National Children's Study. Steps are being taken to assure that this study includes questions relevant to understanding the trade-offs parents make to protect their children's health. ■

for further reading

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