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Children's Environmental Health: What Role for the Federal Government?

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Summary

During the late 1990s, perceived threats to children from pollutants in the ambient environment moved the U.S. Congress to legislate, President Clinton to issue an Executive Order, and the U.S. Environmental Protection Agency (EPA) to establish a new office aimed at enhancing children's environmental protections. In the 107th Congress, legislative proposals have been introduced that would extend these protections. This report summarizes and analyzes the scientific basis for concerns about children's environmental health risks from chemicals in the ambient environment, and discusses alternative federal policy responses that have been proposed. At the request of the Senate Committee on Environment and Public Works, CRS elicited expert assistance from scientists to consider the weight of scientific evidence regarding children's environmental risks, and policy experts to propose possible federal policy options. CRS convened an all-day seminar on May 22, 2000 at which authors presented draft papers, and experts representing a wide range of viewpoints critiqued them, addressing scientific papers in the morning and policy papers in the afternoon. The seminar and the commissioned papers were supported, in part, by a grant from the Robert Wood Johnson Foundation. Based on these papers and discussions, CRS constructed consensus statements and submitted them to participating experts for review and comment. This CRS report briefly summarizes the papers, lists the consensus statements, draws conclusions, and identifies issues for legislators.

Concerns about children's exposure to chemicals in the environment appear to be based, at least in part, on scientific data and studies. The science indicates that there may be increased risks to children, but that the extent and significance of those risks are unknown because data on chemical toxicity and exposure, particularly with respect to children, are very limited. Given this relatively sparse scientific basis for making general policy decisions, policy analysts representing a broad spectrum of political philosophies support additional federal funding for toxicological and risk assessment research. Beyond research and monitoring, policy preferences of experts diverge. The arguments for and against each policy approach are difficult to follow and analyze, in part, due to the shifting definitions used by advocates. A key factor in the debate is how individuals, experts and nonexperts weigh risk estimates based on available scientific information against their personal and societal values. Policy preferences also depend on political philosophies.

Members of the 107th Congress have introduced proposals to increase funding for data collection and analysis, that may be relatively uncontroversial. The outlook for proposals that go beyond research is less certain. Provisions that target a specific contaminant (e.g., wood preservatives used in children's playground equipment) may be enacted. In evaluating broader proposals, Congress will likely consider the adequacy of scientific evidence demonstrating a need for legislation, as well as the value of the potential outcomes, good and bad, of choosing to act in the current legislative session or to wait for additional evidence. This report will not be updated, since it summarizes a specific set of scientific and policy papers.

Contents

Children's Environmental Health: What Role for the Federal Government?

Background

Issue Development. The middle to late 1990s saw a flurry of federal legislative and administrative activity concerned with environmental risks to children's health. For example, three major environmental statutes – the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), the Federal Food, Drug, and Cosmetic Act (FFDCA), and the Safe Drinking Water Act (SDWA) – were amended to address risks to children, a new Office of Children's Health Protection was established at the U.S. Environmental Protection Agency (EPA), and President Clinton issued Executive Order 13045 establishing an interagency task force to identify strategies for better protecting children's environmental health and safety. (Selected key activities are described in Appendix A.) In the 107th Congress, policymakers are asking "Do U.S. children need more federal protection from environmental pollution?" and "Do our other environmental laws need to be more protective of children?"

Although few doubt that children are potentially more vulnerable than adults to certain environmental hazards, such as lead poisoning, skeptics question the need for increased federal efforts to protect children from most environmental contamination, sometimes because the risks appear small and uncertain relative to other health risks in childhood (such as risks of poisoning or falling), or perhaps because the homes, playgrounds, and other places where children are most likely to be exposed to chemicals traditionally have been regulated at the local or state level. Others question the statutory authority or competence of EPA for addressing hazards that they believe might be handled better by public health practitioners or perhaps housing specialists, rather than by federal environmental protection specialists. On the other hand, many children advocate groups argue for stronger environmental laws and believe that environmental regulations should provide greater child protection in all program areas, not just for pesticides and drinking water.

The CRS Seminar on the Issue. This report summarizes and analyzes the scientific basis for concerns about children's environmental health risks from chemicals in the ambient environment and discusses alternative federal policy responses that have been proposed. Because the scientific and policy issues involving children's environmental health are complex, this CRS analysis is based in large part on papers prepared by outside experts in fields related to children's environmental health, and on critiques of those papers presented at a CRS seminar by peer reviewers representing a range of viewpoints. The seminar was held at the request of the Senate Committee on Environment and Public Works. Four knowledgeable pediatricians and research scientists prepared scholarly papers exploring the scientific research basis for assessing potential environmental health threats to children. In addition, four policy experts authored papers evaluating federal policy opportunities with respect to such

risks. Critiques of the eight papers were prepared by other pediatricians, toxicologists, epidemiologists, and environmental or public health scientists and policy experts representing a range of informed viewpoints.

Highlights of the papers and critiques were presented and discussed at an all-day CRS seminar held May 22, 2000. Scientific papers were presented in the morning session, policy papers in the afternoon. Following the seminar, authors revised their papers to address comments by peer reviewers and points raised during the discussions. CRS analyzed the final papers and discussions to identify points of consensus and dissent, constructed consensus statements, and submitted them to all experts for review and comment. The final consensus statements summarize the conclusions of scientists with regard to each of the four scientific topics and of policy experts regarding federal policy options.

Project Scope. Because congressional interest has centered on perceived threats to children's health from pollutants in the ambient environment – air, soil, water, and food – and on the role of EPA in managing them, CRS attempted to focus the papers and discussions on a narrow definition of "environmental," so as to exclude consideration of potential hazards over which EPA has little authority, because they are not in outdoor air, water, or soil. However, the pediatricians and other public health professionals who participated in the CRS project occasionally blurred the boundary between the broader public health and narrower project definitions. Experts' concerns about particular health trends among children, for example cancer and asthma incidence, prompted CRS to broaden the definition of "environmental hazards" to include indoor air pollutants (e.g., environmental tobacco smoke, particulate matter from use of a gas stove, or pesticides used indoors). Nevertheless, the definition of "environmental" used in this report is narrower than the traditional public health definition; public health professionals use "environmental hazard" to refer to any factor that is not genetic (i.e., inherited), including infection by pathogens, accidents of all kinds, and so-called "lifestyle" factors like diet, exercise, violence, smoking, and drug use, as well as exposure to pollution indoors and out.

State of the Science

The state of scientific knowledge about children's environmental health risks in the ambient environment, as reviewed by four scientists, is summarized below. Following each summary is a list of CRS-developed consensus statements relevant to each topic based on the papers and ensuing seminar discussions. Seminar participants were given the opportunity to review and comment on the statements.

"Men Are from Mars, Women Are from Venus, and Children Are from Pluto: Pediatric Environmental Health" by Dr. Ruth Etzel. The first scientific paper was authored by Ruth A. Etzel, M.D., Ph.D., a pediatrician and epidemiologist, who is a Captain in the U.S. Public Health Service in Washington, D.C. She is the immediate past chairperson of the American Academy of Pediatrics (AAP) Committee on Environmental Health and the editor of the AAP Handbook of Pediatric Environmental Health. Dr. Etzel began by explaining how and why

children's environmental health risks are different from those of adults. She noted that –

- Children may be exposed differently to pollutants;
- Children may absorb pollutants differently;
- Children have a higher rate of metabolism; and
- Children have "windows of vulnerability" while they are growing and developing, when their target organs may be more susceptible than the target organs of adults.

Dr. Etzel summarized developmental stages and illustrative environmental health risks that occur during each stage.[1]

To address the question of how environmental health risks compare to other health risks for children, Dr. Etzel discussed the five leading causes of death among infants less than one year,[2] children between 1 and 4 years, children between 5 and 9 years, children between 10 and 14 years, and children 15 to 19 years. Changes over time in these risks also were discussed. She concluded that with respect to childhood mortality, environmental health risks have been greatest during pregnancy and during the first year of life. Estimates of the proportion of infant deaths that might be due to environmental causes, Dr. Etzel noted, vary between 5% and 40%. If one assumes that the lower estimate is accurate, then 1,424 infant deaths (5% of 28,488 infant deaths) would be attributed to environmental causes, she explained. However, she emphasized that mortality is a poor indicator to use when assessing how environmental risks compare to other health risks for children, because most environmental health risks do not result in deaths among children, but in illnesses and disabilities, which are not routinely tracked.

Scientists who participated in the discussion of Dr. Etzel's paper at the CRS seminar, generally agreed on the following points –

- As a group, children's environmental health risks differ from those of adults. The differences may be large and may go in either direction.
- Differences in exposure and vulnerability to health effects among individual children may be less than, equal to, or greater than differences among groups of children at different stages of development – prenatal, perinatal, infant, toddler, pre-teen, and adolescent – or than between children as a group and adults.
- As a group, children differ from adults in exposure to potentially toxic chemicals in the environment; their absorption and metabolism of such chemicals; and their susceptibility to harmful effects. Some of these differences arise from differences in behavior (for example, drooling and mouthing objects or crawling), physical size, maturity of organs or physiological processes, or presence in different environments (e.g., *in utero*, occupational, recreational,

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[1]The word "developmental" is used throughout this document. It is defined in Dr. Mattison's paper as related to the process of growth and maturation from an immature to a more mature stage.

[2]"Infant" refers to a child from birth through one year of age.

or educational). Socio-economic conditions, health and nutritional status, genes, and access to medical care mediate environmental health effects.

- Children's biological exposure from chemical contaminants in the air, some foods, and water may be greater than that of adults in the same environment, because children breath more, eat more, and drink more, relative to their size, and the skin of a newborn child may absorb more, pound for pound.
- Children experience periods of special vulnerability to some toxic effects of some chemicals as their organs develop. Some of these vulnerable periods are quite extended.
- Although U.S. death rates due to childhood exposure to environmental contamination are not known, they should be viewed in the context of known causes of death, which vary depending on age.
- U.S. death rates might not be the best basis for comparing health risks to children; some measure of illness or disability would be useful, if data were available.

"Do We Know Which Environmental Pollutants Pose a Special Health Risk to Children? Case Studies of Lead, PCBs, and Methyl Mercury" by Dr. Lynn Goldman. Lynn Goldman, M.D., a professor at Johns Hopkins School of Hygiene and Public Health, prepared the second paper. As the former Assistant Administrator of the Office of Prevention, Pesticides and Toxic Substances at the Environmental Protection Agency, she has broad knowledge of the range of chemicals regulated by the federal government. Dr. Goldman gave an overview of the chemicals and pesticides on the market today and the information available about them to assess risks to children. Her points were illustrated by case studies of lead, mercury, and polychlorinated biphenyls (PCBs). She concluded that children may be more susceptible than adults to chemicals in the environment, and that scientists now recognize a need to gather child-specific data.

Dr. Goldman and the other scientists who participated in the discussion of Dr. Goldman's paper at the CRS seminar generally agreed on the following points –

- Information about the potential toxicity to children of chemicals in U.S. commerce is very limited and usually based on indirect measures. There are few experimental data related to developmental neurotoxicity.[3]
- Data on children's exposure to chemicals, including prescription drugs, remain sparse.
- Data on childhood exposure to lead in the United States provide a sound basis for risk assessments. Lead exposure in children can lead to IQ deficits, impaired school performance, distractability, short attention spans, and impulsive behavior.
- Even when data clearly establish the toxicity of a chemical to children, such as the toxicity of methyl mercury to developing brains, exposure data for U.S. children are lacking. Epidemiological studies suggest that a small proportion of U.S. infants may be at risk due to prenatal exposure to methyl mercury.

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[3]Developmental neurotoxicity is the capability of causing damage to the growth, structure, or function of the nervous system of an embryo or fetus either before or after birth up to the time of sexual maturation.

- New data are being collected by industry and government to improve estimates of exposure and toxicity to U.S. children of pesticides, some pediatric drugs, and methyl mercury.
- Chemicals like lead and methyl mercury, that are toxic to nervous tissue in similar ways in children and adults, are more likely to harm young children, whose brains are still developing, than adults, given comparable levels of exposure.
- Where data exist on other chemicals, they are not always well exploited. For example, data gathered by the Food and Drug Administration (FDA) and EPA as part of a product registration application have not been used extensively to develop models for predicting toxicity of unstudied chemicals, often because access to such data is restricted to protect confidential business information (CBI, also known as trade secret claims).

"How Do We Know a Chemical Can Produce a Birth Defect?" by Dr. Donald R. Mattison. Donald Mattison, M.D., M.Sc., is the Medical Director of the March of Dimes. In the third scientific paper, he summarized the state of knowledge about birth defects and other adverse effects on growth and development to illustrate his answer to the question "Do environmental exposures to pollutants increase the rates of adverse health outcomes?" Birth defects are the leading cause of death among infants, and the second leading cause of death among children generally (after motor vehicle accidents). About 150,000 babies are born each year with birth defects (at a rate of 35,714 per million births, about 1 in 28). Yet, the causes of many birth defects are poorly understood, according to Dr. Mattison. He described major difficulties encountered by scientists studying birth defects and discussed the strengths and weaknesses of various kinds of data.

Scientists who participated in the discussion of Dr. Mattison's paper at the CRS seminar, generally agreed on the following points –

- Exposure during development to certain chemicals at toxic levels may cause death, structural abnormality, altered growth, or functional deficits. Some effects may take years to be evident, while others may be immediate, short-lived, and reversible. Increased probability of premature birth also might be an effect of toxic exposure.
- For most chemicals, it is not known whether adverse health effects might result from prenatal, infant, or childhood exposure to low levels in the environment.
- The causes of most significant health problems in infants and children, for example, some birth defects and asthma, are only partially understood.
- The overall infant mortality rate and the rate of infant deaths due to birth defects have fallen significantly in recent years. Nevertheless, the United States has a higher rate of infant mortality than 25 other nations.
- Birth defects are the leading cause of infant mortality in the United States. Birth defects most commonly affect the cardiovascular system, respiratory system, chromosomes, and nervous system, in that order.
- Premature birth is the second most common cause of infant mortality, and the number of pre-term births has increased slightly in recent years.
- Estimates of the percentage of all birth defects that may be caused, at least in part, by environmental factors (including smoking and alcohol use) vary widely from about 3% to as much as 75%. More recent estimates are on the higher

end of this range. Individual susceptibility to environmental pollutants may often be determined genetically.

- All known human developmental toxicants cause developmental disease in at least one species of experimental animals. Animal tests for effects on development often are accurate predictors of human developmental toxicity.
- There is no indication that background ambient levels of teratogens in the air, water, or soil have caused human birth defects in the United States.[4]
- There is limited evidence that birth defects have increased in the vicinity of some contaminated industrial sites.
- Asthma rates have been rising in the United States for 30 years, but scientists do not know why.
- Public health surveillance of asthma morbidity and other disorders in children is needed.
- It is not clear whether the observed increase between 1973 and 1994 in rates of some types of childhood brain tumors indicates a real increase in cases or improved medical technologies.
- Generally, it is not clear whether cancer rates in children are rising.

"Pesticides and Childhood Brain Cancer: A Review and Perspective" by Dr. Andrew F. Olshan. Andrew Olshan, Ph.D., is a professor in the Department of Epidemiology, School of Public Health at the University of North Carolina. His paper examining the state of research on children's environmental health is the fourth and final scientific paper. Dr. Olshan used his own research on the relationship between brain cancer in children and pesticide exposure to portray the more general issues in children's environmental health research.

Scientists who participated in the discussion of Dr. Olshan's paper at the CRS seminar, generally agreed on the following points –

- The environmental factors that might increase childhood cancer rates generally are not known, with a few exceptions most notably ionizing radiation.
- A large increase is needed in chemical testing to support risk assessments for potential health effects in children due to environmental exposure to chemicals.

- Better chemical exposure data are needed for parents and children. Currently, most studies estimate pesticide exposure levels for all pesticides as a group, rather than for particular products, and estimates almost always are based on indirect measures of uncertain validity.
- Although data on pesticide exposure are limited, some believe that home, lawn, and garden uses of pesticides may be larger sources of pesticide exposure to most parents and children than agriculture.
- The biologic mechanisms by which pesticide exposure might lead to cancer in children remain speculative and should be investigated.
- The totality of epidemiologic evidence is not sufficient to conclude causal association of pesticide exposure and brain cancers, though the data are suggestive.

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[4]A teratogen is a chemical, physical, or biological agent that causes birth defects.

- There is a need for much more screening of chemicals for environmental risks to children's health. New research methods, including toxicogenomics and bioinformatics, should be developed to screen chemicals.[5]
- Research should take into account the effects of age at exposure, timing, and duration of chemical exposure. There is a need for better experimental data on the health effects of pesticides on offspring of laboratory animals.
- New methods are needed for toxicological testing, and for evaluating existing databases, especially for factors that determine toxicity, allergenicity, and non-cancer endpoints like developmental immunology. Structure-activity relationships (SAR) among chemicals might be used to evaluate absorption, distribution, metabolism, and interaction with cells, but a need remains for new animal strains suitable for testing.[6]

Selected Policy Options

The four policy papers and key points raised during their discussion are summarized below. CRS-constructed consensus statements based on the policy discussion follow. Seminar participants were given the opportunity to review and comment on the statements.

"Placing Children's Environmental Health Risks in Perspective" by Dr. Kenneth Chilton. Kenneth Chilton, Ph.D., presented the first policy paper in the afternoon session of the CRS seminar on May 22, 2000. Dr. Chilton, a Distinguished Senior Fellow and Manager of Environmental Research at the Center for the Study of American Business at Washington University in St. Louis, Missouri, argued that environmental risks to children's health are not large relative to other risks, and were exaggerated by the Clinton Administration. He expressed concern that this exaggeration might distort priorities in public health programs, diverting public resources away from programs targeting greater risks. He urged restraint in public resource allocations and in public communication about children's environmental health risks, tempering pronouncements about risks with acknowledgments of any associated benefits that may justify risks.

Dr. Chilton described current federal research efforts on children's environmental health risks as "considerable" and "adequate." He would broaden or rescind President Clinton's Executive Order 13045, which mandates development of child-centered programs. Environmental protection legislation, Dr. Chilton stated, should be written to include consideration of costs, benefits, and other risks when regulating environmental contaminants. Finally, Dr. Chilton recommended that a broadly focused public health agency, rather than EPA, should lead any children's environmental health initiative on the part of the federal government. This

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[5]According to "The Genomics Lexicon," "toxicogenomics" is an emerging scientific discipline that combines genomics (the study of genes and their function) and bioinformatics (the management and analysis of biologic research data using advanced computing techniques) to identify and describe the ways that chemical molecules affect and are affected by human bodies. The lexicon may be viewed at <http://209.52.56.28/lexicon/index.html>.

[6]"Structure-activity relationships" refers to the study of how molecular structure relates to function.

arrangement would be more likely to preserve an appropriate balance among programs devoted to various risks, according to Dr. Chilton.

"The Role of the Federal Government in Protecting Children's Environmental Health" by Daniel Swartz. Rabbi Daniel Swartz, Executive Director of the Children's Environmental Health Network (CEHN), emphasized the importance of social, ethical, and political values, in addition to biological and economic factors, in determining what federal policies should be with respect to children's environmental health, particularly in light of the uncertainty of scientific estimates of risk. He argued that equity, liberty, and justice are values Americans hold in common. He expressed a preference for policies aimed at prevention, as opposed to treatment after exposure. Reductions in poverty should be pursued along with reduced environmental hazards, according to the Rabbi. He admired the example set by the Food Quality Protection Act standard for protecting children, in which pesticides are not assumed to be completely safe for children, but are not assumed to be dangerous at all levels in all circumstances, either: data drive the decision whether to provide an extra margin of precaution in standard setting.[7]

Rabbi Swartz provided several suggestions for federal action to protect children's environmental health, including more protective standard setting, consideration of cumulative and aggregate risks to children in risk assessments and rule development, development of national monitoring and research strategies, establishment of a broad parental right to know about potential risks to their children, better intragovernmental and intergovernmental coordination of relevant programs, support for a moral code that protects children, and responsible behavior with respect to children. Finally, Rabbi Swartz warned of the limitations of economic analyses and advised the federal government to revise economic assumptions that he alleged are incompatible with protection of children's environmental health. Rabbi Swartz said he favored retaining and supporting the Executive Order on Children's Environmental Health, establishing a White House Council on Children's Environmental Health and Safety, and employing whatever means are appropriate at the federal level to achieve protection of children's health, including regulation, voluntary programs, grants, demonstration programs, outreach and education, and legislation.

"Navigating the Maze: Federal Activities to Address Children's Environmental Health Risks" by Dr. Kimberly M. Thompson. Kimberly Thompson, Sc.D., Assistant Professor of Risk Analysis and Decision Science at Harvard University's School of Public Health, gave the third policy paper. Dr. Thompson provided an overview of the recent history of federal agency involvement in children's health issues. She argued that the focus of recent initiatives on children's environmental health with a heavy focus on chemicals, failed to recognize or address the most significant risks to children's health, such as poverty, accidents, and violence. However, she noted the lack of data that would permit relative risk assessment. She summarized research needs identified by various workgroups in recent years. The federal government should evaluate and address environmental risks, she urged, in

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[7]The Food Quality Protection Act of 1996 amended the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and the Federal Food, Drug, and Cosmetic Act (FFDCA) to enhance safety for children exposed to pesticides.

light of more certain risks of equal or greater magnitude, such as children's risk of dying in automobile accidents, gun violence, and child abuse. She argued that both exposure to, and toxicity of, chemicals in the environment must be assessed chemical-by-chemical, because the quality and quantity of health effects are variable.

Dr. Thompson concluded that sparse data do not provide a solid scientific basis for rulemaking with respect to children's environmental health risks due to pollution. She urged policy makers and researchers to clearly define terms, identify inequities, and target policies to relatively high risks. The role of the federal government should be to coordinate programs concerned with child welfare, address children's health issues of national or international scope, support medical and public health research, regulate multinational industries, provide resources to meet children's needs, and monitor children's health, according to Dr. Thompson. She questioned our national commitment to improve children's health, however, and expressed special concern about the health of uninsured children and the congressional failure to ratify the International Convention on the Rights of the Child.

Dr. Thompson stated that federal support and oversight is needed for traditional local public health programs, such as immunization and food stamp programs, and she argued that a more analytic approach is needed to ensure accountability and efficient use of federal resources available for children's health programs. A prerequisite to analysis, she claimed, is more transparency in how resources are allocated to research and risk management programs. Dr. Thompson criticized policy decisions that failed to consider tradeoffs among risks and benefits, and she concluded that future research should collect data on costs and benefits of alternative risk management policies, as well as information needed to put environmental risks in perspective.

"The Role of the Federal Government in Protecting Children's Environmental Health" by Dr. Richard J. Jackson. Richard Jackson, M.D., M.P.H., Director of the National Center for Environmental Health at the Centers for Disease Control and Prevention (CDC), contributed the final major paper in which he argued that federal responses to chemical risks historically have been delayed pending data collection and analysis, resulting in unnecessary suffering and permanent disabilities. He urged vigorous enforcement of existing regulations and aggressive promulgation of "child-centered, science-based, prevention-oriented environmental health and safety policies that protect children now and in the future." The special role of the federal government should include public health surveillance, data collection and analysis, and development of national goals for child health, he stated.

Much more funding for research is needed, Dr. Jackson claimed, in order to fully understand the health effects resulting from exposures to environmental toxicants, particularly when those health effects appear only many years after exposure. Dr. Jackson praised the Food Quality Protection Act provision mandating addition of up to a 10-fold safety factor to federal standards limiting pesticide residue levels on food eaten by children. He argued that the FQPA forces manufacturers of pesticide products to prove their safety, an approach which he favored. Swift implementation of the FQPA provisions is needed, he said. He also urged continued and increased funding for the interagency task force on children's environmental health.

Discussion. Discussants raised a number of issues. For example, Dr. Trudy Cameron, a professor of economics at the University of California at Los Angeles, noted that the policy papers all seemed to recommend selection of measurable public health goals prior to decisions about how to allocate federal resources. Dr. Cameron argued that the federal government should intervene to manage the availability of public goods like health protection, because preventive measures in particular are unlikely to attract much private investment.

Many speakers expressed concern about a focus on mortality, when illnesses are so much more prevalent in children. Moreover, it was noted that defining children's risk in terms of deaths during childhood would miss any increase in death rates during the adult years due to childhood exposure to environmental contaminants.

Dr. James Wilson, Senior Fellow at Resources for the Future, stated that most federal laws governing chemicals and the environment protect women of child-bearing age and children, making additional chemical regulations unnecessary. He opined that the key lesson of the seminar was that the effect of poverty on the environment of children is a more significant problem than environmental pollution.

Ms. Karen Florini, a Senior Attorney with Environmental Defense, argued that the United States is rich enough to be both safe and healthy, that is, to address injuries as well as environmental risks to children. What she termed a "lack of political will" to address poverty, guns, and smoking does not excuse delays in addressing environmental health hazards for which political will does exist, she said. In addition, Ms. Florini claimed that at least some progress in reducing environmental risks to children may be relatively inexpensive or even profitable for the regulated industries.

Ms. Florini added that data are too sparse to rule out children's exposures to environmental chemicals as causes of chronic diseases in adulthood. Until data can be collected, she urged use of conservative, protective assumptions to fill in any scientific gaps.

Ms. Sandra Tirey, an Assistant Vice President of the Chemical Manufacturers' Association (now the American Chemistry Council), suggested that a key role for the federal government should be in communicating accurate children's health risk information to the general public. She also favored federal incentives for collaboration "among government, academic, industry, and other stakeholder interests."

The ultimate purpose of research sponsored by the federal government seemed to be at issue, according to Mr. Jim O'Hara, formerly with the Food and Drug Administration and now directing Health-Track (a project supported by The Pew Charitable Trusts through a grant to Georgetown University). He noted that some policy advocates want research to inform regulations, while others seem to see research only as a tool to inform the public. He urged integration of public health and environmental protection approaches in federal policies.

Areas of Consensus. Convergence, rather than divergence, of opinion is evident among the authors and discussants of policy papers: authors seemed unanimously to favor governmental action in the form of research. The following

statements of consensus on possible federal approaches were approved by participants in the May 22, 2000 seminar.

- The federal government should identify research priorities and conduct and sponsor basic medical, biological, environmental, and public health research to improve scientific understanding of children's health and development;
- The federal government should organize, fund, and evaluate monitoring programs to collect data on chemicals in the environment, children's health trends, and children's exposure to chemicals;
- The federal government should help shape, manage, and support a public health infrastructure capable of preventing and responding to significant children's environmental health risks, with special attention to children with limited access to medical care;
- Federal policies should recognize that economic status, environment, and health interact, and that diseases usually are caused by a confluence of genetic and environmental factors; and
- Federal policies for research and risk management related to children's health should recognize the significance of morbidity (i.e., illness and disability), although no satisfactory metric is available for quantitative comparisons.[8]

Conclusions

Concerns about children's exposure to chemicals in the environment appear to be based, at least in part, on scientifically based knowledge of past experience with toxic chemicals and adverse effects of exposure to them in the environment. The science indicates that there may be increased risks to children, but that the extent and significance of those risks are unknown, because data on chemical toxicity and exposure, particularly with respect to children, are limited and do not permit generalizations about the risks to children that may be posed by the universe of chemicals. It is possible that the relative toxicity and exposure of children to toxic chemicals in the environment may be no greater relative to adult exposure *on average* or for *most* chemicals. On the other hand, greater health risks to children have been found for environmental exposure to lead, and research demonstrates a potentially greater toxicity to children, if they are exposed to high enough levels, of other pollutants like PCBs and mercury.

Given this relatively weak scientific basis for making policy decisions, analysts representing a broad spectrum of political philosophies support additional federal funding for toxicological and risk assessment research. New methods of data analysis appear promising as tools to maximize the informative value of data collected by various programs and agencies. Scientists and policy experts also endorse greater commitment to monitoring of environmental contamination and of human exposure,

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[8]Participants wanted to go beyond the narrow measure of mortality to include other adverse conditions of health. They discussed the advantages and disadvantages of various health benefit measures in use today, such as lives saved, life-years saved, quality-adjusted life-years (QALYs) saved, and disability-adjusted life-years (DALYs) saved, but disagreed about their measurability and utility.

especially children's exposure, to chemicals in the environment. Improved assessments of children's environmental health risks depend on such data collection efforts.

Beyond research and monitoring, policy preferences of these experts diverge, despite a common understanding of available scientific evidence. The arguments for and against each policy approach are difficult to follow and analyze, in part, due to the shifting context of the discussion: policy advocates employ diverse definitions of terms like "environmental," "children," and "risk" and compare different sets of hazards and different measures of risk. For example, some advocates for a more active federal role in protecting children from environmental risks define "environmental" to include microbiological hazards in buildings and "risk" to encompass rates of illness and potential irreversibility of some health effects, as well as probabilities of death. These might argue that many, or even most, risks are due to gene-environment interactions. On the other hand, those who maintain that environmental risks are small relative to other childhood hazards, sometimes compare mortality rates attributed to chemical exposure to risks from deaths attributed to accidents and other physical and biological hazards (which can also be considered "environmental" in the broadest, public health sense – that is, they are not determined by individual's genetic makeup). For the purposes of this report and the project on which it is based, policy arguments about risks due to environmental exposures to chemical pollutants are distinguished from arguments about risks due to other environmental influences on health, such as poor nutrition, illicit drug use, automobile accidents, or inadequate medical treatment. "Children" is used to refer to infants, children, and teenagers.

A key factor in the debate, which appears to be fundamental, is how individuals, experts and nonexperts, weigh risk estimates based on available scientific information against their personal and societal values. For example, people disagree about whether a chance of increased harm to children justifies increased expenditures (or reallocation of resources) by government or regulated entities to ensure safety. Clearly, whether or not action is justified depends, in part, on the likelihood, magnitude and severity of harm (that is, the risk) that might occur. But, there is little agreement, even among experts, on such questions as "How much information is enough to act?" "What sources of information are most reliable?" The less scientific information that is available, the more policy preferences are influenced by value preferences, which vary widely. Moreover, factors other than risk may be important considerations with respect to policy preferences.

Policy preferences also depend on political philosophies. Individuals advocate different policy approaches depending on what they see as the strengths and weaknesses of federal, state, and local governments and non-governmental entities.

Experts argue for a wide range of federal policy approaches to children's environmental health protection. Some experts are inclined to avoid federal actions that would divert existing resources to further reduce children's environmental health risks, at least until such risks could be better characterized with respect to competing priorities. While waiting for scientific evidence allowing better quantification of relative risks, policy makers should be targeting resources to reduce recognized health and safety risks to children, these experts believe. Other experts are inclined to increase investments of federal resources to enhance protection of children now, for

example, by attempting to minimize their exposure to potentially hazardous chemicals through federal pollution prevention incentives or regulations.

Legislative Proposals in the 107th Congress

A consensus seems to have emerged that additional research is needed to better understand and evaluate risks to children exposed to chemicals in the environment. The 107th Congress appears likely to continue full funding for existing programs at EPA, such as endocrine disruptor screening and pesticide residue tolerance reassessment under the Food Quality Protection Act.

Other proposals in the 107th Congress would go beyond research. Some are narrow provisions that target a specific contaminant. For example, a provision in Senate-passed S. 1216 would require an EPA report on the safety of children's playground equipment treated with chromated copper arsenate (CCA), a wood preservative. The Children's Environmental Protection Act (S. 855) is a much broader bill that would direct EPA to ensure that all environmental standards protect children and other vulnerable subpopulations with an adequate margin of safety.

Evaluation of these proposals involves considering the adequacy of scientific evidence demonstrating a need for legislation, as well as the value of the potential outcomes, good and bad, of choosing to act in the near future or to wait for additional evidence. Health, economic, social, political, and ethical outcomes are a few of the key factors to be considered.

Appendix A. A Summary of Recent Congressional and Administrative Activities Concerned with Environmental Risks to Children's Health

Three consecutive Congresses enacted legislation targeting environmental health risks to children. The 104th Congress enacted the Food Quality Protection Act of 1996 (FQPA), in part to better protect children from pesticides. To ensure the safety of children, the FQPA requires EPA review of all pesticide registrations for food uses and standards for pesticide residue levels on food (tolerances). Where there is reason to believe that children might be at greater risk, and there are insufficient data to assess risk, FQPA directs EPA to set standards that are up to 10 times safer than would be required to ensure adult safety.

Amendments to the Safe Drinking Water Act in 1996 direct EPA in regulating drinking water to consider infants, children, and other segments of the population that may be at greater risk of adverse health effects due to exposure to contaminants than the general population. The law also requires on-going EPA research on how such population groups may be affected by drinking water contaminants.

The 105th Congress enacted the Birth Defects Prevention Act (Public Law 105-168) in 1998, which authorized the Centers for Disease Control and Prevention (CDC) to collect, analyze, and make available data on birth defects. And the 106th Congress enacted the Children's Health Act of 2000, establishing a National Center on Birth Defects and Developmental Disabilities at the Centers for Disease Control and Prevention (Public Law 106-310). This Act authorizes research and outreach on asthma, cancer, lead poisoning, and autism.

The Clinton Administration launched EPA's Children's Environmental Health Initiative in October 1995, when EPA Administrator Browner announced a policy to "consistently and explicitly evaluate environmental health risks of infants and children" in all of EPA's risk assessments and risk characterizations and in setting environmental and public health standards. The following year, EPA issued a report, *Environmental Health Threats to Children*, identifying environmental hazards of concern and a strategy for addressing them. A new EPA Office of Children's Health Protection was established and given responsibility for implementing the strategy.

On April 21, 1997, President Clinton issued Executive Order 13045, *Protection of Children from Environmental Health Risks and Safety Risks*. It extended the EPA initiative on children's environmental health protection to all federal agencies by directing agencies to "make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children" and to ensure that "policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks." A task force, co-chaired by the Secretary of the Department of Health and Human Services (DHHS) and the Administrator of the EPA (or their designated representatives), was established to recommend federal environmental health and safety policies, priorities, and activities to protect children.

In September 1997, EPA formed a Children's Health Protection Advisory Committee to identify EPA rules that should be reviewed to determine whether they adequately protected children. In 1998, Vice President Gore announced a related federal initiative to gather toxicological information about chemicals to which children might be exposed and establishment of eight federal research centers devoted to the study of children's environmental health. EPA issued a second report, *America's Children and the Environment: A First View of Available Measures* in December 2000.

In its first year, the Bush Administration has launched additional programs to protect children and continued support of others. On March 13, 2001, EPA Administrator Whitman announced that EPA and the Ad Council were launching a media campaign to alert parents to indoor environmental triggers of asthma attacks, such as mold and secondhand smoke. In July 2001, EPA announced that 35 chemical companies had agreed to voluntarily test 20 chemicals for potential toxic effects on children.

In October 2001, Children's Health Month, President Bush extended the life of the interagency task force for children's environmental health and safety for 18 months (Executive Order 13229, Oct. 9, 2001), and the executive leadership of that task force held its first meeting under the Bush Administration. Also in October, EPA co-sponsored a regional Asthma Summit with DHHS and Mount Sinai Hospital, announced a public relations campaign to encourage parents who smoke to do so outdoors, announced recent approval of smog-reduction plans for five major metropolitan areas (Houston, Milwaukee, Chicago, Baltimore, and Philadelphia), and announced the locations of four new children's environmental health research centers.