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October 23, 2000

Ms. Carol M. Browner
Administrator
Environmental Protection Agency (EPA)
1200 Pennsylvania Avenue
Washington, DC 20460

Re: Children's Environmental Health Data Needs and Right-to-Know Blueprint

Dear Administrator Browner:

This letter provides consensus recommendations from the Children's Health Protection Advisory Committee (CHPAC) regarding the need to generate, and make available to the public, additional information on environmental health hazards to children, their exposures to hazards, and the resultant health outcomes. Together, these recommendations form a *Children's Environmental Health Data Needs and Right-to-Know Blueprint*. These recommendations, with explanation and justification, are provided in Attachment 1.

Presentations from a variety of EPA and the Centers for Disease Control and Prevention (CDC) personnel on existing data systems and research efforts show a paucity of basic information on these topics. Disparate Agency mandates, insufficient funding, and limited linkages between research and environmental health practice have led to a patchwork of Agency efforts to address the link between environmental pollution and population health status. Lack of a coordinated system undercuts the ability of the EPA Office of Children's Health Protection to adequately carry out its mandate in protecting the health of the nation's children from contaminants in the environment.

Through a *Children's Environmental Health Data Needs and Right-To-Know Blueprint*, EPA in conjunction with the Department of Health and Human Services and other government agencies should monitor, track, and annually report environmental hazards, childhood exposures, biomonitoring data and childhood health conditions that may be related to the environment. For maximum benefit, these environmental and health data sets need to be coordinated and linked so that the relationship between environment and children's health can be ascertained. To facilitate linkages, data sets should be geocoded whenever possible. Several specific elements are recommended for inclusion in this Blueprint:

- *Indicators* – In order for the Agency to track progress and evaluate needs, indicators must be identified that will be used to measure environmental contaminants or health effects in children resulting from environmental exposures.
- *Biomonitoring* – Biological monitoring can provide direct evidence of human exposures to contaminants. A systematic program should be developed to utilize biological samples to evaluate health effects resulting from exposures and to help identify opportunities for interventions for disease prevention.
- *Highly Exposed/Susceptible Subpopulations* – In many instances, the data collection systems that currently exist fail to identify children who have the highest exposures to toxicants relative to other children. Farmworker children, for example, may be exposed to pesticides by doing farm work, eating foods directly from the fields, by dermal contact with treated plants and soils, and by exposure to drift from pesticide application. Little information is currently available on these potentially high exposures.
- *Indoor Air Quality* – It is estimated that children spend more than 90 percent of their time indoors. Current efforts to evaluate indoor air quality are limited, and we lack a basic of understanding of children's exposures in schools, homes, and other indoor environments that are frequented by children.
- *Children's Products* – Children may be significantly exposed to chemicals in certain consumer products, particularly those products whose intended use involves mouthing and extensive dermal exposure by children, and all products intended for use by children through the age of five. Limited information is available on these exposures and their potential health impacts.

This letter also contains a recommendation in support of the development of a comprehensive *National Longitudinal Cohort Study of Environmental Impacts on Children and Families* that has been proposed as an interagency effort between EPA, CDC, National Institute of Child Health and Human Development and other federal agencies. The Committee has outlined specific recommendations for the design and implementation of the study with particular emphasis on consideration of childhood environmental health hazards.

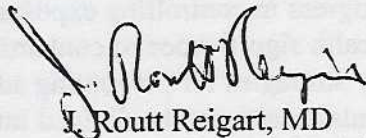
For each of the elements that are recommended for inclusion in *the Children's Environmental Health Data Needs and Right-To-Know Blueprint*, a more detailed section is attached that lists specific data needs and recommendations.

Protecting and improving the environment is a fundamental goal of our national environmental policies. Although many environmental and public health databases exist, they are not comprehensive, nor are they integrated with each other and with health outcome databases. We recommend a cohesive and comprehensive national strategy for identifying environmental hazards, measuring exposures, and tracking health conditions that may be related to the environment.

In closing, the CHPAC appreciates the EPA's continued efforts to safeguard children's environmental health. However, the recommendations contained in the *Children's Environmental Health Right-to-Know Blueprint* will provide the framework for a comprehensive national strategy that will identify environmental hazards, measure exposures, and monitor health conditions of children that may be related to the environment.

Your consideration of the recommendations is requested, and the CHPAC stands ready to provide further assistance where needed. We would appreciate a specific response to these recommendations at the next Committee meeting.

Sincerely,



J. Routt Reigart, MD
Chair, Children's Health
Protection Advisory Committee

KF:rlr
Attachments

c - w/attachments:
Ms. P. Goode
Ms. R. Trovato

Indicators

Problem Statement

Environmental health indicators are quantitative measures of environmental contaminants or adverse health effects or biomarkers associated with exposures to environmental contaminants or conditions. Environmental health indicators can be used to describe the trends of environmental pollution and of health outcomes and can help to answer critical questions about the link between a child's environment and health status. Current indicators used by EPA are largely limited to measurements of contaminants in specific environmental media, and generally do not include evaluations of human exposure or human health status. Adequate indicators are necessary to monitor progress in controlling exposures to environmental contaminants; to characterize potential health significance of contaminants in the environment; and for identifying the most effective policy strategies for preventing adverse health outcomes. Indicators relevant to children's environmental health can be divided into two categories: exposure-based indicators, and health/outcome indicators.

Background

Environmental health indicators should aim to answer the following questions:

- What are the major causes of childhood morbidity and mortality that may be related to exposures from the environment?
- What are the major environmental contaminants to which children may be exposed? What are the sources and trends of release of these contaminants?
- What are the demographic and spatial distributions of the childhood environmental diseases? What are the trends of these diseases?
- What steps can be taken to reduce childhood exposures to contaminants in the environment?

Additionally, indicators and tracking systems should be designed to identify highly exposed or susceptible populations. A centralized database of such groups should be maintained. Broad national systems based on a sample of the population, e.g., the National Health and Nutrition Examination Survey (NHANES), collect national average, but might not be representative of actual exposures.

The Agency has proposed evaluating two categories of indicators:

- Exposure based indicators
- Health/outcome-based indicators

Several studies conducted by EPA or in which EPA is a participant, including the National Human Exposure Assessment Survey (NHEXAS) pilot studies, NHANES, Pesticide Data Program, Agricultural Health Study, Children's Total Exposure to Persistent Pesticides, Consumption Survey of Food and Individual Intake (CSFII), BASE Study of indoor air quality, and U.S.-Mexico Border XXI research provide additional indicators of children's environmental health. These databases, however, are not designed to provide a systematic or integrated means for data collection and reporting. It is not possible to integrate the information from the various studies, and many represent one-time sampling efforts with limited numbers of participants less than 12 years old.

Currently, EPA contributes to the Federal Interagency Forum on Child and Family Statistics that produces an annual report *America's Children: Key National Indicators of Well-Being*. To date, EPA has contributed reports on childhood lead poisoning that are included every other year. EPA intends to include air pollution measures for the Year 2000 report. It has been proposed that a companion report produced by EPA be created to include a more extensive list of childhood environmental health indicators.

Recommendations

1. a. For exposure-based indicators for which data exist that are relevant to children:

EPA should utilize existing data from NHEXAS pilot studies, Behavioral Risk Factors Survey of the States (BRFSS), NHANES studies, and other focused surveys and research projects to establish a database on the following exposure-based indicators of children's environmental health: air contaminants (e.g., environmental tobacco smoke/cotinine) drinking water contaminants (e.g., arsenic and disinfection by-products, including chloroform); pesticides; and blood lead levels. EPA should continue to fund NHEXAS and NHANES to ensure the continued collection of information on these indicators.

- b. For exposure-based indicators on which there are limited or no data relevant to children:

EPA should establish an approach to systematically monitor the following exposure-based indicators of children's environmental health: air contaminants (e.g., criteria contaminants, HAPs, environmental tobacco smoke, molds, mycotoxins); microbial pathogens in drinking water; persistent bioaccumulative toxins (e.g., vinyl chloride); and, toxicants in breast milk (e.g., endocrine disruptors).

2. a. For health/outcome indicators for which data exist that are relevant to children:

EPA should work with the Centers for Disease Control and Prevention (CDC), the Agency for Toxic Substances and Disease Registry (ATSDR), and state and local health departments to track the following health outcomes to determine the role of environmental exposures and the efficacy of policies in controlling the occurrence of adverse childhood health outcomes:

childhood cancer; birth defects and developmental disabilities, low birth weight, and infant mortality.

- b. For health/outcome indicators for which data are limited or do not exist that are relevant to children:

EPA should work with CDC and ATSDR to establish an approach to systematically monitor and report on health/outcome indicators of children's environmental health, including childhood asthma and other respiratory effects, neurotoxicity, and immune system effects.

3. EPA should work with Department of Health and Human Services to coordinate, link, and jointly analyze exposure and health effects data sets. Tracking system linkages should indicate temporal trends in children's environmental exposures and health outcomes and identify high-risk populations to allow opportunities for establishing interventions for prevention of exposures and disease. It would be highly advantageous to maintain a centralized database for this information.
4. EPA should actively participate in the Federal Agency Forum on Child and Family Statistics and include childhood blood lead poisoning levels in each volume of the annual report and attempt to increase the number of environmental health indicators included each year.
5. EPA should develop a companion report to the Federal Interagency Forum report that is publicly available and specifically addresses a broad range of children's environmental health indicators, including both exposure-based indicators and health/outcome indicators as listed in previous recommendations.
6. For water contaminants, EPA should continue and coordinate comprehensive and systematic monitoring and reporting activities currently required under relevant federal laws such as the Clean Water Act and Safe Drinking Water Act. These activities will include data for the 86 chemicals and microbial pathogens currently regulated and reported in the Consumer Confidence Reports.

EPA's planned additional monitoring under stage II of the Disinfectant/Disinfectant By-Products Rule and Unregulated Contaminant Monitoring Rule is a critical next step.

7. It is imperative that all studies be conducted with an underlying goal of improving interagency linkage of data. Without more effective data integration, important information on exposure, biomonitoring, and health effects will continue to be scattered among different agencies.

Biomonitoring

Problem Statement

Biological monitoring, also known as biomonitoring, can provide valuable information on human exposures to chemicals. Biomonitoring of human tissues and fluids provides direct evidence of exposures as well as data with which to validate exposure models. Unfortunately, there is no comprehensive, systematic biomonitoring program for adults, much less for children. Nor is there any such program for breast milk, which is important both as an indicator of the mother's exposure, and as a direct source of infant exposures to contaminants. Absent biomonitoring data, we are missing important opportunities to prioritize chemicals for toxicity testing and/or exposure-reduction measures.

Background

The broadest biomonitoring program now extant, the Center for Disease Control's National Health and Nutrition Examination Survey (NHANES) currently provides information on blood levels of 25 chemicals (projected to rise to 50 and 100 in the next two years, respectively) in a representative sample of the population. Until 1999, NHANES data were gathered periodically, but the program is now planned as an ongoing annual activity. NHANES does not measure contaminants in the blood of children under age 12, except for lead and cadmium (at least partly because only small quantities of blood can be gathered from individual children, thus limiting the number of chemical analyses that can be performed per sample). Because NHANES is designed as a statistically valid sample of the US population, it does not necessarily identify atypically high exposures, though over-sampling of selected groups has been done in particular situations. (In addition to NHANES itself, NHANES samples from about 200 individuals are being analyzed for up to 80 chemicals known or suspected endocrine disrupters; this is a one-time initiative sponsored by the National Institute for Environmental Health Science, and no results are yet available.)

The only other ongoing broad-based biomonitoring initiative is EPA's National Human Exposure Assessment Survey (NHEXAS). EPA has conducted three pilot NHEXAS studies in 460 individuals, including children over age one, in three regions; those studies included some measurements of 46 compounds in blood, urine, or hair, but only six compounds were measured in children. EPA is now analyzing the results of the pilot studies, which were designed to validate methods, but has not yet begun collection of nationally representative data. At present, it is not clear whether or to what extent NHANES and NHEXAS are being, or can be, integrated.

In addition, the Agency for Toxic Substances and Disease Registry (ATSDR) collects selected biomonitoring data at numerous Superfund sites and other locations as part of its exposure investigations. By definition, these are not nationally representative samples and most involve fewer than 100 participants. However, they do represent opportunities to observe the relationship between specific environmental exposures and uptake of certain toxic substances by children and adults.

There is no ongoing, systematic collection of data on contaminants in breast milk. Sporadically, researchers (including some funded by ATSDR, National Institute of Environmental Health Science, and EPA) have looked for, and found, a few specific compounds such as PCBs, DDT, dioxin, and a handful of pesticides. However, there has never been a systematic attempt to identify the full range of potential contaminants.

Recommendations

- 1) The Department of Health and Human Services and EPA should seek additional resources for NHANES and work collaboratively with the Centers for Disease Control and Prevention (CDC) to address the following priorities:
 - a) Development of small-volume analytical methods, so that additional chemicals may be measured in the volume of blood that can practically be collected from children;
 - b) Additional collection of samples from children who may have atypically high exposures – most notably children of farmworkers and children who are themselves farmworkers, as well as low-income/minority children for whom oversampling may be needed in order to secure satisfactory statistical power;
 - c) Analysis of a substantially increased number of compounds in the National Exposure Report Card, with particular consideration given to including:
 - i) pesticidal “inerts”
 - ii) chemicals that have or are suspected of having persistent or bioaccumulative properties;
 - iii) chemicals that are known or suspected developmental toxicants, including ones that showed potential developmental toxicity in screening-level tests; and
 - iv) chemicals that are known or suspected endocrine disrupters.
- 2) EPA should work with CDC and ATSDR for inclusion of additional substances in the National Exposure Report Card.
- 3) EPA should devote resources to NHEXAS, particularly for chemicals that would be unlikely to be detected through blood monitoring even if significant exposures occurred (e.g., particulates or compounds that rapidly degrade).
- 4) EPA in conjunction with other federal agencies and institutions should fund research to identify contaminants in breast-milk at the national level and use that information to design a representative, population-based assessment.
- 5) EPA should work with CDC to maximize the integration of NHANES and NHEXAS data, to the extent feasible given with “participant burden” issues (i.e., the duration of the NHANES interview, which covers non-environmental as well as environmental parameters). If participant burden severely limits such integration for the same individual subjects, EPA and CDC should explore options to collect NHEXAS and NHANES data at the same time and place on “matched” subjects.

Highly Exposed/Susceptible Subpopulations: *An Example Using Child Farmworker Protection*

Problem Statement

Children and infants are uniquely susceptible to the effects of many environmental contaminants because of their physiological immaturity and greater potential for exposure. Differences in exposure are considered a more important source of differences in risk than age-related differences in toxicological vulnerability. A useful example is found in children of migrant and seasonal farmworkers. Migrant and seasonal child agricultural workers, have higher exposure to environmental hazards because of their direct occupational exposure as workers, bystander exposure, residential exposure due to drift, dietary exposure from eating unwashed fruits and vegetables, and exposure due to use of contaminated water for drinking, washing, and bathing.

EPA's current model for establishing re-entry intervals for agricultural workers fails to address child agricultural workers and child-specific parameters of exposure routes, including body weight or surface area of exposure, consolidated activities, developmental stages, ingestion and inhalation rates, and diet. The aggregate or cumulative effect of these exposures is not considered. Further, child agricultural workers have not been included in the development of children's environmental health indicators. In fact, very little research has been conducted that addresses this population specifically, even though their exposures, and thus risks, likely exceed those of other children.

Background

Many subpopulations of children have disproportionate exposure or susceptibility to the effects of environmental contaminants. These include children living near Superfund sites, the immuno-compromised, the economically disadvantaged, and children of migrant and seasonal farmworkers. Children of farmworkers serve as a paradigm for this issue.

Currently, EPA conducts risk assessment tests based on a single pesticide. Yet agricultural farmworker children are exposed not only to one chemical but to numerous chemicals and unknown inert ingredients during the course of a day, week, or season. Studies should be developed to address the aggregate risks to children exposed to multiple pesticides, chemical combinations and inert ingredients. These studies need to be conducted to look not only at single compound exposure risk, but the cumulative effect as well as the combination of locations and durations where these children are exposed, including residential, occupation, dietary, surface water (including contaminated drinking and bathing water and irrigation ditches where children swim, wade, or wash clothes, etc.) and bystander exposures.

Exposures faced by child agricultural workers are complicated and difficult to resolve given the lack of research on aggregate exposures. But not acknowledging the complexity of child agricultural workers exposures creates the public perception that these children are not

living, working, or playing in the fields and that therefore no one need look at their exposures. The perception remains that addressing the adult workers has been sufficient.

Recommendations

- 1) EPA, in coordination with the Department of Health and Human Services, should maintain a centralized database for elevated exposures and disease rates in highly exposed or uniquely susceptible populations, particularly for highly exposed communities or regional locales. Data on such situations will by and large not be reflected in broad national samples of the population.
- 2) EPA should ensure that highly exposed subpopulations, such as migrant and seasonal child agricultural workers, are added to current and included in all future research and evaluation of exposure and risk. If such research and evaluations exclude highly exposed subpopulations, EPA should explain why and provide for public comment.
- 3) EPA should provide additional resources for a National Health and Nutrition Examination Survey format for studying migrant and seasonal child agricultural workers, including measures of pesticide levels in the children's blood and urine.
- 4) When conducting studies of child agricultural workers, EPA should consider whether these children
 - a) are working or playing in the fields;
 - b) are located in housing next to fields;
 - c) attend schools or day care centers near fields; or
 - d) are by-stander children in households where parents bring home pesticides on their clothes and into their homes. The difference between the exposure levels of child agricultural workers and their parents should also be measured.
- 5) Due to the proximity of day care centers, schools and farm labor housing in rural communities to pesticide treated fields and orchards, EPA should conduct studies that address pesticide drift that affects bystander children, including children of migrant and seasonal farm workers and other children in rural communities.
- 6) EPA should provide funding to conduct studies to assess the activity patterns of children of migrant and seasonal farm workers and child agricultural workers. Child agricultural workers, who work along side adults, are uniquely exposed due to their smaller body size, surface area, and activity patterns. To measure the extent to which child and adult agricultural workers' exposures differ, studies should be conducted to determine both aggregate and individual residential, occupational, dietary, and bystander surface water exposures.
- 7) EPA should conduct studies to assess the increased environmental exposures of children of migrant and seasonal farm workers as compared to children living in residential settings.

Indoor Air Quality

Problem Statement

Assessments of indoor air quality can provide important information about human exposures to contaminants. Despite being outdoors more than adults, children may spend as much as 90 percent of their time indoors. Yet only limited efforts exist to assess air quality in the buildings children frequent, such as schools, day-care centers and homes. Assessing indoor air quality is an expensive but critical step toward better understanding of children's exposure.

Background

At least four recent studies assess indoor air quality, but only one small study focuses on schools. The broadest indoor air quality assessment program now in place, the Building Assessment Survey and Evaluation (BASE) study, is a cross-sectional assessment of 100 public and commercial office buildings. Cities with populations of at least 100,000 were randomly selected from 10 climate regions in the continental U.S. Office buildings in these cities then were randomly selected, provided the buildings met eligibility criteria and access could be obtained from the owner/manager. During one week of data collection per building, environmental measurements were taken according to a standardized protocol; characteristics of the building and its heating, ventilation and air conditioning system were described; and an occupant questionnaire was administered. Because occupants of office buildings tend to be adults, the applicability of BASE study results to children is unclear.

The Temporal Indoor Monitoring and Evaluation (TIME) study follows a protocol similar to the BASE study, but is longitudinal and is restricted to Federal government buildings. Two studies measure improvements in indoor air quality after interventions. The Building Air Quality Intervention Study measures air quality improvements after provision of EPA guidance. The School Intervention Study measures air quality improvements resulting from implementation of EPA's Indoor Air Quality Tools for Schools guidance, but only a handful of schools have been included in the study to date.

Recommendations

- 1) EPA should devote additional resources to assessing indoor air quality at schools, pre-schools, day-care centers, Head Start programs and other locations where children spend large amounts of time.
 - e) EPA should evaluate data from studies such as the National Human Exposure Assessment Survey (NHEXAS), the National Health and Nutrition Examination Survey, the School Intervention Study, and BASE, and whenever feasible should expand them to include schools and other buildings children frequent.
 - f) Using BASE-type methodology, EPA should assess a small number of schools and day-care centers to compare results with BASE data on office buildings. If office-building data are unrepresentative of air quality in schools and day care centers, then EPA should conduct a BASE-type study for schools and day-care centers. Studies of indoor air

quality for children should ensure adequate representation of buildings in urban and rural areas, and of schools serving socially or economically disadvantaged populations.

- 2) EPA should review existing sources of data – such as the time diary component of the Child Development Supplement of the Panel Study of Income Dynamics¹ – for relevant data on children's time use and activities in various environments.
- 3) EPA should ensure that adequate data are available to characterize children's exposure to environmental tobacco smoke (for example, through biomonitoring of cotinine).
- 4) EPA should provide adequate funding to carry its studies through to completion in a timely manner. Publication and analysis of data from the 1994 BASE study remains incomplete. The NHEXAS study has not advanced from the pilot-study stage to the collection of nationally representative data.

¹ Information on this study can be obtained from the Institute for Social Research at:
<http://www.isr.umich.edu/src/child-development/home.html>.

Children's Products

Problem Statement

Ensuring that children are not exposed to unsafe levels of toxic chemicals is a central objective of environmental policy. A basic first step in meeting this objective is identifying the chemicals to which children are exposed. This knowledge needs to cover all relevant potential pathways of exposure, including children's use of products such as baby bottles, toys, utensils, clothes, etc. Currently, however, there is no systematic or comprehensive information on which chemicals are present in children's products. This absence of first-step information is contrary to the principle of right-to-know. It also prevents rational next steps toward insuring chemical safety for children, including toxicity testing for untested chemicals to which children are being exposed, exposure assessment, and exposure-reduction measures in appropriate circumstances.

Background

During recent discussions by EPA, industry, and public-interest groups about establishing a Voluntary Children's Health Chemical Evaluation Program (VCHCEP), it became apparent that virtually no data are now publicly available – at least in any systematic and accessible way – on children's exposure to chemicals via their use of child-oriented products such as baby bottles, teething rings, toys, children's clothing, etc. According to representatives of EPA and the Consumer Product Safety Commission (CPSC) who participated in the VCHCEP meetings, those agencies also lack such information. By contrast, ingredients in personal-care products such as soaps and shampoos are routinely listed on product containers. In addition, EPA has at least some information on pesticide residues on produce consumed by children, and contaminants children are exposed to via drinking water and air. However, the lack of information on chemicals present in children's products seriously handicaps efforts to prioritize chemicals for evaluation and risk reduction where appropriate.

Because the universe of children's products is large, EPA should give priority to products that children are likely to mouthe and products that may involve dermal exposure. EPA may wish to consult with CPSC to determine if CPSC has information defining this group of products.

Manufacturers of children's products should have information on the chemical content of their products readily available, either directly if they formulate the products themselves, or indirectly from their suppliers if they do not. The recommendations set forth above urge EPA to assure that this information is made publicly available, so that it can be evaluated both by governmental agencies and by interested members of the public.

Recommendations

- 1) For products whose intended use involves mouthing or extensive dermal contact by children, or for all products intended for use by children through the age of five, EPA should ensure that manufacturers of products make information on chemicals contained in such products

available to the public, along with any existing information on associated exposures. EPA could achieve this objective either by arranging for voluntary release of such information, through a rulemaking processes, or through some combination.

- 2) Absent objective information showing that a chemical contained in children's products presents no hazard, EPA should ensure that adequate objective information is available regarding the extent of exposure. (If adequate objective information supports a conclusion of no hazard, exposure information is not needed.) Where available information does not (i) allow establishment of a reliable level of concern for a chemical and (ii) demonstrate that exposure is below this level, EPA should seek to reduce exposures pending development of such information.

(Note: Where data indicate that exposure exceeds the level of concern, EPA should assure that such exposures are eliminated, but that situation is beyond the scope of this work group on data needs.)

Design and Implementation of a National Longitudinal Study of Children's Health

Problem Statement

Assessing the consequences and complexities of environmental influences on human growth and development presents major research challenges. A longitudinal cohort study designed around specific hypotheses that include an assessment of environmental exposures and potential health outcomes can provide critical information for designing policies for a healthy and safe environment for children. Previous longitudinal studies of children were conducted decades ago, and more recent studies have followed children for only a few years. Past studies have not evaluated human development nor investigated environmental factors, both risk and protective, that influence growth and developmental processes. The longitudinal cohort study should be designed to allow assessment of physical, chemical, biological and psychosocial environmental influences on the well-being of children.

This longitudinal cohort study should be designed to effectively test the greatest feasible number of important hypotheses regarding the interactions between children's health and their environment.

Background

The current limited information on environmental, social and biological determinants of disease and disability in children is a serious impediment to promoting the health and well-being of children. A national longitudinal study of children's health will provide invaluable information to determine health care strategies, disease prevention, and influence policy decisions. A longitudinal study of children and their families, national in scope and composition, can provide critical information about developmental disorders and environmental, social, and economic factors that affect children's health.

Research of this magnitude represents a major investment that can be applied to policies and standards of care and prevention for future generations. A national study of children and their environment should compliment existing research, incorporate knowledge from ongoing research, and utilize advances in biomarker and exposure monitoring. EPA should support and contribute expertise to the planning process for a national longitudinal study of children.

Recommendations

- 1) EPA should fund for the planning and implementation of a national longitudinal study. The overarching goal of the study would be to identify factors that cause or predispose children to asthma, cancer, neurobehavioral disorders, and other potentially preventable disorders related to environmental exposures.
- 2) EPA should work with other agencies to evaluate strategies for critical aspects of the study such as:

- a) Data and sample collection;
 - b) Data management;
 - c) Statistical design;
 - d) Standardization;
 - e) Ethical safeguards including participant privacy;
 - f) Disparities and diversity among children and families; and
 - g) Influence of prenatal exposures.
- 3) In designing a national longitudinal study EPA should support efforts to:
- a) Establish a scientific research board to evaluate protocols, analytical research, and other aspects of the study;
 - b) Establish an advisory panel comprised of community members to review implementation strategies, ethical safeguards including participant privacy, and methods for communicating results; and
 - c) Evaluate plans for maintenance of records and archiving of samples for future studies.
 - d) Assure protection of participant privacy including the use of identifiers, elicit informed consent and determine the potential impact of participation on participants.
- 4) In releasing results of the study EPA should support efforts to:
- a) Inform individual subjects of health outcomes germane to them; and
 - b) Inform the public, public health community, and others by timely publication of findings to facilitate prevention, intervention, and treatment.
- 5) EPA should work with an interagency group, particularly one that includes CDC, to review existing surveys such as the National Human Exposure Assessment Survey, National Health and Nutrition Examination Survey and evaluate the following factors that will influence exposure monitoring and biomonitoring:
- a) Capacity constraints that may limit efforts to collect, archive and use human exposure data;
 - b) Methods development anticipated for future needs;
 - c) Sampling strategy to assist in determining whether at-risk populations will be represented; and
 - d) Ability to link environmental exposures and biomonitoring results to health outcomes.
- 6) In selecting a number of limited items for biomonitoring, EPA should evaluate substances in the Agency for Toxic Substances and Disease Registry's priority list, list of priority contaminants, or other master lists or in products highly used by children so that priorities can be established for exposure measurements or methods development.