

Valuing Environmental Health Risk Reductions to Children

PROCEEDINGS OF

SESSION I: THE STATUS OF CHILDREN

A WORKSHOP SPONSORED BY THE U.S. ENVIRONMENTAL PROTECTION AGENCY'S NATIONAL CENTER FOR ENVIRONMENTAL ECONOMICS (NCEE), NATIONAL CENTER FOR ENVIRONMENTAL RESEARCH (NCER), AND OFFICE OF CHILDREN'S HEALTH PROTECTION; AND THE UNIVERSITY OF CENTRAL FLORIDA

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DISCLAIMER

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Changes in the Lives of U.S. Children: 1990-2000

Kristin Smith
Robert Kominski
Julia Overturf

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Introduction



- Once every ten years, the decennial census provides the opportunity to generate snapshots of the population for very small geographic units. Much more than a complete count of the nation's population, the census provides important social, economic and housing detail about the population, allowing policy-makers and planners to see how characteristics have changed over time in cities, towns and neighborhoods.

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- Over the past decade there has been renewed interest on the well-being of children. Spearheaded by federal activities such as the Federal Interagency Forum on Children and Families, much of the focus has been on identifying a variety of indicators of children's well-being.

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- In this presentation, I present nine indicators of child well-being from the 1990 and 2000 decennial Censuses. What is unique about this presentation is that data for the items highlighted here are shown for all fifty states and the District of Columbia. Doing so allows one to see the variability that exists across the Nation, as well as providing details of change during the past decade.

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Population and Family Characteristics

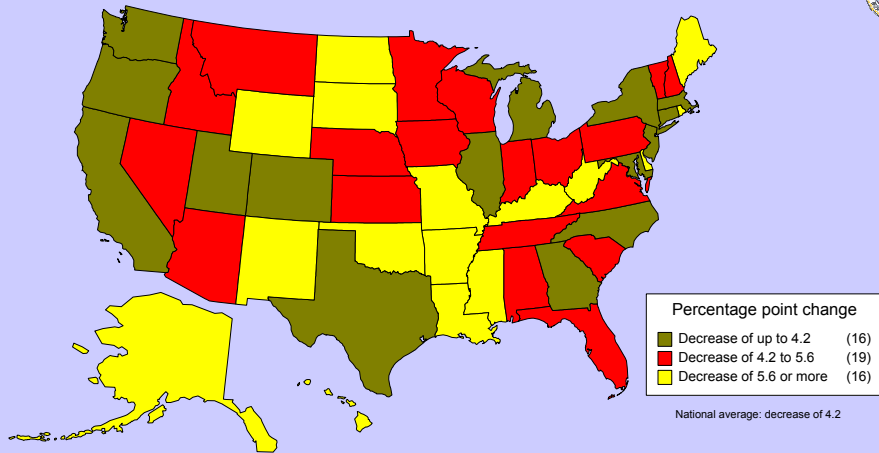
- Children living in married-couple families
- Children with difficulty speaking English
- Children who are foreign-born

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Children Living in Married-Couple Families 1990-2000 Change



NOTE: Includes children under 18 in households who are not householders, subfamily reference persons or their spouses. Children in married-couple families are the never-married, biological, adopted, and step sons and daughters of a married householder or a married subfamily reference person.
SOURCE: U.S. Census Bureau, 1990 and 2000 Censuses.

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Children Living in Married-Couple Families

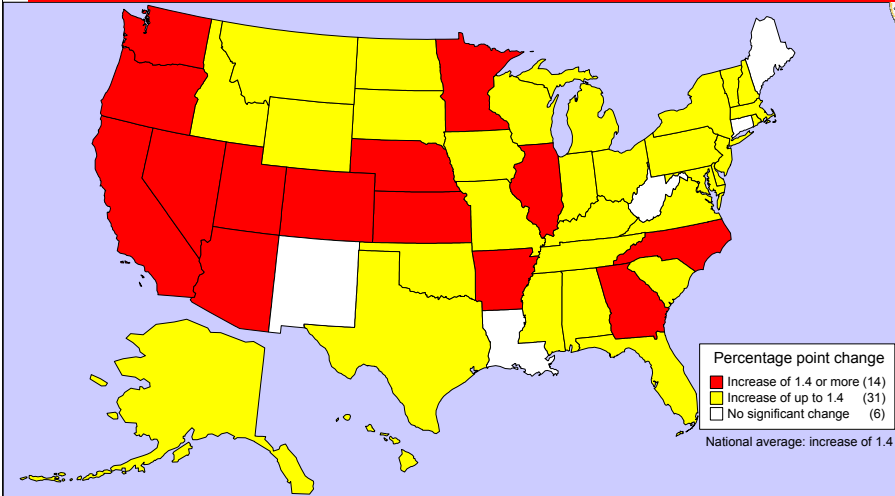


- In 2000, 68 percent of children under 18 years old lived in married-couple families, down from 72 percent in 1990.
- The decline in children living in married-couple families occurred in all states in the nation, with several states showing a decrease of about 7 percentage points. New Jersey had a small decrease (1.7 percentage points) from 74 percent in 1990 to 72 percent in 2000.

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Children With Difficulty Speaking English 1990-2000 Change



NOTE: Includes children under 18 in households who are not householders, subfamily reference persons or their spouses. Children with difficulty speaking English speak a language other than English at home and speak English less than 'very well.' This includes those who speak English 'well,' 'not very well,' or 'not at all.'

SOURCE: U.S. Census Bureau, 1990 and 2000 Censuses.

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Children With Difficulty Speaking English

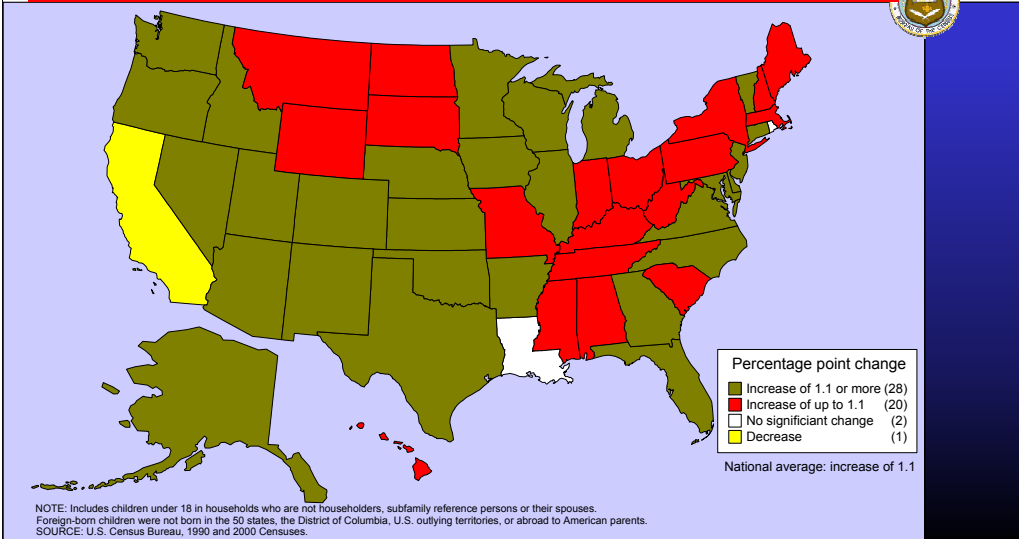


- Nationally, the proportion of children ages 5 to 17 with difficulty speaking English increased from 5 percent in 1990 to 7 percent in 2000.
- Most states experienced such an increase, with the largest percentage point increase occurring in Nevada, where it rose from 4 percent in 1990 to 9 percent in 2000.

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Children Who Are Foreign-born 1990-2000 Change



NOTE: Includes children under 18 in households who are not householders, subfamily reference persons or their spouses.
Foreign-born children were not born in the 50 states, the District of Columbia, U.S. outlying territories, or abroad to American parents.
SOURCE: U.S. Census Bureau, 1990 and 2000 Censuses.

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Children Who Are Foreign-born



- In 2000, 4 percent of children living in the United States were foreign-born, up from 3 percent in 1990.
- Five states had increases of 2.5 percentage points or more in the proportion of foreign-born children: Arizona, Colorado, Nevada, Oregon and Washington – all of which were also states that saw their percentages of children with difficulty speaking English increase.

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Economic Security

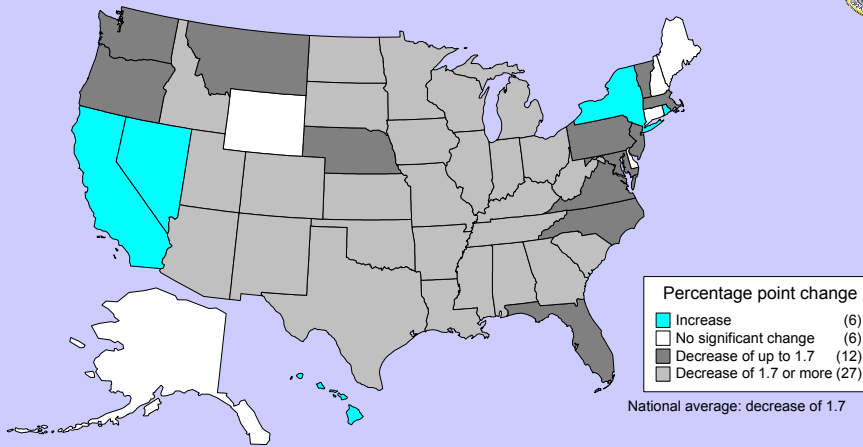


- Children in families in poverty
- Children in crowded housing
- Children living with a full-time employed parent

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Children in Families in Poverty 1990-2000 Change



NOTE: Includes children under 18 in households who are not householders, subfamily reference persons or their spouses. Child poverty includes children living in households who are related to the householder and whose family income and family size put the child below the poverty threshold. Poverty data collected in the 1990 and 2000 censuses refers to poverty in calendar year 1989 and 1999, respectively. The average poverty threshold for a family of four was \$12,674 in 1989 and \$17,029 in 1999.
SOURCE: U.S. Census Bureau, 1990 and 2000 Censuses.

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Children in Families in Poverty

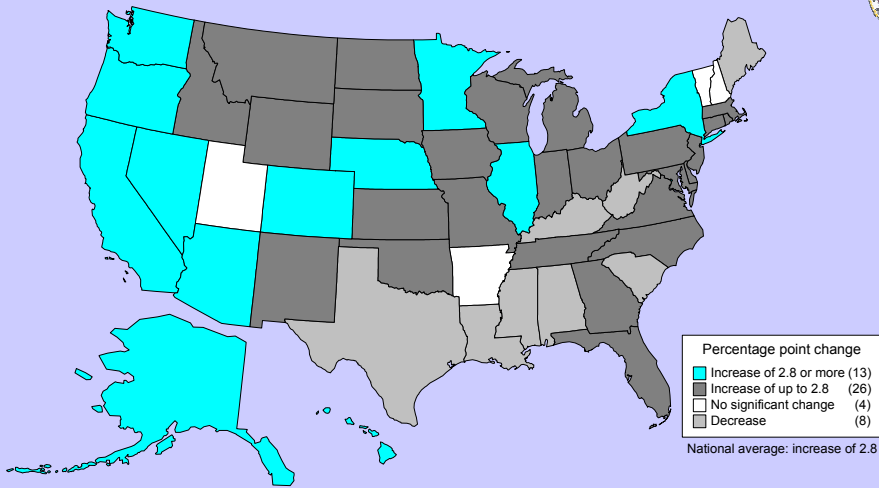


- Child poverty decreased for the nation as a whole from 18 percent in 1990 to 16 percent in 2000.
- Louisiana and Mississippi had large declines in child poverty over the 1990s, even though they had the highest levels among the states in 2000. Despite a decrease in child poverty for the nation as a whole and for many individual states, child poverty increased significantly over the decade in five states and the District of Columbia.

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Children in Crowded Housing 1990-2000 Change



NOTE: Includes children under 18 in households who are not householders, subfamily reference persons or their spouses. Children living in crowded housing live in a house where the number of persons per room is greater than 1.
SOURCE: U.S. Census Bureau, 1990 and 2000 Censuses.

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Children in Crowded Housing

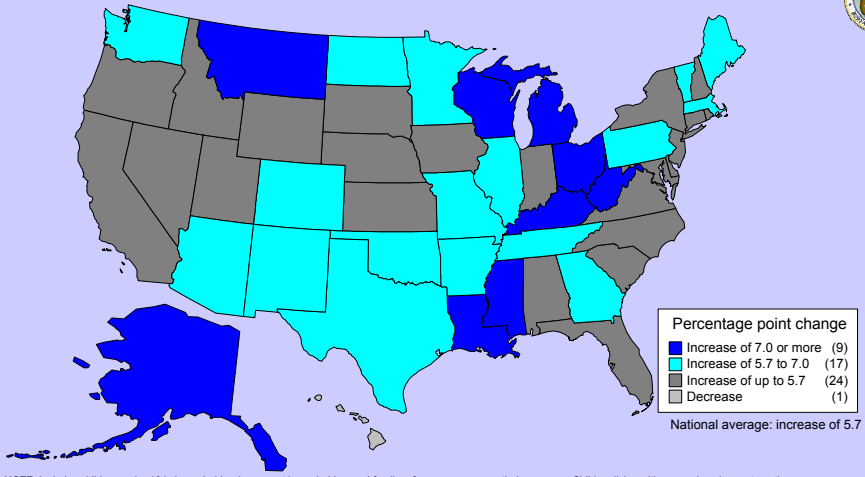


- In 2000, 19 percent of children lived in crowded housing, up from 16 percent a decade earlier.
- In Nevada, a rapidly-growing state, the proportion of children living in crowded housing increased 7.6 percentage points over the decade, from 19.7 percent in 1990 to 27.3 percent in 2000, the largest increase in the nation.
- However, the largest decrease was found in Texas, where the rate decreased from 25 percent in 1990 to 15 percent in 2000.

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Children Living with a Full-time Employed Parent 1990-2000 Change



NOTE: Includes children under 18 in households who are not householders, subfamily reference persons or their spouses. Children living with an employed parent are the never-married biological, adopted, and stepsons and stepdaughters of a householder or a subfamily reference person, living with one or two parents who are employed and working at least 35 hours per week.

SOURCE: U.S. Census Bureau, 1990 and 2000 Censuses.

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Children Living with a Full-time Employed Parent



- In 2000, 83 percent of children lived in families with at least one parent employed full time, up from 77 percent in 1990.
- The largest gain in parental employment was found in Michigan where the rate of children living in families with an employed parent rose from 73 percent in 1990 to 84 percent in 2000.

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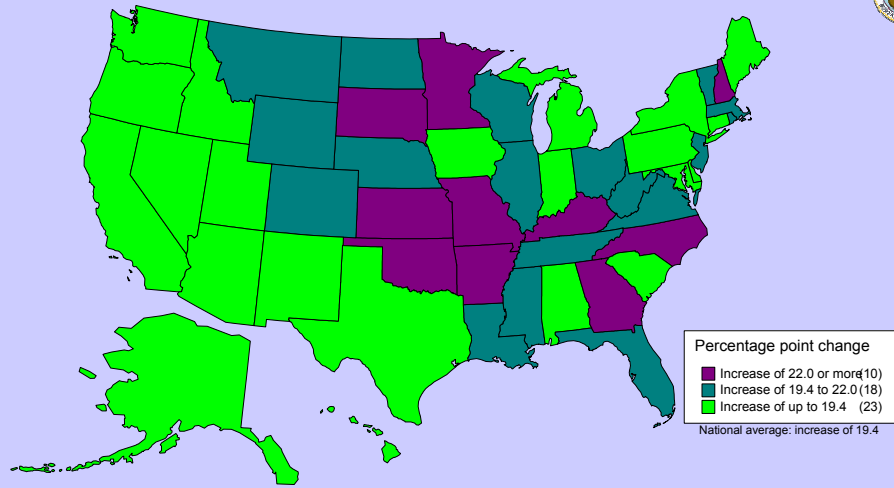
Education

- 3- to 5-year olds enrolled in school
- 18- to 24-year olds who have completed high school
- 16- to 19-year olds not working nor enrolled in school

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3- to 5-Year Olds Enrolled in School 1990-2000 Change



NOTE: Includes only children 3- to 5-years who are living in households. Enrolled in school includes those in kindergarten, preschool, or nursery school.
SOURCE: U.S. Census Bureau, 1990 and 2000 Censuses

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3- to 5-Year Olds Enrolled in School

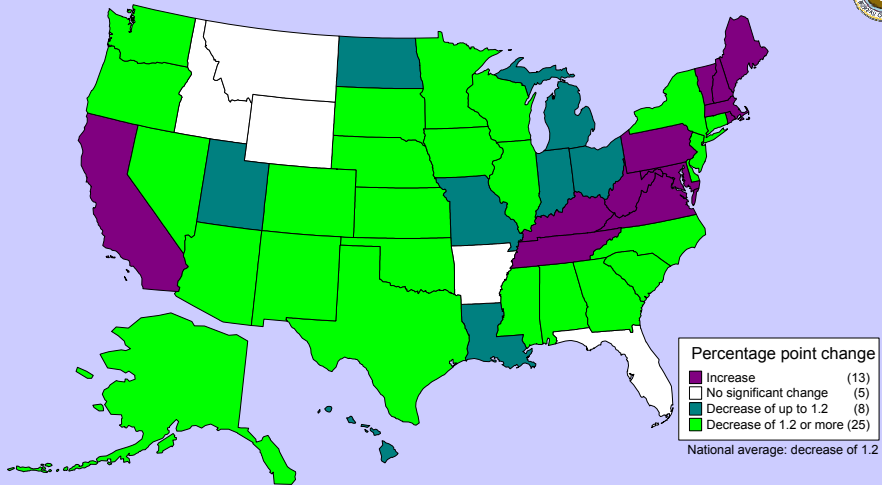


- Nationally, the proportion of children ages 3 to 5 enrolled in early education rose from 42 percent in 1990 to 61 percent in 2000, representing an increase of 19 percentage points.
- The figure clearly shows the geographic variation in early education among children ages 3 to 5, with most of the smaller increases clustered among the Western states. Georgia, a Southern state, had the largest increase from 41 percent in 1990 to 67 percent in 2000.

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18- to 24-Year Olds Who Have Completed High School 1990-2000 Change



NOTE: Universe excludes those who are still enrolled in high school or below.
SOURCE: U.S. Census Bureau, 1990 and 2000 Censuses.

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18- to 24-Year Olds Who Have Completed High School

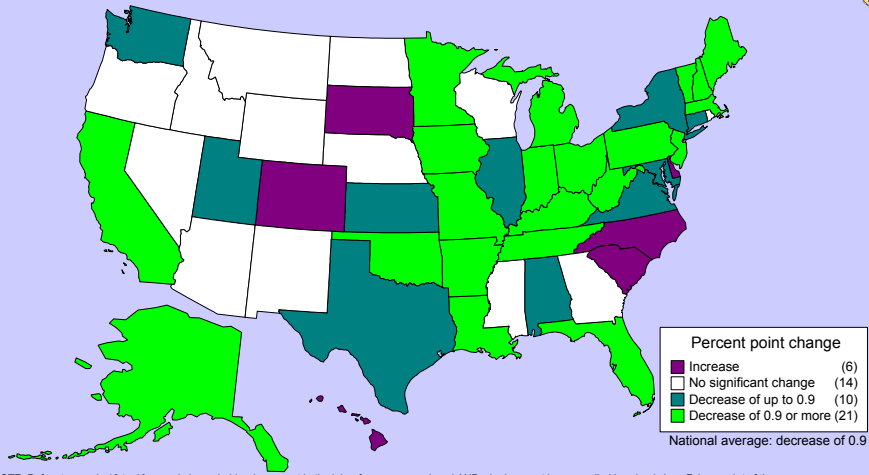


- Nationally, the percentage of people ages 18 to 24 who had completed high school dropped from 84 percent in 1990 to 82 percent in 2000. Part of this decrease was related to changes in the demographic composition of this age group, particularly with respect to the Hispanic population.
- Declines occurred in many states where the proportion of young Hispanics in the population increased, such as in Arizona, Colorado, Nevada, and North Carolina.
- Twelve states and the District of Columbia experienced increases in high school completion rates. The rates in California and West Virginia increased about 3 percentage points from 1990 to 2000.

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16- to 19-Year Olds Not Working Nor Enrolled in School 1990-2000 Change



NOTE: Refers to people 16-to-19 years in households who are not in the labor force or unemployed AND who have not been enrolled in school since February 1st of the survey year.
SOURCE: U.S. Census Bureau, 1990 and 2000 Censuses.

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16- to 19-Year Olds Not Working Nor Enrolled in School



- In 2000, 9 percent of youth ages 16 to 19 neither worked nor attended school, representing a decrease from 10 percent in 1990.
- Several states experienced decreases of around 2 percentage points. In contrast, the rate significantly increased in only six states (Colorado, Delaware, Hawaii, North Carolina, South Carolina, and South Dakota).

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Additional Data



- Future U.S. Census Bureau reports on child well-being will build upon the data presented here today and incorporate other data to more fully portray changes in the lives of U.S. children.
 - Census report to be published by end of 2003, “Children and the Households They Live In: 2000” using Census 2000 data.
 - Census report to be published in 2004 comparing 1990 and 2000 Census data on more indicators.
- Many more indicators of child well-being are available for analysis at many geographic levels (Nation, State, MSA, county, tract, etc.).

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Other available data



- Hispanic origin
- Foreign language spoken at home
- Recent immigrant
- Citizenship
- Metropolitan residence
- Home ownership
- Labor force status of parents
- Household utilities (incomplete plumbing or kitchen, no telephone or vehicle)
- Teen marital status
- Family structure and living arrangements

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Other available data



- Receipt of government assistance
- Multi-generational household
- Foreign-born parent
- Parent's educational status
- Living with a parent who is disabled
- Parent is a recent immigrant
- Living with a parent who speaks English less than very well

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America's Children and the Environment: Measures of Contaminants, Body Burdens, and Illnesses

US Environmental Protection Agency
Office of Policy, Economics and Innovation
Daniel A. Axelrad

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America's Children and the Environment

- First edition - December 2000
- Second edition - February 2003
- Goals:
 - Identify environmental conditions and health outcomes of greatest relevance for children
 - Identify best available data
 - Develop most informative measures
 - Identify limitations, data needs, future directions

Topics Addressed

- Environmental Contaminants
- Body Burdens
- Childhood Illnesses

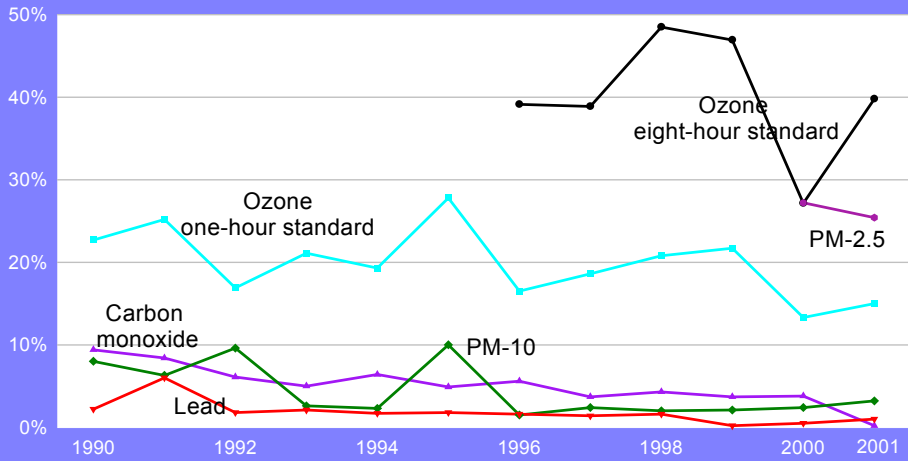
Environmental Contaminants

- Outdoor Air Pollutants
- Indoor Air Pollutants
- Drinking Water Contaminants
- Pesticide Residues
- Land Contaminants

Criteria Air Pollutants - Exceedance of Standards

Measure E1

Percentage of children living in counties in which air quality standards were exceeded

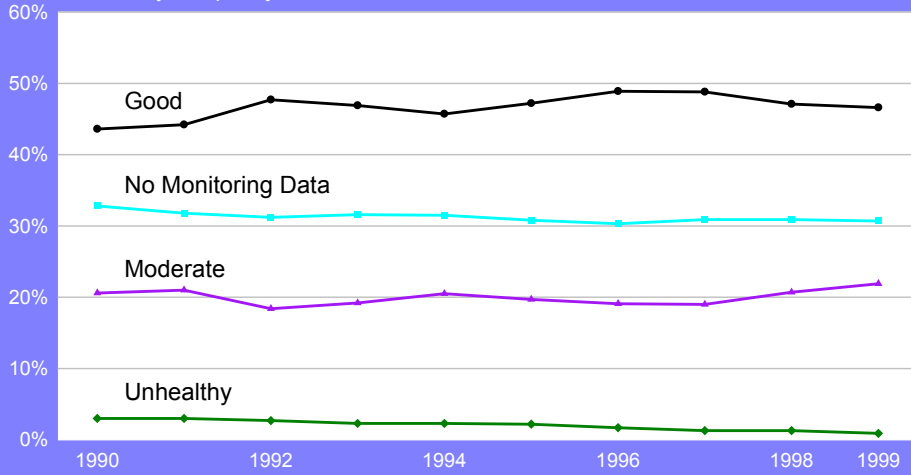


SOURCE: U.S. Environmental Protection Agency, Office of Air and Radiation, Aerometric Information Retrieval System

Criteria Air Pollutants - Daily Air Quality Index

Measure E2

Percentage of children's days with good, moderate, or unhealthy air quality

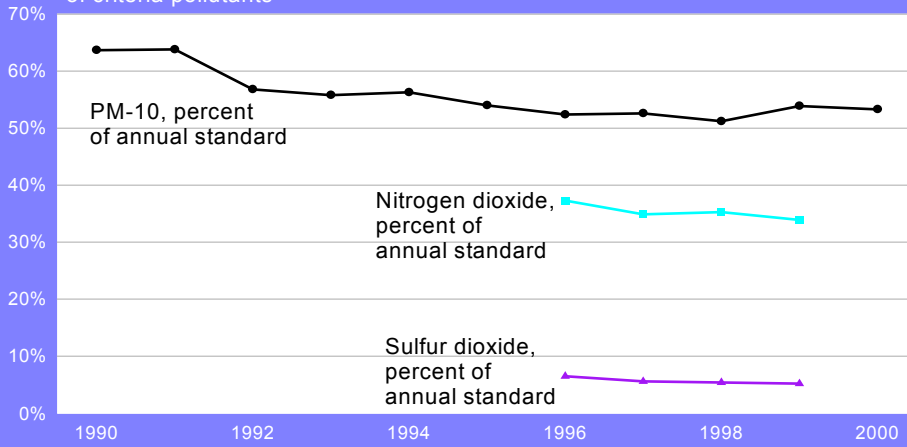


SOURCE: U.S. Environmental Protection Agency, Office of Air and Radiation, Aerometric Information Retrieval System

Criteria Air Pollutants - Long Term

Measure E3a

Long-term trends in annual average concentrations of criteria pollutants

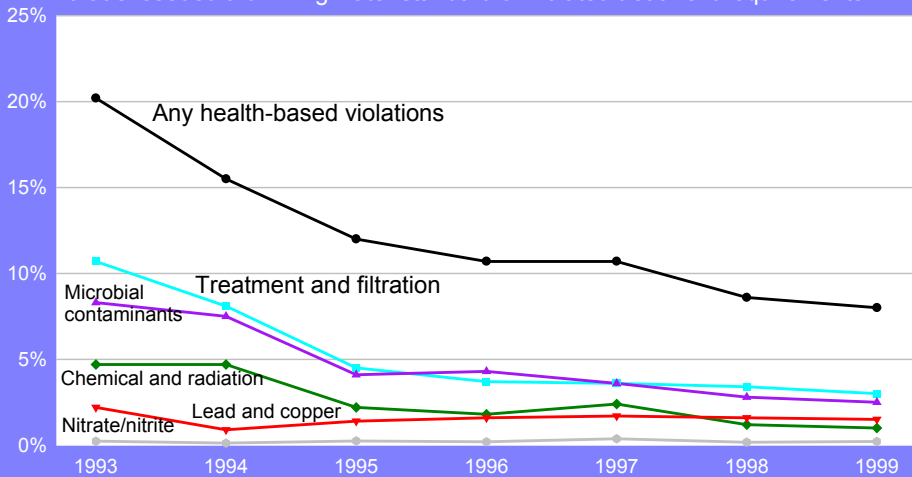


SOURCE: U.S. Environmental Protection Agency, Office of Air and Radiation, Aerometric Information Retrieval System

Drinking Water

Measure E6

Percentage of children living in areas served by public water systems that exceeded a drinking water standard or violated treatment requirements



SOURCE: U.S. Environmental Protection Agency, Office of Water, Safe Drinking Water Information System (Percentages are estimated)

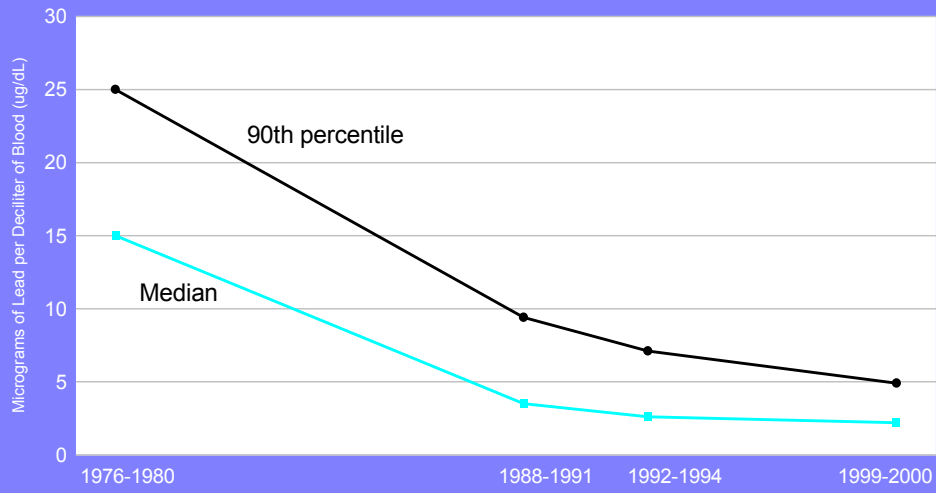
Body Burdens

- Concentrations of Lead in Blood
 - in children age 5 and under
- Concentrations of Mercury in Blood
 - women of childbearing age
- Concentrations of Cotinine in Blood
 - marker for exposure to Environmental Tobacco Smoke
 - in children under age 18

Lead Body Burdens

Measure B1

Concentrations of lead in blood of children ages 5 and under

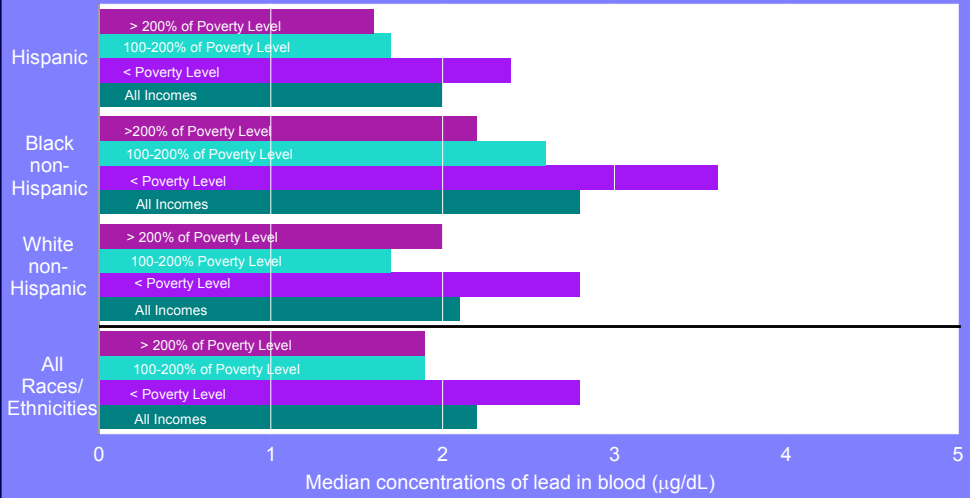


SOURCE: Centers for Disease Control and Prevention, National Center for Health Statistics, National Health and Nutrition Examination Survey

Lead Body Burdens

Measure B2

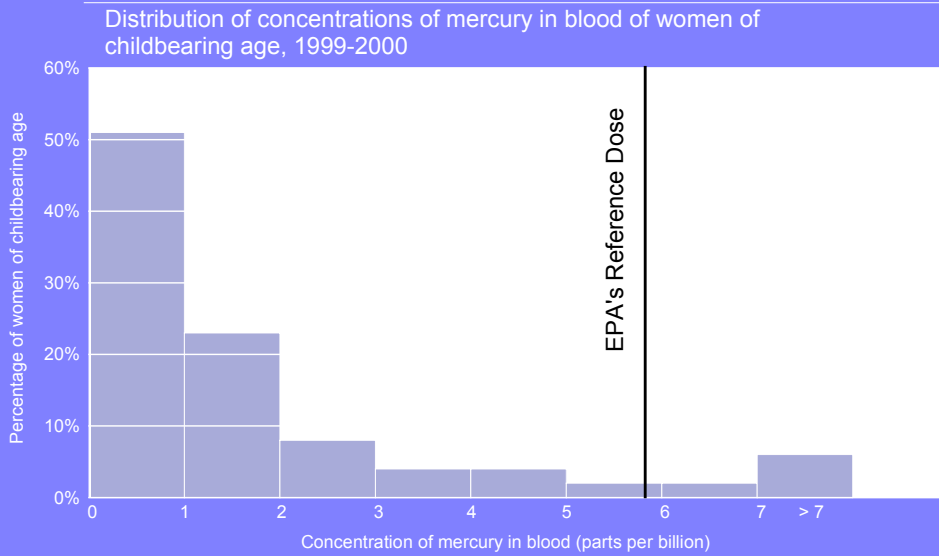
Median concentrations of lead in blood of children ages 1-5, by race/ethnicity and family income, 1999-2000



SOURCE: Centers for Disease Control and Prevention, National Center for Health Statistics, National Health and Nutrition Examination Survey

Mercury Body Burdens

Measure B4

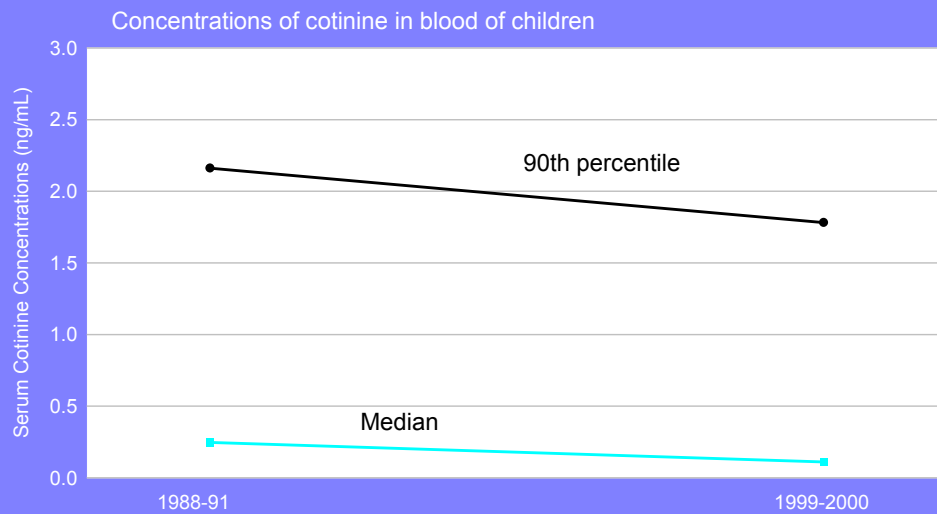


SOURCE: Centers for Disease Control and Prevention, National Center for Health Statistics, National Health and Nutrition Examination Survey

Note: EPA's reference dose (RfD) for methylmercury is 0.1 micrograms per kilogram body weight per day. This is approximately equivalent to a concentration of 5.8 parts per billion mercury in blood.

Cotinine Body Burdens - marker for ETS exposure

Measure B5



SOURCE: Centers for Disease Control and Prevention, National Center for Health Statistics, National Health and Nutrition Examination Survey

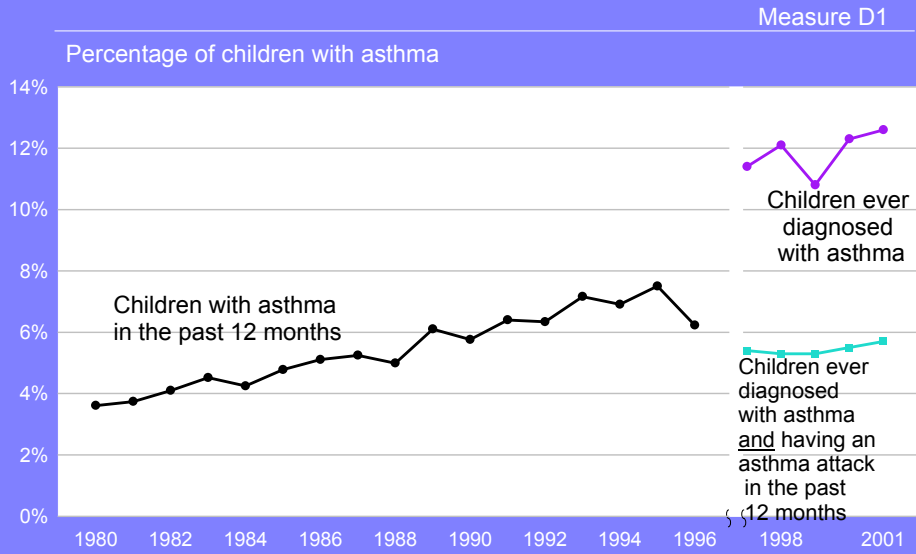
Childhood Illnesses

Scope:

Important childhood diseases and disorders that may be influenced by exposure to environmental contaminants

- Respiratory Diseases
- Childhood Cancer
- Neurodevelopmental Disorders
- Birth Defects (CA data only)

Asthma Prevalence



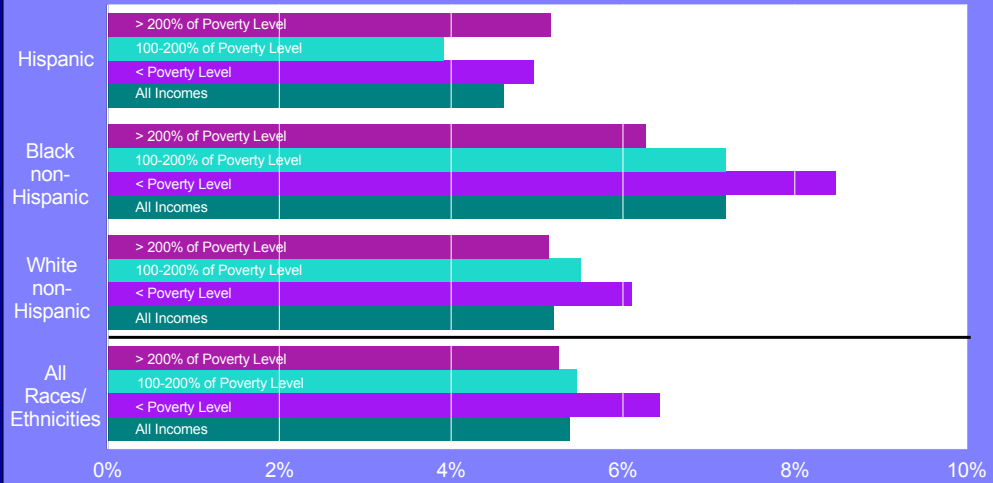
SOURCE: Centers for Disease Control and Prevention, National Center for Health Statistics, National Health Interview Survey

Note: The survey questions for asthma changed in 1997; data before 1997 cannot be directly compared to data in 1997 and later.

Asthma Prevalence

Measure D2

Percentage of children having an asthma attack in the previous 12 months, by race/ethnicity and family income, 1997-2000

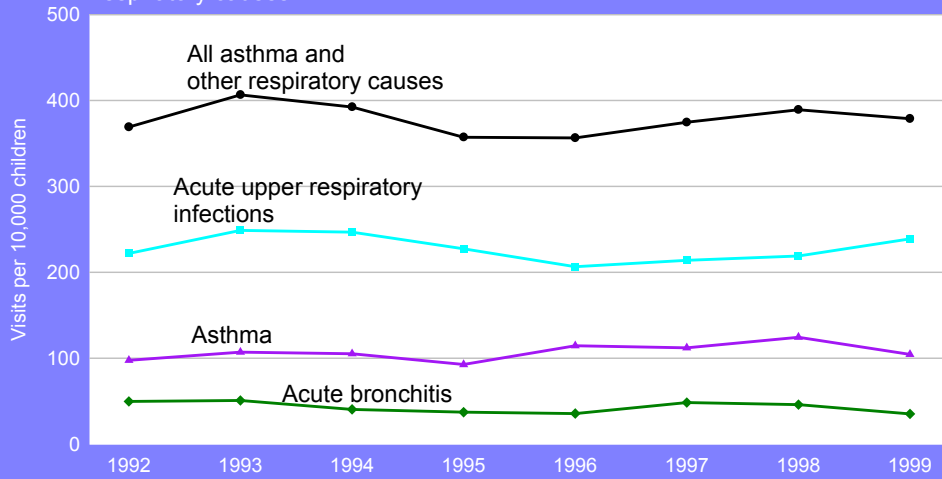


SOURCE: Centers for Disease Control and Prevention, National Center for Health Statistics, National Health Interview Survey

ER Visits for Respiratory Effects

Measure D3

Children's emergency room visits for asthma and other respiratory causes

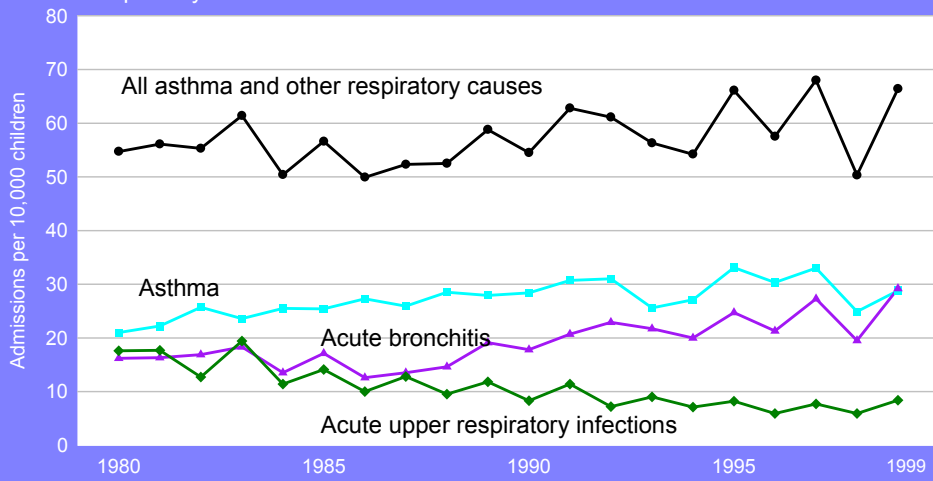


SOURCE: Centers for Disease Control and Prevention, National Center for Health Statistics, National Hospital Ambulatory Medical Care Survey

Hospital Admissions for Respiratory Effects

Measure D4

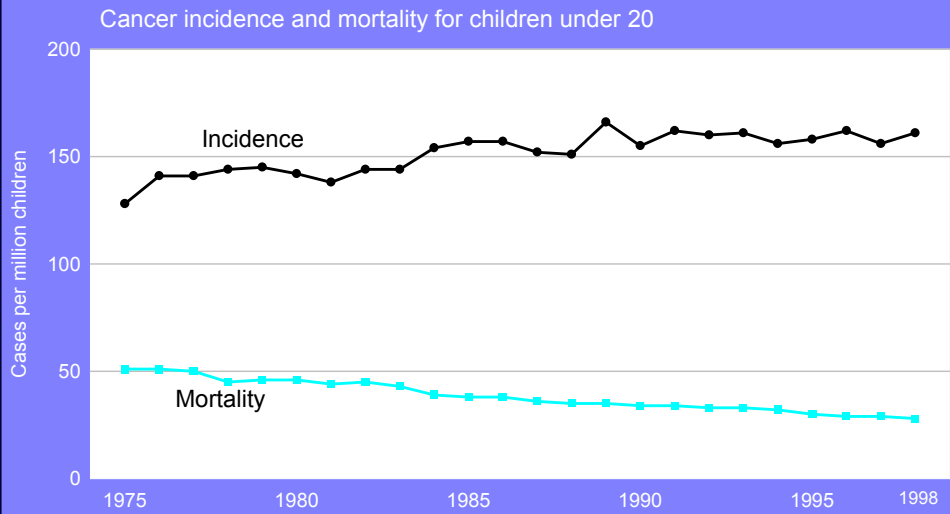
Children's hospital admissions for asthma and other respiratory causes



SOURCE: Centers for Disease Control and Prevention, National Center for Health Statistics, National Hospital Discharge Survey

Childhood Cancer Incidence and Mortality

Measure D5

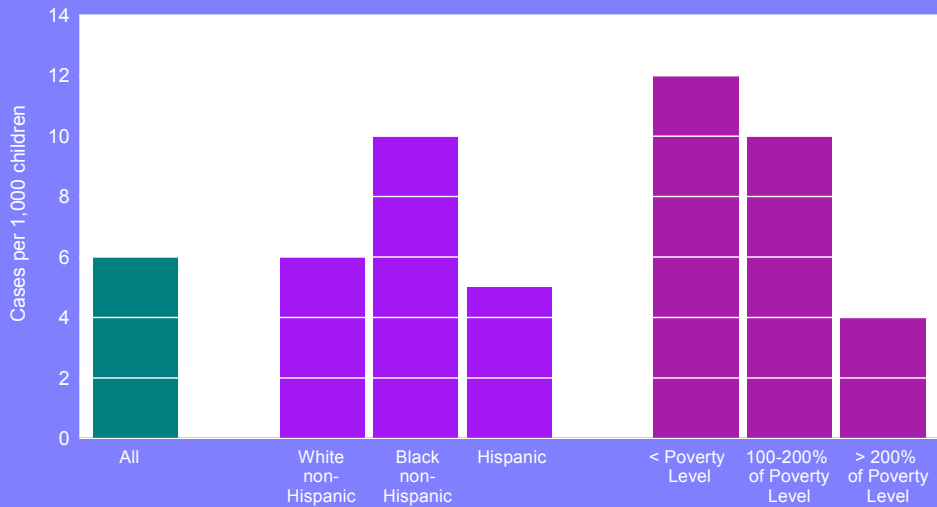


SOURCE: Incidence data from National Cancer Institute, Surveillance, Epidemiology and End Results Program; mortality data from Centers for Disease Control and Prevention, National Center for Health Statistics, National Vital Statistics System

Mental Retardation

Measure D7

Children reported to have mental retardation, by race/ethnicity and family income, 1997-2000

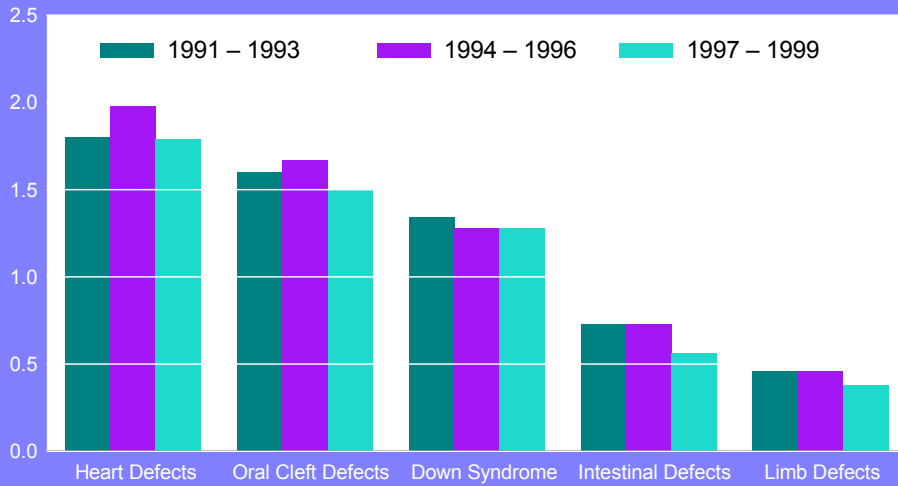


SOURCE: Centers for Disease Control and Prevention, National Center for Health Statistics, National Health Interview Survey

Birth Defects in California

Measure S5

Number of birth defects in California per 1,000 live births and fetal deaths



SOURCE: California Birth Defects Monitoring Program

Conclusions

- Areas of improvement, including:
 - reduced blood lead levels and exposure to secondhand smoke
 - modest decreases in exposure to air pollutants and drinking water contaminants
- Areas of concern, including:
 - prenatal mercury exposure
 - rising prevalence of asthma
- Much remains to be learned about how pollutants affect children's health

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Acknowledgments

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AMERICA'S CHILDREN AND THE ENVIRONMENT

Measures of Contaminants, Body Burdens, and Illnesses



<http://www.epa.gov/envirohealth/children>



Peter Scheidt

Program Office and Interagency Coordinating Committee

U.S. Department of Health and Human Services

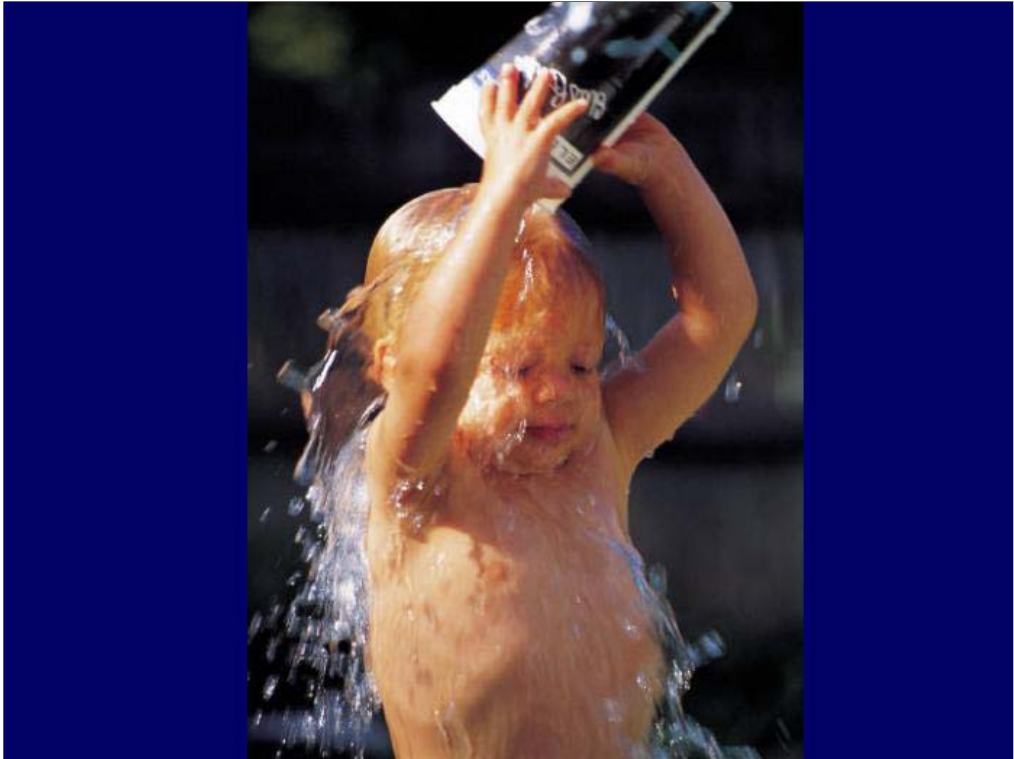
NICHD, CDC, NIEHS

U.S. Environmental Protection Agency



Children have increased vulnerability to environmental exposures

- Critical windows of vulnerability during development
- Immature mechanisms for detoxification and protection
- Differences in metabolism and behavior that may yield higher exposure in the same environments





Rationale for the National Children's Study

From The President's Task Force on Health Risks and Safety Risks to Children, 2000

- Compared to adults, children are especially vulnerable to environmental exposures – metabolism, behavior
- Exposures to some agents demonstrate potential for serious developmental effects – lead, prenatal alcohol
- Current known exposures of high frequency – pesticides, violence, media
- Numerous high burden conditions with suspected environmental contribution – learning disabilities, autism, diabetes, asthma, birth defects, premature birth
- Existing research too limited in size & scope to answer the questions
- Life-course (longitudinal) design needed to correctly link with multiple exposures and multiple outcomes

Why Now?

- Since the 1950s, many environmental factors have been introduced (chemicals in air, food, water, and soil) to increase the effects of the environment and its interaction with the genetic constitution of the developing fetus and the child. Others (DDT) have been decreased, at least in the U.S.
- Since the 1950s, many technological advances have been made (identifying biomarkers, mapping the human genome, computerization, etc.) that would contribute to the ability to identify environmental risks



PL 106-310

Children's Health Act of 2000

- (a) PURPOSE- . . . to authorize NICHD to conduct a national longitudinal study of environmental influences (including physical, chemical, biological, and psychosocial) on children's health and development.
- (b) IN GENERAL- The Director of NICHD shall establish a consortium of representatives from appropriate Federal agencies (including the CDC and EPA) to--
 - (1) plan, develop, and implement a prospective cohort study, from birth to adulthood, to evaluate the effects of both chronic and intermittent exposures on child health and human development; and
 - (2) investigate basic mechanisms of developmental disorders and environmental factors, both risk and protective, that influence health and developmental processes.. . .
- (e) AUTHORIZATION OF APPROPRIATIONS- There are authorized to be appropriated to carry out this section \$18,000,000 for fiscal year 2001, and such sums as may be necessary for each the fiscal years 2002 through 2005.



Study Concepts

- Longitudinal study of children, their families and their environment
- National in scope
- Environment defined broadly (chemical, physical, behavioral, social, cultural)
- Study common range of “environmental” exposures and less common outcomes (n~100,000)
- Environment & genetic expression



Study Concepts (con't)

- State-of-the-art technology – tracking, measurement, data management
- Consortium of multiple agencies
- Extensive public-private partnerships
- National resource for future studies



Study Population - Issues

- Generalizability to U.S. population
- Additional study populations, e.g.
 - Specific high-risk populations
 - Agricultural
 - Industrial
 - Economically disadvantaged
 - Women of child-bearing age - possible effects on fertility & pregnancy



Criteria for Core Hypotheses

- No single hypothesis
- Hypothesis required for costly elements
- Important for child health & development
(prevalence, severity, morbidity, mortality, disability, cost, public health significance)
- Reasonable scientific rationale
- Require the large sample size (~100,000)
- Measurable with study of this size
- Requires longitudinal follow-up



Priority Outcome Areas (and example hypotheses)

- **Undesirable outcomes of pregnancy** (Infection and mediators of Inflammation during pregnancy are major factors associated with pre-term birth)
- **Neurobehavioral development** (proposed - environmentally induced biochemical and physiological conditions of birth and infancy, including maternal hypothyroidism, neonatal hyperbilirubinemia, and others, are associated with learning and cognitive disabilities,.)
- **Injury** (Repeated head trauma w/o anatomic damage - cumulative adverse effects on neurocognitive development)

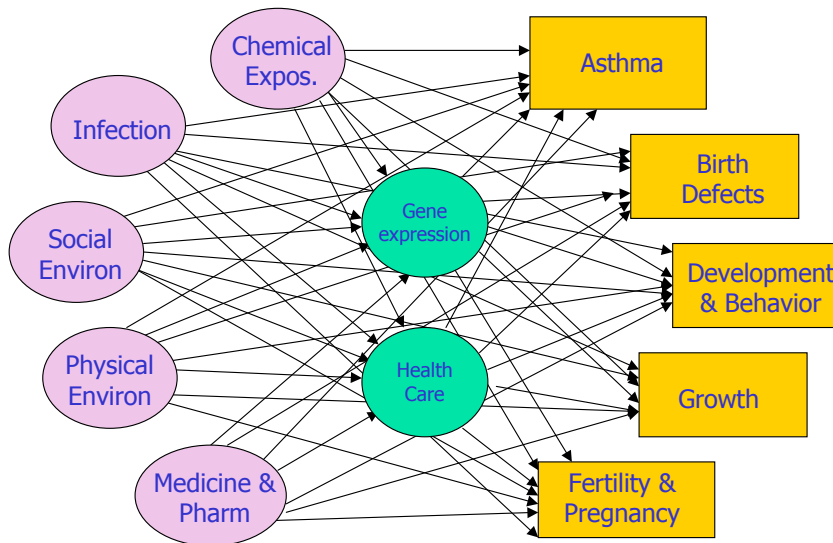


Priority Outcome Areas (and example hypotheses)

- **Asthma** (maternal stress during pregnancy is associated with the prevalence and severity of asthma in offspring)
- **Obesity and physical development** (Obesity and insulin resistance is associated with impaired glucose metabolism in pregnancy and interacting factors in the physical and social environment)



Associations and Interactions in the National Children's Study





Measures Anticipated - Exposures

- Environmental Samples: air, water, dust
- Bio-markers for chemicals: blood, breast milk, hair, tissue, etc.
- Interview and history
- Serology and medical data
- Housing & living characteristics
- Family and social experiences
- Neighborhood and community characteristics



Measures Anticipated – Outcomes

- Fetal growth and outcome of pregnancy
- Birth defects and newborn exam
- Growth, nutrition and physical development
- Medical condition and history: illness (e.g. asthma), conditions, & injuries
- Cognitive and emotional development
- Mental, developmental and behavioral conditions



Projected Time Line

2000-2004	Pilot study/methods development work
2001-2002	Form advisory committee and working groups
<i>Periodically:</i>	Meetings, peer reviews, consultations
Mid 2003	Finalize specific hypotheses, develop study design
Mid 2005	Select initial centers or alternatives and pilot test core protocol
Late 2005	Begin full study with vanguard centers
2005-2007	Enroll additional centers
2008-2009	First preliminary results available from pregnancy
2007-2030	Analyze data as collection continues, publish results throughout:



Potential Benefits of the NCS for Prevention of Diseases

Condition	Potential Reduction	Potential Annual Benefit
Pre-term Birth	10 %	\$0.6 Billion
Asthma	25 %	\$3.2 Billion
Obesity & Diabetes	12.5 %	\$14.5 Billion
Juvenile Diabetes	15 %	\$15 Billion
Injuries	10%	\$39 Billion
Schizophrenia	33 %	\$3.1 Billion
Learning problems One cause comparable to lead	8%	\$100 Billion



NCS - Funding Status

- FY '02 - \$6 M
- FY '03 – \$10 M Proposed
- FY '04 - \$26 M Estimated need
- Funding for FY '05 & beyond to NIH/HHS-EPA/OMB
- Congressional appropriation uncertain



The NCS will provide

- The **answer to concerns about known exposures** during childhood to potential toxicants
- The **power to determine absence of effects** or benefit of exposures to various products important for our economy
- **Causal factors for a number of diseases** and conditions of children with suspected environmental causes
- How **multiple causes** interact to result in **multiple outcomes**
- Large sample size required to **apply knowledge of the human genome** to understand multifactoral genetic conditions
- Identification of early life **factors that contribute to many adult conditions**
- A **national resource to answer future questions** by using stored biological and environmental samples and the extensive data for decades to come



Contact information

- Check the Web site:
<http://NationalChildrensStudy.gov>
- Join the listserv for news and communication
- Contact us at ncs@mail.nih.gov



The End



Environmental Health Valuation for Children: Research in Europe

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Context

- Much fewer studies in Europe than in the United States
- However, recent growth in interest in European countries
- OECD project on the valuation of environmental health risks to children



European studies

- Very few economic European studies on the valuation of children's health
- Greater emphasis on epidemiological work
- Most European valuation studies estimate Health-related quality of life (HRQOL) measures
- Only one study which estimates WTP to protect children's health

Valuation of Air Pollution in Europe

- Navrud (2001) estimates parental WTP to avoid ill-health episodes for their children.
- Health impacts considered: asthma attacks and coughing.
- Sample: parents of children under 17 years of age.
- Possibility of comparing parents' WTP for their own health with parents' WTP for their children's health.
- Mortality risk reduction is valued higher than morbidity risk reduction.
- Results show that WTP to prevent the child from illness is higher than WTP to prevent an adult from illness.

16 D Questionnaire

- Apajasalo et al. (1996a) → health-related quality of life (HRQOL) measure of adolescent aged 12-15.
- 16 multiple choice questions representing one health-related dimension (e.g. mobility, vision, hearing, breathing, etc)
- Sample: “normal” and affected children (children waiting for organ transplantation, children with genetic skeletal dysplasias, and children with epilepsy).
- New approach: adolescents fill in the questionnaire by themselves, & questionnaire sent to their parents for comparison.
- Main Results:
 - The profiles differ significantly according to the diagnosis.
 - The measures obtained from the children and the parents differ
 - Differences between boys and girls.
- Conclusion: Reliable HRQOL measures of adolescents’ health should be based on data collected from the adolescents themselves.

17 D Questionnaire

- Apajasalo et al. (1996b) → HRQOL measure for children aged 8-11 years.
- Based on the 16D questionnaire, they construct a measure consisting of 17 dimensions.
- Sample: affected and non-affected children.
- The children completed the questionnaire with the help of an interviewer.
- Similar results to the 16D study: the profiles vary according to the diagnosis.
- Reliable estimates of the HRQOL of children can be obtained when children fill in the questionnaire by themselves.
- However, recognition that limited cognitive capacities of young children.



Children's QoL Assessment

- Manificat and Dazord (2002) assess quality of life (QoL) among 4 to 12 year old children.
- The questionnaire covers 27 items covering the main paediatric QoL domains, e.g. family life, social life, children's activities and health.
- Sample: ill and non-ill children.
- Children have to fill in the questionnaire by themselves.
- Results show differences across ages, health status and living conditions.



Ongoing Work Programmes

- The Pan-European Programme assesses the evaluation of transport-related health impacts, with a particular emphasis on children. Countries involved: Austria, Switzerland, France, Malta, The Netherlands, and Sweden + WHO.
- Children's Environment and Health Action Plan for Europe (CEHAPE) undertaken by WHO, to tackle the environmental risk factors that most affect European children's health and providing concrete tools to address them. Countries involved: Member countries.
- The RANCH Project addresses the effects of noise on children's cognition and health. Countries involved: the Netherlands, Spain, Sweden and the UK.
- Work in Norway : projects referenced in the Norwegian Research Database (<http://dbh.nsd.uib.no/nfi/english/>)



OECD Workshop

- Objectives:
 - Review the state of knowledge;
 - Assess the different valuation approaches; and,
 - Highlight the needs for further research and political action.
- Structure: 4 sessions:
 - general overview of differences;
 - conceptual and methodological issues;
 - comparison of methodologies; and,
 - policy perspectives.
- Key issues:
 - Unique challenges;
 - Availability of data;
 - Valuation methodology; and,
 - Benefit transfer

Findings (1)

● Overview of the differences between adults and children

– Risk differences

- Children are not little adults
- Heterogeneity between children
- Great number of uncertainties

– Valuation differences

- 4 potential sources of valuation differences: age, risk preferences, context of valuation, and perspective.
- Affect estimates
- Estimated VSL of a child > Estimated VSL of an adult

Findings (2)

- **Conceptual and methodological issues**
 - Formulation of children's preferences:
 - Parental perspective most appropriate
 - Application of intra-household allocation model (unitary vs. pluralistic)
 - Est'd WTP to reduce risk for children > Est'd WTP to reduce risk for adults.
 - Transfer of adults' values
 - Risk of under-estimation
 - Adjust adults' values with relevant marginal rate of substitution between adults' and children's health values.
 - Discounting children's health
 - Scarcity of relevant examples
 - Time-varying discount rate may be appropriate
 - Long term benefits accounted with care
 - Economic uncertainties
 - Key sources of uncertainty: risk context, time, irreversibility, formulation of children's preferences, valuation context and altruism.
 - Children's health value included in parent's health value.
 - Methodological concerns of greater importance.



Findings (3)

- **Comparison of methodologies**

- Stated vs. Revealed preferences techniques
 - Stated-preferences techniques more appropriate.
 - Revealed-preferences more demanding and difficult to implement, in particular in that context of valuation.
- WTP vs. QALYs
 - WTP impose less restrictions on the structure of individual preferences but are more sensitive to the respondent thinking.
 - Any standard chosen is arbitrary
 - The choice will depend upon the setting
- Health outcome measures
 - Studies conclude that perspective of children is preferred
 - Multi-attribute utility instruments provide reliable results
 - But what is the validity of the value obtained?



Findings (4)

- **Policy perspectives**

- Children are highly vulnerable to environmental degradation
- Children are not little adults
- Morbidity and mortality risks reduction greatly differ
- Research on the valuation of children's health should be encouraged and supported
- More comparative studies in different countries
- Better risk and economic assessments are required



Conclusions

- Misallocation of resources devoted toward children (and between children and adults)
- Linked to allocation (misallocation) of resources between morbidity and mortality
- Leads to wrong priorities being set across different impacts and wrong standards within individual impacts
- Much more information and research data are necessary to provide reliable policy advice

Summary of Q&A Discussion Following Session I

Matt Clark (EPA/NCER) asked Dr. Scheidt whether there were any economists doing willingness-to-pay studies in association with the National Children's Study. When Dr. Scheidt responded "No," Dr. Clark suggested that a "wealth of data that would be very useful for policy matters" could be acquired for very little incremental cost, and he stated that similar joint efforts have been successful in the past. He strongly urged Dr. Scheidt to have economists participate and develop some survey materials that could augment the patient study.

Dr. Scheidt responded that the Study group was "very open to that kind of thing" and, in fact, has an economist/sociologist (Bob Michaels from the University of Chicago) involved on the advisory committee, although they've "not engaged in that level of economic study." He invited any interested economists to contact the Study group directly.

Glenn Harrison (University of Central Florida) asked two questions of Dr. Scheidt. He first stated that health economists can easily find studies that relate to the number of children who have hospital stays and diagnosis codes, etc., but they often can't find links to *cost* measures. Acknowledging that the costs are difficult to measure, he asked whether the Study was going to link to existing surveys that can actually give information on the *costs* of delivering healthcare. His second question concerned the issue that "surveys of children's health . . . very often start too late"—that is, they don't provide information on fetal deaths and infant deaths. The resultant "sample selection bias" can make a dramatic difference to the inferences one draws.

Dr. Scheidt responded that they definitely anticipate merging and linking to appropriate existing data sets (e.g., from the Census Bureau), and he stated that there is a white paper and workshop in the planning phase designed to examine all identifiable data sets relevant to the study which are candidates for linking. He said that this search is wide open, ranging "from social data to atmospheric air pollution" data being measured through satellite technology at NASA.

Dr. Scheidt acknowledged the concern with the question on fetal deaths and particularly with health risk issues from the critical period of early in the first trimester onward. Citing the logistical and economic difficulties of following the entire sample of those of child-bearing age from pre-pregnancy on, he stated that they at least hoped to track women whose children are enrolled in the study and who subsequently become pregnant.

Kerry Smith (North Carolina State University) commented on the difficulty, partly due to confidentiality reasons, in linking spatial data (i.e., latitude and longitude) to the households involved in the surveys, and he asked Dr. Scheidt to pay attention to getting economists access to that information, if possible. When, Dr. Scheidt asked for clues about how that might be accomplished, Dr. Smith clarified that what is needed is "a

convenient way in which researchers can ask for the matching to take place by a third party.” He acknowledged that certain for-profit entities allow linking to their databases, but this introduces the issue of cost.

Dr. Smith then asked whether in doing the design work there is “a provision to actually talk to household members about how they think about these choices” (i.e., the precautions parents take with their children). He suggested focus groups, cognitive interviews, etc. as means of ensuring that the right questions are being asked “as opposed to just itemizing what we *think* we’d like to know without talking to them.”

Dr. Scheidt responded, “Yes, unequivocally,” and mentioned that an extensive set of focus group discussions had begun and would be expanded as the protocol becomes clearer.

Dr. Smith asked whether the results of those discussions would be reported before the survey goes out, and Dr. Scheidt responded that information is posted on the website.

Rachel Nugent (NIH Fogarty International Center) called attention to the fact that both people and environmental contaminants move across borders and that “there are a lot of particularly vulnerable populations of children in the U.S. who may have foreign backgrounds or otherwise be influenced by other country backgrounds.” She asked Dr. Scheidt to speak to the issue of coordinating the study with other countries.

Dr. Scheidt cited the Tri-National Commission’s efforts in addressing the environmental impact of NAFTA and in urging Canada and Mexico to carry out “coordinated an parallel studies that would be quite an advantage to us to provide ranges of exposures that we would not otherwise have and potential sample size reductions.” Dr. Scheidt acknowledged the potential problem of including participants from other countries who may migrate. In the study, they clearly anticipate including Spanish-speaking subjects and not excluding systematically any potential migrants, and they plan to provide long-term follow-up of anyone who does migrate. He stated that although the details of that had not yet been determined, they would do as much as is feasible.

Bryan Hubbell (EPA/OAQPS) brought up the issue of the limited network of monitors for many environmental contaminants. He wondered how the study was ensuring that “certain populations that don’t happen to live where a monitor is” are not excluded and asked whether they planned to do additional monitoring.

Dr. Scheidt reiterated that the data from numerous sources (e.g., NASA) were being merged. He also stated that the study anticipated supplementing available data with “an extensive degree of monitoring” itself and was exploring the range of technologies available for doing this economically and efficiently. The study working groups and pilot studies are considering these issues.

J.R. DeShazo (UCLA School of Public Policy) stated that the household's totality of *response* to a perceived risk is important to factor into an evaluation of how households are economically responding to risk. He emphasized that remedial actions taken once a health outcome is expressed, and not just defensive mitigating actions, involve dedicating time and money resources by household members. He asked whether that consideration "was coming front and center in the survey instrument."

Dr. Scheidt asked for a clarification and Dr. DeShazo replied that "the fundamental issue is how parents evaluate the portfolio of health risks their children could face—the level of risk they perceive and what they do to defend and mitigate the risk of exposure to the child, and then once the child shows symptoms what kind of remedial behavior they undertake to reduce their level of risk . . ." in other words, the intra-household process of identifying and dealing with risks to children.

Dr. Scheidt responded that it was an "interesting question" and, saying that they had not focused on the decision-making dynamic in families, he wondered how they might go about doing that. He acknowledged that study participants, as a consequence of participating in the study, would learn a lot about health risks that their children face, or don't face, and that they are a bit concerned about the potential impact this will have on the long-term outcomes of the study. He closed by restating that they had not studied how parents process that information.

Ed Chu, the session moderator, closed the session by urging everyone to look at the study website, and he commented that one of the primary reasons for having Dr. Scheidt speak at the workshop was to stimulate economists' interest and involvement in the study.