



# The National Children's Study

**U.S. Department of Health and Human Services**  
National Institutes of Health  
Centers for Disease Control and Prevention  
**U.S. Environmental Protection Agency**

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# The National Children's Study



- Largest long-term study of children's health and development ever to be conducted in the U.S.
- Longitudinal study of children, their families, and their environment (before birth through age 21)
- Approximately 100,000 children enables study of important but less common outcomes

# Rationale for the National Children's Study



## From The President's Task Force on Environmental Health 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 and scope to answer the questions
- Life-course (longitudinal) design needed to correctly link with multiple exposures and multiple outcomes

\* Reappointed 2001 and 2003

# The President's Task Force on Environmental Health and Safety Risks to Children – 1998\*



- To develop strategies to reduce risk of environmental exposures to children
- Co-chairs: Secretary HHS, Administrator EPA
- Members: 7 cabinet officers
- Need for longitudinal study of effects of environmental exposures
- Consultation (2000) endorsed study
  - Large, bold, multiple agencies, public private partnerships
- New money required

\* Reappointed 2001 and 2003

# PL 106-310: Children's Health Act of 2000



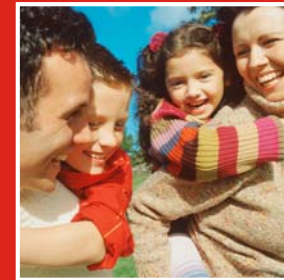
- (a) PURPOSE — ... to authorize NICHD to conduct a national longitudinal study of environmental influences (including physical, chemical, biological, and psychosocial) on children's health and development.
  
- (b) IN GENERAL — The Director of NICHD shall establish a consortium of representatives from 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



- Study high priority and burdensome conditions (n~100,000)
- Hypothesis driven
- Exposure period begins with pregnancy
- Environment and genetic expression
- State-of-the-art technology
- Consortium of multiple agencies
- Extensive public-private partnerships
- National resource for future studies

# Priority Health Exposures, Outcomes



Priority Exposures	Examples
Physical Environment	Housing quality, neighborhood
Chemical Exposures	Pesticides, phthalates, heavy metals
Biologic Environment	Infectious agents, endotoxins, diet
Genetics	Interaction between genes and environment
Psychosocial milieu	Family structure, socio-economic status, parenting style, social networks, exposure to media and violence



Priority Health Outcomes	Examples
Pregnancy Outcomes	Preterm, birth defects
Neurodevelopment and Behavior	Autism, learning disabilities, schizophrenia, conduct and behavior problems
Injury	Head trauma, injuries requiring hospitalizations
Asthma	Asthma incidence and exacerbation
Obesity and Physical Development	Obesity, diabetes, altered puberty

# Priority Environmental Exposures



- **Physical** environment: housing, neighborhoods and communities, climate, radiation...
- **Chemical** exposures: air, water, soil, food, dust, industrial products, pharmaceuticals...
  - Complex ubiquitous low-level exposures
  - Unique exposures (special sub-studies)
- **Biological** environment: intrauterine, infection, nutrition; inflammatory and metabolic response...
- **Genetics**: genetic components of disease; effects of environmental exposures on gene expression...
- **Psychosocial** milieu: influence of family, socio-economics, community, stress...



# Examples of Hypothesis-defining Questions



- How is asthma incidence and severity influenced by the interaction of early life infection and air quality?
- Are assisted reproductive technologies (ART) at increased risk of fetal growth restriction, birth defects, and developmental disabilities?
- Does impaired maternal glucose metabolism during pregnancy cause obesity in children?
- How does high level exposure to media content in infancy affect development and behavior in children?
- Does pre- and post-natal exposure to endocrine-active environmental agents alter age at onset, duration, and completion of puberty?

# Locations vs. Centers



- Locations—geographic locations (counties) from which participants will be recruited
  - Selected by stratified probability sample of primary sampling units
  - 105 locations
- Centers—entities or institutions that will carry out Study at the locations
  - Selected by a competitive process
  - Each will cover more than one location
  - Up to 40 centers

# Sampling and Centers



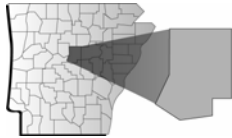
- National probability sample important
  - Exposure-outcome relationship representative of the U.S.
  - Key exposures with varied distributions not missed
  - Clustered for community attributes, logistics
- Centers of excellence important
  - Broad scientific input, top expertise and facilities
- Probability sample by centers
  - Unique combination
  - Requires flexibility and adaptation of center to the scientific design

# National Children's Study Sample



All Births  
in the Nation

~4 million births  
in 3,141 counties



Sample of Study  
Locations

105 locations



Sample of Study  
Segments

Selection of  
neighborhoods



Study  
Households

All or a sample of  
households within  
neighborhoods



Study Women

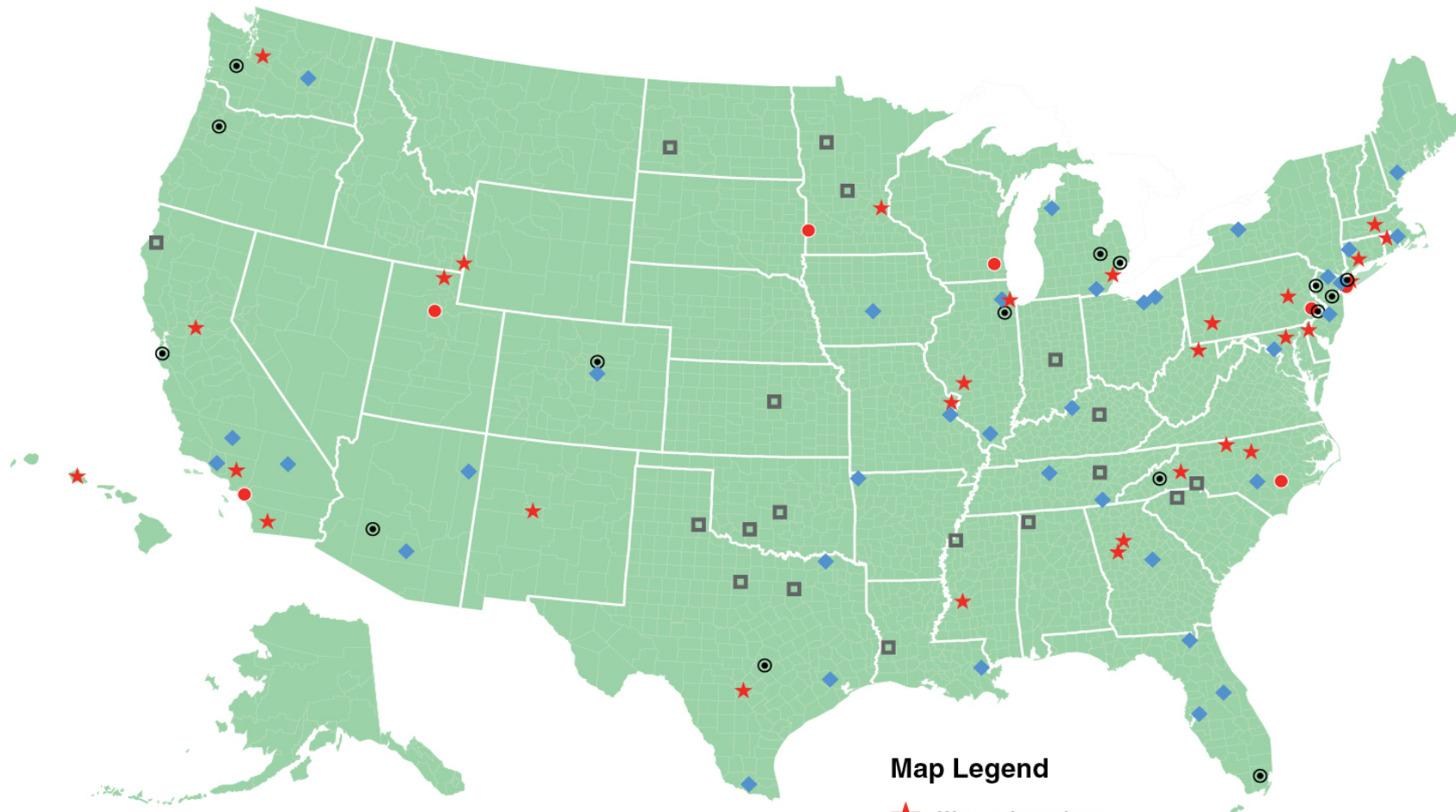
All eligible women in  
the household

# National Children's Study Sample



- National probability sample – known chance of inclusion
- Drawn by NCHS
- 105 locations – corresponding to counties/clusters;  
79 metro, 26 rural
- 13 very large counties; other counties placed into strata based on:
  - Metropolitan status
  - Geography
  - Average number of births per year
  - Race, ethnicity, percent low birth weight

# National Children's Study Locations



## Map Legend

- ★ Wave 1 Locations
- Vanguard/Wave 1 Locations
- ◆ Wave 2 Locations
- ⊙ Wave 3 Locations
- ◻ Locations Not Awarded



# National Children's Study Locations

- ★ **Wave 1 Locations**
- **Vanguard/Wave 1 Locations**
- ◆ **Wave 2 Locations**
- ◎ **Wave 3 Locations**
- **Locations Not Awarded**

- ★ **Wave 1 Locations**
  - Los Angeles County, CA
  - Sacramento County, CA
  - San Diego County, CA
  - New Haven County, CT
  - New Castle County, DE
  - DeKalb County, GA
  - Fayette County, GA
  - Honolulu County, HI
  - Bear Lake County, ID and Lincoln and Uinta Counties, WY
  - Cook County, IL
  - Macoupin County, IL
  - Worcester County, MA
  - Baltimore County, MD
  - Wayne County, MI
  - Ramsey County, MN
  - St. Louis, MO
  - Hinds County, MS
  - Burke County, NC
  - Durham County, NC
  - Rockingham County, NC
  - Valencia County, NM
  - Nassau County, NY
  - Schuylkill County, PA
  - Westmoreland County, PA
  - Providence County, RI
  - Bexar County, TX
  - Cache County, UT
  - King County, WA
  - Marion County, WV
- **Vanguard/Wave 1 Locations**
  - Orange County, CA
  - Duplin County, NC
  - New York City (Queens), NY
  - Montgomery County, PA
  - Salt Lake County, UT
  - Waukesha County, WI
  - Lincoln, Pipestone, and Yellow Medicine Counties, MN, and Brookings County, SD

- ◆ **Wave 2 Locations**
  - Benton County, AR
  - Apache County, AZ
  - Pinal County, AZ
  - Kern County, CA
  - San Bernardino County, CA
  - Ventura County, CA
  - Douglas County, CO
  - Litchfield County, CT
  - Baker County, FL
  - Hillsborough County, FL
  - Orange County, FL
  - Baldwin County, GA
  - Polk County, IA
  - DuPage County, IL
  - Johnson, Union, and Williamson Counties, IL
  - Jefferson County, KY
  - New Orleans, LA
  - Bristol County, MA
  - Montgomery County, MD
  - Cumberland County, ME
  - Grand Traverse County, MI
  - Lenawee County, MI
  - Jefferson County, MO
  - Cumberland County, NC
  - Burlington County, NJ
  - Passaic County, NJ
  - New York City (Manhattan), NY
  - Monroe County, NY
  - Cuyahoga County, OH
  - Lorain County, OH
  - Bradley County, TN
  - Davidson County, TN
  - Harris County, TX
  - Hidalgo County, TX
  - Lamar County, TX
  - Grant County, WA

- ◎ **Wave 3 Locations**
  - Maricopa County, AZ
  - San Mateo County, CA
  - Denver, CO
  - Miami-Dade County, FL
  - Will County, IL
  - Genesee County, MI
  - Macomb County, MI
  - Buncombe County, NC
  - Middlesex County, NJ
  - Warren County, NJ
  - New York City (Brooklyn), NY
  - Marion County, OR
  - Philadelphia County, PA
  - Travis County, TX
  - Thurston County, WA
- **Locations Not Awarded**
  - Colbert County, AL
  - Humboldt County, CA
  - Marion County, IN
  - Saline County, KS
  - Jessamine County, KY
  - Beauregard and Vernon Parishes, LA
  - Becker, Clearwater, and Mahanomen Counties, MN
  - Stearns County, MN
  - Coahoma County, MS
  - Gaston County, NC
  - Stark County, ND
  - Cleveland County, OK
  - Comanche County, OK
  - Spartanburg County, SC
  - Cumberland and Morgan Counties, TN
  - Childress, Collingsworth, Donley, and Hall Counties, TX
  - Dallas County, TX
  - Stephens and Young Counties, TX

# Study Centers Awarded Wave 2 Locations



<b>Study Center (lead institution listed)</b> *denotes new Study Centers	<b>Study Locations</b>
Arkansas Children's Hospital Research Institute*	Benton County, AR
Baylor College of Medicine*	Harris County, TX
Brown University	Bristol County, MA
Case Western Reserve University School of Medicine*	Lorain County, OH Cuyahoga County, OH
Children's Hospital of Philadelphia	Burlington County, NJ
Emory University	Bradley County, TN Baldwin County, GA
Johns Hopkins University Bloomberg School of Public Health	Montgomery County, MD
Maine Medical Center*	Cumberland County, ME
Michigan State University	Grand Traverse County, MI Lenawee County, MI
Mount Sinai School of Medicine	Monroe County, NY New York City (Manhattan), NY Passaic County, NJ



# Wave 2 Locations (continued)



<b>Study Center (lead institution listed)</b> *denotes new Study Centers	<b>Study Locations</b>
Northwestern University	DuPage County, IL
Saint Louis University School of Public Health	Jefferson County, MO Johnson, Union, and Williamson Counties, IL
Tulane University School of Public Health and Tropical Medicine, Center for Applied Environmental Public Health*	New Orleans, LA
University of Arizona*	Apache County, AZ Pinal County, AZ
University of California, Irvine	Kern County, CA San Bernardino County, CA
University of California, Los Angeles	Ventura County, CA
University of Colorado*	Douglas County, CO
University of Iowa*	Polk County, IA
University of Louisville*	Jefferson County, KY

# Wave 2 Locations (continued)



<b>Study Center (lead institution listed)</b> <i>*denotes new Study Centers</i>	<b>Study Locations</b>
University of Miami*	Baker County, FL Orange County, FL Hillsborough County, FL
University of North Carolina at Chapel Hill, Carolina Population Center	Cumberland County, NC
University of Texas Health Science Center San Antonio	Hidalgo County, TX
University of Texas Southwestern Medical Center at Dallas*	Lamar County, TX
University of Washington	Grant County, WA
Vanderbilt University Medical Center*	Davidson County, TN
Yale University	Litchfield County, CT

# Study Centers Awarded Wave 1 Locations



Study Center (lead institution listed)	Study Locations
Brown University	Providence County, RI
Children's Hospital of Philadelphia	Schuylkill County, PA New Castle County, DE
Emory University	DeKalb County, GA Fayette County, GA
Johns Hopkins University Bloomberg School of Public Health	Baltimore County, MD
Michigan State University	Wayne County, MI
Mount Sinai School of Medicine	Nassau County, NY
Northwestern University	Cook County, IL
Saint Louis University School of Public Health	Macoupin County, IL St. Louis, MO
University of California, Davis	Sacramento County, CA
University of California, Irvine	San Diego County, CA
University of California, Los Angeles	Los Angeles County, CA

# Wave 1 Locations (continued)



Study Center (lead institution listed)	Study Locations
University of Hawai'i at Manoa John A. Burns School of Medicine	Honolulu County, HI
University of Massachusetts	Worcester County, MA
University of Minnesota	Ramsey County, MN
University of Mississippi	Hinds County, MS
University of New Mexico	Valencia County, NM
University of North Carolina at Chapel Hill, Carolina Population Center	Rockingham County, NC Burke County, NC Durham County, NC
University of Pittsburgh	Marion County, WV Westmoreland County, PA
University of Texas Health Science Center San Antonio	Bexar County, TX
University of Utah School of Medicine, Department of Pediatrics	Cache County, UT Bear Lake County, ID and Lincoln and Uinta Counties, WY
University of Washington	King County, WA
Yale University	New Haven County, CT

# Study Centers Awarded Vanguard Centers/Wave 1 Locations and Coordinating Center



Study Center	Study Locations
Children's Hospital of Philadelphia	Montgomery County, PA
Mount Sinai School of Medicine	New York City (Queens), NY
South Dakota State University	Brookings County, SD and Lincoln, Pipestone, and Yellow Medicine Counties, MN
University of California, Irvine	Orange County, CA
University of North Carolina at Chapel Hill, Carolina Population Center	Duplin County, NC
University of Utah School of Medicine, Department of Pediatrics	Salt Lake County, UT
University of Wisconsin, Madison and Medical College of Wisconsin	Waukesha County, WI
<b>Coordinating Center:</b> WESTAT with Harvard Medical School, University of Pennsylvania, and Daston Communications	As the Coordinating Center, supports all Study locations

# Selection of Segments



- Several options for defining boundaries of segments
  - Census boundaries
  - Neighborhood boundaries
  - School catchment areas
- Solicit input from the successful offerors to help define the segments
- To maintain the integrity of the sample, offerors will not be involved in the actual selection of segments

# Recruitment of Study Participants



- Household Recruitment Approach
- Supplemented with recruitment through other mechanisms
  - Prenatal care providers
  - Community campaign
  - Births
- Offerors can suggest alternative approaches that would meet the goals of the Study

# Study Participation



- Recruit from pre-conception/early pregnancy
- Diverse populations: ethnicity, SES, family structure
- Approximately 13 in-person home and clinic-based visits (pre-conception through 21)
- Contact by telephone, computer, mail-in questionnaires every 3 months through the first year of life, and then at slightly longer intervals until the child reaches 21 years of age
- Environmental (air, water, soil, dust) samples from child's environment (home, school, day care)
- Psychosocial, demographic, neurodevelopmental, neighborhood and contextual data
- Biological samples from mother, father, child



# Who Will Be Enrolled?



- Household recruitment
  - Women who are in the first trimester of pregnancy
  - Women who are planning a pregnancy
  - Women of childbearing age who are not planning pregnancy but could become pregnant during the enrollment period
- Supplemental recruitment
  - Prenatal care providers
  - Community based recruitment of eligible women



# Schedule of Visits – Core Protocol

Preconception (high probability) – one face to face visit, phone follow-up

Other data collections

- Diary
- Phone
- Mail-in Qs and samples

<b>1<sup>st</sup> Trimester</b>	<b>3 years</b>
<b>2<sup>nd</sup> Trimester UTZ</b>	<b>5 years</b>
<b>3<sup>rd</sup> Trimester</b>	<b>8 years</b>
<b>Delivery Visit</b>	<b>12 years</b>
<b>6 months</b>	<b>16 years</b>
<b>12 months</b>	<b>20 years</b>

 **Clinical Setting**

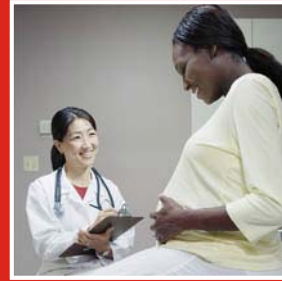
 **Home**

# Participation Incentives



- For the benefit of our children
- Monetary compensation for time, inconvenience, and expenses
- Membership and engagement with Study
- Information about child's and family's
  - Health
  - Development
  - Environment

# Study Milestones and Timeline (as of December 2008)



2000–present	Planning, pilot studies/methods development
2004	Developed Study design
2005	Awarded initial contracts (Coordinating and Vanguard Centers)
2007	Congress appropriated \$69 M
2007	Completion of the first phase of pilot Study protocol
2007	Awarded Wave 1 Study Centers
2008	Congress appropriated \$110.9 M
2008+	Reviews and approvals (OMB, peer review, IRB's)
2008	Awarded Wave 2 Study Centers
2009	Full pilot begins at Vanguard Centers
2009	Repository and Laboratory procurements
2009*+	Award Wave 3 Study Centers
2010*+	Begin full Study for Vanguard and Wave 1 locations
2011*+	Begin full Study for Wave 2 locations
2011*+	First Study results become available (methods, pilots, preliminary findings)
2012*+	Begin full Study for Wave 3 locations
2016	Full data set for outcomes of pregnancy

\* Pending funding    + Pending OMB

# Funding (as of December 2008)



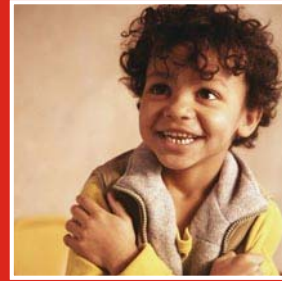
- FY00–6: \$50m from existing budgets of lead agencies
  - Infrastructure: Study plan, Coordinating Center, Vanguard Centers
  - Scientific development: 30 workshops, 20 scientific reviews, 19 pilot studies; hypotheses, exposure and outcome measures, protocol
- FY07: \$69m appropriated
  - Prepare to recruit/enroll at Vanguard Centers
  - Information Management System
  - Establish 2007 Study Centers
- FY08: \$110.9m appropriated
  - Finalize recruitment at Vanguard Centers
  - Prepare to recruit/enroll at 2007 Study Centers
- To conduct the full Study: FY08–34 ~ \$3 B

# So, the National Children's Study 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 society
- **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 multi-factorial 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

# What Will the National Children's Study Mean to Our Children's Well-Being?



- Identification of environmental factors which cause or contribute to health, development, and behavior problems
  - Asthma, injury, obesity, autism, ADHD, prematurity...
- Understanding the biology and genetics of health, development, and behavior
- Evidence-based information on which to base decisions about practice and policy regarding children's physical and mental health
- Economic benefits: cost avoidance
- Resource for future research

# Contact Information



- Check the Web site:  
<http://NationalChildrensStudy.gov>
- Join the listserv (via the Web site) for news and communication
- Contact us at [ncs@mail.nih.gov](mailto:ncs@mail.nih.gov) or 301-594-9147