



Children's Environmental Health Cross-cutting Research Roadmap

U.S. EPA's Office of Research and Development

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- **Overview of the Children’s Environmental Health Roadmap (CEH)**
- **Cross ORD Program Integration**
- **Partner and Stakeholders**
- **Relationship of Roadmap to FY16-19 StRAPs**

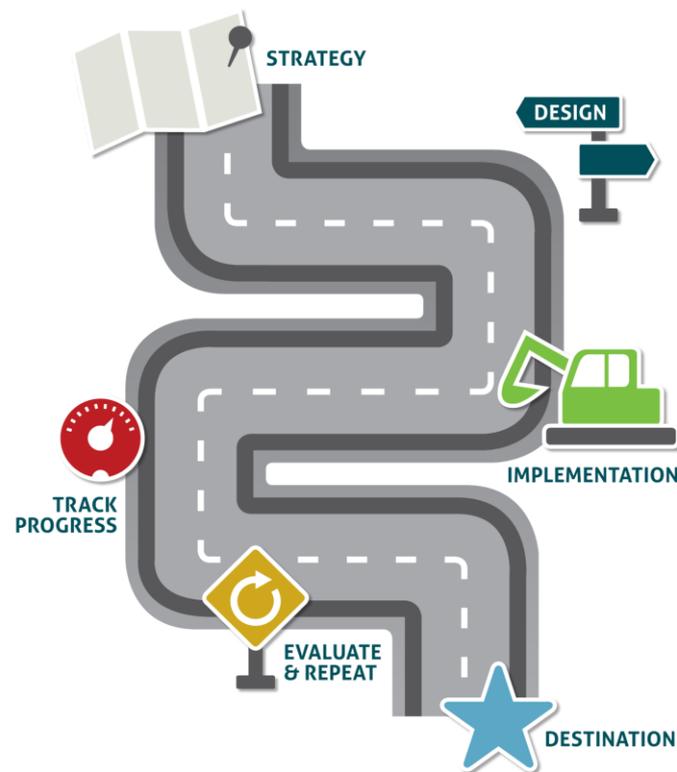




What is a Research Roadmap?

- **Purposes**
 - Describe **EPA** research niche and coordination/collaboration with federal partners, and others
 - Identify gaps and priority needs for **ORD** research in **CEH**
 - Catalyze and describe framework for research integration across the six **ORD** programs
- **Key Drivers**
 - **EPA's 2014-2018 Strategic Plan**
 - **EPA program office mandates**
 - **Recent scientific research findings related to **CEH** for priority health outcomes**

- **Straw of CEH Roadmap research areas and key questions developed by subcommittee of working group including Office of Children's Health Protection**
- **Full working group provided revisions and consensus on these topics**
- **Cross-cutting look at ORD research portfolios and emerging StRAPs for each National Research Program (NRP)**
- **Gap analysis and priority needs based on following criteria:**
 - Agency drivers
 - Child specific research needs
 - Research needs described are those for which EPA/ORD needs to play a transformative leadership role

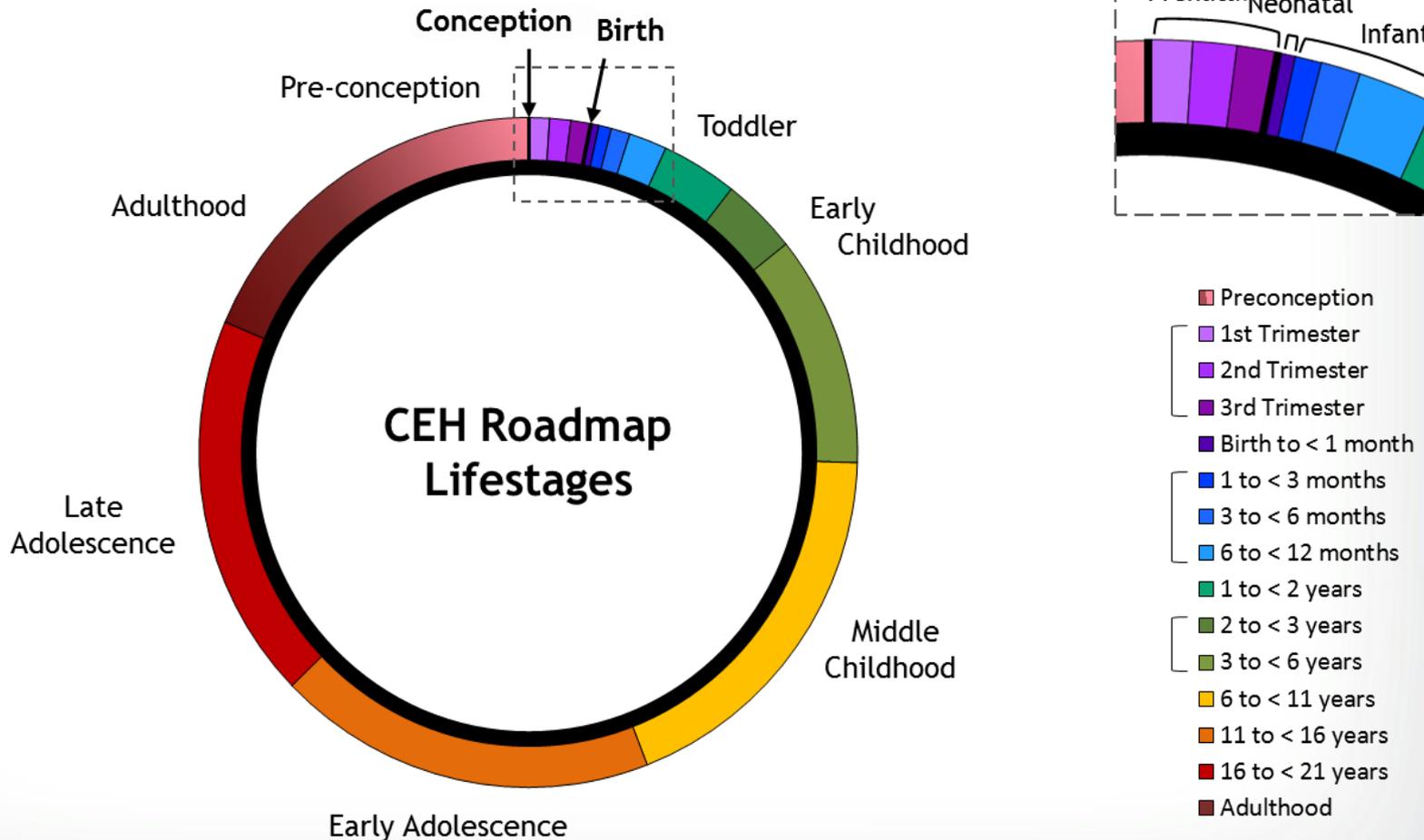


Plan specifically calls for applied research in CEH under two goals.

- **Goal 3, Cleaning-Up Communities and Advancing Sustainable Development**
 - Enhance the ability to adequately consider children’s unique susceptibilities and vulnerabilities
 - Provide the Agency, State, Tribal, and local decision makers with the knowledge needed to make smart, systems-based decisions
- **Goal 4, Ensuring Safety of Chemicals and Preventing Pollution.**
 - Provide the scientific foundation to support safe and sustainable use of chemicals, including the systems understanding needed to adequately protect the health of children
- **Plan also emphasizes the importance of leveraging and building on existing partnerships to address priority problems, specifically including CEH issues**

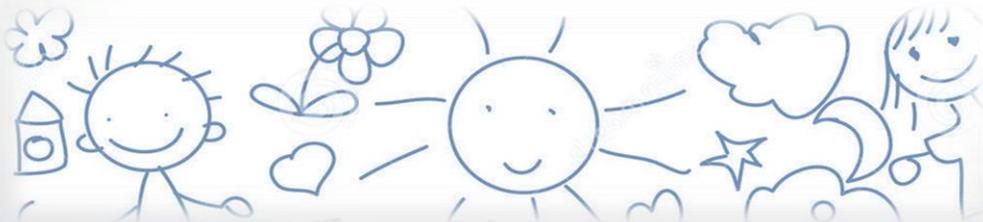
- Sustainable decisions and actions are those that improve the health of individuals and communities today without compromising the health and welfare of future generations.
- **The Agency and stakeholders require scientific understanding, information, and tools to incorporate consideration of early lifestage sensitivity, susceptibility and vulnerability to support sustainable decisions and actions.**
- Focus on the role of **exposure during early life** to xenobiotic environmental factors, in the context of important modifying factors (i.e., non-chemical stressors), on **health impacts over the course of a lifetime.**

CEH Roadmap Lifestages



The lifecourse is depicted as a circle to convey the concept of intergenerational impacts associated with environmental exposures.

- (1) Knowledge infrastructure to provide lifestage-specific data and information**
- (2) Systems understanding of the relationship between environmental exposures and health outcomes across development**
- (3) Methods and models to evaluate early lifestage-specific risks and to support decisions protective of all susceptible and vulnerable early lifestages**
- (4) Translational research and tools to support community actions and decisions**





Summary of Current CEH Research

CHILDREN'S HEALTH OUTCOMES

RESEARCH AREA	Adverse Birth Outcomes	Metabolic Disease	Neurodevelopmental Disorders	Asthma
Knowledge Infrastructure	CSS	CSS, HHRA	CSS, HHRA	HHRA
Systems Understanding	CSS, SHC, SSWR, ACE	CSS, SHC	CSS, SHC, ACE	SHC, ACE
Methods & Models	CSS, HHRA	CSS, HHRA	CSS, HHRA	ACE, HHRA
Community Decision Support	SHC, ACE	SHC	SHC	SHC, ACE

ACE –Air Climate Energy

CSS –Chemical Safety for Sustainability

HHRA –Human Health Risk Assessment

SHC –Safe and Healthy Communities

SSWR –Safe and Sustainable Water Resources



Highlights of Current Research

- **EPA's Exposure Factors Handbook** incorporates data about children's exposures and exposure factors, such as lifestage specific modeled estimates of soil and dust ingestion
- **EPA-NIEHS funded Children's Environmental Health and Disease Prevention Research Centers** exploring associations between exposures and health outcomes in children. Extensive coverage of high-interest exposures and CEH outcomes
- **Virtual Embryo Model**, a simulation model for predictive toxicology of children's health and development, which can be applied to prenatal or postnatal (including lactational) exposures.
- **Community Focused Exposure and Risk Screening Tool (C-FERST)**, a "toolkit" for step-by-step community assessment guidance, GIS maps, reports, fact sheets, best practices, and potential solutions. Children's health issues in C-FERST include childhood lead exposure, childhood asthma, and schools.
- **EnviroAtlas**, will include such indicators as the locations of schools, recreational areas, access to transportation, ecoservices and other factors relevant to health outcomes (demographics, income). Health outcomes of relevance to CEH include low birth weight and preterm birth, asthma, ADHD, and obesity.



Analysis of Key Gaps and Priority Research Needs

- **Current ORD portfolio and planned research in evolving StRAPs;**
 - Strong set of tools for addressing current regulatory mandates
 - Needs for science and information to apply tools to incorporate consideration of early lifestage sensitivity, susceptibility and vulnerability
- **Scope of research activities in other federal agencies**

NIH (including NIEHS and NICHD) investing in research to

 - Increase understanding of fundamental shared mechanisms of complex disease,
 - Susceptibility across the life span to environmental diseases,
 - Links between the totality of environmental exposures and biological pathways
- **Emerging scientific understanding of CEH and key environmental factors**
 - Evidence for endocrine disruption, autism, allergy/asthma
 - Evidence for epigenetics effects, trans-generational impacts
- **Pivotal leadership role for EPA; scope of NRPs**
 - Impacts from real-world exposures to air, water, chemicals; ambient and proximate
 - Predictive capacity to evaluate alternative actions and to anticipate outcomes

Knowledge Infrastructure:

- Tools to effectively access and mine lifestage specific data and knowledge that is being generated at an increasing pace
- Efficient links to access/collate knowledge and data from research conducted across the wider CEH research community

Systems Understanding:

- Adverse Outcome Pathways for chemicals that disrupt specific developmental processes.
- Systems models developed and applied to **understand and predict** impacts of early life environmental exposures to health outcomes
 - Impacts at birth and later in life
 - Address complex interactions of multiple chemical stressors in the context of key modifying factors
 - Measure (untargeted), Mine, Model, Manipulate, Measure (targeted)

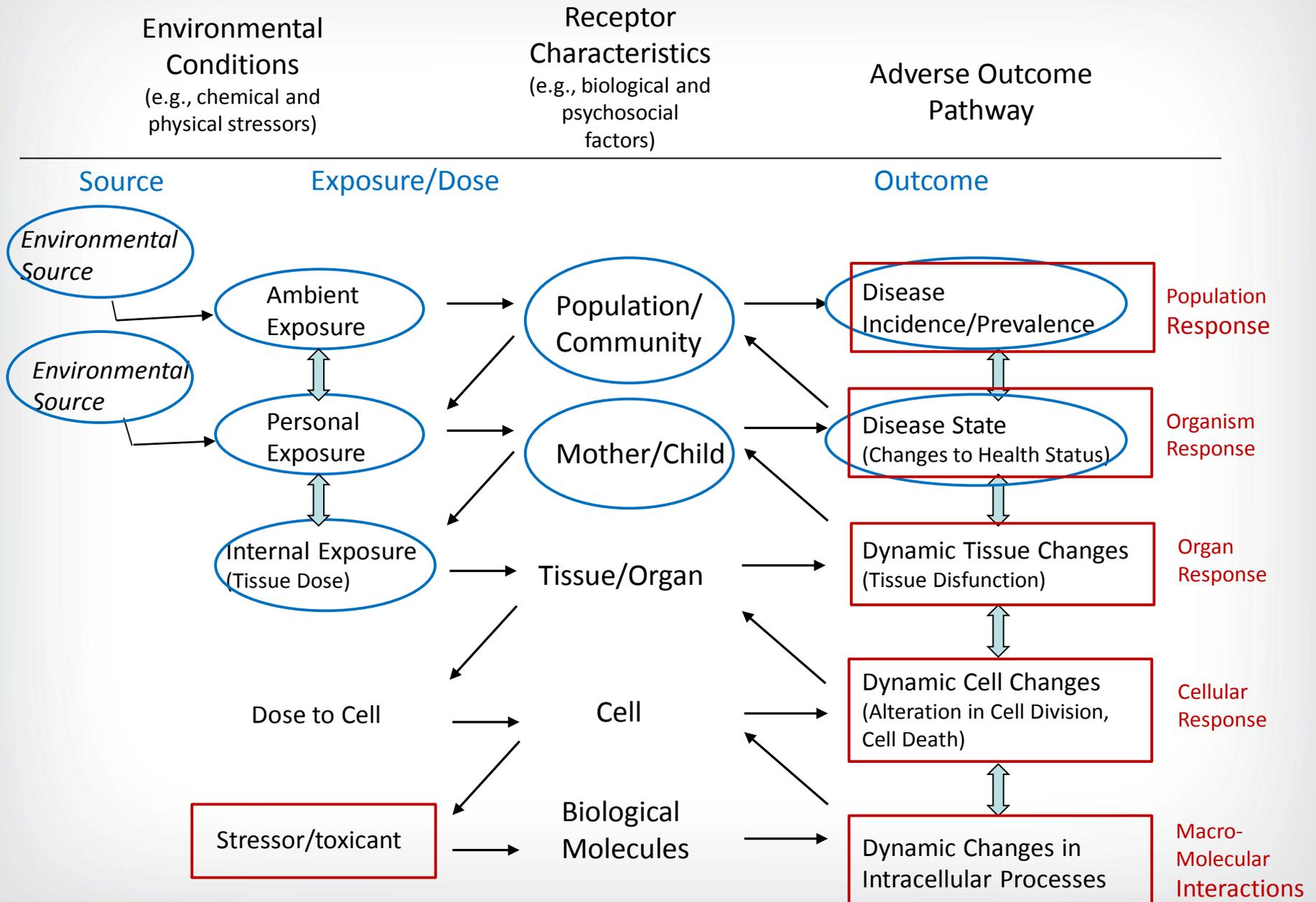
Methods, Models, Tools for decisions:

- **Efficient** methods to characterize children's environments and to monitor exposures of children and pregnant women
- Novel methods to predict potential for developmental toxicity
- Tools **applied** (fit for purpose) to assess exposure-dose-response relationships for children that incorporate early life-stage specific parameters

Translation for local decisions – Fit for Purpose:

- Translational tools designed and evaluated with community decision makers to facilitate access and use of quality data sources to inform and evaluate alternative actions and interventions
- Targeted research to provide information required to evaluate child-specific impacts of exposure to environmental stressors at the community level

Concept for Integrated CEH Research: Addressing Complexity

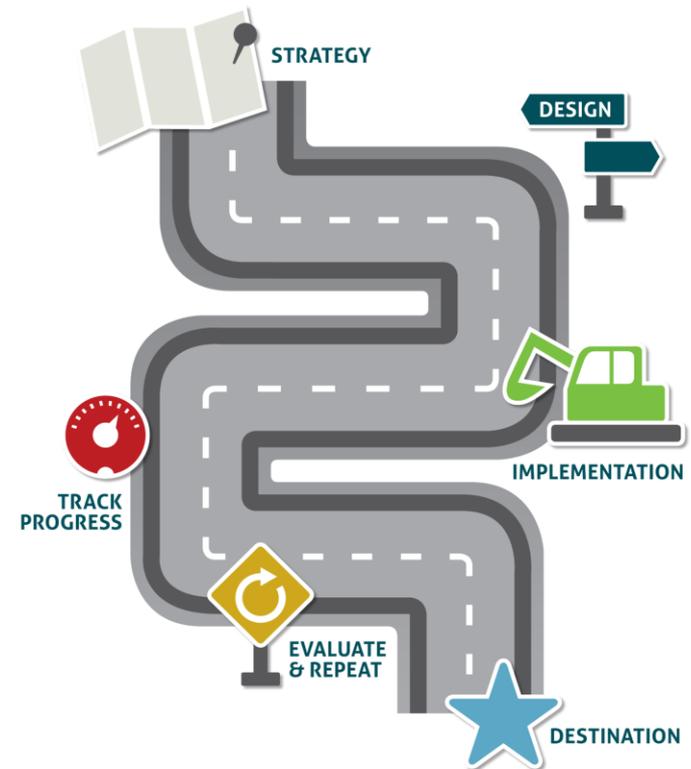




Key Partners and Stakeholders

- **EPA Office of Children's Health Protection and Regional Children's Health Liaisons**
 - **ATSDR; Association of Occupational and Environmental Clinics Pediatric Environmental Specialty Units** Ten specialty units across the U.S. that are a source of medical information and advice on environmental conditions that influence children's health
- **NIEHS - Children's Environmental Health and Disease Research Centers**
 - **16 active centers** conducting research to increase understanding how environmental factors affect children's health and promote translation of basic research findings into intervention and prevention methods to prevent adverse health outcomes.
- **NIEHS & NICHD; CDC - National Children's Study**
 - Multi-year research study examining the effects of environmental influences on the health and development of children. On hold.

- **CEH Roadmap working group will work across the NRPs to finalize the document in concert with the 16-19 StRAP planning process**
- **Clarify and articulate links to and integration with EJ and Climate Roadmaps**
- **Upon implementation, relevant research will be tagged with CEH Roadmap Topic to facilitate searching and tracking**





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Questions?