



Problem Summary & Decision Context

- Human health and well-being ↔ environment
- Considerations for vulnerable groups
- How do the built, natural, and social environments interact to influence health and well-being across the human lifecourse?
- Overall project goal: To understand how non-chemical stressors act as modifiers of chemical exposures, impacting the health and well-being of vulnerable groups

Utility to Agency?

Information gained from this research will be useful in:

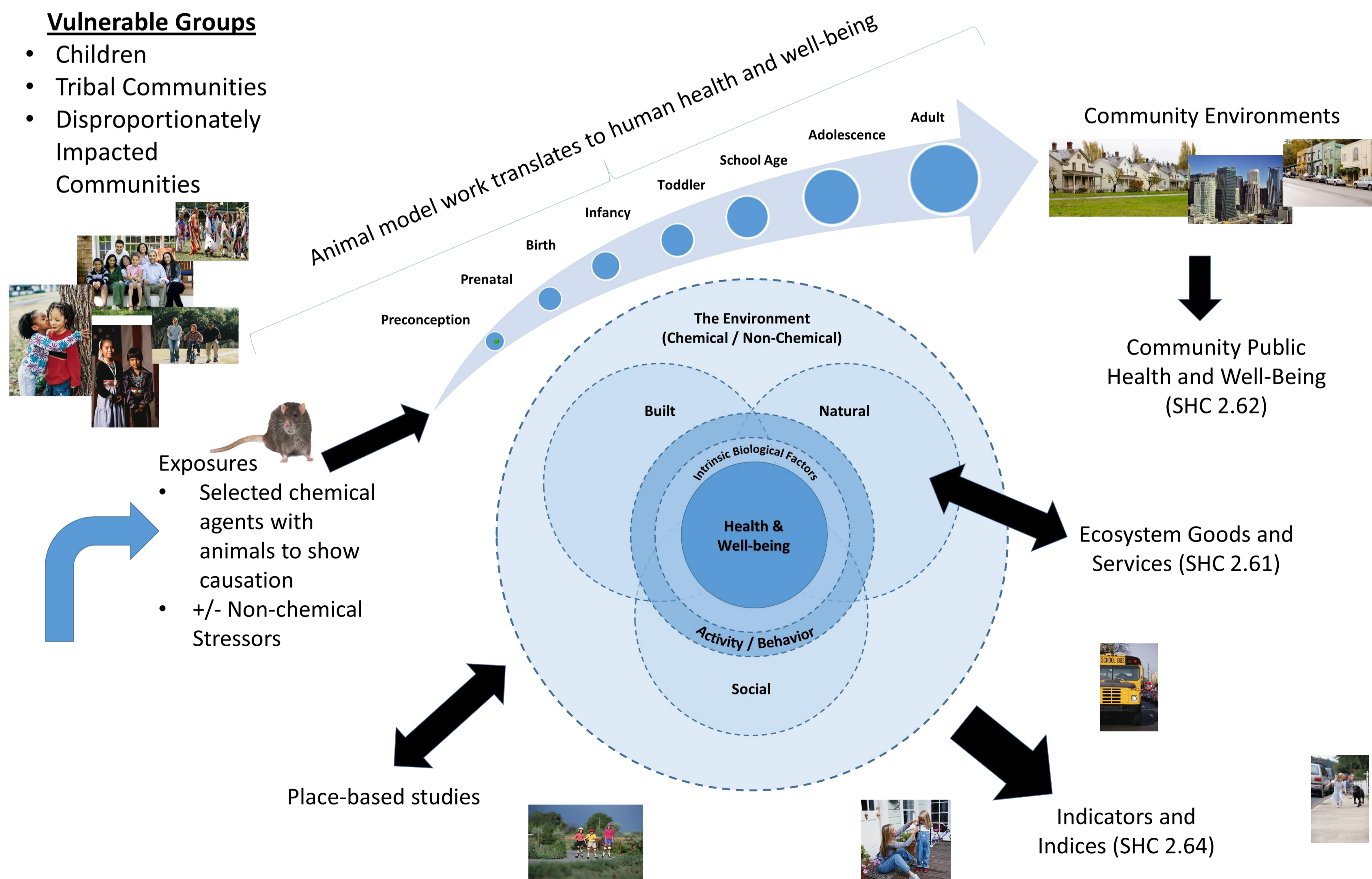
- Risk assessments (EPA Program Offices and Regions) where the specific vulnerability and sensitivity of children must be considered;
- Community decision-making aimed at creating community environments that promote children's health and well-being, Tribal sustainability, and healthy and sustainable communities.

Partner Engagement Opportunities

- Engage with and advise project team in research planning and translation
- Serve as peer reviewers for products
- Serve on writing and review teams for STAR grant RFAs
- Participate in grantee workshops
- Participate in research results webinars
- Apply research findings to EPA and community problems

Accomplishments

- We developed the tools needed to use animal models, under controlled experimental conditions, to evaluate how non-chemical stressors can modify responses to chemical stressors and thereby exacerbate risk and reduce resiliency. Specifically, we:
 - Demonstrated the sensitivity of health outcomes in rodents that are relevant to chronic diseases in humans, e.g., hypertension and insulin resistance;
 - Validated methods for measuring stress hormones in rodent fetuses and newborns to use as bioindicators of the stress response in humans;
 - Developed *in vivo* and *in vitro* approaches to assess the obesogenic potential of chemicals to explore whether chemicals contribute, along with diet and exercise, to obesity in humans;
 - Expanded the evidence base in animals that prenatal and neonatal environments influence lifelong health and well-being.
- We characterized paired soil and house dust samples from the American Healthy Homes Survey (a nationally representative housing stock study) and showed higher levels of organics in the house dust samples as compared to the soil samples, suggesting that house dust will sorb chemicals of interest more effectively than soil. This is important when considering young children's potential exposures to chemical agents found in their everyday environments.
- The Children's Centers (EPA/NIEHS Children's Environmental Health and Disease Prevention Research Centers Program) support research to advance our understanding of how to reduce children's health risks from environmental factors, including exposure to environmental contaminants, from prenatal development to adolescence (<http://www.epa.gov/ncer/childrenscenters>).
 - Research from the Children's Centers has been used to support a number of significant policy changes benefitting communities across the U.S., including proposed changes in the agricultural worker protection standard for pesticides and new requirements for the use of cleaner heating oil for buildings in New York City.



Future Directions

1. Understanding the interrelationships between chemical and non-chemical stressors from the built, natural, and social environments to explain how young children's exposures to these stressors influence their health and well-being
2. Early life environments: Impacts on life-long health
3. Research to reduce children's environmental health risks and protect them from environmental threats to prevent disease and promote well-being (Children's Centers; STAR)
4. Understanding the interrelationships between ecological and human health for Tribal sustainability
5. Research to understand ecological and human health for Tribal sustainability and well-being (Tribal Science Program; STAR)
6. Understanding the interrelationships between social determinants of health, other non-chemical stressors, and chemical agents in assessing the health and well-being of disproportionately impacted communities
7. Research to understand the environmental and social health disparities affecting disproportionately impacted communities (STAR)
8. Generation of age-specific soil and dust ingestion estimates
9. Prenatal and early life exposure to environmental agents and non-chemical stressors and carcinogenesis in later life