ECHO Cohort Consortium Spring 2025 Meeting

April 4, 2025

Wei Perng, Debra MacKenzie

ECHO Environmental influences on Child Health Outcomes

Time	Topic	Moderators/Presenters
7:30-8:30 AM	**Breakfast** *Edison Pre-Function Space (Foyer) – 2nd Floor*	
8:30-8:35 AM	**Welcome Day 2** *Edison Ballroom – 2nd Floor*	**Moderators:** Deb MacKenzie, Wei Perng (both Site)
8:35-9:35 AM	**Investigator: Day 1 Findings** *Edison Ballroom*	**Moderators:** Deb MacKenzie, Wei Perng (both Site) **Presenters:** Working Group Representatives
9:35-10:35 AM	**Site Staff: Day 1 Findings** *Edison Ballroom*	**Moderators:** Deb MacKenzie, Wei Perng (both Site) **Presenters:** Prenatal: Lucy Hall 0-2: Melinda Jarnecke 3-5: Audrey Urquhart 6-10: Caitlyn Evans & Kaitlyn Bird 11-20: Jennifer Egner
10:35-10:45 AM	***Stretch Break***	
10:45-11:50 AM	**Anatomy of a Publication** *Edison Ballroom* PC Co-chairs and CC staff will review the process for submitting and obtaining approval for ECHO research products from concept proposal through publication. DAC will share an overview of their role, services, and newly available data resources. The DAC presentation will be complemented by a site-led analysis proposal that has generated a new data element of interest for investigators. Presentations will be followed by Q&A with a panel comprising members of the PC, DAC, Lab Core, Measurement Core, BATF, and Ancillary Studies Task Force members.	**Presenters:** Bennett Leventhal (PC), Lisa Jacobson (DAC), Annie Nigra (Site) **Panel Members:** Carley Prynn (CC), Stacy Sherrod (LC) & David Cella (MC), Lisa Jacobson (DAC/BATF)

11:50 AM-12:00 PM	**Communications Update** *Edison Ballroom*	**Presenter(s):** Sav Miller, Josee Meehan (both CC)
12:00-1:00 PM	***Lunch*** *Edison Pre-Function Space (Foyer) – 2nd Floor*	
1:00-2:00 PM	**Round Table Discussions: Lessons learned from PAB** *Edison Ballroom* Coordinators: How did PAB inform your approach to communicating with participants? What is one change you will make in day-to-day interactions with participants? Investigators: How did PAB inform your approach to scientific communications? What is one change you will make in your communication strategy (e.g., writing manuscripts)?	**Moderators:** Deb MacKenzie, Wei Perng (both Site)
2:00-2:10 PM	**Closing Remarks** *Edison Ballroom*	**Presenter:** Matthew Gillman (NIH)

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Obesity Scientific Working Group

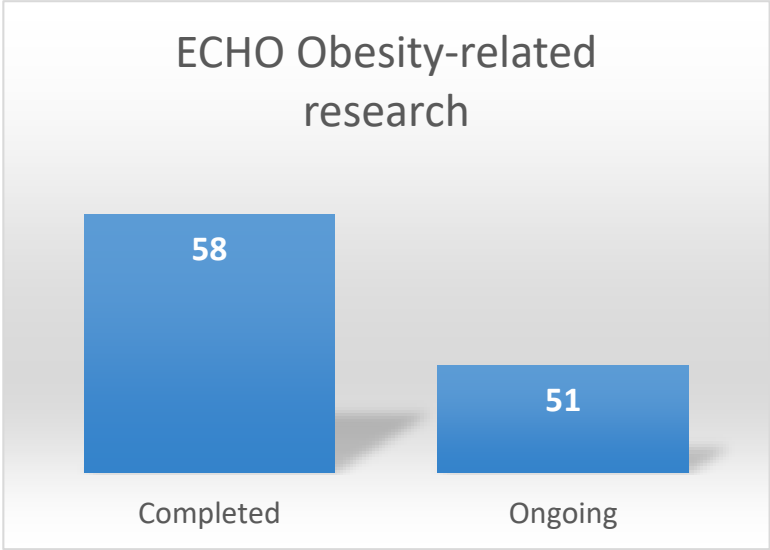
Co-Chairs:
Elizabeth Jensen, MPH PhD
Wake Forest University School of Medicine

Rana Chehab, PhD, MPH, RD
Kaiser Permanente Northern California

ECHO Environmental influences on Child Health Outcomes

Summary of what ECHO has done well

- Advancing knowledge in obesity-related research through over 100 concept proposals and manuscripts
- Leveraging a wealth of longitudinal data to assess growth and obesity trajectories in children, with measures in mothers supporting a life course approach
- Standardized data collection of obesity indicators in Cycle 2



Top 3 Priorities

Produce high impact publications on obesity-related research

Prepare a *QUICK START GUIDE* that summarizes obesity-related analysis concepts and manuscripts into common themes.

Support early-stage investigators (ESIs) by establishing an ESI subgroup and providing essential resources

Engage our Obesity working group members

Recommendations for tasks for the next 3 months

Advance Actionable Research on Obesity Prevention

- Develop a high-impact research agenda within ECHO for prevention of obesity and its metabolic consequences
- Prepare a *Quick Start Guide that* streamlines navigating the proposal process for conducting obesity-related research
- Focus on solution-oriented research, addressing both actionable causes and effect modifiers to mitigate risks, and utilizing a systems approach
- Explore strategies to translate observational findings from ECHO into interventional studies and clinical trials within ISPCTM.

Drive Progress on Approved and New Analysis Proposals

- Multi-level life-course determinants (exposure, effect modifiers) of childhood obesity
- Establish standardized criteria to define preclinical and clinical obesity (Rubino et al., Lancet Diabetes Endocrinol. 2025)
- Associations between social media and obesity risk

Recommendations for tasks for the next 3 months

Strengthen Communication and Knowledge Translation

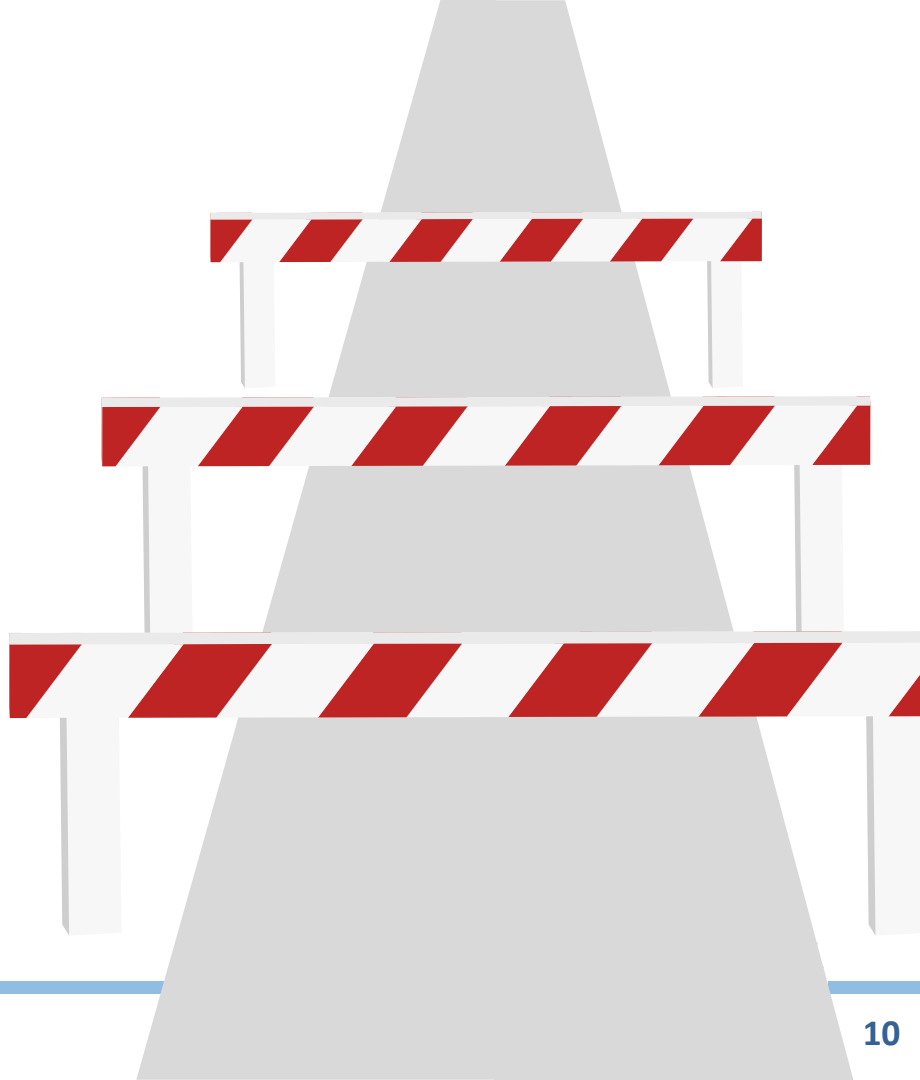
- Communicate and translate findings effectively to policymakers, ECHO participants, and the public
- Implement nuanced communication strategies, considering individual vs. population-level messaging
- Engage diverse stakeholders in research dissemination and policy translation to ensure inclusive decision-making

ESI sub-working group

- Offer resources and training sessions on submitting concept proposals, accessing data on PlatiPUS, and using the manuscript tracker
- Establish a dedicated support group for ESIs and trainees to brainstorm ideas, receive feedback, and build professional networks

Anticipated Barriers

- Limited budget and resources, restricting the analysis of all obesity indicators across the full ECHO participant cohort
- Bridging research to policy impact requires specialized strategies and cross-sector collaboration
- Limited funding to support ESI's time, tight timelines for OIF awardees, and limited support for conducting analysis.



Question to Audience

How can we streamline the research process to identify unanswered but addressable (i.e., data exists with sufficient sample size) research questions,

and

efficiently obtain and analyze the data within the constraints of a limited budget and tight timelines, particularly for ESIs?

Thank You...

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Scientific Working Group: Airways

Anne Marie Singh, MD and Chris Johnson, PhD on behalf of the Airways Workgroup

April 4, 2025

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Summary: What has ECHO done well in Airways

- Brought together diverse cohorts and investigators
  - Collaborative science that cannot be accomplished at a single center
- Published manuscripts related to:
  - Disease incidence, severity, and risk across airways diseases (asthma, wheeze, bronchopulmonary dysplasia)
  - Environmental exposures on health (viruses, pollutants, prematurity, personal and neighborhood opportunity)
  - Genetic and epigenetic contribution to airways disease
  - Methods (measures of pollution, temperature)
- Instituting lung health measures ECHO-wide
- Reinstating Airways Workgroup and looking forward to specialized protocol

Top 3 Priorities: Methods and Logistics

- Priority 1: Asthma is heterogeneous syndrome→ we must have measures to phenotype asthma!
  - Risk factors and etiology varies by phenotype
  - This can help us understand mechanisms of how exposures influence lung health or disease
  - This allows ECHO science to effectively translate to clinical practice

- Priority 2: Work with ECHO collaborators to define the approach to selection of comparison cohort and airways-related cases for biospecimen analysis

- Priority 3: Quality control for spirometry, nasal sampling
  - May include iterative feedback

Top 3 Priorities: Scientific Priorities

1. What risk factors impact gut-airway microbiome patterns, and how do these contribute to asthma phenotypes and asthma prevention?

2. How do nutrition, weight, and metabolism affect respiratory health and asthma prevention?

3. How do GIS-related variables (air pollutants, greenspace, wildfires, etc) and chemical exposures contribute to asthma phenotypes, comorbidities, and asthma prevention?

Recommendations

- Release data to answer priority questions
- Focus on data that is available to prioritize manuscripts in next 3 months
- Pursue allergen-specific IgE and nasal swab collection that is crucial to UH3 work

Anticipated Barriers

- Microbiota and Genetic data just becoming available
- Must continue to work with extant data or already analyzed biospecimens to prioritize output in next 3 months. This takes effort from the DAC.
- Several sites cannot perform new science/proposed studies until:
  - Airways protocol is launched
  - Ancillary study protocol
  - Concern regarding allergen-specific IgE and nasal swab collection

Question to Audience

- How do we best facilitate collaborations across interests groups (e.g. nutrition, geospatial, microbiome)?
  - Can we create a harmonization guidebook/meet with the DAC to discuss how to harmonize variables with other groups, and provide newly defined variables back to the DAC from specialized interests to promote collaboration? For example, extant allergen-specific IgE from airways groups, or nutrition/diet variables from nutrition-focused groups?
  - For example, if dietary measures or neurocognitive outcomes have been harmonized, how to access these data to best leverage collaboration across interest groups?

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Scientific Working Group: Neurodevelopment

Heather Volk, PhD, Johns Hopkins University

Jennifer Ames, PhD, Kaiser Permanente Northern California

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ECHO Environmental influences on Child Health Outcomes

Summary

- What ECHO has done well within the WG's scientific purview
  - Analyses focused on dimensional measures of autism and behavior using the SRS and CBCL
  - Environmental chemicals, prenatal stress and depression, contextual/neighborhood factors

- Growing # of APs are looking at multiple exposures and effect modification
  - complex analyses made possible by ECHO's rich data and large sample sizes

	Neuro-General		Behavioral Outcomes		Social/ASD		Mental Health		Cognition		Attention/ ADHD/EF		Brain Imaging		Sleep		Temper-ament		
EXPOSURE	P	C	P	C	P	C	P	C	P	C	P	C	P	C	P	C	P	C	TOTAL
Chemicals/Contaminants	11	2	15	1	14	2	4	2	5	1	3	1			5	1	1		68
Maternal Conditions/Infections	2		7		7	1			1		1	1					2	1	23
Nutrition			3		6	1				1	1								12
Prenatal Substance Use	1		3		4				1		2								11
Maternal Stress/Social Stress/ Racial & Health Disparities	2	1	12	1	4		7	1	4	1	2				2			1	38
Methods	1		1		4		1		2				3						12
Preterm Birth/Perinatal Outcomes	1	1	3		3	1			2	1	1	1							14
Postnatal Child Conditions		1	1		2		1	1	3	1					1				11
Income/SES	1	1	1		3		1		2	1	1	1							12
COVID-related Social Factors	4		5				2										2		13
General Development	1		1		3														5
Metabolomics	1				1														2
Contextual Factors (Neighborhood)	2		6	1	1		1	2	2		3								18
Microbiome	2		1		1		1												5
Genetics			1	1	1	1					1								5
Epigenetics	1		1						2		1								5
Prenatal Medication					3				1		2								6
ASD			2																2
Calendar Time					2						1								3
Lifestyle			1				2		1		2				2				8
Trajectories					1				1										2
Other	5	2	3	1	2	1	1	1	3		1	1		0	8	1	1	1	32
TOTAL	35	8	67	5	62	7	21	7	30	6	22	5	3	0	18	2	6	3	307
TOTAL	**43**		**72**		**69**		**28**		**36**		**27**		**3**		**20**		**9**		**307**

Summary (cont.)

- Building on synergies to further work on multiple, cross-topic subgroups analyses (i.e., OPE+Neuro WG)
- Ability to respond to natural experiments (e.g., pandemic)

Top 3 Priorities

- Working group education on using temperament, NIH toolbox, and sleep measures in analyses.
- Supporting “stuck” APs
- Work to develop concepts around developmental trajectories, psychometric performance of attention measures, and multidimensional outcomes within ND and across the 5 ECHO outcome domains

Recommendations

- WG recommendations for tasks to complete within the next 3 months
  - Identified speakers for upcoming presentations on temperament and NIH toolbox
  - Small groups/pairs to help unstick stalled APs and identify analytic efficiencies
  - Develop 1-2 concepts as a group in our priority areas

Anticipated Barriers

- Tracking concepts and their scope
- Availability, access, and usage of upcoming genetic and epigenetic data
- Indexing of age of assessments overtime, to help APs plan and promote trajectory analyses
- Limited data on disabilities that may influence collection of ND data
- Time ☺

Question to Audience

- How can we share analytic approaches more clearly and efficiently across WTs?
  - Measure selection/interpretation for specific ND outcomes (e.g., traits vs diagnosis)
  - Inclusion/exclusion criteria relevant to outcomes (e.g., implausible values, incomplete data)
  - Forthcoming bioassays, polygenic scores, etc (i.e., expansion of data that could benefit from harmonization)

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Scientific Working Group: Pre/Peri/Postnatal

Lauren Shuffrey, PhD
NYU Grossman School of Medicine

Judy Aschner, MD
Hackensack Meridian School of Medicine

April 4, 2025

ECHO Environmental influences on Child Health Outcomes

Summary

- We identified **150** analysis proposals focused on PPP outcomes.

Adverse Pregnancy and Birth Outcomes:

Hypertensive Disorders of Pregnancy
Gestational Diabetes
Preterm Birth
Low Birth Weight
Small for Gestational Age (SGA)
Fetal Growth Restriction

Environmental Exposures:

- Air Pollution *(EC0151, EC0499, EC0633)*
- Climate Change *(EC0685, EC0685a, EC0685b)*
- Household Environmental Factors *(EC0698)*
- Public Water Contaminants (arsenic, nitrates, nitrites, metals) *(EC0609, EC0609a, EC0620, EC0760)*
- Endocrine Disrupting Chemicals (phthalates, phenols, parabens, PFAS) *(EC0262, EC0262a, EC0262b, EC0561a)*
- Toxic Metal Exposure (arsenic, lead, mixed metal exposure) (EC0419, EC0609, EC0609a, EC0620, EC0661b)
- Vaginal Microbiome Composition (EC0491)

SES and Health Disparities:

- Maternal Education & SES (EC0015, EC0465, EC0573a)
- Neighborhood Safety & Deprivation (EC0678)
- Food Access & Insecurity (EC0644)
- Racial & Geographic Disparities (EC0015, EC0465)
- Redlining & Structural Racism (EC0633)

Maternal Health & Behaviors:

- Maternal Diet & Nutrition (EC0573a, EC0827, EC0661a)
- Substance Use (EC0241)
- Acetaminophen use during pregnancy (EC0364)
- Maternal Stress & Mental Health (EC0762, EC0412d)
- Maternal Inflammation (EC0373)

Epigenetics & Biological Pathways:

- DNA Methylation & Epigenetic Changes (EC0709, EC0762)
- Oxidative Stress Biomarkers (EC0385b)
- Fetal Growth Markers (EC0374, EC0440)
- Inflammatory Pathways (EC0565, EC0800

Summary

- PPP includes multidisciplinary investigators (MFMs, neonatologists, epidemiologists, pediatricians, psychologists)

- Existing and new biospecimen collection relevant to PPP are a unique resource with enormous potential to contribute novel science: breastmilk, placenta, cord blood, maternal blood

Top 3 Priorities:

1. Move forward stalled AP's that have focused on birth outcomes or perinatal/maternal health

2. Maximize use of biospecimens: placenta, cord blood, gut microbiome, epigenetics, genomics, cytokines, inflammatory biomarkers

3. Examine interactive effects of exposures on PPP outcomes

Recommendations

- Identify DAC or ESI investigators to help with stalled concepts
- New analysis concepts using biospecimen
- Need to prioritize medical record abstractions
- Monthly cross-talk between WGs

Recommendations

- Advance novel PPP APs:
  - Oxytocin exposure during pregnancy and APOs/long-term outcomes
  - Twin growth trajectories
  - Placental-brain cross talk
  - Placental-kidney cross talk
  - Breastfeeding concepts
  - Policy changes impacting access to care during pregnancy
  - Coffee consumption during pregnancy
  - Perinatal vaccine uptake
  - Predictors of fetal loss

Anticipated Barriers

- Biospecimen collection halts
- Staff burden:
  - Specialized biospecimen collection
  - Medical record abstractions
- Limited interpregnancy data
- Quality control for PPP biospecimen data
  - Investigators and DAC need to work together

Question to Audience

What is essential to standardize and what can we be more flexible about?

- Can we allow sites to decide their own needle gauge for maternal blood collection?
- Can we allow sites to use venipuncture instead of a lancet for postpartum blood collection?

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Scientific Working Group: Positive Health

Positive Health Working Group
April 4, 2025

ECHO Environmental influences on Child Health Outcomes

Summary: What ECHO has done well

- Increased awareness and support for Positive Health as an ECHO priority
- Protocol includes positive health measures as core data elements, positioning ECHO to generate groundbreaking research on the early developmental origins of Positive Health
- Alignment with participant priorities and current national initiatives

Top Priorities

- Identify biophysiological markers of PH
- Evaluate Positive Health as a source of resiliency for children and families facing economic, health, and emotional challenges over time
- Investigate the developmental origins of Positive Health trajectories
- Develop a multilevel profile of markers of Positive Health at each age

Recommendations for Next Steps

- Submit investigator-initiated analysis concept for new assays
- Review available longitudinal data
- Draw on available data to organize positive health constructs within each age band and identify precursors and indicators of positive health

Anticipated Barriers

- Easily identifying longitudinal data availability
- Available assay data aligned with timing of positive health measures

Question to Audience

- Are there any recommendations for future topics for the positive health working group to tackle?

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Scientific Working Group: Chemical/Physical Exposures

Alicia K. Peterson & Joseph M. Braun

April 4, 2025

ECHO Environmental influences on Child Health Outcomes

Summary of Chem/Phys Strengths in ECHO

- Several multi-cohort papers have examined prenatal exposure to PFAS, phthalates, phenols and parabens, OPEs, metals, melamine and aromatic amines, and emerging contaminants
- Created exposure-specific interest groups that meet regularly (for some exposures)
- Leveraged existing biospecimens to conduct novel chemical assays

Top 3 Priorities

- Assays of participants from Cycle 1 without specific chemical classes
- Develop new analysis concepts in anticipation of new chemical assays conducted in Cycle 2
- Characterize spatio-temporal trends in chemical exposures using extant data

Recommendations

- Identify ~3 WTLs to lead concepts related to exposure patterns of:
  - Phthalates
  - PFAS
  - Metals
- Resurrect concept of looking at prenatal exposure(s) in relation to child phenome
- Develop methods to better characterize:
  - Total exposure burden
  - Private drinking water contaminants

Recommendations

- Characterize links of maternal/child health with understudied exposures
  - E.g., UFPs, temperature
- Identify novel exposures to quantify in existing or new biospecimens
  - E.g., extractable organic fluorine (total PFAS burden)

Anticipated Barriers

- Ensuring harmonization of old and new exposure biomarker data
- Sample size and lack of exposure overlap
- Documentation of exposure biomarkers
- Cross working group collaboration

Question to Audience

Would it be possible to create a DAC plan to streamline access to relevant documents on SharePoint and the ECHO portal for WTLs once a Step 2 with a related exposure is approved?

How does the lab core plan to harmonize with previous methods from Cycle 1 for analytes already available for extant data (i.e., OPEs or PFAS)?

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Scientific Working Group: Psychosocial

Heather Burris, MD, MPH & Tom O'Connor, PhD
Sites 307 & 126

April 4, 2025

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Summary

What ECHO has done well within the psychosocial scientific purview?

- Exposure coverage
  - Mental health of caregivers
  - Neighborhood social environment
  - Maternal/caregiver stress
- Outcome coverage
  - Neurodevelopment
  - PPP

Top 3 Psychosocial Priorities

- Clarify and promote psychosocial domains
  - Prioritize use of direct measurement (e.g., stress, parenting)
  - Incorporate indirect measurements (e.g., socioeconomic position, SDoH)
  - Systematically track inclusion of psychosocial variables in publications
- Focus on psychosocial domains in dynamic sociopolitical environment (e.g., natural experiments, longitudinal changes)
- Identify underdeveloped psychosocial areas in ECHO

Barriers and Recommendations

- Partner with the publication committee
  - Capture and track psychosocial, SES, and SDoH variables in proposals
  - Identify gaps in ECHO psychosocial science
- Develop and submit 2 analysis proposals based on identified gaps by July 4, 2025
- Collaborate with other WGs to encourage cross-cutting analysis proposals

Question to Audience

- How might ECHO investigate disparities in exposures and outcomes in the current sociopolitical climate?

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Scientific Working Group: Lifestyle

Sunni Mumford & Traci Bekelman

Lifestyle WG Co-chairs

April 4, 2025

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Health Domain	Prenatal Exposures					Childhood Exposures					
	Diet	Activity	Sleep	Substance use/ exposure	Other	Diet	Activity	Sleep	Media	Substance use/ exposure	Other
Obesity	XXXXX XXXXX	X		XX	XX	XXXXX XX		XXXX	X		XX
Neuro	XXXXX X		X	XXXXXXX X	XXXXX X			XXXX			XXX
PPP	XXXXX X	XX	XXXX	XXXXXXX XXXX	XXXXX X						X
Airways	X				X			X			X
Positive health			X	X	XX			XXX	X		XX
Other				X				X			

Summary: What ECHO has done well

- Broad scope: Examined diet, sleep, activity, substance use, stress, screen time across the life course
- Diet and other lifestyle exposures during pregnancy
- Lifestyle behaviors as an outcome
- Joint effects of diet & environmental exposures (chemicals, air pollution)

Top 3 Priorities

- Substance use in teens
- Screentime as exposure (beyond television viewing)
- Use accelerometry data from cycle 1
- Child diet and neurodevelopment outcomes (identifying vulnerable periods)

Recommendations

- 4 Analysis proposals to advance
  - Media use and substance use focused on positive health (Tom)
  - Media use and obesity (Traci, Monique, Susan, Courtney)
  - Infant feeding + child diet >> neurodevelopment (Jean)
  - Accelerometry in children (Diane & Sylvia)
- Refamiliarizing with lifestyle data (including biomarker data)
- Developing a User's Guide
- Identify sites with biomarker cannabis use exposure in pregnancy
- Figure out plan to operationalize movement behavior data once Garmin data in

Anticipated Barriers

- Figuring out scope of data availability
- Longitudinal trajectory modeling (bidirectionality, sequence of events)
- More granular data from small sample vs. less nuanced data from large sample

Question to Audience

- Who can help with trajectory modeling to accommodate repeated measures of both exposures and outcomes?

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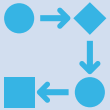
Site Staff Breakout Sessions

Prenatal Age Band – Lucy Hall

Goals

Share best practices for retention, sample collection and general site management



Share strategies and tips for ECHO 3.2 protocol implementation

Site Management - Big Wins

- Created programming code to generate visit reports in REDCap for participant tracking
- Connecting with participants on a personal level (e.g. – remembering pet's names)
- Sending out reminder flyers/postcards with QR codes for participants to schedule visits

Site Management - Opportunities

- Expanding availability as needed for evening visits
- Building in flexibility with visit modality: in-person, remote & mobile unit
- Pairing participants with a Study Coordinator that will follow them for all future visits for consistency & rapport-building

Participant Retention - Big Wins

- Free rides to doctor's appointments (OB) and aligning this with study visits
- Having snacks and water available at visits
- Utilizing EMR systems to schedule visits
- Being available on evenings & weekends (as needed) for study visits

Participant Retention - Opportunities

- Being able to offer remote visits as needed to meet participants where they are, especially if they have older children
- Ability to pick up samples from a participant's home, especially for rural settings where a participant lives far from the study site

Biospecimen Collection- Big Wins

- For remote visits, ensuring the boxes and kits are organized and clearly labeled
- Rural sites with limited lab staff schedule multiple sample pick-ups in a day (batching)
- Maintaining good relationships with lab staff
- Financial incentives help to increase the rate of collection – ***per sample*** vs. ***whole visit***

Biospecimen Collection - Opportunities

- Length of processing, especially for blood, is challenging
- **Placenta collection challenge** – many go to pathology before they can be collected
- Participants are concerned about what each sample type is being used for.
- Need clear one-pagers that outline the what samples will be used for

ECHO LMS Training Recommendations

Suggestions to enhance future trainings

For more complicated protocols like blood, Tier 1 and Tier 2 placenta collection, host a live training on Zoom that's recorded with step-by-step instructions (start to finish).

Next Steps

Updating the current participant-facing flyer that explains the assays/research questions that each type of biospecimen will be used for.

Posting Updated Meetings on SharePoint

Since the meeting dates periodically change, add a listing of all meetings (CC, Ask the DAC, CC Connect) on the **Study Coordinator Corner.**

Format the information about the upcoming meetings in a table, similar to how the Change Memos are structured

Thank You!

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Site Staff Breakout Sessions

0-2 Age Band – Melinda Jarnecke

Goals

Share best practices for retention, sample collection and general site management

Share strategies and tips for ECHO 3.2 protocol implementation

Site Management - Big Wins

- Sites have developed clear communication channels such as the use of Slack, regular team meetings, shared task lists & group check-ins.
- Some sites have created weekly/bi-weekly internal newsletters to keep current on changes (e.g. – Constant Contact).

Site Management - Opportunities

- Communication within ECHO – clarity is needed.
- Sharepoint can be difficult to navigate.
- If an email with a deadline goes out, ensure it goes out to more than one team member.

Participant Retention - Big Wins

- Cross-training of all staff is essential so that all team members can provide coverage as needed.
- Developing strong rapport.
- Some sites have added home visits as needed or extra incentives to maintain retention.

Participant Retention - Opportunities

- Not all sites have similar funding levels for participant compensation & incentives.
- Getting creative with ways to engage participants over time and maintain interest in ECHO – return of results can be a game changer here.

Biospecimen Collection- Big Wins

- Sites have developed internal tracking mechanisms to keep a real-time inventory of kits.
- ***Excel tracking spreadsheets are constantly updated.***
- Some sites have used Qualtrics to maintain kit counts.

Biospecimen Collection - Opportunities

- Bar code issues – Sites have been sending screenshots to Lab Core.
- Discrepancies in the number of kits ordered & received.
- Developing a strategic plan for the return of results to participants and partners.
- Obtaining the new child diaper urine kits to collect greater yields with the Webril pads

Biospecimen Collection - Opportunities

- Enhancing the protocol for infant heel sticks – sites are typically able to obtain 2-3 circles (5 is difficult).
- Difference guidance on what needs a deviation (e.g., use of heel warmers to collect infant blood spots)

ECHO LMS Training Recommendations

Suggestions to enhance future trainings

Future Training Needs

Site sharing on successful methods to obtain complete infant blood spots for the heel stick.

- Sites enjoy the breakout sessions and would like similar opportunities throughout the year for connection and to enhance implementation of the ECHO protocol.

Thank You!

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Site Staff Breakout Sessions

3-5 Year Age Band – Audrey Urquhart

Goals

Share best practices for retention, sample collection and general site management

Share strategies and tips for ECHO 3.2 protocol implementation

Site Management - Big Wins

Local tracking systems – Ripple, REDCap

Track communication, store "unique information" about participants (e.g., family pet name or upcoming family vacation).

Site highlights:

Ripple – Automatic calculation of visit windows and sorting by participants with windows closing the earliest.

REDCap – QR code accessible "landing page" for participants which displays survey links, activities due, and a place to enter in updated contact information.

Site Management - Opportunities

- Microsoft Bookings for self-scheduling appointments.

- Discussion on whether participants can self-schedule visits within a local REDCap project and view calendar
  - ✓ Structured meetings for staff to share successful approaches may be helpful to avoid duplicative effort

Participant Retention - Big Wins

- Extra incentive helpful for school age children (an extra $30 to come in if visit takes place on a school day)
- Holidays/spring break
- "Drop in Days" - flexible visit days where participants drop in at their preferred time and meet with a site staff member to complete eligible activities (surveys, physical exam, samples)

Participant Retention - Opportunities

- Including incentive for the child in the specimen home kit, such as stickers or a small toy
- Mobile units has worked very well for some sites to reach participants in rural areas and these also couples as site advertising
- Partnership within community (Detroit Health Department currently offering free rides to doctor's appointments)

Biospecimen Collection- Big Wins

- Least to the most invasive sample collection has been helpful for young children (saliva, urine first; bloodspot last)

- Ask parents before visit preferred method of urine collection (home diaper kit/hat kit vs. in-person).

Biospecimen Collection - Opportunities

- Saliva collection with swab was noted by one site to feel scary for some children
  - ✓ Alternatives for colorful/"lollipop" swabs?
- More guidance on explaining purpose saliva collection to parents – Does ECHO have other planned uses for saliva other than looking at genetics?
- Sites shared sensitivity to sample collection in regard to cultural differences among participants (e.g., generational, religion).

NIH Toolbox

Training Needs

Administering the NIH Toolbox on a younger 3-year olds has been challenging.

What is the threshold where an administrator should skip an assessment?

What is the guidance for development delay or speech delay?

How should sites best prevent parents from assisting children with the measures?

ECHO LMS Trainings

Suggestions for the future

Is there a way to access LMS training materials after being certified?

Currently, unclear how to go back and find training materials (videos).

Thank You!

ECHO

Environmental influences
on Child Health Outcomes

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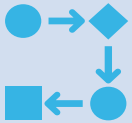
Site Staff Breakout Sessions

6-10 Year Age Band – Caitlyn Evans & Kaitlyn Bird

Goals

Share best practices for retention, sample collection and general site management



Share strategies and tips for ECHO 3.2 protocol implementation

Site Management - Big Wins

- Site checklists for each visit type
- Use of annual contact update form
- Phlebotomy certification for site staff.
- Hiring a medical assistant that has experience with pediatric phlebotomy.
- Site manuals with clear responsibilities for each staff role.

Site Management - Opportunities

- Ensuring that your site has various modes of contact tracing listed in your consent such as Facebook, use of an emergency contact, formal contact tracing.
- Determining successful methods for talking about sensitive topics in remote surveys.

Participant Retention - Big Wins

- Site developed resource guides have been very useful.
- As a child gets older, ask the parent to share the child's email.
- Offering childcare stipends to allow parents time to complete surveys or DoorDash gift cards for completing surveys

Participant Retention - Opportunities

- Raffling a Nintendo Switch for tweens & teens
- Provide participants with an extra incentive for scheduling a weekday visit has been very helpful.
- Created an NIH Toolbox map where participants could see their progress in assessment – pair this with toys as incentives/prizes.

Biospecimen Collection- Big Wins

- Use of separate teams/coordinators for sample collection and processing has increased efficiency.
- Early morning visits before school and later visit times have been helpful for biospecimen collection for children in this age range.

Biospecimen Collection - Opportunities

- Labels in Cycle 1 are preferred (previous system)
- How can we make the protocol 100% remote?
- Whole blood collection is a barrier for many sites.

ECHO LMS Training Recommendations

Suggestions to enhance future trainings

Team suggests making the LMS training dashboard specific to each site based on the age band(s) served.

LMS Recommendation: Create more streamlined training guides.

LMS Recommendation: Lighten the watermarks that are on all training materials to enhance readability.

Next Steps

Let’s centralize ECHO documents into one storage location.

Thank You!

ECHO

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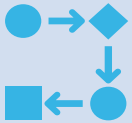
Site Staff Breakout Sessions

11-20 Year Age Band – Jennifer Egner

Goals

Share best practices for retention, sample collection and general site management



Share strategies and tips for ECHO 3.2 protocol implementation

Site Management - Big Wins

- Sites send internal weekly emails about compensation and current inventory.
- Importance of offering multiple ways for participants to communicate with the study team
- Use of Microsoft Bookings for study visits – Zoom links are included for remote visits

Site Management - Opportunities

- Many sites are now providing the opportunity for participants to complete forms & questionnaires over Zoom
- Participant recruitment is often equally split across multiple Study Coordinators

Participant Retention - Big Wins

- The power of social media giveaways
- Birthday cards with a $10 gift card for participants
- Have a variety of gift cards for those that want to avoid certain vendors

Participant Retention - Opportunities

- Teens are motivated by cash or gift cards.
- They are also motivated by video games.
- Work with your local/sIRB to determine ways to communicate directly with your teen participant with parent permission – (direct emails, etc.)

Biospecimen Collection- Big Wins

- Offering some Saturdays for in-person visits
- Offering home visits with 2 team members when needed
- Flexibility with visit modality (in-person, remote, hybrid)

Biospecimen Collection - Opportunities

- Teens have voiced concerns about the urine sample for drug testing.
- Many do not want to provide the urine sample for this reason.
- There can be a disclaimer from ECHO that urine will not be tested for drugs.
- We sometimes have to be clear with parents that the child can decline the blood draw.

ECHO LMS Training Recommendations

Suggestions to enhance future trainings

LMS Recommendation: Determine ways to make the LMS system more interactive.

LMS Recommendation: Track changes directly on the training documents so that it is easier to see what has been updated or changed.

LMS Recommendation: Update the LMS to correct the login timeout which requires you to change your password.

Next Steps

Increasing the implementation timeline from a change memo release.

Thank You!

ECHO

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Anatomy of a Publication: Publications Committee

Bennett Leventhal & Carley Prynn
Your Credentials

April 4, 2025

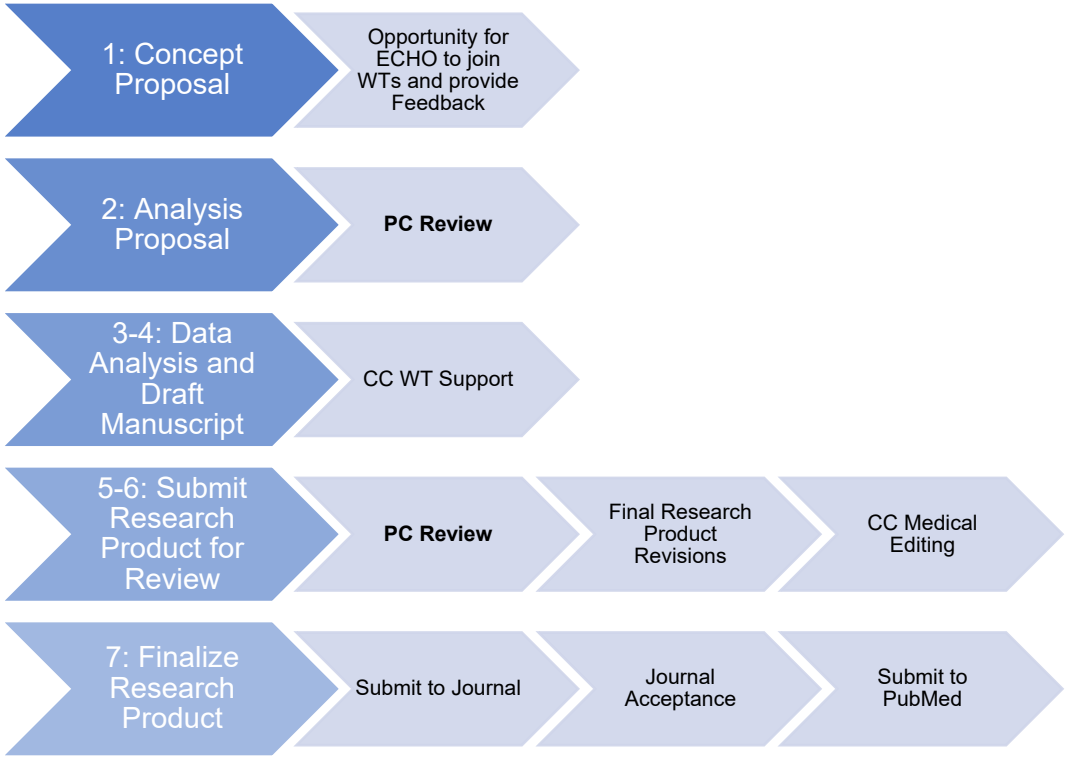
ECHO Environmental influences on Child Health Outcomes

Publications Committee in Review

	Cycle 2	Cumulative
Concept Proposals Submitted	231	665
Analysis Proposals Received	149	676
Analysis Proposals Approved	136	542
Published Manuscripts	88	220
Research Products Received (Abstracts/Presentations)	138	412
Presentations at Scientific Conferences	52	190
Currently Receiving CC Writing Team Support Services	260	

As of March 24, 2025

Publications Pipeline Process



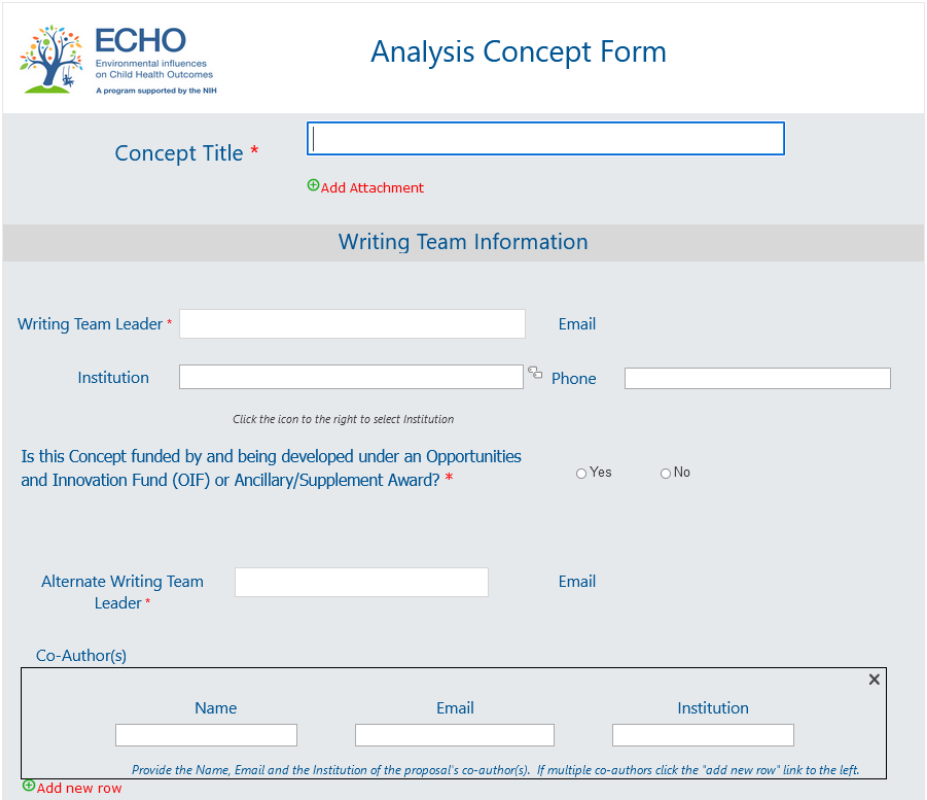
Step 1

Concept Proposal

Concept Proposal

- Short online form
- Idea for research product that may yield more than one paper
- Not reviewed by PC
- Intent to share common interest idea and form WT to prepare AP
  - Uses online discussion board to solicit input/feedback and to invite individuals to join the writing team
- Weekly email to all PIs with new concept proposals
  - You can sign up for notifications using the "Areas of Interest" on SharePoint

Concept Proposal



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Analysis Concept Form

Concept Title *

Add Attachment

Writing Team Information

Writing Team Leader * Email

Institution Phone

Click the icon to the right to select Institution

Is this Concept funded by and being developed under an Opportunities and Innovation Fund (OIF) or Ancillary/Supplement Award? * Yes No

Alternate Writing Team Leader * Email

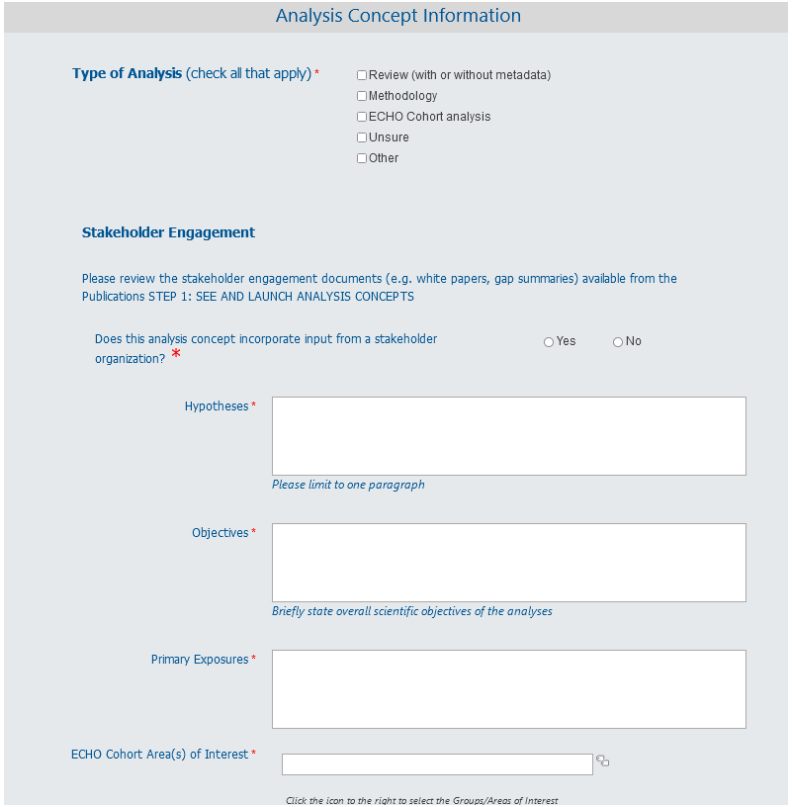
Co-Author(s)

Name Email Institution

Provide the Name, Email and the Institution of the proposal's co-author(s). If multiple co-authors click the "add new row" link to the left.

Add new row

Concept Proposal



Analysis Concept Information

Type of Analysis (check all that apply) *

- ☐ Review (with or without metadata)
- ☐ Methodology
- ☐ ECHO Cohort analysis
- ☐ Unsure
- ☐ Other

Stakeholder Engagement

Please review the stakeholder engagement documents (e.g. white papers, gap summaries) available from the Publications STEP 1: SEE AND LAUNCH ANALYSIS CONCEPTS

Does this analysis concept incorporate input from a stakeholder organization? * ○ Yes ○ No

Hypotheses *

Please limit to one paragraph

Objectives *

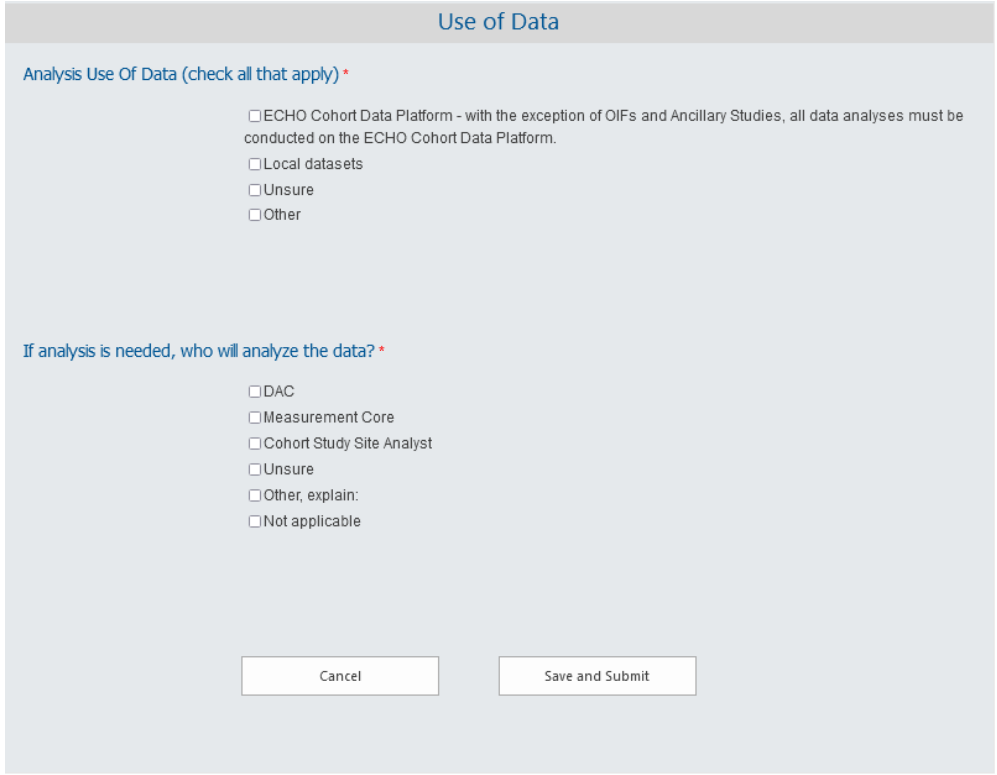
Briefly state overall scientific objectives of the analyses

Primary Exposures *

ECHO Cohort Area(s) of Interest *

Click the icon to the right to select the Groups/Areas of Interest

Concept Proposal



Step 2

Analysis Proposals and Manuscripts

STEP 2: Analysis Proposal

A. General Information

1. Titles (CP and AP)
2. Funding other than ECHO

B. Writing Team Information

1. WTL (ECHO funded salary)
2. Alternate WTL (ECHO funded salary)
3. Intended First and Senior Authors

   Can be post-doc, student, staff, etc.; ECHO funding not required
4. Writing Team Members
5. Recommendations for experts to help PC with review

C. Conflict or Interest Declaration

STEP 2: Analysis Proposal

D. Type of Proposal & Data

1. ECHO Awardee(s) (study site, DAC, etc.)
2. ECHO Focus Area(s)
3. Potential Stakeholders and involvement in proposal development
4. Real Addresses required?
5. Real Dates required?
6. DAC – using DAC? If not, who?
7. Access ECHO data on ECHO platform
8. Use Navajo data through University of New Mexico?
9. Use of Genetic Data
10. List all variables required
11. List required data harmonization
12. Biospecimens

E. Data Availability

1. Outcome of PlatIPUS search
2. Sample size and statistical power, based on PlatIPUS

STEP 2: Analysis Proposal

F. Study Design

1. Lay Abstract
2. Background
3. Data Science Task (descriptive, association, or causal inference)
4. Specific Aims and Hypotheses
5. Overlap with existing ECHO proposals & publications – How will they be resolved.
6. Study Design (case-control, cross-sectional, etc.)
7. Conceptual Model with Directed Acyclic Graph (DAG)
   - List confounds, moderators, mediators
8. Study Population
9. Measurement
10. Approach to Data Analysis
    - Descriptive, Bivariate, Multivariate,
    - Managing Missing Data
    - Sensitivity Analysis
    - How to address race/ethnicity
11. Strengths and Limitations
12. Impact and Solution Orientation
13. Innovation

General Analysis Proposal (AP) Information

AP is a plan for an ECHO research product that is expected to produce a single manuscript

Every AP & manuscript reviewed by: 3 primary reviewers, 1 Associate Chair, and 1 Co-chair

- One primary reviewer is a DAC representative
- When appropriate, additional experts consulted and/or all Co-chairs review

Timeline: 12 months from AP approval to submission of a manuscript for PC review

- 3 months planning, 6 months data analysis, and 3 months manuscript completion

The Publications Committee must review:

- Manuscripts prior to submission to the journal or pre-print site
- Abstracts prior to submission to the scientific congress
  - Reviewed within 5 business days
- Slides prior to final presentation to a group external to ECHO
  - Reviewed within 5 business days

Analysis Proposal Reviews

Analysis proposal reviews are completed within 10 business days and re-reviews within 5 business days

Reviews/Responses to Review

- **APPROVED**: WTL may incorporate PC suggestions
- **REVISE & RESUBMIT – minor revisions**: WTL provides point-by-point responses; AC review only
- ***REVISED & RESUBMIT – major revisions****:* WTL should provide point-by-point responses; full PC review
- **NOT APPROVED**: major flaws; PC approval unlikely
  - No further action is requested of WTL

Utilizing PlatIPUS

- Verify sample size using PlatIPUS prior to completing analysis proposal
- Use PlatIPUS to estimate sample size for analysis (Section E)
- Ensure adequate sample size before developing the analysis plan

Use of Tribal Data

- Encourage use of Navajo Nation and Cheyenne River Sioux Tribal data in manuscripts
- Cheyenne River Sioux Tribe data included on ECHO Cohort Platform with all ECHO Cohort data
  - Requires approval from Cheyenne River Sioux Tribe
- WTL must opt in to use Navajo Nation Data
  - Requires approval from SC and Navajo Nation
- If WTL opts out, must provide rationale

Extras

- Extension requests for the 12 month timeline
  - Data unavailable, personal circumstances
  - Encourage WTL to identify another individual on WT to move manuscript forward
- If WTL requests to split paper after analysis approval, send to CC for Co-chair approval
- Comply with the NIH Public Access Policy, including submission of Publications to PubMed Central (PMC)

CC Editorial Services

- Standard medical editorial services for WTL
- Edits and submits the final manuscript to the target journal and ensures:
  - Editorial review of manuscript, cover letter, and response to journal reviewers
  - Format manuscripts per specific journal guidelines
  - Ensure consistency among abstract, text, tables, and figures
  - Check administrative information (e.g., funding, disclosures)
  - Submit to journal
- Within 10 business days of receiving the final documents:
  - For initial submission or resubmission of journal submission
  - Reformat manuscript to an alternate journal
- The writing team is responsible for covering publication fees

Thank you!

- Publications Committee Co-chairs
  - Jean Kerver, Bennett Leventhal, Wei Perng
- Associate Chairs
  - Linda Adair, Akram Alshawabkeh, Jyoti Angal, Izzuddin Aris, Patricia Brennan, Jody Ganiban, Maxwell Mansolf, Monica McGrath, Cynthia McEvoy, Mike O'Shea, Emily Oken, Janet Peacock, Stephanie Stepp, Deborah Watkins.
- Coordinating Center Publications Operations Team
  - Rebecca Coker, Dahlia Cowhig, Toya Hobbs, Carla Quinones Cordova, Candice Quick, Carley Prynn
  - Writing Team Support Project Leaders: Camille Brown-Lowery, Halima Garba, Julia Ralston, Samantha Simons

Primary Reviewers

Bianca Acevedo	Lyndsay Avalos	Charles Barone	Traci Bekelman	Martin Blaser
Matthew Blitz	Claudia Buss	Carlos Camargo	Amber Cathey	Yu Chen
Hyunok Choi	Brent Collett	Sarah Comstock	Lisa Croen	Lunthita Duthely
Amy Eapen	Assiamira Ferrara	Stephanie Fisher	Sarah Geiger	Akhgar Ghassabian
Elizabeth Jensen	Margaret Karagas	Catherine Karr	Matthew Kasman	Michelle Katzow
Daphne Koinis Mitchell	Janine LaSalle	Cecilia Liu	Kristen Lyall	Tengfei Ma
Justin Manjourides	Lacey McCormack	Kimberly McKee	John Meeker	Rachel Miller
Paul Moore	Sunni Mumford	Roger Newman	Ruby Nguyen	Sara Nozadi
Thomas O'Connor	Edo Pellizzari	Katherine Rivera-Spoljaric	Andrew Rundle	Rebecca Schmidt
Nancy Sherwood	Anne Marie Singh	Elliott Spindel	Anne Starling	Susan Sumner
Elaine Symanski	Leonardo Trasande	Jim VanDerslice	Kartik Venkatesh	Jim Zhang
Yue Zhang	Yeyi Zhu	Emily Zimmerman		

Publication Process – Role of the Data Analysis Center (DAC)

Bioassay Data at the DAC

Lisa P. Jacobson on behalf of the DAC

April 4, 2025

ECHO Environmental influences on Child Health Outcomes

Publication Process – Role of the Data Analysis Center (DAC)

ECHO
Environmental influences
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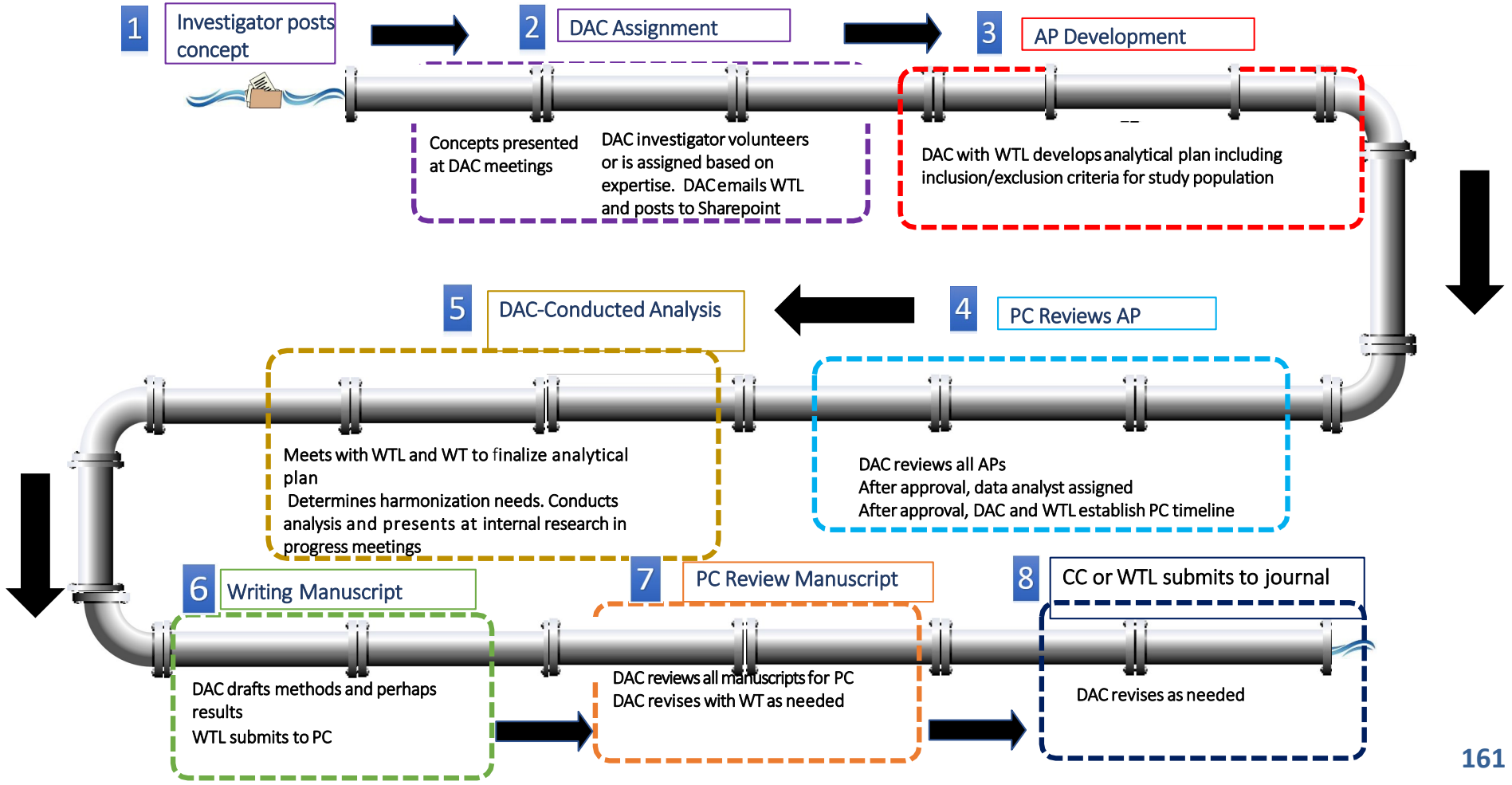
Publication Pipeline for ECHO Cohort Data Analyses - DAC Involvement



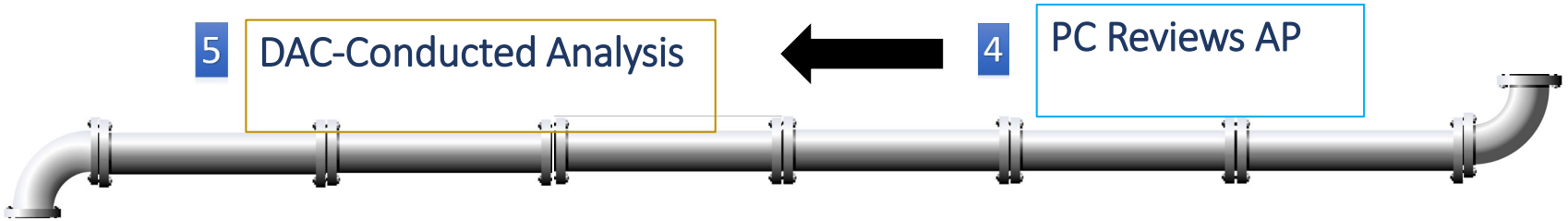
Publication Pipeline for ECHO Cohort Data Analyses - DAC Involvement

Concepts presented at DAC meetings

If DAC-conducted AP, DAC investigator volunteers or is assigned based on expertise. DAC emails WTL and posts to Sharepoint

DAC with WTL develops analytical plan including inclusion/exclusion criteria for study population if DAC-conducted AP

Publication Pipeline for ECHO Cohort Data Analyses
- DAC Involvement



DAC team meets with WTL and WT to finalize analytical plan, determines harmonization needs, conducts analysis, and presents at internal research-in-progress meetings

DAC reviews all APs
After approval, data analyst assigned to DAC-conducted AP
After approval, DAC and WTL establish PC timeline

Helps to:

1) **Predefine variables**
2) **Schedule meetings**
3) **Develop table and figure shells**

Publication Pipeline for ECHO Cohort Data Analyses - DAC Involvement

DAC drafts methods and perhaps results for DAC-conducted AP
WTL submits to PC

DAC reviews all manuscripts for PC
DAC revises with WT as needed for DAC-conducted AP

DAC revises as needed for DAC-conducted AP

Data Warehouse (DW)

- Combines Cycle 1 and Cycle 2 data
- Header variables facilitate aggregating participants and families within family units and across multiple study sites and awards
- Contains the harmonized, derived data
- Monthly snapshots
- Contains real dates for linking with calendar time

Bioassay Data at the DAC

ECHO Environmental influences on Child Health Outcomes

Bioassay Data on ECHO Analysis Workbench

- Non -omics assay data at the DAC
  - Cohort sites sent extant data to DAC in Cycle 1.
  - Cohort sites sent specimens to the HHEAR laboratories in Cycle 1 for approved Analysis Proposals and HHEAR sent results to DAC.
  - HHEAR generated assay results using Type C specimens for approved Analysis Proposals in Cycle 1.
- -omics data at the DAC
  - Cohort sites sent extant data (genetics, epigenetics, microbiome) to the DAC in Cycle 1.
  - DAC pulled metabolomics data that sites sent to the metabolomics workbench.
  - Center for Inherited Disease Research (CIDR) generated genome-wide data and epigenetic data (still ongoing) using Types A, B, and C specimens.

How to Determine What is Available

- ECHO PlatIPUS (**Plat**form: **I**nform and **P**rovide **U**ser **S**earch)) is the primary location (external to the data platform) for determining availability.

  https://echoportal.org/Platipus/MainMenu/Index

  – New features added for documentation

  – Note: PlatIPUS will be updated with Cycle 2 data this summer

- Administrative report provides numbers of participants with each measure in Cycle 2. (Table A4. Number of Participants with Cycle 2 Data on the ECHO Cohort Data Platform)
- Certified users have access to Cycle 1 and Cycle 2 data on the Data Warehouse.

Assay Results Sent to DAC Since 10/31/2023

- **EC0376**
  - Carotenoids (Nutrients)
  - Iodine (Metals and Metalloids)
  - Fatty Acids*
- **EC0561**
  - PFAS (award 133)
- **EC0565**
  - Olink Inflammatory Markers*
- **EC0655**
  - Novel Chemicals (Fungicides, Herbicides, Insecticides, Pesticides, Flame Retardants, Phthalates, Phenols, and PAHs)
- **EC0656**
  - Melamine
- **EC0661**
  - Folate (Nutrients)
- **EC0668 & EC0669**
  - Speciated Arsenic (Metals and Metalloids)
- **EC0656**
  - Melamine
- Extant Results
  - Iodine (Nutrients)
  - Thyroid Hormone

* These data will be available on the ECHO Analysis Workbench in April

Platipus Public Version

- Assist investigators using public data on DASH and for planning ancillary studies
- Participants
  - Two options
    - DASH: ~78,000 participants that have contributed data to DASH
    - ECHO Cohort Platform: ~135,000 participants with data for the 10/31/2023 data lock
- Data
  - Derived variables
  - Cycle 1 forms
  - Assay results
  - Geocodes (match quality)
  - Biospecimens

New Bioassay Documentation

Biospecimen Assay Updates

New documentation for biospecimen assay results generated for approved Analysis Proposals

- Location: ECHO Portal > PlatIPUS > Lab Assays
- Documentation includes assay classes analyzed, number of samples, contributing cohorts, example code for accessing results, and more!
  - Example code includes SQL, R, and SAS code using the Data Warehouse
- The list of documentation files is still growing.

Biospecimen Assay Updates

Browse ECHO Lab Assays (20)

Data Analytic Materials

Show entries Search:

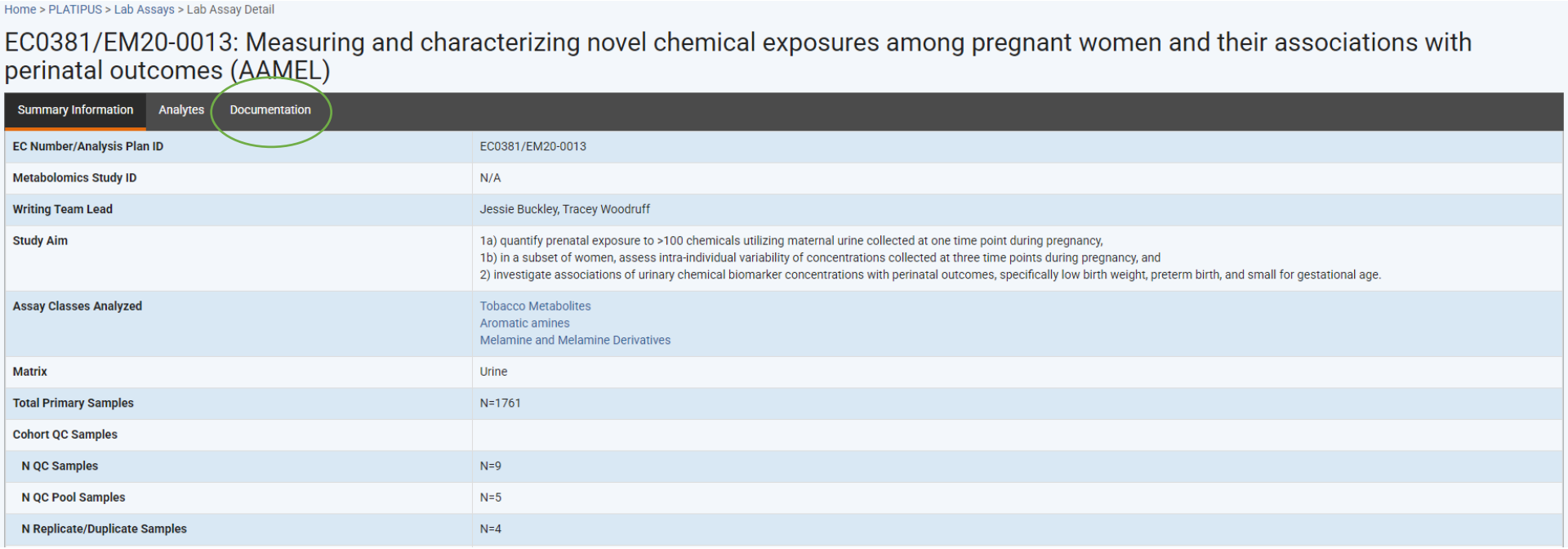
EC Number/Analysis Plan ID	Writing Team Lead	Title	Assay Classes
EC0231/EM18-0002	Deborah Bennett	Association of organophosphate ester flame retardant exposure during pregnancy and effects on perinatal outcomes	Organophosphorus Flame Retardants Alkyl Phosphate Pesticides (Organophosphorus Insecticides) and Pyrethroids
EC0346/EM18-0006	Lida Chatzi	Perfluoroalkyl Compounds and Child Metabolic Health	Untargeted
EC0361/EM19-0008	Jessie Buckley, Tracey Woodruff	Assessing exposures to novel chemicals among pregnant women in ECHO: a pilot to inform studies of associations with child health outcomes	Organophosphorus Flame Retardants Alkyl Phosphate Pesticides (Organophosphorus Insecticides) and Pyrethroids Urinary dilution Phthalate and Phthalate Alternatives Phenols (including bisphenols, parabens, and other environmental phenols used in personal care and consumer products) Fungicides and Herbicides Polycyclic Aromatic Hydrocarbons (PAHs) Neonicotinoid insecticides Insecticides, not otherwise specified Tobacco Metabolites Aromatic amines Melamine and Melamine Derivatives
EC0374/EM19-0009	Wei Perng and Yeyi Zhu	Characterizing the maternal intrauterine environment via untargeted metabolomics profiling of maternal blood collected during pregnancy in relation to birth size	Untargeted

Summary Information | Analytes | Documentation

EC Number/Analysis Plan ID	EC0381/EM20-0013
Metabolomics Study ID	N/A
Writing Team Lead	Jessie Buckley, Tracey Woodruff
Study Aim	1a) quantify prenatal exposure to >100 chemicals utilizing maternal urine collected at one time point during pregnancy, 1b) in a subset of women, assess intra-individual variability of concentrations collected at three time points during pregnancy, and 2) investigate associations of urinary chemical biomarker concentrations with perinatal outcomes, specifically low birth weight, preterm birth, and small for gestational age.
Assay Classes Analyzed	Tobacco Metabolites Aromatic amines Melamine and Melamine Derivatives
Matrix	Urine
Total Primary Samples	N=1761
Cohort QC Samples	
N QC Samples	N=9
N QC Pool Samples	N=5
N Replicate/Duplicate Samples	N=4
Contributing Cohorts	10101, 13101, 13102, 13301
Participant Type/Life Stages (Primary Samples)	
Biological Mother	
Prenatal	N=1761
DAC Contact	echo-dac@rti.org

Biospecimen Assay Updates

- Accessing example code:



Home > PLATIPUS > Lab Assays > Lab Assay Detail

EC0381/EM20-0013: Measuring and characterizing novel chemical exposures among pregnant women and their associations with perinatal outcomes (AAMEL)

Summary Information | Analytes | Documentation

EC Number/Analysis Plan ID	EC0381/EM20-0013
Metabolomics Study ID	N/A
Writing Team Lead	Jessie Buckley, Tracey Woodruff
Study Aim	1a) quantify prenatal exposure to >100 chemicals utilizing maternal urine collected at one time point during pregnancy, 1b) in a subset of women, assess intra-individual variability of concentrations collected at three time points during pregnancy, and 2) investigate associations of urinary chemical biomarker concentrations with perinatal outcomes, specifically low birth weight, preterm birth, and small for gestational age.
Assay Classes Analyzed	Tobacco Metabolites Aromatic amines Melamine and Melamine Derivatives
Matrix	Urine
Total Primary Samples	N=1761
Cohort QC Samples	
N QC Samples	N=9
N QC Pool Samples	N=5
N Replicate/Duplicate Samples	N=4

Biospecimen Assay Updates

Home > PLATIPUS > Lab Assays > Lab Assay Detail

EC0381/EM20-0013: Measuring and characterizing novel chemical exposures among pregnant women and their associations with perinatal outcomes (AAMEL)

Summary Information | Analytes | Documentation

Analysis Proposal	Access File
Final Lab Analysis Plan	Access File
Lab Analysis Result Summary	Aromatic amines HHEAR Analysis Results Summary Melamine and Melamine Derivatives HHEAR Analysis Results Summary
Lab Methodology Details	HHEAR Methods for Aromatic Amines analysis HHEAR Methods for Melamine and Melamine Derivatives analysis
Cohort QC Report	
Cohort QC Pools Summary	Access File
Scatter Plot of Relative Percent Difference by Analyte	Aromatic Amines and Melamines Relative Percent Difference Scatter Plots Melamines Relative Percent Difference Scatter Plots
Relative Percent Difference Tables for Duplicates	
Summary of Concordant and Discordant Duplicates	
Publications	
Data Access	In the Data Warehouse, use ECHO_DW_Prod database and table dwAssays.Lab_Bio_Analysis_Results to access these results. These results can be identified by records where specimen_category = 'Type A/B Specimen' AND panel_ID in ('EC0381_AA', 'EC0381_USMOKE', 'EC0381_MEL') Code: SQL Query: Select * from [ECHO_DW_Prod].[dwAssays].[Lab_Bio_Analysis_Results] where specimen_category = 'Type A/B Specimen' AND panel_ID in ('EC0381_AA', 'EC0381_USMOKE', 'EC0381_MEL') AND DWSnapshotDT = (SELECT max(DWSnapshotDt) as DWSnapshotDt FROM dwDbo.DWSnapshotDates WHERE DWIsEnabled=1)

New Bioassay Harmonization

Purpose of the Harmonization

- Ensure a standardized approach that makes ECHO bioassay data easier to use
  - Reduce duplicate efforts and improve analysis completion time
- Issues addressed
  - LOD/LOQ correction, urinary dilution correction, standardization of units, uniformity of lab names and assay methods, removal of duplicates and replicates, etc.

Five Broad Groups of Data

- Urinary analytes (mostly non-persistent)
- Blood analytes (mostly persistent)
- Metals (urine, teeth, blood)
- Cytokines
- Tobacco metabolites

Assay Harmonization Team

Analyte group	Investigator	R code lead	R code reviewer
Urine	Giehae Choi	Sudhi Upadhyaya	Taylor Etzel
Blood	Jessie Buckley	Xuan Li	Taylor Etzel
Metals and metalloids	Miranda Jones	Mohamad Burjak	Jiayin Liu
Cytokines	Heather McKay	Xiaoshuang Xun	Garrett Fuselier
Tobacco metabolites	Miranda Jones	Mohamad Burjak	Jiayin Liu

Adaeze Wosu Nzegwu & Kristen McArthur – updating guidance document

Roles

1. Investigator: provide guidance and direction about the assay group
2. R code lead: Generate and responsible for the R code
3. R code reviewer: Review R code for logic; help with documentation and research

Assay Harmonization Products

At the end of the harmonization, each assay data group will have:

- A derived dataset
- A documentation file
- Data dictionary

We will still have an overall guidance document

(limited to issues that affect most assay classes)

Variable Names

- Variable names will be the same across the different derived datasets, but prefixes will indicate the assay group.
- For example, the variable indicating the **LOD flag** in the respective datasets would look like this:
    1. **urine**_lodflag
    2. **blood**_lodflag
    3. **cyto**_lodflag
    4. **met**_lodflag
    5. **tobm**_lodflag

Examples of Derived Variables

- Each data dictionary will contain about 35-40 variables:
  - Age (in months) of child at specimen collection
  - Season of specimen collection
  - Life stage
  - Lab method
  - LOD/LOQ values
  - LOD/LOQ corrected values

Standardized Approaches to Issues Applicable Across Assay Classes

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Examples of Issues Common Across Files

- Exclusions due to repeat values or potentially inaccurate results
- Treatment of values outside of limits of detection
- Consistent naming of assay units, laboratories and assay methods
- Life stage definitions
- Urinary dilution corrections
- Missing information on day or trimester of specimen collection

Missing Information on Day or Trimester of Specimen Collection

- Where month and year are available, but day is missing …
  - We impute 15 (i.e., midpoint of a month)
  - We also created a flag variable to indicate that the day is substituted

- Where trimester of specimen collection is missing …
  - We impute the trimester using calculations based on the date of specimen collection, the child's date of birth, and gestational age at birth.

-omics Data on Merge (high performance area of EAW)

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Genetics Data on Merge

- Genetics data using Cycle 1 specimens are on EAW.
  - 35,380 participants

Type of Family	Number
Trios	439
Mother-Child Pairs	10,749
Father-Child Pairs	61
Mother and > 1 children	1,040
Father and > 1 children	12
Child only singleton	7,363
Mother only singleton	181
Father only singleton	3
Complete Families with more than 1 child	276
Total Families (including singletons)	20,124

- DAC Analysis Workshop (April 24) will provide further information

Other -omics Data on Merge

- 8,333 (5,989 children) with non-targeted metabolomics
- 6,968 (5,815 children) with m16s microbiome data
- 6,608 (5,989 children) with extant methylated DNA data; newly generated data (longitudinal and cross-sectional) forthcoming in 2025

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Assay Classes Available in Urine Only

Assay Class	Blood	Urine
5.3: Phthalate and Phthalate Alternatives (C010)		✓
5.5: Organophosphorus Flame Retardants (OPEs) (C016)		✓
5.8: Alkyl Phosphate Pesticides (Organophosphorus Insecticides) and Pyrethroids (C025)		✓
5.9: Disinfection Byproducts (C028)		✓
5.10: Fungicides and Herbicides (C031)		✓
5.18: Melamine and Melamine Derivatives (C055)		✓
5.19: Neonicotinoid Insecticides (C058)		✓
5.20: Insecticides, not otherwise specified (C061)		✓
5.24: Oxidative Stress Markers (C073)		✓

Assay Classes Available in Blood Only

Assay Class	Blood	Urine
5.14: Polybrominated Diphenyl Ethers (PBDEs) (C043)	✓	
5.15: Polychlorinated Biphenyls (PCBs) (C046)	✓	
5.16: Vitamin D (C049)	✓	
5.22: Cardiometabolics (C067)	✓	
5.23: Nutrients (C070)	✓	
5.25: Targeted Lipid Metabolites (C076)	✓	

Assay Classes Available in Urine and Blood

Assay Class	Blood	Urine
5.2: Perfluoroalkyl and Polyfluoroalkyl Substances (PFASs, PFCs) (C007)	✓	✓
5.4: Phenols (including bisphenols, parabens, and other environmental phenols used in personal care and...	✓	✓
5.6: Metals and Metalloids (C019)	✓	✓
5.7: Tobacco Metabolites (C022)	✓	✓
5.11: Organochlorine Pesticides (C034)	✓	✓
5.12: Polycyclic Aromatic Hydrocarbons (PAHs) (C037)	✓	✓
5.17: Aromatic amines (C052)	✓	✓
5.21: Cytokines (C064)	✓	✓

Participant Type

- Use Participant type variable from PtReg to check:

- Biological mother
  - Based on last character of ParticipantID
  - Life stage (prenatal)

- Child
  - Cord blood: day of delivery, child data

Samples Excluded From Derived Data

- Replicates and duplicates
- Samples with potentially inaccurate results
  - Contamination
  - Clotting
  - Hemolysis
  - Insufficient for testing

analysis_result_comment	n
OK (Ready for all Valid Results)	33283
Cellular Debris Present	6
Less than Limit of Detection	19339
Small Clot Present	294
Clotted Sample	179
17: Quantity of sample insufficient for analysis	5
18: Quantity of sample insufficient for repeat analysis	<5
Moderately Hemolyzed	<5
201: Below LOD, results repeated and confirmed (37,33)	<5
Quantity not sufficient for retest	13
Quantity not sufficient for repeat testing	35
Instrument Error	7
Markedly Hemolyzed	6
A dilution was required	172
Result repeated and confirmed	1120
37: Value less than LOD	3410
Lab reported code 37	3963
Result repeated and confirmed	67
Valid Measurement - lab reported code 0	6705
<NA>	145480

Values Below the Lower Limit of Detection

- LOD/ sqrt(2) substituted for values flagged as < LOD that did not report a machine read value (i.e., result is blank)
- Positive machine read values kept
- Zeros and negative machine read values are replaced with the smallest positive value for that analyte and specimen type in ECHO
- For results with both LOD and LOQ, we retain only the LOD

Values Above the Upper Limit of Detection

- Values retained as reported

- Flag included to indicate that the value is beyond the upper limit of detection

Standardization of Units, Laboratory Names and Assay Methods

- Standardization of assay units
- Consistent lab names
  - **HHEAR**: Wadsworth Human Health Exposure Analysis Resource
  - **DTSC:** California Department of Toxic Substances Control
  - **CDC:** Centers for Disease Control and Prevention
- Consistent naming of assay analysis methods
  - HPLC-MS/MS

Urinary Dilution Correction

- Based on cohort, life stage, and participant type

Maternal specific life stages	Definition for calculation
Prenatal (pre)	From conception to the day OF delivery
Postnatal/post-delivery	Post-delivery/post-natal samples for moms (average them)

Child specific life stage	Definition for calculation
Infancy/toddler	From day of delivery to 2 years 11 months 30 days
Early childhood	3 years to 5 years 11 months 30 days
Middle childhood	6 years to 10 years 11 months 30 days
Adolescence	11 years to 17 years 11 months 30 days
Adulthood	18 years to 20 years 11 months 30 days

Variables that Define a Unique Observation

- participantid
- participant_type
- assay_class
- assay ID
- _date_specimen
- _specimen_id
- specimen_freeze_thaws

Life Stage Definitions

- Cycle 2 definition + new category indicating day of delivery

- Life stage in the derived dataset is defined solely on the dates of collection in relation to child's date of birth
- Cord blood included under child ParticipantID, and life stage should be ***day of delivery***
  - However, we check to see the date of specimen collection is indeed child's day of birth

Life stage	Definition for calculation
Prenatal (pre)	From conception to the day before delivery
Day of delivery	***Any data collected on child's day of birth***
Infancy/toddler	1 day to 2 years 11 months 30 days
Early childhood	3 years to 5 years 11 months 30 days
Middle childhood	6 years to 10 years 11 months 30 days
Adolescence	11 years to 17 years 11 months 30 days
Adulthood	18 years to 20 years 11 months 30 days

Urinary Dilution Correction

- Boeniger method
- Corrections using specific gravity (SG) and creatinine (CR)
- Separate columns for SG and CR corrected values

DAC-Site collaboration: Public drinking water contaminant estimates

Data availability:

Contaminants	Spatial resolution	Temporal resolution
All (80+) federally regulated (EPA) contaminants: • Arsenic, fluoride, nitrate, trihalomethanes, uranium, etc.	• Water system boundaries • Tracts (2010, 2020) • ZCTAs (2010, 2020)	Aggregated to EPA Standardized Monitoring Framework requirements

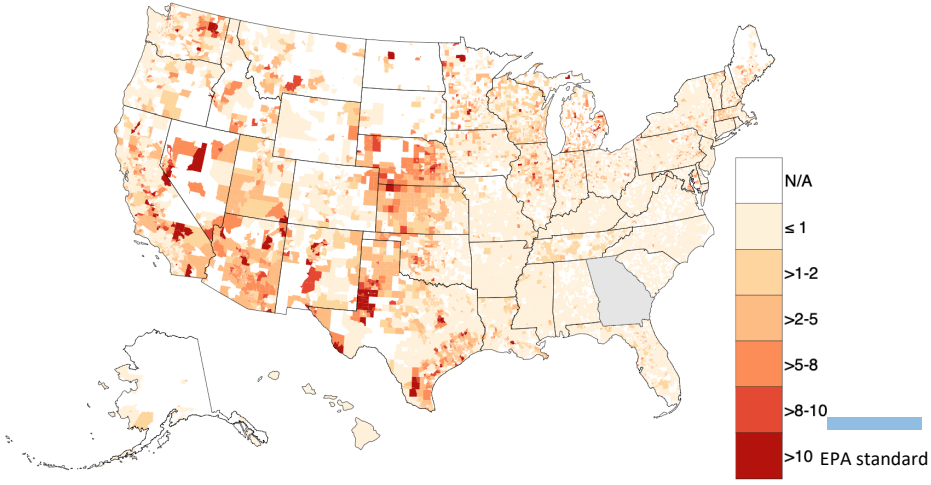
DAC-Site collaboration: Public drinking water contaminant estimates

Columbia Center For Children's Environmental Health
Mailman School of Public Health
Columbia University

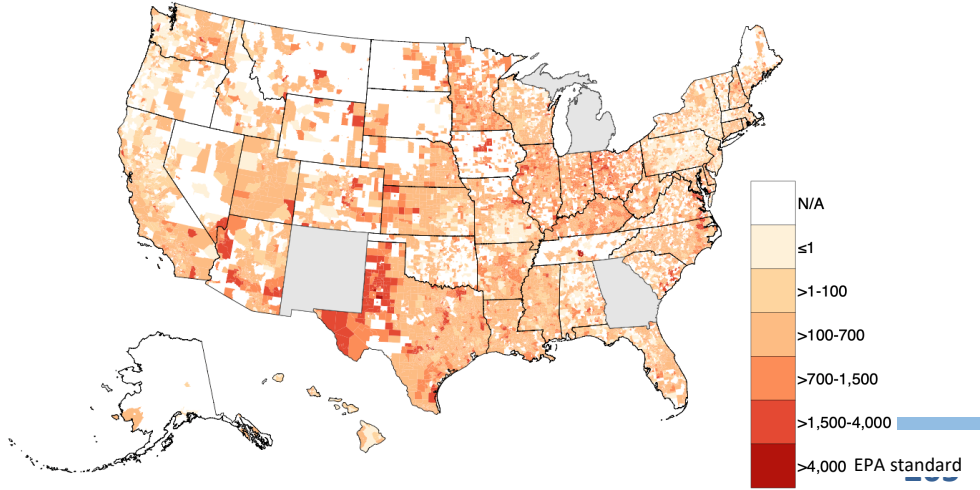
Data availability:

Contaminants	Spatial resolution	Temporal resolution
All (80+) federally regulated (EPA) contaminants: • Arsenic, fluoride, nitrate, trihalomethanes, uranium, etc.	• Water system boundaries • Tracts (2010, 2020) • ZCTAs (2010, 2020)	Aggregated to EPA Standardized Monitoring Framework requirements

Arsenic, 2011-2013 (µg/L)
(2010 tract boundaries)



Fluoride, 2017-2019 (µg/L)
(2010 tract boundaries)

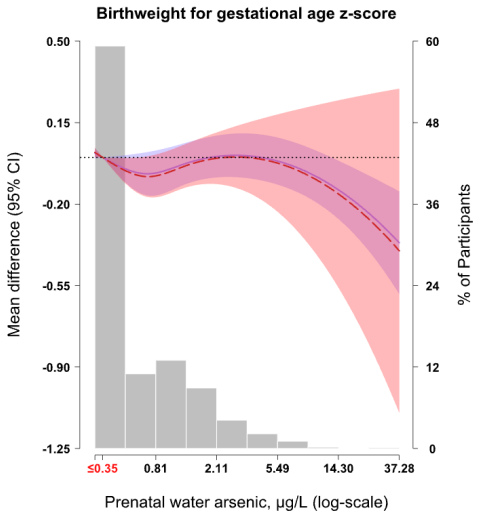


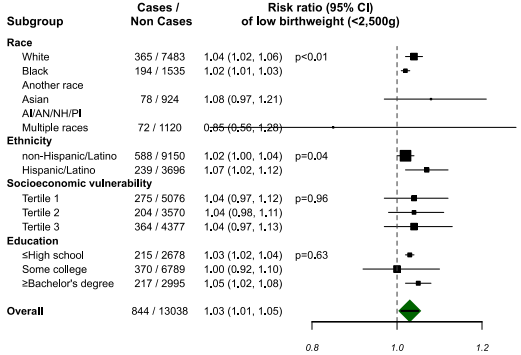
DAC-Site collaboration: Public drinking water contaminant estimates

ECHO Cohort analyses in progress:

EC0609: Public Water Arsenic and Birth Outcomes
EC0729: Public Water Disinfection Byproducts and Infant Health Outcomes
EC0758: Prenatal Public Water Contaminants and Child Neurocognitive Function
EC0757: Prenatal Public Water Contaminants and Child Behavioral and Emotional Problems
EC0759: Public Drinking Water Metals and Infant Growth
EC0760: Prenatal Exposure to Nitrites and Nitrates from Public Drinking Water and Associated Birth Outcomes
EC0797: The Association Between the Microbiome in Childhood and Disinfectant Byproducts in Drinking Water
EC0831: Public Water Disinfection Byproducts and Cord Blood Methylation Patterns
EC0778: Public Water Arsenic and Disinfection Byproducts and Hypertensive Disorders of Pregnancy

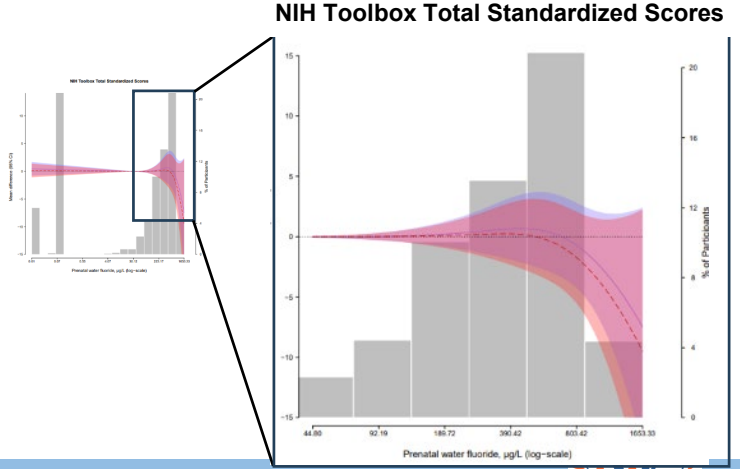
Prenatal arsenic and birth outcomes





Nigra et al. under revision

Prenatal fluoride and NIH Toolbox scores



Simon et al. in prep

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A program supported by the NIH

Communications Update

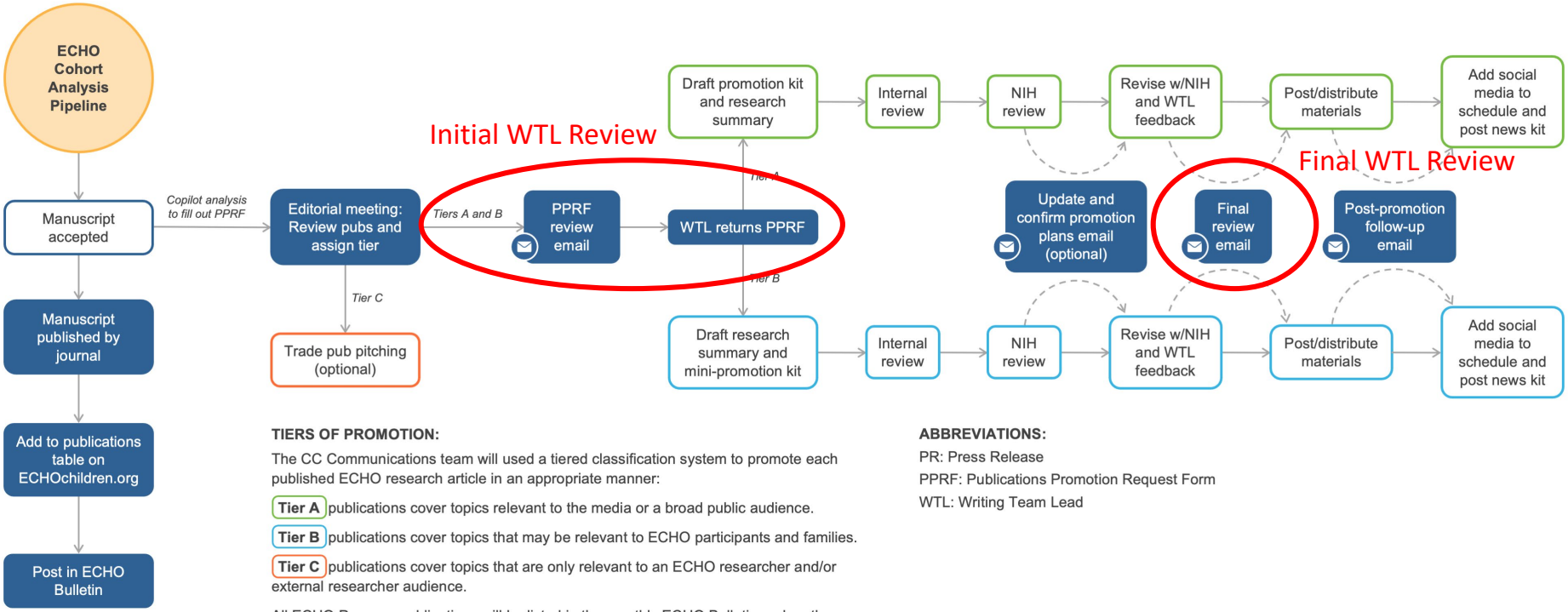
Sav Miller & Josee Meehan
ECHO CC Communication Team

April 4, 2025

ECHO Environmental influences on Child Health Outcomes

Research Promotion & Web Resources

ECHO Cohort Publication Promotion Process Flowchart



TIERS OF PROMOTION:

The CC Communications team will used a tiered classification system to promote each published ECHO research article in an appropriate manner:

Tier A publications cover topics relevant to the media or a broad public audience.

Tier B publications cover topics that may be relevant to ECHO participants and families.

Tier C publications cover topics that are only relevant to an ECHO researcher and/or external researcher audience.

All ECHO Program publications will be listed in the monthly ECHO Bulletin and on the ECHO website publications table.

ABBREVIATIONS:

PR: Press Release

PPRF: Publications Promotion Request Form

WTL: Writing Team Lead

Updated 18FEB2025

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New & Improved Research Summary Page

Research Summaries

Research summaries of ECHO publications endeavor to share study results with participants and the public.

In the search tool below, you can filter research summaries by outcome area, exposure category, and research type. You can also narrow search results down by selecting a specific date range or searching for a specific keyword. See the legend for more information about each filterable category.

LEGEND

Outcome Areas: describe the health effect(s) being investigated in a given study

Exposure Categories: describe the type(s) of exposures that are being investigated in a given study

Results Filter: Outcome Area | Exposure Categories | Research Type

Publication Date: Start date | End date | Keyword Search | Reset

Filter & Search!

Results Filter: Pre-, Peri-, and Postnatal | Social | Research Type

Publication Date: Start date | End date | Nutrition | Reset

Outcome Area: Pre-, Peri-, and Postnatal
Exposure: Social
Research Type: Observational

ECHO Study Evaluates Influence of Neighborhood-Level Poverty and Food Insecurity During Pregnancy on Birthweight

March 1, 2024

For this study, ECHO researchers analyzed data to understand what connections might exist between where a pregnant person lives, their access to food, and birth outcomes. Read More

PUBLICATION | PDF | PRESS RELEASE

Outcome Area: Pre-, Peri-, and Postnatal
Exposure: Social
Research Type: Observational

ECHO Study Shows Fish Consumption and Omega-3 Supplement Use Uncommon During Pregnancy

February 27, 2024

Omega-3 fatty acids are essential nutrients for supporting positive health outcomes. Getting enough of these nutrients during pregnancy is vital for child health and neurodevelopment and may also improve other... Read More

ARTICLE | PUBLICATION | PDF

Outcome Area: Pre-, Peri-, and Postnatal
Exposure: Social
Research Type: Observational

ECHO Study Identifies Demographics of Pregnant People Least Likely to Get the Nutrients They Need

September 7, 2021

One in three pregnant women in the United States eats too little or too many key vitamins and minerals. Prior studies do not tell us what groups are at the... Read More

ARTICLE | PUBLICATION | PDF | PDF EN ESPAÑOL

New ECHO Outcome Area & Topic Pages

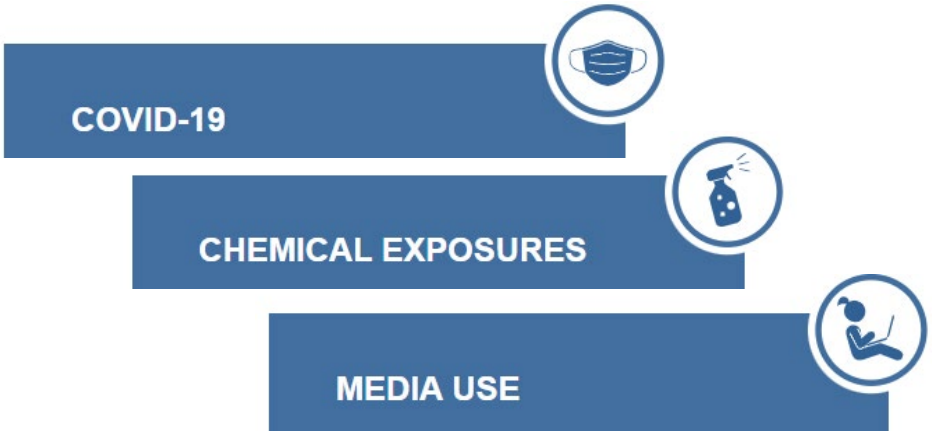
Pre-, Peri-, and Postnatal (pregnancy and birth)

Upper and Lower Airway (breathing)

Obesity (body weight)

Neurodevelopment (brain development)

Positive Health (well-being)



Newly published

ECHO Autism Research

AUTISM

Autism spectrum disorder (ASD) is a neurological and developmental condition affecting social interaction, communication, learning, and behavior. In 2020, an estimated 1 in 36 8-year-old children had ASD. It is nearly four times more common in boys than girls and occurs across all racial and ethnic groups.

Source: NIMH

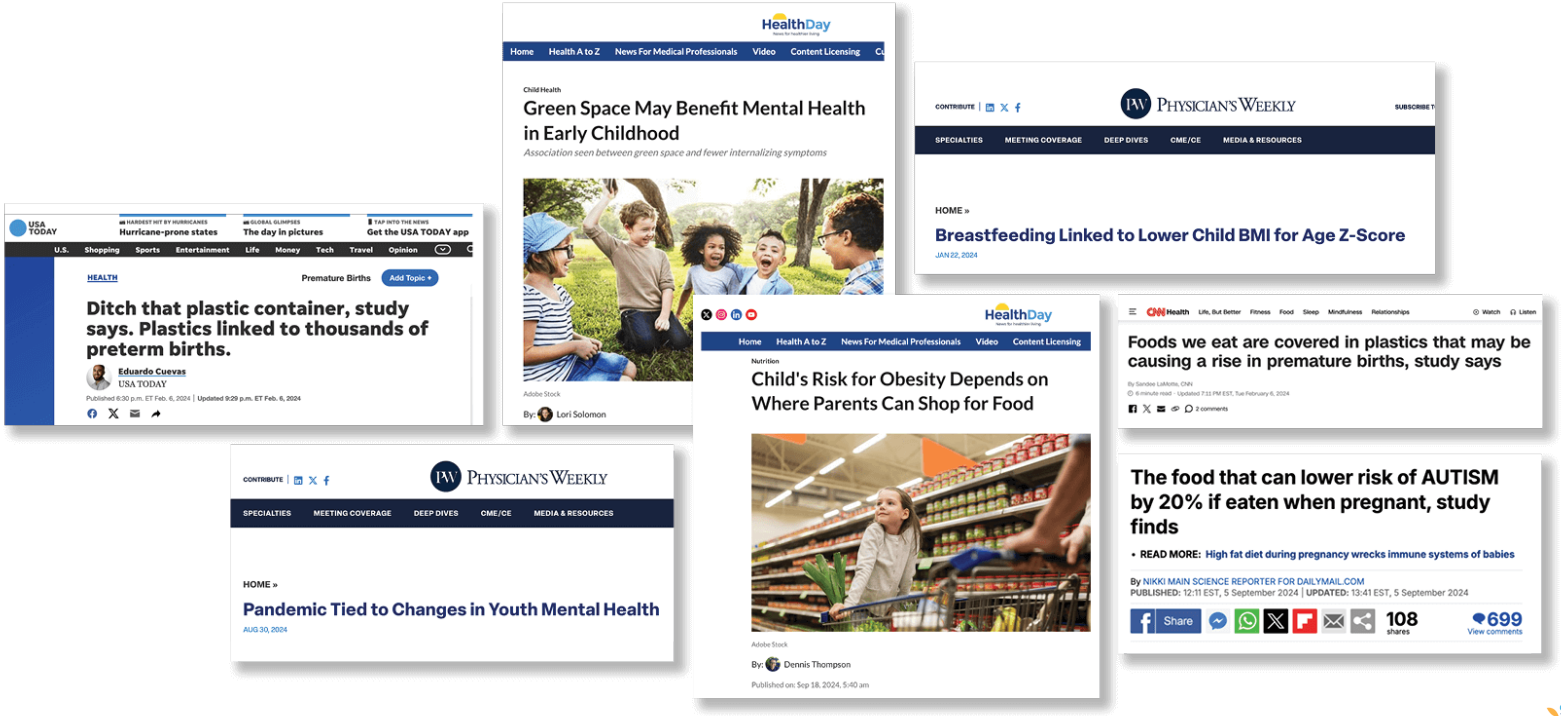
The ECHO Program's nationwide research network follows more than 64,000 children and families from pregnancy and birth through adolescence. This broad, longitudinal approach allows researchers to study a wide range of children to understand better the factors that may influence the development of autism-related traits, even in those without a diagnosis. ECHO researchers examine various potential influences, including prenatal diet, chemical exposures, biological factors, and gestational and postpartum conditions.

What We're Learning

The ECHO Program has published more than 1,800 articles about the results of its research, including many that looked at autism spectrum disorder and autism-related traits

Media Outreach

14 ECHO Cohort studies received attention from **357 news outlets** in 2024.



2024 Year in Review

Participant Engagement

Participant Engagement Resources

- In the **Storefront**
  - Downloads and print orders of participant handouts; brochures; sympathy, birthday, & thank you cards; and other templates
  - Most resources are available in English and Spanish
  - Many of the resources can be customized
- On **SharePoint**
  - Includes downloads of handouts and flyers, templates for lay summaries, promotion kits for recent ECHO publications, and more
- On **ECHOChildren.org**
  - Includes participant educational resources, ECHO Insights flyers, research summaries, and more

Find a link to the ECHO Storefront on the **SharePoint Communications Corner**

SharePoint Participant Engagement Resources can be found in the **Communication Corner, Study Coordinator Corner, and Protocol Recruitment/Retention Tab**

New resource: **ECHO at a Glance**

- Printable handout with an overview of the ECHO Program
- Find it on the SharePoint Communications Corner (Communication Tools tab)

ECHO
at a glance

Enhancing the Health of Children for Generations to Come

The ECHO Program is a nationwide research network launched in 2016 by the National Institutes of Health that answers big questions about what affects the health and well-being of children in the United States.

Through ECHO, many of the nation's leading researchers are working together to find the answers to those questions.

ECHO examines a broad range of early environmental influences—including socioeconomic status, family support, biological factors, nutrition, and physical and chemical exposures—to discover what can enhance the lives of children today and across generations.

Research Focus

ECHO studies five areas of child health that have a high public health impact:

- **Pre-, Peri-, and Postnatal Outcomes** *Pregnancy and Birth*
- **Neurodevelopment** *Brain Development*
- **Upper and Lower Airway Health** *Breathing*
- **Positive Health** *Well-being*
- **Obesity** *Body Weight*

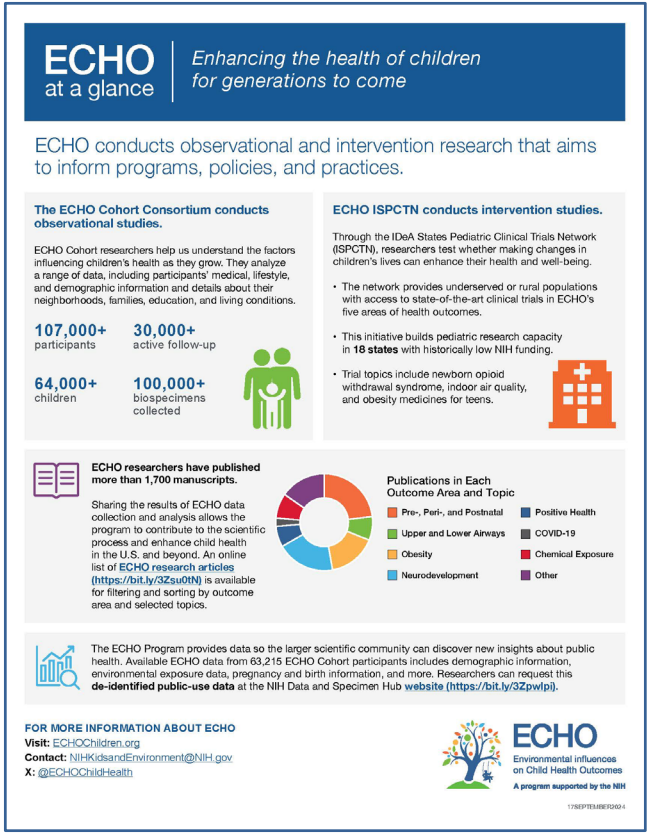
The Environmental influences on Child Health Outcomes (ECHO) Program
A research program in the Office of the Director at the National Institutes of Health (NIH)

- The **ECHO Cohort** uses **observational** research to learn what environmental factors affect children's health.
- The **IDeA States Pediatric Clinical Trials Network** (ISPCTN) uses **intervention** research to learn how to enhance children's health.
- **ECHO Cores and Centers** provide operational support for the Cohort and ISPCTN.
- Together, these make up the ECHO Program, which includes 107,000+ participants and their caregivers at 75+ study sites in 42 states, the District of Columbia, and Puerto Rico.

ECHO Cohort · ECHO ISPCTN · ECHO Core/Center

Participants come from diverse geographic, socioeconomic, racial, and ethnic backgrounds, enhancing the scientific power of the ECHO Program's dataset and clinical trials.

Researchers are helping ECHO discover what influences in early growth—and even before birth—affect us throughout our lives and across generations.



ECHO
at a glance

Enhancing the health of children for generations to come

ECHO conducts observational and intervention research that aims to inform programs, policies, and practices.

The ECHO Cohort Consortium conducts observational studies.

ECHO Cohort researchers help us understand the factors influencing children's health as they grow. They analyze a range of data, including participants' medical, lifestyle, and demographic information and details about their neighborhoods, families, education, and living conditions.

107,000+ participants
30,000+ active follow-up
64,000+ children
100,000+ biospecimens collected

ECHO ISPCTN conducts intervention studies.

Through the IDeA States Pediatric Clinical Trials Network (ISPCTN), researchers test whether making changes in children's lives can enhance their health and well-being.

- The network provides underserved or rural populations with access to state-of-the-art clinical trials in ECHO's five areas of health outcomes.
- This initiative builds pediatric research capacity in **18 states** with historically low NIH funding.
- Trial topics include newborn opioid withdrawal syndrome, indoor air quality, and obesity medicines for teens.

ECHO researchers have published more than 1,700 manuscripts.

Sharing the results of ECHO data collection and analysis allows the program to contribute to the scientific process and enhance child health in the U.S. and beyond. An online list of ECHO research articles (https://bit.ly/3Zsu0tN) is available for filtering and sorting by outcome area and selected topics.

Publications in Each Outcome Area and Topic
Pre-, Peri-, and Postnatal · Positive Health · Upper and Lower Airways · COVID-19 · Obesity · Chemical Exposure · Neurodevelopment · Other

The ECHO Program provides data so the larger scientific community can discover new insights about public health. Available ECHO data from 63,215 ECHO Cohort participants includes demographic information, environmental exposure data, pregnancy and birth information, and more. Researchers can request this **de-identified public-use data** at the NIH Data and Specimen Hub website (https://bit.ly/3ZpwIpi).

FOR MORE INFORMATION ABOUT ECHO
Visit: ECHOChildren.org
Contact: NIHKidsandEnvironment@NIH.gov
X: @ECHOChildHealth

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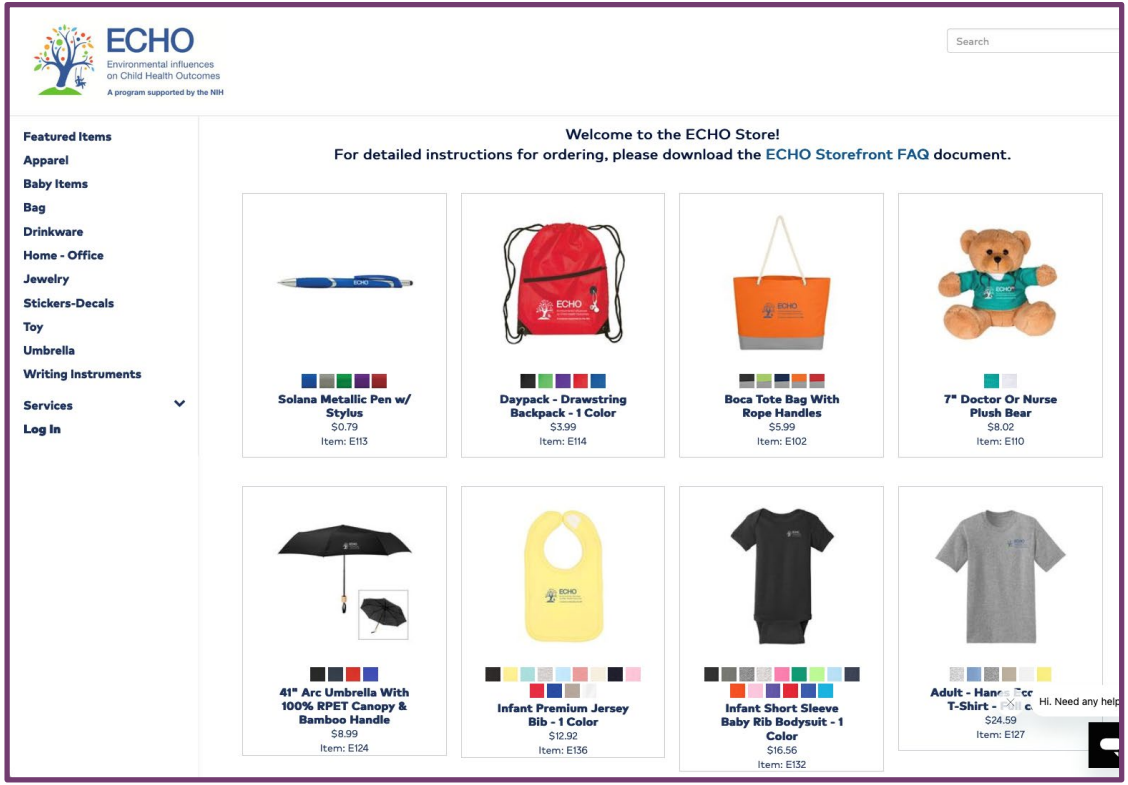
17SEPTEMBER2024

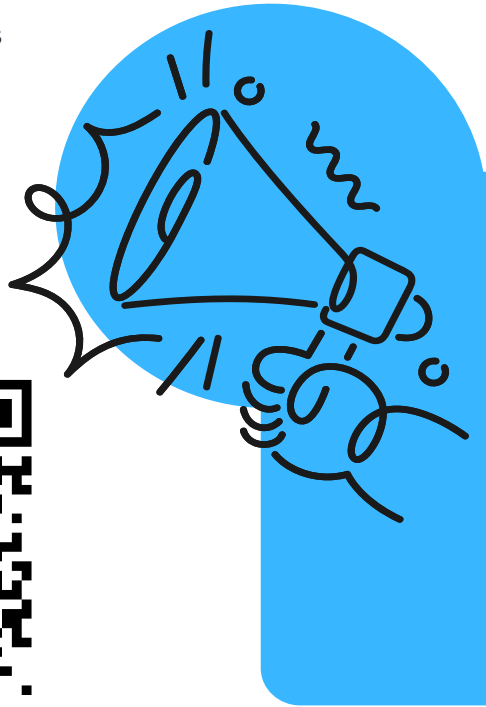
The ECHO Store

- Order 38 separate ECHO-branded promotional materials for participants and others
- Items include baby clothes, bags, drinkware, toys, umbrellas, more.
- Sites can request a purchase order (PO) with the vendor.
- The Communications Corner on SharePoint provides a links to the Store



Our ECHO, Our Health Facebook Live Events

Our ECHO, Our Health is a space where ECHO participants, investigators, and community members come together to learn about the latest findings from the ECHO Cohort, share insights, and discuss health research. We will host live events to facilitate direct communication between researchers and participants, creating opportunities for mutual learning and collaboration.



Join our Facebook Group!

Step 1: Scan the QR code or search “Our ECHO, Our Health” on Facebook.

Step 2: Request to join the group and answer 2 very short membership questions, and accept group rules/disclaimer

Pdf flyer can be found on sharepoint

Coming Soon

New Quarterly Newsletter

Updated echochildren.org pages

- **Online Newsroom**
  - The most recent and impactful studies
  - ECHO in the News section showcasing ECHO media coverage
  - Resources for media including one-pagers, links to the new research summary page, and ECHO Discovery webinars
- **New Topic Pages**
  - A new page each quarter showcasing ECHO research on timely topics, guided by news trends and recent studies.

Thank you

- **Internal Communications**

  Thank you for staying engaged with ECHO communications. These messages include key updates and are carefully reviewed for clarity and maximum efficiency.

- **Publication Promotion**

  Thank you for providing timely responses to our requests for information. Your input helps us effectively promote ECHO publications.

Email us at echo_communications@duke.edu or scan the QR code

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Round Table Discussions: Lessons Learned from PAB

Debra MacKenzie & Wei Perng
April 4, 2025

ECHO Environmental influences on Child Health Outcomes

Prompts (40 mins)

Coordinators:

- How did PAB inform your approach to communicating with participants?
- What is one change you will make in day-to-day interactions with participants?

Investigators:

- How did PAB inform your approach to scientific communications?
- What is one change you will make in your communication strategy (ex: writing manuscripts)?

Discussion (20 mins)

- Tables report back to larger group

ECHO

Environmental influences
on Child Health Outcomes

A program supported by the NIH

Some Closing Remarks

Matthew W. Gillman, MD, SM
Director, ECHO Program Office

NIH National Institutes of Health
Environmental influences on Child Health Outcomes (ECHO)

Sense of Hope

- Sorry Program Office unable to see you in person this time
- Personally, I sensed so much camaraderie and teamwork in the room yesterday
  - —Participants, Staff, Investigators
- ECHO's mission is crucial, noble
  - —We achieve it by working together
    - Especially in the face of challenge, anxiety, uncertainty

Speaking of Participants…

- The data on enrollment are great,

AND

- Isn’t it wonderful to welcome members of the Participant Action Board!
  - —Face to face interaction facilitates their important work

Enable High-Impact Science

- Goal #2 of Office Strategic Plan
- 8 fantastic examples in Day 1 flash talks
  - —In different stages: published, works in progress, idea fleshing
- 8 thoughtful sets of ideas from working groups in Day 2
  - —Short- to medium-term wins
  - —Moving into UH3 phase, setting the stage for more publications with high impact
- Take advantage of alignment with “Make America Healthy Again” priorities

Expanding ECHO's Reach

- Goal #3 of Office Strategic Plan
- Science
  - —DASH data
  - —Ancillary studies coming soon!
- Translating Science to Action
  - —Storytellers: mabel.terminel@nih.gov
  - —Science to Action Symposium Sept 15, 2025
  - —Program Office continues to work with interested parties
  - —Participant Action Board

Thank You!

- Thanks to Wei, Deb, Planning Group, Coordinating Center
  - —Complete evaluation of meeting
- Safe travels

Thank you for the incredible teamwork!

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