Opportunities for evaluating chemical exposures and child health in the United States: the Environmental influences on Child Health Outcomes (ECHO) Program

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Supplemental material

Table S1. Summary of literature review assessing chemicals measured in environmental media and biological samples

Table S2. Number of 70 ECHO cohorts with existing chemical assays by participant and life stage

Table S3. Number of 70 ECHO cohorts with existing or planned assays of specific chemicals by participant and life stage
Table S1. Summary of literature review assessing chemicals measured in environmental media and biological samples

The table below displays results of our literature review to determine levels of chemicals measured in environmental media and NHANES biomonitoring for children aged 12-19 years. Additional details of our search methodology are included in the Methods of the main article.

Legend

| Environmental Media                          | Level          | Biospecimens (NHANES adolescents) | Level² | Trend³ |
|----------------------------------------------|----------------|-----------------------------------|--------|--------|
|                                             |                |                                   | Range of unit values¹ at the 75th percentile | Percent change in the geometric mean |
| Drinking water                              | Below LOD      | Below LOD                         | LOD to < 5 | Below LOD at all time points |
|                                              | LOD to < 5    |                                   | 5-50   | Decreasing by ≥5% per cycle |
|                                              | 50-250         |                                   | 50-250 | Stable |
|                                              | >250           |                                   | >250   | Increasing by ≥5% per cycle |
|                                              | Below 20% or not reported | Insufficient data |

¹ Range of unit values: Units for chemicals in various media are given after the table.
² Level: The highest 75th percentile value found across the reporting cycles 1999-2016 among adolescents (age 12-19 years).
³ Trend: The cycle-to-cycle percent change in geometric mean concentrations of biomarkers detected among adolescents (age 12-19 years) in at least three consecutive cycles.

| Chemical                                           | CASRN | Ambient air | Personal air | Indoor air | House dust | Drinking water | Food | Level | Trend |
|----------------------------------------------------|-------|-------------|--------------|------------|------------|----------------|------|-------|-------|
| Benzophenone-3                                     | 131-57-7 | 80-05-7     |              |            |            |                |      |       |       |
| Bisphenol A                                        | 80-05-7 | 620-92-8    |              |            |            |                |      |       |       |
| Bisphenol F                                        | 80-09-1 | 140-66-9    |              |            |            |                |      |       |       |
| Bisphenol S                                        | 101-20-2 | 3380-34-5   |              |            |            |                |      |       |       |
| 4-tert-Octylphenol                                 | 120-83-2 | 120-83-2    |              |            |            |                |      |       |       |
| Triclocarban                                       | 583-78-8 | 583-78-8    |              |            |            |                |      |       |       |
| Triclosan                                          | 94-26-8 | 94-26-8     |              |            |            |                |      |       |       |
| 2,4-Dichlorophenol                                 | 120-47-8 | 120-47-8    |              |            |            |                |      |       |       |
| 2,5-Dichlorophenol                                 | 99-76-3 | 99-76-3     |              |            |            |                |      |       |       |

At least one ECHO cohort with existing or planned assays

Environmental phenols and parabens (i.e., personal care and consumer product chemicals and metabolites)
| Chemical                                                                 | CASRN  | Ambient air | Personal air | Indoor air | House dust | Drinking water | Food | Level | Trend |
|------------------------------------------------------------------------|--------|-------------|--------------|------------|------------|----------------|------|-------|-------|
| *n*-Propyl paraben                                                     | 94-13-3|             |              |            |            |                |      |       |       |
| **Phthalate and phthalate alternatives [metabolites]**                  |        |             |              |            |            |                |      |       |       |
| Benzyl butyl phthalate (BzBP) [Mono-benzyl phthalate (MBzP); Mono-n-butyl phthalate (MnBP)] | 85-68-7|             |              |            |            |                |      |       |       |
| Di-2-ethylhexyl phthalate (DEHP) [Mono-2-ethylhexyl phthalate (MEHP); Mono-(2-ethyl-5-hydroxyhexyl) phthalate (MEHHP); Mono-(2-ethyl-5-oxohexyl) phthalate (MEOHP); Mono-(2-ethyl-5-carboxypentyl) phthalate (MECPP)] | 117-81-7|             |              |            |            |                |      |       |       |
| Di-n-butyl phthalate (DBP) [Mono-n-butyl phthalate (MnBP); Mono-3-hydroxybutylphthalate (MHBP)] | 84-74-2|             |              |            |            |                |      |       |       |
| Dicyclohexyl phthalate (DCHP) [Mono-cyclohexyl phthalate (MCHP)]      | 84-61-7|             |              |            |            |                |      |       |       |
| Diethyl phthalate (DEP) [Mono-ethyl phthalate (MEP)]                  | 84-66-2|             |              |            |            |                |      |       |       |
| Disobutyl phthalate (DiBP) [Mono-isobutyl phthalate]                  | 84-69-5|             |              |            |            |                |      |       |       |
| Disodecyl phthalate (DiDP) [Mono-(carboxyoctyl) phthalate (MCNP)]     | 26761-0-0|             |              |            |            |                |      |       |       |
| Diisononyl phthalate [Mono-isononyl phthalate (MiNP); Mono-(carboxyoctyl) phthalate (MCOP)] | 28553-12-0|             |              |            |            |                |      |       |       |
| Dimethyl phthalate (DMP) [Mono-methyl phthalate (MMP)]                | 131-11-3|             |              |            |            |                |      |       |       |
| Di-n-octyl phthalate (DnOP) [Mono-3-carboxypropyl) phthalate (MCPP); Mono-n-octyl phthalate (MOP)] | 117-84-0|             |              |            |            |                |      |       |       |
| Di-2-ethylhexyl terephthalate (DEHTP) [Mono-2-ethyl-5-carboxypentyl terephthalate and Mono-2-ethyl-5-hydroxyhexyl terephthalate] | 6422-86-2|             |              |            |            |                |      |       |       |
| Di-2-ethylhexyl terephthalate (DEHTP) [Mono-2-ethyl-5-hydroxyhexyl terephthalate] | 6422-86-2|             |              |            |            |                |      |       |       |
| Di(isononyl) cyclohexane-1,2-dicarboxylate (DINCH) [Cyclohexane-1,2-dicarboxylic acid mono(hydroxy-isononyl ester) (MHCNCH)] | 166412-78-8|             |              |            |            |                |      |       |       |
| **Perfluoroalkyl and polyfluoroalkyl substances (PFASs)**              |        |             |              |            |            |                |      |       |       |
| Perfluorobutane sulfonic acid (PFBS)                                   | 375-73-5|             |              |            |            |                |      |       |       |
| Perfluorodecanoic acid (PFDA)                                         | 335-76-2|             |              |            |            |                |      |       |       |
| Perfluorooctane sulfonic acid (PFOS)                                   | 1763-23-1|             |              |            |            |                |      |       |       |
| Perfluoroctanoic acid (PFOA)                                          | 335-67-1|             |              |            |            |                |      |       |       |
| Perfluorodecanoic acid (PFDa)                                         | 307-55-1|             |              |            |            |                |      |       |       |
| Perfluoroheptanoic acid (PFHpA)                                       | 375-85-9|             |              |            |            |                |      |       |       |
| Perfluorohexane sulfonic acid (PFHxS)                                 | 355-46-4|             |              |            |            |                |      |       |       |
| Perfluorononanoic acid (PFNA)                                         | 375-95-1|             |              |            |            |                |      |       |       |
| Perfluoroctane sulfonamide (PFOSA)                                    | 754-91-6|             |              |            |            |                |      |       |       |
| 2-(N-Ethyl-perfluoroctane 3ulfonamide) acetic acid (Et-PFOSA-AcOH)   | 2991-50-6|             |              |            |            |                |      |       |       |
| Chemical                                                                 | CASRN   | Ambient air | Personal air | Indoor air | House dust | Drinking water | Food | Level | Trend |
|------------------------------------------------------------------------|---------|-------------|--------------|------------|------------|----------------|------|-------|-------|
| 2-(N-Methyl-perfluorooctane 4-sulfonamide) acetic acid (Me-PFOSA-AcOH) | 2355-31-9 |             |              |            |            |                |      |       |       |
| Perfluoroundecanoic acid (PFUnDA)                                     | 2058-94-8 |             |              |            |            |                |      |       |       |
| **Polycyclic aromatic hydrocarbons [metabolites]**                     |         |             |              |            |            |                |      |       |       |
| Fluorene [2-Hydroxyfluorene; 3-Hydroxyfluorene; 9-Hydroxyfluorene]      | 86-73-7 |             |             |            |            |                |      |       |       |
| Naphthalene [1-Naphthalene and 2-Naphthalol]                           | 91-20-3 |             |             |            |            |                |      |       |       |
| Phenanthrene [1-Hydroxyphenanthrene; 2-Hydroxyphenanthrene; 3-         | 85-01-8 |             |             |            |            |                |      |       |       |
| Hydroxyphenanthrene; 4-Hydroxyphenanthrene]                           |         |             |              |            |            |                |      |       |       |
| Pyrene [1-Hydroxypyrene]                                              | 129-00-0 |             |             |            |            |                |      |       |       |
| **Organophosphorus insecticides [metabolites] and dialkyl phosphate    |         |             |              |            |            |                |      |       |       |
| Acephate                                                               | 30560-19-1 |            |             |            |            |                |      |       |       |
| Chlorpyrifos                                                          | 2921-88-2 |            |             |            |            |                |      |       |       |
| Chlorpyrifos Methyl                                                   | 5598-13-0 |            |             |            |            |                |      |       |       |
| 3,5,6-Trichloro-2-Pyridinol [chlorpyrifos and chlorpyrifos methyl]    | 6515-38-4 |            |             |            |            |                |      |       |       |
| Diazinon [2-Isopropyl-4-methyl-pyrimidinol]                            | 333-41-5 |            |             |            |            |                |      |       |       |
| Dimethoate                                                            | 60-51-5  |            |             |            |            |                |      |       |       |
| Methamidophos                                                         | 10265-92-6 |            |             |            |            |                |      |       |       |
| Malathion                                                             | 121-75-5 |            |             |            |            |                |      |       |       |
| Malathion dicarboxylic acid                                          | 1190-28-9 |            |             |            |            |                |      |       |       |
| Methyl parathion                                                      | 298-00-0 |            |             |            |            |                |      |       |       |
| para-Nitrophenol [ethyl parathion, methyl parathion, and nitrobenzene]| 100-02-7 |            |             |            |            |                |      |       |       |
| Omethoate                                                             | 1113-02-06 |           |             |            |            |                |      |       |       |
| Diethylphosphate (DEP) [organophosphorus insecticides]                | 220-697-7 |            |             |            |            |                |      |       |       |
| Dimethylphosphate (DMP) [organophosphorus insecticides]               | 813-78-5 |            |             |            |            |                |      |       |       |
| Diethylthiophosphate (DETP) [organophosphorus insecticides]           | 2465-65-8 |            |             |            |            |                |      |       |       |
| Dimethylthiophosphate (DMTP) [organophosphorus insecticides]          | 59401-04-6 |            |             |            |            |                |      |       |       |
| Diethylidithiophosphate (DEDTP) [organophosphorus insecticides]       | 52857-42-8 |            |             |            |            |                |      |       |       |
| Dimethyldithiophosphate (DMDTP) [organophosphorus insecticides]       | 756-80-9 |            |             |            |            |                |      |       |       |
| **Organophosphate or other alternative flame retardants [metabolites]**|         |             |              |            |            |                |      |       |       |
| Tris(1-chloro-2-propyl) phosphate (TCPP) [BCPP]                       | 13674-84-5 |            |             |            |            |                |      |       |       |
| Tris(2-chloroethyl) phosphate (TCEP) [BCEtP]                          | 115-96-8  |            |             |            |            |                |      |       |       |
| Chemical                                                                 | CASRN   | Environmental media (level) | Biospecimens |
|------------------------------------------------------------------------|---------|----------------------------|--------------|
|                                                                        |         | Ambient air | Personal air | Indoor air | House dust | Drinking water | Food | Level | Trend |
| Tris(1,3-dichloro-2-propyl) phosphate (TDCIPP) [BDCPP]                 | 13674-87-8 |             |             |           |            |               |      |       |       |
| Tribenzyl phosphate (TBzP) [DBzP]                                      | 1707-92-2 |             |             |           |            |               |      |       |       |
| Tris-butyl phosphate (TBuP) [DBuP]                                     | 126-73-8 |             |             |           |            |               |      |       |       |
| Tri-o-cresyl phosphate (ToCP) [DoCP]                                   | 1330-78-5 |             |             |           |            |               |      |       |       |
| Tri-p-cresyl phosphate (TpCP) [DpCP]                                   | 78-32-0 |             |             |           |            |               |      |       |       |
| Triphenyl phosphate (TPhP) [DPhP]                                      | 115-86-6 |             |             |           |            |               |      |       |       |
| 2-Ethylhexyl-2,3,4,5-tetrabromobenzolate (EH-TBBZ) [TBBA]              | 183658-27-7 |             |             |           |            |               |      |       |       |
| **Perchlorate and other anions**                                       |         |              |              |             |            |               |      |       |       |
| Nitrate                                                                | 14797-55-8 |             |             |           |            |               |      |       |       |
| Perchlorate                                                            | 14797-73-0 |             |             |           |            |               |      |       |       |
| Thiocyanate                                                            | 302-04-5 |             |             |           |            |               |      |       |       |
| **Pyrethroids [metabolites]**                                          |         |              |              |             |            |               |      |       |       |
| Cyfluthrin [trans-3-(2,2-Dichlorovinyl)2,2-dimethylcyclopropane carboxylic acid; 4-fluoro-3-phenoxybenzoic acid] | 68359-37-5 |             |             |           |            |               |      |       |       |
| Cypermethrin [trans-3-(2,2-Dichlorovinyl)2,2-dimethylcyclopropane carboxylic acid; 3-Phenoxybenzoic acid] | 52315-07-8 |             |             |           |            |               |      |       |       |
| trans-permethrin [trans-3-(2,2-Dichlorovinyl)2,2-dimethylcyclopropane carboxylic acid] | 52645-53-1 |             |             |           |            |               |      |       |       |
| Deltamethrin [cis-3-(2,2-Dibromovinyl)-2,2-dimethylcyclopropane carboxylic acid] |         |             |             |           |            |               |      |       |       |
| **Metals and metalloids**                                              |         |              |              |             |            |               |      |       |       |
| Antimony                                                               | 7440-36-0 |             |             |           |            |               |      |       |       |
| Arsenic, Total                                                         | -       |             |             |           |            |               |      |       |       |
| Inorganic-related Arsenic Species                                      | -       |             |             |           |            |               |      |       |       |
| Arsenic (V) acid                                                       | 7778-39-4 |             |             |           |            |               |      |       |       |
| Arsenobetaine                                                          | 64436-13-1 |             |             |           |            |               |      |       |       |
| Arsenocholine                                                          | 39895-81-3 |             |             |           |            |               |      |       |       |
| Arsenous (III) acid                                                   | 13464-58-9 |             |             |           |            |               |      |       |       |
| Dimethylarsinic acid                                                   | 75-60-5 |             |             |           |            |               |      |       |       |
| Monomethylarsonic acid                                                | 124-58-3 |             |             |           |            |               |      |       |       |
| Trimethylarsine oxide                                                  | 4964-14-1 |             |             |           |            |               |      |       |       |
| Barium                                                                | 7440-39-3 |             |             |           |            |               |      |       |       |
| Beryllium                                                             | 7440-41-7 |             |             |           |            |               |      |       |       |
| Cadmium                                                               | 7440-43-9 |             |             |           |            |               |      |       |       |
| Cesium                                                                | 7440-46-2 |             |             |           |            |               |      |       |       |
| Chemical                                           | CASRN     | Environmental media (level) | Biospecimens |
|---------------------------------------------------|-----------|----------------------------|--------------|
|                                                   |           | Ambient air | Personal air | Indoor air | House dust | Drinking water | Food | Level | Trend |
| Chromium [NHANES data not reported in 12-19 year olds] | 7440-47-3 |             |             |           |           |                |      |       |       |
| Cobalt                                            | 7440-48-4 |             |             |           |           |                |      |       |       |
| Copper                                             | 7440-50-8 |             |             |           |           |                |      |       |       |
| Lead                                               | 7439-92-1 |             |             |           |           |                |      |       |       |
| Manganese                                          | 7439-96-5 |             |             |           |           |                |      |       |       |
| Mercury                                            | 7439-97-6 |             |             |           |           |                |      |       |       |
| Molybdenum                                         | 7439-98-7 |             |             |           |           |                |      |       |       |
| Platinum                                           | 7440-06-4 |             |             |           |           |                |      |       |       |
| Selenium                                           | 7782-49-2 |             |             |           |           |                |      |       |       |
| Strontium                                          | 7440-24-6 |             |             |           |           |                |      |       |       |
| Thallium                                           | 7440-28-0 |             |             |           |           |                |      |       |       |
| Tin                                                | 7440-31-5 |             |             |           |           |                |      |       |       |
| Tungsten                                           | 7440-33-7 |             |             |           |           |                |      |       |       |
| Uranium                                            | 7440-61-1 |             |             |           |           |                |      |       |       |
| Zinc                                               | 7440-66-6 |             |             |           |           |                |      |       |       |
| **Tobacco smoke**                                  |           |             |             |           |           |                |      |       |       |
| Cotinine [nicotine]                                | 486-56-6  |             |             |           |           |                |      |       |       |
| Hydroxycotinine [nicotine]                         | 108450-02-8 |             |             |           |           |                |      |       |       |
| 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanol (NNAL) | 76014-81-8 |             |             |           |           |                |      |       |       |
| **Disinfection byproducts**                        |           |             |             |           |           |                |      |       |       |
| Bromodichloromethane                               | 75-27-4   |             |             |           |           |                |      |       |       |
| Dibromochloromethane (Chlorodibromomethane)        | 124-48-1  |             |             |           |           |                |      |       |       |
| Tribromomethane (Bromoform)                        | 75-25-2   |             |             |           |           |                |      |       |       |
| Trichloromethane (Chloroform)                      | 67-66-3   |             |             |           |           |                |      |       |       |
| **Fungicides and metabolites**                     |           |             |             |           |           |                |      |       |       |
| Ortho-Phenyl phenol                                | 90-43-7   |             |             |           |           |                |      |       |       |
| Ethylene thiourea [dithiocarbamate fungicides]     | 96-45-7   |             |             |           |           |                |      |       |       |
| Pentachlorophenol                                  | 87-86-5   |             |             |           |           |                |      |       |       |
| Propylene thiourea [Propineb]                      | 2055-46-1 |             |             |           |           |                |      |       |       |
| **Herbicides and metabolites**                     |           |             |             |           |           |                |      |       |       |
| 2,4-Dichlorophenoxyacetic acid (2,4-D)              | 94-75-7   |             |             |           |           |                |      |       |       |
| 2,4,5-Trichlorophenoxyacetic acid                  | 93-76-5   |             |             |           |           |                |      |       |       |
| Chemical                                      | CASRN      | Ambient air | Personal air | Indoor air | House dust | Drinking water | Food | Level | Trend |
|-----------------------------------------------|------------|-------------|--------------|------------|------------|----------------|------|-------|-------|
| Atrazine                                      | 1912-24-9  |             |              |            |            |                |      |       |       |
| Atrazine mercapturate [atrazine]              |            |             |              |            |            |                |      |       |       |
| Desethyl atrazine [atrazine]                  | 6190-65-4  |             |              |            |            |                |      |       |       |
| Desisopropyl atrazine                         | 1007-28-9  |             |              |            |            |                |      |       |       |
| Desisopropyl atrazine mercapturate [atrazine]|            |             |              |            |            |                |      |       |       |
| Diaminochlorotrazine                           | 122-34-9   |             |              |            |            |                |      |       |       |
| **Organochlorine pesticides [metabolites]**   |            |             |              |            |            |                |      |       |       |
| 2,4,5-Trichlorophenol [several organochlorine pesticides] | 95-95-4 |             |              |            |            |                |      |       |       |
| 2,4,6-Trichlorophenol [several organochlorine pesticides] | 118-79-6 |             |              |            |            |                |      |       |       |
| 4, 4'-DDE                                     | 72-55-9    |             |              |            |            |                |      |       |       |
| 4, 4'-DDT                                     | 50-29-3    |             |              |            |            |                |      |       |       |
| Aldrin                                        | 309-00-2   |             |              |            |            |                |      |       |       |
| *beta*-Hexachlorocyclohexane (BHC)            | 608-73-1   |             |              |            |            |                |      |       |       |
| Dieldrin                                      | 60-57-1    |             |              |            |            |                |      |       |       |
| Endrin                                        | 72-20-8    |             |              |            |            |                |      |       |       |
| Heptachlor [heptachlor epoxide]               | 76-44-8    |             |              |            |            |                |      |       |       |
| Hexachlorobenzene                             | 118-74-1   |             |              |            |            |                |      |       |       |
| Lindane [*gamma*-Hexachlorocyclohexane]       | 58-89-9    |             |              |            |            |                |      |       |       |
| *o,p*' Dichlorodiphenyl-trichloroethane (*o,p*'-DDT) | 789-02-6 |             |              |            |            |                |      |       |       |
| Mirex                                         | 2385-85-5  |             |              |            |            |                |      |       |       |
| Oxychlordane                                  | 27304-13-8 |             |              |            |            |                |      |       |       |
| *trans*-Nonachlor                             | 39765-80-5 |             |              |            |            |                |      |       |       |
| *alpha*-Chlordane (cis-chlordane) [oxychlordane] | 5103-71-9 |             |              |            |            |                |      |       |       |
| *gamma*-Chlordane (trans-chlordane) [oxychlordane] | 5103-74-2 |             |              |            |            |                |      |       |       |
| **Polybrominated diphenyl ethers (PBDEs)**    |            |             |              |            |            |                |      |       |       |
| PBDE 17                                       | 147217-75-2|             |              |            |            |                |      |       |       |
| PBDE 28                                       | 41318-75-6 |             |              |            |            |                |      |       |       |
| PBDE 47                                       | 5436-43-1  |             |              |            |            |                |      |       |       |
| PBDE 66                                       | 189084-61-5|             |              |            |            |                |      |       |       |
| PBDE 85                                       | 182346-21-0|             |              |            |            |                |      |       |       |
| PBDE 99                                       | 60348-60-9 |             |              |            |            |                |      |       |       |
| PBDE 100                                      | 189084-64-8|             |              |            |            |                |      |       |       |
| Chemical       | CASRN    | Environmental media (level) | Biospecimens |
|---------------|----------|----------------------------|--------------|
|               |          | Ambient air | Personal air | Indoor air | House dust | Drinking water | Food |
| PBDE 153      | 68631-49-2 |             |             |           |           |               |      |
| PBDE 154      | 207122-15-4 |             |             |           |           |               |      |
| PBDE 183      | 207122-16-5 |             |             |           |           |               |      |
| PBDE 209      | 1163-19-5  |             |             |           |           |               |      |
| **Non-dioxin-like polychlorinated biphenyls (PCBs)** | | | | | | | |
| PCB 28        | 7012-37-5  |             |             |           |           |               |      |
| PCB 44        | 41464-39-5  |             |             |           |           |               |      |
| PCB 49        | 41464-40-8  |             |             |           |           |               |      |
| PCB 52        | 35693-99-3  |             |           |           |           |               |      |
| PCB 66        | 32598-10-0  |             |             |           |           |               |      |
| PCB 74        | 32690-93-0  |             |             |           |           |               |      |
| PCB 87        | 38380-02-8  |             |             |           |           |               |      |
| PCB 99        | 38380-01-7  |             |             |           |           |               |      |
| PCB 101       | 37680-73-2  |             |             |           |           |               |      |
| PCB 110       | 38380-03-9  |             |             |           |           |               |      |
| PCB 128       | 38380-07-3  |             |             |           |           |               |      |
| PCB 138       | 35065-28-2  |             |             |           |           |               |      |
| PCB 146       | 51908-16-8  |             |             |           |           |               |      |
| PCB 149       | 38380-04-0  |             |             |           |           |               |      |
| PCB 151       | 52663-63-5  |             |             |           |           |               |      |
| PCB 153       | 35065-27-1  |             |             |           |           |               |      |
| PCB 158       | 74472-42-7  |             |             |           |           |               |      |
| PCB 170       | 35065-30-6  |             |             |           |           |               |      |
| PCB 172       | 52663-74-8  |             |             |           |           |               |      |
| PCB 177       | 52663-70-4  |             |             |           |           |               |      |
| PCB 178       | 52663-67-9  |             |             |           |           |               |      |
| PCB 180       | 35065-29-3  |             |             |           |           |               |      |
| PCB 183       | 52663-69-1  |             |             |           |           |               |      |
| PCB 187       | 52663-68-0  |             |             |           |           |               |      |
| PCB 194       | 35694-08-7  |             |             |           |           |               |      |
| PCB 195       | 52663-78-2  |             |             |           |           |               |      |
| PCB 196       | 42740-50-1  |             |             |           |           |               |      |
| Chemical                  | CASRN     | Environmental media (level) | Biospecimens |
|--------------------------|-----------|-----------------------------|--------------|
|                          |           | Ambient air | Personal air | Indoor air | House dust | Drinking water | Food | Level | Trend |
| PCB 199                  | 52663-75-9|              |              |            |            |                |      |       |       |
| PCB 203                  | 52663-76-0|              |              |            |            |                |      |       |       |
| PCB 206                  | 40186-72-9|              |              |            |            |                |      |       |       |
| PCB 209                  | 2051-24-3 |              |              |            |            |                |      |       |       |
| Dioxin-like polychlorinated biphenyls (PCBs) | | | | | | | | |
| PCB 81                   | 70362-50-4|              |              |            |            |                |      |       |       |
| PCB 105                  | 32598-14-4|              |              |            |            |                |      |       |       |
| PCB 114                  | 74472-37-0|              |              |            |            |                |      |       |       |
| PCB 118                  | 31508-00-6|              |              |            |            |                |      |       |       |
| PCB 123                  | 65510-44-3|              |              |            |            |                |      |       |       |
| PCB 126                  | 57465-28-8|              |              |            |            |                |      |       |       |
| PCB 156                  | 38380-08-4|              |              |            |            |                |      |       |       |
| PCB 157                  | 69782-90-7|              |              |            |            |                |      |       |       |
| PCB 167                  | 52663-72-6|              |              |            |            |                |      |       |       |
| PCB 169                  | 32774-16-6|              |              |            |            |                |      |       |       |
| PCB 189                  | 39635-31-9|              |              |            |            |                |      |       |       |
| No ECHO cohorts with existing or planned assays | | | | | | | | |
| Volatile organic compounds (VOCs) | | | | | | | | |
| 1,1,1-Trichloroethane (methyl chloroform) | 71-55-6 | | | | | | | |
| Chemical            | CASRN  | Environmental media (level) | Biospecimens |
|---------------------|--------|----------------------------|--------------|
|                     |        | Ambient air | Personal air | Indoor air | House dust | Drinking water | Food |
| 1,4-Dioxane         | 123-91-1 |             |              |           |           |               |      |
| 2,5-Dimethylfuran   | 625-86-5 |             |              |           |           |               |      |
| Benzene             | 71-43-2 |             |              |           |           |               |      |
| Carbon tetrachloride| 56-23-5 |             |              |           |           |               |      |
| Chlorobenzene       | 108-90-7 |             |              |           |           |               |      |
| Chloroethane        | 75-00-3 |             |              |           |           |               |      |
| Cyclohexane         | 110-82-7 |             |              |           |           |               |      |
| Dibromomethane      | 74-95-3 |             |              |           |           |               |      |
| Diethyl ether       | 60-29-7 |             |              |           |           |               |      |
| Ethyl acetate       | 141-78-6 |             |              |           |           |               |      |
| Ethylbenzene        | 100-41-4 |             |              |           |           |               |      |
| Furan               | 110-00-9 |             |              |           |           |               |      |
| Heptane             | 142-82-5 |             |              |           |           |               |      |
| Hexachloroethane    | 67-72-1 |             |              |           |           |               |      |
| Hexane              | 110-54-3 |             |              |           |           |               |      |
| Isopropylbenzene    | 98-82-8 |             |              |           |           |               |      |
| m- and p-Xylene     | 108-38-3/ |             |              |           |           |               |      |
| Methylene chloride  | 106-42-3 |             |              |           |           |               |      |
| Methyl t-butyl ether| 75-09-2 |             |              |           |           |               |      |
| Methylcyclopentane  | 1634-04-4 |             |              |           |           |               |      |
| Nitrobenzene        | 96-37-7 |             |              |           |           |               |      |
| Nitromethane        | 98-95-3 |             |              |           |           |               |      |
| Octane              | 111-65-9 |             |              |           |           |               |      |
| o-Xylene            | 95-47-6 |             |              |           |           |               |      |
| Styrene             | 100-42-5 |             |              |           |           |               |      |
| Tetrachloroethylene | 127-18-4 |             |              |           |           |               |      |
| Carbon tetrachloride| 56-23-5 |             |              |           |           |               |      |
| Tetrahydrofuran     | 109-99-9 |             |              |           |           |               |      |
| Toluene             | 108-88-3 |             |              |           |           |               |      |
| Trichloroethylene   | 79-01-6 |             |              |           |           |               |      |
| Chemical                                                                 | CASRN  | Ambient air | Personal air | Indoor air | House dust | Drinking water | Food | Level | Trend |
|------------------------------------------------------------------------|--------|-------------|--------------|------------|------------|----------------|------|-------|-------|
| **Volatile organic compounds (VOCs) [metabolites]**                    |        |             |              |            |            |                |      |       |       |
| 1-Bromopropane [N-Acetyl-S-(n-propyl)-L-cysteine]                      | 106-94-5 |             |              |            |            |                |      |       |       |
| 1,3-Butadiene [N-Acetyl-S-(3,4-dihydroxybutyl)-L-cysteine; N-Acetyl-S-(1-hydroxymethyl-2-propenyl)-L-cysteine; N-Acetyl-S-(2-hydroxy-3-butynyl)-L-cysteine; N-Acetyl-S-(4-hydroxy-2-butenyl)-L-cysteine] | 106-99-0 |             |              |            |            |                |      |       |       |
| Acrolein [N-Acetyl-S-(2-carboxyethyl)-L-cysteine; N-Acetyl-S-(3-hydroxypropyl)l-cysteine] | 107-02-8 |             |              |            |            |                |      |       |       |
| Acrylamide [N-Acetyl-S-(2-carbamoyl ethyl)-L-cysteine; N-Acetyl-S-(2-carbamoyl-2-hydroxyethyl)-L-cysteine] | 79-06-1 |             |              |            |            |                |      |       |       |
| Acrylonitrile [N-Acetyl-S-(2-cyanoethyl)-L-cysteine; N-Acetyl-S-(2-hydroxyethyl)-L-cysteine] | 107-13-1 |             |              |            |            |                |      |       |       |
| Benzene [N-Acetyl-S-(phenyl)-L-cysteine]                                | 71-43-2 |             |              |            |            |                |      |       |       |
| Carbon disulfide [2-Thioxothiazolidine-4-carboxylic acid]              | 75-15-0 |             |              |            |            |                |      |       |       |
| Crotonaldehyde [N-Acetyl-S-(3-hydroxypropyl-1-methyl)-L-cysteine]       | 4170-30-3 |             |              |            |            |                |      |       |       |
| Cyanide [2-Aminothiazoline-4-carboxylic acid]                          | 57-12-5 |             |              |            |            |                |      |       |       |
| N,N-Dimethyl formamide [N-Acetyl-S-(N-methylcarbamoyl)-L-cysteine]      | 68-12-2 |             |              |            |            |                |      |       |       |
| Ethylbenzene [Pheny glyoxylic acid]                                    | 100-41-4 |             |              |            |            |                |      |       |       |
| Propylene oxide [N-Acetyl-S-(2-hydroxypropyl)-L-cysteine]              | 75-56-9 |             |              |            |            |                |      |       |       |
| m-/p -Xylene [3- & 4-Methyl hippuric acid]                             | 108-38-3 / 106-42-3 |             |              |            |            |                |      |       |       |
| o -Xylene [N-Acetyl-S-(dimethylphenyl)-L-cysteine; 2-Methyl hippuric acid] | 100-42-5 |             |              |            |            |                |      |       |       |
| Styrene [Pheny glyoxylic acid; N-Acetyl-S-(phenyl-2-hydroxyethyl)-L-cysteine; Mandelic acid] | 100-42-5 |             |              |            |            |                |      |       |       |
| Tetrachloroethylene [N-Acetyl-S-(trichlorovinyl)-L-cysteine]           | 127-18-4 |             |              |            |            |                |      |       |       |
| Toluene [N-Acetyl-S-(benzyl)-L-cysteine]                                | 108-88-3 |             |              |            |            |                |      |       |       |
| Trichloroethylene [N-Acetyl-S-(1,2-dichlorovinyl)-L-cysteine; N-Acetyl-S-(2,2-dichlorovinyl)-L-cysteine] | 79-01-6 |             |              |            |            |                |      |       |       |
| **Other chemicals biomonitored by NHANES (unknown whether ECHO cohorts have existing or planned assays)** |        |             |              |            |            |                |      |       |       |
| **Insect repellents and metabolites**                                  |        |             |              |            |            |                |      |       |       |
| N,N-Diethyl-meta-toluamide (DEET)                                      | 2728-05-4 |             |              |            |            |                |      |       |       |
| 3-(Diethylcarbamoyl) acid (DCBA) [DEET]                                | - |             |              |            |            |                |      |       |       |
| N,N-Diethyl-3-(hydroxymethyl) benzamide (DHMB) [DEET]                   | - |             |              |            |            |                |      |       |       |
| **Carbamate pesticides [metabolites]**                                 |        |             |              |            |            |                |      |       |       |
| Carbofuran [Carbofuran phenol]                                         | 1563-66-2 |             |              |            |            |                |      |       |       |
| Chemical                                                                 | CASRN   | Environmental media (level) | Biospecimens |
|------------------------------------------------------------------------|---------|----------------------------|--------------|
| Propoxur [2-Isopropoxyphenol]                                           | 114-26-1|                            |              |
| **Heterocyclic amines**                                                |         |                            |              |
| 3-Amino-1,4-dimethyl-5H-pyrido[4,3-b]indole (Trp-P-1)                  | 62450-06-0|                            |              |
| 2-Amino-3-methyl-9H-pyrido[2,3-b]indole (MeA-α-C)                      | 26148-68-5|                            |              |
| 2-Amino-1-methyl-6-phenylimidazo[4,5-b]pyridine (PhIP)                 | 105650-23-5|                            |              |
| 2-Amino-9H-pyrido[2,3-b]indole (A-α-C)                                  | 26148-68-5|                            |              |
| 2-Amino-3-methyl-3H-imidazo[4,5-f]quinolone (IQ)                       | 76180-96-6|                            |              |
| 2-Amino-6-methylpyrido[1,2-a:3',2'-d]imidazole (Glu-P-1)               | 67730-11-4|                            |              |
| 2-Aminodipyrido[1,2-a:3',2'-d] imidazole (GLU-P-2)                     | 67730-10-3|                            |              |
| Harman                                                                 | 486-84-0|                            |              |
| 1-Methyl-3-amino-5H-pyrido[4,3-b]indole (Trp-P-2)                      | 62450-07-1|                            |              |
| Norharman                                                              | 244-63-3|                            |              |
### Units for chemicals in various media

| Medium                              | Environmental phenols, phthalates | Parabens | PFASs | PAHs | Pesticides, fungicides, herbicides | OPFRs | Perchlorate and related anions | Metals, metalloids | Cotinine | NNAL | Disinfection byproducts | PBDEs | PCBs | VOCs | Heterocyclic amines |
|-------------------------------------|-----------------------------------|----------|-------|------|------------------------------------|-------|-------------------------------|-------------------|-----------|------|----------------------|-------|------|------|---------------------|
| Drinking water                      | µg/L (ppb)                        | ng/L (ppt) | ng/L (ppt) | µg/L (ppb) | ng/L (ppb) | µg/L (ppb) | µg/L (ppb) | µg/L (ppb) | µg/L (ppb) | ng/m³ (ppt) | ng/m³ (ppt) | µg/m³ (ppb) |
| Ambient Air                         | ng/m³ (ppt)                       | ng/m³ (ppt) | ng/m³ (ppt) | ng/m³ (ppt) | ng/m³ (ppt) | ng/m³ (ppt) | ng/m³ (ppt) | ng/m³ (ppt) | ng/m³ (ppt) | ng/m³ (ppt) | µg/m³ (ppb) |
| Personal Air                        | ng/m³ (ppt)                       | ng/m³ (ppt) | ng/m³ (ppt) | ng/m³ (ppt) | ng/m³ (ppt) | ng/m³ (ppt) | ng/m³ (ppt) | ng/m³ (ppt) | ng/m³ (ppt) | ng/m³ (ppt) | µg/m³ (ppb) |
| Indoor Air                          | ng/m³ (ppt)                       | ng/m³ (ppt) | ng/m³ (ppt) | ng/m³ (ppt) | ng/m³ (ppt) | ng/m³ (ppt) | ng/m³ (ppt) | ng/m³ (ppt) | ng/m³ (ppt) | ng/m³ (ppt) | µg/m³ (ppb) |
| House Dust                          | ng/g (ppb)                        | ng/g (ppb) | ng/g (ppb) | ng/g (ppb) | ng/g (ppb) | µg/g (ppb) | ng/g (ppb) | µg/g (ppb) | µg/g (ppb) | µg/g (ppb) | µg/g (ppb) |
| Food                                | ng/g (ppb)                        | ng/g (ppb) | ng/g (ppb) | ng/g (ppb) | ng/g (ppb) | µg/g (ppb) | ng/g (ppb) | µg/g (ppb) | µg/g (ppb) | µg/g (ppb) | µg/g (ppb) |
| Serum or Blood                      | µg/L (ppb)                        | µg/L (ppb) | µg/L (ppb) | µg/L (ppb) | µg/L (ppb) | µg/L (ppb) | µg/L (ppb) | µg/L (ppb) | µg/L (ppb) | µg/L (ppb) | µg/L (ppb) |
| Urine                               | µg/L (ppb)                        | µg/L (ppb) | µg/L (ppb) | µg/L (ppb) | µg/L (ppb) | mg/L (ppb) | µg/L (ppb) | µg/L (ppb) | µg/L (ppb) | µg/L (ppb) | µg/L (ppb) |

4-(Methylnitrosamino)-1-(3-pyridyl)-1-butan-1-ol (NNAL); Organophosphate flame retardants (OPFRs); Perfluoroalkyl substances (PFASs); Polybrominated diphenyl ethers (PBDEs); Polychlorinated biphenyls (PCBs); Polycyclic aromatic hydrocarbons (PAHs); Volatile organic compounds (VOCs)

1 Includes organophosphorus insecticides, pyrethroids, fungicides, herbicides, organochlorine pesticides, insect repellents, and carbamate pesticides
Table S2. Number of 70 ECHO cohorts with existing chemical assays by participant and life stage

| Chemical Class                              | Mother | Child                      |
|---------------------------------------------|--------|----------------------------|
|                                             | Collected | Pre- | Conception | Prenatal | Delivery/ | Collected | Delivery/ | Infant | Early | Middle |  
|                                             | (any)   | (n=50) | (n=69)     | (n=70)   | infancy   | (any)     | neonatal | (n=70) | childhood | childhood |
| Environmental phenols and parabens          | 16      | 8     | 9           | 0        | 2         | 0         | 0        | 2       | 1       | 1       |
| Phthalates                                  | 9       | 1     | 9           | 0        | 2         | 1         | 1        | 1       | 1       | 1       |
| PFASs                                       | 5       | 0     | 5           | 0        | 2         | 1         | 0        | 0       | 1       | 1       |
| PAHs                                        | 5       | 1     | 5           | 1        | 1         | 1         | 0        | 1       | 1       | 1       |
| Organophosphorus insecticides               | 5       | 1     | 4           | 1        | 1         | 1         | 0        | 1       | 1       | 1       |
| Organophosphate or other alternative flame retardants | 3   | 0     | 2           | 1        | 0         | 0         | 0        | 0       | 0       | 0       |
| Perchlorate and related anions              | 2       | 1     | 2           | 0        | 1         | 1         | 0        | 0       | 0       | 0       |
| Pyrethroids                                 | 3       | 1     | 2           | 1        | 1         | 1         | 0        | 1       | 1       | 1       |
| Metals/metalloids                           | 7       | 1     | 6           | 4        | 5         | 4         | 2        | 3       | 1       | 1       |
| Tobacco biomarkers                          | 10      | 1     | 7           | 5        | 7         | 2         | 4        | 5       | 2       | 2       |
| Disinfection byproducts                     | 7       | 7     | 0           | 0        | 0         | 0         | 0        | 0       | 0       | 0       |
| Fungicides or herbicides                    | 1       | 0     | 1           | 0        | 0         | 0         | 0        | 0       | 0       | 0       |
| Organochlorine pesticides                  | 4       | 1     | 3           | 1        | 2         | 2         | 0        | 0       | 0       | 0       |
| PBDEs                                       | 6       | 1     | 5           | 1        | 4         | 2         | 1        | 3       | 1       | 1       |
| PCBs                                        | 5       | 1     | 4           | 1        | 2         | 2         | 0        | 1       | 1       | 1       |

n, number of cohorts that collected any data at each life stage. Perfluoroalkyl substances (PFASs); Polybrominated diphenyl ethers (PBDEs); Polychlorinated biphenyls (PCBs); Polycyclic aromatic hydrocarbons (PAHs)

1 Life stages defined as follows: delivery/infancy (birth to <12 months), delivery/neonatal (<1 month), infancy (1 to <12 months), early childhood (1 to <5 years), middle childhood (5 to <12 years)

2 Number of cohorts that collected any data at each life stage
Table S3. Number of 70 ECHO cohorts with existing or planned assays of specific chemicals by participant and life stage¹

| Chemical Class                  | Mother                                      | Child                                      |                      |                      |                      |                      |
|---------------------------------|---------------------------------------------|--------------------------------------------|----------------------|----------------------|----------------------|----------------------|
|                                 | Collected (any) (n=70)                      | Pre-Conception (n=50)                      | Prenatal (n=69)      | Delivery/infancy (n=70) | Collected (any) (n=70) | Delivery/neonatal (n=69) | Infancy (n=70) | Early childhood (n=68) | Middle childhood (n=60) |
| Environmental phenols and parabens |                                    |                                            |                      |                      |                      |                      |
| Bisphenol A                     | 19                                          | 8                                          | 19                   | 0                    | 10                    | 2                    | 3                    |                      |
| Bisphenol S or bisphenol F      | 17                                          | 7                                          | 17                   | 0                    | 7                     | 1                    | 1                    |                      |
| Triclosan                       | 18                                          | 8                                          | 18                   | 0                    | 9                     | 2                    | 3                    | 7                    |
| Triclocarban                    | 14                                          | 7                                          | 14                   | 0                    | 6                     | 2                    | 2                    | 5                    |
| 2,4- or 2,5-Dichlorophenol      | 15                                          | 8                                          | 15                   | 0                    | 6                     | 0                    | 1                    | 5                    |
| Benzenophene-3                  | 15                                          | 8                                          | 15                   | 0                    | 6                     | 0                    | 1                    | 5                    |
| Parabens                        | 17                                          | 8                                          | 17                   | 0                    | 9                     | 2                    | 3                    | 7                    |
| Other                           | 12                                          | 9                                          | 11                   | 0                    | 5                     | 2                    | 1                    | 2                    |
| PFASs                           | 13                                          | 9                                          | 12                   | 1                    | 7                     | 4                    | 1                    | 2                    |
| PFOS or PFOA                    | 9                                           | 0                                          | 9                    | 0                    | 1                     | 0                    | 0                    | 1                    |
| Other long-chain                | 7                                           | 0                                          | 6                    | 0                    | 2                     | 1                    | 0                    | 1                    |
| Short-chain                     | 5                                           | 1                                          | 3                    | 0                    | 3                     | 2                    | 0                    | 1                    |
| Organophosphorus insecticides³  | 9                                           | 1                                          | 7                    | 2                    | 6                     | 2                    | 2                    | 4                    |
| Non-specific metabolites        | 6                                           | 0                                          | 4                    | 1                    | 5                     | 2                    | 1                    | 2                    |
| Specific metabolites            | 5                                           | 0                                          | 3                    | 1                    | 3                     | 2                    | 1                    | 1                    |
| Other                           | 3                                           | 0                                          | 1                    | 1                    | 1                     | 1                    | 0                    | 0                    |
| Metals/metalloids               | 14                                          | 2                                          | 12                   | 7                    | 31                    | 16                   | 11                   | 17                   |
| Lead                            | 12                                          | 2                                          | 12                   | 4                    | 27                    | 15                   | 10                   | 16                   |
| Manganese                       | 7                                           | 0                                          | 8                    | 2                    | 17                    | 10                   | 4                    | 8                    |
| Arsenic                         | 7                                           | 0                                          | 7                    | 2                    | 15                    | 7                    | 5                    | 11                   |
| Blood mercury (or methylmercury)| 4                                           | 0                                          | 4                    | 1                    | 9                     | 3                    | 3                    | 7                    |
| Urine mercury (or inorganic mercury) | 8                                          | 1                                          | 8                    | 3                    | 16                    | 8                    | 4                    | 9                    |
| Cadmium                         | 8                                           | 0                                          | 8                    | 2                    | 14                    | 7                    | 5                    | 10                   |
| Other                           | 9                                           | 1                                          | 9                    | 2                    | 14                    | 6                    | 4                    | 10                   |
| Organochlorine pesticides       | 6                                           | 2                                          | 5                    | 2                    | 10                    | 9                    | 1                    | 1                    |
| DDT or DDE                      | 4                                           | 1                                          | 3                    | 1                    | 7                     | 7                    | 0                    | 0                    |
| Hexachlorocyclohexane            | 4                                           | 0                                          | 3                    | 0                    | 5                     | 5                    | 0                    | 0                    |
| Hexachlorocyclohexene            | 4                                           | 0                                          | 3                    | 0                    | 5                     | 5                    | 0                    | 0                    |

n, number of cohorts that collected any data at each life stage. Dichlorodiphenyltrichloroethane (DDT), dichlorodiphenyldichloroethylene (DDE), Perfluoroalkyl substances (PFASs); perfluorooctanoic acid (PFOA); perfluorooctanesulfonic acid (PFOS)

¹ Life stages defined as follows: delivery/infancy (birth to <12 months), delivery/neonatal (<1 month), infancy (1 to <12 months), early childhood (1 to <5 years), middle childhood (5 to <12 years)

² Number of cohorts that collected any data at each life stage

³ Non-specific metabolites include dialkylphosphates and specific metabolites include 3,5,6-trichloro-2-pyridinol (TCPy) and malondialdehyde (MDA)