

Note to readers with disabilities: *EHP* strives to ensure that all journal content is accessible to all readers. However, some figures and Supplemental Material published in *EHP* articles may not conform to [508 standards](#) due to the complexity of the information being presented. If you need assistance accessing journal content, please contact ehp508@niehs.nih.gov. Our staff will work with you to assess and meet your accessibility needs within 3 working days.

Supplemental Material

Disparities in Toxic Chemical Exposures and Associated Neurodevelopmental Outcomes: A Scoping Review and Systematic Evidence Map of the Epidemiological Literature

Devon C. Payne-Sturges, Tanya Khemet Taiwo, Kristie Ellickson, Haley Mullen, Nedelina Tchangalova, Laura Anderko, Aimin Chen, and Maureen Swanson

Table of Contents

Table S1. Population, Exposure, Comparator, Outcome (PECO) Framework.

Table S2. Inclusion/Exclusion Criteria.

Table S3. Search Strategies.

PubMed

CINAHL Plus (EBSCO)

GreenFILE (EBSCO)

Web of Science Core Collection

Table S4. Definitions of Disparity Comparator Measures.

Table S5. Publication Dates of Included Studies.

Table S6. Cohorts Most Frequently Analyzed in the Studies Included in the Review.

Table S7. Neurodevelopmental Assessment Abbreviations.

Table S8. Measures of Social Comparators Used in Research Studies, 1974 – 2022, by Decade.

Table S9. Proportion of Studies that Presented Data on Exposure and Outcome Disparity by Pollutant.

Figure S1. Map of study locations.

Figure S2. Interactive Tableau Tool for the Seven Exemplar Neurotoxicant Exposures and Health Disparities.

References

Additional File- Excel Document

Table S1. Population, Exposure, Comparator, Outcome (PECO) Framework

Population (P)	Children and adolescents aged 0-18 years Children residing in the US
Exposure (E)	Environmental exposures to toxins affecting neurodevelopment: <ul style="list-style-type: none"> • Organophosphate pesticides • Polybrominated diphenyl ethers • Air pollution • Lead poisoning • Polychlorinated biphenyls • Mercury • Phthalates
Comparator (C)	Children (aged 0-18) from disadvantaged backgrounds or communities who have experienced historic discrimination due to social, economic, and other proxies for social disadvantage and marginalization vs. children who are not from these backgrounds. Social disadvantage may be examined by stratifying exposures and health outcomes by: <ul style="list-style-type: none"> • Race • Ethnicity • Income • Urban/rural residence • Indigenous populations • Occupation
Outcome (O)	Diagnostic neurodevelopmental outcomes include: <ul style="list-style-type: none"> • Attention and impulse control disorders • Attention-deficit/hyperactivity disorder (ADHD) • Autism spectrum disorder • Cerebral palsy • Developmental delays • Cognitive dysfunction • Intellectual deficits • Behavioral problems • Learning disabilities • Disorders of executive function • Birth defects (e.g, neural tube defects) or other relevant physical outcomes measured at birth (e.g.,reduced head circumference) • Other neurological effects (e.g., decreased cortical activation)

Table S2. Inclusion/Exclusion Criteria

Concept	Include	Exclude
Population (P)	<ul style="list-style-type: none"> Children and adolescents aged 0-18 years; include in-utero development Focus on children residing in the US Studies on pregnant women Include only explicit references to children, adolescents, in-utero development or pregnant women (e.g. exclude if “communities” are mentioned without referencing the population of interest) 	<ul style="list-style-type: none"> Children residing outside of the U.S. Studies with broad age ranges which include both children and adults (e.g. ages 5-65 years)
Exposure (E)	<ul style="list-style-type: none"> Environmental exposures to toxins affecting neurodevelopment (Prime Examples of Neurodevelopmental Toxins highlighted in Project TENDR’s consensus statement): <ul style="list-style-type: none"> Polybrominated diphenyl ethers Lead Mercury Polychlorinated biphenyls Phthalates Combustion-related air pollution PAHs, NO2, fine particulate matter (PM2.5, UFP), other pollutants with PM2.5/NO2 as markers, passive tobacco smoke exposure (secondhand smoke or environmental tobacco smoke exposure) Organophosphate pesticides Include both direct measurements on children and studies measuring ambient exposures Preliminary exclusion of abstracts based on Exposure: click the "no" radio button at the top of the abstract review to select "no" for all criteria. 	<ul style="list-style-type: none"> Air pollution unrelated to combustion (PM10, Crystalline Silica)
Comparator (C)	<ul style="list-style-type: none"> Main comparison: Children (aged 0-18 years) from disadvantaged backgrounds or communities who have experienced historic discrimination due to social, economic and other proxies for social disadvantage and marginalization vs. children who are not from these backgrounds. Social disadvantage may be examined by stratifying exposures and health outcomes by: <ul style="list-style-type: none"> Race/ethnicity; family income; socioeconomic status; parental occupation; geographical location (urban vs rural) Geographic comparisons must be located within the U.S. Studies with explicit group comparisons (e.g. high vs. low income) Studies focusing on populations of special interest for health disparities (e.g. low income and racial minority groups) Where a relevant health disparity in children may be inferred but is not explicitly stated, mark as ‘unclear’ 	<ul style="list-style-type: none"> Studies that do not examine health disparities Country-level geographic comparisons (e.g. U.S. vs. Italy)
Outcome (O)	<ul style="list-style-type: none"> Neurodevelopmental outcomes include: <ul style="list-style-type: none"> Attention and impulse control disorders 	<ul style="list-style-type: none"> The initial PEC screen will include ALL studies with PEC components, <u>regardless of outcome</u>.

Concept	Include	Exclude
	<ul style="list-style-type: none"> ○ ADHD ○ Autism Spectrum Disorder ○ Cerebral palsy ○ Developmental delays ○ Cognitive dysfunction ○ Intellectual deficits ○ Behavioral problems ○ Learning Disabilities ○ Disorders of Executive Function ○ Birth defects (e.g, neural tube defects) or other relevant physical outcomes measured at birth (e.g., reduced head circumference) ○ Other neurological effects (e.g., decreased cortical activation) ● Mark ‘Yes’ for all outcomes in the initial screen 	<ul style="list-style-type: none"> ● Articles identifying neurodevelopmental outcomes will be tagged after PEC screening.
Additional filters/hedges	<ul style="list-style-type: none"> ● Human studies ● Observational studies: <ul style="list-style-type: none"> ○ Case-control studies ○ Cohort studies ○ Cross-sectional studies ○ Ecologic studies ● Studies in English 	<ul style="list-style-type: none"> ● Non-observational studies: <ul style="list-style-type: none"> ○ Reviews ○ Meta-analyses ○ Commentaries/editorials ○ Randomized controlled trials ○ Interventions ○ Experimental studies ○ Quasi-experimental studies ● Animal studies

Note: Authors (DPS, KE) and KH conducted consistency checks reviewing titles and abstracts on 5% of the studies in CADIMA to assess inter-rater reliability and refine study inclusion and exclusion criteria. Reviewers were required to attain at least 80% agreement. Text in black indicates initial selection criteria; text in purple indicates criteria added after consistency check 1, and text in green indicates criteria added after consistency check 2. Abbreviations: United States (US), polycyclic aromatic hydrocarbons (PAHs), nitrogen dioxide (NO₂), particulate matter 2.5 microns and below (PM_{2.5}), particulate matter 10 microns and below (PM₁₀), ultra fine particles (UFP).

Table S3. Search Strategies

Note: The following search terms were combined using the Boolean operator OR between terms within a concept (i.e. Population) and the Boolean operator AND between concepts of the PECO Framework. Variations on these strings were used for each database, accounting for different database syntaxes. Free text terms, as well as controlled vocabulary terms, were used for designing the search strategy. Free text terms were limited to Title/Abstract only.

Dates of searches for all databases: 23 July 2019; Updated: 12 July 2021, and 18 November 2022

PubMed

#	Concepts	Query	23 July 2019	12 July 2021	18 Nov 2022
1	Population (P)	child [MeSH] OR adolescent [MeSH] OR minors [MeSH] OR infant [MeSH] OR pediatrics [MeSH] OR child [Title/Abstract] OR childhood [Title/Abstract] OR children [Title/Abstract] OR infan* [Title/Abstract] OR schoolchild* [Title/Abstract] OR school child* [Title/Abstract] OR newborn* [Title/Abstract] OR new-born* [Title/Abstract] OR baby [Title/Abstract] OR babies [Title/Abstract] OR toddler* [Title/Abstract] OR boy [Title/Abstract] OR boys [Title/Abstract] OR boyhood [Title/Abstract] OR girl* [Title/Abstract] OR kid [Title/Abstract] OR kids [Title/Abstract] OR juvenil* [Title/Abstract] OR pediatric* [Title/Abstract] OR paediatric* [Title/Abstract] OR peadiatric* [Title/Abstract] OR adolescen* [Title/Abstract] OR early life [Title/Abstract] OR youth* [Title/Abstract] OR teen* [Title/Abstract] OR postnat* [Title/Abstract] OR post-nat* [Title/Abstract] OR prenatal* [Title/Abstract] OR pre-nat* [Title/Abstract] OR fetal [Title/Abstract] OR foetus [Title/Abstract] OR foetal [Title/Abstract] OR fetu* [Title/Abstract] OR in utero [Title/Abstract] OR peri-nat* [Title/Abstract] OR perinat* [Title/Abstract] OR neonat* [Title/Abstract] OR prematur* [Title/Abstract] OR preterm* [Title/Abstract]	4,525,841	415,868	262,273
2	Exposure (E)	Lead poisoning, nervous system [MeSH] OR Lead expos* [Title/Abstract] OR Lead poison* [Title/Abstract] OR Lead toxic* [Title/Abstract] OR Pb [Title/Abstract] OR Mercury poisoning, nervous system [MeSH] OR Mercury [Title/Abstract] OR Hg [Title/Abstract] OR Polychlorinated biphenyls [MeSH] OR PCB [Title/Abstract] OR Polychlorinated biphenyl* [Title/Abstract] OR Phthalic Acids [MeSH] OR phthalate* [Title/Abstract] OR Phthalic acid* [Title/Abstract] OR Plasticizer* [Title/Abstract] OR Endocrine disruptor* [Title/Abstract] OR Plastic* [Title/Abstract] OR Polyvinyl chloride* [Title/Abstract] OR "Polyethylene terephthalate" [Title/Abstract] OR PET [Title/Abstract] OR PVC [Title/Abstract] OR Air Pollution [MeSH] OR Air Pollutants [MeSH] OR Nitrogen Dioxide [MeSH] OR Ozone [MeSH] OR Volatile Organic Compounds [MeSH] OR Sulfur Dioxide [MeSH] OR Carbon Monoxide [MeSH] OR Vehicle Emissions [MeSH] OR Polycyclic Aromatic Hydrocarbon [MeSH] OR distance to road [Title/Abstract] OR PM2.5 [Title/Abstract] OR air pollution [Title/Abstract] OR particulate matter [Title/Abstract] OR ozone [Title/Abstract] OR nitrogen dioxide [Title/Abstract] OR black carbon [Title/Abstract] OR traffic pollution [Title/Abstract] OR traffic-related PM [Title/Abstract] OR diesel exhaust emission* [Title/Abstract] OR engine emission* [Title/Abstract] OR ultrafine [Title/Abstract] OR polycyclic aromatic hydrocarbon* [Title/Abstract] OR PAH [Title/Abstract] OR styrene [Title/Abstract] OR microplastic* [Title/Abstract] OR Volatile Organic Compound* [Title/Abstract] OR VOC [Title/Abstract] OR Organophosphorus compounds [MeSH] OR Organophosphorus poisoning [MeSH] OR Organophosphate pesticide* [Title/Abstract] OR Organophosphate poison* [Title/Abstract] OR	1,265,610	142,249	101,187

#	Concepts	Query	23 July 2019	12 July 2021	18 Nov 2022
		<p>Organophosphorus compound* [Title/Abstract] OR Organophosphate herbicide* [Title/Abstract] OR Organophosphate insecticide* [Title/Abstract] OR aryldialkylphosphatase [Title/Abstract] OR Cholinesterase Inhibitor* [Title/Abstract] OR Cholinesterase Reactivator* [Title/Abstract] OR "poly(thiophene-3-acetic acid)" [Title/Abstract] OR neurotoxic esterase [Title/Abstract] OR isocarbophos [Title/Abstract] OR duodote [Title/Abstract] OR anilofos [Title/Abstract] OR diethylphosphoryloxime [Title/Abstract] OR tributylmethyl phosphonium chloride [Title/Abstract] OR diclofluanid [Title/Abstract] OR chloroacetol phosphate [Title/Abstract] OR crufomate [Title/Abstract] OR phosphorylphosphatase [Title/Abstract] OR phosphoramidic acid [Title/Abstract] OR soman [Title/Abstract] OR sarin [Title/Abstract] OR Pralidoxime Compound* [Title/Abstract] OR armin [Title/Abstract] OR dichlorvos [Title/Abstract] OR chlorfenvinphos [Title/Abstract] OR Carbamyl Phosphate [Title/Abstract] OR iphos [Title/Abstract] OR mevinphos [Title/Abstract] OR monocrotophos [Title/Abstract] OR naled [Title/Abstract] OR azinphosmethyl [Title/Abstract] OR chlorpyrifos [Title/Abstract] OR coumaphos [Title/Abstract] OR cystaphos [Title/Abstract] OR diazinon [Title/Abstract] OR dimethoate [Title/Abstract] OR disulfoton [Title/Abstract] OR fenitrothion [Title/Abstract] OR fenthion [Title/Abstract] OR fonofos [Title/Abstract] OR leptophos [Title/Abstract] OR malathion [Title/Abstract] OR parathion [Title/Abstract] OR methyl parathion [Title/Abstract] OR phorate [Title/Abstract] OR phosmet [Title/Abstract] OR temefos [Title/Abstract] OR paraoxon [Title/Abstract] OR phosphamidon [Title/Abstract] OR phosphines [Title/Abstract] OR trichlorfon [Title/Abstract] OR tetrachlorvinphos [Title/Abstract] OR tetraisopropylpyrophosphamide [Title/Abstract] OR dimethylphosphate [Title/Abstract] OR dimethylthiophosphate [Title/Abstract] OR dimethyldithiophosphate [Title/Abstract] OR diethylphosphate [Title/Abstract] OR dimethyl thiophosphate [Title/Abstract] OR dimethyl dithiophosphate [Title/Abstract] OR dimethyl phosphate [Title/Abstract] OR dimethyl thiophosphate [Title/Abstract] OR dimethyl dithiophosphate [Title/Abstract] OR diethyl phosphate [Title/Abstract] OR diethyl thiophosphate [Title/Abstract] OR diethyl dithiophosphate [Title/Abstract] OR PNP [Title/Abstract] OR tcpy [Title/Abstract] OR "3,5,6-trichloro-2-pyridinol" [Title/Abstract] OR Halogenated Diphenyl Ethers [MeSH] OR Flame Retardants [MeSH] OR flame retard* [Title/Abstract] OR fire retard* [Title/Abstract] OR fireproofing agent* [Title/Abstract] OR FireMaster [Title/Abstract] OR Bromkal [Title/Abstract] OR diphenyl ether deriv* [Title/Abstract] OR halogenated diphenyl* [Title/Abstract] OR brominated diphenyl* [Title/Abstract] OR PBDE [Title/Abstract] OR polybrominated diphenyl* [Title/Abstract] OR polybromodiphenyl* [Title/Abstract] OR PBDP* [Title/Abstract] OR BDE [Title/Abstract] OR pentabromodiphenyl* [Title/Abstract] OR c-pentaBDE* [Title/Abstract] OR PentaBDE* [Title/Abstract] OR PeBDE [Title/Abstract] OR DE 71 [Title/Abstract] OR DE71 [Title/Abstract] OR PBDPO [Title/Abstract] OR pentabromo deriv* [Title/Abstract] OR pentabromophenyl* [Title/Abstract] OR octabromodiphenyl* [Title/Abstract] OR c-octaBDE* [Title/Abstract] OR OctaBDE* [Title/Abstract] OR OcBDE [Title/Abstract] OR octabromo deriv* [Title/Abstract] OR OBDE [Title/Abstract] OR OBDPO [Title/Abstract] OR decabromodiphenyl* [Title/Abstract] OR c-decaBDE* [Title/Abstract] OR DecaBDE* [Title/Abstract] OR DeBDE [Title/Abstract] OR DBDPO [Title/Abstract] OR FR 300 BA [Title/Abstract] OR tribromodiphenyl* [Title/Abstract] OR tribromo deriv* [Title/Abstract] OR tetrabromodiphenyl* [Title/Abstract] OR TetraBDE* [Title/Abstract] OR TeBDE [Title/Abstract] OR TBDE [Title/Abstract] OR BPDE [Title/Abstract] OR tetrabromo deriv* [Title/Abstract] OR TBDP [Title/Abstract] OR hexabromodiphenyl* [Title/Abstract] OR HexaBDE* [Title/Abstract] OR HxBDE [Title/Abstract] OR hexabromo deriv* [Title/Abstract] OR heptabromodiphenyl* [Title/Abstract] OR HeptaBDE* [Title/Abstract] OR nonabromodiphenyl* [Title/Abstract] OR NonaBDE* [Title/Abstract] OR NoBDE [Title/Abstract]</p>			

#	Concepts	Query	23 July 2019	12 July 2021	18 Nov 2022
3	Comparator (C)	Health status disparities [MeSH] OR social determinants of health [MeSH] OR race factors [MeSH] OR ethnic groups/epidemiology [MeSH] OR ethnic groups/ethnology [MeSH] OR vulnerable populations [MeSH] OR socioeconomic factors [MeSH] OR population health [MeSH] OR cities/epidemiology [MeSH] OR cities/ethnology [MeSH] OR occupations/adverse effects [MeSH] OR occupations/epidemiology [MeSH] OR occupations/injuries [MeSH] OR occupations/poisoning [MeSH] OR occupations/toxicity [MeSH] OR occupations/standards [MeSH] OR occupations/statistics and numerical data [MeSH] OR farms [MeSH] OR built environment [MeSH] OR residence characteristics [MeSH] OR occupational exposure [MeSH] OR socioeconomic [Title/Abstract] OR poverty [Title/Abstract] OR disparit* [Title/Abstract] OR inequalit* [Title/Abstract] OR equit* [Title/Abstract] OR inequit* [Title/Abstract] OR social position [Title/Abstract] OR social status [Title/Abstract] OR economic position [Title/Abstract] OR economic status [Title/Abstract] OR residence characteristic [Title/Abstract] OR community [Title/Abstract] OR communities [Title/Abstract] OR "place of residence" [Title/Abstract] OR geograph* [Title/Abstract] OR urban [Title/Abstract] OR city [Title/Abstract] OR cities [Title/Abstract] OR industrial [Title/Abstract] OR industry [Title/Abstract] OR suburb* [Title/Abstract] OR rural [Title/Abstract] OR agricultur* [Title/Abstract] OR farm* [Title/Abstract] OR migrant* [Title/Abstract] OR occupational exposure* [Title/Abstract]	1,795,642	333,597	252,081
4	P + E + C	#1 AND #2 AND #3	18,357	2,836	1,901
5	Study type	"cohort studies" [MeSH] OR "case-control studies" [MeSH] OR "comparative study" [pt] OR "risk factors"[MeSH] OR "cohort"[tw] OR "compared"[tw] OR "groups"[tw] OR "case control"[tw] OR "multivariate"[tw]	7,599,340	1,047,068	733,690
6	P + E + C + Study type	(#4 and #5)	10,274	1,415	892
7	P + E + C + Study Type + U.S. Studies	((#6 AND (north america[mesh:noexp] OR united states[mesh])) OR (#6 NOT (africa[mesh] OR asia[mesh] OR australia[mesh] OR canada[mesh] OR europe[mesh] OR south america[mesh]))) <i>Excluding non-US studies</i>	5,411	697	577
8	P + E + C + Study Type + U.S. Studies + Human Studies	(#7 NOT ("Animals"[Mesh] NOT ("Animals"[Mesh] AND "Humans"[Mesh]))) <i>Excluding animal studies</i>	5,195	653	542

#	Concepts	Query	23 July 2019	12 July 2021	18 Nov 2022
9	P + E + C + Study Type + U.S. Studies + Human Studies + Studies in English	(#7 NOT ("Animals"[Mesh] NOT ("Animals"[Mesh] AND "Humans"[Mesh]))) <i>Limited to English</i>	4,933	648	536
TOTAL PubMed records			6,117		

CINAHL Plus (EBSCO)

Note: For the updated searches, limiters were applied before starting each search:

- Limiters - Published Date: 20190801-20211231
- Limiters - Published Date: 20210801-20221118

#	Concepts	Query	23 July 2019	12 July 2021	18 Nov 2022
S1	Population (P)	((MH "Child") OR (MH "Adolescence") OR (MH "Minors (Legal)") OR (MH "Infant") OR (MH "Pediatrics")) OR TI (child OR childhood OR children OR infan* OR schoolchild* OR "school child*" OR newborn* OR new-born* OR baby OR babies OR toddler* OR boy OR boys OR boyhood OR girl* OR kid OR kids OR juvenil* OR pediatric* OR paediatric* OR peadiatric* OR adolescen* OR "early life" OR youth* OR teen* OR postnat* OR post-nat* OR prenat* OR pre-nat* OR fetal OR foetus OR foetal OR fetu* OR "in utero" OR peri-nat* OR perinat* OR neonat* OR prematur* OR preterm*) OR AB (child OR childhood OR children OR infan* OR schoolchild* OR "school child*" OR newborn* OR new-born* OR baby OR babies OR toddler* OR boy OR boys OR boyhood OR girl* OR kid OR kids OR juvenil* OR pediatric* OR paediatric* OR peadiatric* OR adolescen* OR "early life" OR youth* OR teen* OR postnat* OR post-nat* OR prenat* OR pre-nat* OR fetal OR foetus OR foetal OR fetu* OR "in utero" OR peri-nat* OR perinat* OR neonat* OR prematur* OR preterm*) <i>Expanders - Apply equivalent subjects</i> <i>Search modes - Boolean/Phrase</i>	1,187,635	163,511	104,074
S2	Exposure (E)	((MH "Lead poisoning") OR (MH "Lead") OR (MH "Mercury poisoning") OR (MH "Mercury") OR (MH "Polychlorinated biphenyls") OR (MH "Plasticizers") OR (MH "Air Pollution") OR (MH "Air Pollutants") OR (MH "Nitrogen Oxides") OR (MH "Ozone") OR (MH "Carbon Monoxide") OR (MH "Motor Vehicle Emissions") OR (MH "Polycyclic Hydrocarbons, Aromatic") OR (MH "Organophosphorus Compounds") OR (MH "Phenyl Ethers") OR (MH "Flame Retardants")) OR TI ("Lead expos*" OR "Lead poison*" OR "Lead tox*" OR Pb OR Mercury OR Hg OR PCB* OR "Polychlorinated biphenyl*" OR phthalate* OR "Phthalic acid*" OR Plasticizer* OR "Endocrine disruptor*" OR Plastic* OR "Polyvinyl chloride*" OR "Polyethylene terephthalate" OR PET OR PVC OR "distance to road" OR PM2.5 OR "air pollution" OR "particulate matter" OR ozone OR "nitrogen dioxide" OR "black carbon" OR "traffic pollution" OR "residential distance to nearest major" OR "traffic-related PM" OR "diesel exhaust emission*" OR "engine emission*" OR ultrafine OR "polycyclic aromatic hydrocarbon*" OR PAH* OR styrene OR microplastic* OR "Volatile Organic Compound*" OR VOC* OR "Organophosphate pesticide*" OR "Organophosphate poison*" OR "Organophosphorus compound*" OR "Organophosphate herbicide*" OR "Organophosphate insecticide*" OR aryldialkylphosphatase OR "Cholinesterase Inhibitor*" OR "Cholinesterase Reactivator*" OR "poly(thiophene-3-acetic acid)" OR "neurotoxic esterase" OR isocarbophos OR duodote OR anilofos OR diethylphosphoryloxime OR "tributylmethyl phosphonium chloride" OR diclofluanid OR "chloroacetol phosphate" OR cruformate OR phosphorylphosphatase OR "phosphoramidic acid" OR soman OR sarin OR "Pralidoxime Compound*" OR armin OR dichlorvos OR chlorfenvinphos OR "Carbamyl Phosphate" OR iphos OR mevinphos OR monocrotophos OR naled OR azinphosmethyl OR chlorpyrifos OR coumaphos OR cystaphos OR diazinon OR dimethoate OR disulfoton OR fenitrothion OR fenthion OR fonofos OR leptophos OR malathion OR parathion OR "methyl parathion" OR phorate OR phosmet OR temefos OR paraoxon OR phosphamidon OR phosphines OR trichlorfon OR tetrachlorvinphos OR tetraisopropylpyrophosphamide OR dimethylphosphate OR dimethylthiophosphate OR dimethyldithiophosphate OR diethylphosphate OR "dimethyl thiophosphate" OR "dimethyl dithiophosphate" OR "dimethyl phosphate" OR "dimethyl thiophosphate" OR "dimethyl dithiophosphate" OR "diethyl phosphate" OR "diethyl thiophosphate" OR "diethyl dithiophosphate" OR PNP OR tcpy OR "3,5,6-trichloro-2-pyridinol"	96,944	15,925	9,993

#	Concepts	Query	23 July 2019	12 July 2021	18 Nov 2022
		<p>OR "flame retard*" OR "fire retard*" OR "fireproofing agent*" OR FireMaster OR Bromkal OR "diphenyl ether deriv*" OR "halogenated diphenyl*" OR "brominated diphenyl*" OR PBDE* OR "polybrominated diphenyl*" OR polybromodiphenyl* OR PBDP* OR BDE* OR pentabromodiphenyl* OR c-pentaBDE* OR PentaBDE* OR PeBDE OR "DE 71" OR DE71 OR "pentabrominated diphenyl*" OR PBDPO OR "pentabromo deriv*" OR pentabromophenyl* OR octabromodiphenyl* OR c-octaBDE* OR OctaBDE* OR OcBDE OR "octabromo deriv*" OR OBDE OR OBDPO OR decabromodiphenyl* OR c-decaBDE* OR DecaBDE* OR DeBDE OR DBDPO OR "decabrominated diphenyl*" OR "FR 300 BA" OR tribromodiphenyl* OR "tribromo deriv*" OR tetrabromodiphenyl* OR TetraBDE* OR TeBDE OR TBDE OR BPDE OR "tetrabromo deriv*" OR TBDP OR "tetrabrominated diphenyl*" OR hexabromodiphenyl* OR HexaBDE* OR HxBDE OR "hexabromo deriv*" OR heptabromodiphenyl* OR HeptaBDE* OR nonabromodiphenyl* OR NonaBDE* OR NoBDE) OR AB ("Lead expos*" OR "Lead poison*" OR "Lead tox*" OR Pb OR Mercury OR Hg OR PCB* OR "Polychlorinated biphenyl*" OR phthalate* OR "Phthalic acid*" OR Plasticizer* OR "Endocrine disruptor*" OR Plastic* OR "Polyvinyl chloride*" OR "Polyethylene terephthalate" OR PET OR PVC OR "distance to road" OR PM2.5 OR "air pollution" OR "particulate matter" OR ozone OR "nitrogen dioxide" OR "black carbon" OR "traffic pollution" OR "residential distance to nearest major" OR "traffic-related PM" OR "diesel exhaust emission*" OR "engine emission*" OR ultrafine OR "polycyclic aromatic hydrocarbon*" OR PAH* OR styrene OR microplastic* OR "Volatile Organic Compound*" OR VOC* OR "Organophosphate pesticide*" OR "Organophosphate poison*" OR "Organophosphorus compound*" OR "Organophosphate herbicide*" OR "Organophosphate insecticide*" OR arylalkylphosphatase OR "Cholinesterase Inhibitor*" OR "Cholinesterase Reactivator*" OR "poly(thiophene-3-acetic acid)" OR "neurotoxic esterase" OR isocarbophos OR duodote OR anilofos OR diethylphosphoryloxime OR "tributylmethyl phosphonium chloride" OR diclofluanid OR "chloroacetol phosphate" OR crufomate OR phosphorylphosphatase OR "phosphoramidic acid" OR soman OR sarin OR "Pralidoxime Compound*" OR armin OR dichlorvos OR chlorfenvinphos OR "Carbamyl Phosphate" OR iphos OR mevinphos OR monocrotophos OR naled OR azinphosmethyl OR chlorpyrifos OR coumaphos OR cystaphos OR diazinon OR dimethoate OR disulfoton OR fenitrothion OR fenthion OR fonofos OR leptophos OR malathion OR parathion OR "methyl parathion" OR phorate OR phosmet OR temefos OR paraoxon OR phosphamidon OR phosphines OR trichlorfon OR tetrachlorvinphos OR tetraisopropylpyrophosphamide OR dimethylphosphate OR dimethylthiophosphate OR dimethyldithiophosphate OR diethylphosphate OR "dimethyl thiophosphate" OR "dimethyl dithiophosphate" OR "dimethyl phosphate" OR "dimethyl thiophosphate" OR "dimethyl dithiophosphate" OR "diethyl phosphate" OR "diethyl thiophosphate" OR "diethyl dithiophosphate" OR PNP OR tcpy OR "3,5,6-trichloro-2-pyridinol" OR "flame retard*" OR "fire retard*" OR "fireproofing agent*" OR FireMaster OR Bromkal OR "diphenyl ether deriv*" OR "halogenated diphenyl*" OR "brominated diphenyl*" OR PBDE* OR "polybrominated diphenyl*" OR polybromodiphenyl* OR PBDP* OR BDE* OR pentabromodiphenyl* OR c-pentaBDE* OR PentaBDE* OR PeBDE OR "DE 71" OR DE71 OR "pentabrominated diphenyl*" OR PBDPO OR "pentabromo deriv*" OR pentabromophenyl* OR octabromodiphenyl* OR c-octaBDE* OR OctaBDE* OR OcBDE OR "octabromo deriv*" OR OBDE OR OBDPO OR decabromodiphenyl* OR c-decaBDE* OR DecaBDE* OR DeBDE OR DBDPO OR "decabrominated diphenyl*" OR "FR 300 BA" OR tribromodiphenyl* OR "tribromo deriv*" OR tetrabromodiphenyl* OR TetraBDE* OR TeBDE OR TBDE OR BPDE OR "tetrabromo deriv*" OR TBDP OR "tetrabrominated diphenyl*" OR hexabromodiphenyl* OR HexaBDE* OR HxBDE OR "hexabromo deriv*" OR heptabromodiphenyl* OR HeptaBDE* OR nonabromodiphenyl* OR NonaBDE* OR NoBDE)</p> <p><i>Expanders - Apply equivalent subjects</i></p> <p><i>Search modes - Boolean/Phrase</i></p>			

#	Concepts	Query	23 July 2019	12 July 2021	18 Nov 2022
S3	Comparator (C)	<p>((MH "Health Status Disparities") OR (MH "Social Determinants of Health") OR (MH "Race Factors") OR (MH "Ethnic Groups") OR (MH "Special Populations") OR (MH "Socioeconomic Factors") OR (MH "Population Health") OR (MH "Urban Areas") OR (MH "Occupations and Professions") OR (MH "Agriculture") OR (MH "Farmworkers") OR (MH "Built Environment") OR (MH "Residence Characteristics") OR (MH "Occupational Exposure")) OR TI (socioeconomic OR poverty OR disparit* OR inequalit* OR equit* OR inequit* OR "social position*" OR "social status*" OR "economic position*" OR "economic status*" OR "residence characteristic*" OR communit* OR "place* of residence" OR geograph* OR urban OR city OR cities OR industrial OR industry OR suburb* OR rural OR agricultur* OR farm* OR migrant* OR "occupational exposure*") OR AB (socioeconomic OR poverty OR disparit* OR inequalit* OR equit* OR inequit* OR "social position*" OR "social status*" OR "economic position*" OR "economic status*" OR "residence characteristic*" OR communit* OR "place* of residence" OR geograph* OR urban OR city OR cities OR industrial OR industry OR suburb* OR rural OR agricultur* OR farm* OR migrant* OR "occupational exposure*")</p> <p><i>Expanders - Apply equivalent subjects</i> <i>Search modes - Boolean/Phrase</i></p>	573,803	102,117	67,014
S4	P + E + C	<p>S1 AND S2 AND S3</p> <p><i>Expanders - Apply equivalent subjects</i> <i>Search modes - Boolean/Phrase</i></p>	4,057	628	374
S5	P + E + C + Studies in English	<p>S1 AND S2 AND S3</p> <p><i>Narrow by Language: - english</i> <i>Expanders - Apply equivalent subjects</i> <i>Search modes - Boolean/Phrase</i></p>	1,269	335	257
S6	P + E + C + Studies in English – MEDLINE records	<p>S1 AND S2 AND S3</p> <p><i>Limiters - Exclude MEDLINE records</i> <i>Narrow by Language: - english</i> <i>Expanders - Apply equivalent subjects</i> <i>Search modes - Boolean/Phrase</i></p>	1,184	323	251
S7	P + E + C + Studies in English – MEDLINE records + U.S. Studies	<p>S1 AND S2 AND S3</p> <p><i>Narrow by Subject Geographic: - usa</i> <i>Limiters - Exclude MEDLINE records</i> <i>Narrow by Language: - english</i> <i>Expanders - Apply equivalent subjects</i> <i>Search modes - Boolean/Phrase</i></p>	644	168	114
TOTAL CINAHL Plus Records			926		

GreenFILE (EBSCO)

#	Concepts	Query	18 Nov 2022
S1	Population (P)	<p>TI (child OR childhood OR children OR infan* OR schoolchild* OR "school child*" OR newborn* OR new-born* OR baby OR babies OR toddler* OR boy OR boys OR boyhood OR girl* OR kid OR kids OR juvenil* OR pediatric* OR paediatric* OR peadiatric* OR adolescen* OR "early life" OR youth* OR teen* OR postnat* OR post-nat* OR prenat* OR pre-nat* OR fetal OR foetus OR foetal OR fetu* OR "in utero" OR peri-nat* OR perinat* OR neonat* OR prematur* OR preterm*) OR AB (child OR childhood OR children OR infan* OR schoolchild* OR "school child*" OR newborn* OR new-born* OR baby OR babies OR toddler* OR boy OR boys OR boyhood OR girl* OR kid OR kids OR juvenil* OR pediatric* OR paediatric* OR peadiatric* OR adolescen* OR "early life" OR youth* OR teen* OR postnat* OR post-nat* OR prenat* OR pre-nat* OR fetal OR foetus OR foetal OR fetu* OR "in utero" OR peri-nat* OR perinat* OR neonat* OR prematur* OR preterm*)</p> <p><i>Expanders - Apply equivalent subjects</i> <i>Search modes - Boolean/Phrase</i></p>	34,830
S2	Exposure (E)	<p>TI ("Lead expos*" OR "Lead poison*" OR "Lead tox*" OR Pb OR Mercury OR Hg OR PCB* OR "Polychlorinated biphenyl*" OR phthalate* OR "Phthalic acid*" OR Plasticizer* OR "Endocrine disruptor*" OR Plastic* OR "Polyvinyl chloride*" OR "Polyethylene terephthalate" OR PET OR PVC OR "distance to road" OR PM2.5 OR "air pollution" OR "particulate matter" OR ozone OR "nitrogen dioxide" OR "black carbon" OR "traffic pollution" OR "residential distance to nearest major" OR "traffic-related PM" OR "diesel exhaust emission*" OR "engine emission*" OR ultrafine OR "polycyclic aromatic hydrocarbon*" OR PAH* OR styrene OR microplastic* OR "Volatile Organic Compound*" OR VOC* OR "Organophosphate pesticide*" OR "Organophosphate poison*" OR "Organophosphorus compound*" OR "Organophosphate herbicide*" OR "Organophosphate insecticide*" OR aryldialkylphosphatase OR "Cholinesterase Inhibitor*" OR "Cholinesterase Reactivator*" OR "poly(thiophene-3-acetic acid)" OR "neurotoxic esterase" OR isocarbophos OR duodote OR anilofos OR diethylphosphoryloxime OR "tributylmethyl phosphonium chloride" OR diclofluanid OR "chloroacetol phosphate" OR crufomate OR phosphorylphosphatase OR "phosphoramidic acid" OR soman OR sarin OR "Pralidoxime Compound*" OR armin OR dichlorvos OR chlorfenvinphos OR "Carbamyl Phosphate" OR iphos OR mevinphos OR monocrotophos OR naled OR azinphosmethyl OR chlorpyrifos OR coumaphos OR cystaphos OR diazinon OR dimethoate OR disulfoton OR fenitrothion OR fenthion OR fonofos OR leptophos OR malathion OR parathion OR "methyl parathion" OR phorate OR phosmet OR temefos OR paraoxon OR phosphamidon OR phosphines OR trichlorfon OR tetrachlorvinphos OR tetraisopropylpyrophosphamide OR dimethylphosphate OR dimethylthiophosphate OR dimethyldithiophosphate OR diethylphosphate OR "dimethyl thiophosphate" OR "dimethyl dithiophosphate" OR "dimethyl phosphate" OR "dimethyl thiophosphate" OR "dimethyl dithiophosphate" OR "diethyl phosphate" OR "diethyl thiophosphate" OR "diethyl dithiophosphate" OR PNP OR tcpy OR "3,5,6-trichloro-2-pyridinol" OR "flame retard*" OR "fire retard*" OR "fireproofing agent*" OR FireMaster OR Bromkal OR "diphenyl ether deriv*" OR "halogenated diphenyl*" OR "brominated diphenyl*" OR PBDE* OR "polybrominated diphenyl*" OR polybromodiphenyl* OR PBDP* OR BDE* OR pentabromodiphenyl* OR c-pentaBDE* OR PentaBDE* OR PeBDE OR "DE 71" OR DE71 OR "pentabrominated diphenyl*" OR PBDPO OR "pentabromo deriv*" OR pentabromophenyl* OR octabromodiphenyl* OR c-octaBDE* OR OctaBDE* OR OcBDE OR "octabromo deriv*" OR OBDE OR OBDPO OR decabromodiphenyl* OR c-decaBDE* OR DecaBDE* OR DeBDE OR DBDPO OR "decabrominated diphenyl*" OR "FR 300 BA" OR tribromodiphenyl* OR "tribromo deriv*" OR tetrabromodiphenyl* OR TetraBDE* OR TeBDE OR TBDE OR BPDE OR "tetrabromo deriv*" OR TBDP OR "tetrabrominated diphenyl*" OR hexabromodiphenyl* OR HexaBDE* OR HxBDE OR "hexabromo deriv*" OR heptabromodiphenyl* OR HeptaBDE* OR nonabromodiphenyl* OR NonaBDE* OR NoBDE) OR AB ("Lead expos*" OR "Lead poison*" OR "Lead tox*" OR Pb OR Mercury OR Hg OR PCB* OR "Polychlorinated biphenyl*" OR phthalate* OR "Phthalic acid*" OR Plasticizer* OR "Endocrine disruptor*" OR Plastic* OR "Polyvinyl chloride*" OR "Polyethylene terephthalate" OR PET OR PVC OR "distance to road" OR PM2.5 OR "air pollution" OR "particulate matter" OR ozone OR "nitrogen dioxide" OR "black carbon" OR "traffic pollution" OR "residential distance to nearest major" OR "traffic-related PM" OR "diesel exhaust emission*" OR "engine emission*" OR ultrafine OR "polycyclic aromatic hydrocarbon*" OR PAH* OR styrene OR microplastic* OR "Volatile Organic Compound*" OR VOC* OR "Organophosphate pesticide*" OR "Organophosphate poison*" OR</p>	135,743

#	Concepts	Query	18 Nov 2022
		<p>"Organophosphorus compound*" OR "Organophosphate herbicide*" OR "Organophosphate insecticide*" OR arylalkylphosphatase OR "Cholinesterase Inhibitor*" OR "Cholinesterase Reactivator*" OR "poly(thiophene-3-acetic acid)" OR "neurotoxic esterase" OR isocarbophos OR duodote OR anilofos OR diethylphosphoryloxime OR "tributylmethyl phosphonium chloride" OR diclofluanid OR "chloroacetol phosphate" OR crufomate OR phosphorylphosphatase OR "phosphoramidic acid" OR soman OR sarin OR "Pralidoxime Compound*" OR armin OR dichlorvos OR chlorfenvinphos OR "Carbamyl Phosphate" OR iphos OR mevinphos OR monocrotophos OR naled OR azinphosmethyl OR chlorpyrifos OR coumaphos OR cystaphos OR diazinon OR dimethoate OR disulfoton OR fenitrothion OR fenthion OR fonofos OR leptophos OR malathion OR parathion OR "methyl parathion" OR phorate OR phosmet OR temefos OR paraoxon OR phosphamidon OR phosphines OR trichlorfon OR tetrachlorvinphos OR tetraisopropylpyrophosphamide OR dimethylphosphate OR dimethylthiophosphate OR dimethyldithiophosphate OR diethylphosphate OR "dimethyl thiophosphate" OR "dimethyl dithiophosphate" OR "dimethyl phosphate" OR "dimethyl thiophosphate" OR "dimethyl dithiophosphate" OR "diethyl phosphate" OR "diethyl thiophosphate" OR "diethyl dithiophosphate" OR PNP OR tcpy OR "3,5,6-trichloro-2-pyridinol" OR "flame retard*" OR "fire retard*" OR "fireproofing agent*" OR FireMaster OR Bromkal OR "diphenyl ether deriv*" OR "halogenated diphenyl*" OR "brominated diphenyl*" OR PBDE* OR "polybrominated diphenyl*" OR polybromodiphenyl* OR PBDP* OR BDE* OR pentabromodiphenyl* OR c-pentaBDE* OR PentaBDE* OR PeBDE OR "DE 71" OR DE71 OR "pentabrominated diphenyl*" OR PBDPO OR "pentabromo deriv*" OR pentabromophenyl* OR octabromodiphenyl* OR c-octaBDE* OR OctaBDE* OR OcBDE OR "octabromo deriv*" OR OBDE OR OBDPO OR decabromodiphenyl* OR c-decaBDE* OR DecaBDE* OR DeBDE OR DBDPO OR "decabrominated diphenyl*" OR "FR 300 BA" OR tribromodiphenyl* OR "tribromo deriv*" OR tetrabromodiphenyl* OR TetraBDE* OR TeBDE OR TBDE OR BPDE OR "tetrabromo deriv*" OR TBDP OR "tetrabrominated diphenyl*" OR hexabromodiphenyl* OR HexaBDE* OR HxBDE OR "hexabromo deriv*" OR heptabromodiphenyl* OR HeptaBDE* OR nonabromodiphenyl* OR NonaBDE* OR NoBDE)</p> <p><i>Expanders - Apply equivalent subjects</i> <i>Search modes - Boolean/Phrase</i></p>	
S3	Comparator (C)	<p>TI (socioeconomic OR poverty OR disparit* OR inequalit* OR equit* OR inequit* OR "social position*" OR "social status*" OR "economic position*" OR "economic status*" OR "residence characteristic*" OR communit* OR "place* of residence" OR geograph* OR urban OR city OR cities OR industrial OR industry OR suburb* OR rural OR agricultur* OR farm* OR migrant* OR "occupational exposure*") OR AB (socioeconomic OR poverty OR disparit* OR inequalit* OR equit* OR inequit* OR "social position*" OR "social status*" OR "economic position*" OR "economic status*" OR "residence characteristic*" OR communit* OR "place* of residence" OR geograph* OR urban OR city OR cities OR industrial OR industry OR suburb* OR rural OR agricultur* OR farm* OR migrant* OR "occupational exposure*")</p> <p><i>Expanders - Apply equivalent subjects</i> <i>Search modes - Boolean/Phrase</i></p>	318,859
S4	P + E + C	<p>S1 AND S2 AND S3</p> <p><i>Expanders - Apply equivalent subjects</i> <i>Search modes - Boolean/Phrase</i></p>	3,605
S5	P + E + C + Studies in English	<p>S1 AND S2 AND S3</p> <p><i>Narrow by Language: - english</i> <i>Expanders - Apply equivalent subjects</i> <i>Search modes - Boolean/Phrase</i></p>	3,603

#	Concepts	Query	18 Nov 2022
S6	P + E + C + Studies in English + U.S. Studies	S1 AND S2 AND S3 <i>Narrow by Subject Geographic: - united states</i> <i>Narrow by Language: - english</i> <i>Expanders - Apply equivalent subjects</i> <i>Search modes - Boolean/Phrase</i>	190
S7	P + E + C + Studies in English + U.S. Studies + Peer Reviewed	S1 AND S2 AND S3 <i>Limiters - Peer Reviewed</i> <i>Narrow by Subject Geographic: - united states</i> <i>Narrow by Language: - english</i> <i>Expanders - Apply equivalent subjects</i> <i>Search modes - Boolean/Phrase</i>	155
TOTAL GreenFILE Records			155

Web of Science Core Collection

Note: For the updated searches, limiters were applied before starting each search:

- Timespan: 2019-07-24 to 2021-07-12 (Publication Date)
- Timespan: 2021-07-13 to 2022-11-18 (Publication Date)

#	Concepts	Query	23 July 2019	12 July 2021	18 Nov 2022
1	Population (P)	TS=(child OR childhood OR children OR infan* OR school* OR newborn OR new-born* OR baby OR babies OR toddler* OR boy OR boys OR boyhood OR girl* OR kid OR kids OR juvenil* OR pediatrics OR pediatric* OR paediatric* OR peadiatric* OR adolescen* OR early life OR youth OR postnat* OR post-nat* OR prenat* OR pre-nat* OR fetal OR foetus OR foetal OR fetu* OR "in utero" OR peri-nat* OR perinatal OR perinatally OR neonatal OR neonates OR neonate OR "low birthweight" OR prematur* OR preterm* OR minor*)	4,492,021	617,369	361,322
2	Exposure (E)	TS=(Lead exposure OR Lead poisoning OR lead toxicity OR Pb OR Mercury exposure OR Mercury poisoning OR Mercury toxicity OR Hg OR PCB* OR Polychlorinated Biphenyl* OR PCB* OR phthalate* OR phthalic acid* OR plasticizer* OR endocrine disruptor* OR plastic* OR "polyvinyl chloride" OR "polyethylene terephthalate" OR PET OR PVC OR distance to road OR PM2.5 OR air pollutants OR Volatile Organic Compound* OR VOC* OR Sulfur Dioxide OR Carbon Monoxide OR Vehicle Emission* OR traffic-related air pollution OR air pollution OR particulate matter OR ozone OR nitrogen dioxide OR particulates OR black carbon OR traffic pollution OR residential distance to nearest major OR traffic-related PM OR Diesel Exhaust Emissions OR Engine Emissions OR Ultrafine OR polycyclic aromatic hydrocarbon* OR PAH OR Styrene OR Microplastic* OR Organophosphate pesticide* OR Organophosphate poison* OR Organophosphorus Compound* OR Organophosphate herbicide* OR Organophosphate insecticide* OR arylalkylphosphatase OR Cholinesterase Inhibitor* OR Cholinesterase Reactivator* OR "poly(thiophene-3-acetic acid)" OR "neurotoxic esterase" OR isocarbophos OR duodote OR anilofos OR diethylphosphoryloxime OR "tributylmethyl phosphonium chloride" OR diclofluanid OR "chloroacetol phosphate" OR crufomate OR phosphorylphosphatase OR "phosphoramidic acid" OR soman OR sarin OR Pralidoxime Compound* OR armin OR dichlorvos OR chlorfenvinphos OR armin OR "Carbamyl Phosphate" OR iphos OR mevinphos OR monocrotophos OR naled OR azinphosmethyl OR chlorpyrifos OR coumaphos OR cystaphos OR diazinon OR dimethoate OR disulfoton OR fenitrothion OR fenthion OR fonofos OR leptophos OR malathion OR parathion OR "methyl parathion" OR phorate OR phosmet OR temefos OR paraoxon OR phosphamidon OR phosphines OR trichlorfon OR tetrachlorvinphos OR tetraisopropylpyrophosphamide OR dimethylphosphate OR dimethylthiophosphate OR dimethyldithiophosphate OR diethylphosphate OR "dimethyl thiophosphate" OR "dimethyl dithiophosphate" OR "dimethyl phosphate" OR "dimethyl thiophosphate" OR "dimethyl dithiophosphate" OR "diethyl phosphate" OR "diethyl thiophosphate" OR "diethyl dithiophosphate" OR PNP OR tcpy OR 3,5,6-trichloro-2-pyridinol OR flame retard* OR fire retard* OR fireproofing agent* OR FireMaster OR Bromkal OR diphenyl ether deriv* OR halogenated diphenyl* OR brominated diphenyl* OR PBDE* OR polybrominated diphenyl* OR polybromodiphenyl* OR PBDP* OR BDE* OR pentabromodiphenyl* OR c-pentaBDE* OR PentaBDE* OR "PeBDE" OR "DE 71" OR "DE71" OR "PBDPO" OR pentabromo deriv* OR pentabromophenyl* OR octabromodiphenyl* OR c-octaBDE* OR OctaBDE* OR "OcBDE" OR octabromo deriv* OR "OBDE" OR "OBDPO" OR decabromodiphenyl* OR c-decaBDE* OR DecaBDE* OR "DeBDE" OR "DBDPO" OR "FR 300 BA" OR tribromodiphenyl* OR tribromo deriv* OR tetrabromodiphenyl* OR TetraBDE* OR "TeBDE" OR "TBDE" OR "BPDE" OR tetrabromo deriv* OR "TBDP" OR hexabromodiphenyl* OR	2,255,472	343,779	209,339

#	Concepts	Query	23 July 2019	12 July 2021	18 Nov 2022
		HexaBDE* OR "HxBDE" OR hexabromo deriv* OR heptabromodiphenyl* OR HeptaBDE* OR nonabromodiphenyl* OR NonaBDE* OR "NoBDE")			
3	Comparator (C)	TS=("social determinants of health" OR "population health" OR vulnerable OR vulnerability OR socioeconomic OR poverty OR disparit* OR inequalit* OR equit* OR inequit* OR social position OR social status OR economic position OR economic status OR "built environment" OR residence characteristic* OR "place of residence" OR urban OR city OR cities OR industrial OR suburb* OR rural OR agricultur* OR farm OR farms OR migrant* OR occupational exposure*)	3,031,110	622,264	375,916
4	P + E + C	#1 and #2 and #3	26,953	6,751	4,374
5	P + E + C + Studies in English	#1 and #2 and #3 and English (Languages)	25,561	6,508	4,285
6	Study Type	TS=(cohort studies OR case-control studies OR comparative study OR risk factors OR cohort OR compared OR groups OR case control OR multivariate)	11,444,025	1,983,034	1,206,228
7	P + E + C + Studies in English + Study Type	#5 and #6	13,119	3,491	2,328
8	P + E + C + Studies in English + Study Type + Human Studies	#7 NOT (TS=(Animals) NOT TS=(Animals AND Humans)) <i>Excluding animal studies</i>	12,487	3,389	2,254
9	P + E + C + Studies in English + Study Type + Human Studies + U.S. Studies	(#8 AND TS=(North America OR United States)) OR (#8 NOT TS=(Africa OR Asia OR Australia OR Canada OR Europe OR South America))	11,561	3,144	2,115
TOTAL Web of Science Records			16,820		

Table S4. Definitions of Disparity Comparator Measures*

Measure	Definition
Measures of race	
Identity	Subjective self-identification assessed through an open-ended question (i.e., free response)
Self-classification	Self-identification assessed through a closed-ended question (e.g. census questionnaire, birth records (although these might be completed by third party))
Observed	Race identified by a third-party (e.g., interviewer) based on appearance alone or through interaction
Phenotype	Skin tone or other physical characteristics (e.g., hair texture, bone structure) assessed alone or in combination
Reflected	The race you believe others assume you to be; respondent's understanding of how they are view by others
Ancestry	As informed by familial history, genetic testing, or blood quantum
Unclear/not stated	Insufficient or no information on how race was measured
Identity vs self-classification	Race was self-identified, but unclear if the question was open- or closed-ended
Measures of ethnicity	
Identity	Subjective self-identification assessed through an open-ended question (i.e., free response)

Self-classification	Self-classification Self-identification assessed through a closed-ended question (e.g. census questionnaire)
Country of origin	The country from which a person originally comes or “nationality”
Observed	Ethnicity identified by a third-party (e.g., interviewer) based on appearance alone or through interaction
Reflected	The ethnicity you believe others assume you to be; respondent's understanding of how they are view by others
Ancestry	As informed by familial history
Unclear/not stated	Insufficient or no information on how ethnicity was measured
Identity vs self-classification	Ethnicity was self-identified, but unclear if the question was open- or closed-ended
Measures of geography	
Urban	Urban is meant to capture living conditions particular to urban areas or areas with high population density and pollution sources. Generally based on administrative data (e.g., census) designation.
Rural	Rural denotes living in areas that are remote, sparsely populated and generally located farther from health care facilities and other services as compared to urban areas. Generally Based on administrative data (e.g., census) designation.
Land Use	As related to living in or in close proximity to different types of land use, including agricultural lands or LULUs such as mining operations or high traffic areas. Based on administrative data
Other	If not one of the categories above

Unclear/not stated	Insufficient or no information on how geography was measured
Socioeconomic Status	
Income	Parent/Individual or household: monthly or annual; before taxes. Collected at individual or area-based level. Based on administrative data (e.g., census).
Education	Educational attainment: highest level attained; qualifications; years completed. Can be collected at individual or area-based level. Based on administrative data (e.g., census).
Occupation	Parental Employment; type of employment - blue or white collar; manual or nonmanual; Unemployment experience (ever or number of years). Can be collected at individual or area-based level. Based on administrative data (e.g., census).
Poverty Status	Absolute or relative poverty thresholds; income-to poverty ratios; material deprivation indices; participation in reduced-priced school lunch programs. Collected at individual or area-based level. Based on administrative data (e.g., census).
Insurance	Health insurance status; participation in Medicaid or private insurance
Subjective SES	Self-identification, comparison, or satisfaction: self-identification as upper, middle, or lower class; comparison of income with others; satisfaction with income
Other	If not one of the categories above (e.g., acculturation, housing status, years in the U.S.)
Unclear/not stated	Insufficient or no information on how SES was measured
Adversity Indices	
Adversity Indices	Indices that capture a wide variety of different psychosocial indicators of social adversity including material deprivation; poverty; child maltreatment; food insecurity; stressful life events; maternal depression; lack of social

	support. Generally based on closed-ended questions.
Social Vulnerability Index	Explicit reference to CDC's Social Vulnerability Index which was developed to help understand "the potential negative effects on communities caused by external stresses on human health" because of "low resilience". The domains that make up the social vulnerability index are socioeconomic status, household composition and disability, minority status and language, and housing and transportation.
Language	Observed or self-reported: 1) Spanish language spoken at home; or 2) primary language spoken in the home (English/non-English); or 3) "limited English speaking household" as one in which no member of age ≥ 14 years (i) speaks only English at home; or (ii) speaks a non-English language at home and speaks English "very well". May be derived from administrative data (e.g., census) or interviews.
HOME	Based on the Home Observation for Measurement of the Environment assessment protocol originally developed by Robert H. Bradley and Bettye M. Caldwell in the 1980s to measure positive stimulation and quality of the home learning environment using a combination of observations and parent interviews.

* Race and ethnicity categories follow OMB 1997 Revised Directive¹⁵. Race - American Indian or Alaska Native, Asian, Black or African American, Native Hawaiian or Other Pacific Islander, and White. Ethnicity - Hispanic or Latino and Not Hispanic or Latino; Race and ethnicity measures originated from Martinez et al. 2022²; SES and language measures are from Conway et al. 2019³; Urban-Rural is based on Vlahov and Galea 2002⁴.

Table S5. Publication Dates of Included Studies

Category	Date Range	Number of Studies	Median Date (year)
Exposure			
AP	2006-2023	52	2013
ETS	1994 - 2015	17	2009
Pb	1974-2022	63	2006
Hg	2003-2019	6	2014
OP	2002-2022	41	2015
Phthalates	2009-2021	12	2017
PBDE	2018-2019	3	2019
PCB	1988-2019	7	2002
Mixtures	2003 - 2021	17	2014

Note: Some studies are counted more than once if they examined multiple exemplar neurotoxicants separately. Abbreviations: Air pollution (AP), environmental tobaccos smoke (ETS), lead (Pb), mercury (Hg), organophosphate pesticides (OP), polybrominated diphenyl ether (PBDE) and polychlorinated biphenyls (PCB).

Table S6. Cohorts Most Frequently Analyzed in the Studies Included in the Review

Note: Counts are overlapping, as multiple cohorts were analyzed in one study

Cohort Name	Location	Cohort/Dataset	Number of studies included in this review
Columbia Center for Children's Environmental Health (CCCEH) cohort	New York, NY	Prospective longitudinal study of children of nonsmoking African-American and Dominican women in New York City followed in-utero to age 9; recruited from 1998-2006	28
Center for the Health Assessment of Mothers and Children of Salinas (CHAMACOS) study	Salinas Valley, CA	The longest running longitudinal birth cohort study of pesticides and other environmental exposures among children in a farmworker community, starting in 1999	19
Mount Sinai Children's Environmental Health Study	New York, NY	Prospective multiethnic cohort that enrolled a prenatal population in New York City between 1998 and 2002	10
Cincinnati Lead Study (CLS) / Cincinnati Prospective Study	Cincinnati, OH	Prospective longitudinal examination of effects of low to moderate prenatal and postnatal lead exposure on health and development of urban inner-city infants, children, adolescents and adults, initiated in 1979	8
NHANES (all iterations)	National	National survey which includes pediatric data	6
Childhood Autism Risks from Genetics and the Environment (CHARGE)	California	A large, population-based case-control investigation of environmental risk factors in relation to ASD and developmental delay without ASD symptoms; fieldwork began in 2003	5

Table S7. Neurodevelopmental Assessment Abbreviations

Measurement (Other Editions)	Abbreviation (Other Editions)	Number of Articles Using Assessment Tool
Ages and Stages Questionnaire	(ASQ-3; ASQ-I)	2
Autism Diagnostic Interview-Revised	ADI-R	4
Autism Diagnostic Observation Schedule (2nd Edition; Generic)	ADOS (ADOS-2; ADOS-G)	3
Bayley Scales of Infant Development (2nd Edition; Mental Development Index, Psychomotor Development Index, Behavior Rating Scale)	BSID (BSID-II; MDI, PDI, BRS)	23
Behavior Assessment System for Children (2nd Edition; Parent Rating Scale)	BASC (BASC-2; BASC-PRS)	7
Behavior Rating Inventory of Executive Function	BRIEF	3
Brazelton Neonatal Behavioral Assessment Scale	BNBAS	3
Child Behavior Checklist	CBCL	18
Conners Continuous Performance Test	Conners CPT (Conners K-CPT)	5
Diagnostic Interview Schedule for Children-IV	DISC-IV	2
Flanker Inhibitory Control and Attention Test	Flanker	1
Infant Behavior Questionnaire-Revised	IBQ-R	1
Kaufman Assessment Battery for Children	K-ABC	2
Kaufman Brief Intelligence Test (2nd Edition)	K-BIT (K-BIT-2)	3
McCarthy Scales of Children's Abilities (including General Cognitive Index)	MSCA (GCI)	6
Mullen Scales of Early Learning	MSEL	2
NICU Network Neurobehavioral Scale	NNNS	2
Peabody Picture Vocabulary Test (Revised)	PPVT (PPVT-R)	3
Revised Conners' Parent Rating Scale	CPRS- R	3
Social Communication Questionnaire	SCQ	3
Social Responsiveness Scale	SRS	2
Stanford-Binet (4th Edition)	S-B (S-B IV)	3
Wechsler Intelligence Scales for Children (Revised; 3rd Edition; 4th Edition; 5 th Edition)	WISC (WISC-R; WISC-III; WISC-IV; WISC-V)	34
Wechsler Preschool and Primary Scale of Intelligence (Revised; 3rd Edition)	WPPSI (WPPSI-R; WPPSI-III)	13
Wide Range Achievement Test (Revised; 3rd Edition; 4th Edition)	WRAT	6

Wide Range Assessment of Memory and Learning (2nd Edition)	WRAML (WRAML2)	5
Wide Range Assessment of Visual Motor Abilities	WRAVMA	3
Wisconsin Knowledge and Concepts Examination	WKCE	2

Table S8. Measures of Social Comparators Used in Research Studies, 1974 – 2022, by Decade

[illegible]

Ancestry									2	2			2	1.5
Unclear/Not Stated	1	100	1	100	4	67	8	44.4	39	41	10	71	63	47
Identity vs Self classification [‡]									4	4			4	3
Geography	1	100	1	100	2	100	7	100	26	100	7	100	44	100
Urban	1	100	1	100	2	100	4	57	11	42	3	43	22	50
Rural							2	29	12	46	2	29	16	36
Land Use							1	14	2	8	1	14	4	9
Other									1	4	1	14	2	5
Socioeconomic Status	7	100	10	100	35	100	66	100	184	100	56	100	357	100
Income	1	14			2	6	8	12	32	17	14	25	57	16
Education	3	43	3	30	13	37	30	45	79	43	23	41	152	43
Occupation	1	14	2	20	4	11	6	9	5	3	2	4	20	6
Poverty Status	2	29	1	10	5	14	11	17	29	16	10	18	58	16
Insurance					1	3			11	6	1	2	13	4
Subjective SES							1	1.5					1	0.3
Other			2	20	7	20	9	14	28	15	6	10	50	14
Unclear/Not Stated			2	20	3	9	1	1.5					6	2
Adversity Indices					1	100	1	100	17	100	9	100	28	100
Adversity Indices					1	100	1	100	16	94	9	100	27	96
Social Vulnerability									1	6			1	4

Index														
Language			1	100	2	100	3	100	3	100	6	100	27	100
HOME			5	100	11	100	15	100	29	100	9	100	69	100

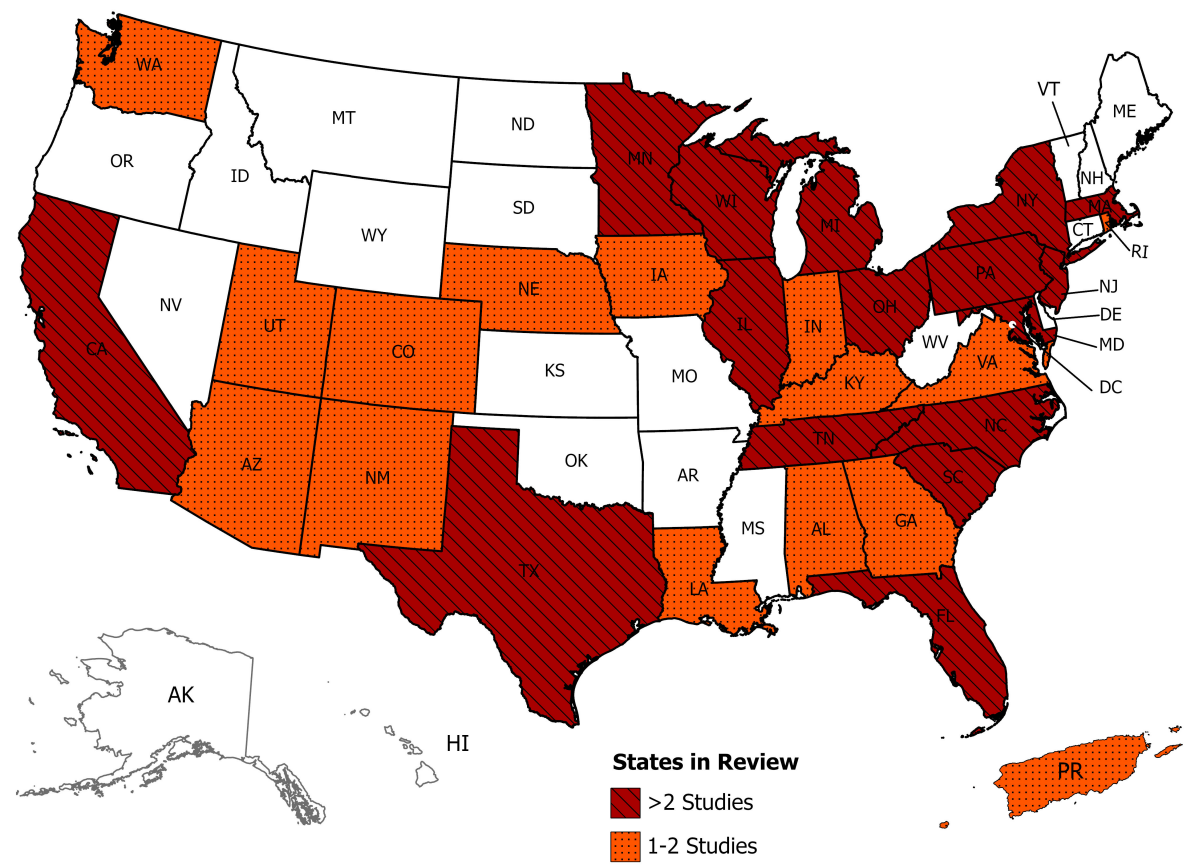
Notes: [†]Selection of multiple measures was allowed; percentages may sum to more than 100. [‡]For racial identity versus self-classification, race was noted as self-identified by a participant, but it was unclear whether the question was open- or closed-ended. The same applies to ethnic identity versus self-classification. See Table S4 for definitions of comparator measures.

Table S9. Proportion of Studies that Presented Data on Exposure and Outcome Disparity by Pollutant

Disparity Comparison Provided	Air Pollution n=52		ETS n=17		Lead n=63		Mercury n=6		OP Pesticides n=41		Phthalates n=12		PBDE n=3		PCBs n=7		Mixtures n=17		Overall n=218	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Exposure Disparity																				
Yes	19	37	7	41	29	46	1	17	14	34	4	33	3	100	0		7	41	84	39
No	33	63	10	59	34	54	5	83	27	66	8	67	0		7	100	10	59	134	61
Outcome Disparity at Baseline																				
Yes	21	40	8	47	31	49	4	67	7	17	6	50	2	67			11	35	90	41
No	31	60	9	53	32	51	2	33	34	83	6	50	1	33	7	100	6	65	128	59

Note: Some studies are counted more than once if they examined multiple neurotoxicants separately.

Figure S1. Map of study locations



Notes: Map was created using ArcGIS Pro 3.1.0, 2023. Study locations are also listed in Excel Tables S1 – 9. Studies based entirely on nationally representative demographic samples (n=23) are not shown.

Figure S2. Interactive Tableau Tool for the Seven Exemplar Neurotoxicant Exposures and Health Disparities

An interactive dashboard was developed to visualize, filter and link to the articles included in Payne-Sturges, et al. (2023) using Tableau Desktop Professional Edition v.2022.2 (Tableau; Seattle, WA). The top of the dashboard includes the Project TENDR logo that when selected sends the user to the Project TENDR website (projecttendr.com). On the top right side of the dashboard is an icon. When a user hovers the cursor over that icon, a description of the dashboard and a brief `how-to` becomes visible. In this scoping review, the authors placed articles into categories based on the study designs. The main view in the dashboard includes a heatmap depicting counts of articles for the indicator of social disadvantage and outcomes tested. To the right of the heatmap is a stacked bar chart that provides a count of articles where the study design included or did not include a test of effect modification or interactions between exposure, outcome, and comparator (indicators of social disadvantage). Finally, on the bottom right of the main dashboard view is a table with the author list for each article and a link to the article or the abstract, depending on open access options. There is an information icon in the dashboard that provides definitions used by the review authors to differentiate between a study design including effect modification or interactions (middle right). The interactive dashboard is filterable in three places: the pollutant buttons at the top, the heatmap cells, and the stacked bar chart. Each filter is cumulative, which means that if a user selects the lead pollutant button all of the articles in the heatmap, reflected in the stacked bar chart, and in the table of articles will be filtered to those that included a study of lead exposures. If a user *also* selects the top left most cell in the heatmap, the stacked bar chart and the table of articles will be further filtered to study designs that included a Behavioral, Psychological outcome and a comparator including an indicator of socio-economic disadvantage (for example). Finally, if the user *also* selects a portion of the stacked bar chart, the table of articles will be further filtered to study designs that included either effect modification, interactions or did not look. Clicking on any link in the table of articles will bring the user to the website with the full article or abstract and citation depending on open access. A user may always refresh the view (eliminate the filters) by re-selecting any selection. An icon or cell is selected if it appears bold and all other items in that view are greyed out.

Available at:

https://public.tableau.com/app/profile/project.tendr/viz/HealthDisparitiesScopingReview/heatmap_dash?publish=yes

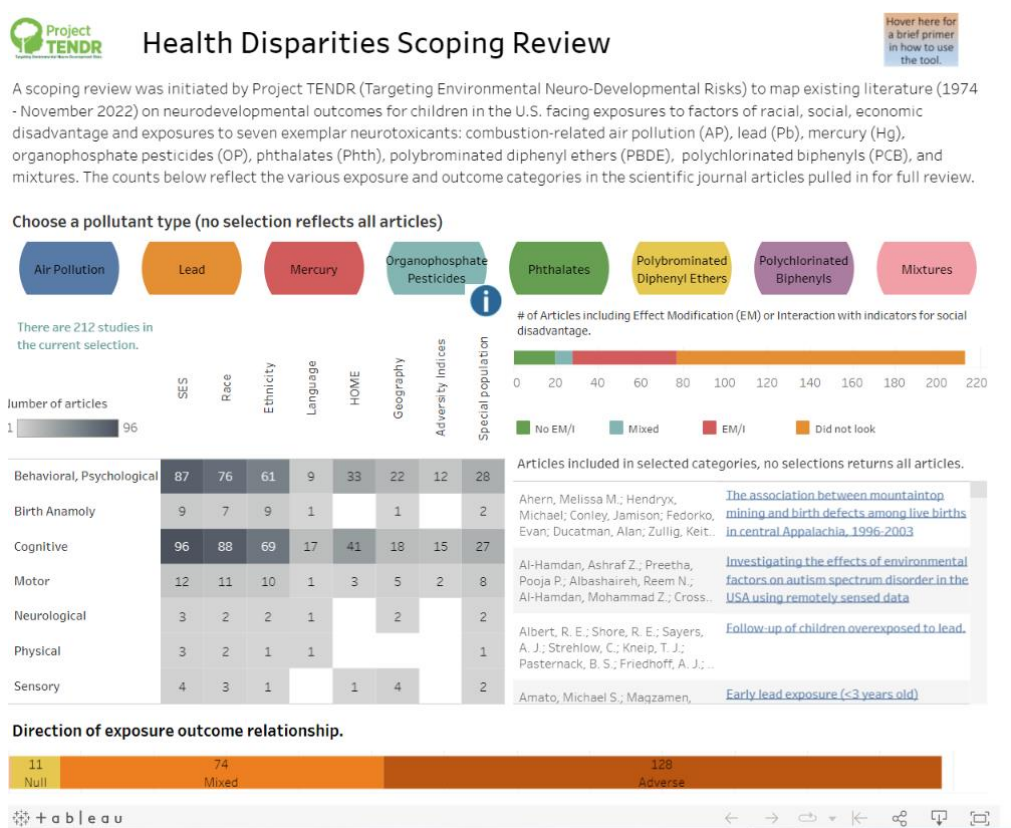


Figure S2. Screenshot of the Interactive Tableau Tool on the Seven Exemplary Neurotoxicant Exposures and Health Disparities

References

1. Office of Management and Budget. Revisions to the Standards for the Classification of Federal Data on Race and Ethnicity. *Fed Regist.* 1997;62(210).
2. Martinez RAM, Andrabi N, Goodwin AN, Wilbur RE, Smith NR, Zivich PN. Conceptualization, Operationalization, and Utilization of Race and Ethnicity in Major Epidemiology Journals, 1995–2018: A Systematic Review. *Am J Epidemiol.* Published online August 8, 2022:kwac146. doi:10.1093/aje/kwac146
3. David I. Conway, Alex D. McMahon, Denise Brown, Alastair H. Leyland. Chapter 4 Measuring socioeconomic status and inequalities. In: *Reducing Social Inequalities in Cancer: Evidence and Priorities for Research*. IARC Scientific Publications. International Agency for Research on Cancer; 2019. <https://www.ncbi.nlm.nih.gov/books/NBK566205/>
4. Vlahov D. Urbanization, Urbanicity, and Health. *J Urban Health Bull N Y Acad Med.* 2002;79(90001):1S - 12. doi:10.1093/jurban/79.suppl_1.S1