

SUPPLEMENTAL MATERIAL

Harmonized human biomonitoring in European children, teenagers and adults: EU-wide exposure data of 11 chemical substance groups from the HBM4EU Aligned Studies (2014-2021)

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Table S1: analytical information of biomarkers analyzed in the HBM4EU Aligned Studies (2014-2021)

Parent compound	Biomarker	Age Group	Data collection	Biological matrix	Analytical method	LOD (µg/L)	LOQ (µg/L)	HBM4EU QA/QC label*			
Pesticides in urine											
Chlorpyrifos	TCPy	Children	ESTEBAN	UM	UHPLC-MS/MS	0.02	0.05	Label C			
			SLO CRP	UM	UPLC-MS/MS	0.02		Label C			
			ORGANIKO	UM	LC-MS/MS	0.01	0.1	Label A			
			RAVMABAT_children	US	GC-MS/MS	0.15	0.4	Label A			
			SPECIMEn-NL	US	LC-MS/MS	0.01	0.1	Label A			
			3xG	UM	LC-MS/MS		0.1	Label A			
		Adults	ESTEBAN	UM	UHPLC-MS/MS	0.02	0.05	Label C			
			RAVMABAT_adults	US	GC-MS/MS	0.15	0.4	Label A			
			INSEF-ExpoQuim	UM	LC-MS/MS	0.1		Label D			
			HBM4EU-study Switzerland	UM	LC-MS/MS		0.1	Label A			
			ESB	UD	GC-MS		0.47	Label A			
			Diet_HBM	US	GC-MS		0.47	Label A			
			Glyphosate	AMPA	Children	ESTEBAN	UM	LC-MS/MS	0.02	0.05	Label B
						SLO CRP	UM	GC-MS/MS		0.1	Label B
ORGANIKO	UM	GC-MS/MS				0.03	0.1	Label A			
GerES V-sub (unweighted)	UM	GC-MS/MS					0.1	Label B			
3xG	UM	LC-MS/MS					0.2-0.5	Label A			
Adults	ESTEBAN	UM				LC-MS/MS	0.02	0.05	Label B		
Adults	HBM4EU-study Switzerland	UM			LC-MS/MS		0.2-0.3	Label A			
	ESB	UD			GC-MS/MS		0.1	Label B			
	Diet_HBM	US			GC-MS/MS		0.1	Label A			
	Glyphosate	Glyphosate			Children	ESTEBAN	UM	LC-MS/MS	0.02	0.05	Label C
						SLO CRP	UM	GC-MS/MS		0.1	Label C
						ORGANIKO	UM	GC-MS/MS	0.03	0.1	Label A
						GerES V-sub (unweighted)	UM	GC-MS/MS		0.1	Label C
						3xG	UM	LC-MS/MS		0.1	Label A
Adults			ESTEBAN	UM		LC-MS/MS	0.02	0.05	Label C		
Adults			HBM4EU-study Switzerland	UM	LC-MS/MS		0.1-0.5	Label A			
			ESB	UD	GC-MS/MS		0.1	Label C			
			Diet_HBM	US	GC-MS/MS		0.1	Label A			
			Pesticides (pyrethroids) in urine								
			Cis-cyfluthrin Cis-permethrin Cis-cypermethrin	cis-DCCA	Children	ESTEBAN	UM	GC-MS/MS	0.005	0.015	Label B
						ORGANIKO	UM	LC-MS/MS	0.05	0.1	Label A
						RAVMABAT_children	US	GC-MS	0.035	0.1	Label A
						SPECIMEn-NL	US	LC-MS/MS	0.05	0.1	Label A
3xG	UM	LC-MS/MS					0.1	Label A			
Adults	ESTEBAN	UM				GC-MS/MS	0.005	0.015	Label B		
Adults	RAVMABAT_adults	US			GC-MS	0.035	0.1	Label A			
	HBM4EU-study Switzerland	UM			LC-MS/MS		0.1-0.2	Label A			
	ESB	UD			GC-MS		0.1	Label A			
	Diet_HBM	US			GC-MS		0.1	Label A			
	Cyfluthrin	F-3-PBA			Children	ESTEBAN	UM	GC-MS/MS	0.005	0.015	Label B
						SLO CRP	UM	UPLC-MS/MS	0.02		Label C
						ORGANIKO	UM	LC-MS/MS	0.01	0.1	Label A
						RAVMABAT_children	US	GC-MS	0.035	0.1	Label A
SPECIMEn-NL			US	LC-MS/MS		0.03	0.1	Label A			
3xG			UM	LC-MS/MS			0.1	Label A			
Adults			ESTEBAN	UM	GC-MS/MS	0.005	0.015	Label B			
			RAVMABAT_adults	US	GC-MS	0.035	0.1	Label A			
			HBM4EU-study Switzerland	UM	LC-MS/MS		0.1	Label A			
			ESB	UD	GC-MS		0.1	Label A			
			Diet_HBM	US	GC-MS		0.1	Label A			
			Cyhalothrin Bifenthrin	CIF3CA	Children	ORGANIKO	UM	LC-MS/MS	0.02	0.1	Label A
						RAVMABAT_children	US	GC-MS	0.035	0.1	Label A
						SPECIMEn-NL	US	LC-MS/MS		0.1	Label A
3xG	UM	LC-MS/MS					0.1	Label A			
Adults	RAVMABAT_adults	US			GC-MS	0.035	0.1	Label A			
	HBM4EU-study Switzerland	UM			LC-MS/MS		0.1-0.2	Label A			

Parent compound	Biomarker	Age Group	Data collection	Biological matrix	Analytical method	LOD (µg/L)	LOQ (µg/L)	HBM4EU QA/QC label*			
Deltamethrin	cis-DBCA	Children	ESB	UD	GC-MS		0.1	Label A			
			Diet_HBM	US	GC-MS		0.1	Label A			
			ESTEBAN	UM	GC-MS/MS	0.005	0.015	Label B			
			ORGANIKO	UM	LC-MS/MS	0.05	0.1-0.2	Label A			
			RAVMABAT_children	US	GC-MS	0.035	0.1	Label A			
		SPECIMEn-NL	US	LC-MS/MS	0.05	0.1	Label A				
		Adults	3xG	UM	LC-MS/MS		0.1-0.8	Label A			
			ESTEBAN	UM	GC-MS/MS	0.005	0.015	Label B			
			RAVMABAT_adults	US	GC-MS	0.035	0.1	Label A			
			HBM4EU-study Switzerland	UM	LC-MS/MS		0.1-0.7	Label A			
ESB	UD		GC-MS		0.1	Label A					
Most pyrethroids (except cyfluthrin and bifenthrin)	3-PBA	Children	Diet_HBM	US	GC-MS		0.1	Label A			
			ESTEBAN	UM	GC-MS/MS	0.005	0.015	Label B			
			SLO CRP	UM	UPLC-MS/MS	0.02		Label B			
			ORGANIKO	UM	LC-MS/MS	0.01	0.1	Label A			
			RAVMABAT_children	US	GC-MS	0.035	0.1	Label A			
		SPECIMEn-NL	US	LC-MS/MS	0.03	0.1	Label A				
		3xG	UM	LC-MS/MS		0.1	Label A				
		Adults	ESTEBAN	UM	GC-MS/MS	0.005	0.015	Label B			
			RAVMABAT_adults	US	GC-MS	0.035	0.1	Label A			
			HBM4EU-study Switzerland	UM	LC-MS/MS		0.1-0.3	Label A			
ESB	UD		GC-MS		0.1	Label A					
Diet_HBM	US		GC-MS		0.1	Label A					
Trans-cyfluthrin Trans-cypermethrin Trans-permethrin	trans-DCCA	Children	ESTEBAN	UM	GC-MS/MS	0.005	0.015	Label C			
			ORGANIKO	UM	LC-MS/MS	0.05	0.1	Label A			
			RAVMABAT_children	US	GC-MS	0.035	0.1	Label A			
			SPECIMEn-NL	US	LC-MS/MS	0.05	0.1	Label A			
			3xG	UM	LC-MS/MS		0.1	Label A			
		Adults	ESTEBAN	UM	GC-MS/MS	0.005	0.015	Label C			
			RAVMABAT_adults	US	GC-MS	0.035	0.1	Label A			
			HBM4EU-study Switzerland	UM	LC-MS/MS		0.1-0.3	Label A			
			ESB	UD	GC-MS		0.1	Label A			
			Diet_HBM	US	GC-MS		0.1	Label A			
Bisphenols in urine											
Bisphenol A (BPA)	BPA total	Adults	ESTEBAN	UM	GC-MS/MS	0.01	0.09	Label B			
			HBM survey in adults in HR	UM	LC-MS/MS	0.01	0.03	Label A			
			INSEF-ExpoQuim	UM	LC-MS/MS	0.2		Label A			
			Oriscav-Lux2	US	LC-MS/MS	0.2		Label A			
			(C)ELSPAC: YA	UM	LC-MS/MS	0.01	0.03	Label A			
			POLAES	US	LC-MS/MS	0.083	0.25	Label A			
			CPHMINIPUB/DYMS	US	LC-MS/MS		0.07	Label A			
			HBM4EU-study Switzerland	UM	LC-MS/MS		0.29	Label A			
			FinHealth	US	LC-MS/MS		0.2	Label A			
			ESB	UD	LC-MS/MS		0.25	Label A			
			Diet_HBM	US	LC-MS/MS	0.01	0.03	Label A			
			Bisphenol F (BPF)	BPF total	Adults	ESTEBAN	UM	GC-MS/MS	0.01	0.03	Label B
						HBM survey in adults in HR	UM	LC-MS/MS	0.03	0.1	Label A
INSEF-ExpoQuim	UM	LC-MS/MS				0.03		Label A			
Oriscav-Lux2	US	LC-MS/MS				0.05		Label A			
(C)ELSPAC: YA	UM	LC-MS/MS				0.03	0.1	Label A			
POLAES	US	LC-MS/MS				0.05	0.15	Label A			
CPHMINIPUB/DYMS	US	LC-MS/MS					0.05	Label A			
HBM4EU-study Switzerland	UM	LC-MS/MS					0.07	Label A			
ESB	UD	LC-MS/MS					0.15	Label A			
Diet_HBM	US	LC-MS/MS				0.03	0.1	Label A			
Bisphenol S (BPS)	BPS total	Adults				ESTEBAN	UM	GC-MS/MS	0.005	0.01	Label B
						HBM survey in adults in HR	UM	LC-MS/MS	0.01	0.03	Label A
						INSEF-ExpoQuim	UM	LC-MS/MS	0.03		Label A
			Oriscav-Lux2	US	LC-MS/MS	0.06		Label A			
			(C)ELSPAC: YA	UM	LC-MS/MS	0.01	0.03	Label A			
			POLAES	US	LC-MS/MS	0.017	0.05	Label A			
			CPHMINIPUB/DYMS	US	LC-MS/MS		0.02	Label A			
			HBM4EU-study Switzerland	UM	LC-MS/MS		0.09	Label A			

Parent compound	Biomarker	Age Group	Data collection	Biological matrix	Analytical method	LOD (µg/L)	LOQ (µg/L)	HBM4EU QA/QC label*			
			ESB	UD	LC-MS/MS		0.05	Label A			
			Diet_HBM	US	LC-MS/MS	0.01	0.03	Label A			
Phthalates in urine											
Butyl benzyl phthalate (BBzP)	MBzP	Children	ESTEBAN	UM	LC-MS/MS	0.07	0.2	Label A			
			CROME	UM	LC-MS/MS	0.05	0.2	Label A			
			NACII	US	LC-MS/MS		0.2	Label A			
			SLO CRP	UM	LC-MS/MS		0.2	Label A			
			POLAES	US	LC-MS/MS	0.07	0.2	Label A			
			NEBII	US	LC-MS/MS	0.07	0.2	Label A			
			InAirQ	US	LC-MS/MS	0.12	0.37	Label A			
			SPECIMEn-NL	US	LC-MS/MS		0.2	Label A			
			OCC	US	LC-MS/MS	0.03	0.08	Label D			
			PCB cohort	US	LC-MS/MS	0.19		Label C			
			GerES V-sub (unweighted)	UM	LC-MS/MS		0.2	Label B			
			3xG	UM	LC-MS/MS		0.2	Label A			
		Teenagers	ESTEBAN	UM	LC-MS/MS	0.07	0.2	Label A			
			CROME	UM	LC-MS/MS	0.05	0.2	Label A			
			BEA	UM	LC-MS/MS		0.2	Label A			
			SLO CRP	UM	LC-MS/MS		0.2	Label A			
			CELSPAC: Teenagers	UM	LC-MS/MS	0.1	0.3	Label A			
			Riksmaten adolescents	US	LC-MS/MS	0.2		Label A			
			POLAES	US	LC-MS/MS	0.07	0.2	Label A			
			NEBII	US	LC-MS/MS	0.07	0.2	Label A			
			PCB cohort follow-up	US	LC-MS/MS	0.1	0.3	Label A			
			GerES V-sub (unweighted)	UM	LC-MS/MS		0.2	Label B			
			FLEHS IV	US	LC-MS/MS		0.2	Label A			
			Dicyclohexyl phthalate (DCHP)	MCHP	Children	ESTEBAN	UM	LC-MS/MS	0.07	0.2	Label A
						CROME	UM	LC-MS/MS	0.05	0.2	Label D
						NACII	US	LC-MS/MS		0.1	Label A
SLO CRP	UM	LC-MS/MS					0.2	Label A			
POLAES	US	LC-MS/MS				0.07	0.2	Label A			
NEBII	US	LC-MS/MS				0.2	0.5	Label D			
InAirQ	US	LC-MS/MS				0.05	0.15	Label A			
SPECIMEn-NL	US	LC-MS/MS					0.2	Label A			
OCC	US	LC-MS/MS				0.23	0.69	Label A			
GerES V-sub (unweighted)	UM	LC-MS/MS					0.2	Label B			
Teenagers	ESTEBAN	UM				LC-MS/MS	0.07	0.2	Label A		
	CROME	UM				LC-MS/MS	0.05	0.2	Label D		
	BEA	UM			LC-MS/MS		0.2	Label A			
	SLO CRP	UM			LC-MS/MS		0.2	Label A			
	CELSPAC: Teenagers	UM			LC-MS/MS	0.2	0.6	Label D			
	POLAES	US			LC-MS/MS	0.07	0.2	Label A			
	NEBII	US			LC-MS/MS	0.2	0.5	Label D			
	PCB cohort follow-up	US			LC-MS/MS	0.2	0.6	Label D			
	GerES V-sub (unweighted)	UM			LC-MS/MS		0.2	Label B			
	Di(2-ethylhexyl) phthalate (DEHP)	5cx-MEPP			Children	ESTEBAN	UM	LC-MS/MS	0.07	0.2	Label A
						CROME	UM	LC-MS/MS	0.05	0.2	Label A
						NACII	US	LC-MS/MS		0.1	Label A
						SLO CRP	UM	LC-MS/MS		0.2	Label A
						POLAES	US	LC-MS/MS	0.07	0.2	Label A
NEBII						US	LC-MS/MS	0.7	2	Label A	
InAirQ						US	LC-MS/MS	0.12	0.37	Label A	
SPECIMEn-NL			US	LC-MS/MS			0.2	Label A			
OCC			US	LC-MS/MS		0.07	0.22	Label A			
PCB cohort			US	LC-MS/MS		0.23		Label C			
GerES V-sub (unweighted)			UM	LC-MS/MS			0.2	Label B			
3xG			UM	LC-MS/MS			0.2	Label A			
Teenagers			ESTEBAN	UM	LC-MS/MS	0.07	0.2	Label A			
			CROME	UM	LC-MS/MS	0.05	0.2	Label A			
			BEA	UM	LC-MS/MS		0.2	Label A			
			SLO CRP	UM	LC-MS/MS		0.2	Label A			
			CELSPAC: Teenagers	UM	LC-MS/MS	0.07	0.2	Label A			
			Riksmaten adolescents	US	LC-MS/MS	0.07		Label A			

Parent compound	Biomarker	Age Group	Data collection	Biological matrix	Analytical method	LOD (µg/L)	LOQ (µg/L)	HBM4EU QA/QC label*
Di(2-ethylhexyl) phthalate (DEHP)	5OH-MEHP	Children	POLAES	US	LC-MS/MS	0.1	0.2	Label A
			NEBII	US	LC-MS/MS	0.7	2	Label A
			PCB cohort follow-up	US	LC-MS/MS	0.07	0.2	Label A
			GerES V-sub (unweighted)	UM	LC-MS/MS		0.2	Label B
			FLEHS IV	US	LC-MS/MS		0.5	Label A
			ESTEBAN	UM	LC-MS/MS	0.07	0.2	Label A
			CROME	UM	LC-MS/MS	0.05	0.2	Label A
			NACII	US	LC-MS/MS		0.1	Label A
			SLO CRP	UM	LC-MS/MS		0.2	Label A
			POLAES	US	LC-MS/MS	0.07	0.2	Label A
			NEBII	US	LC-MS/MS	0.2	0.5	Label A
			InAirQ	US	LC-MS/MS	0.25	0.74	Label A
			SPECIMEn-NL	US	LC-MS/MS		0.2	Label A
			OCC	US	LC-MS/MS	0.05	0.1	Label A
	PCB cohort	US	LC-MS/MS	0.48		Label C		
	GerES V-sub (unweighted)	UM	LC-MS/MS		0.2	Label B		
	3xG	UM	LC-MS/MS		0.2	Label A		
	Teenagers	ESTEBAN	UM	LC-MS/MS	0.07	0.2	Label A	
		CROME	UM	LC-MS/MS	0.05	0.2	Label A	
		BEA	UM	LC-MS/MS		0.2	Label A	
		SLO CRP	UM	LC-MS/MS		0.2	Label A	
		CELSPAC: Teenagers	UM	LC-MS/MS	0.07	0.2	Label A	
		Riksmaten adolescents	US	LC-MS/MS	0.1		Label A	
		POLAES	US	LC-MS/MS	0.07	0.2	Label A	
		NEBII	US	LC-MS/MS	0.2	0.5	Label A	
		PCB cohort follow-up	US	LC-MS/MS	0.07	0.2	Label A	
		GerES V-sub (unweighted)	UM	LC-MS/MS		0.2	Label B	
		FLEHS IV	US	LC-MS/MS		0.2	Label A	
5oxo-MEHP		Children	ESTEBAN	UM	LC-MS/MS	0.07	0.2	Label A
			CROME	UM	LC-MS/MS	0.05	0.2	Label A
			NACII	US	LC-MS/MS		0.1	Label A
	SLO CRP		UM	LC-MS/MS		0.2	Label A	
	POLAES		US	LC-MS/MS	0.07	0.2	Label A	
	NEBII		US	LC-MS/MS	0.2	0.5	Label A	
	InAirQ		US	LC-MS/MS	0.25	0.74	Label A	
	SPECIMEn-NL		US	LC-MS/MS		0.2	Label A	
	OCC		US	LC-MS/MS	0.06	0.19	Label A	
	PCB cohort		US	LC-MS/MS	1.08		Label C	
	GerES V-sub (unweighted)		UM	LC-MS/MS		0.2	Label B	
	3xG		UM	LC-MS/MS		0.2	Label A	
	Teenagers		ESTEBAN	UM	LC-MS/MS	0.07	0.2	Label A
			CROME	UM	LC-MS/MS	0.05	0.2	Label A
BEA		UM	LC-MS/MS		0.2	Label A		
SLO CRP		UM	LC-MS/MS		0.2	Label A		
CELSPAC: Teenagers		UM	LC-MS/MS	0.07	0.2	Label A		
Riksmaten adolescents		US	LC-MS/MS	0.2		Label A		
POLAES		US	LC-MS/MS	0.07	0.2	Label A		
NEBII		US	LC-MS/MS	0.2	0.5	Label A		
PCB cohort follow-up		US	LC-MS/MS	0.07	0.2	Label A		
GerES V-sub (unweighted)		UM	LC-MS/MS		0.2	Label B		
FLEHS IV		US	LC-MS/MS		0.2	Label A		
MEHP		Children	ESTEBAN	UM	LC-MS/MS	0.1	0.3	Label A
			CROME	UM	LC-MS/MS	0.05	0.2	Label A
			SLO CRP	UM	LC-MS/MS		0.3	Label A
	POLAES		US	LC-MS/MS	0.1	0.3	Label A	
	NEBII		US	LC-MS/MS	0.2	0.5	Label A	
	InAirQ		US	LC-MS/MS	0.12	0.37	Label A	
	SPECIMEn-NL		US	LC-MS/MS		0.3	Label A	
	OCC		US	LC-MS/MS	0.07	0.2	Label A	
	PCB cohort		US	LC-MS/MS	0.33		Label C	
	GerES V-sub (unweighted)		UM	LC-MS/MS		0.5	Label B	
	3xG		UM	LC-MS/MS		0.2	Label A	
	Teenagers		ESTEBAN	UM	LC-MS/MS	0.1	0.3	Label A

Parent compound	Biomarker	Age Group	Data collection	Biological matrix	Analytical method	LOD (µg/L)	LOQ (µg/L)	HBM4EU QA/QC label*			
Diethyl phthalate (DEP)	MEP	Children	CROME	UM	LC-MS/MS	0.05	0.2	Label A			
			BEA	UM	LC-MS/MS		0.3	Label A			
			SLO CRP	UM	LC-MS/MS		0.3	Label A			
			CELSPAC: Teenagers	UM	LC-MS/MS	0.18	0.5	Label A			
			Riksmaten adolescents	US	LC-MS/MS	0.3		Label A			
			POLAES	US	LC-MS/MS	0.1	0.3	Label A			
			NEBII	US	LC-MS/MS	0.2	0.5	Label A			
			PCB cohort follow-up	US	LC-MS/MS	0.18	0.5	Label A			
			GerES V-sub (unweighted)	UM	LC-MS/MS		0.5	Label B			
			FLEHS IV	US	LC-MS/MS		0.5	Label A			
			ESTEBAN	UM	LC-MS/MS	0.17	0.5	Label A			
			CROME	UM	LC-MS/MS	0.05	0.2	Label A			
			NACII	US	LC-MS/MS		0.5	Label A			
			SLO CRP	UM	LC-MS/MS		0.5	Label A			
			POLAES	US	LC-MS/MS	0.5	1	Label A			
			NEBII	US	LC-MS/MS	0.2	0.5	Label A			
			InAirQ	US	LC-MS/MS	0.05	0.15	Label A			
			SPECIMEn-NL	US	LC-MS/MS		0.5	Label A			
			OCC	US	LC-MS/MS	0.43	1.3	Label A			
			PCB cohort	US	LC-MS/MS	3.23		Label C			
			GerES V-sub (unweighted)	UM	LC-MS/MS		0.5	Label B			
			3xG	UM	LC-MS/MS		0.4	Label A			
			Teenagers			ESTEBAN	UM	LC-MS/MS	0.17	0.5	Label A
						CROME	UM	LC-MS/MS	0.05	0.2	Label A
						BEA	UM	LC-MS/MS		0.5	Label A
						SLO CRP	UM	LC-MS/MS		0.5	Label A
						CELSPAC: Teenagers	UM	LC-MS/MS	0.2	0.6	Label A
						Riksmaten adolescents	US	LC-MS/MS	0.2		Label D
						POLAES	US	LC-MS/MS	0.17	0.5	Label A
						NEBII	US	LC-MS/MS	0.2	0.5	Label A
PCB cohort follow-up	US	LC-MS/MS				0.02	0.6	Label A			
GerES V-sub (unweighted)	UM	LC-MS/MS					0.5	Label B			
FLEHS IV	US	LC-MS/MS					0.5	Label A			
Di-isobutyl phthalate (DiBP)	MiBP	Children				ESTEBAN	UM	LC-MS/MS	0.33	1	Label A
						CROME	UM	LC-MS/MS	0.05	0.2	Label A
						NACII	US	LC-MS/MS		0.5	Label A
						SLO CRP	UM	LC-MS/MS		1	Label A
			NEBII	US	LC-MS/MS	0.2	0.5	Label A			
			InAirQ	US	LC-MS/MS	0.25	0.74	Label A			
			SPECIMEn-NL	US	LC-MS/MS		1	Label A			
			OCC	US	LC-MS/MS	0.15	0.47	Label A			
			PCB cohort	US	LC-MS/MS	0.67		Label C			
			GerES V-sub (unweighted)	UM	LC-MS/MS		1	Label B			
			3xG	UM	LC-MS/MS		0.4	Label A			
			Teenagers			ESTEBAN	UM	LC-MS/MS	0.33	1	Label A
						CROME	UM	LC-MS/MS	0.05	0.2	Label A
						BEA	UM	LC-MS/MS		1	Label A
						SLO CRP	UM	LC-MS/MS		1	Label A
CELSPAC: Teenagers	UM	LC-MS/MS				0.07	0.2	Label D			
NEBII	US	LC-MS/MS				0.2	0.5	Label A			
PCB cohort follow-up	US	LC-MS/MS				0.07	0.2	Label D			
GerES V-sub (unweighted)	UM	LC-MS/MS					1	Label B			
FLEHS IV	US	LC-MS/MS					0.5	Label A			
Di-isodecyl phthalate (all C10 phthalates including DPHP) (DiDP)	cx-MiDP	Children	ESTEBAN	UM	LC-MS/MS	0.07	0.2	Label A			
			SLO CRP	UM	LC-MS/MS		0.2	Label A			
			POLAES	US	LC-MS/MS	0.07	0.2	Label A			
			InAirQ	US	LC-MS/MS	0.12	0.37	Label D			
			SPECIMEn-NL	US	LC-MS/MS		0.2	Label A			
			OCC	US	LC-MS/MS	0.02	0.07	Label A			
			GerES V-sub (unweighted)	UM	LC-MS/MS		0.2	Label B			
			3xG	UM	LC-MS/MS		0.2	Label A			
			Teenagers			ESTEBAN	UM	LC-MS/MS	0.07	0.2	Label A
						BEA	UM	LC-MS/MS		0.2	Label A

Parent compound	Biomarker	Age Group	Data collection	Biological matrix	Analytical method	LOD (µg/L)	LOQ (µg/L)	HBM4EU QA/QC label*	
Di-isodecyl phthalate (all C10 phthalates including DPHP) (DiDP)	OH-MiDP	Children	SLO CRP	UM	LC-MS/MS		0.2	Label A	
			Riksmaten adolescents	US	LC-MS/MS	0.1		Label A	
			POLAES	US	LC-MS/MS	0.07	0.2	Label A	
			GerES V-sub (unweighted)	UM	LC-MS/MS		0.2	Label B	
			FLEHS IV	US	LC-MS/MS		0.2	Label A	
			ESTEBAN	UM	LC-MS/MS	0.07	0.2	Label A	
			CROME	UM	LC-MS/MS	0.05	0.2	Label D	
			NACII	US	LC-MS/MS		0.2	Label A	
			SLO CRP	UM	LC-MS/MS		0.2	Label A	
			POLAES	US	LC-MS/MS	0.07	0.2	Label A	
			NEBII	US	LC-MS/MS	0.2	0.5	Label A	
			InAirQ	US	LC-MS/MS	0.12	0.37	Label A	
			SPECIMEn-NL	US	LC-MS/MS		0.2	Label A	
			OCC	US	LC-MS/MS	0.02	0.06	Label A	
		GerES V-sub (unweighted)	UM	LC-MS/MS		0.2	Label B		
		3xG	UM	LC-MS/MS		0.2	Label A		
		Teenagers	ESTEBAN	UM	LC-MS/MS	0.07	0.2	Label A	
			CROME	UM	LC-MS/MS	0.05	0.2	Label D	
			BEA	UM	LC-MS/MS		0.2	Label A	
			SLO CRP	UM	LC-MS/MS		0.2	Label A	
			CELSPAC: Teenagers	UM	LC-MS/MS	0.2	0.6	Label D	
			Riksmaten adolescents	US	LC-MS/MS	0.08		Label A	
			POLAES	US	LC-MS/MS	0.07	0.2	Label A	
			NEBII	US	LC-MS/MS	0.2	0.5	Label A	
			PCB cohort follow-up	US	LC-MS/MS	0.2	0.6	Label D	
			GerES V-sub (unweighted)	UM	LC-MS/MS		0.2	Label B	
			FLEHS IV	US	LC-MS/MS		0.2	Label A	
			Di-isononyl phthalate (DiNP)	cx-MiNP	Children	ESTEBAN	UM	LC-MS/MS	0.07
CROME	UM					LC-MS/MS	0.05	0.2	Label A
SLO CRP	UM					LC-MS/MS		0.2	Label A
POLAES	US	LC-MS/MS				0.1	0.2	Label A	
NEBII	US	LC-MS/MS				0.7	2	Label D	
InAirQ	US	LC-MS/MS				0.05	0.15	Label A	
SPECIMEn-NL	US	LC-MS/MS					0.2	Label A	
OCC	US	LC-MS/MS				0.04	0.1	Label A	
GerES V-sub (unweighted)	UM	LC-MS/MS					0.2	Label B	
3xG	UM	LC-MS/MS					0.2	Label A	
Teenagers	ESTEBAN	UM				LC-MS/MS	0.07	0.2	Label A
	CROME	UM				LC-MS/MS	0.05	0.2	Label A
	BEA	UM				LC-MS/MS		0.2	Label A
	SLO CRP	UM				LC-MS/MS		0.2	Label A
	CELSPAC: Teenagers	UM			LC-MS/MS	0.2	0.4	Label A	
	Riksmaten adolescents	US			LC-MS/MS	0.05		Label A	
	POLAES	US			LC-MS/MS	0.07	0.2	Label A	
	NEBII	US			LC-MS/MS	0.7	2	Label D	
	PCB cohort follow-up	US			LC-MS/MS	0.2	0.4	Label A	
	GerES V-sub (unweighted)	UM			LC-MS/MS		0.2	Label B	
	FLEHS IV	US			LC-MS/MS		0.2	Label A	
	Children	ESTEBAN			UM	LC-MS/MS	0.07	0.2	Label A
		CROME			UM	LC-MS/MS	0.05	0.2	Label A
		SLO CRP			UM	LC-MS/MS		0.2	Label A
POLAES		US			LC-MS/MS	0.17	0.5	Label A	
NEBII		US			LC-MS/MS	0.2	0.5	Label A	
InAirQ		US			LC-MS/MS	0.05	0.15	Label A	
SPECIMEn-NL		US			LC-MS/MS		0.2	Label A	
OCC		US	LC-MS/MS	0.03	0.1	Label A			
GerES V-sub (unweighted)		UM	LC-MS/MS		0.2	Label B			
3xG		UM	LC-MS/MS		0.2	Label A			
Teenagers		ESTEBAN	UM	LC-MS/MS	0.07	0.2	Label A		
		CROME	UM	LC-MS/MS	0.05	0.2	Label A		
		BEA	UM	LC-MS/MS		0.2	Label A		
		SLO CRP	UM	LC-MS/MS		0.2	Label A		
	CELSPAC: Teenagers	UM	LC-MS/MS	0.3	0.7	Label D			

Parent compound	Biomarker	Age Group	Data collection	Biological matrix	Analytical method	LOD (µg/L)	LOQ (µg/L)	HBM4EU QA/QC label*			
Di-n-butyl phthalate (DnBP)	MnBP	Children	Riksmaten adolescents	US	LC-MS/MS	0.05		Label A			
			POLAES	US	LC-MS/MS	0.07	0.2	Label A			
			NEBII	US	LC-MS/MS	0.2	0.5	Label A			
			PCB cohort follow-up	US	LC-MS/MS	0.3	0.7	Label D			
			GerES V-sub (unweighted)	UM	LC-MS/MS		0.2	Label B			
			FLEHS IV	US	LC-MS/MS		0.2	Label A			
			ESTEBAN	UM	LC-MS/MS	0.33	1	Label A			
			CROME	UM	LC-MS/MS	0.05	0.2	Label A			
			NACII	US	LC-MS/MS		0.5	Label A			
			SLO CRP	UM	LC-MS/MS		1	Label A			
			POLAES	US	LC-MS/MS	0.33	1	Label A			
			NEBII	US	LC-MS/MS	0.2	0.5	Label A			
			InAirQ	US	LC-MS/MS	0.25	0.74	Label A			
			SPECIMEn-NL	US	LC-MS/MS		1	Label A			
		OCC	US	LC-MS/MS	0.2	0.5	Label A				
		PCB cohort	US	LC-MS/MS	0.67		Label C				
		GerES V-sub (unweighted)	UM	LC-MS/MS		1	Label B				
		3xG	UM	LC-MS/MS		0.4	Label A				
		Teenagers	ESTEBAN	UM	LC-MS/MS	0.33	1	Label A			
			CROME	UM	LC-MS/MS	0.05	0.2	Label A			
			BEA	UM	LC-MS/MS		1	Label A			
			SLO CRP	UM	LC-MS/MS		1	Label A			
			CELSPAC: Teenagers	UM	LC-MS/MS	0.18	0.4	Label A			
			POLAES	US	LC-MS/MS	0.33	1	Label A			
			NEBII	US	LC-MS/MS	0.2	0.5	Label A			
			PCB cohort follow-up	US	LC-MS/MS	0.18	0.4	Label A			
			GerES V-sub (unweighted)	UM	LC-MS/MS		1	Label B			
			FLEHS IV	US	LC-MS/MS		0.5	Label A			
Di-n-pentyl phthalate (DnPeP)	MnPeP		Children	ESTEBAN	UM	LC-MS/MS	0.07	0.2	Label A		
				CROME	UM	LC-MS/MS	0.05	0.2	Label D		
				NACII	US	LC-MS/MS		0.1	Label A		
				SLO CRP	UM	LC-MS/MS		0.2	Label A		
		POLAES		US	LC-MS/MS	0.07	0.2	Label A			
		NEBII		US	LC-MS/MS	0.2	0.5	Label D			
		InAirQ		US	LC-MS/MS	0.25	0.74	Label A			
		SPECIMEn-NL		US	LC-MS/MS		0.2	Label A			
		OCC		US	LC-MS/MS	0.04	0.12	Label A			
		GerES V-sub (unweighted)		UM	LC-MS/MS		0.2	Label B			
		Teenagers		ESTEBAN	UM	LC-MS/MS	0.07	0.2	Label A		
				CROME	UM	LC-MS/MS	0.05	0.2	Label D		
				BEA	UM	LC-MS/MS		0.2	Label A		
				SLO CRP	UM	LC-MS/MS		0.2	Label A		
			POLAES	US	LC-MS/MS	0.07	0.2	Label A			
			NEBII	US	LC-MS/MS	0.2	0.5	Label D			
			GerES V-sub (unweighted)	UM	LC-MS/MS		0.2	Label B			
			Di-n-octyl phthalate (DnOP)	MnOP	Children	ESTEBAN	UM	LC-MS/MS	0.07	0.2	Label A
						CROME	UM	LC-MS/MS	0.05	0.2	Label A
						NACII	US	LC-MS/MS		0.1	Label A
						SLO CRP	UM	LC-MS/MS		0.2	Label A
						POLAES	US	LC-MS/MS	0.07	0.2	Label A
						NEBII	US	LC-MS/MS	0.5	1.5	Label D
						InAirQ	US	LC-MS/MS	0.12	0.37	Label A
		SPECIMEn-NL				US	LC-MS/MS		0.2	Label A	
		OCC				US	LC-MS/MS	0.03	0.1	Label A	
		GerES V-sub (unweighted)				UM	LC-MS/MS		0.2	Label B	
		Teenagers				ESTEBAN	UM	LC-MS/MS	0.07	0.2	Label A
CROME	UM					LC-MS/MS	0.05	0.2	Label A		
BEA	UM					LC-MS/MS		0.2	Label A		
SLO CRP	UM					LC-MS/MS		0.2	Label A		
CELSPAC: Teenagers	UM				LC-MS/MS	0.2	0.5	Label D			
POLAES	US				LC-MS/MS	0.07	0.2	Label A			
NEBII	US				LC-MS/MS	0.5	1.5	Label D			
PCB cohort follow-up	US				LC-MS/MS	0.2	0.5	Label D			

Parent compound	Biomarker	Age Group	Data collection	Biological matrix	Analytical method	LOD (µg/L)	LOQ (µg/L)	HBM4EU QA/QC label*
			GerES V-sub (unweighted)	UM	LC-MS/MS		0.2	Label B
DINCH in urine								
Di-isononyl cyclohexane-1,2-dicarboxylate (DINCH)	cx-MINCH	Children	ESTEBAN	UM	LC-MS/MS	0.02	0.05	Label A
			CROME	UM	LC-MS/MS	0.05	0.2	Label A
			NACII	US	LC-MS/MS		0.1	Label A
			SLO CRP	UM	LC-MS/MS		0.05	Label A
			POLAES	US	LC-MS/MS	0.02	0.05	Label A
			InAirQ	US	LC-MS/MS	0.12	0.37	Label A
			SPECIMEn-NL	US	LC-MS/MS		0.05	Label A
			OCC	US	LC-MS/MS	0.02	0.05	Label A
			PCB cohort	US	LC-MS/MS	0.03	0.1	Label A
			GerES V-sub (unweighted)	UM	LC-MS/MS		0.05	Label B
		Teenagers	3xG	UM	LC-MS/MS		0.2	Label A
			ESTEBAN	UM	LC-MS/MS	0.02	0.05	Label A
			CROME	UM	LC-MS/MS	0.05	0.2	Label A
			BEA	UM	LC-MS/MS		0.05	Label A
			SLO CRP	UM	LC-MS/MS		0.05	Label A
			Riksmaten adolescents	US	LC-MS/MS	0.1		Label A
			POLAES	US	LC-MS/MS	0.017	0.05	Label A
			PCB cohort follow-up	US	LC-MS/MS	0.03	0.1	Label A
			GerES V-sub (unweighted)	UM	LC-MS/MS		0.05	Label B
			FLEHS IV	US	LC-MS/MS		0.2	Label A
Di-isononyl cyclohexane-1,2-dicarboxylate (DINCH)	OH-MINCH	Children	ESTEBAN	UM	LC-MS/MS	0.02	0.05	Label A
			CROME	UM	LC-MS/MS	0.05	0.2	Label A
			NACII	US	LC-MS/MS		0.14	Label A
			SLO CRP	UM	LC-MS/MS		0.05	Label A
			POLAES	US	LC-MS/MS	0.02	0.05	Label A
			NEBII	US	LC-MS/MS	0.2	0.5	Label A
			InAirQ	US	LC-MS/MS	0.12	0.37	Label A
			SPECIMEn-NL	US	LC-MS/MS		0.05	Label A
			OCC	US	LC-MS/MS	0.03	0.08	Label A
			PCB cohort	US	LC-MS/MS	0.05	0.14	Label A
		Teenagers	GerES V-sub (unweighted)	UM	LC-MS/MS		0.05	Label B
			3xG	UM	LC-MS/MS		0.2	Label A
			ESTEBAN	UM	LC-MS/MS	0.02	0.05	Label A
			CROME	UM	LC-MS/MS	0.05	0.2	Label A
			BEA	UM	LC-MS/MS		0.05	Label A
			SLO CRP	UM	LC-MS/MS		0.05	Label A
			CELSPAC: Teenagers	UM	LC-MS/MS	0.3	1	Label D
			Riksmaten adolescents	US	LC-MS/MS	0.1		Label A
			POLAES	US	LC-MS/MS	0.02	0.05	Label A
			NEBII	US	LC-MS/MS	0.2	0.5	Label A
PCB cohort follow-up	US	LC-MS/MS	0.05	0.14	Label A			
GerES V-sub (unweighted)	UM	LC-MS/MS		0.05	Label B			
FLEHS IV	US	LC-MS/MS		0.2	Label A			
Organophosphorus flame retardants in urine								
Tris(2chloroisopropyl)phosphate (TCIPP)	BCIPP	Children	ESTEBAN	UM	LC-MS/MS	0.19-0.2	0.64-0.67	Label A
			SLO CRP	UM	LC-MS/MS	0.09	0.3	Label A
			OCC	US	LC-MS/MS		0.4	Label A
			PCB cohort	US	LC-MS/MS	0.09	0.3	Label A
			GerES V-sub (unweighted)	UM	GC-MS/MS		0.1	Label A
			3xG	UM	LC-MS/MS		0.4	Label A
Tris(1,3-dichloro-2-propyl) phosphate (TDCIPP)	BDCIPP	Children	ESTEBAN	UM	LC-MS/MS	0.1	0.32-0.34	Label A
			SLO CRP	UM	LC-MS/MS	0.09	0.3	Label A
			NEBII	US	LC-MS/MS	0.17	0.5	Label A
			OCC	US	LC-MS/MS		0.05	Label A
			PCB cohort	US	LC-MS/MS	0.09	0.3	Label A
			GerES V-sub (unweighted)	UM	GC-MS/MS		0.3	Label A
Triphenylphosphate (TPHP)	DPHP	Children	3xG	UM	LC-MS/MS		0.05	Label A
			ESTEBAN	UM	LC-MS/MS	0.1	0.32-0.34	Label A
			SLO CRP	UM	LC-MS/MS	0.03	0.09	Label A
			NEBII	US	LC-MS/MS	0.03	0.1	Label A
OCC	US	LC-MS/MS		0.1	Label A			

Parent compound	Biomarker	Age Group	Data collection	Biological matrix	Analytical method	LOD (µg/L)	LOQ (µg/L)	HBM4EU QA/QC label*	
			PCB cohort	US	LC-MS/MS	0.03	0.09	Label A	
			GerES V-sub (unweighted)	UM	GC-MS/MS		0.15	Label A	
			3xG	UM	LC-MS/MS		0.1	Label A	
Halogenated flame retardants in blood									
Polybrominated diphenylether (BDE-47)	BDE-47	Children	ESTEBAN	BS	GC-MS/MS; UHPLC-MS/MS	0.001	0.002	Label A	
			CROME	BS	LC-MS/MS; GC-MS/MS	1e-04	2e-04	Label A	
			SLO CRP	BS	LC-MS/MS; GC-MS/MS		0.002	Label A	
Polybrominated diphenylether (BDE-153)	BDE-153	Children	NEBII	BP	GC-MS/MS	2e-04	5e-04	Label A	
			ESTEBAN	BS	GC-MS/MS; UHPLC-MS/MS	0.001	0.002	Label A	
			CROME	BS	LC-MS/MS; GC-MS/MS	3e-05	1e-04	Label A	
Dechlorane (DP)	Plus	Anti-DP	SLO CRP	BS	LC-MS/MS; GC-MS/MS		4e-04	Label A	
			NEBII	BP	GC-MS/MS	7e-04	0.002	Label A	
			ESTEBAN	BS	GC-MS/MS; UHPLC-MS/MS	0.001	0.002	Label A	
Dechlorane (DP)	Plus	Syn-DP	CROME	BS	LC-MS/MS; GC-MS/MS	0.019	0.06	Label A	
			SLO CRP	BS	LC-MS/MS; GC-MS/MS		0.04	Label A	
			NEBII	BP	GC-MS/MS	2e-04	5e-04	Label A	
Dechlorane (DP)	Plus	Syn-DP	ESTEBAN	BS	GC-MS/MS; UHPLC-MS/MS	0.001	0.002	Label A	
			CROME	BS	LC-MS/MS; GC-MS/MS	0.031	0.103	Label A	
			SLO CRP	BS	LC-MS/MS; GC-MS/MS		0.05	Label A	
			NEBII	BP	GC-MS/MS	2e-04	5e-04	Label A	
UV filters in urine									
Benzophenone (BP-1)	1	BP-1	Teenagers	ESTEBAN	UM	LC-MS/MS		0.01	Label A
				BEA	UM	LC-MS/MS		0.01	Label A
				Riksmaten adolescents	US	LC-MS/MS		0.01	Label A
			Adults	POLAES	US	LC-MS/MS	0.01		Label A
				GerES V-sub (unweighted)	UM	LC-MS/MS		0.5	Label B
				ESTEBAN	UM	LC-MS/MS		0.01	Label A
				Oriscav-Lux2	US	LC-MS/MS		0.01	Label A
Benzophenone (BP-3)	3	BP-3	Teenagers	CPHMINIPUB/DYMS	US	LC-MS/MS		0.01	Label B
				ESB	UD	LC-MS/MS		0.5	Label B
				ESTEBAN	UM	LC-MS/MS		0.03	Label A
				BEA	UM	LC-MS/MS		0.03	Label A
			Adults	Riksmaten adolescents	US	LC-MS/MS		0.03	Label A
				POLAES	US	LC-MS/MS	0.03		Label A
				NEBII	US	UPLC-MS/MS	0.04	0.1	Label B
				GerES V-sub (unweighted)	UM	LC-MS/MS		2	Label B
Benzophenone (BP-3)	3	BP-3	Adults	ESTEBAN	UM	LC-MS/MS		0.03	Label A
				Oriscav-Lux2	US	LC-MS/MS		0.03	Label A
				CPHMINIPUB/DYMS	US	LC-MS/MS		0.03	Label B
				ESB	UD	LC-MS/MS		2	Label B
Per- and polyfluoroalkyl substances in blood									
Perfluorobutane sulfonic acid (PFBS)	PFBS	Teenagers	ESTEBAN	BS	LC-MS/MS	0.05	0.19	Label B	
			CROME	BS	LC-MS/MS	0.01	0.04	Label A	
			BEA	BS	LC-MS/MS		0.1	Label A	
			SLO CRP	BS	LC-MS/MS	0.01	0.04	Label A	
			Riksmaten adolescents	BS	UPLC-MS/MS		0.04-0.54	Label C	
			NEBII	BP	LC-MS/MS	0.02	0.05	Label A	
			PCB cohort follow-up	BS	LC-MS/MS	0.01	0.04	Label A	
Perfluorodecanoic acid (PFDA)	PFDA	Teenagers	GerES V-sub (unweighted)	BP	LC-MS/MS		0.25	Label B	
			FLEHS IV	BS	LC-MS/MS		0.2	Label D	
			ESTEBAN	BS	LC-MS/MS	0.05	0.2	Label B	
			CROME	BS	LC-MS/MS	0.004	0.01	Label A	
			BEA	BS	LC-MS/MS		0.2	Label A	
			SLO CRP	BS	LC-MS/MS	0.004	0.01	Label A	
			Riksmaten adolescents	BS	UPLC-MS/MS		0.06-0.29	Label C	

Parent compound	Biomarker	Age Group	Data collection	Biological matrix	Analytical method	LOD (µg/L)	LOQ (µg/L)	HBM4EU QA/QC label*
Perfluorododecanoic acid (PFDoDA)	PFDoDA	Teenagers	NEBII	BP	LC-MS/MS	0.02	0.05	Label A
			PCB cohort follow-up	BS	LC-MS/MS	0.01	0.03	Label A
			GerES V-sub (unweighted)	BP	LC-MS/MS		0.25	Label B
			FLEHS IV	BS	LC-MS/MS		0.2	Label A
			ESTEBAN	BS	LC-MS/MS	0.02	0.05	Label B
			CROME	BS	LC-MS/MS	0.005	0.02	Label A
			BEA	BS	LC-MS/MS		0.12	Label D
			SLO CRP	BS	LC-MS/MS	0.005	0.02	Label A
			Riksmaten adolescents	BS	UPLC-MS/MS		0.06-0.29	Label C
			NEBII	BP	LC-MS/MS	0.02	0.05	Label A
Perfluoroheptanoic acid (PFHpA)	PFHpA	Teenagers	PCB cohort follow-up	BS	LC-MS/MS	0.01	0.04	Label A
			GerES V-sub (unweighted)	BP	LC-MS/MS		0.25	Label B
			FLEHS IV	BS	LC-MS/MS		0.2	Label A
			ESTEBAN	BS	LC-MS/MS	0.05	0.2	Label B
			CROME	BS	LC-MS/MS	0.01	0.03	Label A
			BEA	BS	LC-MS/MS		0.2	Label A
			SLO CRP	BS	LC-MS/MS	0.01	0.03	Label A
			Riksmaten adolescents	BS	UPLC-MS/MS		0.06-0.29	Label C
			NEBII	BP	LC-MS/MS	0.02	0.05	Label A
			PCB cohort follow-up	BS	LC-MS/MS	0.004	0.01	Label A
Perfluoroheptane sulfonic acid (PFHpS)	PFHpS	Teenagers	GerES V-sub (unweighted)	BP	LC-MS/MS		0.25	Label B
			FLEHS IV	BS	LC-MS/MS		0.2	Label A
			ESTEBAN	BS	LC-MS/MS	0.05	0.19	Label B
			CROME	BS	LC-MS/MS	0.005	0.02	Label A
			BEA	BS	LC-MS/MS		0.25	Label A
			SLO CRP	BS	LC-MS/MS	0.005	0.02	Label A
			NEBII	BP	LC-MS/MS	0.02	0.05	Label A
			PCB cohort follow-up	BS	LC-MS/MS	0.004	0.01	Label A
			FLEHS IV	BS	LC-MS/MS		0.2	Label A
			ESTEBAN	BS	LC-MS/MS	0.05	0.2	Label B
Perfluorohexanoic acid (PFHxA)	PFHxA	Teenagers	CROME	BS	LC-MS/MS	0.01	0.04	Label A
			BEA	BS	LC-MS/MS		0.25	Label A
			SLO CRP	BS	LC-MS/MS	0.01	0.04	Label A
			Riksmaten adolescents	BS	UPLC-MS/MS		0.06-0.29	Label C
			PCB cohort follow-up	BS	LC-MS/MS	0.005	0.02	Label A
			GerES V-sub (unweighted)	BP	LC-MS/MS		0.25	Label B
			FLEHS IV	BS	LC-MS/MS		0.2	Label D
			ESTEBAN	BS	LC-MS/MS	0.05	0.19	Label B
			CROME	BS	LC-MS/MS	0.005	0.02	Label A
			BEA	BS	LC-MS/MS		0.34	Label A
Perfluorohexane sulfonic acid (PFHxS)	PFHxS	Teenagers	SLO CRP	BS	LC-MS/MS	0.004	0.01	Label A
			Riksmaten adolescents	BS	UPLC-MS/MS		0.02-0.46	Label C
			NEBII	BP	LC-MS/MS	0.02	0.05	Label A
			PCB cohort follow-up	BS	LC-MS/MS	0.005	0.02	Label A
			GerES V-sub (unweighted)	BP	LC-MS/MS		0.25	Label B
			FLEHS IV	BS	LC-MS/MS		0.2	Label A
			ESTEBAN	BS	LC-MS/MS	0.05	0.2	Label B
			CROME	BS	LC-MS/MS	0.004	0.01	Label A
			BEA	BS	LC-MS/MS		0.16	Label A
			SLO CRP	BS	LC-MS/MS	0.004	0.01	Label A
Perfluorononanoic acid (PFNA)	PFNA	Teenagers	Riksmaten adolescents	BS	UPLC-MS/MS		0.06-0.29	Label C
			NEBII	BP	LC-MS/MS	0.02	0.05	Label A
			PCB cohort follow-up	BS	LC-MS/MS	0.005	0.02	Label A
			GerES V-sub (unweighted)	BP	LC-MS/MS		0.5	Label B
			FLEHS IV	BS	LC-MS/MS		0.2	Label A
			ESTEBAN	BS	LC-MS/MS	0.02	0.05	Label B
			CROME	BS	LC-MS/MS	0.02	0.07	Label A
			BEA	BS	LC-MS/MS		0.16	Label A
			SLO CRP	BS	LC-MS/MS	0.02	0.07	Label A
			Riksmaten adolescents	BS	UPLC-MS/MS		0.02-0.29	Label C
Perfluorooctanoic acid (PFOA)	PFOA	Teenagers	NEBII	BP	LC-MS/MS	0.02	0.05	Label A
			PCB cohort follow-up	BS	LC-MS/MS	0.004	0.01	Label A
			GerES V-sub (unweighted)	BP	LC-MS/MS		0.5	Label B
			FLEHS IV	BS	LC-MS/MS		0.2	Label A
			ESTEBAN	BS	LC-MS/MS	0.02	0.05	Label B
			CROME	BS	LC-MS/MS	0.02	0.07	Label A
			BEA	BS	LC-MS/MS		0.16	Label A

Parent compound	Biomarker	Age Group	Data collection	Biological matrix	Analytical method	LOD (µg/L)	LOQ (µg/L)	HBM4EU QA/QC label*
Perfluorooctane sulfonic acid (PFOS)	PFOS	Teenagers	FLEHS IV	BS	LC-MS/MS		0.2	Label A
			ESTEBAN	BS	LC-MS/MS	0.03	0.1	Label B
			CROME	BS	LC-MS/MS	0.03	0.09	Label A
			BEA	BS	LC-MS/MS		0.33	Label A
			SLO CRP	BS	LC-MS/MS	0.03	0.09	Label A
			Riksmaten adolescents	BS	UPLC-MS/MS		0.06-0.56	Label C
			NEBII	BP	LC-MS/MS	0.02	0.05	Label A
			PCB cohort follow-up	BS	LC-MS/MS	0.01	0.04	Label A
Perfluoropentanoic acid (PFPeA)	PFPeA	Teenagers	GerES V-sub (unweighted)	BP	LC-MS/MS		0.25	Label B
			FLEHS IV	BS	LC-MS/MS		0.2	Label A
			ESTEBAN	BS	LC-MS/MS	0.02	0.05	Label B
			CROME	BS	LC-MS/MS	0.01	0.04	Label A
			BEA	BS	LC-MS/MS		0.16	Label A
			SLO CRP	BS	LC-MS/MS	0.01	0.04	Label A
			PCB cohort follow-up	BS	LC-MS/MS	0.004	0.01	Label A
			GerES V-sub (unweighted)	BP	LC-MS/MS		0.25	Label B
Perfluoroundecanoic acid (PFUnDA)	PFUnDA	Teenagers	FLEHS IV	BS	LC-MS/MS		0.2	Label A
			ESTEBAN	BS	LC-MS/MS	0.02	0.05	Label B
			CROME	BS	LC-MS/MS	0.004	0.01	Label A
			BEA	BS	LC-MS/MS		0.2	Label A
			SLO CRP	BS	LC-MS/MS	0.004	0.01	Label A
			Riksmaten adolescents	BS	UPLC-MS/MS		0.06-0.29	Label C
			NEBII	BP	LC-MS/MS	0.02	0.05	Label A
			PCB cohort follow-up	BS	LC-MS/MS	0.004	0.01	Label A
GerES V-sub (unweighted)	BP	LC-MS/MS		0.25	Label B			
Arsenic in urine								
Arsenic (As)	AsB	Teenagers	BEA	UM	ICP-MS		0.1	Label A
			Riksmaten adolescents	US	ICP-MS		0.1	Label A
			GerES V-sub (unweighted)	UM	LC-ICP-MS		0.1	Label A
			FLEHS IV	US	LC-ICP-MS	0.1		Label B
	As(V)	Teenagers	BEA	UM	ICP-MS		0.1	Label A
			SLO CRP	UM	HPLC-HG-AFS	0.1		Label C
			Riksmaten adolescents	US	ICP-MS		0.1	Label A
			GerES V-sub (unweighted)	UM	LC-ICP-MS		0.1	Label A
	As(III)	Teenagers	FLEHS IV	US	LC-ICP-MS	0.1		Label B
			BEA	UM	ICP-MS		0.1	Label A
			SLO CRP	UM	HPLC-HG-AFS	0.1		Label B
			Riksmaten adolescents	US	ICP-MS		0.1	Label A
	DMA	Teenagers	GerES V-sub (unweighted)	UM	LC-ICP-MS		0.1	Label A
			FLEHS IV	US	LC-ICP-MS	0.1		Label B
			BEA	UM	ICP-MS		0.1	Label A
			SLO CRP	UM	HPLC-HG-AFS	0.2		Label B
	MMA	Teenagers	Riksmaten adolescents	US	ICP-MS		0.1	Label A
			GerES V-sub (unweighted)	UM	LC-ICP-MS		0.1	Label A
			FLEHS IV	US	LC-ICP-MS	0.1		Label B
			BEA	UM	ICP-MS		0.1	Label A
	As total	Teenagers	SLO CRP	UM	HPLC-HG-AFS	0.2		Label B
			Riksmaten adolescents	US	ICP-MS		0.1	Label A
			FLEHS IV	US	LC-ICP-MS	0.1		Label B
			ESTEBAN	UM	ICP-MS	0.01	0.04	Label C
Tox. rel. As	Teenagers	BEA	UM	ICP-MS		0.05	Label A	
		SLO CRP	UM	HPLC-HG-AFS	0.03		Label B	
		Riksmaten adolescents	US	ICP-MS		0.05	Label A	
		ESTEBAN	UM	HPLC-ICPMS	0.15	0.3	Label C	
Cadmium in urine								
Cadmium (Cd)	Cd	Adults	ESTEBAN	UM	ICP-MS	0.002	0.005	Label C
			HBM survey in adults in HR	UM	ICP-MS	0.004	0.013	Label A
			INSEF-ExpoQuim	UM	ICP-MS	0.008	0.025	Label A
			Oriscav-Lux2	US	ICP-MS		0.1	Label A
			(C)ELSPAC: YA	UM	ICP-MS	0.004	0.013	Label A
			POLAES	US	ICP-MS	0.004	0.008	Label A
			CPHMINIPUB/DYMS	US	ICP-MS	0.015	0.05	Label A

Parent compound	Biomarker	Age Group	Data collection	Biological matrix	Analytical method	LOD (µg/L)	LOQ (µg/L)	HBM4EU QA/QC label*
			ESB	UD	ICP-MS		0.002-0.018	Label A
			Diet_HBM	US	ICP-MS	0.01	0.03	Label A
Polycyclic aromatic hydrocarbons (PAHs) in urine								
Benzo[a]pyrene (BaP)	3-hydroxyBaP	Adults	ESTEBAN	UM	GC-MS/MS	5e-04	0.001	Label C
			HBM survey in adults in HR	UM	LC-MS/MS	0.06	0.2	Label D
			INSEF-ExpoQuim	UM	LC-MS/MS	0.15	0.5	Label D
			(C)ELSPAC: YA	UM	LC-MS/MS	0.06	0.2	Label D
			(C)ELSPAC: YA	US	LC-MS/MS	0.06	0.2	Label D
Fluorene (FLUO)	2-FLUO	Adults	ESB	UD	LC-MS/MS		5e-05	Label A
			Diet_HBM	US	LC-MS/MS	0.06	0.2	Label D
			ESTEBAN	UM	GC-MS/MS	0.002	0.005	Label B
			HBM survey in adults in HR	UM	LC-MS/MS	0.006	0.018	Label A
			INSEF-ExpoQuim	UM	LC-MS/MS	0.003	0.01	Label A
	3-FLUO	Adults	Oriscav-Lux2	US	GC-MS/MS	0.02	0.06	Label A
			(C)ELSPAC: YA	UM	LC-MS/MS	0.006	0.018	Label A
			CPHMINIPUB/DYMS	US	GC-MS	0.08	0.09	Label A
			Diet_HBM	US	LC-MS/MS	0.006	0.018	Label A
			ESTEBAN	UM	GC-MS/MS	0.005	0.01	Label B
Naphtalene (NAPH)	1-NAPH	Adults	HBM survey in adults in HR	UM	LC-MS/MS	0.006	0.018	Label A
			INSEF-ExpoQuim	UM	LC-MS/MS	0.015	0.05	Label D
			Oriscav-Lux2	US	GC-MS/MS	0.02	0.06	Label A
			(C)ELSPAC: YA	UM	LC-MS/MS	0.006	0.018	Label A
			Diet_HBM	US	LC-MS/MS	0.006	0.018	Label A
	2-NAPH	Adults	ESTEBAN	UM	GC-MS/MS	0.015	0.05	Label B
			HBM survey in adults in HR	UM	LC-MS/MS	0.006	0.018	Label A
			INSEF-ExpoQuim	UM	LC-MS/MS	0.008	0.025	Label A
			Oriscav-Lux2	US	GC-MS/MS	0.1	0.2	Label A
			(C)ELSPAC: YA	UM	LC-MS/MS	0.006	0.018	Label D
			POLAES	US		1	3	Label A
			CPHMINIPUB/DYMS	US	GC-MS	0.797	1.16	Label A
			HBM4EU-study Switzerland	UM	LC-MS/MS	0.033	0.1	Label A
			ESB	UD	LC-MS/MS		0.1	Label A
			Diet_HBM	US	LC-MS/MS	0.006	0.018	Label D
Phenanthrene (PHE)	1-PHEN	Adults	ESTEBAN	UM	GC-MS/MS	0.002	0.005	Label B
			HBM survey in adults in HR	UM	LC-MS/MS	0.006	0.018	Label A
			INSEF-ExpoQuim	UM	LC-MS/MS	0.003	0.01	Label A
			Oriscav-Lux2	US	GC-MS/MS	0.015	0.05	Label A
			(C)ELSPAC: YA	UM	LC-MS/MS	0.006	0.018	Label A
	2-PHEN	Adults	ESB	UD	LC-MS/MS		0.005	Label A
			Diet_HBM	US	LC-MS/MS	0.006	0.018	Label A
			ESTEBAN	UM	GC-MS/MS	0.002	0.005	Label B
			HBM survey in adults in HR	UM	LC-MS/MS	0.006	0.018	Label D
			INSEF-ExpoQuim	UM	LC-MS/MS	0.003	0.01	Label A
	3-PHEN	Adults	(C)ELSPAC: YA	UM	LC-MS/MS	0.006	0.018	Label D
			ESB	UD	LC-MS/MS		0.005	Label A
			Diet_HBM	US	LC-MS/MS	0.006	0.018	Label A
			ESTEBAN	UM	GC-MS/MS	0.002	0.005	Label B
			HBM survey in adults in HR	UM	LC-MS/MS	0.006	0.018	Label D
			INSEF-ExpoQuim	UM	LC-MS/MS	0.003	0.01	Label A
			Oriscav-Lux2	US	GC-MS/MS	0.01	0.03	Label A
			(C)ELSPAC: YA	UM	LC-MS/MS	0.006	0.018	Label D
			ESB	UD	LC-MS/MS		0.005	Label A
			Diet_HBM	US	LC-MS/MS	0.006	0.018	Label D

Parent compound	Biomarker	Age Group	Data collection	Biological matrix	Analytical method	LOD (µg/L)	LOQ (µg/L)	HBM4EU QA/QC label*
4-PHEN	4-PHEN	Adults	ESTEBAN	UM	GC-MS/MS	0.005	0.01	Label B
			HBM survey in adults in HR	UM	LC-MS/MS	0.006	0.018	Label A
			INSEF-ExpoQuim	UM	LC-MS/MS	0.003	0.01	Label A
			Oriscav-Lux2	US	GC-MS/MS	0.02	0.05	Label A
			(C)ELSPAC: YA	UM	LC-MS/MS	0.006	0.018	Label A
			CPHMINIPUB/DYMS	US	GC-MS	0.042	0.058	Label A
			ESB	UD	LC-MS/MS		0.005	Label A
	Diet_HBM	US	LC-MS/MS	0.006	0.018	Label A		
	9-PHEN	Adults	ESTEBAN	UM	GC-MS/MS	0.005	0.01	Label C
			HBM survey in adults in HR	UM	LC-MS/MS	0.06	0.2	Label D
			INSEF-ExpoQuim	UM	LC-MS/MS	0.008	0.025	Label A
			Oriscav-Lux2	US	GC-MS/MS	0.05	0.1	Label A
			(C)ELSPAC: YA	UM	LC-MS/MS	0.06	0.2	Label D
			ESB	UD	LC-MS/MS		0.005	Label D
Diet_HBM			US	LC-MS/MS	0.06	0.2	Label D	
Pyrene (Pyr)	1-PYR	Adults	ESTEBAN	UM	GC-MS/MS	0.005	0.01	Label B
			HBM survey in adults in HR	UM	LC-MS/MS	0.006	0.018	Label A
			INSEF-ExpoQuim	UM	LC-MS/MS	0.008	0.025	Label A
			Oriscav-Lux2	US	GC-MS/MS	0.015	0.03	Label A
			(C)ELSPAC: YA	UM	LC-MS/MS	0.006	0.018	Label A
			POLAES	US		0.007	0.02	Label A
			HBM4EU-study Switzerland	UM	LC-MS/MS	0.003	0.01	Label A
			ESB	UD	LC-MS/MS		0.01	Label A
			Diet_HBM	US	LC-MS/MS	0.006	0.018	Label A
			Acrylamide in urine					
Acrylamide	N-Acetyl-S-(2-carbamoyl-ethyl)cysteine (AAMA)	Children	ESTEBAN	UM	LC-MS/MS		3.2	Label A
			NACII	US	LC-MS/MS		3.2	Label A
			NEBII	US	LC-MS/MS	0.33	1	Label A
			GerES V-sub (unweighted)	UM	LC-MS/MS		1	Label B
		Adults	ESTEBAN	UM	LC-MS/MS		3.2	Label A
			INSEF-ExpoQuim	UM	LC-MS/MS		3.2	Label A
			Oriscav-Lux2	US	LC-MS/MS	0.33	1	Label A
			ESB	UD	LC-MS/MS		10	Label A
			Diet_HBM	US	LC-MS/MS	1	2	Label A
			Acrylamide	N-Acetyl-S-(2-carbamoyl-2-hydroxyethyl)cysteine (GAMA)	Children	ESTEBAN	UM	LC-MS/MS
NACII	US	LC-MS/MS					1	Label A
NEBII	US	LC-MS/MS				0.33	1	Label A
GerES V-sub (unweighted)	UM	LC-MS/MS					1	Label B
Adults	ESTEBAN	UM			LC-MS/MS		1	Label A
	INSEF-ExpoQuim	UM			LC-MS/MS		1	Label A
	Oriscav-Lux2	US			LC-MS/MS	0.33	1	Label A
	ESB	UD			LC-MS/MS		1	Label A
	Diet_HBM	US			LC-MS/MS	1	3	Label A
	Mycotoxins in urine							
Deoxynivalenol (DON)	tDON	Adults	ESTEBAN	UM	LC-MS/MS		0.05	Label A
			INSEF-ExpoQuim	UM	HR-MS/MS		0.05	Label A
			Oriscav-Lux2	US	LC-MS/MS	0.1	0.5	Label A
			POLAES	US	LC-MS/MS	0.2	0.5	Label A
			ESB	UD	HPLC-MS/MS		0.3	Label A
			Diet_HBM	US	LC-MS/MS	0.04	0.14	Label D

Abbreviations: Biological matrix: BP = blood plasma; BS = blood serum; UD = 24h urine; UM = first morning urine; US = Random spot urine. Analytical method: GC = Gas chromatography; HG-AFS = hydride generation atomic fluorescence spectrometry; HPLC = high-performance liquid chromatography; HR = High resolution; ICP = Inductively coupled plasma; LC = Liquid chromatography; MS/MS = tandem mass spectrometry; UHPLC = ultra-high performance liquid chromatography; UPLC = ultra-high performance liquid chromatography. LOD = limit of detection; LOQ = limit of quantification.

*HBM4EU QA/QC labels: Label A = Biomarker data quality assured by HBM4EU QA/QC program; Label B = Biomarker data generated before HBM4EU QA/QC program but deemed comparable by HBM4EU Quality Assurance Unit (QAU); Label C = Biomarker data generated before HBM4EU QA/QC program but comparability not guaranteed by HBM4EU Quality Assurance Unit (QAU); Label D = Biomarker data not quality assured by HBM4EU QA/QC program.

Contributing studies in children: DK: Odense Child Cohort (OCC), NO: Norwegian Environmental Biobank II (NEBII), HU: Transnational Adaption Actions for Integrated Indoor Air Quality Management (InAirQ), SK: Endocrine disruptors and health in children and teenagers in Slovakia (PCB cohort), PL: Polish Aligned Environmental Study (POLAES), SI: Exposure of children and adolescents to selected chemicals through their habitat environment (SLO CRP), EL: Cross-Mediterranean Environment and Health Network (CROME), IT: Northern Adriatic cohort II (NACII), FR: Étude de santé sur l'environnement, la biosurveillance, l'activité physique et la nutrition (ESTEBAN), DE: German Environmental Survey 2014-2017 subsample (GerES V-sub, unweighted), BE: Gezondheid, Gemeenten, Geboorte studie (3xG), NL: Survey on PEStiCide Mixtures in Europe, The Netherlands (SPECIMEn-NL), IL: The National Health and Nutrition Survey 2015 Israel (RAV MABAT), CY: Organic diet and children's health (ORGANIKO). Contributing studies in teenagers: SE: Riksmaten Adolescents 2016-17 (Riksmaten Ungdom), NO: Norwegian Environmental Biobank II (NEBII), CZ: Central European Longitudinal Studies of Parents and Children: Teenagers (CELSPAC: TE), SK: Endocrine disruptors

and health in children and teenagers in Slovakia follow-up (PCB cohort follow-up), PL: Polish Aligned Environmental Study (POLAES), SI: Exposure of children and adolescents to selected chemicals through their habitat environment (SLO CRP), EL: Cross-Mediterranean Environment and Health Network (CROME), ES: Biomonitorización en Adolescentes (BEA), FR: Étude de santé sur l'environnement, la biosurveillance, l'activité physique et la nutrition (ESTEBAN), DE: German Environmental Survey 2014-2017 subsample (GerES V-sub, unweighted), BE: Flemish Environment and Health Study IV (FLEHS IV). Contributing studies in adults: DK: Copenhagen Minipuberty study (parents)/Danish Young Men Study (CPHMINIPUB/DYMS), IS: Icelandic National Dietary Survey (Diet_HBM), CZ: Central European Longitudinal Studies of Parents and Children: Young Adults ((C)ELSPAC: YA), PL: Polish Aligned Environmental Study (POLAES), HR: Implementation of Human Biomonitoring Survey In Adults in HR Using HBM4EU Methodology (HBM in HR), PT: Exposure of the Portuguese Population to Environmental Chemicals: a study nested in INSEF 2015 (INSEF-ExpoQuim), CH: Human Biomonitoring for Europe Program for Switzerland (HBM4EU-study Switzerland), FR: Étude de santé sur l'environnement, la biosurveillance, l'activité physique et la nutrition (ESTEBAN), DE: Environmental Specimen Bank (ESB), LU: Observation des Risques et de la Santé Cardiovasculaire au Luxembourg (Oriscav-Lux2) and IL: The National Health and Nutrition Survey 2015 Israel (RAV MABAT).

Table S2: overview exposure levels HBM4EU Aligned Studies (expressed in µg/L)

Biomarker	Age Group	Countries included	Unit	N	QF (%)	GM (95% CI)	P95 (95% CI)
Pesticides in urine							
TCPy	children	CY; IL; NL; BE	µg/L	495	99.8	2.42 (2.21-2.64)	11.5 (10.3-14.4)
	adults	FR; CH; DE; IS	µg/L	746	83.5	0.800 (0.733-0.874)	4.13 (3.63-5.00)
AMPA	children	FR; SI; CY; DE; BE	µg/L	971	59.4	nc	0.465 (0.420-0.549) ^a
	adults	FR; DE; CH; IS	µg/L	914	29.5	nc	0.328 (0.280-0.370)
Pesticides (pyrethroids) in urine							
3-PBA	children	FR; SI; CY; IL; NL; BE	µg/L	863	98.0	1.17 (1.08-1.26)	5.78 (5.23-6.97)
	adults	FR; IL; CH; DE; IS	µg/L	900	90.8	0.353 (0.327-0.383)	2.10 (1.88-2.41)
cis-DBCA	children	FR; CY; IL; NL; BE	µg/L	715	89.2	0.600 (0.548-0.657)	4.15 (3.63-5.02)
	adults	FR; IL; CH; DE; IS	µg/L	900	67.1	0.146 (0.131-0.162)	1.51 (1.21-2.16)
cis-DCCA	children	FR; CY; IL; NL; BE	µg/L	715	96.2	0.412 (0.383-0.443)	2.04 (1.86-2.37)
	adults	IL; CH; DE; IS	µg/L	756	44.4	nc	0.520 (0.447-0.652)
trans-DCCA	children	CY; IL; NL; BE	µg/L	493	99.4	0.837 (0.767-0.914)	4.41 (3.42-5.22)
	adults	IL; CH; DE; IS	µg/L	756	74.9	0.168 (0.151-0.187)	1.26 (0.940-1.67)
4-F-3-PBA	children	FR; CY; IL; NL; BE	µg/L	715	14.3	nc	0.095 (0.083-0.116) ^a
	adults	FR; IL; CH; DE; IS	µg/L	900	6.11	nc	0.075 (0.068-0.086) ^a
CIF3CA	children	CY; IL; NL; BE	µg/L	493	45.6	nc	0.759 (0.495-1.14)
	adults	IL; CH; DE; IS	µg/L	755	27.0	nc	0.436 (0.373-0.641)
Bisphenols in urine							
BPA total	adults	FR; PL; HR; PT; LU; DK; CZ; CH; FI; DE; IS	µg/L	2756	92.4	1.28 (1.22-1.35)	9.28 (8.29-9.86)
BPF total	adults	FR; PL; HR; PT; LU; DK; CZ; CH; DE; IS	µg/L	2450	61.7	0.107 (0.096-0.119)	5.86 (5.02-7.63)
BPS total	adults	FR; PL; HR; PT; LU; DK; CZ; CH; DE; IS	µg/L	2456	67.1	0.083 (0.075-0.091)	2.23 (1.95-2.65)
Phthalates in urine							
5cx-MEPP	children	FR; EL; IT; SI; PL; NO; HU; NL; DK; DE; BE	µg/L	2579	100	14.4 (13.9-14.9)	54.5 (51.5-58.5)
	teenagers	FR; EL; ES; SI; CZ; SE; PL; NO; SK; DE; BE	µg/L	2799	99.9	10.6 (10.3-11.0)	40.6 (37.8-43.7)
5OH-MEHP	children	FR; EL; IT; SI; PL; NO; HU; NL; DK; DE; BE	µg/L	2579	99.9	11.2 (10.8-11.6)	46.3 (42.1-51.2)
	teenagers	FR; EL; ES; SI; CZ; SE; PL; NO; SK; DE; BE	µg/L	2799	99.9	10.4 (10.1-10.8)	54.7 (50.5-62.1)
5oxo-MEHP	children	FR; EL; IT; SI; PL; NO; HU; NL; DK; DE; BE	µg/L	2577	99.5	7.41 (7.15-7.69)	29.6 (27.8-32.5)
	teenagers	FR; EL; ES; SI; CZ; SE; PL; NO; SK; DE; BE	µg/L	2798	99.9	6.11 (5.92-6.32)	24.7 (23.3-26.7)
cx-MiDP	children	FR; SI; PL; NL; DK; DE; BE	µg/L	1557	96.7	0.746 (0.712-0.782)	3.05 (2.80-3.70)
	teenagers	FR; ES; SI; SE; PL; DE; BE	µg/L	1881	96.2	0.728 (0.700-0.757)	2.89 (2.60-3.17)
cx-MiNP	children	FR; EL; SI; PL; HU; NL; DK; DE; BE	µg/L	1980	97.5	4.34 (4.11-4.59)	27.0 (23.3-29.8)
	teenagers	FR; EL; ES; SI; CZ; SE; PL; SK; DE; BE	µg/L	2618	99.8	5.45 (5.23-5.67)	34.8 (29.8-39.2)
MBzP	children	FR; EL; IT; SI; PL; NO; HU; NL; DE; BE	µg/L	2279	97.3	3.64 (3.45-3.83)	28.6 (26.1-31.3)
	teenagers	FR; EL; ES; SI; CZ; SE; PL; NO; SK; DE; BE	µg/L	2799	96.9	2.76 (2.63-2.90)	27.9 (22.7-30.7)
MEHP	children	FR; EL; SI; PL; NO; HU; NL; DK; DE; BE	µg/L	2280	90.2	1.21 (1.15-1.28)	7.00 (6.38-7.75)
	teenagers	FR; EL; ES; SI; CZ; SE; PL; NO; SK; DE; BE	µg/L	2799	93.3	1.77 (1.70-1.84)	9.23 (8.32-10.1)
MEP	children	FR; EL; IT; SI; PL; NO; HU; NL; DK; DE; BE	µg/L	2580	99.7	24.4 (23.3-25.7)	214 (196-226)
	teenagers	FR; EL; ES; SI; CZ; PL; NO; SK; DE; BE	µg/L	2499	100	43.3 (41.3-45.4)	387 (337-465)

Biomarker	Age Group	Countries included	Unit	N	QF (%)	GM (95% CI)	P95 (95% CI)
MiBP	children	FR; EL; IT; SI; NO; HU; NL; DK; DE; BE	µg/L	2279	100	26.6 (25.6-27.6)	123 (111-138)
	teenagers	FR; EL; ES; SI; NO; DE; BE	µg/L	1631	99.9	25.6 (24.6-26.8)	112 (104-130)
MnBP	children	FR; EL; IT; SI; PL; NO; HU; NL; DK; DE; BE	µg/L	2579	99.8	21.1 (20.4-21.8)	80.5 (77.0-86.0)
	teenagers	FR; EL; ES; SI; CZ; PL; NO; SK; DE; BE	µg/L	2499	98.8	24.8 (23.7-26.0)	163 (148-186)
OH-MiDP	children	FR; IT; SI; PL; NO; HU; NL; DK; DE; BE	µg/L	2418	94.6	1.13 (1.08-1.18)	5.88 (5.22-6.55)
	teenagers	FR; ES; SI; SE; PL; NO; DE; BE	µg/L	2062	96.6	1.22 (1.16-1.27)	6.03 (5.50-6.77)
OH-MiNP	children	FR; EL; SI; PL; NO; HU; NL; DK; DE; BE	µg/L	2280	97.6	3.77 (3.58-3.96)	22.6 (20.4-25.4)
	teenagers	FR; EL; ES; SI; SE; PL; NO; DE; BE	µg/L	2212	99.8	4.63 (4.43-4.83)	27.3 (24.0-31.2)
Σ(5cx-MEPP + 5OH-MEHP)	children	FR; EL; IT; SI; PL; NO; HU; NL; DK; DE; BE	µg/L	2579		25.9 (25.1-26.8)	98.3 (91.9-105)
	teenagers	FR; EL; ES; SI; CZ; SE; PL; NO; SK; DE; BE	µg/L	2799		22.4 (21.7-23.1)	92.0 (85.3-101)
Σ(5oxo-MEHP+ 5OH-MEHP)	children	FR; EL; IT; SI; PL; NO; HU; NL; DK; DE; BE	µg/L	2577		18.7 (18.1-19.4)	76.0 (69.7-83.4)
	teenagers	FR; EL; ES; SI; CZ; SE; PL; NO; SK; DE; BE	µg/L	2798		17.0 (16.4-17.6)	79.9 (73.0-89.3)
Σ(MEHP + 5OH-MEHP + 5oxo-MEHP)	children	FR; EL; SI; PL; NO; HU; NL; DK; DE; BE	µg/L	2278		19.5 (18.8-20.3)	77.8 (73.4-88.2)
	teenagers	FR; EL; ES; SI; CZ; SE; PL; NO; SK; DE; BE	µg/L	2798		19.1 (18.5-19.8)	89.3 (81.6-99.4)
DINCH in urine							
cx-MINCH	children	FR; EL; IT; SI; PL; HU; NL; DK; SK; DE; BE	µg/L	2579	96.2	1.25 (1.19-1.31)	8.29 (7.39-9.47)
	teenagers	FR; EL; ES; SI; SE; PL; SK; DE; BE	µg/L	2317	97.8	0.932 (0.890-0.976)	5.99 (5.29-7.27)
OH-MINCH	children	FR; EL; IT; SI; PL; NO; HU; NL; DK; SK; DE; BE	µg/L	2879	98.7	2.34 (2.25-2.44)	16.5 (14.2-18.4)
	teenagers	FR; EL; ES; SI; SE; PL; NO; SK; DE; BE	µg/L	2499	98.8	1.59 (1.51-1.66)	12.0 (10.3-13.8)
Σ(OH-MINCH + cx-MINCH)	children	FR; EL; IT; SI; PL; HU; NL; DK; SK; DE; BE	µg/L	2579		3.57 (3.42-3.72)	23.7 (20.6-26.9)
	teenagers	FR; EL; ES; SI; SE; PL; SK; DE; BE	µg/L	2317		2.51 (2.40-2.63)	17.0 (14.8-19.5)
Organophosphorus flame retardants (OPFRs) in urine							
BDCIPP	children	FR; SI; NO; DK; SK; DE; BE	µg/L	1770	63.9	0.355 (0.334-0.378)	2.61 (2.35-2.95)
DPHP	children	FR; SI; NO; DK; SK; DE; BE	µg/L	1770	99.2	1.82 (1.74-1.91)	8.29 (7.54-9.09)
BCIPP	children	FR; SI; DK; SK; DE; BE	µg/L	1470	27.3	nc	1.70 (1.45-2.06)
Halogenated flame retardants (HFRs) in blood							
BDE-47	children	FR; NO; EL; SI	µg/L	710	62.4	nc ^a	0.009 (0.007-0.011)
BDE-153	children	FR; NO; EL; SI	µg/L	710	40.1	nc	0.006 (0.006-0.008)
Anti-DP	children	FR; NO; EL; SI	µg/L	710	57.2	nc	0.102 (0.083-0.130)
Syn-DP	children	FR; NO; EL; SI	µg/L	710	48.0	nc	0.047 (0.040-0.059) ^a
UV-filters (benzophenones) in urine							
BP-1	teenagers	FR; ES; SE; PL; DE	µg/L	1208	96.4	1.11 (0.996-1.23)	25.8 (20.8-32.1)
	adults	FR; LU; DK; DE	µg/L	975	82.7	0.354 (0.300-0.418)	13.2 (10.6-19.0)
BP-3	teenagers	FR; ES; SE; PL; NO; DE	µg/L	1389	95.6	2.46 (2.21-2.73)	62.8 (49.3-78.2)
	adults	FR; LU; DK; DE	µg/L	975	86.6	1.20 (1.02-1.40)	40.1 (31.0-49.1)
Per-/poly-fluorinated compounds (PFASs) in blood							
PFDA	teenagers	FR; ES; DE; EL; SI; SK; NO; BE	µg/L	1657	50.2	nc	0.380 (0.350-0.416)
PFHpA	teenagers	FR; ES; DE; EL; SI; SK; NO; BE	µg/L	1657	28.2	nc	0.142 (0.132-0.150) ^a
PFHpS	teenagers	FR; ES; EL; SI; SK; NO; BE	µg/L	1357	35.0	nc	0.175 (0.166-0.200) ^a
PFHxA	teenagers	FR; ES; DE; EL; SI; SK	µg/L	1180	30.3	nc	0.249 (0.249-0.249) ^a
PFHxS	teenagers	FR; ES; DE; EL; SI; SK; NO; BE	µg/L	1657	80.0	0.341 (0.326-0.356)	1.20 (1.10-1.31)
PFNA	teenagers	FR; ES; DE; EL; SI; SK; NO; BE	µg/L	1657	77.7	0.270 (0.260-0.281)	0.786 (0.750-0.867)

Biomarker	Age Group	Countries included	Unit	N	QF (%)	GM (95% CI)	P95 (95% CI)
PFOA	teenagers	FR; ES; DE; EL; SI; SK; NO; BE	µg/L	1657	97.5	0.942 (0.917-0.968)	2.22 (2.10-2.42)
PFOS	teenagers	FR; ES; DE; EL; SI; SK; NO; BE	µg/L	1657	100	2.01 (1.95-2.08)	6.06 (5.62-6.77)
PFPeA	teenagers	FR; ES; DE; EL; SI; SK; BE	µg/L	1480	16.0	nc	0.193 (0.193-0.193) ^a
PFUnDA	teenagers	FR; ES; DE; EL; SI; SK; NO; BE	µg/L	1657	35.6	nc	0.211 (0.200-0.231) ^a
Σ(PFHxS + PFOS)	teenagers	FR; ES; DE; EL; SI; SK; NO; BE	µg/L	1657		2.44 (2.37-2.52)	7.21 (6.71-7.84)
Σ(PFOA + PFNA + PFHxS + PFOS)	teenagers	FR; ES; DE; EL; SI; SK; NO; BE	µg/L	1657		3.80 (3.69-3.91)	9.80 (9.09-10.6)
Σ(PFOA + PFNA)	teenagers	FR; ES; DE; EL; SI; SK; NO; BE	µg/L	1657		1.25 (1.22-1.28)	2.96 (2.80-3.14)
Arsenic in urine							
As(III)	teenagers	ES; SI; SE; DE; BE	µg/L	1144	91.1	0.271 (0.257-0.286)	0.940 (0.884-1.07)
As(V)	teenagers	ES; SE; DE; BE	µg/L	1048	68.3	0.161 (0.152-0.171)	0.843 (0.718-1.00)
AsB	teenagers	ES; SE; DE; BE	µg/L	1048	91.9	3.11 (2.68-3.63)	91.0 (81.4-122)
DMA	teenagers	ES; SI; SE; DE; BE	µg/L	1144	100	3.27 (3.12-3.42)	12.3 (11.2-14.3)
MMA	teenagers	ES; SI; SE; BE	µg/L	844	96.2	0.876 (0.821-0.936)	2.38 (2.26-2.53)
Cadmium in urine							
Cd	adults	DE; PL; HR; PT; LU; DK; CZ; IS	µg/L	2117	96.0	0.173 (0.167-0.179)	0.744 (0.682-0.770)
Polycyclic Aromatic Hydrocarbons (PAHs) in urine							
1-NAPH	adults	FR; PL; PT; LU; DK; CH; DE	µg/L	1803	74.2	0.637 (0.584-0.695)	10.8 (9.78-12.6)
2-NAPH	adults	FR; PL; HR; PT; LU; DK; CZ; CH; DE; IS	µg/L	2606	98.9	4.45 (4.24-4.67)	31.9 (29.3-35.6)
1-PHEN	adults	FR; HR; PT; LU; CZ; DE; IS	µg/L	1841	93.2	0.105 (0.100-0.111)	0.608 (0.554-0.706)
2-PHEN	adults	FR; PT; DE; IS	µg/L	1031	96.9	0.063 (0.060-0.067)	0.327 (0.289-0.423)
3-PHEN	adults	FR; PT; LU; DE	µg/L	1038	97.5	0.090 (0.085-0.096)	0.475 (0.443-0.615)
4-PHEN	adults	FR; HR; PT; LU; DK; CZ; DE; IS	µg/L	2079	70.7	0.028 (0.027-0.030)	0.269 (0.240-0.318)
1-PYR	adults	FR; PL; HR; PT; LU; CZ; CH; DE; IS	µg/L	2369	95.9	0.097 (0.092-0.102)	0.703 (0.632-0.786)
2-FLUO	adults	FR; HR; PT; LU; DK; CZ; IS	µg/L	1750	95.4	0.258 (0.245-0.273)	2.12 (1.86-2.31)
3-FLUO	adults	FR; HR; LU; CZ; IS	µg/L	1203	76.2	0.054 (0.049-0.059)	0.845 (0.692-1.00)
Acrylamide in urine							
AAMA	children	FR; IT; SI; NO; DE	µg/L	1199	99.8	64.4 (61.8-67.0)	202 (188-224)
	adults	FR; PT; LU; DE; IS	µg/L	1181	98.8	62.4 (58.7-66.3)	339 (309-396)
GAMA	children	FR; IT; SI; NO; DE	µg/L	1199	99.8	13.6 (13.0-14.1)	45.5 (41.7-50.5)
	adults	FR; PT; LU; DE; IS	µg/L	1165	98.5	12.3 (11.6-13.0)	54.8 (52.4-62.4)
Mycotoxins in urine							
tDON	adults	FR; PL; PT; LU; DE	µg/L	1099	96.5	5.59 (5.10-6.14)	36.2 (33.0-41.2)

Abbreviations: QC = quantification frequency; nc = not calculated (proportion of results above limit of detection or limit of quantification was too low (<60%) to provide a valid result).

^a Data should be interpreted with caution as some of the LOQs in the separate studies exceeds the pooled P95.

Table S3: International comparison of pesticides in children and adults after 2014

Study/region	HBM4EU			CHMS				NHANES		KoNEHS		New-Zealand	
	Sampling year	2014-2021		2016-2017 Cycle V		2018-2019 Cycle VI		2013-2014		2015-2017 Cycle III		2015-2017	
Matrix	urine			urine		urine		urine		urine		urine	
Unit	µg/ g crt			µg/ g crt		µg/ g crt		µg/ g crt		µg/ g crt		µg/ g crt	
Descriptor	GM (CI)			GM (CI)		GM (CI)		GM (CI)		GM (CI)		GM	
	age ^a	N	value	N	value	N	value	N	value	N	value	N	value
TCPy	6-11	495	2.44 (2.24;2.65)									941	13
Cis-DBCA	6-11	715	0.65 (0.59;0.71)	518	0.040 (0.033;0.049)	488	0.034 (0.029;0.039)					941	NA*
Cis-DCCA	6-11	715	0.44 (0.41;0.47)	528	0.14 (0.12;0.16)	498	0.18 (0.13;0.25)						
Trans-DCCA	6-11	493	0.84 (0.78;0.92)	530	0.27 (0.24;0.30)	499	0.38 (0.26;0.55)	416	NA			941	1.2
3-PBA	6-11	863	1.24 (1.15;1.33)	526	0.56 (0.47;0.68)	495	0.66 (0.51;0.85)	408	0.939 (0.694;1.27)	887	1.27 (1.14;1.41)	941	1.3
	20-39	899	0.39 (0.37;0.42)							3772	1.16 (1.07;1.26)		
References				(Health Canada, 2019)		(Health Canada, 2021)		(CDC)		(Jung et al., 2022)		(Li et al., 2022)	

GM = Geometric mean, CI = 95% confidence interval, *NA = not calculated due to a low Detection frequency, ^aNew-Zealand 5-14 years.

Table S4: International comparison of bisphenols exposure in adults after 2014.

Study/region	HBM4EU		CHMS				NHANES		KoNEHS			
	Sampling year	2014-2021	2014-2015 Cycle IV	2016-2017 Cycle V	2018-2019 Cycle VI	2015-2016		2015-2017 Cycle III				
Age (years)	20-39		20-39	20-39	20-39	20+		≥19				
Matrix	urine		urine	urine	urine	urine		urine				
Unit	µg/g crt		µg/g crt	µg/g crt	µg/g crt	µg/g crt		µg/g crt				
Descriptor	GM (CI)		GM (CI)	GM (CI)	GM (CI)	GM (CI)		GM (CI)				
	N	value	N	value	N	value	N	value	N	value		
BPA	2741	1.13 (1.08;1.18)	362	0.91 (0.80;1.0)	359	0.75 (0.60;0.94)	332	0.69 (0.56;0.84)	1690	1.1 (1.01;1.19)	3780	1.38 (1.23;1.55)
BPS	2446	0.07 (0.07;0.08)							1690	0.505 (0.438;0.583)	3776	NA*
BPF	2440	0.09 (0.08;0.10)							1690	NC*	3777	NA*
References			(Health Canada, 2017)		(Health Canada, 2019)		(Health Canada, 2021)		(CDC)		(Jung et al., 2022)	

GM = Geometric mean, CI = 95% confidence interval, NA*: >40% of samples < LOD, GM was not calculated. NC*: Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Table S5: International comparison of phthalates and substitute DINCH exposure in children and teenagers after 2014 and temporal comparison with DEMOCOPHES 2011-2012.

Study/region	HBM4EU				CHMS				NHANES		KoNEHS		DEMOCOPHES	
	2014-2021				2016-2017 Cycle V		2018-2019 Cycle VI		2015-2016 Cycle		2015-2017 Cycle III		2011-2012	
Matrix	urine				urine				urine		urine		urine	
Unit	µg/g crt				µg/g crt		µg/g crt		µg/g crt		µg/g crt		µg/g crt	
Descriptor	GM (CI)				GM (CI)		GM (CI)		GM (CI)		GM (CI)		GM (CI)	
	Age group ^a	N	value	N	value	N	value	N	value	N	value	N	value	
MEP	6-11	2579	27.04 (25.81;28.33)	528	21 (17;27)	498	19 (14;25)	415	31.6 (25.6;39.0)			1816	34.4 (32.7;36.2)	
	12-19	2499	32.52 (31.09;34.03)	530	19 (15;23)	504	16 (13;21)	405	27.3 (23.3;31.9)					
MBzP	6-11	2278	3.88 (3.70;4.07)	529	11 (9.7;14)	496	7.5 (5.3;11)	415	13.8 (11.3;16.8)	885	2.59 (2.18;3.07)	1816	7.1 (6.8;7.4)	
	12-19	2799	2.07 (1.98;2.17)	531	4.0 (3.0;5.4)	502	3.1 (2.4;4.0)	405	4.7 (3.68;6.00)	901	1.74 (1.47;2.06)			
MiBP	6-11	2278	29.07 (28.13;30.04)	528	17 (16;19)	494	16 (14;18)	415	14.5 (12.6;16.6)			1355	45.9 (43.9;47.9)	
	12-19	1631	19.53 (18.81;20.29)	531	9.8 (8.3;11)	503	9.1 (7.6;11)	405	8.11 (7.03;9.35)					
MnBP	6-11	2578	23.37 (22.71;24.04)	528	23 (22;25)	492	22 (20;25)	415	18.5 (17.4;19.7)	885	39.9 (37.9;42.0)	1355	34.6 (33.2;36.0)	
	12-19	2499	18.65 (17.91;19.42)	530	12 (11;14)	500	12 (10;13)	405	8.98 (7.71;10.5)	897	22.3 (18.5;26.8)			
MEHP	6-11	2279	1.33 (1.26;1.40)	526	1.6 (1.4;1.9)	489	1.4 (1.2;1.5)	415	1.83 (1.63;2.04)					
	12-19	2799	1.33 (1.28;1.37)	425	0.82 (0.68;1.0)	489	0.88 (0.76;1.0)	405	0.908 (0.814;1.01)					
5OH-MEHP	6-11	2578	12.37 (11.99;12.76)	529	11 (9.5;13)	497	9.6 (8.6;11)	415	11.3 (10.5;12.3)	885	26.4 (24.7;28.2)			
	12-19	2799	7.82 (7.57;8.07)	531	4.5 (3.9;5.3)	504	4.5 (4.0;5.1)	405	4.51 (4.18;4.87)	901	8.6 (7.61;9.72)			
5oxo-MEHP	6-11	2576	8.21 (7.95;8.47)	529	8.2 (7.0;9.6)	497	6.9 (6.2;7.6)	415	7.7 (7.12;8.32)	885	17.6 (16.3;19.0)			
	12-19	2798	4.58 (4.45;4.71)	531	3.1 (2.6;3.7)	503	3.1 (2.7;3.6)	405	2.92 (2.66;3.20)	901	5.9 (5.13;6.77)			
5cx-MEPP	6-11	2578	15.89 (15.42;16.38)	527	14 (12;17)	496	12 (11;13)	415	18.9 (17.5;20.4)	885	40.8 (37.8;44.0)			
	12-19	2799	7.97 (7.73;8.20)	529	5.2 (4.5;6.1)	497	5.1 (4.3;6.1)	405	7.29 (6.63;8.00)	901	17.5 (16.0;19.2)			
DEHP metabolites*	6-11	2277	21.41 (20.71;22.13)									1816	46.8 (45.2, 48.5)	
OH-MiNP	6-11	2279	4.13 (3.95;4.32)	525	1.6 (1.2;2.0)	474	1.4 (1.2;1.6)							
	12-19	2212	3.57 (3.44;3.72)	513	0.85 (0.70;1.0)	469	0.65 (0.51;0.82)							
cx-MiNP	6-11	1979	4.87 (4.62;5.12)	509	1.2 (1.0;1.5)	462	0.87 (0.75;1.0)							
	12-19	2618	4.06 (3.91;4.22)	493	0.58 (0.49;0.68)	435	0.44 (0.38;0.51)							
OH-MiDP	6-11	2417	1.26 (1.21;1.30)	525	0.34 (0.26;0.46)	494	0.44 (0.36;0.54)							
	12-19	2062	0.95 (0.91;0.99)	529	0.20 (0.14;0.29)	499	0.26 (0.20;0.35)							
OH-MINCH	6-11	2877	2.51 (2.41;2.62)	512	0.20 (0.16;0.26)	455	0.27 (0.21;0.35)							
	12-19	2499	1.20 (1.14;1.25)	511	NA	471	0.12 (0.10;0.15)							
cx-MINCH	6-11	2577	1.36 (1.30;1.42)											
	12-19	2317	0.7 (0.67;0.73)											
References				(Health Canada, 2019)	(Health Canada, 2021)			(CDC)		(Jung et al., 2022)			Den Hond et al. 2015	

GM = Geometric mean, CI = 95% confidence interval, *DEHP metabolites = sum of Σ(MEHP + 5OH-MEHP + 5oxo-MEHP), ^aHBM4EU and KoNEHS 12-18 years, DEMOCOPHES 5-11 years.

Table S6: International comparison of organophosphorus flame retardants in children after 2014

Study/region	HBM4EU		NHANES	
Sampling year	2014-2021		2013-2014	
Age (years)	6-11		6-12	
Matrix	urine		urine	
Unit	µg/g crt		µg/g crt	
Descriptor	GM (CI)		GM (CI)	
	N	value	N	value
BDCIPP	1768	0.37 (0.35;0.40)	421	2.89 (2.38;3.51)
References	(CDC)			

GM = Geometric mean, CI = 95% confidence interval.

Table S7: International comparison of benzophenone (UV-filter) exposure in teenagers and adults after 2014.

Study/region	HBM4EU			NHANES	
Sampling year	2014-2021			2015-2016	
Matrix	urine			urine	
Unit	µg/g crt			µg/g crt	
Descriptor	GM (CI)			GM (CI)	
	Age group ^a	N	value	N	value
BP-3	12-18	1389	1.98 (1.8;2.2)	405	12.7 (8.95;18.0)
	20-39	965	1.1 (0.95;1.3)	1690	20.1 (16.6;24.3)
References	(CDC)				

GM = Geometric mean, CI = 95% confidence interval, a NHANES age 12-19.

Table S8: International comparison of PFASs exposure in teenagers after 2014.

Study/region	HBM4EU		CHMS				NHANES			
	2014-2021		2016-2017 Cycle V		2018-2019 Cycle VI		2015-2016		2017-2018	
Sampling year	12-18		12-19		12-19		12-19		12-19	
Age (years)	plasma/serum		plasma		plasma		serum		serum	
Matrix	µg/L		µg/L		µg/L		µg/L		µg/L	
Unit	GM (CI)		GM (CI)		GM (CI)		GM (CI)		GM (CI)	
Descriptor	N	Value	N	Value	N	Value	N	Value	N	Value
PFOS	1657	2.01 (1.95;2.08)	526	1.9 (1.7;2.0)	508	1.6 (1.4;1.8)	353	2.94 (2.70;3.19)	313	2.68 (2.31;3.12)
PFOA	1657	0.94 (0.92;0.97)	527	1.1 (0.95;1.2)	508	0.96 (0.86;1.1)	353	1.25 (1.14;1.37)	313	1.18 (1.06;1.31)
PFNA	1657	0.27 (0.26;0.28)	494	0.41 (0.33;0.51)	474	0.34 (0.30;0.40)	353	0.481 (0.440;0.526)	313	0.348 (0.286;0.424)
PFHxS	1657	0.34 (0.33;0.36)	527	0.69 (0.59;0.80)	508	0.53 (0.45;0.62)	353	0.918 (0.778;1.08)	313	0.866 (0.732;1.02)
References			(Health Canada, 2019)		(Health Canada, 2021)		(CDC)			

GM = Geometric mean, CI = 95% confidence interval, ^abased on 4 pool samples of N = 100.

Table S9: International comparison of arsenic species exposure in teenagers after 2014.

Study/region	HBM4EU		CHMS				NHANES					
	2014-2021		2014-2015 Cycle IV		2016-2017 Cycle V		2018-2019 Cycle VI		2015-2016		2017-2018	
Sampling year	12-18		12-19		12-19		12-19		12-19		12-19	
Age (years)	urine		urine		urine		urine		urine		urine	
Matrix	µg/g crt		µg/g crt		µg/g crt		µg/g crt		µg/g crt		µg/g crt	
Unit	GM (CI)		GM (CI)		GM (CI)		GM (CI)		GM (CI)		GM (CI)	
Descriptor	N	value	N	value	N	value	N	value	N	value	N	value
Σ(As III + As V + DMA + MMA)*	748	4.37 (4.18;4.57)	506	4.0 (3.5;4.5)	515	3.4 (3.0;3.9)	505	4.5 (3.6;5.5)	402	4.04 (3.78;4.31)	363	3.79 (3.42;4.20)
References			(Health Canada, 2017)		(Health Canada, 2019)		(Health Canada, 2021)		(CDC)			

GM = Geometric mean, CI = 95% confidence interval, *Σ(As III + As V + DMA + MMA) based on pooled data from only 3 countries (ES, SE, BE).

Table S10: International comparison of cadmium exposure in adults after 2014.

Study/region	HBM4EU		CHMS				NHANES				KoNEHS		DEMOCOPHES	
	2014-2021		2016-2017 Cycle V		2018-2019 Cycle VI		2015-2016		2017-2018		2015-2017 Cycle III		2011-2012	
Age (years)	20-39		20-39		20-39		20+		20+		≥19		24-52	
Matrix	Urine		urine		urine		Urine		Urine		urine		urine	
Unit	µg/g crt		µg/g crt		µg/g crt		µg/g crt		µg/g crt		µg/g crt		µg/g crt	
Descriptor	GM (CI)		GM (CI)		GM (CI)		GM (CI)		GM (CI)		GM (CI)		GM (CI)	
	N	value	N	value	N	value	N	value	N	value	N	value	N	value
Cadmium - all	2107	0.15 (0.14;0.15)	372	0.12 (0.10;0.14)	329	0.15 (0.12;0.18)	1792	0.19 (0.175;0.205)	1707	0.189 (0.175;0.205)	3781	0.43 (0.387;0.474)		
Cadmium - women	1134	0.17 (0.17 - 0.18)											1685	0.193 (0.19;0.20)
References			(Health Canada, 2019)		(Health Canada, 2021)		(CDC)				(Jung et al., 2022)		(Den Hond et al., 2015)	

GM = Geometric mean, CI = 95% confidence interval.

Table S11: International comparison of PAHs exposure in adults after 2014.

Study/region	HBM4EU		CHMS		NHANES		KoNEHS	
	2014-2021		2014-2015 Cycle IV		2015-2016		2015-2017 Cycle III	
Age (years)	20-39		20-39		≥20		≥19	
Matrix	urine		urine		urine		urine	
Unit	µg/g crt		µg/g crt		µg/g crt		µg/g crt	
Descriptor	GM (CI)		GM (CI)		GM (CI)		GM (CI)	
	N	value	N	value	N	value	N	value
1-naphthol	1798	0.61 (0.56;0.66)	358	0.84 (0.66;1.1)	1690	1.92 (1.67;2.22)		
2-naphthol	2601	3.99 (3.83;4.16)	354	4.5 (3.9;5.2)	1742	5.44 (4.92;6.02)	3754	3.16 (2.99;3.33)
2-FLUO	1745	0.21 (0.20;0.22)	359	0.27 (0.22;0.33)	1789	0.225 (0.202;0.251)	3754	0.39 (0.357;0.425)
3-FLUO	1203	0.04 (0.04;0.05)	358	0.097 (0.075;0.13)	1785	0.0988 (0.086.5;0.113)		
1-PHEN	1841	0.09 (0.09; 0.10)	358	0.14 (0.12;0.17)	1790	0.120 (0.110;0.131)	3751	0.13 (0.124;0.142)
2-PHEN	1031	0.07 (0.06;0.07)	357	0.057 (0.050;0.066)				
3-PHEN	1038	0.09 (0.08;0.09)	358	0.076 (0.064;0.091)				
4-PHEN	2074	0.03 (0.02;0.03)	358	0.021 (0.018;0.026)				
1-PYR	2369	0.09 (0.08;0.09)	329	0.096 (0.083;0.11)	1788	0.133 (0.125.0.143)	3754	0.15 (0.140;0.170)
References			(Health Canada, 2017)		(CDC)		(CDC; Jung et al., 2022; Lee et al., 2022)	

GM = Geometric mean, CI = 95% confidence interval.

Table S12: Ethics committees and funding information of the HBM4EU Aligned Studies

Study acronym	Country	Ethics information	Funding information
NEBII	NO	Approved by The Regional Committees for Medical and Health Research Ethics in Norway, Reference: 2015/1340.	Funded by the Norwegian Institute of Public Health, and the work done as part of the HBM4EU aligned studies co-funded by two projects funded by the Research Council of Norway (references; 268465 and 275903).
OCC	DK	Approved by the Regional Scientific Ethical Review Committee for Southern Denmark (Project ID S-0090130) and the Danish Data Protection Agency (J.No.18/33119).	Funded by Odense University Hospital, Denmark, the Region of Southern Denmark, The Municipality of Odense, Denmark, The University of Southern Denmark, Odense Patient data Exploratory Network (OPEN), Denmark, The Danish Centre for Hormone Disrupting Chemicals, The Danish Research Council, Novo Nordisk Foundation, Denmark.
InAirQ	HU	Approved by the Medical Research Council of Hungary (registration number: 46399-4/2017/EKU)	Co-funded by Interreg CENTRAL EUROPE and the National Public Health Center, Hungary.
PCB cohort and PCB cohort (follow-up)	SK	Approved by the ethical committee of the Slovak Medical University in Bratislava (No. 01/2018 and 02/2019).	Funded by the Slovak Ministry of Health (project no. 2012/47-SZU-11) and the Slovak Research and Development Agency (project no. APVV-0571-12). The original cohort was funded by the U.S. National Institutes of Health, National Cancer Institute, grant R01-CA96525. PCB cohort (follow-up) received additional funding from the Ministry of Health of the Slovak Republic, program 07B0103.
POLAES	PL	Approved by the ethical committee of the Nofer Institute of Occupational Medicine (No. 10/2017).	POLEAS study was financially supported by Ministry of Education and Science (project no. 3764/H2020/2017/2)
SLO CRP	SL	Approved by the National Medical Ethics Committee, Republic of Slovenia (NMEC, number of accordance: 0120-118/2017/3).	Supported by the Chemicals Office of the Republic of Slovenia through the Jožef Stefan Institute program group P1- 0143 (Slovenia), and a national project "Exposure of children and adolescents to selected chemicals through their habitat environment" (CRP-V3-1640, grant agreement No. C2715-16-634802)
CROME	EL	Approved by the Committee on Ethics and Deontology for Research of AUTH, in the assembly 1/25-10-2018, by the request no. Prot. 111256 / 17-09-2018 regarding the research under the project "Cross-Mediterranean Environment and Health Network" and it was carried out in accordance with the current Code of Ethics of Aristotle University of Thessaloniki.	Co-funded by the European Commission research funds of Horizon 2020.
NAC II	IT	Approved by the Ethics Committees of the University of Udine and of the Institute for Maternal and Child Health - IRCCS Burlo Garofolo, Trieste (Italy), (CE/V-70 - 05/02/2007; CE/ V-109-12/04/2010).	Supported by the European Union through its Sixth Framework Program for RTD (contract "PHIME" no. FOOD-CT-2006-016253). Furthermore, it was funded by the grant RC 12/12 of Institute for Maternal and Child Health - IRCCS Burlo Garofolo, Trieste (Italy), CROME LIFE project "Cross – Mediterranean Environment and Health Network" (LIFE12 ENV/GR/001040) and H2020-MSCA ITN EJD-REP BIOTECH 675526 project.
ESTEBAN	FR	Approved by the Ile-de-France Protection to person committee on the 06.12.2012 (Internal number: CPP-IDF IX 12-012, EudraCT: 2012-A00459-34). The Committee has examined all provided and requested document (Inform consent, protocol, authorization form from the	Funded by Santé Publique France and the French ministries of Health and the Environment.

		Ministry of Health, etc.). The French Data Protection Agency gave its approval on the 14.02.2013. A Decree of the State Council establishing a processing of personal data relating to biomonitoring, health surveillance and nutrition (The Esteban study) was established after approval of the French Advisory Committee on Information Processing for Research (CCTIRS). The French National Agency for Medicines and Health Products' Safety (ANSM) gave its approval for the use of biological samples and biobanking.	
GerES V-sub(unweighted)	DE	Approved by the Ethics Commission of the Berlin Chamber of Physicians (Eth-14/14) and the Federal Officer for Data Protection and Freedom of Information (III-425/009#0018).	Funded by the German Ministry for Environment, Nature Conservation and Nuclear Safety (BMU) and the German Ministry of Education and Research (BMBF).
3xG	BE	Approved by the ethical committee of University Hospital Antwerp and University Antwerp on 09.11.2010 (Ref N° UA A10-58) and an amendment for follow-up at 7 years was approved on 09.01.2019, an amendment for conducting additional analysis in the frame of HBM4EU was approved on 24.08.2020 (Ref N° UA A10-58: 3xG).	Commissioned and co-financed by NIRAS, STORA and MONA.
SPECIMEn-NL	NL	Approved by the ethical committee of METC, University Medical Centre Utrecht on 07.19.2019 (Ethical Approval number 19-513).	Funded by the HBM4EU project, co-financed under Horizon 2020 (grant agreement No 733032).
ORGANIKO	CY	Approved by the Cyprus National Bioethics Committee (EEBK/EII/2016/25, dated 07/05/2016) and the Cyprus Ministry of Education and Culture (7.15.06.15/2).	Funded by the EU LIFE+ programme.
Riksmaten Adolescents 2016-17	SE	Approved by the Regional Ethical Review Board in Uppsala, Sweden (No. 2015/190).	Conducted and mainly financed by the Swedish Food Agency. Financial support was provided from the Swedish Civil Contingencies Agency and from the Swedish Environmental Protection Agency (SEPA).
CELSPAC: TE	CZ	Approved by the Research Ethics Committee of Masaryk University, the Czech Republic (Ref. No: EKV-2019-046, dated 27.05.2019).	Supported by Research Infrastructure RECETOX RI (No LM2018121) financed by the MEYS, and by the Teaming project CETOCOEN EXCELLENCE financed by the MEYS (No CZ.02.1.01/0.0/0.0/17_043/0009632) and by Horizon 2020 research and innovation programme under grant agreement No 857560. The work was also supported by the Cetocoen Plus project (CZ.02.1.01/0.0/0.0/15_003/0000469).
(C)ELSPAC: YA	CZ	Approved by the ELSPAC Ethics Committee (Ref. No: ELSPAC/EK/2/2019, dated 13.03.2019).	
BEA	ES	Approved by the Comité de Ética de la Investigación del Instituto de Salud Carlos III (CEI PI 56_2017_v3) on 07.11.2017	Funded by the MAGRAMA-ISCI III Project SEG 1321/15
FLEHS IV	BE	Approved by the ethical committee of University Hospital Antwerp and University Antwerp on 12.06.2017 (Ref N° B300201732753) and an amendment for conducting additional analysis in the frame of HBM4EU was approved on 18.02.2019 and on 15.05.2020 (Ref N° B300201732753).	Commissioned and co-financed by the Government of Flanders, Department of Environment & Spatial Development.
Diet_HBM	IS	Approved by The National Bioethics Committee on the 31.10.2019, VSN-19-115.	Mainly financed by the National Directory of Health and the University of Iceland. Received support from Public Health Fund.

FinHealth	FI	Approved by Helsinki and Uusimaa hospital district ethical committee on 22.03.2016 (Decision number 37/13/03/00/2016).	Co-funded by THL and the Ministry of Social Affairs and Health.
HBM survey in adults in Croatia	HR	Approved by the Ethical Committee of the Croatian Institute of Public Health (CIPH) on 1st August, 2018 under Internal number: Klasa:030-02/18-10/11; Ur. broj: 381-10-18-2. The Committee has examined all provided and requested document (Inform consent, protocol, statement of the CIPH data protection officer, etc.)	Co-funded by Croatian Institute of Public Health.
INSEF-ExpoQuim	PT	Approved by the ethical committees of the National Institute of Health Doutor Ricardo Jorge (INSA; on 12.02.2019), of the Regional Health Administrations of North (Ref. ^a T1061 on 02.04.2019), Center (Ref. ^a 63/2019 on 24.06.2019), Lisbon and Tagus Valey (Proc.027/CES/INV/2019 on 06.08.2019), Alentejo (Proc. n ^o 14/2019/CE on 15.05.2019) and Algarve (Proc. N ^o 07/2019 on 11.04.2019), of the Health Service of the Autonomous Region of Madeira (SESARAM; approval n ^o 19/2019 on 17.06.2019) and of the Hospital of Horta (on 19.03.2019).	Co-funded by the National Institute of Health Dr Ricardo Jorge.
HBM4EU-study for Switzerland	CH	Approved by the Ethikkommission Nordwest und Zentralschweiz (EKNZ) on the 26.11.2019 (Ethical approval number: 2019-02136).	The Swiss participation in this European Program is funded by the Swiss State Secretary for Education Research and Innovation (SERI). The project leader of the HBM4EU-study in Switzerland is the Swiss HBM4EU grant signatory.
ESB	DE	The study protocol of the ESB has been reviewed by the ethics committee of the Medical Association Westfalen-Lippe, the Medical Faculty of the University of Münster and (since 2012) by the ethical committee of the Medical Association of the Saarland (Ha02/12).	Funded by the German Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU).
Oriscav-Lux2	LU	Approved by the national ethical committee of Luxembourg (No. 201505/12) and the National Data Protection Commission has been notified of the project.	Funded by the Luxembourg Institute of Health (LIH), the Laboratoire national de santé (human biomonitoring part), the Ministry of Higher Education and Research of Luxembourg and the Ministry of Health of Luxembourg.
CPHMINIPUB (parents)/	DK	Approved by the ethical committee of The Capital Region of Denmark (Respectively No. H-15014876 and H-KF-289428) and the Danish Data Protection Agency (respectively No. RH-2015-210, I-Suite 04146 and RH-2015-246, I-Suite nr.: 04225).	Received support from the Candy Foundation, Nos. 2017-224 and 2020- 344; Absalon Foundation, No. F-23653-01; The Danish Environmental Protection Agency (Miljøstyrelsen: MST-621-00012 Center on Endocrine Disrupters); The Research council of Capital Region of Denmark: No. E-22717-11; Research council of Rigshospitalet: Nos. E-22717-12, E-22717-07, E-22717-08; Aase og Ejnar Danielsens Fond: No. 10-001874; International Research and Research Training Centre for Male Reproduction and Child Health (EDMaRC): No. 1500321/1604357.
DYMS			Received support from the Danish Health Authority.
RAV MABAT	IL	Approved by the Ministry of Health ethics committee (MOH 043-2012). Approval to measure additional contaminants in the framework of the aligned studies was provided by the Ministry of Health ethics committee (MOH 066-2019).	Funded by the Israel Ministry of Health.

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