Supplementary Table S1 - Associations between maternal and child sociodemographic characteristics and Denver-II performance - PIPA-UFRJ-2023

	Global		Personal-Social		Fine Motor Adaptive		Language		Gross Motor	
	Failure	Non-failure	Failure	Non-failure	Failure	Non-failure	Failure	Non-failure	Failure	Non-failure
Maternal age years - mean (DPSD	30.7 (7.1)	29.8 (6.8)	29.8 (7.5)	29.9 (6.9)	29.3 (6.7)	30.0 (6.9)	31.1 (7.3)	29.9 (6.9)	32.0 (6.2)	29.8 (6.9)
p value[a]	0.31		0.90		0.73		0.36		0.17	
Monthly per capita income R$ - median (P25;P75)	833 (500; 1500)	750 (500; 1162)	667 (327 - 1500)	750 (500 ;1175)	**1500 (1000; 1750)**	**750 (494 ;1167)**	800 (500 ;1000)	750 (500 ;1200)	1000 (537;1687)	750 (500 ; 1167)
p value[a]	0.295		0.91		**0.01**		0.91		0.41	
Birth weight (kg) - mean (SD)	3.3 (0.4)	3.3 (0.4)	3.3 (0.4)	3.3 (0.4)	3.2 (0.3)	3.3 (0.4)	3.3 (0.5)	3.3 (0.4)	3.2 (0.5)	3.3 (0.4)
p value[a]	0.94		0.90		0.40		0.34		0.23	
BMI z-score - median (P25;P75)	0.50 (-0.17; 1.36)	0.54 (-0.10; 1.19)	0.50 (-0.17; 1.35)	0.54 (-0.10; 1.19)	0.42 (-0.20; 1.18)	0.57 (-0.11; 1.21)	0.42 (-0.20; 1.18)	0.57 (1-0.11; 1.21)	0.54 (-0.21; 1.55)	0.54 (-0.10; 1.21)
p value[a]	0.78		0.82		0.65		0.74		0.68	
Child age at assessment (months) - median (P25; P75)	13 (12; 15)	13 (12; 13)	12 (12; 14)	13 (12; 14)	16 (13;17)	13 (12; 14)	14 (12; 17)	13 (12; 14)	13 (12; 14)	13 (12; 14)
p value[a]	**0,01**		0,36		**0,01**		**0,01**		0,32	
	n (%)									
Years of maternal study										
<12	54 (18.1)	244 (81.9)	21 (7.0)	277 (93.0)	11 (3.7)	287 (96.3)	18 (6.0)	280 (94.0)	16 (5.4)	282 (94.6)
≥12	21 (22.1)	74 (77.9)	8 (8.4)	87 (91.6)	4 (4.2)	91 (95.8)	9 (9.5)	86 (90.5)	4 (4.2)	91 (95.8)
p value [b]	0.39		0.66		0.76		0.25		0.79	
Lives in a slum										
Yes	42 (20.3)	165 (79.7)	16 (7.7)	191 (92.3)	8 (4.3)	176 (95.7)	15 (7.2)	192 (92.8)	12 (5.8)	195 (94.2)
No	33 (17.9)	151 (82.1)	13 (7.1)	171 (92.9)	7 (3.4)	200 (96.6)	12 (6.5)	172 (93.5)	8 (4.3)	176 (95.7)
p value [b]	0.56		0.80		0.62		0.78		0.52	
Living zone										
Center (AP1)	6 (14.3)	36 (85.7)	2 (4.8)	40 (95.2)	1 (2.4)	41 (97.6)	3 (7.1)	39 (92.9)	1 (2.4)	41 (97.6)
South Zone (AP 2)	41 (20.0)	164 (80.0)	16 (7.8)	189 (92.2)	10 (4.9)	195 (95.1)	12 (5.9)	193 (94.1)	13 (6.3)	192 (93.7)
North Zone (AP 3)	23 (22.1)	81 (77.9)	8 (7.7)	96 (92.3)	3 (2.9)	101 (97.1)	10 (9.6)	94 (90.4)	5 (4.8)	99 (95.2)
West Zone (APs 4 and 5)	5 (11.9)	37 (88.1)	3 (7.1)	39 (92.9)	1 (2.4)	41 (97.6)	2 (4.8)	40 (95.2)	1 (2.4)	41 (97.6)
p value[b]	0.43		0.92		0.72		0.60		0.58	
Ethnicity										
Non-white	53 (18.2)	81.8 (239)	21 (7.2)	371 (92.8)	12 (4.1)	280 (95.9)	20 (6.8)	272 (93.2)	14 (4.8)	278 (95.2)
White	22 (22.0)	78 (78.0)	8 (8.0)	92 (92.0)	3 (3.0)	97 (97.0)	7 (7.0)	93 (93.0)	6 (6.0)	94 (94.0)
p value[b]	0.40		0.79		0.77		0.96		0.64	
Parity										
Multiparous	45 (18.2)	202 (81.8)	18 (7.3)	229 (92.7)	**6 (2.4)**	**241 (97.6)**	17 (6.9)	230 (93.1)	12 (4.9)	235 (95.1)
Primiparous	30 (20.5)	116 (79.5)	11 (7.5)	135 (92.5)	**9 (6.2)**	**137 (93.8)**	10 (6.8)	136 (93.2)	8 (5.5)	138 (94.5)
P value[b]	0.57		0.93		**0.06**		0.99		0.79	
Alcohol consumption										
Yes	**22 (14.8)**	**127 (85.2)**	9 (6.0)	140 (94.0)	6 (4.0)	143 (96.0)	8 (5.4)	141 (94.6)	**4 (2.7)**	**147 (97.3)**
No	**53 (21.7)**	**191 (78.3)**	20 (8.2)	224 (91.8)	9 (3.7)	235 (96.3)	19 (7.8)	225 (92.2)	**16 (6.6)**	**228 (93.4)**
p value[b]	**0.09**		0.43		0.87		0.36		**0.09**	
Tobbaco exposure										

Yes	23 (20.9)	87 (79.1)	8 (7.3)	102 (92.7)	4 (3.6)	106 (96.4)	8 (7.3)	102 (92.7)	6 (5.5)	104 (94.5)	
No	52 (18.4)	231 (81.6)	21 (7.4)	262 (92.6)	11 (3.9)	2.72 (96.1)	19 (6.7)	264 (93.3)	14 (4.9)	269 (95.1)	
p value[b]	0.57		0.96		0.91		0.84		0.84		
Hypertension											
Yes	**22 (25.0)**	**66 (75.0)**	**10 (11.4)**	**78 (88.6)**	2 (2.3)	86 (97.7)	**13 (14.8)**	**75 (85.2)**	2 (2.3)	86 (97.7)	
No	**53 (17.4)**	**252 (82.6)**	**19 (6.2)**	**286 (93.8)**	13 (4.3)	292 (95.7)	**14 (4.6)**	**291 (95.4)**	18 (5.9)	287 (94.1)	
p value[b]	**0.11**		**0.11**		0.54		**0.01**		0.27		
Diabetes											
Yes	25 (21.6)	91 (78.4)	9 (7.8)	107 (92.2)		113 (97.4)	9 (7.8)	107 (92.2)	8 (6.9)	108 (93.1)	
No	50 (18.1)	227 (81.9)	20 (7.2)	257 (92.8)	12 (4.3)	265 (95.7)	18 (6.5)	259 (93.5)	12 (4.3)	265 (95.7)	
p value[b]	0.42		0.85		0.57		0.65		0.32		
Child characteristics											
Sex											
Male	43 (21.6)	156 (78.4)	18 (9.0)	181 (91.0)	**11 (5.5)**	**188 (94.5)**	16 (8.0)	183 (92.0)	10 (5.0)	189 (95.0)	
Female	32 (16.5)	162 (83.5)	11 (5.7)	183 (94.3)	**4 (2.1)**	**190 (97.9)**	11 (5.7)	183 (94.3)	10 (5.2)	184 (94.8)	
p value[b]	0.20		0.20		**0.07**		0.35		0.95		
Weight adequacy for gestational age											
SGA	1 (16.7)	5 (83.3)	0 (0.0)	6 (100.0)	0 (0.0)	6 (100.0)	0 (0.0)	6 (100.0)	1 (16.7)	5 (83.3)	
AGA	66 (18.8)	285 (81.2)	28 (8.0)	323 (92.8)	14 (4.0)	337 (96.0)	22 (6.3)	329 (93.7)	17 (4.8)	334 (95.2)	
LGA	7 (22.6)	24 (77.4)	1 (3.2)	30 (96.8)	1 (3.2)	30 (96.8)	4 (12.9)	27 (87.1)	2 (6.5)	29 (93.5)	
p value[b]	0.87		0.49		0.86		0.30		0.41		
Breast-feeding											
<6 months	**24 (25.0)**	**72 (75.0)**	8 (8.3)	88 (91.7)	4 (4.2)	92 (95.8)	**13 (13.5)**	**83 (86.5)**	3 (3.1)	93 (96.9)	
≥6 months	**47 (16.7)**	**235 (83.3)**	21 (7.4)	261 (92.6)	11 (3.9)	271 (96.1)	**12 (4.3)**	**270 (95.7)**	15 (5.3)	267 (94.7)	
p value[b]	**0.07**		0.78		1.00		**0.01**		0.58		
Hospitalization in the first year of life											
Yes	7 (17.1)	34 (82.9)	2 (4.9)	39 (95.1)	2 (4.9)	39 (95.1)	3 (7.3)	38 (92.7)	1 (2.4)	40 (97.6)	
No	68 (19.5)	280 (80.5)	27 (7.8)	321 (92.2)	13 (3.7)	335 (96.3)	24 (6.9)	324 (93.1)	19 (5.5)	329 (94.5)	
p value[b]	0.71		0.75		0.67		1.00		0.71		
Attends daycare											
No	60 (19.7)	244 (80.3)	25 (8.2)	279 (91.8)	13 (4.3)	291 (95.7)	21 (6.9)	283 (93.1)	13 (4.3)	291 (95.7)	
Yes	15 (17.2)	72 (82.8)	4 (4.6)	83 (95.4)	2 (2.3)	85 (97.7)	6 (6.9)	81 (93.1)	7 (8.0)	80 (92.0)	
p value[b]	0.60		0.25		0.54		1.00		0.17		

[a] p value Mann-Whitney
[b] p value Chi-square
12 years of schooling corresponds to high school.
Small for Gestational Age (SGA), Appropriate for Gestational Age (AGA), and Large for Gestational Age (LGA).

Supplementary Table S2 – Associations between umbilical cord blood arsenic, lead, and mercury concentrations from continuous logarithmized metals and Denver-II performance 1. Crude OR - PIPA-UFRJ-2023

		Global Performance		Personal-Social		Fine Motor Adaptive		Language		Gross Motor	
		OR (CI95%)									
One metal	Arsenic	1.08	(0.83 -1.39)	0.85	(0.55 - 1.31)	1.05	(0.63 - 1.77)	1.13	(0.77 - 1.65)	**1.54**	**(1.04 - 2.27)** **
	Lead	1.00	(0.67 - 1.49)	0.97	(0.53 - 1.76)	0.96	(0.41 - 2.26)	1.57	(0.86 - 2.85)	**0.52**	**(0.26 -1.01)****
	Mercury	1.00	(0.79 - 1.27)	1.09	(0.76 - 1.56)	0.94	(0.57 - 1.57)	0.96	(0.67 - 1.39)	1.08	(0.70 - 1.67)
Two metals	Arsenic	1.07	(0.83 - 1.39)	0.83	(0.53 - 1.30)	1.04	(0.59 - 1.82)	1.10	(0.74- 1.62)	**1.60**	**(1.07 - 2.40)***
	Lead	0.91	(0.61 - 1.38)	0.75	(0.41 - 1.40)	0.99	(0.41 - 2.39)	1.70	(0.88 - 3.28)	**0.52**	**(0.27 - 1.00)** ****
	Arsenic	1.08	(0.83 - 1.41)	0.81	(0.51 - 1.28)	1.06	(0.60 - 1.88)	1.13	(0.76 - 1.69)	**1.58**	**(1.05 - 2.38)** **
	Mercury	0.98	(0.77 - 1.26)	1.11	(0.76 - 1.63)	0.94	(0.56 - 1.59)	0.95	(0.65 - 1.39)	0.98	(0.62 - 1.54)
	Lead	1.00	(0.67 - 1.49)	0.94	(0.51 - 1.74)	0.98	(0.41 - 2.31)	1.58	(0.87 - 2.89)	**0.47**	**(0.23 - 0.96)*****
	Mercury	1.00	(0.78 - 1.27)	1.10	(0.76 - 1.59)	0.94	(0.56 - 1.58)	0.92	(0.64 - 1.34)	1.22	(0.77 - 1.92)
Two metals and interactions	Arsenic	1.04	(0.79 - 1.37)	0.87	(0.55 - 1.36)	0.97	(0.52 - 1.79)	1.08	(0.72 - 1.63)	**1.58**	**(1.02 - 2.48)** ***
	Lead	0.68	(0.32 - 1.44)	1.22	(0.33 _ 4.53)	0.57	(1.35 - 2.40)	0.76	(0.26 - 2.19)	0.50	(0.20 - 1.26)
	Arsenic*Lead[2]	0.83	(0.57 - 1.22)	1.30	(0.70 - 2.41)	0.71	(0.33 - 1.50)	0.60	(0.35 - 1.04)	0.97	(0.57 - 1.68)
	Arsenic	1.09	(0.83 - 1.42)	0.80	(0.50 - 1.27)	0.99	(0.53 - 1.85)	1.12	(0.75 - 1.69)	**1.53**	**(1.00 - 2.34)** ****
	Mercury	1.19	(0.69 - 2.05)	1.63	(0.58 - 4.55)	0.58	(0.50 - 1.66)	0.82	(0.38 - 1.76)	1.46	(0.63 - 3.40)
	Arsenic* Mercury [2]	1.11	(0.86 - 1.43)	1.20	(0.76 - 1.91)	0.76	(0.45 - 1.30)	0.92	(0.63 - 1.35)	1.28	(0.85 - 1.92)
	Lead	1.17	(0.75 - 1.81)	1.04	(0.54 - 1.99)	1.03	(0.38 - 2.77)	1.59	(0.82 - 3.07)	0.55	(0.24 - 1.26)
	Mercury	1.05	(0.81 - 1.35)	1.14	(0.77 - 1.69)	0.96	(0.56 - 1.65)	0.92	(0.64 - 1.34)	1.35	(0.80 - 2.29)
	Lead*Mercury [2]	1.26	(0.93 - 1.71)	1.19	(0.76 - 1.69)	1.08	(0.55 - 2.09)	1.00	(0.61 - 1.64)	1.24	(0.75 - 2.06)
Three metals	Arsenic	1.08	(0.83 - 1.41)	0.80	(0.51 - 1.27)	1.06	(0.60 - 1.88)	1.12	(0.75 - 1.67)	**1.57**	**(1.03 - 2.39)** **
	Lead	0.91	(0.60 - 1.39)	0.71	(0.37 - 1.35)	1.00	(0.41 - 2.44)	1.71	(0.89 - 3.29)	**0.49**	**(0.24 - 1.00)** ****
	Mercury	0.99	(0.77 - 1.28)	1.17	(0.79 - 1.73)	0.94	(0.55 -1.60)	0.91	(0.63 - 1.34)	1.10	(0.68 - 1.78)
Three metals and interactions	Arsenic	1.05	(0.79 - 1.40)	0.83	(0.52 - 1.33)	0.95	(0.46 - 1.81)	1.13	(0.73 - 1.70)	1.33	(0.78 - 2.25)
	Lead	0.53	(0.21 - 1.34)	1.08	(0.26 - 4.50)	0.97	(0.14 - 6.92)	0.83	(0.22 - 3.12)	**0.18**	**(0.04 - 0.86)** **
	Mercury	1.32	(0.73 - 2.36)	1.55	(0.55 - 4.38)	0.58	(0.17 - 2.01)	0.85	(0.37 - 1.96)	1.93	(0.75 - 4.98)
	Arsenic*Lead[2]	0.65	(0.41 - 1.06)	1.33	(0.65 - 2.71)	0.89	(0.33 - 2.40)	0.61	(0.32 - 1.19)	0.44	(0.19 - 1.02)
	Arsenic* Mercury [2]	1.41	(0.86 - 1.51)	1.17	(0.73 - 1.88)	0.76	(0.41 - 1.42)	0.97	(0.64 - 1.47)	1.33	(0.83 - 2.13)
	Lead* Mercury [2]	0.80	(0.38 - 1.71)	0.87	(0.25 - 3.02)	1.47	(0.31 - 6.96)	1.08	(0.37 - 3.11)	0.37	(0.11 - 1.23)

Denver-II: Denver Developmental Screening Test-II; CI; confidence interval; OR; odds ratio; ORs for continuous models are expressed per interquartile range (IQR) increase and per doubling of metal concentration (ln2 ≈ 0.693).
1 Using the non-failed Denver-II group as a reference.
[2]Interaction terms
*p-value <0.02
** p-value <0.03
*** p-value <0.04
**** p-value <0.05

Supplementary Table S3 – Association of arsenic, lead, and mercury in umbilical cord blood categorized by the 95th [1] percentile with performance in Denver-II [2], crude OR - PIPA-UFRJ-2023

	Global Performance	Personal-Social	Fine Motor Adptive	Language	Gross Motor
	OR (IC95%) p value	OR (IC95%) p value	OR (IC95%) p value	OR (IC95%) p value	OR (IC95%) p value
Arsenic (< 1.03 µg/L)	1.00	1.00	1.00	1.00	1.00
Arsenic (≥ 1.03 µg/L)	1.64 (0.56 - 4.78) 0.37	0.78 (1.00 - 6.16) 0.81	1.49 (0.18 - 12.43) 0.71	*	7.14 (2.06 - 24.84) 0.002
Lead (< 2.48 µg/dL)	1.00	1.00	1.00	1.00	1.00
Lead (≥ 2.48 µg/dL)	0.47 (0.10 - 2.16) 0.33	*	1.52 (0.17 - 13.61) 0.71	2.41 (0.48 - 12.14) 0.29	*
Mercury (< 3.70 µg/L)	1.00	1.00	1.00	1.00	1.00
Mercury (≥ 3.70 µg/L)	1.47 (0.45 - 4.78) 0.52	2.32 (0.49 - 11.08) 0.29	1.63 (0.19 - 14.24) 0.66	0.65 (0.07 - 5.58) 0.69	1.34 (0.16 - 11.67) 0.79

Denver-II: Denver-II Developmental Screening Test; CI, confidence interval; OR, odds ratio
1. Considering those less exposed below the 95th percentile and more exposed above the 95th percentile
2. Using the group non-failure as a reference
Regression model with all three metals simultaneously