Supplementary Table 1. Risk-of-bias and study-quality assessment using the Newcastle-Ottawa Scale (NOS)

Study (Year)	Country	Study design	Selection (0–4)	Comparability (0–2)	Exposure/ Outcome (0–3)	Total NOS (0–9)	Quality category	Main limitation(s)
Siddiqui et al. (18)	India	Case–control	3	1	2	6	Moderate	Small N, limited confounder control
Alatise and Schrauzer (19)	Nigeria	Case–control	3	1	3	7	High	Small sample, unclear sampling years
Ionescu et al. (17)	Czech Rep/ Germany	Retrospective	3	1	2	6	Moderate	Missing demographics, no follow-up
Mansouri et al. (16)	Iran	Case–control	4	2	3	9	High	Limited external validity
Anđelković et al. (20)	Serbia	Case–control	4	1	2	7	High	Possible matrix variability
Afridi et al. (34)	Pakistan	Case–control	3	1	3	7	High	Male BC only; small sample
Li et al. (35)	China	Case–control	3	1	3	7	High	Mixed metal exposures
Wei and Zhu (36)	USA	Cohort	4	2	3	9	High	None major
Gaudet et al. (37)	USA / EU	Cohort	4	2	3	9	High	None major
Hu et al. (29)	USA	Cross-sectional	3	1	2	6	Moderate	Self-reported BC status (NHANES)
Bell et al. (30)	USA	Cross-sectional	3	1	2	6	Moderate	Urinary dilution correction
Mérida-Ortega et al. (32)	Mexico	Case–control	3	1	2	6	Moderate	Multi-metal exposure confounding
Benderli Cihan et al. (39)	Türkiye	Case–control	3	1	2	6	Moderate	Stage-specific cohort only
Blaurock-Busch et al. (38)	India	Cross-sectional	3	0	2	5	Low	Convenience sampling
O'Brien et al. (40)	USA	Cohort	4	2	3	9	High	None major

High quality: 7–9 points; Moderate quality: 4–6 points; Low quality: 0–3 points

Supplementary Table 2. BC incidence and the acceptable lead level in the countries cited in this review

Authors (year)	Country	Incidence*	Pb level before**	Regulation	Pb level after**	BLL	Values in BC patients	Values in controls
Anđelković et al. (20)	Serbia	60.5	25 µg/L	2013	10 µg/L	Children: 10 µg/dL (45)	BLL: 1.17 µg/dL, Tumor: 91.89 ng/g	BLL : 1.36 µg/dL Benign tissue : 106.32 ng/g
Mansouri et al. (16)	Iran	30.5	-	-	10 µg/L (46)	Men: 40 mg/dL Women: 30 mg/dL Children: 30 mg/dL (47)	Breast tissue: 13.1 µg/kg	Breast tissue: 6.4 µg/kg
Alatise and Schrauzer (19)	Nigeria	51.5	10 µg/L	2015	10 µg/L	5-15 µg/dL (48)	BLL: 6.1 µg/dL Hair: 23.6 µg/g Breast tissue: 0.11 µg/g	BLL: 5.0 µg/dL Hair: 10.3 µg/g Breast tissue: 0.10 µg/g
Ionescu et al. (17)	Czech Republic Germany	63.5 (2006) 92 (2006)	25 µg/L 25 µg/L	2014 2013	10µg/L 10 µg/L	100 µg/l Children: 15 µg/L (49)	Breast tissue : 105 µg/kg	Breast tissue: 64 µg/kg
Siddiqui et al. (18)	India	29.9 (2006)	50 µg/L	2012	10 µg/L	Children: 5 µg/dL (50)	BLL: 20.33 µg/dL Breast tissue : 0.54 µg/g	BLL: 6.14 µg/dL Breast tissue: 0.40 µg/g
Rizk and Sky-Peck (28)	ND	-			-		Breast tissue: 1.55 µg/g	Breast tissue: 1.33 µg/g
Santoliquido et al. (27)	ND	-			-		Breast tissue: 0.60 µg./g	Breast tissue: 0.68 µg/g
Hu et al. (29)	USA	95.9	50 µg/L	1991	15 µg/L	Children: 3.5 µg/dL (51) Adult: 5 µg/dL (52)	Urine: 0.48 µg/L	Urine: 0.37 µg/L
Bell et al. (30)	USA	95.9	50 µg/L	1991	15 µg/L	Children: 3.5 µg/dL Adult: 5 µg/dL	Urine: 0.62 µg/g-créatinine	Urine: 0.42 µg/g-creatinine
Mérida-Ortega et al. (32)	Mexico	39.9	-	1994	10 µg/L	Children: 5 µg/dL (53)	Urine: 2.71 µg/g-creatinine	Urine: 2.99 µg/g-creatinine
Men et al. (25)	China	33	10 µg/L	2006	10 µg/L	Children: 10 µg/dL (54)	Urine: 75.0 µg/L	Urine: 75.0 µg/L
Burton et al. (31)	USA	88.6 (2016)	50 µg/L	1991	15 µg/L	Children: 3.5 µg/dL Adult: 5 µg/dL	Urine: 0.578 µg/L	Urine: 0.388 µg/L
McElroy et al. (22)	USA	88.7 (2008)	50 µg/L	1991	15 µg/L	Children: 3.5 µg/dL Adult: 5 µg/dL	Urine: 0.86 µg/L	Urine: 0.64 µg/L
Fernández-Martínez et al. (33)	Spain	81	25 µg/L	2013	10 µg/L	Children: 10 µg/dL (55)	Plasma: 0.23 ng/mL	Plasma: 0.22 ng/mL
Caini et al. (21)	Italy	87	25 µg/L	2013	10 µg/L	Children: 10 µg/dL (56)	Serum: 1.70 µg/L	Serum: 1.70 µg/L
Afridi et al. (34)	Pakistan	34.2	50 µg/L	2010	50 µg/L	Children: 10 µg/dL Adult: 70 µg/dL (57)	Hair: 8.29 µg/g BLL: 528 µg/L Serum: 2.19 µg/L	Hair: 4.36 µg/g BLL: 239 µg/L Serum: 0.75 µg/L
Li et al. (35)	China	33	10 µg/L	2006	10 µg/L	Children: 10 µg/dL	Plasma : 24.3 µg/L	Plasma : 16.0 µg/L
Wei and Zhu (36)	USA	95.9	50 µg/L	1991	15 µg/L	Children: 3.5 µg/dL Adult: 5 µg/dL	BLL: 1.52 µg/dL	BLL: 1.08 µg/dL
Gaudet et al. (37)	USA Italy Sweden	95.9 87 81.4	50 µg/L 25 µg/L 25 µg/L	1991 2013 2013	15 µg/L 10 µg/L 10 µg/L	Children: 3.5 µg/dL Adult: 5 µg/dL Children: 10 µg/dL	ND	ND
Blaurock-Busch et al. (38)	India	34.6 (2014)	50 µg/L	2012	10 µg/L	Children: 5 µg/dL	Hair: 11.42 µg/g	Hair: 2.15 µg/g
Benderli Cihan et al. (39)	Turkey	46.8	-	2000	10 µg/L	Adult: 40 µg/dL (58)	Hair: 3.794 µg/g	Hair: 6.196 µg/g
O'Brien et al. (40)	USA	95.9	50 µg/L	1991	15 µg/L	Children: 3.5 µg/dL Adult: 5 µg/dL	Teonail: 0.144 µg/g	Teonail: 0.134 µg/g
O'Brien et al. (41)	USA	95.9	50 µg/L	1991	15 µg/L	Children: 3.5 µg/dL Adult: 5 µg/dL	Toenail: 0.117 and 0.087 µg/g	Toenail: 0.111 and 0.104 µg/g

*Age-Standardized Rate per 100 000, Incidence, Females, 2022: GLOBOCAN
** Acceptable Pb level in water