

**Supplementary information for:**

Waste streams as current sources of persistent organic pollutants and organophosphate esters in Africa – A Critical Review

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**Table S1: Studied landfill / Dumpsites**

S/N	Name	Landfills / Dumpsites	Locations	Age (Year)	Protection	References
<b>Cameroon</b>						
1	Ngodi					
2	Makea	WEEE recycling sites	Douala, Cameroun.	ns	ns	[1]
3	New Bell					
4	Etetak	Dumpsites	Yaoundé, Cameroon	ns	ns	[2]
5	TCK quarters					
<b>Ethiopia</b>						
6	Kotobe	workshop and dumping site	Addis Ababa, Ethiopia	ns	ns	[3]
<b>Ghana</b>						
7	Agbogbloshie	Informal WEEE sites	Accra, Ghana	middle of the 1990s	No	[2,4,5,6,7,8,9,10,11,12]
<b>Nigeria</b>						
8	Olusosun			ns	ns	
9	Solous 2			ns	ns	
10	Solous 3		Lagos, Nigeria	ns	ns	
11	Ikorodu	Dumpsites		ns	ns	[13]
12	Awotan			ns	ns	
13	Lapite		Ibadan, Nigeria	ns	ns	
14	Aba eku			ns	ns	
15	Dumpsite of the Obafemi Awolowo University	Dumpsite	Ile-Ife, Nigeria	ns	ns	[14]
16	Computer village			ns	ns	
17	Alaba International Market		Lagos, Nigeria	ns	ns	
18	Ogunpa	WEEE recycling sites		ns	ns	
19	Queens cinema areas		Ibadan, Nigeria	ns	Ns	[15]

20	shopping centre			ns	Ns	
21	Port-Harcourt Road		Aba, Nigeria	ns	Ns	
22	Jubilee road			ns	Ns	
23	Karmo	Landfill	Abuja, Nigeria	1995	ns	[16,17]
24	Anjanta	Landfill	Abuja, Nigeria	2003	ns	
25	Mission road		Benin, Nigeria	ns	ns	[18]
26	Sapele road	WEEE recycling sites	Benin, Nigeria	ns	ns	
27	Olusosun		Lagos, Nigeria	1991	No	
28	OSWMA Yard	Landfill	Ondo, Nigeria	ns	No	[19]
29	ns		Ondo, Nigeria	ns	No	
30	ns	Dumpsite	Ado-Ekiti, Nigeria	ns	ns	[20]
<b>Senegal</b>						
31	Mbeubeuss	Landfill	Dakar, Senegal	ns	ns	[21]
<b>South Africa</b>						
	ns	WEEE dismantling/ recycling facilities	Durban, South Africa	ns	ns	[22]
32	Kingtom	domestic dumpsite.	Freetown, Sierra Leone	ns	No	[4]
	ns	Landfill	Gauteng Province, South Africa	ns	ns	[23]
33	Hatherley	landfill	Gauteng province, South Africa	ns	ns	[24]
34	Chloorkop				Yes	
35	Robinson deep		Gauteng province, South Africa	ns	Yes	
36	Soshanguve	landfill			Ns	[25,26]
	Hatherly				ns	
37	Garstkloof				ns	

38	Onderstepoort				ns	
	8 dumpsites not specified	landfill	Gauteng province, South Africa	ns	ns	[27]
39	Temba			10	No	
	Soshanguve			10	No	
	Heatherley	landfill	Pretoria, South Africa	40	No	[28]
40	Kwaggasrand			7	No	
41	Garankuwa			10	No	
42	Goudkoppies	landfill		ns	Yes	
	Robinson Deep		Johannesburg, South Africa	ns	Yes	
43	Marie Louis			ns	Yes	
	Soshanguve	landfill		ns	No	[29,30]
	Onderstepoort			ns	No	
	Heatherly		Pretoria, South Africa	ns	No	
	Garankuwa			ns	No	
	Temba			ns		
	Soshanguve			ns		
	Garankuwa			ns		
44	Derdepoort			ns		
	Onderstepoort			ns		
	Kwaggasrand	Landfill	Pretoria, South Africa	ns	No	[31]
	Heatherley			ns		
45	Valhalla			ns		
46	Garskloof			ns		
47	Bellville			ns	ns	
48	Coastal Park	Landfill site	Cape Town, South Africa	ns	ns	[32]
49	Vissershok			ns	ns	
	Tanzania					
50	ns	municipal waste dumpsite and a WEEE handling facility	Dar es Salaam, Tanzania	ns	ns	[33]

(-): not specified      No: no protective lining      Yes: protective lining present      Red colour: name not specified in the manuscript or has already been numbered

WEEE: waste electrical and electronic equipment

**Table S2:** Concentrations (ng/L for water and ng/g for sludge, soil or fish/invertebrates) of individual PFAS reported in African waste streams

Study location / year of study	Environmental media (number of samples)	Treatment process	Concentrations – mean (range)															Σ	References
			PFB <sub>A</sub>	PFP <sub>eA</sub>	PFHx <sub>A</sub>	PFHp <sub>A</sub>	PFO <sub>A</sub>	PFN <sub>A</sub>	PFDA	PFUnD <sub>A</sub>	PFBS	PFHx <sub>S</sub>	PFOS	EtFOS <sub>A</sub>	PFDoD <sub>A</sub>	PFDS	FOSA		
<b>Waste water / sludge</b>																			
Lagos, Oyo and Ogun, Nigeria/ 2012	Waste water effluent (ns)	Activation/aeration	-	-	nd-0.25	<sup>h</sup> nd-0.014	0.019 -0.42	nd-0.13	nd-0.60	nd-0.16	nd-0.14	nd-0.042	-	-	nd-0.28	-	nd-0.54	Σ <sub>10</sub> 0.10-0.54 (0.27)	[34]
(Bungoma, Busia, Kakamega, Kisumu, Kisii, and Mumia), Kenya / 2013	Waste water effluent (n=9)	Aerated lagoon	-	-	nd-2.2	-	1.3-28	nd-11	nd-9.8	1.5-15	-	nd-5.6	0.9-9.8	-	1.2-9.0	-	nd-5.7	*12	[35]
	Sludge effluent (n=9)		-	-	nd-570	-	32-350	nd-71	nd-340	nd-400	-	nd-830	nd-670	-	nd-240	nd	nd-6.0	*0.17	**0.44
Bugolobi / 2015	Waste water influent (ns)	Sedimentation and a secondary/trickling filters	nd	nd	nd	nd	0.9-2.3	0.2-0.6	nd	nd-0.2	nd	1.4-1.8	0.4-0.8	nd	-	-	-	#4.5 (3.4-5.1)	[36]
	Waste water effluent (ns)		nd	nd	nd-1.6	nd	1.4-2.4	0.5	nd	nd-0.3	nd	2.2-3.1	1.3-1.5	nd	-	-	-	##7.7 (5.6-9.1)	
	Waste water influent (ns)	Primary settling tank; secondary settling	2.7	15	19	-	10	-	0.8	-	-	71	510	-	-	-	-	Σ <sub>7</sub> 630	[37]

Gauteng Province, South Africa / 2016–2017	Waste water effluent (ns)	tank and external nitrification	2.9	9.9	17	-	8.7	-	0.7	-	-	88	95	-	-	-	-	Σ <sub>7</sub> 220
	Waste water Influent (ns)	Anaerobic pond and biological filter	2.5	6.0	9.9	-	5.4	-	0.8	-	-	18	87	-	-	-	-	Σ <sub>7</sub> 130
	Waste water effluent (ns)		2.9	3.0	3.6	-	1.6	-	2.2	-	-	6.7	57	-	-	-	-	Σ <sub>7</sub> 77
	Waste water influent (ns)		6.2	8.2	6.3	-	6.5	-	0.9	-	-	18	150	-	-	-	-	Σ <sub>7</sub> 200
	Waste water effluent (ns)	Activated sludge process	3.4	10.2	6.1	-	2.4	-	0.7	-	-	4.1	8.9	-	-	-	-	Σ <sub>7</sub> 36

**Dumpsite**

Calabar, Nigeria / ns	Dumpsite soil (ns)	-	nd	nd	nd	0.6	2.3	1.0	5.0	0.6	0.05	nd	1.4	-	2.2	nd	nd	[38]
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**Industrially polluted water**

South Africa / September,	Water (n=9)	-	-	5.7-45	nd-20	nd-2.5	0.6-4.6	nd-1.8	-	-	nd-25	nd-7.6	0.4-36	-	-	-	-	<sup>m</sup> Σ <sub>15</sub> nd-39 [39]
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2014	Invertebrates (ns)	nd-1.6	nd-2.1	-	-	nd-1.0	nd-0.9	nd-1.8	nd-2.0	nd-0.4	-	nd-36	-	nd-0.3	nd-0.06	-	<sup>m</sup> ∑ <sub>15</sub> nd-35
	Fish (n=33)	-	nd-5.8	nd-12	-	0.1-2.3	nd-1.7	nd-8.7	nd-4.7	nd-0.8	-	nd-460	-	nd-1.9	nd-0.1	-	<sup>m</sup> ∑ <sub>15</sub> nd-289

# influent      ## effluent      <sup>m</sup>mean concentrations      \*PFOA      \*\*PFOS      ns: not specified      nd: not detect      <sup>h</sup>found only in hospital

**Table S3:** Concentrations (ng/L for leachate and ng/g for sediment) of organophosphate esters (OPEs) reported in African waste streams

Study location / year of study	Environmental media (number of samples)	Treatment process	Concentrations – mean (range)										Σ	References
			Tn BP	TC EP	TCPP	TDCP P	TPH P	EHD HP	TEHP	TOTP	TCP	T2IP PP		
Pretoria and Johannesburg (Gauteng Province), South Africa / 2017	Landfill (ns)	Sediment (ng/g)	nd-5.0	0.76 – 9.7	33-1,200	20-740	0.81-34	0.41-8.5	0.85-37	nd-420	nd-3.7	nd-6.9	∑ <sub>10</sub> 120-1,700	[29]
	Landfill (ns)	Leachate (ng/L)	nd-820	12-3500	52-14,000	230-15,000	nd-130	nd-520	nd-200	nd	nd-47	nd-17	∑ <sub>10</sub> 560-17,000	

nd: not detect      ns: not specified



**Table S4:** Concentrations (ng/L for leachate or water, ng/g for sediment or soil; and ng/m<sup>3</sup> for air) of chlorinated paraffins and alternative flame retardants reported in African waste streams

Study location / year of study	Environmental media (number of samples)	Treatment process	Concentrations – mean (range)													Reference
			Chlorinated paraffins		Alternative flame retardants											
			SCCPs	MCCPs	EH-TBB	BTB PE	BEH-TEBP	Syn-DP	Anti-DP	EH-TBB	BEH-TBP	BTBPE	HBB	DBDPE	PBT	
Gauteng Province, South Africa/ 2013	Landfill Leachate (effluent) (n=18)	Geomembrane liners	-	-	0.06	0.011	0.0011	-	-	-	-	-	-	nd	-	[25]
Gauteng Province, South Africa/ 2013	Landfill Sediment (n=18)		-	-	10	51	11	-	-	-	-	-	-	nd	-	
Gauteng Province, South Africa / 2016 - 2017	Landfill air (ns)	-	-	-	-	-	-	-	-	nd – 0.002	nd – 0.0012	nd – 0.0014	-	-	-	[23]
Dar es Salaam, Tanzania / 2019	Dumpsite air (n=9)	-	4-59	1-33	-	-	-	<0.0004 – 0.002	<0.0006-0.007	-	-	-	-	-	-	[33]
Dar es Salaam, Tanzania / 2019	Dumpsite Soil (n=9)	-	11-5,300	<19-5,100	-	-	-	<0.01-2	0.03-4	-	-	-	-	-	-	[33]
Accra, Ghana / ns	WEEE recycling site Soil	-	-	-	-	-	-	-	-	-	-	20	1.6	35	0.15	[2]

(n=4)															
Accra, Ghana / 2015	WEEE recycling site Soil (n=15)	-	3,300 (150 – 28,000)	380 (nd – 1,400)	-	-	-	-	-	-	-	-	-	-	[4]
Freetown, Sierra Leone / 2015	Dumpsite Soil (n=10)	-	450 (69 – 1,600)	220 (nd – 1,400)	-	-	-	-	-	-	-	-	-	-	[4]
Accra, Ghana / 2018	Dumpsite Soil (n=1)	-	310	-	-	-	-	-	-	-	-	1.1	-	-	[2]
Accra, Ghana / 2018	Eggs (n=1)	-	<sup>1</sup> 2,100	-	-	3.8	-	-	-	-	-	1.1	-	-	[2]
Yaoundé, Cameroon / 2018	Eggs (n=1)	-	<sup>1</sup> 150	-	-	-	-	-	-	-	-	-	-	-	[2]

nd: not detect

ns: not specified

<sup>1</sup>(ng/g) lipid wt

**Table S5:** Concentrations (ng/L for leachate or water, ng/g for sediment or soil; and ng/m<sup>3</sup> for air) of polybrominated diphenyl ethers (PBDEs), hexabromocyclododecane (HBCDD), and tetrabromobisphenol A (TBBP-A) reported in African waste streams

Study locations / year of study	Environmental media (number of samples)	Treatment processes	Concentrations – mean (range)											Reference
			BDE-28	BDE-47	BDE-100	BDE-99	BDE-154	BDE-153	BDE-183	BDE-209	Σ	ΣHBCD	TBBP-A	
<b>Dumpsite / Landfill</b>														
Gauteng Province, South Africa/ 2014	Landfill leachate (ns)	-	nd-0.049	0.047-0.1	0.035-0.12	0.004-0.084	0.009-0.14	nd-0.012	0.004-0.012	0.14-0.47	Σ <sub>9</sub> 0.32-1.4	-	-	
	Landfill sediment	-	nd-0.12	0.45-0.48	0.05-0.7	0.31-0.42	nd-0.32	0.02-0.11	0.01-0.13	1.2-3.0	Σ <sub>9</sub> 2.5-4.9	-	-	[30]
	Groundwater around landfill (ns)	-	-	-	-	-	-	-	-	-	Σ <sub>9</sub> (0.045-0.45)	-	-	
Gauteng Province, South Africa / 2014	Landfill leachate (n=24)*	-	<10-200	<10-990	<10-1,200	110-1,900	<40-160	<170	<520	<1,200	MTΣ <sub>8</sub> 40-480	<0.03 – 2.6 (γ-HBCD)	<0.82	[27]
Pretoria, South Africa / ns	Landfill Sediment (ns)	-	-	-	-	-	-	-	-	-	Σ <sub>15</sub> 33	-	-	[28]
Cape Town, South Africa / 2010 –2011	Landfill leachate (ns)*	-	nd – 42	0.05-3,000	0.06-1,200	0.10-2,200	nd-710	nd-8,000	nd-5,900	nd-6,400	MTΣ <sub>8</sub> 0.28 - 2,200	-	-	[32]

Gauteng, South Africa / 2013	Landfill sediment (ns)	-	-	0.40 (nd – 1.4)	0.46 (nd – 1.70) (+BDE-99)	-	0.74 (0.06 – 3.9) (+BDE -153)	-	0.65 (0.14-1.5)	1.6 (nd-4.2)	$\sum_7 0.8 - 8.4$	-	-	[26]
	Landfill leachate (ns)	-	-	-	-	-	-	-	-	1.900	$\sum_7 0.13 - 3.7$	-	-	
Pretoria, South Africa / ns	Landfill leachate (ns)	-	0.1-3.3	1.5 – 9.8	nd-2.2	nd-5.2	nd-2.2	nd-0.88	nd-0.26	-	$\sum_{13} 8.4-55$	-	-	[31]
Gauteng Province, South Africa/ 2013	Landfill leachate (n=18)	-	-	-	-	-	-	-	-	-	-	0.024	-	[25]
Gauteng Province, South Africa/ 2013	Landfill sediment (n=18)	-	-	-	-	-	-	-	-	-	-	33	-	
Accra, Ghana/ 2015	WEEE recycling soil (n=18)	-	17	9.0	5.3	5.9	2.9	2.6	1.8	11	$\sum_{17} 16 - 97 (55)$	-	-	[5]
Abia, Lagos, and Oyo, Nigeria /2015	WEEE recycling soil (n=29)	-	0.0002 - 0.040	0.0001-0.083	0.00017-0.086	0.00042-0.16	0.0001-0.080	0.00024-0.064	0.0002-0.15	0.00085-18	** $\sum_{17} 0.0032-21$	-	-	[15]
Accra, Ghana/ 2013	WEEE recycling soil (n=41)	-	-	-	-	-	-	-	-	-	$\sum_8 140 - 6,900,$ (median = 2800)	-	-	[6]
Gauteng province, South Africa / ns	Landfill soil (n=6)	-	-	-	-	-	-	-	-	-	$\sum_7 7.1 - 11$ (median = 7.3)	-	-	[24]

Ile-Ife, Nigeria / ns	Dumpsite soil (ns)	-	0.79 (nd – 1.7)	0.36 (nd – 0.84)	1.0 (nd – 2.5)	0.85 (nd – 1.7)	0.74 (nd – 3.2)	14 (nd – 110)	-	-	-	-	-	[14]
Accra, Ghana / ns	Plant and soils around WEEE recycling site (not quantified) (n=14)	-	-	-	-	-	-	-	-	-	<sup>a</sup> BDEs- 28 and 47	-	-	[7]
Abuja, Nigeria / ns	Dumpsite soil (n=96)	-	0.22-70	0.31-57	nd - 57	0.89 – 77	nd – 41	0.32-76	nd-42	-	$\sum_7 110 -$ 370	-	-	[16]
	Dumpsite plants (n=40)	-	1.1 – 9.0	3.6-18	1.0-7.2	2.0-11	nd-8.6	nd-6.1	nd-6.9	-	$\sum_7 8.5 -$ 61	-	-	
Benin City, Nigeria / 2017	WEEE recycling soil (n=30)	-	-	nd	-	nd	-	nd	-	nd	$\sum_1$ nd – 1.9	-	-	[18]
Accra, Ghana/ 2015	WEEE recycling soil (n=15)	-	15 (0.04- 72)	140 (0.39- 860)	18 (0.06- 130)	190 (0.27- 1600)	32 (0.11- 170)	53 (0.08- 340)	92 (0.14- 760)	1600 (nd- 8800)	$\sum_3$ 6.3 - 7700	-	-	[4]
Freetown, Sierra Leone/ 2015	Dumpsite Soil (n=10)	-	0.15 (nd- 0.60)	2.1 (0.05- 10)	0.51 (0.01- 2.9)	3.0 (0.04- 19)	0.86 (nd- 1.8)	0.98 (nd- 3.0)	1.4 (nd- 3.7)	23 (nd- 87)	$\sum_2$ 1.2–100	-	-	[4]
Accra, Ghana/ ns	WEEE recycling soil (n=1)	-	-	-	-	-	-	-	-	-	$\sum_7$ 770	9.8	150	[2]
Durban, South Africa / 2012 - 2013	Indoor dust around WEEE recycling facilities (n=3)	-	nd – 120	67 – 3,000	66 – 1,000	77 – 6,200	-	270 – 1,600	88 – 1,700	1,900 - 28,000	$\sum_8$ 2,600 – 44,000	-	-	[22]

Gauteng Province / 2016 - 2017	Landfill air (ns)	-	-	-	-	-	-	-	-	-	-	$\sum_9 0.95-2,800$	0.05 -0.12	-	[23]
Gauteng Province, South Africa / February, 2017	Landfill sediment (ns)	-	-	0.28-0.65	0.04-0.06	0.33	0.05-0.11	0.09-0.31	-	-	-	$\sum_5 0.82-1.4$	-	-	[29]
<b>Waste water</b>															
Cape town, South Africa / 2010 –2011	Sludge (within) (ns)	Activat ed sludge system and bio-reactor system	nd-32	0.07-840	nd-120	nd-420	nd-150	nd-1500	nd-3,500	nd-34,000	$\sum_8 24.1-100,000$	-	-	-	[40]
Gauteng province, South Africa / 2013	Rivers receiving form WWTP and industrial effluent (ns)	-	-	-	80	120	60	nd	nd	-	-	930	-	-	[41]
Cape Town, South Africa/ 2010 –2011	Raw water (n=18)	Membrane bioreactor system	nd-1,900	1.5-530	1.6 – 35	610-2,600	0.75 - 22	2.3 – 46	6.4-130	4.9-2,300	$*\sum_8 1,200-9,600$	-	-	-	[42]
	Secondary effluent from WWTP		nd-280	8.0-2,200	0.41-14	0.44-18	nd-12	0.57-23	nd-30	nd-1,800	$*\sum_8 60 – 6,700$	-	-	-	
	Primary effluent from WWTP		0.08-520	3.5 - 920	0.21-17	0.35-68	0.14-13	0.41-16	1.1-33	nd-9,800	$*\sum_8 290 – 30,000$	-	-	-	

(n=18)												
Sludge (n=18)		nd – 4.64	33 (1.0- 130)	0.68-8.0	1.4-9.2	0.33- 4.2	6.0 (2.3- 7.7)	1.6 (0.85-38)	68 (nd- 300)	50-1,200	-	-

#### Waters around dumpsite

Ile-Ife, Nigeria /2012 - 2013	Surface water sediment (ns)	-	0.79 (0.25- 1.0)	0.36 (0.16- 0.44)	1.0 (0.39- 1.6)	0.85 (0.48- 1.3)	0.74 (0.43- 1.0)	14 (2.6- 59)	-	-	<sup>MT</sup> ∑ <sub>6</sub> 18	-	-	[43]
	Surface water (ns)	-	10 – 50	20-30	10 – 50	10 -40	20-50	60-1650	-	-	<sup>MT</sup> ∑ <sub>6</sub> 30- 310	-	-	[44]

#### Human / Biological samples collected around landfill / dumpsite

Abuja, Nigeria / ns	<sup>f</sup> Eggs (n=56)	-	7.9 – 12	14-22	37-90	26-110	9.8-27	40-97	12-35	-	<sup>l</sup> ∑ <sub>7</sub> 190- 370	-	-	[17]
	Cow milk (n=56)	-	3.1-12	9.2-66	1-13	6.8-19	nd-5.5	0.33-10	nd-5.5	-	<sup>l</sup> ∑ <sub>7</sub> 33- 100	-	-	
Accra, Ghana / 2018	<sup>f</sup> Egg (n=4)	-	-	-	-	-	-	-	-	-	∑2.3	<0.2	-	[2]
Yaoundé, Cameroon / 2018	<sup>f</sup> Egg (n=4)	-	-	-	-	-	-	-	-	-	∑0.5 – 2.8	<0.1 <sup>f</sup> <sub>380</sub>	-	

WWTP: waste water treatment plant

\*Range of mean

\*\*Range of median concentrations

<sup>l</sup>(ng/g) lipid wt

<sup>q</sup>identified but not quantified

<sup>MT</sup>Mean value of the total congeners

nd: not detect

<sup>f</sup>free range chicken eggs around dumpsite

**Table S6:** Concentrations (ng/L for leachate or water, ng/g for sediment, dust or soil; and ng/m<sup>3</sup> for air) of polychlorinated biphenyls (PCBs) reported in African waste streams

Study location / year of study)	Environm ental media (number of samples)	Treatme nt process	Concentrations – mean (range)								Reference
			PCB-28	PCB-52	PCB-101	PCB-118	PCB-153	PCB-138	PCB-180	∑ PCB	
<b>Dumpsite/Landfill</b>											
Addis Ababa, Ethiopia / 2018 – 2019	Soil from transforme r dumpsite (n=45)	-	480	360	-	-	-	-	-	∑ <sub>6</sub> 166 – 4,500	[3]
Gauteng Province, South Africa / 2017	Landfill Sediment (ns)	-	-	nd – 0.45	nd-0.75	0.26-0.76	0.65-1.8	0.34-0.86	0.64-0.36	∑ <sub>7</sub> 2.3-6.9	[29]
Douala, Cameroun / 2017	WEEE recycling sites soil (n=30)	-	0.4 – 1.06	0.43-7.4	1.1-1.3	1.5-4.6	nd – 0.71	1.5-1.7	1.8-1.9	∑ <sub>30</sub> 32 – 73	[1]
Lagos, Nigeria / ns	Dumpsite leachate (ns)	-	-	-	-	-	-	-	-	∑ <sub>6</sub> PCB (nd- 80)	[13]



Lagos and Ibadan, Nigeria / ns	Dumpsite soil (ns)	-	-	-	-	-	-	-	-	$\sum_6$ PCB (nd-410)	[13]
Accra, Ghana / 2010	WEEE recycling soil (ns)	-	-	-	-	-	-	-	-	$\sum$ dl-PCB (1.8 - 560)	[8]
Accra, Ghana / ns	WEEE recycling soil (n=1)	-	-	-	-	-	-	-	-	$\sum_7$ 620	[2]
Dakar, Senegal / ns	Dumpsite soil (ns)	-	-	-	-	-	-	-	-	$\sum_7$ 29	[21]
Accra, Ghana/ 2015	Dumpsite soil (n=15)	-	20 (0.40-140)	13 (0.29-66)	14 (0.46-39)	14 (0.35-54)	14 (0.55-38)	17 (0.46-54)	8.0 (0.28-18)	$\sum_7$ 92 (6.5-83)	[4]
Freetown, Sierra Leone / 2015	Dumpsite soil (n=10)	-	0.58 (0.04-2.6)	0.66 (0.05-2.6)	0.77 (0.04-2.6)	0.66 (0.04-2.4)	1.0 (0.04-3.4)	1.0 (0.04-3.5)	0.67 (0.02-2.4)	$\sum_7$ 4.7 (0.74-43)	[4]
Ado-Ekiti, Nigeria / ns	Dumpsite soil (ns)	-	-	2.3	-	-	-	-	-	$\sum_{15}$ 24 - 29	[20]
Durban, South Africa / 2012-2013,	Indoor dust around WEEE recycling facilities (n=3)	-	-	-	-	-	-	-	-	$\sum_3$ 54 – 490	[22]
Ado-Ekiti, Nigeria / ns	Air around burning dumpsite (ns)	-	-	-	-	-	-	-	-	$\sum_{15}$ 3.1–5.0	[20]
Accra, Ghana / 2011	Air from burning WEEE recycling site (ns)	-	-	-	-	-	-	-	-	$\sum_{190}$ 0.28 – 11	[9]
Lagos and Akure, Nigeria / ns	Dumpsite leachate (ns)	-	-	-	-	-	-	-	-	$\sum_{14}$ 3 – 41	[19]

<b>Waste water</b>											
Alexandria, Egypt / 2010 –2011	Waste sludge (ns)	Sedimentation, activation, and anaerobic digestion	960 (450-2,400)	720 (440-980)	1,500 (700-3,000)	1,800 (900-2,400)	1,500 (840-2,200)	1,400 (1,100-1,700)	540 (360-720)	$\sum_7$ 5,600 - 11,000	[45]
Northeast Tunisia, Tunisia / ns	Textile waste water (ns)	-	-	-	-	-	-	-	-	$\sum_7$ 160-1,200	
Northeast Tunisia, Tunisia / ns	Industrially polluted water (mg/L) (n=13)	-	-	-	-	-	-	-	-	$\sum_7$ 90-470	[46]
Ramadan city, Egypt / 2008 - 2009	Raw waste water	-	1,600 (nd-4,500)	4,600 (550-7,300)	610 (nd-1,800)	430 (44-1,300)	70-3,300 (1,400)	1,800 (240-6,400)	730 (150 – 2,200)	$\sum_{12}$ 27,000 (12,000 – 52,000)	
	Primary sedimentation effluent (ns)	-	1,400 (nd-3,900)	4,100 (540-6,300)	480 (nd-1,500)	340 (35 – 1,000)	920 (50-1,800)	1,500 (90-5,700)	600 (120 – 1,800)	$\sum_{12}$ 18,000 (10,000 – 22,000)	[47]
	Final effluent (ns)	Aerated oxidation	540 (nd-1,600)	2,700 (350-4,300)	300 (nd-940)	220 (5.1 – 790)	390 (29-670)	390 (19-820)	270 (44-550)	$\sum_{12}$ 8,100 (5,600 – 11,000)	
<b>Human / Biological samples collected around landfill / dumpsite</b>											
Accra, Ghana / 2015	Blood plasma workers	-	26 (< 10–250)	12 (< 10–130)	< 10 (< 10–70)	-	84 (< 10–3,400)	64 (< 10–1,500)	141 (< 10–9,900)	$\sum_6$ 340 (30–15,000)	[10]

	around WEEE recycling site (n=88)											
Accra, Ghana / 2011	Blood plasma workers around WEEE recycling site (n=39)	-	-	-	-	-	36 (3–160)	25 (2–180)	21 (2–78)	-		[11]
Accra, Ghana / 2014–2016	Breast milk of mothers around WEEE dumpsite (n=105)	-	1.3 (0.002–5.8)	0.19 (nd–1.0)	0.08 (nd–0.53)	-	0.42 (nd–5.4)	0.86 (nd–4.4)	0.53 (nd–6.0)	$^{MT,1}\sum_6$	4.4	[12]
Accra, Ghana / 2018	<sup>f</sup> Eggs (n=4)	--	-	-	-	-	-	-	-	$^{i,f}\sum_7 < 1.4 - 290$		
Yaoundé, Cameroon / 2018	<sup>f</sup> Eggs (n=4)	-	-	-	-	-	-	-	-	$^{i,c}\sum_7 28-36$ $^{i,f}\sum_7 32$	0.29	[2]
<b>Around dumpsite</b>												
Lagos and Akure, Nigeria / ns	Groundwater (ns)	-	-	-	-	-	-	-	-	$\sum_{14}$	nd - 67	[19]

ns: not specified

nd: not detect

<sup>i</sup>ICES indicator PCBs

<sup>f</sup>free range chicken eggs around dumpsite

<sup>l</sup>(ng/g) lipid wt

<sup>dl</sup> $\sum$ dioxin like-PCB

<sup>MT</sup>Mean value of the total congeners



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