

Table SM1. Definition and values of the quantitative non cancer, cancer and ecological risks variables (USEPA, 2001; Emoyan, 2020; Iwegbue et al 2020)

S/N	Quantitative definition and values	Quantitative definition and values
1	AT _{ca} the averaging time for carcinogens (in days)	EF the exposure frequency (350 days year ⁻¹ for infants and adults)
2	AT the averaging time (19,893 days ie 54.5yrs × 365 days)	ET the exposure time (8 hrs day ⁻¹ for infants and adults)
3	ED the exposure duration (54.5 yrs, the average lifespan of Nigerians)	PEF the particle emission factor (1.36 × 10 ⁹ m ³ kg ⁻¹)
4	IUR the inhalation unit risk (mg m ⁻³), SFO the oral slope factor (2.00 mg ⁻¹ kg ⁻¹ day ⁻¹)	SA the surface area of the skin in contact with soil (2800 for infant and 5700 cm ² /event)
5	ILCR _{ing} , the incremental lifetime cancer risk through non dietary accidental ingestion exposure	IngR the ingestion rate of soil (200 mg day ⁻¹ for infants and 100 mg day ⁻¹ for adults)
6	ILCR _{inh} the incremental lifetime cancer risk through non dietary accidental inhalation exposure	CUCL the UCL95% concentrations of PAHs in soil samples (mg kg ⁻¹)
7	ILCR _{derm} the incremental lifetime cancer risk through non dietary accidental dermal exposure	CDI _{ing-nc} , the chronic daily intakes for ingestion exposure
8	ABS the dermal absorption factor (0.13 for infants and adults)	CDI _{inh-nc} , the chronic daily intakes for inhalation exposure
9	AF the soil skin adherence factor for dust (0.2 for infants and 0.7 mg cm ⁻² adults)	CDI _{derm-nc} , the chronic daily intakes for dermal exposure
10	AT _{nc} the averaging time for non-carcinogens (in days)	C _{PAHs} the concentration value of a given PAH isomer in the soil
11	BW the average body weight in kilograms (15 kg for infants and 60 kg adults)	C _{QV} the quality value of a given PAH isomer in the soil
12	CF, the conversion factor (1 × 10 ⁻⁶ kg mg ⁻¹)	C _{QV(MPCs)} the concentrations above which the occurrence of ecological risk is unacceptable
13	ED the exposure duration in years (6 yrs for infants and 30 yrs adults)	C _{QV(NCs)} is the concentrations below which the occurrence of ecological risk is negligible
14	BaP _{TEF} is the cancer potency relative to BaP	C _i is the individual PAH concentration
	BaP _{MEF} is the mutagenic potency relative to BaP	BaP _{TEFs} is the toxic equivalency factors relative to BaP

Table SM2. Values of toxicological parameters of PAHs used for health risk assessment.

	Oral Ingestion Reference Dose (RfDo)	Inhalation Reference Dose (RfDi)	SFO_{ing} (mg/kg/d)	IUR (µg/m³)	ABSGI	BaP_{TEF}	BaP_{MEF}
Nap	2 x 10 ⁻²	8.57 x 10 ⁻⁴					
Acy	6 x 10 ⁻²	6 x 10 ⁻²					
Ace	6 x 10 ⁻²	6 x 10 ⁻²					
Flu	4 x 10 ⁻²	4 x 10 ⁻²					
Phen	3 x 10 ⁻²	3 x 10 ⁻²					
Ant	3 x 10 ⁻¹	3 x 10 ⁻¹					
Flt	4 x 10 ⁻²	4 x 10 ⁻²					
Pyr	3 x 10 ⁻¹	3 x 10 ⁻¹					
BaA			7.3 x 10 ⁻¹	1.1 x 10 ⁻⁴	1	0.1	0.082
Chry			7.3 x 10 ⁻³	1.1 x 10 ⁻⁵	1	0.001	0.017
BbF			7.3 x 10 ⁻¹	1.1 x 10 ⁻⁴	1	0.1	0.25
BkF			7.3 x 10 ⁻²	1.1 x 10 ⁻⁴	1	0.01	0.11
BaP			7.3	1.1 x 10 ⁻³	1	1	1
IndP			7.3 x 10 ⁻¹	1.1 x 10 ⁻⁴	1	0.1	0.31
DahA			7.3	1.2 x 10 ⁻³	1	1	0.29
BghiP							
Reference	USEPA (2012)	USEPA (2012)	USDOE (2011)	USEPA, (2010)	USEPA (2011)	USEPA (1993)	Durant (1996)

Table SM3. Values of variables for estimation of human health risk assessment

Parameters	Unit	Definition	Values		References
			Child	Adult	
Csoil	µg/kg	PAHs concentration in soil			
ABS	-	Dermal absorption factor for PAHs	0.13	0.13	USEPA, 2011
AF	mg/cm ²	Soil to skin adherences factor	0.2	0.07	USEPA, 2011
BW	Kg	Average body weight	15	60	USEPA, 2001
ED	Year	Exposure duration	6	30	USEPA, 2001
EF	d/yr	Exposure frequency	350	350	
ET	h/d	Exposure time	8	8	USEPA, 1987
IngR	mg/d	Soil ingestion rate for receptor	200	100	USDOE, 2011
SA	cm ² /event	Skin surface area	2800	5700	USDOE, 2011
ATnc	D	Averaging time for non-carcinogenic	ED x 365		USDOE, 2011
ATca	d	Averaging time for carcinogenic	LT x 365		USDOE, 2011
LT	Year	Lifetime	54.5 years		WHO, 2018
PEF	m ³ /kg	Soil to air particulate emission factor	1.36 x 10 ⁹		USDOE, 2011
CF	kg mg ⁻¹	Conversion factor	1 x 10 ⁻⁶		
IUR	mg m ⁻³	Inhalation unit risk	See Table S1		
SFO	mg/kg/d	Oral slope factor	See Table S1		
CDI _{ing}	-	Chronic daily intake via ingestion	From equation 1		
CDI _{inh}	-	Chronic daily intake via inhalation	From equation 2		
CDI _{derm}	-	Chronic daily intake via dermal contact	From equation 3		
HQ _{ing}	-	Hazard quotient via ingestion	From equation 4		
HQ _{inh}	-	Hazard quotient via inhalation	From equation 4		
HQ _{derm}	-	Hazard quotient via dermal contact	From equation 4		
ILCR _{ing}	-	incremental lifetime cancer risk via ingestion	From equation 6		-
ILCR _{inh}	-	incremental lifetime cancer risk via inhalation	From equation 7		
ILCR _{derm}	-	incremental lifetime cancer risk via dermal contact	From equation 8		-

Table SM 4. Percentage composition (%) pattern of PAHs in soils

	GS1		GS2		GS3		GS4		GS5		GS6		GS7		GS8		GS9		Total	%
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B		
Nap	32	8	4776	4	34	5134	33	2571	2405	1288	1219	3211	626	2891	1515	2089	1367	2650	31853	10.03
Acy	138	2	4206	4	4	32	71	17	2139	11	1071	21	571	19	1355	15	1213	18	10907	3.44
Ace	46	4	6472	44	2	7238	24	3621	3248	1833	1625	4535	825	4078	2036	2955	1831	3745	44162	13.91
Flu	50	8	6394	30	100	2764	75	1386	3235	708	1667	1736	871	1561	2053	1135	1860	1435	27068	8.53
Ant	404	34	4092	118	6	16876	205	8455	2149	4287	1077	10581	641	9518	1395	6902	1236	8742	76718	24.17
Phen	1872	6	3156	6	28	88	950	6	2053	6	1041	6	995	6	1524	6	1282	6	13037	4.11
Flt	1556	2	5342	6	72	348	814	175	3078	91	1575	219	1195	197	2136	144	1856	182	18988	5.98
Pyr	56	4	1858	6	16	862	36	434	947	648	482	541	259	595	603	568	542	581	9038	2.85
BaA	42	2	1584	12	22	800	813	7	1199	10	1006	8	1006	8	1102	9	1006	8	8644	2.72
Chry	22	16	492	6	1078	1452	550	729	521	1091	800	910	675	1000	598	955	699	978	12572	3.96
BbF	1850	16	4712	56	48	5268	3281	2662	3997	3965	3639	3314	3639	3639	3818	3476	3639	3558	54577	17.19
BkF	10	296	760	6	ND	606	0	451	380	229	0	417	0	434	190	331	95	374	4579	1.44
BaP	2	84	230	12	148	250	75	167	153	90	150	170	113	168	133	129	141	149	2364	0.74
DahA	22	152	2	10	22	172	12	91	12	132	17	111	12	121	15	116	15	119	1153	0.36
IndP	22	14	12	26	14	156	18	91	15	124	15	107	16	115	16	111	15	113	1000	0.32
BghiP	180	ND	4	ND	54	64	92	0	48	0	73	32	70	16	61	8	72	20	794	0.25
Total	6304	648	44092	346	1648	42110	7049	20863	25576	14508	15456	25920	11513	24368	18548	18950	16868	22678	317445	100
2 Rings	32	8	4776	4	34	5134	33	2571	2405	1288	1219	3211	626	2891	1515	2089	1367	2650	31853	10.03
3 Rings	2510	54	24320	202	140	26998	1325	13485	12823	6844	6481	16880	3903	15182	8363	11013	7422	13946	171891	54.15
4 Rings	1676	24	9276	30	1188	3462	2213	1345	5745	1839	3862	1678	3134	1800	4439	1675	4102	1748	49236	15.51
5 Rings	1884	548	5704	84	218	6296	3368	3371	4541	4415	3806	4012	3763	4363	4155	4053	3890	4200	62671	19.74
6 Rings	202	14	16	26	68	220	110	91	63	124	88	139	86	131	76	119	87	133	1793	0.56
7C	1970	580	7792	128	1332	8704	4749	4198	6276	5638	5626	5037	5460	5487	5870	5128	5609	5299	84883	26.74

Table SM 5. $\sum RQ_{(NCs)}$ of PAHs in soil

		Nap	Acy	Ace	Flu	Phen	Ant	Flt	Pyr	Chry	BaA	BbF	BkF	BaP	DahA	IndP	BghiP	$\sum RQ_{(NCs)}$
GS1	Top soil	23	115	38	42	79	1560	60	47	0	9	740	0	1	8	0	2	2725
	Sub soil	6	2	3	7	7	5	0	3	0	6	6	12	32	58	0	0	149
GS2	Top soil	3411	3505	5393	5328	802	2630	205	1548	15	197	1885	32	88	1	0	0	25042
	Sub soil	3	3	37	25	23	5	0	5	0	2	22	0	5	4	0	0	135
GS3	Top soil	24	3	2	83	1	23	3	13	0	431	19	0	57	8	0	1	670
	Sub soil	3667	27	6032	2303	3309	73	13	718	7	581	2107	25	96	66	3	1	19029
GS4	Top soil	24	59	20	63	40	792	31	30	8	220	1312	0	29	5	0	1	2633
	Sub soil	1836	14	3018	1155	1658	5	7	362	0	292	1065	19	64	35	2	0	9530
GS5	Top soil	1718	1782	2707	2695	421	1711	118	789	11	208	1599	16	59	5	0	1	13840
	Sub soil	920	9	1527	590	840	5	3	540	0	436	1586	10	34	51	2	0	6553
GS6	Top soil	871	893	1354	1389	211	867	61	401	9	320	1456	0	58	7	0	1	7898
	Sub soil	2293	18	3779	1447	2075	5	8	451	0	364	1325	17	65	43	2	0	11893
GS7	Top soil	447	476	687	726	126	829	46	216	9	270	1456	0	43	5	0	1	5337
	Sub soil	2065	16	3398	1301	1866	5	8	495	0	400	1456	18	65	47	2	0	11142
GS8	Top soil	1082	1129	1697	1711	273	1270	82	502	10	239	1527	8	51	6	0	1	9589
	Sub soil	1492	12	2463	945	1353	5	6	473	0	382	1391	14	50	45	2	0	8633
GS9	Top soil	977	1011	1526	1550	242	1069	71	452	9	279	1456	4	54	6	0	1	8707
	Sub soil	1893	15	3121	1196	1714	5	7	484	0	391	1423	16	57	46	2	0	10370

Table SM 6. $\sum RQ_{(MPCs)}$ of PAHs in soil

		Nap	Acy	Ace	Flu	Phen	Ant	Flt	Pyr	Chry	BaA	BbF	BkF	BaP	DahA	IndP	BghiP	$\sum RQ_{(MPCs)}$
GS1	Top soil	0.2	1.2	0.4	0.4	0.8	15.6	0.6	0.5	0.1	0.1	7.4	0.0	0.0	0.1	0.0	0.0	9
	Sub soil	0.1	0.0	0	0	0.1	0.1	0.0	0	0.0	0	0	0.1	0	1	0.0	0.0	1
GS2	Top soil	34.1	35.1	53.9	53.3	8.0	26.3	2.1	15.5	0.1	2.0	18.8	0.3	0.9	0.0	0.0	0.0	227
	Sub soil	0.0	0.0	0.4	0.3	0.2	0.1	0.0	0.1	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.8
GS3	Top soil	0.2	0.0	0.0	1	0.0	0.2	0.0	0.1	0.1	4.3	0.2	0.0	0.6	0.1	0.0	0.0	2
	Sub soil	36.7	0.3	60.3	23.0	33.1	0.7	0.1	7.2	0.0	5.8	21.1	0.3	1.0	0.7	0.0	0.0	166
GS4	Top soil	0.2	0.6	0.2	0.6	0.4	7.9	0.3	0.3	0.1	2.2	13.1	0.0	0.3	0.0	0.0	0.0	1.1
	Sub soil	18.4	0.1	30.2	11.6	16.6	0.1	0.1	3.6	0.0	2.9	10.6	0.2	0.6	0.4	0.0	0.0	12.0
GS5	Top soil	17.2	17.8	27.1	27.0	4.2	17.1	1.2	7.9	0.0	2.1	16.0	0.2	0.6	0.0	0.0	0.0	96
	Sub soil	9.2	0.1	15.3	5.9	8.4	0.1	0.0	5.4	0.0	4.4	15.9	0.1	0.3	0.5	0.0	0.0	45
GS6	Top soil	8.7	8.9	13.5	13.9	2.1	8.7	0.6	4.0	0.0	3.2	14.6	0.0	0.6	0.1	0.0	0.0	27.5
	Sub soil	22.9	0.2	37.8	14.5	20.7	0.1	0.1	4.5	0.0	3.6	13.3	0.2	0.7	0.4	0.0	0.0	75.8
GS7	Top soil	4.5	4.8	6.9	7.3	1.3	8.3	0.5	2.2	0.0	2.7	14.6	0.0	0.4	0.0	0.0	0.0	27.0
	Sub soil	20.6	0.2	34.0	13.0	18.7	0.1	0.1	5.0	0.0	4.0	14.6	0.2	0.6	0.5	0.0	0.0	68
GS8	Top soil	10.8	11.3	17.0	17.1	2.7	12.7	0.8	5.0	0.0	2.4	15.3	0.1	0.5	0.1	0.0	0.0	58
	Sub soil	14.9	0.1	24.6	9.5	13.5	0.1	0.1	4.7	0.0	3.8	13.9	0.1	0.5	0	0.0	0.0	72
GS9	Top soil	9.8	10.1	15.3	15.5	2.4	10.7	0.7	4.5	0.0	2.8	14.6	0.0	0.5	0	0.0	0.0	62
	Sub soil	18.9	0.2	31	12	17.1	0.1	0.1	4.8	0.0	3.9	14.2	0.2	0.6	0	0.0	0.0	85

Table SM 7. PAHs concentrations in soils compared with effect-based soil quality guideline values

PAHs	Conc. Range ($\mu\text{g kg}^{-1}$)	ERL	ERM	TEL	PEL	<ERL (%)	ERL-ERM (%)	>ERM	<TEL (%)	TEL-PEL (%)	>PEL (%)
Nap	4.0-5134	0.16	2.10	0.03	0.39	0 (0)	0 (0)	18 (100)	0 (0)	0 (0)	18 (100)
Acy	2.0-4206	0.04	0.64	0.01	0.13	0 (0)	0 (0)	18 (100)	0 (0)	0 (0)	18 (100)
Ace	2.0-7238	0.02	0.50	0.01	0.09	0 (0)	0 (0)	18 (100)	0 (0)	0 (0)	18 (100)
Flu	8.0-6394	0.02	0.54	0.02	0.14	0 (0)	0 (0)	18 (100)	0 (0)	0 (0)	18 (100)
Phen	6.0-3156	0.24	1.50	0.09	0.54	0 (0)	0 (0)	18 (100)	0 (0)	0 (0)	18 (100)
Ant	6.0-16876	0.09	1.10	0.05	0.25	0 (0)	0 (0)	18 (100)	0 (0)	0 (0)	18 (100)
Flt	2.0-5342	0.60	5.10	0.11	1.49	0 (0)	1 (5)	18 (100)	0 (0)	0 (0)	18 (100)
Pyr	4.0-1858	0.67	2.60	0.15	1.40	0 (0)	0 (0)	18 (100)	0 (0)	0 (0)	18 (100)
BaA	2.0-1584	0.26	1.60	0.07	0.69	0 (0)	0 (0)	18 (100)	0 (0)	0 (0)	18 (100)
Chry	6.0-1452	0.38	2.80	0.11	0.85	0 (0)	0 (0)	18 (100)	0 (0)	0 (0)	18 (100)
BbF	16.0-5268	0.32	1.80	0.07	0.69	0 (0)	0 (0)	18 (100)	0 (0)	0 (0)	18 (100)
BaP	2.0-250	0.43	1.60	0.09	0.76	0 (0)	0 (0)	18 (100)	0 (0)	0 (0)	18 (100)
BkF	ND-760	0.28	1.62	0.07	0.07	4 (22)	0 (0)	14 (78)	4 (22)	0 (0)	14 (78)
IndP	2.0-156	0.26	1.60	0.07	0.07	0 (0)	0 (0)	18 (100)	0 (0)	0 (0)	18 (100)
DahA	2.0-172	0.06	0.26	0.01	0.14	0 (0)	0 (0)	18 (100)	0 (0)	0 (0)	18 (100)
BghiP	ND-180	0.43	1.60	0.11	0.85	4 (22)	0 (0)	14 (78)	4 (22)	0 (0)	14 (78)
Total	346-44092	4.02	44.79	1.68	16.77	0 (0)	0 (0)	18 (100)	0 (0)	0 (0)	18 (100)

Table SM 8. BaPTEQ and BaPMEQ ($\mu\text{g}/\text{kg}$) of PAHs in the soils

		BaA	Chry	BbF	BkF	BaP	IndP	DahA	BaPTEQ	BaA	Chry	BbF	BkF	BaP	IndP	DahA	BaPMEQ
GS1	Top soil	4.20	0.02	185	0.10	2.00	2.20	22.0	216	3.44	0.37	463	1.10	2.00	6.82	6.38	483
	Sub soil	0.20	0.02	1.60	2.96	84.0	1.40	152	242	0.16	0.27	4.00	32.6	84.0	4.34	44.1	169
GS2	Top soil	158	0.49	471	7.60	230	1.20	2.00	871	130	8.36	1178	83.6	230	3.72	0.58	1634
	Sub soil	1.20	0.01	5.6	0.06	12.0	2.60	10.0	31.5	0.98	0.10	14.0	0.66	12.0	8.06	2.90	38.7
GS3	Top soil	2.20	1.08	4.8	0.00	148	1.40	22.0	179	1.80	18.3	12.0	0.00	148	4.34	6.38	191
	Sub soil	80.0	1.45	527	6.06	250	15.6	172	1052	65.6	24.7	1317	66.7	250	48.4	49.9	1822
GS4	Top soil	81.3	0.55	328	0.00	75.0	1.80	12.0	499	66.7	9.35	820	0.00	75.0	5.58	3.48	980
	Sub soil	0.70	0.73	266	4.51	167	9.10	91.0	539	0.57	12.4	666	49.6	167	28.2	26.4	950
GS5	Top soil	120	0.52	400	3.80	153	1.50	12.0	690	98.3	8.86	999	41.8	153	4.65	3.48	1309
	Sub soil	0.95	1.09	397	2.29	90	12.4	132	634	0.78	18.5	991	25.1	89.5	38.3	38.1	1202
GS6	Top soil	101	0.80	364	0.00	150	1.45	17.0	634	82.5	13.6	910	0.00	150	4.50	4.93	1165
	Sub soil	0.8	0.91	331	4.17	170	10.7	111	629	0.68	15.5	828	45.9	170	33.2	32.3	1126
GS7	Top soil	101	0.67	364	0.00	113	1.63	12.0	591	82.5	11.5	910	0.00	113	5.04	3.48	1125
	Sub soil	0.83	1.00	364	4.34	168	11.5	121	671	0.68	17.0	910	47.8	168	35.8	35.2	1215
GS8	Top soil	110	0.60	382	1.90	133	1.56	14.5	643	90.4	10.2	954	20.9	133	4.84	4.21	1217
	Sub soil	0.89	0.95	348	3.31	129	11.1	116	609	0.73	16.2	869	36.4	129	34.5	33.7	1120
GS9	Top soil	101	0.70	364	0.95	141	1.51	14.5	624	82.5	11.9	910	10.5	141	4.67	4.21	1165
	Sub soil	0.83	0.98	356	3.74	149	11.3	119	641	0.68	16.6	889	41.2	149	35.1	34.5	1167

Table SM 9. Total cancer risk of PAHs

		Infants				Adults			
		ILCRIN G	ILCRIN H	ILCRDER M	Total Cancer Risk	ILCRIN G	ILCRIN H	ILCRDER M	Total Cancer Risk
GS1	Top soil	2.01E-02	1.70E-09	7.32E-03	2.74E-02	1.39E-03	1.87E-09	7.19E-04	2.11E-03
	Sub soil	2.26E-02	2.19E-09	8.23E-03	3.08E-02	1.56E-03	2.42E-09	8.08E-04	2.37E-03
GS2	Top soil	8.13E-02	7.32E-09	2.96E-02	1.11E-01	5.60E-03	8.07E-09	2.91E-03	8.51E-03
	Sub soil	2.94E-03	2.56E-10	1.07E-03	4.01E-03	2.02E-04	2.82E-10	1.05E-04	3.07E-04
GS3	Top soil	1.68E-02	1.48E-09	6.10E-03	2.28E-02	1.15E-03	1.64E-09	5.99E-04	1.75E-03
	Sub soil	9.82E-02	8.80E-09	3.57E-02	1.34E-01	6.77E-03	9.71E-09	3.51E-03	1.03E-02
GS4	Top soil	4.66E-02	3.92E-09	1.69E-02	6.35E-02	3.21E-03	4.32E-09	1.66E-03	4.87E-03
	Sub soil	5.03E-02	4.61E-09	1.83E-02	6.86E-02	3.47E-03	5.09E-09	1.80E-03	5.27E-03
GS5	Top soil	6.44E-02	5.66E-09	2.34E-02	8.78E-02	4.44E-03	6.24E-09	2.30E-03	6.74E-03
	Sub soil	5.92E-02	5.25E-09	2.15E-02	8.07E-02	4.08E-03	5.79E-09	2.12E-03	6.20E-03
GS6	Top soil	5.92E-02	4.98E-09	2.15E-02	8.07E-02	4.08E-03	5.50E-09	2.12E-03	6.19E-03
	Sub soil	5.87E-02	5.31E-09	2.14E-02	8.01E-02	4.05E-03	5.86E-09	2.10E-03	6.15E-03
GS7	Top soil	5.52E-02	4.64E-09	2.01E-02	7.53E-02	3.80E-03	5.12E-09	1.97E-03	5.78E-03
	Sub soil	6.27E-02	5.67E-09	2.28E-02	8.55E-02	4.32E-03	6.25E-09	2.24E-03	6.56E-03
GS8	Top soil	6.00E-02	5.17E-09	2.18E-02	8.19E-02	4.14E-03	5.70E-09	2.15E-03	6.28E-03
	Sub soil	5.69E-02	5.10E-09	2.07E-02	7.76E-02	3.92E-03	5.63E-09	2.03E-03	5.95E-03
GS9	Top soil	5.82E-02	4.96E-09	2.12E-02	7.94E-02	4.01E-03	5.47E-09	2.08E-03	6.09E-03
	Sub soil	5.98E-02	5.38E-09	2.18E-02	8.16E-02	4.12E-03	5.94E-09	2.14E-03	6.26E-03

Table SM 10. Hazard index of PAHs

		CHILD				ADULT			
		HQING	HQINH	HQDERM	HI	HQING	HQINH	HQDERM	HI
GS1	Top soil	8.06E-01	5.45E-05	2.38E-03	8.08E-01	1.01E-01	2.40E-05	4.23E-04	1.01E-01
	Sub soil	2.24E-02	5.25E-06	7.29E-05	2.25E-02	2.80E-03	2.58E-06	1.30E-05	2.82E-03
GS2	Top soil	1.13E+01	3.14E-03	3.29E-02	1.14E+01	1.41E+00	1.47E-03	5.86E-03	1.42E+00
	Sub soil	6.48E-02	5.13E-06	2.17E-04	6.50E-02	8.10E-03	2.47E-06	3.86E-05	8.14E-03
GS3	Top soil	8.79E-02	2.13E-05	2.48E-04	8.82E-02	1.10E-02	1.06E-05	4.42E-05	1.10E-02
	Sub soil	1.16E+01	3.19E-03	3.75E-02	1.16E+01	1.45E+00	1.59E-03	6.68E-03	1.46E+00
GS4	Top soil	4.47E-01	3.79E-05	1.31E-03	4.48E-01	5.59E-02	1.73E-05	2.34E-04	5.61E-02
	Sub soil	5.81E+00	1.60E-03	1.88E-02	5.83E+00	7.26E-01	7.98E-04	3.34E-03	7.30E-01
GS5	Top soil	5.88E+00	1.59E-03	1.71E-02	5.90E+00	7.35E-01	7.43E-04	3.05E-03	7.39E-01
	Sub soil	3.12E+00	8.08E-04	1.00E-02	3.13E+00	3.90E-01	4.04E-04	1.78E-03	3.92E-01
GS6	Top soil	2.98E+00	8.04E-04	8.68E-03	2.99E+00	3.73E-01	3.77E-04	1.55E-03	3.75E-01
	Sub soil	7.26E+00	1.99E-03	2.35E-02	7.29E+00	9.08E-01	9.97E-04	4.18E-03	9.13E-01
GS7	Top soil	1.72E+00	4.21E-04	4.99E-03	1.72E+00	2.14E-01	1.97E-04	8.90E-04	2.16E-01
	Sub soil	6.58E+00	1.80E-03	2.13E-02	6.60E+00	8.22E-01	8.98E-04	3.79E-03	8.27E-01
GS8	Top soil	3.80E+00	1.00E-03	1.11E-02	3.81E+00	4.75E-01	4.70E-04	1.97E-03	4.77E-01
	Sub soil	4.83E+00	1.30E-03	1.56E-02	4.84E+00	6.03E-01	6.51E-04	2.77E-03	6.07E-01
GS9	Top soil	3.39E+00	9.04E-04	9.86E-03	3.40E+00	4.24E-01	4.24E-04	1.76E-03	4.26E-01
	Sub soil	6.05E+00	1.65E-03	1.96E-02	6.08E+00	7.57E-01	8.24E-04	3.48E-03	7.61E-01

Table SM 11. PCA of PAHs in soils

	Topsoil		Subsoil	
	Component		Component	
	1	2	1	2
Nap	.935	.334	.804	.568
Acy	.943	.308	.809	.559
Ace	.936	.328	.804	.568
Flu	.932	.340	.804	.568
Ant	.960	.253	.804	.568
Phen	.963	-.250	.228	.933
Flt	.990	.078	.804	.567
Pyr	.941	.317	.939	.251
BaA	.775	.369	.230	.931
Chry	-.425	.903	.938	.253
BbF	.772	.059	.939	.250
BkF	.924	.237	.703	.535
BaP	.521	.847	.766	.564
DahA	-.824	-.291	.459	.404
IndP	-.365	-.926	.941	.229
BghiP	-.452	-.876	.478	.821
Variance %	67.141	25.625	56.496	33.391
Cumm Var. %	67.141	92.767	56.496	89.887

REFERENCES

- Durant, J., Busby, W., Lafleur, A., Penman, B., Crespi, C. 1996. Human cell mutagenicity of oxygenated, nitrated and unsubstituted polycyclic aromatic hydrocarbons associated with urban aerosols, *Mutagen Research-Genetic Toxicology* 371, 123-157.
- USDOE (United States Department of Energy) (2011). The risk assessment information system (RAIS). US Department of Energy, Oak Ridge Operations (ORO) Office: Oak Ridge, TN, USA.
- USEPA (1993). Risk-based concentration Table. U.S. Environmental Protection Agency, Region 111 (Third Quarter).
- USEPA (2010). Regional screening levels (RSL) summary tables. <http://www.epa.gov/risk/risk-based-screening-table-generic-tables> (accessed on 21 April, 2017).
- USEPA (2011). Exposure factor handbook 2011 edition EPA/600/R-090/052F. National Center for Environmental Assessment, Office of Research and Development, US Environmental Protection Agency, Washington DC. Available from <https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=236252>.
- USEPA (United States Environmental Protection Agency) (2012). Mid Atlantic risk assessment, Regional Screening Level (RSL). Summary Table. <http://www.epa.gov/region9/surperfund/prg/>.
- USEPA, 1989. Risk assessment guidance for Superfund, Vol. I: Human health evaluation manual. Office of Solid Waste and Emergency Response EPA/540/1-89/002.
- WHO (2018). Nigeria: Life Expectancy. Retrieved on December 10th, 2018 from <https://www.worldlifeexpectancy.com/nigeria-life-expectancy>