Supplementary Information

MANUSCRIPT TITLE: Distribution, sources, and potential toxicological significance of PAHs in drinking water sources within the Pearl River Delta

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Source identification

Due to the wide-spread sources of PAHs, the possible sources of PAHs in the drinking source water within this region were also determined *via* conventional reported methods [1-5]. According to these references, the ratios between pairs of individual PAHs are often employed to determine the sources of PAHs. Four groups of isomers have been documented: Ant and Phe with the same molecular weight of 178, Flua and Pyr with the same molecular weight of 202, BaA and Chry with the same molecular weight of 228, and In*cd*B and B*ghi*P with the same molecular weight of 276. If Ant/(Ant + Phe) < 0.1, PAH sources mainly originated from petroleum discharges. If Ant/(Ant + Phe) > 0.1, PAH sources mainly originated from combustion [2]. If Flua/(Flua + Pyr) < 0.4, PAH sources mainly originated from petroleum emissions, and if 0.4 < Flua/(Flua + Pyr) < 0.5, PAHs sources originated from both petroleum discharges and combustion of its refined products. If Flua/(Flua + Pyr) > 0.5, the source originated from wood and coal combustion [2]. If B*a*A/(B*a*A + Chry) < 0.2, the main sources of PAHs originated from petroleum discharges, and if 0.2 < B*a*A/(B*a*A + Chry) < 0.35, PAH sources originated from both petroleum discharges and combustion. If B*a*A/(B*a*A + Chry) > 0.35, only combustion is considered the PAH source [5]. If In*cd*B/(In*cd*B + B*ghi*P) < 0.2, PAHs sources mainly originated from petroleum discharges, and if 0.2 < In*cd*B/(In*cd*B + B*ghi*P) < 0.5, PAH sources originated from petroleum combustion. Finally, if In*cd*B/(In*cd*B + B*ghi*P) > 0.5, PAH sources originated from wood and coal combustion [5].

Table S1

Physical and chemical parameters of 15 water samples (60 L of each)

City	Sample	Wet season				Dry season			
		PH	TSS (mg/L)	DOC(mg/L)	POC(mg/L)	PH	TSS (mg/L)	DOC(mg/L)	POC(mg/L)
Guangzhou	YG	7.87	11.07	4.49	2.74	7.86	18.75	2.13	1.54
	XC	8.5	63.7	5.15	7.03	8.58	75.32	13.96	14.52
	JG	7.72	98.25	1.39	1.88	8.15	18.82	3.60	2.56
	YJS	7.3	19.06	1.45	0.64	8.25	13.79	2.72	1.09
	SHD	7.28	26.12	2.02	1.36	7.81	15.54	1.01	0.46
	LWZ	7.27	49.46	0.97	1.02	7.28	14.26	0.94	0.39
Huizhou	HZH	7.86	12.27	0.79	0.30	7.17	10	0.51	0.29
Dongguan	DG	7.2	9.41	1.09	0.31	7.68	26.35	0.68	0.44
	YT	7.67	32.94	1.47	1.51	7.78	26.79	0.96	1.20
Shenzhen	SHZH	7.37	25.51	1.19	0.73	7.41	24.23	0.60	0.89
Foshan	FSH	8.31	18.88	1.21	0.51	7.78	11.65	1.02	0.85
Zhaoqing	ZHQ	8.56	6.9	1.40	0.20	7.99	14.5	1.26	1.09
Zhongshan	ZHSH	8.16	10.92	1.96	0.35	8.26	11.54	0.86	0.31
Jiangmen	JM	8.6	12.67	1.37	0.42	7.91	7.94	0.78	0.42
Zhuhai	ZHH	8.18	31.02	2.77	0.95	7.84	18.06	1.39	0.84

TSS, total suspended solid; DOC, dissolved organic carbon; POC, particulate organic carbon

Table S2

Recoveries of surrogate standards

Surrogate standard	Dissolved phase			Particulate phase		
	Average	SD	RSD	Average	SD	RSD
d_8-Nap	58.50%	28.55%	48.80%	83.24%	35.23%	42.32%
d_{10}-Ace	64.48%	22.44%	34.80%	81.76%	21.63%	26.46%
d_{10}-Phe	100.37%	22.66%	22.57%	82.75%	22.07%	26.68%
d_{12}-Chry	85.74%	28.06%	32.72%	108.84%	39.78%	36.55%
d_{12}-Pey	97.24%	36.97%	38.02%	92.52%	35.46%	38.33%

Table S3a

The ranges of PAHs concentrations detected in fifteen water samples both in dissolved phase and particulate phase in wet season

Wet	Dissolved phase				Particulate phase			
	Min (ng/L)	Max (ng/L)	Mean (ng/L)	Detection Frequency (%)	Min (ng/L)	Max (ng/L)	Mean (ng/L)	Detection Frequency (%)
Ace	0.33	7.15	1.73	100.00	0.32	23.66	2.29	100.00
Dih	0.48	25.13	3.97	100.00	0.22	42.76	3.55	100.00
Flu	4.57	80.25	15.99	100.00	0.63	191.23	16.13	100.00
Phe	13.44	346.26	51.99	100.00	2.29	896.47	67.56	100.00
Ant	0.95	54.85	8.23	100.00	0.39	102.35	7.80	100.00
Flua	0.39	42.76	8.71	100.00	0.75	593.88	43.75	100.00
Pyr	0.69	78.66	12.85	100.00	0.86	642.70	47.49	100.00
BaA	0.52	30.90	3.93	100.00	0.65	72.45	6.68	100.00
Chry	0.69	45.23	6.92	100.00	0.72	207.55	16.87	100.00
BbF	0.43	19.85	4.26	100.00	0.83	65.10	7.09	100.00
BkF	nd	12.90	1.73	93.33	0.89	63.59	6.88	100.00
BaP	nd	15.93	2.00	80.00	0.76	40.76	4.77	100.00
IncdB	nd	10.03	1.23	60.00	0.78	19.04	3.24	100.00
DiB	0.44	9.79	1.82	100.00	0.45	20.53	2.19	100.00
BghiP	nd	8.22	1.06	86.67	0.46	35.78	4.53	100.00
∑PAHs	32.03	754.76	126.42		13.35	3017.82	240.80	

nd, not detected.

Table S3b

The ranges of PAHs concentrations detected in fifteen water samples both in dissolved phase and particulate phase in dry season

Dry	Dissolved phase				Particulate phase			
	Min (ng/L)	Max (ng/L)	Mean (ng/L)	Detection Frequency (%)	Min (ng/L)	Max (ng/L)	Mean (ng/L)	Detection Frequency (%)
Ace	nd	6.07	2.18	86.67	nd	0.76	0.17	40.00
Dih	1.24	4.38	2.18	100.00	0.18	2.04	0.76	100.00
Flu	2.82	14.29	6.44	100.00	0.66	7.55	2.54	100.00
Phe	11.57	33.20	21.64	100.00	2.13	24.62	6.23	100.00
Ant	nd	12.25	6.19	93.33	0.289	3.71	1.77	100.00
Flua	5.06	15.55	11.41	100.00	0.64	9.16	2.63	100.00
Pyr	3.28	19.02	11.80	100.00	0.70	10.87	3.04	100.00
BaA	nd	12.04	4.58	80.00	nd	2.68	0.72	73.33
Chry	0.71	12.61	7.15	100.00	0.40	5.33	1.41	100.00
BbF	nd	0.06	0.01	6.67	nd	1.41	0.35	40.00
BkF	nd	0.04	0.01	6.67	nd	0.51	0.07	13.33
BaP	nd	0.84	0.07	20.00	nd	1.35	0.21	26.67
IncdB	nd	8.41	1.71	33.33	nd	1.31	0.45	93.33
DiB	nd	11.12	0.77	20.00	nd	1.18	0.14	13.33
BghiP	nd	7.40	2.46	46.67	nd	1.44	0.29	33.33
∑PAHs	48.09	113.63	78.59		8.56	69.60	20.78	

nd, not detected.

Table S4

Toxic equivalence factors of 15 PAHs

Targets	TEF	Targets	TEF
Dibenzo[*a*,*h*]anthracene *	5	Benzo[*g*,*h*,*i*]perylene	0.01
Benzo[*a*]pyrene *	1	Acenaphthene	0.001
Benzo[*a*]anthracene *	0.1	Fluorene	0.001
Benzo[*b*]fluoranthene *	0.1	Phenanthrene	0.001
Benzo[*k*]fluoranthene *	0.1	Pyrene	0.001
Indeno[1,2,3-*cd*]pyrene *	0.1	Fluranthene	0.001
Chresene *	0.01	Acenaphthylene	0.001
Anthracene	0.01		

Fig. S1. Levels of PAHs (particle and dissolved water phase) in other drinking water sources of China (Guo *et al. Chemosphere*, 2007, 68, 93-104; Doong *et al. Water Research*, 2004, 38, 1733-1744; Wang *et al. Chemosphere*, 2009, 75, 1119-1127; Ma *et al. Environ. Monitor. Assess.* 2008, 146, 127-138; Deng *et al. Chemosphere*, 2006, 64, 1401-1411.).

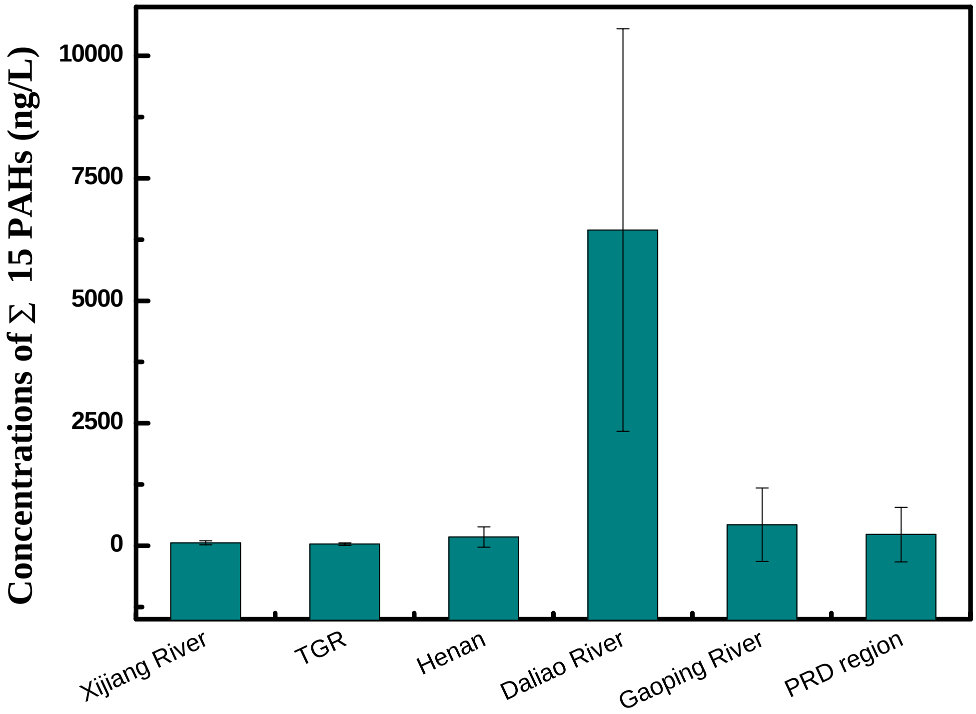


Fig. S2. The correlations between PAHs and total organic carbon (TOC)

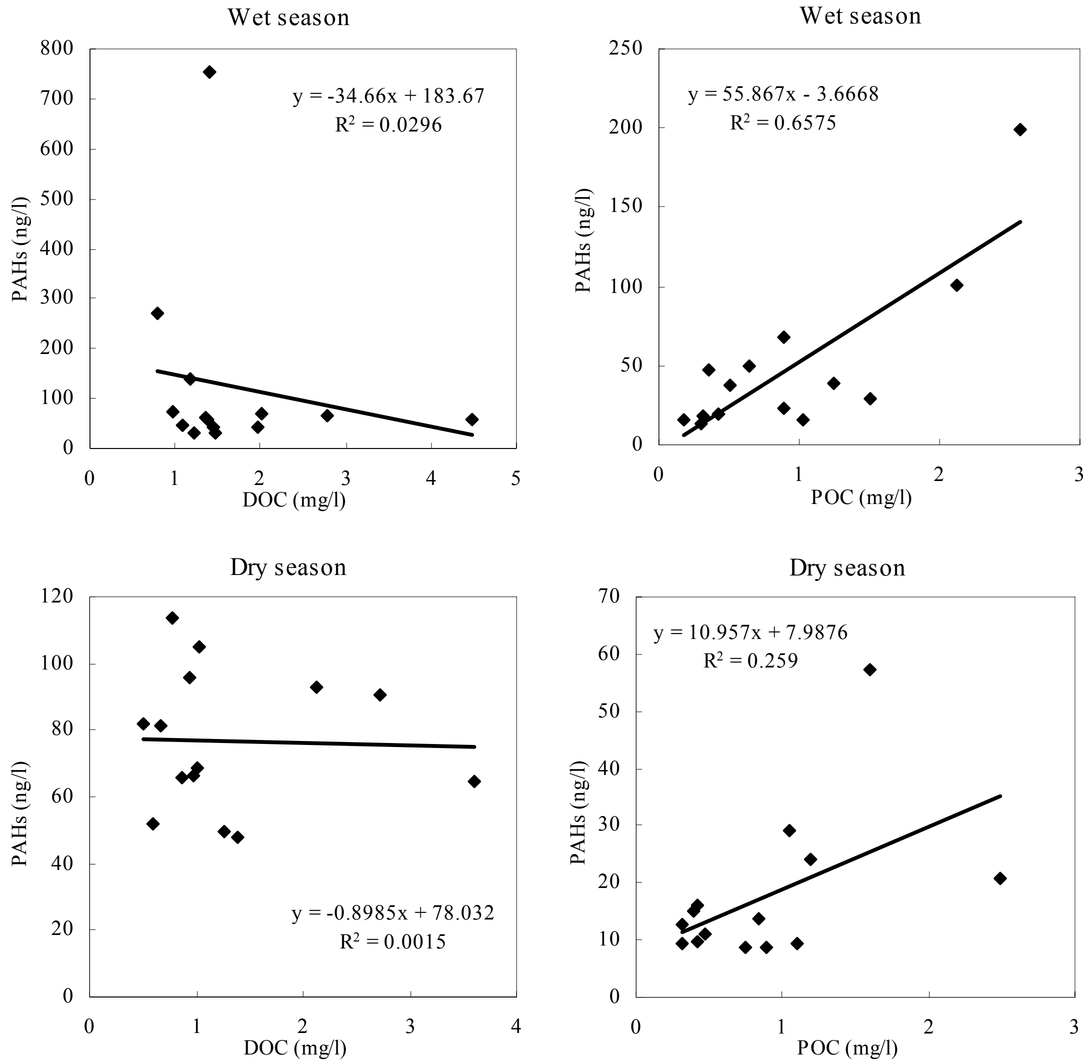
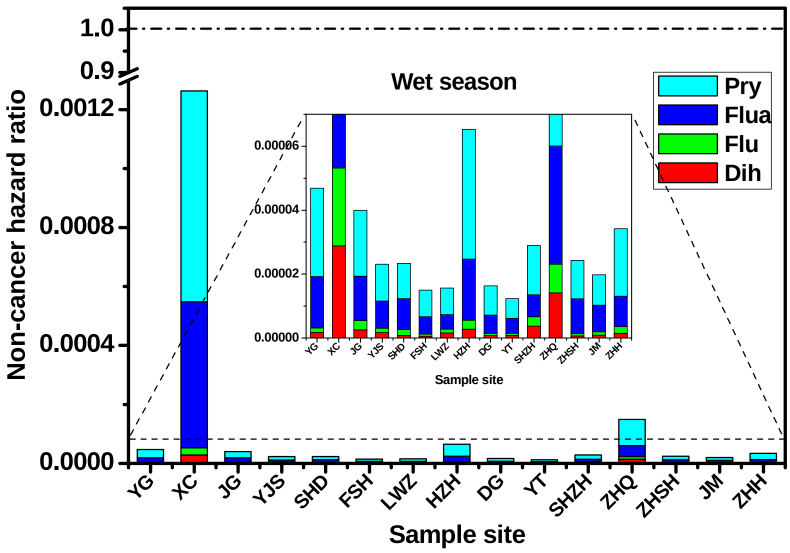


Fig. S3. Non-cancer hazard risks caused by individual PAHs through daily water consumption by people in the PRD region.



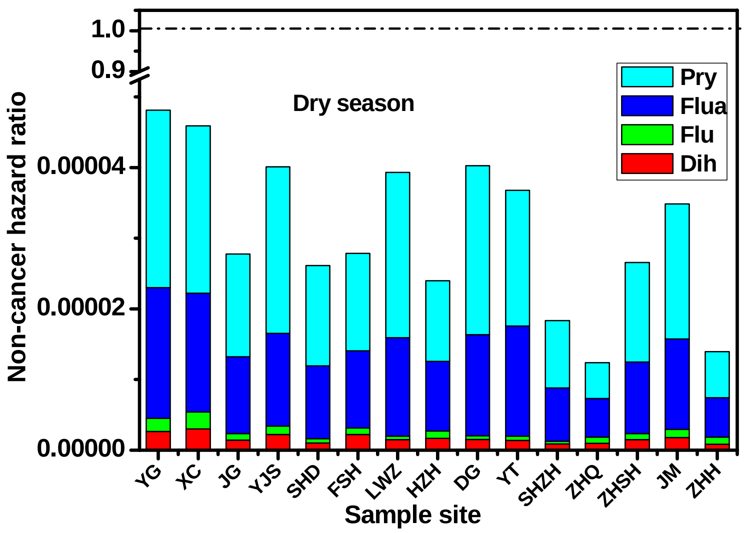
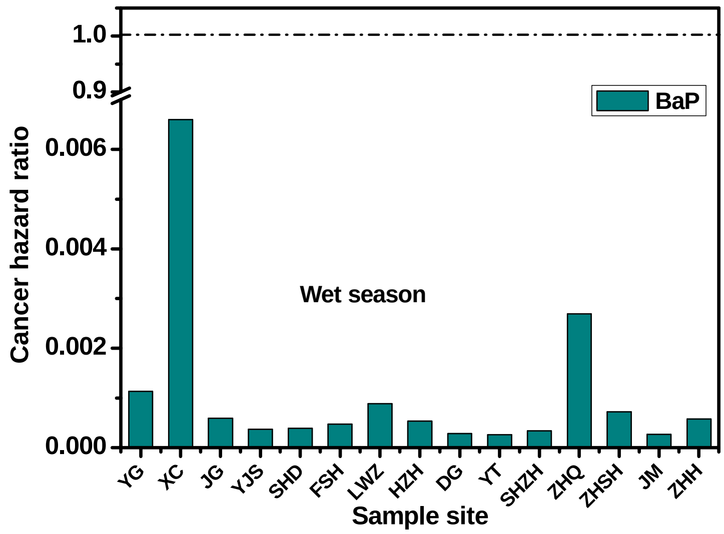
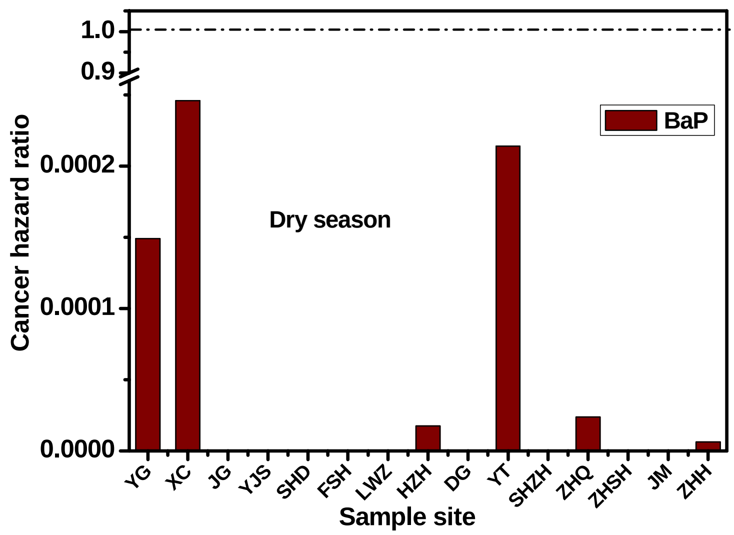


Fig. S4. Cancer hazard risks caused by BaP through daily water consumption by people in the PRD region.





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