Supplemental Material

Polycyclic Aromatic Hydrocarbon exposure and household solid fuel combustion in Xuanwei and Fuyuan counties, China

George S. Downward[1†], Wei Hu[2], Nat Rothman[2], Boris Reiss[1], Guoping Wu[3], Fusheng Wei[3], Robert S.Chapman[4], Lutzen Portengen[1], Lan Qing[2*], Roel Vermeulen[1*]

[1]Institute for Risk Assessment Sciences, Division of Environmental Epidemiology, Utrecht University, Utrecht, The Netherlands

[2]Division of Cancer Epidemiology and Genetics, National Cancer Institute, NIH, DHHS, Bethesda, MD, USA

[3]China National Environmental Monitoring Centre, Beijing, China

[4]College of Public Health Sciences, Chulalongkorn University, Bangkok, Thailand

†: Corresponding author

Correspondence:

George Downward

Institute for Risk Assessment Sciences,

Utrecht University,

Utrecht,

Yalelaan 2

3584CM

The Netherlands

Phone: +31 30 253 2578

Email: g.s.downward@uu.nl

*: These authors co-supervised this work.

Table of Contents

Table S1 - Variables considered for inclusion in mixed model creation

Broad Category	Details
Stove Design	**Stove ventilated, unventilated mixed portable stove or firepit**
	Stove ventilated, unventilated or mixed ventilation*
	Stove ventilated, unventilated mixed or firepit
	Stove either firepit or other design (or mixed)
	Stove design as reported by study participant£
Fuel Type/Source	**Major fuel type including smoky coal subtypes and county from which coal sourced (Xuanwei divided into north/south)**
	County from which fuel purchased
	Major fuel type
	Fuel type including smoky coal subtypes
	Fuel type including individual smoky coal mines
	Fuel type including smoky coal subtypes
	Weight of fuel used†
Meteorological conditions	**Season of visit**
	Average daily temperature
	Average daily high temperature
	Average daily low temperature
	Average daily humidity
	Average daily wind speed
	Average daily maximum wind speed
	Average daily dew point
	Average daily rainfall
Other Variables	**Room size**†
	Age of participant
	Month of visit
	Phase of study during visit
	Administrative borders‡
	Number of stoves operated
	Number of hours spent using stove(s)

* - refers to the use of multiple stoves with different ventilation designs
£ - Categories are high stove, low stove (with or without ventilation), portable stove, firepit and multiple stoves
† - divided into quartiles
‡ - townships/areas as defined by local administrative bodies
Variables in bold were selected in the final model

Table S2a - Personal exposure to particle bound PAHs (in ng/m^3) by ventilation

		BaP			PYR			BbF			DBA			BaA			BkF		
	N	AM	GM	GSD	AM	GM	GSD	AM	GM	GSD	AM	GM	GSD	AM	GM	GSD	AM	GM	GSD
Smoky Coal	**131**	**74.4**	**44.7**	**2.8**	**71.8**	**22.6**	**4.6**	**119.6**	**69.8**	**2.8**	**27.8**	**13.8**	**3.4**	**102.4**	**49.0**	**3.5**	**26.5**	**15.7**	**2.8**
Ventilated Stove	72	50.2	38.1	2.1	33.1	18.2	3.2	75.5	56.9	2.2	16.8	10.6	2.7	61.1	40.9	2.6	18.9	13.9	2.2
Unventilated Stove	6	224.5	160.3	2.4	290.3	131.5	4.4	406.7	269.4	2.7	92.1	54.2	3.1	357.5	205.9	3.3	78.1	45.8	3.2
Portable Stove	13	41.5	31.5	2.2	22.4	10.4	3.9	88.5	66.6	2.2	17.5	11.4	2.6	56.2	35.4	2.8	13.9	9.7	2.4
Firepit	11	186.4	151.5†	2.0	247.7	164.5†	2.6	302.6	243.6†	2.0	76.5	61.4†	1.9	282.6	216.3†	2.1	62.5	50.4†	1.9
Mixed Ventilation	25	85.7	48.1	3.2	90.4	26.7	5.0	129.2	71.6	3.2	31.7	15.6	3.9	119.7	52.7	4.2	30.3	17.5	3.0
Unknown	4	13.2	7.7	3.0	2.0	1.5	2.2	19.7	11.4	3.0	5.0	2.7	3.2	9.3	4.5	3.6	5.4	2.9	3.2
Smokeless Coal	**27**	**15.1**	**10.6***	**2.5**	**6.8**	**3.1***	**3.5**	**50.4**	**28.6***	**2.9**	**8.8**	**5.1***	**2.9**	**13.3**	**7.5***	**3.2**	**11.9**	**4.4***	**3.0**
Ventilated Stove	2	5.6	5.5	1.3	3.8	2.5	4.2	12.4	12.4	1.1	8.2	4.8	4.9	5.4	3.7	3.8	1.8	1.8	1.2
Unventilated Stove	14	13.8	9.4*	2.7	2.7	1.7*	2.5	33.1	22.9*	2.7	7.2	4.6*	2.7	9.4	5.4*	3.0	4.9	3.6*	2.3
Portable Stove	10	19.3	14.2	2.4	13.4	6.9	3.8	85.1	47.8	3.3	11.9	6.7	3.3	20.6	13.4	3.1	24.4	7.0	4.2
Firepit	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mixed Ventilation	1	10.6	10.6	-	4.2	4.2	-	20.1	20.1	-	1.5	1.5	-	10.6	10.6	-	4.2	4.2	-
Unknown	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
"Other" Coal	**24**	**61.5**	**39.7**	**2.8**	**54.7**	**20.1**	**5.4**	**103.9**	**63.1**	**3.0**	**26.0**	**13.2**	**3.4**	**82.7**	**43.4**	**3.7**	**21.4**	**13.8**	**2.9**
Ventilated Stove	10	38.8	26.9	2.6	29.2	10.1	5.2	53.3	36.9	2.6	10.3	7.4	2.6	41.8	24.2	3.3	12.8	8.8	2.7
Unventilated Stove	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Portable Stove	9	95.6	68.0	2.8	83.8	41.0	4.8	175.2	118.1	3.1	50.5	34.4	2.7	142.6	91.2	3.4	33.2	23.1	2.9
Firepit	1	21.8	21.8	-	4.4	4.4	-	34.8	34.8	-	5.4	5.4	-	8.7	8.7	-	9.8	9.8	-
Mixed Ventilation	4	51.7	36.4	3.2	65.5	33.7	5.2	87.4	68.3	2.6	15.4	8.0	3.8	68.6	52.5	2.7	19.1	14.5	2.7
Unknown	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wood	**14**	**66.6**	**58.2**	**1.7**	**85.1**	**44.8**	**3.6**	**91.2**	**80.4**	**1.7**	**14.2**	**10.3**	**2.6**	**74.2**	**62.5**	**1.9**	**24.5**	**20.6**	**1.8**
Ventilated Stove	5	73.4	61.2	1.9	83.2	24.7	5.8	106.3	91.8	1.9	20.9	18.3	1.8	75.5	57.4	2.4	29.3	24.7	1.9
Unventilated Stove	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Portable Stove	4	78.4	70.1	1.7	57.1	47.5	2.3	103.8	93.5	1.7	14.1	11.3	2.1	89.8	77.8	1.8	27.8	23.6	1.9
Firepit	5	50.2	47.7	1.4	109.5	77.4	2.8	65.9	62.4	1.5	7.8	5.3*	2.9	60.5	57.0	1.5	17.0	15.3	1.7
Mixed Ventilation	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unknown	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Plant	**4**	**95.6**	**83.8**	**1.9**	**157.2**	**130.0**	**2.1**	**146.6**	**131.5**	**1.8**	**20.5**	**13.9**	**3.7**	**129.6**	**114.4**	**1.8**	**37.1**	**29.2**	**2.3**
Ventilated Stove	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unventilated Stove	1	116.1	116.1	-	191.1	191.1	-	177.0	177.0	-	23.5	23.5	-	170.0	170.0	-	39.9	39.9	-
Portable Stove	1	39.5	39.5	-	109.0	109.0	-	59.8	59.8	-	2.0	2.0	-	56.6	56.6	-	9.6	9.6	-
Firepit	1	67.3	67.3	-	49.1	49.1	-	126.6	126.6	-	29.7	29.7	-	86.7	86.7	-	26.2	26.2	-
Mixed Ventilation	1	159.5	159.5	-	279.7	279.7	-	222.7	222.7	-	26.9	26.9	-	205.1	205.1	-	72.5	72.5	-
Unknown	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
"Other" Fuel	**66**	**73.8**	**36.9**	**3.3**	**92.7**	**21.0**	**6.3**	**119.1**	**62.2**	**3.3**	**25.7**	**10.2**	**3.9**	**101.0**	**37.6**	**4.4**	**25.8**	**13.5**	**3.2**
Ventilated Stove	12	37.5	26.5	2.6	35.4	10.1	5.2	51.8	35.3	2.7	10.5	7.2	2.9	42.1	21.4	3.9	11.8	8.5	2.7
Unventilated Stove	13	158.8	73.0	4.7	224.5	52.3	10.2	272.7	145.5	4.1	71.1	30.6	4.4	230.7	89.3	6.0	55.4	28.3	4.2
Portable Stove	6	62.0	40.9	2.9	49.6	21.4	5.2	104.8	78.4	2.5	19.8	10.7	3.7	80.8	41.9	3.9	19.0	13.0	2.7
Firepit	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mixed Ventilation	32	60.0	33.5	3.0	75.9	21.2	5.3	93.0	56.5	2.9	15.8	7.9	3.4	81.8	35.4	3.8	22.0	13.1	2.8
Unknown	3	21.3	16.5	2.5	15.4	7.0	5.5	30.8	26.1	2.0	6.8	4.7	2.9	19.2	13.2	3.2	7.4	5.4	2.7

*- significant difference with smoky coal for same PAH and strata via Tukey HSD test
† - significant difference with ventilated stove for same PAH within fuel strata via Tukey HSD test
N – number of samples
BaP - benzo[a]pyrene, PYR - pyrene, BbF - benzo[b]fluoranthene DBA - dibenz(ah)anthracene, BaA - benzo[a]anthracene, BkF - benzo[k]flouranthene

Table S2b - Personal Exposure to particle bound PAHs (in ng/m^3) by ventilation

		BPE			CHR			FLT			IPY		
	N	AM	GM	GSD	AM	GM	GSD	AM	GM	GSD	AM	GM	GSD
Smoky Coal	**131**	**81.5**	**47.1**	**3.0**	**94.3**	**44.0**	**3.6**	**65.3**	**19.3**	**4.7**	**45.7**	**28.3**	**2.8**
Ventilated Stove	72	53.7	39.1	2.2	54.3	34.5	2.8	28.7	15.6	3.3	33.6	25.4	2.1
Unventilated Stove	6	230.2	165.1	2.5	374.8	217.3	3.2	273.6	108.2	5.1	112.4	71.8	2.8
Portable Stove	13	48.0	33.1	2.8	68.7	45.0	2.7	17.2	9.2	3.2	23.6	17.0	2.3
Firepit	11	220.7	185.3†	1.9	245.2	186.4†	2.1	228.7	147.6†	2.7	109.5	92.9†	1.8
Mixed Ventilation	25	92.4	51.8	3.5	103.0	45.5	4.1	84.1	21.9	5.4	52.9	31.0	3.3
Unknown	4	17.6	8.4	3.6	7.9	4.4	3.2	1.6	1.4	1.8	12.8	5.6	4.0
Smokeless Coal	**27**	**17.6**	**11.1***	**2.9**	**29.3**	**12.6***	**3.5**	**5.6**	**2.8***	**3.2**	**13.7**	**9.7***	**2.5**
Ventilated Stove	2	7.2	4.9	3.8	7.0	4.8	3.8	3.9	2.7	3.7	8.8	7.4	2.4
Unventilated Stove	14	15.8	9.9*	2.9	12.6	8.3*	2.6	2.4	1.7*	2.2	12.5	8.7*	2.6
Portable Stove	10	23.1	15.1	3.0	58.7	27.3	4.0	10.7	5.4	3.9	17.1	12.4	2.5
Firepit	0	-	-	-	-	-	-	-	-	-	-	-	-
Mixed Ventilation	1	10.6	10.6	-	13.7	13.7	-	4.2	4.2	-	6.3	6.3	-
Unknown	0	-	-	-	-	-	-	-	-	-	-	-	-
"Other" Coal	**24**	**69.3**	**41.9**	**2.9**	**89.1**	**43.2**	**3.9**	**44.0**	**15.6**	**5.5**	**40.3**	**26.4**	**2.7**
Ventilated Stove	10	36.5	27.4	2.3	39.1	21.9	3.4	23.7	8.4	4.8	22.7	17.8	2.2
Unventilated Stove	0	-	-	-	-	-	-	-	-	-	-	-	-
Portable Stove	9	118.4	80.7	2.8	159.4	91.1	3.8	65.1	31.1	5.2	64.2	47.4	2.4
Firepit	1	23.9	23.9	-	7.6	7.6	-	3.3	3.3	-	17.4	17.4	-
Mixed Ventilation	4	52.4	31.7	3.4	76.2	67.4	1.8	57.4	23.7	7.6	36.2	20.9	3.9
Unknown	0	-	-	-	-	-	-	-	-	-	-	-	-
Wood	**14**	**55.2**	**44.2**	**2.0**	**66.2**	**54.3**	**2.0**	**73.7**	**34.7**	**4.0**	**59.7**	**47.2**	**2.0**
Ventilated Stove	5	70.9	60.6	1.9	73.3	51.6	2.9	73.5	19.1	6.2	66.9	50.8	2.2
Unventilated Stove	0	-	-	-	-	-	-	-	-	-	-	-	-
Portable Stove	4	60.2	48.4	2.1	72.2	60.0	2.0	41.2	33.5	2.4	71.0	57.5	2.0
Firepit	5	35.5	30.1	1.9	54.4	52.7	1.3	99.8	64.8	3.2	43.4	37.4	1.9
Mixed Ventilation	0	-	-	-	-	-	-	-	-	-	-	-	-
Unknown	0	-	-	-	-	-	-	-	-	-	-	-	-
Plant	**4**	**73.7**	**62.1**	**2.2**	**128.7**	**121.5**	**1.5**	**144.8**	**118.5**	**2.2**	**58.8**	**49.3**	**2.0**
Ventilated Stove	0	-	-	-	-	-	-	-	-	-	-	-	-
Unventilated Stove	1	93.8	93.8	-	171.2	171.2	-	170.0	170.0	-	69.2	69.2	-
Portable Stove	1	19.2	19.2	-	91.9	91.9	-	104.7	104.7	-	20.3	20.3	-
Firepit	1	94.7	94.7	-	81.0	81.0	-	42.2	42.2	-	39.9	39.9	-
Mixed Ventilation	1	87.0	87.0	-	170.9	170.9	-	262.1	262.1	-	105.7	105.7	-
Unknown	0	-	-	-	-	-	-	-	-	-	-	-	-
"Other" Fuel	**66**	**80.1**	**34.7**	**3.6**	**96.3**	**37.3**	**4.3**	**82.6**	**17.4**	**6.6**	**43.5**	**26.2**	**2.7**
Ventilated Stove	12	45.4	27.6	3.1	33.6	17.8	3.5	32.4	8.6	5.5	25.3	20.1	2.2
Unventilated Stove	13	200.5	77.2	5.3	242.5	102.3	5.5	197.2	42.9	10.7	90.8	50.4	3.6
Portable Stove	6	88.9	45.7	3.8	81.6	49.1	3.2	37.8	17.6	4.9	34.6	24.2	2.5
Firepit	0	-	-	-	-	-	-	-	-	-	-	-	-
Mixed Ventilation	32	48.3	27.6	3.1	70.8	35.5	3.5	70.0	17.4	5.6	34.9	23.0	2.6
Unknown	3	18.3	18.0	1.3	15.7	8.7	4.2	12.0	5.4	5.4	20.8	20.4	1.3

*- significant difference with smoky coal for same PAH and strata via Tukey HSD test
† - significant difference with ventilated stove for same PAH within fuel strata via Tukey HSD test
N – number of samples
BPE - benzo[ghi]perylene, CHR – chrysene, FLT - fluoranthene, IPY - indeno(1,2,3-cd)pyrene.

Table S3 - Personal Exposure to Gas phase PAHs (in ng/m^3) by ventilation

	N	NAP			ANY			FLU			PHE		
		AM	GM	GSD	AM	GM	GSD	AM	GM	GSD	AM	GM	GSD
Smoky Coal	96	4200	2900	2.4	700	450	2.7	430	260	2.7	620	360	2.8
Ventilated Stove	53	2900	2500	1.9	510	400	2.1	260	200	2.1	350	260	2.1
Unventilated Stove	4	11000	6300	3.0	960	710	2.4	920	660	2.7	1300	820	3.3
Portable Stove	12	4900	3900	2.1	750	510	2.5	530	430	1.9	970	770	2.0
Firepit	4	17000	14000	2.1	3000	2600	1.8	2200	1800†	2.1	3200	2300†	2.3
Mixed Ventilation	19	3900	2600	3.2	750	460	3.5	420	250	3.3	560	340	3.4
Unknown	4	1300	1100	2.0	200	150	2.2	110	82	2.2	190	140	2.3
Smokeless Coal	17	3100	2800	1.6	470	370	2.1	210	200	1.5	420	370	1.7
Ventilated Stove	0	-	-	-	-	-	-	-	-	-	-	-	-
Unventilated Stove	9	2800	2600	1.6	480	380	2.2	180	160	1.6	340	310	1.6
Portable Stove	7	3600	3400	1.5	490	370	2.3	260	260	1.2	530	480	1.7
Firepit	0	-	-	-	-	-	-	-	-	-	-	-	-
Mixed Ventilation	1	2000	2000	-	310	310	-	190	190	-	260	260	-
Unknown	0	-	-	-	-	-	-	-	-	-	-	-	-
"Other" Coal	14	8300	5400	2.8	950	590	3.0	610	360	3.4	1000	570	3.5
Ventilated Stove	6	3200	2500	2.3	450	310	2.8	190	130	2.7	320	220	2.8
Unventilated Stove	0	-	-	-	-	-	-	-	-	-	-	-	-
Portable Stove	7	13000	11000	2.1	1400	1000	2.7	1000	800	2.2	1600	1300	2.5
Firepit	0	-	-	-	-	-	-	-	-	-	-	-	-
Mixed Ventilation	1	5900	5900	-	630	630	-	450	450	-	670	670	-
Unknown	0	-	-	-	-	-	-	-	-	-	-	-	-
Wood	7	14000	5900	6.4	3300	1600*	6.0	730	380	5.0	1100	600	4.9
Ventilated Stove	2	13000	13000	1.3	3200	3200	1.1	730	730	1.2	1100	1100	1.3
Unventilated Stove	0	-	-	-	-	-	-	-	-	-	-	-	-
Portable Stove	3	21000	14000	3.1	5200	3800	2.7	1100	850	2.5	1700	1300	2.5
Firepit	2	2000	730	10.9	570	200	11.1	150	62	8.5	240	100	8.3
Mixed Ventilation	0	-	-	-	-	-	-	-	-	-	-	-	-
Unknown	0	-	-	-	-	-	-	-	-	-	-	-	-
Plant	3	26000	20000*	2.4	6400	5700*	1.8	1400	1300*	1.6	2500	2500*	1.3
Ventilated Stove	0	-	-	-	-	-	-	-	-	-	-	-	-
Unventilated Stove	1	54000	54000	-	11000	11000	-	2200	2200	-	3300	3300	-
Portable Stove	0	-	-	-	-	-	-	-	-	-	-	-	-
Firepit	1	10000	10000	-	3600	3600	-	1100	1100	-	2300	2300	-
Mixed Ventilation	1	15000	15000	-	4500	4500	-	960	960	-	2000	2000	-
Unknown	0	-	-	-	-	-	-	-	-	-	-	-	-
"Other" Fuel	56	7600	4300	3.1	1300	730*	3.4	600	300	3.4	1000	500	3.6
Ventilated Stove	9	4500	3100	2.4	860	600	2.5	310	220	2.4	460	330	2.4
Unventilated Stove	11	20000	13000	3.4	3100	2100	3.4	1700	1100	3.5	2900	1800†	3.6
Portable Stove	5	4400	4000	1.6	820	700	1.9	410	340	1.9	780	630	2.1
Firepit	0	-	-	-	-	-	-	-	-	-	-	-	-
Mixed Ventilation	28	4500	3300	2.7	910	550	3.4	320	220	2.8	570	360	3.1
Unknown	3	4400	2500	3.7	1100	450	5.8	280	140	4.3	510	240	4.6

*- significant difference with smoky coal for same PAH and strata via Tukey HSD test
† - significant difference with ventilated stove for same PAH within fuel strata via Tukey HSD test
N – number of samples
NAP - naphthalene, ANY – acenaphthylene, FLU – fluorine, PHE - phenanthrene

Table S4 - Personal exposure to particle phase PAHs (in ng/m^3) by smoky coal source

County	Smoky coal subtype	Mine Name	N	BaP			FLT			PYR			BbF			DBA			BaA			BkF			BPE		
				AM	GM	GSD	AM	GM	GSD	AM	GM	GSD	AM	GM	GSD	AM	GM	GSD	AM	GM	GSD	AM	GM	GSD	AM	GM	GSD
Xuanwei	**Coking Coal**		**74**	72.4	47.5	2.6	56.7	19.9	4.4	63.5	24.7	4.1	106.4	69.7	2.6	27.1	15.5	3.1	95.5	53.5	3.3	26.0	16.9	2.6	79.2	50.1	2.8
		Azhi	21	86.6	58.4	2.7	66.7	24.5	4.2	72.4	30.1	3.7	132.2	92.3	2.5	31.7	20.3	2.9	116.9	73.0	3.0	32.9	22.6	2.5	94.6	66.6	2.6
		Baoshan	8	103.9	63.6	3.6	96.2	31.1	8.4	110.3	39.4	7.0	160.8	101.1	3.5	47.2	24.2	4.2	142.0	71.2	5.3	33.0	21.6	3.2	126.3	71.0	4.0
		Laibin	20	57.0	44.6	2.1	29.7	16.7	3.5	39.0	21.9	3.2	79.3	60.9	2.3	23.5	14.9	2.8	69.5	46.1	3.0	18.4	14.2	2.2	67.5	46.7	2.8
		Tangtang	16	81.2	47.0	3.1	82.0	21.3	6.3	86.2	26.0	6.0	114.5	66.3	3.0	24.1	12.6	3.3	113.4	55.3	3.8	30.5	17.0	3.2	77.2	43.6	3.1
		Yangchang	9	30.0	26.5	1.7	13.1	10.9	2.0	15.0	12.4	2.0	43.8	38.2	1.8	11.9	8.9	2.5	30.3	26.1	1.8	12.4	10.2	2.0	30.8	28.5	1.6
Fuyuan	**Overall**		**52**	76.7	39.2*	3.0	80.9	18.3*	5.4	86.2	19.5*	5.7	136.5	65.8*	3.2	28.6	10.9*	3.9	114.3	42.1*	4.1	28.0	14.0*	3.1	83.2	40.9*	3.3
	Coking Coal		17	152.8	81.4†	3.3	199.3	45.8†	8.4	212.4	55.4†	7.6	280.4	155†	3.1	65.1	34.8†	3.2	252.3	115.4†	3.9	55.0	27.8†	3.5	163.2	83.9†	3.8
		Daping	6	29.5	24.9	1.9	10.1	4.6	3.5	13.9	6.5	3.7	59.5	51.9	1.8	11.9	11.0	1.6	35.2	29.0	2.0	10.0	8.4	1.9	33.8	30.6	1.6
		Enhong	7	118.9	99.6	1.9	134.3	89.7	2.6	150.4	102.2	2.6	210.3	179.8	1.8	45.8	39.3	1.9	184.9	149.6	2.0	39.6	32.3	2.1	135.3	87.3	3.9
		Haidan	4	397.1	338.8	2.1	596.7	436.8	3.1	618.8	475.3	2.7	734.4	617.4	2.2	178.6	157.7	1.9	695.7	581.8	2.2	149.7	127.7	2.1	406.3	354.6	2.0
	1/3 Coking Coal		8	42.0	27.7†	2.9	36.5	17.1†	4.8	37.1	15.3†	5.5	98.6	60.7†	3.5	18.6	10.2†	3.7	66.5	34.7†	4.5	16.7	10.7†	3.2	48.6	31.4†	3.0
		Bagong	6	53.3	43.3	2.2	47.9	35.2	2.4	49.1	34.5	2.6	127.1	107.7	1.9	24.0	17.2	2.8	87.1	70.9	2.1	21.4	18.0	2.0	61.4	48.5	2.2
		Dahe	2	7.9	7.2	1.8	2.2	1.9	2.2	1.4	1.4	1.3	12.9	10.8	2.4	2.4	2.2	1.8	5.0	4.1	2.5	2.4	2.2	1.8	10.1	8.5	2.3
	Gas Fat Coal		25	37.5	27.1	2.2	19.8	10.9	2.9	21.0	11.0	3.2	51.1	37.0	2.2	7.4	4.9	2.4	37.4	23.0	2.7	13.9	10.0	2.2	41.5	29.3	2.3
		Housuo	24	37.4	26.7	2.2	20.0	10.7	2.9	21.1	10.8	3.3	50.8	36.3	2.2	7.4	4.8	2.4	37.5	22.6	2.7	14.1	10.0	2.3	40.8	28.5	2.3
		Qingyun	1	39.9	39.9	-	15.7	15.7	-	18.1	18.1	-	56.9	56.9	-	8.5	8.5	-	35.1	35.1	-	9.7	9.7	-	58.1	58.1	-
	Meager Lean Coal (Gumu)		2	59.0	32.0	5.6	16.1	6.9	8.3	25.5	8.5	12.1	132.3	83.3	4.3	24.0	14.3	4.8	95.2	33.0	11.4	18.5	8.8	7.0	63.4	17.4	16.2

County	Smoky coal subtype	Mine Name	N	CHR			IPY		
				AM	GM	GSD	AM	GM	GSD
Xuanwei	**Coking Coal**		**74**	82.3	46.5	3.2	46.9	30.0	2.8
		Azhi	21	102.4	65.2	3.0	54.6	37.7	2.6
		Baoshan	8	122.6	67.6	4.1	69.8	39.6	4.0
		Laibin	20	61.0	41.1	2.9	36.6	26.3	2.5
		TangTang	16	95.4	45.9	4.0	50.7	28.5	3.0
		Yangchang	9	23.8	20.6	1.8	24.5	19.9	2.2
Fuyuan	**Overall**		**52**	111.5	38.0*	4.4	44.6	25.6*	2.8
	Coking Coal		17	248.5	114.6†	3.9	83.1	50.2†	3.0
		Daping	6	40.4	31.3	2.4	18.7	16.5	1.8
		Enhong	7	176.9	139.2	2.1	69.9	62.4	1.7
		Haidan	4	686.0	572.2	2.2	203.1	183.0	1.8
	1/3 Coking Coal		8	87.2	45.5†	4.9	25.3	16.5†	2.9
		Bagong	6	114.3	98.3	1.9	32.2	25.7	2.3
		Dahe	2	6.0	4.5	3.1	4.5	4.4	1.4
	Gas Fat Coal		25	25.3	16.6	2.6	26.1	19.3	2.2
		Housuo	24	25.1	16.3	2.6	25.7	18.8	2.2
		Qingyun	1	29.0	29.0	-	35.1	35.1	-
	Meager Lean Coal (Gumu)		2	123.3	47.3	9.8	25.6	16.4	4.2

*- significant difference between smoky coal subtypes from Fuyuan
† - significant variation within designated smoky coal subtype
N – number of samples
BaP - benzo[a]pyrene, PYR - pyrene, BbF - benzo[b]fluoranthene DBA - dibenz(ah)anthracene, BaA - benzo[a]anthracene, BkF - benzo[k]flouranthene
BPE - benzo[ghi]perylene, CHR – chrysene, FLT - fluoranthene, IPY - indeno(1,2,3-cd)pyrene

Table S5 - Personal Exposure to Gas Phase PAHs (in ng/m^3) by Smoky Coal Source

			N	NAP			ANY			FLU			PHE		
County	Smoky coal subtype	Mine Name		AM	GM	GSD	AM	GM	GSD	AM	GM	GSD	AM	GM	GSD
Xuanwei	**Coking Coal**		**61**	3600	2700	2.4	590	400	2.6	340	230	2.6	460	310	2.7
		Azhi	19	3300	2700	2.0	560	420	2.3	330	250	2.3	440	320	2.5
		Baoshan	7	6100	4200	2.5	900	580	2.9	520	290	3.3	730	420	3.4
		Laibin	19	2700	2100	2.7	380	290	2.7	250	190	2.7	340	260	2.7
		TangTang	16	4100	3000	2.3	740	490	2.6	390	240	2.7	520	320	2.7
Fuyuan	**Overall**		**30**	5100	2900	2.7	930	530	3.0	560	290*	2.9	850	420*	3.1
	Coking Coal		5	15000	7100†	5.0	2300	960†	6.0	1700	820†	4.3	2600	1400†	3.8
		Daping	2	1300	1300	1.2	140	140	1.1	190	190	1.1	370	370	1.1
		Haidan	3	25000	22000	1.9	3800	3400	1.7	2700	2200	2.2	4200	3400	2.2
	1/3 Coking Coal (Dahe)		2	2300	1800	2.6	370	320	2.2	310	230	3.3	480	390	2.7
	Gas Fat Coal (Housuo)		21	2900	2400	2.1	680	500	2.5	310	230	2.4	390	290	2.3
	Meager Lean Coal(Gumu)		2	5500	4400	2.6	580	440	3.1	640	460	3.3	1600	1200	2.9

*- significant difference between smoky coal subtypes from Fuyuan
† - significant variation within designated smoky coal subtype
N – number of samples
NAP - naphthalene, ANY – acenaphthylene, FLU – fluorine, PHE - phenanthrene

Table S6a – Indoor measurements of particle phase PAHs (in ng/m^3) by fuel type and stove design

		BaP			PYR			BbF			DBA			BaA			BkF		
	N	AM	GM	GSD	AM	GM	GSD	AM	GM	GSD	AM	GM	GSD	AM	GM	GSD	AM	GM	GSD
Smoky Coal	**137**	**73.5**	**47.6**	**2.5**	**76.0**	**26.6**	**4.4**	**115.2**	**72.0**	**2.7**	**31.2**	**16.9**	**3.1**	**97.0**	**53.0**	**3.2**	**26.6**	**17.0**	**2.6**
Ventilated Stove	75	52.6	39.3	2.1	40.6	19.5	3.2	78.5	57.0	2.3	19.9	12.8	2.7	65.6	42.1	2.7	20.4	14.2	2.3
Unventilated Stove	6	110.0	75.4	2.5	147.2	62.6	4.4	194.0	131.4	2.5	60.7	40.7	2.9	164.6	101.1	2.8	37.4	23.5	2.8
Portable Stove	13	66.7	45.0	2.6	58.2	23.7	4.7	145.6	86.2	2.9	29.6	16.7	3.1	92.2	49.5	3.6	23.4	15.2	2.6
Firepit	12	164.1	150.4†	1.6	242.8	203.0†	1.9	272.9	247.4†	1.6	80.3	60.8†	2.5	243.4	219.6†	1.6	59.5	53.2†	1.7
Mixed Ventilation	27	95.4	56.6	2.6	103.8	34.1	4.5	129.7	82.7	2.5	37.3	19.6	2.8	119.5	66.4	2.9	31.5	21.3	2.5
Unknown	4	12.2	9.8	2.2	1.7	1.6	1.6	15.6	12.4	2.1	13.3	7.0	4.1	7.9	5.6	2.6	4.4	3.1	2.5
Smokeless Coal	**25**	**15.3**	**10.4***	**2.7**	**4.3**	**2.1***	**3.1**	**49.8**	**34.9***	**2.6**	**12.2**	**6.9***	**3.1**	**12.4**	**7.3***	**3.0**	**6.2**	**4.7***	**2.2**
Ventilated Stove	2	2.0	2.0*	1.2	0.7	0.6	1.4	26.5	19.6	3.2	17.6	5.7	12.7	1.2	1.2*	1.3	1.7	1.7	1.2
Unventilated Stove	13	18.6	12.8	2.7	5.1	2.3*	3.2	53.9	37.9	2.6	11.0	7.3	2.8	14.9	9.4*	2.8	7.0	5.4	2.3
Portable Stove	9	12.6	10.2	2.2	3.4	2.0	3.0	50.7	35.2	2.8	13.4	6.5	3.2	10.1	6.7	2.7	5.6	4.5	2.1
Firepit	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mixed Ventilation	1	23.5	23.5	-	9.1	9.1	-	34.4	34.4	-	7.2	7.2	-	23.5	23.5	-	10.0	10.0	-
Unknown	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
"Other" Coal	**26**	**46.2**	**35.0**	**2.2**	**45.5**	**19.9**	**3.8**	**73.2**	**54.1**	**2.3**	**19.6**	**12.6**	**2.8**	**56.1**	**38.1**	**2.5**	**16.6**	**11.8**	**2.5**
Ventilated Stove	10	41.5	33.6	2.1	21.5	14.3	3.1	52.8	42.6	2.1	24.2	14.2	3.2	42.8	30.7	2.4	15.1	10.8	2.6
Unventilated Stove	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Portable Stove	9	53.6	35.7	2.7	79.8	30.1	5.0	86.9	60.0	2.6	17.3	10.5	3.1	72.2	42.8	3.2	18.8	11.9	2.9
Firepit	1	44.0	44.0	-	14.7	14.7	-	127.2	127.2	-	24.5	24.5	-	59.7	59.7	-	16.6	16.6	-
Mixed Ventilation	6	43.2	34.8	2.1	39.3	19.3	3.8	77.5	59.8	2.3	14.6	12.0	2.1	53.6	42.4	2.2	15.8	12.5	2.2
Unknown	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wood	**14**	**55.2**	**47.9**	**1.7**	**98.3**	**63.0**	**3.2**	**73.2**	**64.2**	**1.7**	**6.6**	**5.7***	**1.8**	**61.9**	**51.0**	**2.0**	**21.8**	**18.6**	**1.8**
Ventilated Stove	5	67.6	54.3	2.1	109.4	48.8	6.0	87.5	71.8	2.1	7.1	6.8	1.4	67.8	47.4	2.8	27.5	22.2	2.1
Unventilated Stove	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Portable Stove	3	45.9	42.4	1.6	45.1	38.4	2.0	60.4	56.5	1.6	7.8	5.8	2.5	55.0	47.9	1.9	19.1	17.4	1.7
Firepit	5	48.0	43.8	1.7	119.7	100.4	1.9	65.6	59.6	1.7	5.6	4.8*	2.0	59.1	54.0	1.6	17.9	15.9	1.8
Mixed Ventilation	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unknown	1	57.6	57.6	-	96.1	96.1	-	77.9	77.9	-	5.1	5.1	-	66.7	66.7	-	21.2	21.2	-
Plant	**5**	**69.2**	**65.1**	**1.5**	**164.6**	**145.2**	**1.7**	**100.8**	**94.7**	**1.5**	**12.4**	**8.6**	**2.9**	**90.8**	**85.1**	**1.5**	**34.0**	**28.6**	**1.9**
Ventilated Stove	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unventilated Stove	1	47.6	47.6	-	90.7	90.7	-	71.9	71.9	-	24.4	24.4	-	68.6	68.6	-	64.2	64.2	-
Portable Stove	1	59.3	59.3	-	191.4	191.4	-	88.4	88.4	-	2.0	2.0	-	83.9	83.9	-	15.7	15.7	-
Firepit	2	61.0	59.6	1.4	112.8	108.6	1.5	92.2	86.7	1.7	13.3	10.4	2.9	70.2	69.4	1.3	20.6	19.7	1.5
Mixed Ventilation	1	116.9	116.9	-	315.4	315.4	-	159.2	159.2	-	8.8	8.8	-	161.2	161.2	-	49.1	49.1	-
Unknown	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
"Other" Fuel	**75**	**100.1**	**37.4**	**3.8**	**161.0**	**21.1**	**8.0**	**163.8**	**64.2**	**3.6**	**40.0**	**13.4**	**3.9**	**142.0**	**36.1**	**5.0**	**36.4**	**14.6**	**3.6**
Ventilated Stove	14	44.3	27.8	2.9	85.8	17.0	6.6	58.2	34.3	3.2	14.1	11.5	2.1	51.6	23.4	4.3	17.4	10.7	3.3
Unventilated Stove	21	174.9	62.5	5.3	322.4	47.8	12.0	314.6	126.1	4.6	77.1	22.3	5.8	258.2	72.0	6.9	65.4	26.6	4.8
Portable Stove	6	50.4	41.6	2.1	38.2	18.8	4.9	95.9	82.2	1.9	31.5	23.5	2.4	58.1	38.9	3.0	15.7	13.4	1.9
Firepit	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mixed Ventilation	31	91.3	32.0	3.5	122.2	15.5	6.4	135.0	57.5	2.9	31.8	10.8	3.4	131.9	30.5	4.3	31.9	12.7	3.1
Unknown	3	25.5	17.0	3.1	28.9	5.7	10.2	33.8	20.3	3.5	2.6	2.3	1.9	21.6	10.6	4.2	8.8	5.0	3.7

*- significant difference with smoky coal for same PAH and strata via Tukey HSD test
† - significant difference with ventilated stove for same PAH within fuel strata via Tukey HSD test
N – number of samples
BaP - benzo[a]pyrene, PYR - pyrene, BbF - benzo[b]fluoranthene DBA - dibenz(ah)anthracene, BaA - benzo[a]anthracene, BkF - benzo[k]flouranthene

Table S6b - Indoor measurements of particle phase PAHs (in ng/m3) by fuel type and stove design

		BPE			CHR			FLT			IPY		
	N	AM	GM	GSD	AM	GM	GSD	AM	GM	GSD	AM	GM	GSD
Smoky Coal	**137**	**92.6**	**53.5**	**2.7**	**91.2**	**47.3**	**3.3**	**65.2**	**22.0**	**4.6**	**47.7**	**31.8**	**2.5**
Ventilated Stove	75	58.3	42.6	2.3	55.2	35.4	2.7	36.2	16.8	3.3	36.9	27.2	2.2
Unventilated Stove	6	148.5	108.0	2.4	176.2	108.6	2.7	128.9	50.0	4.6	73.1	51.5	2.6
Portable Stove	13	82.1	51.6	2.8	111.8	59.3	3.6	48.8	19.0	4.9	31.3	23.1	2.3
Firepit	12	211.4	177.7†	1.9	251.7	207.8†	1.9	217.8	178.3†	2.0	108.7	94.4†	1.8
Mixed Ventilation	27	138.8	62.6	2.8	103.4	55.5	2.9	81.3	26.0	4.9	57.5	37.1	2.4
Unknown	4	19.5	13.8	2.9	8.6	5.9	2.9	1.0	1.0	1.2	16.2	10.6	3.5
Smokeless Coal	**25**	**21.7**	**13.9***	**2.8**	**25.6**	**15.1***	**3.2**	**3.5**	**1.9***	**2.8**	**15.5**	**11.4***	**2.4**
Ventilated Stove	2	14.7	6.7	7.5	19.1	7.2	10.0	0.9	0.8	1.4	15.5	7.2	7.2
Unventilated Stove	13	23.4	14.9	2.7	24.2	15.3	2.9	4.0	1.9*	3.0	15.8	12.5	2.1
Portable Stove	9	20.8	14.1	2.7	29.9	16.8	3.4	2.9	1.9	2.7	15.3	10.7	2.4
Firepit	0	-	-	-	-	-	-	-	-	-	-	-	-
Mixed Ventilation	1	21.7	21.7	-	19.0	19.0	-	7.2	7.2	-	14.5	14.5	-
Unknown	0	-	-	-	-	-	-	-	-	-	-	-	-
"Other" Coal	**26**	**51.9**	**37.1**	**2.4**	**55.8**	**36.7**	**2.6**	**38.5**	**16.0**	**3.9**	**32.6**	**24.2**	**2.3**
Ventilated Stove	10	48.2	37.3	2.3	36.6	26.1	2.4	16.3	11.1	3.0	36.1	28.7	2.2
Unventilated Stove	0	-	-	-	-	-	-	-	-	-	-	-	-
Portable Stove	9	61.9	37.7	3.0	70.9	45.1	2.9	68.5	25.2	5.0	32.6	20.3	2.9
Firepit	1	64.6	64.6	-	152.7	152.7	-	12.7	12.7	-	26.4	26.4	-
Mixed Ventilation	6	41.1	32.8	2.2	49.1	37.5	2.4	34.8	15.4	4.5	27.9	23.7	2.0
Unknown	0	-	-	-	-	-	-	-	-	-	-	-	-
Wood	**14**	**33.2**	**29.4**	**1.7**	**52.6**	**42.4**	**2.1**	**86.7**	**48.6**	**4.0**	**37.4**	**32.6**	**1.7**
Ventilated Stove	5	42.4	36.1	1.9	52.0	35.7	2.8	96.9	33.2	8.2	45.9	38.1	2.1
Unventilated Stove	0	-	-	-	-	-	-	-	-	-	-	-	-
Portable Stove	3	27.1	25.5	1.5	45.0	38.6	2.0	33.6	28.0	2.2	33.8	30.6	1.7
Firepit	5	28.0	25.7	1.6	56.8	50.1	1.8	109.0	88.5	2.0	31.7	28.6	1.7
Mixed Ventilation	0	-	-	-	-	-	-	-	-	-	-	-	-
Unknown	1	31.4	31.4	-	57.6	57.6	-	83.9	83.9	-	34.4	34.4	-
Plant	**5**	**44.3**	**41.1**	**1.5**	**88.3**	**85.0**	**1.4**	**159.5**	**137.6**	**1.8**	**39.9**	**38.0**	**1.4**
Ventilated Stove	0	-	-	-	-	-	-	-	-	-	-	-	-
Unventilated Stove	1	43.2	43.2	-	68.6	68.6	-	85.2	85.2	-	35.4	35.4	-
Portable Stove	1	24.6	24.6	-	92.9	92.9	-	185.8	185.8	-	26.9	26.9	-
Firepit	2	51.4	46.6	1.9	75.7	73.5	1.4	104.6	99.0	1.6	37.1	36.4	1.3
Mixed Ventilation	1	51.1	51.1	-	128.7	128.7	-	317.4	317.4	-	62.9	62.9	-
Unknown	0	-	-	-	-	-	-	-	-	-	-	-	-
"Other" Fuel	**75**	**106.7**	**39.2**	**3.7**	**149.0**	**38.6**	**4.8**	**143.8**	**17.7**	**8.1**	**63.5**	**29.0**	**3.2**
Ventilated Stove	14	41.2	30.3	2.4	42.0	18.2	4.3	87.9	14.1	7.6	34.0	26.6	2.0
Unventilated Stove	21	208.8	63.7	5.7	262.8	82.7	5.9	280.3	40.0	12.2	109.7	47.1	4.4
Portable Stove	6	95.4	67.7	2.7	54.3	40.2	2.6	31.0	17.0	4.3	40.4	33.6	2.0
Firepit	0	-	-	-	-	-	-	-	-	-	-	-	-
Mixed Ventilation	31	78.1	32.1	3.1	151.1	38.3	3.7	110.1	13.0	6.4	54.5	22.7	3.1
Unknown	3	16.5	11.5	2.8	19.0	6.3	6.6	24.1	4.9	10.0	17.6	13.3	2.4

*- significant difference with smoky coal for same PAH and strata via Tukey HSD test
† - significant difference with ventilated stove for same PAH within fuel strata via Tukey HSD test
N – number of samples
BPE - benzo[ghi]perylene, CHR – chrysene, FLT - fluoranthene, IPY - indeno(1,2,3-cd)pyrene.

Table S7 - Indoor measurements of particle phase PAHs (in ng/m^3) by smoky coal source

				BaP			FLT			PYR			BbF			DBA			BaA			BkF			BPE		
County	Smoky coal subtype	Mine Name	N	AM	GM	GSD	AM	GM	GSD	AM	GM	GSD	AM	GM	GSD	AM	GM	GSD	AM	GM	GSD	AM	GM	GSD	AM	GM	GSD
Xuanwei	**Coking Coal**		**77**	79.1	50.0	2.5	66.3	20.9	4.8	79.3	26.7	4.4	111.0	70.8	2.7	32.0	17.6	3.0	101.6	57.1	3.0	27.4	17.6	2.6	100.4	53.9	2.8
		Azhi	21	79.6	63.2	2.0	70.9	30.6	4.2	76.2	38.1	3.4	122.7	98.1	2.0	24.7	18.8	2.2	109.3	79.2	2.3	29.9	23.7	2.0	80.0	64.1	2.0
		Baoshan	8	103.7	62.0	3.1	115.2	26.0	9.6	132.5	34.8	8.0	153.4	87.8	3.4	55.8	34.5	3.1	140.0	70.6	4.0	41.2	23.3	3.9	133.8	80.6	2.9
		Laibin	23	87.0	45.6	3.0	49.2	15.8	4.7	76.7	21.4	4.7	109.3	60.6	3.1	35.4	14.1	3.6	100.1	48.0	3.6	24.3	14.8	2.8	137.1	47.1	3.7
		Tangtang	16	79.2	47.5	2.8	88.5	20.6	6.4	94.8	26.0	5.6	110.7	66.2	2.9	36.2	21.0	3.6	109.4	57.2	3.5	28.7	16.0	3.0	94.4	55.5	3.1
		Yangchang	9	35.8	33.2	1.5	15.9	14.9	1.5	18.3	17.0	1.6	51.4	45.7	1.6	11.5	10.6	1.6	39.2	34.4	1.7	14.6	12.9	1.6	34.9	33.5	1.4
Fuyuan	**Overall**		**60**	63.9	42.9*	2.5	61.9	21.9*	4.4	68.4	24.5*	4.4	110.8	68.9*	2.7	28.2	15.2*	3.2	87.3	45.4*	3.4	24.9	15.8*	2.6	76.8	50.0*	2.5
	Coking Coal		21	97.4	67.7†	2.5	119.5	52.1†	4.6	132.2	61.7†	4.3	177.4	120.3†	2.6	48.3	29.3†	3.0	149.7	92.0†	3.1	39.6	25.1†	2.9	121.3	80.5†	2.6
		Daping	7	29.4	26.6	1.6	13.2	9.4	2.5	17.6	12.1	2.6	54.7	45.3	2.0	11.8	9.7	2.2	35.5	27.8	2.2	9.0	8.3	1.6	35.2	30.5	1.8
		Enhong	9	99.8	85.6	1.8	110.1	88.4	2.1	124.0	101.1	2.0	176.1	153.0	1.8	42.5	36.8	1.8	147.0	128.4	1.8	47.0	35.9	2.3	112.8	98.8	1.7
		Haidan	5	188.1	163.7	1.9	285.1	221.8	2.3	307.2	248.0	2.2	351.4	306.0	1.8	109.7	91.4	2.0	314.4	269.9	1.9	69.0	61.9	1.7	257.0	216.3	2.0
	1/3 Coking Coal		8	66.9	44.7	3.2	61.9	25.9	5.3	67.6	27.9	5.0	126.4	85.4	3.2	27.5	16.6	3.7	90.9	54.5	4.3	24.3	17.6	2.8	73.5	47.5	3.3
		Bagong	6	63.1	55.4	1.7	61.6	33.7	3.1	66.7	34.6	3.2	122.0	106.4	1.8	29.1	22.0	2.3	87.3	75.2	1.8	24.7	21.6	1.8	63.0	57.3	1.6
		Dahe	2	78.4	23.4	14.3	62.7	11.8	28.1	70.4	14.6	24.3	139.6	44.1	13.1	22.6	7.2	12.9	101.8	20.7	25.0	23.0	9.5	8.7	105.2	27.2	17.7
	Gas Fat Coal		24	34.2	28.8	1.8	15.4	10.7	2.5	16.8	11.4	2.6	46.5	38.4	1.9	11.1	8.0	2.3	32.4	23.8	2.3	13.0	10.4	1.9	40.3	33.9	1.9
		Housuo	23	33.4	28.0	1.8	14.3	10.1	2.5	15.6	10.7	2.5	45.3	37.3	1.9	10.8	7.7	2.3	31.3	22.9	2.3	12.6	10.1	1.9	39.5	33.0	1.9
		Qingyun	1	53.7	53.7	-	39.4	39.4	-	44.9	44.9	-	74.5	74.5	-	17.5	17.5	-	59.2	59.2	-	21.9	21.9	-	60.3	60.3	-
	Meager Lean Coal (Gumu)		2	55.3	36.4	4.0	16.6	7.2	8.2	22.8	9.2	9.1	119.3	94.0	2.8	26.4	22.4	2.3	75.0	29.9	9.2	16.6	11.9	3.4	60.5	43.6	3.3

			N	CHR			IPY		
				AM	GM	GSD	AM	GM	GSD
Xuanwei	**Coking Coal**		**77**	85.4	48.7	3.0	51.3	33.2	2.5
		Azhi	21	94.2	69.5	2.2	46.6	36.7	2.1
		Baoshan	8	122.0	66.8	3.4	75.8	53.0	2.4
		Laibin	23	89.2	40.8	3.6	47.8	25.5	3.0
		Tangtang	16	81.6	48.8	3.1	62.9	37.6	3.1
		Yangchang	9	29.9	25.1	1.8	28.5	27.1	1.4
Fuyuan	**Overall**		**60**	92.9	42.0*	3.7	43.3	29.8*	2.4
	Coking Coal		21	169.0	93.4†	3.5	63.2	43.4†	2.5
		Daping	7	44.0	28.0	3.1	17.1	16.6	1.3
		Enhong	9	140.1	121.8	1.8	65.0	55.2	1.8
		Haidan	5	395.8	312.8	2.2	124.4	107.6	1.9
	1/3 Coking Coal		8	103.5	62.8	4.4	42.9	30.2	3.3
		Bagong	6	101.9	89.3	1.8	45.1	41.7	1.5
		Dahe	2	108.2	21.8	25.4	36.3	11.4	13.2
	Gas Fat Coal		24	23.0	17.9	2.1	27.6	22.2	2.0
		Housuo	23	22.2	17.2	2.1	26.6	21.4	1.9
		Qingyun	1	41.6	41.6	-	50.4	50.4	-
	Meager Lean Coal (Gumu)		2	89.8	53.1	4.9	25.6	19.2	3.1

*- significant difference between smoky coal subtypes from Fuyuan
† - significant variation within designated smoky coal subtype
N – number of samples
BaP - benzo[a]pyrene, PYR - pyrene, BbF - benzo[b]fluoranthene DBA - dibenz(ah)anthracene, BaA - benzo[a]anthracene, BkF - benzo[k]flouranthene
BPE - benzo[ghi]perylene, CHR – chrysene, FLT - fluoranthene, IPY - indeno(1,2,3-cd)pyrene

Table S8- Exploratory factor analysis of log transformed indoor PAH values

	Factor 1	Factor 2	Factor 3
EV(% variance explained)	3.9(39%)	3.7(37%)	1.8(18%)
Benzo[ghi]perylene (6)	0.49	**0.77**	0.38
Benzo[b]fluoranthene (5)	0.47	**0.56**	**0.66**
Dibenz[ah]anthracene(5)	0.28	**0.81**	0.31
Benzo[a]pyrene (5)	**0.63**	**0.61**	0.41
Benzo[k]fluoranthene (5)	**0.61**	**0.58**	0.42
Indeno[1,2,3-cd]pyrene (5)	**0.53**	**0.77**	0.27
Pyrene(4)	**0.87**	0.39	0.29
Fluoranthene(4)	**0.88**	0.35	0.31
Chrysene(4)	**0.55**	**0.52**	**0.62**
Benzo[a]anthracene (4)	**0.69**	**0.56**	0.42

Values in bold (Eigen value > 0.5) are considered to be contributory to that factor

Numbers in parentheses represent number of carbon rings for respective PAH

Factor analysis was performed with varimax rotation

Table S9 - Mixed effect model for indoor PAH measurements (using PAHs and variables selected for personal measurements)

		BaP			FLT			CHR	
Reference/Background Value (Intercept)*		3.04			1.65			3.0	
Fuel Type	Estimate	95% CI	GMR	Estimate	95% CI	GMR	Estimate	95% CI	GMR
Smokeless Coal (FY & XW)	Ref		1	Ref		1	Ref		1
Coking Coal from North XW	0.82	0.19,1.44	2.27	1.1	0.16,2.03	3	1.01	0.29,1.72	2.75
Coking Coal from South XW	0.93	-0.22,2.07	2.54	1.51	-0.2,3.22	4.53	0.83	-0.42,2.11	2.3
Coking Coal from FY	0.47	-0.24,1.19	1.61	0.84	-0.23,1.93	2.33	0.75	-0.11,1.6	2.11
1/3 Coking coal FY	0.8	-0.17,1.75	2.23	1.76	0.33,3.17	5.79	1.21	0.15,2.25	3.35
Gas Fat coal FY	0.26	-0.5,1.02	1.3	0.48	-0.64,1.6	1.62	0.01	-0.85,0.86	1.01
Meagre Lean coal FY	0.67	-0.66,2	1.95	0.45	-1.54,2.44	1.56	1.07	-0.51,2.66	2.92
Multiple Coal Types	0.53	-0.04,1.1	1.7	1.11	0.27,1.96	3.04	0.76	0.09,1.42	2.13
Multiple Fuel Types	0.64	0.11,1.16	1.89	1.23	0.46,2.02	3.43	0.69	0.07,1.3	1.98
Smoky Coal of uncertain type	1.42	0.53,2.3	4.12	3.31	1.98,4.65	27.39	1.91	0.84,2.98	6.77
Plant Products	0.02	-1.05,1.1	1.02	0.83	-0.78,2.48	2.3	0.22	-1.07,1.51	1.24
Wood	0.05	-0.84,0.97	1.06	0.95	-0.4,2.34	2.59	0.13	-0.95,1.23	1.14
Stove Design									
Ventilated Stove	Ref		1	Ref		1	Ref		1
Unventilated Stove	0.51	0.07,0.95	1.67	0.67	0,1.34	1.95	0.73	0.2,1.25	2.07
Fire Pit	0.92	0.24,1.58	2.51	1.54	0.52,2.52	4.66	1.02	0.21,1.81	2.77
Portable Stove	0.14	-0.26,0.54	1.15	0.17	-0.43,0.76	1.18	0.37	-0.11,0.84	1.44
Mixed Ventilation	0.29	-0.01,0.59	1.33	0.22	-0.23,0.67	1.25	0.44	0.08,0.81	1.56
Unknown ventilation	-0.79	-1.49,-0.09	0.45	-1.53	-2.58,-0.47	0.22	-1.2	-2.03,-0.36	0.3
Room size (in m^3)									
<40m3	Ref		1	Ref		1	Ref		1
40m3 to 49m3	-0.42	-0.81,-0.03	0.66	-0.51	-1.1,0.06	0.6	-0.69	-1.17,-0.22	0.5
50m3 to 67m3	0.07	-0.35,0.49	1.08	0.41	-0.23,1.04	1.5	0	-0.5,0.51	1
>67m3	0.11	-0.31,0.53	1.12	0.5	-0.14,1.12	1.64	-0.03	-0.53,0.48	0.97
Room Size Unknown	-0.35	-0.76,0.06	0.7	-0.21	-0.82,0.39	0.81	-0.47	-0.96,0.02	0.63
Season									
Autumn	Ref		1	Ref		1	Ref		1
Winter	-0.15	-0.47,0.17	0.86	0.17	-0.32,0.65	1.18	0.06	-0.31,0.42	1.06
Spring/Summer	-0.09	-0.37,0.18	0.91	-0.62	-1.03,-0.21	0.54	-0.32	-0.63,0	0.73
Variance explained (%)									
Between Subjects		46			57			39	
Between Villages		24			36			50	

*Reference value represents log transformed PAH value (in ng/m^3) for the reference model entry (smokeless coals from Fuyuan, burnt in a ventilated stove in a "small" room)
GMR: = geometric mean ratio = GM(estimate)/GM(reference)=exp(Estimate)
BaP - benzo[a]pyrene, FLT – fluoranthene, CHR – chrysene

Table S10a- Mixed effect models for personal exposure to particle bound PAHs

	BPE			BbF			DBA			BkF		
Reference/Background Value (Intercept)*	2.4			3.08			1.05			1.53		
Fuel Type	Estimate	95% CI	GMR	Estimate	95% CI	GMR	Estimate	95% CI	GMR	Estimate	95% CI	GMR
Smokeless Coal (FY & XW)	Ref		1	Ref		1	Ref		1	Ref		1
Coking Coal from North XW	1.27	1.96,0	3.58	1.12	0.5,1.73	3.07	1.42	0.71,2.12	4.15	1.12	0.47,1.76	3.08
Coking Coal from South XW	0.72	1.86,0	2.05	0.43	-0.53,1.39	1.53	0.77	-0.37,1.92	2.16	0.56	-0.5,1.6	1.75
Coking Coal from FY	0.9	1.74,0	2.46	1.14	0.36,1.9	3.11	1.36	0.5,2.21	3.89	0.93	0.14,1.7	2.52
1/3 Coking coal FY	0.39	1.37,0	1.48	0.44	-0.46,1.28	1.55	0.51	-0.54,1.51	1.67	0.26	-0.7,1.17	1.3
Gas Fat coal FY	0.35	1.18,0	1.42	0.27	-0.46,0.98	1.31	0.07	-0.77,0.89	1.07	0.38	-0.4,1.14	1.46
Meagre Lean coal FY	0.22	1.74,0	1.25	1.24	-0.15,2.61	3.45	1.45	-0.12,3.01	4.27	0.7	-0.71,2.1	2.02
Multiple Coal Types	0.93	1.57,0	2.53	0.78	0.2,1.35	2.18	1.04	0.37,1.71	2.83	0.82	0.21,1.43	2.27
Multiple Fuel Types	0.9	1.49,0	2.45	0.87	0.32,1.42	2.39	0.79	0.17,1.4	2.2	0.84	0.26,1.41	2.31
Smoky Coal of uncertain type	1.38	2.39,0	3.97	1.49	0.55,2.42	4.42	1.16	0.08,2.23	3.18	0.99	0.04,1.94	2.69
Plant Products	-0.01	1.25,0	0.99	0.24	-0.95,1.43	1.27	-0.09	-1.44,1.26	0.91	0.13	-1.08,1.34	1.14
Wood	0.2	1.24,0	1.23	0.45	-0.51,1.41	1.57	0.04	-1.02,1.11	1.04	0.45	-0.52,1.42	1.57
Stove Design												
Ventilated Stove	Ref		1	Ref		1	Ref		1	Ref		1
Unventilated Stove	0.51	1.02,0	1.66	0.67	0.18,1.15	1.95	0.73	0.17,1.29	2.07	0.45	-0.04,0.94	1.57
Fire Pit	1.24	1.98,0	3.44	1.08	0.38,1.76	2.93	1.18	0.41,1.94	3.24	1.07	0.38,1.76	2.92
Portable Stove	0.35	0.82,0	1.43	0.52	0.09,0.95	1.69	0.48	-0.01,0.97	1.62	0.2	-0.23,0.63	1.22
Mixed Ventilation	0	0.36,0	1	0.09	-0.25,0.42	1.09	-0.02	-0.41,0.36	0.98	0.1	-0.23,0.44	1.11
Unknown ventilation	-0.97	-0.14,0	0.38	-0.91	-1.67,-0.14	0.4	-0.94	-1.8,-0.08	0.39	-0.96	-1.72,-0.19	0.38
Room size (in m3)												
<40m3	Ref		1	Ref		1	Ref		1	Ref		1
40m3 to 49m3	-0.34	0.13,0	0.71	-0.46	-0.9,-0.03	0.63	-0.37	-0.86,0.11	0.69	-0.28	-0.71,0.15	0.76
50m3 to 67m3	0.63	1.13,0	1.87	0.4	-0.07,0.86	1.49	0.48	-0.05,0.99	1.61	0.47	0,0.94	1.61
>67m3	0.21	0.71,0	1.24	-0.14	-0.61,0.33	0.87	0.1	-0.42,0.63	1.11	-0.01	-0.47,0.46	0.99
Room Size Unknown	0.07	0.55,0	1.08	-0.08	-0.53,0.37	0.92	0.04	-0.47,0.53	1.04	-0.02	-0.47,0.43	0.98
Season												
Autumn	Ref		1	Ref		1	Ref		1	Ref		1
Winter	0.12	0.47,0	1.13	0.28	-0.02,0.58	1.33	0.28	-0.09,0.64	1.33	0.29	-0.03,0.6	1.33
Spring/Summer	0.12	0.41,0	1.13	-0.04	-0.3,0.23	0.97	0.52	0.19,0.84	1.68	0.02	-0.26,0.29	1.02
Variance explained												
Between Subjects		40			32			32			31	
Between Villages		53			80			72			65	

*Reference value represents log transformed PAH value (in ng/m^3) for the reference model entry (smokeless coals from Fuyuan, burnt in a ventilated stove in a "small" room)
GMR: = geometric mean ratio = GM(estimate)/GM(reference)=exp(Estimate)
BPE – Benzo[ghi]perylene, BbF – Benzo[b]fluoranthene, DBA – Dibenz[ah]anthracene, BkF – Benzo[k]fluoranthene

Table S10b- Mixed effect models for personal exposure to particle bound PAHs

	IPY			PYR			BaA		
Reference/Background Value (Intercept)*	2.2			1.55			2.21		
Fuel Type	Estimate	95% CI	GMR	Estimate	95% CI	GMR	Estimate	95% CI	GMR
Smokeless Coal (FY & XW)	Ref		1	Ref		1	Ref		1
Coking Coal from North XW	1.01	0.39,1.61	2.73	1.12	0.19,2.04	3.06	1.55	0.78,2.31	4.72
Coking Coal from South XW	0.53	-0.46,1.5	1.7	0.52	-1.13,2.13	1.68	0.95	-0.37,2.26	2.59
Coking Coal from FY	0.92	0.18,1.65	2.51	0.73	-0.4,1.85	2.07	1.37	0.44,2.3	3.94
1/3 Coking coal FY	0.03	-0.9,0.9	1.03	0.09	-1.33,1.45	1.09	0.57	-0.59,1.67	1.76
Gas Fat coal FY	0.33	-0.41,1.04	1.39	0.06	-1.07,1.16	1.06	0.48	-0.43,1.37	1.62
Meagre Lean coal FY	0.73	-0.61,2.06	2.08	0.27	-1.75,2.28	1.31	1.06	-0.6,2.73	2.9
Multiple Coal Types	0.79	0.21,1.37	2.21	0.95	0.08,1.81	2.58	1.23	0.53,1.93	3.43
Multiple Fuel Types	0.82	0.28,1.37	2.28	0.98	0.16,1.8	2.66	1.24	0.58,1.9	3.45
Smoky Coal of uncertain type	0.83	-0.09,1.76	2.3	1.51	0.17,2.86	4.54	1.66	0.56,2.75	5.25
Plant Products	0.14	-1.02,1.3	1.15	-0.23	-1.94,1.49	0.8	0.38	-1.02,1.78	1.46
Wood	0.52	-0.4,1.44	1.68	0.45	-0.92,1.83	1.56	0.95	-0.19,2.09	2.57
Stove Design									
Ventilated Stove	Ref		1	Ref		1	Ref		1
Unventilated Stove	0.34	-0.13,0.81	1.41	0.33	-0.36,1.02	1.39	0.45	-0.12,1.02	1.57
Fire Pit	1.05	0.39,1.7	2.85	1.73	0.74,2.7	5.62	1.16	0.34,1.98	3.2
Portable Stove	0.11	-0.31,0.52	1.11	0.2	-0.41,0.82	1.23	0.36	-0.15,0.87	1.43
Mixed Ventilation	-0.01	-0.34,0.31	0.99	0.12	-0.36,0.6	1.13	0.06	-0.33,0.45	1.06
Unknown ventilation	-0.8	-1.53,-0.06	0.45	-1.31	-2.4,-0.22	0.27	-1.29	-2.19,-0.39	0.27
Room size (in m^3)									
<40m3	Ref		1	Ref		1	Ref		1
40m3 to 49m3	-0.22	-0.64,0.19	0.8	0.1	-0.5,0.71	1.11	-0.27	-0.78,0.24	0.77
50m3 to 67m3	0.47	0.03,0.92	1.61	0.84	0.18,1.5	2.31	0.59	0.03,1.14	1.8
>67m3	0.12	-0.33,0.56	1.12	0.44	-0.23,1.1	1.55	0.13	-0.42,0.68	1.14
Room Size Unknown	0.03	-0.4,0.46	1.03	0.38	-0.25,1.01	1.46	0.08	-0.45,0.6	1.08
Season									
Autumn	Ref		1	Ref		1	Ref		1
Winter	0.17	-0.15,0.47	1.18	0.68	0.22,1.14	1.98	0.36	-0.01,0.74	1.44
Spring/Summer	0.23	-0.04,0.5	1.26	-0.56	-0.96,-0.16	0.57	-0.26	-0.58,0.06	0.77
Variance explained									
Between Subjects		32			36			35	
Between Villages		65			54			62	

*Reference value represents log transformed PAH value (in ng/m^3) for the reference model entry (smokeless coals from Fuyuan, burnt in a ventilated stove in a "small" room)
GMR: = geometric mean ratio = GM(estimate)/GM(reference)=exp(Estimate)
IPY – Indeno[1,2,3-cd]pyrene, PYR – Pyrene, BaA – Benzo[a]anthracene

Table S11 - Mixed effect models for personal exposure to gas-phase PAHs

	PHE			ANY			FLU		
Reference/Background Value (Intercept)*	4.84			5.49			4.39		
Fuel Type	Estimate	95% CI	GMR	Estimate	95% CI	GMR	Estimate	95% CI	GMR
Smokeless Coal (FY & XW)	Ref		1	Ref		1	Ref		1
Coking Coal from North XW	0.43	4.16,5.55	1.54	0	4.73,6.27	1	0.51	3.69,5.09	1.67
Coking Coal from South XW	-	-	-	-	-	-	-	-	-
Coking Coal from FY	0.66	-0.26,1.08	1.94	-0.36	-0.75,0.73	0.7	0.39	-0.17,1.18	1.48
1/3 Coking coal FY	0.78	-0.47,1.66	2.17	0.06	-1.5,0.81	1.06	0.76	-0.69,1.47	2.14
Gas Fat coal FY	0.32	-0.62,2.18	1.37	0.06	-1.43,1.55	1.06	0.43	-0.62,2.16	1.53
Meagre Lean coal FY	1.54	-0.49,1.08	4.67	0.27	-0.85,0.95	1.3	0.98	-0.39,1.22	2.65
Multiple Coal Types	0.65	0.16,2.9	1.92	0.19	-1.21,1.73	1.21	0.63	-0.38,2.31	1.88
Multiple Fuel Types	0.81	-0.09,1.38	2.24	0.58	-0.61,0.99	1.78	0.76	-0.1,1.36	2.13
Smoky Coal of uncertain type	0.67	0.16,1.43	1.96	0.27	-0.15,1.29	1.31	0.86	0.11,1.39	2.37
Plant Products	0.85	-0.28,1.63	2.34	0.78	-0.7,1.23	2.18	0.44	-0.05,1.76	1.55
Wood	-0.53	-0.67,2.34	0.59	-0.36	-0.82,2.38	0.69	-0.73	-1.03,1.91	0.48
Stove Design									
Ventilated Stove	Ref		1	Ref		1	Ref		1
Unventilated Stove	1.2	-1.83,0.76	3.33	0.69	-1.74,1.01	1.99	1.02	-1.99,0.53	2.78
Fire Pit	1.75	0.51,1.5	5.73	1.52	-0.13,0.91	4.56	1.79	0.39,1.34	6.01
Portable Stove	1.01	0.59,1.76	2.73	0.4	0.07,1.31	1.49	0.87	0.44,1.61	2.38
Mixed Ventilation	0.11	0.75,2.72	1.12	-0.03	0.52,2.52	0.97	0.05	0.85,2.72	1.05
Unknown ventilation	-0.47	-0.28,0.51	0.62	-0.69	-0.44,0.38	0.5	-0.73	-0.33,0.43	0.48
Room size (in m^3)									
<40m3	Ref		1	Ref		1	Ref		1
40m3 to 49m3	-0.25	0.13,0.76	0.78	0.01	-0.15,0.53	1.01	-0.11	-0.01,0.61	0.9
50m3 to 67m3	0.51	-0.8,0.29	1.67	0.79	-0.53,0.55	2.2	0.7	-0.63,0.4	2.02
>67m3	0.13	-0.05,1.06	1.13	0.36	0.22,1.33	1.44	0.25	0.15,1.22	1.28
Room Size Unknown	-0.11	-0.42,0.67	0.89	0.22	-0.18,0.91	1.25	0.08	-0.27,0.75	1.09
Season									
Autumn	Ref		1	Ref		1	Ref		1
Winter	0.52	-1.24,0.29	1.67	0.42	-1.48,0.11	1.52	0.46	-1.46,0.01	1.58
Spring/Summer	0.45	0.14,0.88	1.56	0.19	-0.01,0.83	1.21	0.31	0.07,0.83	1.36
Variance explained									
Between Subjects		67			100			87	
Between Villages		100			71			84	

*Reference value represents log transformed PAH value (in ng/m^3) for the reference model entry (smokeless coals from Fuyuan, burnt in a ventilated stove in a "small" room)
GMR: = geometric mean ratio = GM(estimate)/GM(reference)=exp(Estimate)
PHE - Phenanthrene, ANY - Acenaphthylene, FLU - Fluorine

Table S12a - Mixed effect models for indoor measurements of particle bound PAHs

	BPE			BbF			DBA			BkF		
Reference/Background Value (Intercept)*	3.12			3.63			1.79			1.98		
Fuel Type	Estimate	95% CI	GMR	Estimate	95% CI	GMR	Estimate	95% CI	GMR	Estimate	95% CI	GMR
Smokeless Coal (FY & XW)	Ref		1	Ref		1	Ref		1	Ref		1
Coking Coal from North XW	0.89	0.23,1.54	2.44	0.78	0.16,1.39	2.18	1.02	0.32,1.71	2.78	0.85	0.22,1.48	2.34
Coking Coal from South XW	0.76	-0.39,1.9	2.13	0.62	-0.4,1.67	1.86	0.38	-0.7,1.46	1.46	0.64	-0.46,1.72	1.91
Coking Coal from FY	0.53	-0.24,1.3	1.7	0.61	-0.13,1.34	1.84	0.81	-0.02,1.64	2.26	0.62	-0.11,1.35	1.85
1/3 Coking coal FY	0.82	-0.16,1.79	2.28	0.89	0.01,1.75	2.43	0.7	-0.28,1.66	2.01	0.96	0.03,1.88	2.62
Gas Fat coal FY	0.22	-0.6,1.01	1.24	0.07	-0.66,0.8	1.08	0.19	-0.64,1.01	1.21	0.37	-0.38,1.12	1.45
Meagre Lean coal FY	0.69	-0.74,2.12	1.99	1.08	-0.29,2.44	2.93	1.6	0,3.19	4.93	0.86	-0.49,2.21	2.37
Multiple Coal Types	0.49	-0.13,1.11	1.63	0.48	-0.1,1.05	1.61	0.55	-0.13,1.23	1.74	0.51	-0.08,1.11	1.67
Multiple Fuel Types	0.63	0.07,1.19	1.88	0.62	0.09,1.15	1.86	0.57	-0.06,1.2	1.77	0.74	0.2,1.28	2.1
Smoky Coal of uncertain type	1.69	0.73,2.64	5.4	1.48	0.54,2.42	4.39	1.53	0.42,2.65	4.64	1.42	0.5,2.34	4.13
Plant Products	-0.51	-1.66,0.66	0.6	0.08	-1.04,1.21	1.08	-0.64	-1.95,0.68	0.53	0.39	-0.72,1.52	1.48
Wood	-0.48	-1.44,0.49	0.62	-0.04	-0.98,0.92	0.96	-0.78	-1.86,0.33	0.46	0.19	-0.73,1.13	1.21
Stove Design												
Ventilated Stove	Ref		1	Ref		1	Ref		1	Ref		1
Unventilated Stove	0.41	-0.06,0.88	1.51	0.67	0.22,1.12	1.96	0.43	-0.1,0.96	1.54	0.45	0,0.89	1.56
Fire Pit	0.92	0.19,1.62	2.51	0.88	0.17,1.57	2.42	0.71	-0.11,1.5	2.04	0.85	0.16,1.51	2.33
Portable Stove	0.16	-0.27,0.58	1.17	0.31	-0.1,0.72	1.36	0.09	-0.4,0.58	1.1	0.02	-0.39,0.43	1.02
Mixed Ventilation	0.23	-0.1,0.55	1.26	0.39	0.07,0.7	1.47	0.11	-0.27,0.49	1.12	0.31	0,0.62	1.37
Unknown ventilation	-0.87	-1.61,-0.12	0.42	-0.82	-1.54,-0.09	0.44	-0.96	-1.83,-0.1	0.38	-0.93	-1.64,-0.21	0.4
Room size (in m^3)												
<40m3	Ref		1	Ref		1	Ref		1	Ref		1
40m3 to 49m3	-0.47	-0.89,-0.06	0.62	-0.58	-1,-0.17	0.56	-0.43	-0.92,0.05	0.65	-0.4	-0.8,-0.01	0.67
50m3 to 67m3	0.08	-0.37,0.52	1.08	-0.01	-0.45,0.44	0.99	0.08	-0.44,0.6	1.08	0.05	-0.38,0.48	1.05
>67m3	0.11	-0.34,0.55	1.11	-0.09	-0.53,0.35	0.91	0.12	-0.38,0.63	1.13	-0.02	-0.45,0.4	0.98
Room Size Unknown	-0.36	-0.79,0.08	0.7	-0.56	-0.98,-0.13	0.57	-0.18	-0.68,0.33	0.84	-0.48	-0.9,-0.07	0.62
Season												
Autumn	Ref		1	Ref		1	Ref		1	Ref		1
Winter	-0.03	-0.37,0.31	0.97	-0.05	-0.37,0.25	0.95	0.39	0.03,0.73	1.47	0.03	-0.29,0.35	1.03
Spring/Summer	-0.09	-0.38,0.21	0.92	-0.1	-0.37,0.17	0.91	0.14	-0.19,0.46	1.14	0.09	-0.19,0.37	1.09
Variance explained												
Between Subjects		52			35			39			45	
Between Villages		28			47			74			39	

*Reference value represents log transformed PAH value (in ng/m^3) for the reference model entry (smokeless coals from Fuyuan, burnt in a ventilated stove in a "small" room)
GMR: = geometric mean ratio = GM(estimate)/GM(reference)=exp(Estimate)
BPE – Benzo[ghi]perylene, BbF – Benzo[b]fluoranthene, DBA – Dibenz[ah]anthracene, BkF – Benzo[k]fluoranthene

Table 12b- Mixed effect models for indoor measurements of particle bound PAHs

	IPY			PYR			BaA		
Reference/Background Value (Intercept)*	2.83			1.8			2.72		
Fuel Type	Estimate	95% CI	GMR	Estimate	95% CI	GMR	Estimate	95% CI	GMR
Smokeless Coal (FY & XW)	Ref		1	Ref		1	Ref		1
Coking Coal from North XW	0.72	0.12,1.31	2.05	1.15	0.24,2.06	3.15	1.24	0.5,1.97	3.45
Coking Coal from South XW	0.71	-0.31,1.73	2.04	1.46	-0.21,3.13	4.31	1.35	0.01,2.69	3.86
Coking Coal from FY	0.41	-0.29,1.11	1.51	0.78	-0.26,1.84	2.19	0.85	0.01,1.7	2.33
1/3 Coking coal FY	0.38	-0.53,1.26	1.46	1.64	0.23,3.04	5.16	1.24	0.11,2.35	3.45
Gas Fat coal FY	0.24	-0.49,0.96	1.28	0.38	-0.72,1.48	1.47	0.45	-0.44,1.34	1.57
Meagre Lean coal FY	0.65	-0.66,1.96	1.91	0.41	-1.52,2.36	1.51	0.72	-0.84,2.29	2.05
Multiple Coal Types	0.42	-0.15,0.99	1.52	1.11	0.29,1.95	3.05	0.95	0.28,1.62	2.57
Multiple Fuel Types	0.57	0.05,1.09	1.77	1.16	0.4,1.92	3.18	0.94	0.34,1.55	2.57
Smoky Coal of uncertain type	0.92	0.02,1.82	2.5	3.36	2.08,4.66	28.93	2.14	1.1,3.19	8.53
Plant Products	-0.14	-1.22,0.94	0.87	0.75	-0.82,2.34	2.11	0.32	-0.94,1.6	1.38
Wood	0.02	-0.87,0.93	1.02	0.95	-0.35,2.29	2.58	0.36	-0.69,1.44	1.43
Stove Design									
Ventilated Stove	Ref		1	Ref		1	Ref		1
Unventilated Stove	0.33	-0.11,0.76	1.39	0.75	0.11,1.4	2.13	0.7	0.18,1.22	2.02
Fire Pit	0.73	0.07,1.38	2.08	1.5	0.53,2.44	4.5	1.04	0.24,1.81	2.84
Portable Stove	-0.09	-0.49,0.3	0.91	0.14	-0.43,0.72	1.15	0.16	-0.31,0.63	1.18
Mixed Ventilation	0.12	-0.19,0.42	1.13	0.26	-0.18,0.7	1.29	0.36	0.01,0.71	1.43
Unknown ventilation	-0.65	-1.35,0.05	0.52	-1.43	-2.44,-0.4	0.24	-1.17	-1.99,-0.35	0.31
Room size (in m3)									
<40m3	Ref		1	Ref		1	Ref		1
40m3 to 49m3	-0.43	-0.82,-0.05	0.65	-0.53	-1.09,0.03	0.59	-0.5	-0.96,-0.05	0.6
50m3 to 67m3	0.01	-0.41,0.44	1.01	0.34	-0.26,0.95	1.41	0.11	-0.38,0.61	1.12
>67m3	0.06	-0.36,0.47	1.06	0.5	-0.11,1.1	1.65	0.14	-0.36,0.63	1.15
Room Size Unknown	-0.33	-0.73,0.08	0.72	-0.2	-0.79,0.38	0.82	-0.4	-0.88,0.07	0.67
Season									
Autumn	Ref		1	Ref		1	Ref		1
Winter	0.09	-0.22,0.4	1.1	0.22	-0.25,0.7	1.25	0	-0.38,0.37	1
Spring/Summer	0.02	-0.25,0.29	1.02	-0.48	-0.89,-0.08	0.62	-0.27	-0.59,0.05	0.76
Variance explained									
Between Subjects		39			62			48	
Between Villages		40			36			39	

*Reference value represents log transformed PAH value (in ng/m^3) for the reference model entry (smokeless coals from Fuyuan, burnt in a ventilated stove in a "small" room)
GMR: = geometric mean ratio = GM(estimate)/GM(reference)=exp(Estimate)
BPE – Benzo[ghi]perylene, BbF – Benzo[b]fluoranthene, DBA – Dibenz[ah]anthracene, BkF – Benzo[k]fluoranthene

Table S13 - Total PAH values and BaP_{eq} values by fuel type and stove design

		Total PAH			BaP_{eq}		
	N	AM	GM	GSD	AM	GM	GSD
Smoky Coal	**96**	**6600**	**4500**	**2.5**	**243.07**	**134.63**	**2.98**
Ventilated Stove	53	4500	3800	1.9	172.88	121.21	2.37
Unventilated Stove	4	16000	9900	2.9	701.53	455.93	2.78
Portable Stove	12	7500	6100	2	159.22	112.34	2.38
Firepit	4	28000	24000†	2	1065.05	907.3†	1.93
Mixed Ventilation	19	6300	4200	3.2	263.98	148.72	3.3
Unknown	4	1800	1500	2.1	44.91	25.42	3.06
Smokeless Coal	**17**	**4400**	**4100**	**1.5**	**91.33**	**66.01**	**2.38**
Ventilated Stove	0	-	-	-	-	-	-
Unventilated Stove	9	4000	3700	1.6	73.73	57.04	2.25
Portable Stove	7	5300	5000	1.4	123.39	91.36	2.46
Firepit	0	-	-	-	-	-	-
Mixed Ventilation	1	2800	2800	-	25.28	25.28	-
Unknown	0	-	-	-	-	-	-
"Other" Coal	**14**	**12000**	**7500**	**2.9**	**287.98**	**167.19**	**3.4**
Ventilated Stove	6	4400	3300	2.4	110.18	70.15	3.06
Unventilated Stove	0	-	-	-	-	-	-
Portable Stove	7	18000	15000	2.1	429.69	315.1	2.56
Firepit	0	-	-	-	-	-	-
Mixed Ventilation	1	8500	8500	-	362.89	362.89	-
Unknown	0	-	-	-	-	-	-
Wood	**7**	**20000**	**11000**	**3.7**	**222.36**	**182.72**	**2.05**
Ventilated Stove	2	20000	19000	1.2	324.87	321.76	1.22
Unventilated Stove	0	-	-	-	-	-	-
Portable Stove	3	30000	21000	2.9	228.44	193.13	1.98
Firepit	2	3500	2500	3.5	110.72	95.48	2.2
Mixed Ventilation	0	-	-	-	-	-	-
Unknown	0	-	-	-	-	-	-
Plant	**3**	**38000**	**31000***	**2.1**	**331.58**	**327.52**	**1.22**
Ventilated Stove	0	-	-	-	-	-	-
Unventilated Stove	1	72000	72000	-	352.24	352.24	-
Portable Stove	0	-	-	-	-	-	-
Firepit	1	18000	18000	-	262.47	262.47	-
Mixed Ventilation	1	24000	24000	-	380.01	380.01	-
Unknown	0	-	-	-	-	-	-
"Other" Fuel	**56**	**11000**	**6400**	**3**	**239.83**	**115.28**	**3.23**
Ventilated Stove	9	6500	4600	2.4	123.68	94.92	2.49
Unventilated Stove	11	30000	19000	3.4	706.9	378.71	3.96
Portable Stove	5	6900	6100	1.7	151.96	95.69	2.87
Firepit	0	-	-	-	-	-	-
Mixed Ventilation	28	6700	4900	2.6	127.55	85.01	2.62
Unknown	3	6500	3500	4	69.97	61.75	1.92

*- significant difference with smoky coal for same strata via Tukey HSD test
† - significant difference with ventilated stove for same PAH within fuel strata via Tukey HSD test
N – number of samples
Total PAH: Sum concentration of all 14 reported PAH measurements, restricted to samples where measurements for all 14 PAHs were available (n=193, personal only)
BaP toxic equivalent values (BaPeq) are calculated using toxic equivalencies as stated by Nisbet and Lagoy, 1992 (Nisbet, I.C.; Lagoy, P.K. Toxic equivalency factors (TEFs) for polycyclic aromatic hydrocarbons (PAHs). Regulatory Toxicology and Pharmacology, 1992, 16(3), 290-300). Bapeq was calculated as follows:
BaPeq= 5xDBA+1xBaP+0.1xBaA+0.1xBbF+0.1xIPY+0.01xBPE+0.01xCHR+0.001xANY+0.001xFLU+0.001xNAP+0.001xPHE+0.001xPYR

Table S14 - Total PAH values and BaPeq values by smoky coal source

			Total PAH			BaP_{eq}		
		N	AM	GM	GSD	AM	GM	GSD
Xuanwei	**Coking Coal**	**61**	**5700**	**4200**	**2.4**	**246.3**	**156.7**	**2.8**
	Azhi	19	5200	4300	2	245.1	175.5	2.5
	Baoshan	7	9300	6200	2.7	375	194.8	4.1
	Laibin	19	4200	3300	2.6	205	145.9	2.5
	Tangtang	16	6500	4600	2.4	240.4	135.4	3.1
Fuyuan	**Overall**	**30**	**8200**	**4600**	**2.7**	**232.9**	**90.0***	**3.4**
	Coking	5	25000	12000†	4.8	896.4	411.2†	5.1
	Daping	2	2300	2300	1.2	96.5	82.3	2.3
	Haidan	3	40000	35000	1.9	1429.6	1201.6	2.2
	1/3 Coking (Dahe)	2	3500	2800	2.6	25.9	23.2	1.9
	Gas Fat (Haidan)	21	4600	3700	2.1	96.2	68.8	2.2
	Meager Lean (Gumu)	2	8900	6900	2.9	216.2	126.3	5

*- significant difference between smoky coal subtypes from Fuyuan
† - significant variation within designated smoky coal subtype
N – number of samples
Total PAH: Sum concentration of all 14 reported PAH measurements, restricted to samples where measurements for all 14 PAHs were available (n=193, personal only)
BaP toxic equivalent values (BaPeq) are calculated using toxic equivalencies as stated by Nisbet and Lagoy, 1992 (Nisbet, I.C.; Lagoy, P.K. Toxic equivalency factors (TEFs) for polycyclic aromatic hydrocarbons (PAHs). Regulatory Toxicology and Pharmacology, 1992, 16(3), 290-300). Bapeq was calculated as follows:
BaPeq= 5xDBA+1xBaP+0.1xBaA+0.1xBbF+0.1xIPY+0.01xBPE+0.01xCHR+0.001xANY+0.001xFLU+0.001xNAP+0.001xPHE+0.001xPYR

Table S15 - Mixed effect models for total PAH values and BAP_{eq} values

	Total PAH			BaP_{eq}		
Reference/Background Value (Intercept)*	7.82			3.83		
Fuel Type	Estimate	95%CI	GMR	Estimate	95%CI	GMR
Smokeless Coal (FY & XW)	Ref		1	Ref		1
Coking Coal from North XW	0.17	-0.44,0.78	1.19	1.16	0.46,1.86	3.2
Coking Coal from South XW						
Coking Coal from FY	-0.08	-1.04,0.89	0.92	1.01	-0.18,2.17	2.75
1/3 Coking coal FY	0.1	-1.13,1.34	1.11	-0.26	-1.57,1.05	0.77
Gas Fat coal FY	-0.03	-0.79,0.7	0.97	0.2	-0.68,1.03	1.22
Meagre Lean coal FY	0.72	-0.51,1.95	2.06	1.24	-0.16,2.61	3.44
Multiple Coal Types	0.53	-0.12,1.19	1.7	1.04	0.31,1.76	2.82
Multiple Fuel Types	0.58	-0.01,1.17	1.79	0.76	0.1,1.41	2.14
Smoky Coal of uncertain type	0.6	-0.21,1.4	1.81	1.13	0.17,2.09	3.08
Plant Products	0.4	-0.92,1.74	1.5	-0.04	-1.54,1.47	0.96
Wood	-0.39	-1.53,0.75	0.67	-0.13	-1.45,1.21	0.88
Stove Design						
Ventilated Stove	Ref		1	Ref		1
Unventilated Stove	0.72	0.19,1.25	2.05	0.77	0.16,1.37	2.16
Fire Pit	1.48	0.64,2.3	4.38	1.54	0.52,2.55	4.69
Portable Stove	0.57	0.14,1	1.77	0.32	-0.2,0.84	1.38
Mixed Ventilation	-0.07	-0.41,0.28	0.93	-0.16	-0.56,0.23	0.85
Unknown ventilation	-0.64	-1.3,0.02	0.53	-0.85	-1.63,-0.07	0.43
Room size (in m^3)						
<40m3	Ref		1	Ref		1
40m3 to 49m3	-0.22	-0.67,0.23	0.8	-0.56	-1.13,0.01	0.57
50m3 to 67m3	0.55	0.07,1.01	1.74	0.3	-0.27,0.87	1.35
>67m3	0.11	-0.35,0.56	1.12	-0.27	-0.84,0.31	0.77
Room Size Unknown	0.05	-0.42,0.5	1.05	-0.06	-0.63,0.5	0.94
Season						
Autumn	Ref		1	Ref		1
Winter	0.51	0.15,0.86	1.66	0.38	-0.02,0.75	1.46
Spring/Summer	0.17	-0.12,0.45	1.18	0.25	-0.05,0.56	1.29
Variance explained						
Between Subjects		100			37	
Between Villages		73			90	

*Reference value represents log transformed PAH value (in ng/m3) for the reference model entry (smokeless coals from Fuyuan, burnt in a ventilated stove in a "small" room)
GMR: = geometric mean ratio = GM(estimate)/GM(reference)=exp(Estimate)
BPE – Benzo[ghi]perylene, BbF – Benzo[b]fluoranthene, DBA – Dibenz[ah]anthracene, BkF – Benzo[k]fluoranthene
Total PAH: Sum concentration of all 14 reported PAH measurements, restricted to samples where measurements for all 14 PAHs were available (n=193, personal only)
BaP toxic equivalent values (BaPeq) are calculated using toxic equivalencies as stated by Nisbet and Lagoy, 1992 (Nisbet, I.C.; Lagoy, P.K. Toxic equivalency factors (TEFs) for polycyclic aromatic hydrocarbons (PAHs). Regulatory Toxicology and Pharmacology, 1992, 16(3), 290-300). Bapeq was calculated as follows:
BaPeq= 5xDBA+1xBaP+0.1xBaA+0.1xBbF+0.1xIPY+0.01xBPE+0.01xCHR+0.001xANY+0.001xFLU+0.001xNAP+0.001xPHE+0.001xPYR