Supplementary data

Health risk assessment of heavy metals accumulated on $PM_{2.5}$ fractioned road dust from two cities of Pakistan.

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Table S1. Reference dose and slope factor values used for calculation of hazard indices (Rehman et al. 2020)[1] [2]

	Cd	Cr	Cu	Ni	Pb	Zn	Sb
RfD_{Inh}	1.00E-03	2.86E-05	4.02E-02	2.06E-02	3.52E-03	3.00E-01	
SF	6.30E+00	4.20E+01	-	8.40E-01	8.50E-03	-	7.10E-04

Table S2. Non-carcinogenic and carcinogenic risk indices of toxic heavy metals in PM2.5 fraction of road dust samples.

		Karachi															
		Children	**Adults**	**Children**	**Adults**	**Children**	**Adults**	**Children**	**Adults**	**Children**	**Adults**	**Children**	**Adults**	**Children**	**Adults**	**Children**	**Adults**
		K.S1	**K.S1**	**K.S2**	**K.S2**	**K.H1**	**K.H1**	**K.H2**	**K.H2**	**K.R1**	**K.R1**	**K.R2**	**K.R2**	**K.O1**	**K.O1**	**K.O2**	**K.O2**
Pb	HQ_{Inh}	1.09E-07	4.54E-06	4.97E-05	2.06E-06	2.2E-05	9.13E-06	1.74E-05	7.23E-06	2.52E-05	1.05E-05	1.2E-05	5E-06	1.48E-05	6.15E-06	8.57E-06	3.56E-06
	CR	3.275E-10	1.36E-10	1.49E-10	6.17E-11	6.58E-10	2.73E-10	5.21E-10	2.16E-10	7.54E-10	3.13E-10	3.6E-10	1.5E-10	4.43E-10	1.84E-10	2.57E-10	1.06E-10
Cu	HQ_{Inh}	2.828E-06	1.17E-06	2.2E-07	9.12E-08	1.42E-06	5.89E-07	4.48E-07	1.86E-07	9.67E-07	4.01E-07	9.16E-07	3.8E-07	9.41E-07	3.91E-07	5.08E-07	2.11E-07
	CR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cd	HQ_{Inh}	5.14E-06	2.13E-06	2.23E-06	9.27E-07	1.42E-05	5.9E-06	4.67E-06	1.94E-06	1.34E-05	5.54E-06	7.16E-06	2.97E-06	9.97E-06	4.14E-06	5.32E-06	2.21E-06
	CR	3.239E-08	1.34E-08	1.41E-08	5.84E-09	8.95E-08	3.71E-08	2.94E-08	1.22E-08	8.42E-08	3.49E-08	4.51E-08	1.87E-08	6.28E-08	2.61E-08	3.35E-08	1.39E-08
Ni	HQ_{Inh}	1.68E-06	6.98E-07	8.62E-07	3.58E-07	3.53E-06	1.47E-06	1.69E-06	7.03E-07	4.16E-06	1.73E-06	1.92E-06	7.99E-07	3.32E-06	1.38E-06	1.67E-06	6.93E-07
	CR	2.911E-08	1.21E-08	1.49E-08	6.19E-09	6.11E-08	2.54E-08	2.93E-08	1.22E-08	7.21E-08	2.99E-08	3.33E-08	1.38E-08	5.74E-08	2.38E-08	2.89E-08	1.2E-08
Cr	HQ_{Inh}	4.91E-04	2.04E-04	2.51E-04	1.04E-04	1.42E-03	5.90E-04	4.04E-04	1.68E-04	7.73E-04	3.21E-04	6.98E-04	2.90E-04	7.02E-04	2.92E-04	4.19E-04	1.74E-04
	CR	5.897E-07	2.45E-07	3.02E-07	1.25E-07	1.71E-06	7.08E-07	4.85E-07	2.01E-07	9.28E-07	3.85E-07	8.39E-07	3.48E-07	8.44E-07	3.5E-07	5.04E-07	2.09E-07
Zn	HQ_{Inh}	1.12E-06	4.63E-07	5.53E-07	2.29E-07	3.44E-06	1.43E-06	1.09E-06	4.52E-07	2.77E-06	1.15E-06	1.90E-06	7.9E-07	1.92E-06	7.98E-07	1.33E-06	5.5E-07
	CR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sb	HQ_{Inh}	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	CR	5.51E-12	2.28E-12	2.16E-12	8.97E-13	9.95E-12	4.13E-12	4.15E-12	1.72E-12	1.08E-11	4.49E-12	5.54E-12	2.30E-12	7.46E-12	3.09E-12	4.18E-12	1.73E-12
		Shikarpur															

		Children S.S1	Adults S.S1	Children S.S2	Adults S.S2	Children S.H1	Adults S.H1	Children S.H2	Adults S.H2	Children S.R1	Adults S.R1	Children S.R2	Adults S.R2	Children S.O1	Adults S.O1	Children S.O2	Adults S.O2
Pb	HQ_{Inh}	3.134E-05	1.3E-05	1.67E-05	6.91E-06	1.17E-05	4.86E-06	1.86E-05	7.71E-06	1.94E-05	8.06E-06	1.48E-05	6.15E-06	2.28E-05	9.45E-06	1.7E-05	7.07E-06
	CR	9.377E-10	3.89E-10	4.98E-10	2.07E-10	3.51E-10	1.46E-10	5.56E-10	2.31E-10	5.81E-10	2.41E-10	4.43E-10	1.84E-10	6.82E-10	2.83E-10	5.1E-10	2.11E-10
Cu	HQ_{Inh}	9.647E-07	4E-07	5.23E-07	2.17E-07	3.46E-07	1.44E-07	6.37E-07	2.64E-07	6.09E-07	2.53E-07	6.48E-07	2.69E-07	7.91E-07	3.28E-07	1.57E-06	6.52E-07
	CR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cd	HQ_{Inh}	9.741E-06	4.04E-06	5.32E-06	2.21E-06	4.93E-06	2.05E-06	7.47E-06	3.1E-06	6.81E-06	2.83E-06	7.76E-06	3.22E-06	9.25E-06	3.84E-06	6.12E-06	2.54E-06
	CR	6.137E-08	2.55E-08	3.35E-08	1.39E-08	3.11E-08	1.29E-08	4.71E-08	1.95E-08	4.29E-08	1.78E-08	4.89E-08	2.03E-08	5.83E-08	2.42E-08	3.86E-08	1.6E-08
Ni	HQ_{Inh}	8.236E-07	3.42E-07	5.19E-07	2.16E-07	3.78E-07	1.57E-07	4.09E-07	1.7E-07	5.27E-07	2.19E-07	6.47E-07	2.68E-07	2.72E-06	1.13E-06	3.5E-07	1.45E-07
	CR	1.425E-08	5.91E-09	8.99E-09	3.73E-09	6.54E-09	2.71E-09	7.08E-09	2.94E-09	9.12E-09	3.78E-09	1.12E-08	4.64E-09	4.7E-08	1.95E-08	6.06E-09	2.52E-09
Cr	HQ_{Inh}	1.19E-03	4.93E-04	1.09E-03	4.52E-04	3.24E-03	1.34E-03	2.29E-03	9.52E-04	8.48E-04	3.52E-04	1.22E-03	5.08E-04	1.44E-03	5.99E-04	7.45E-04	3.09E-04
	CR	1.428E-06	5.93E-07	1.31E-06	5.43E-07	3.89E-06	1.61E-06	2.75E-06	1.14E-06	1.02E-06	4.23E-07	1.47E-06	6.1E-07	1.73E-06	7.19E-07	8.95E-07	3.71E-07
Zn	HQ_{Inh}	4.848E-06	2.01E-06	2.36E-06	9.78E-07	1.96E-06	8.14E-07	3.08E-06	1.28E-06	4.24E-06	1.76E-06	3.75E-06	1.55E-06	4.77E-06	1.98E-06	2.71E-06	1.13E-06
	CR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sb	HQ_{Inh}	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	CR	3.15E-11	1.30E-11	1.33E-11	5.52E-12	2.46E-11	1.02E-11	3.55E-11	1.47E-11	2.81E-11	1.16E-11	2.68E-11	1.11E-11	4.18E-11	1.73E-11	2.06E-11	8.55E-12

Table S3. Calculated values of Hazard Index (HI) for non-carcinogenic and carcinogenic heavy metals in PM2.5 fraction of road dust samples.

City		**Elements**						
Karachi		**Pb**	**Cu**	**Cd**	**Ni**	**Cr**	**Zn**	**Sb**
	HI(Children)	1.16E-04	8.25E-06	6.21E-05	1.88E-05	5.16E-03	1.41E-05	-
	CR(Children)	3.47E-09	-	3.91E-07	3.26E-07	6.20E-06	-	4.98E-11
	HI(Adults)	4.81E-05	3.42E-06	2.58E-05	7.82E-06	2.14E-03	5.86E-06	-
	CR(Adults)	1.44E-09	-	1.62E-07	1.35E-07	2.57E-06	-	2.06E-11
Shikarpur		**Pb**	**Cu**	**Cd**	**Ni**	**Cr**	**Zn**	**Sb**
	HI(Children)	1.52E-04	6.09E-06	5.74E-05	6.37E-06	1.21E-02	2.77E-05	-
	CR(Children)	4.56E-09	-	3.62E-07	1.10E-07	1.45E-05	-	2.22E-10
	HI(Adults)	6.32E-05	2.53E-06	2.38E-05	2.64E-06	5.01E-03	1.15E-05	-
	CR(Adults)	1.89E-09	-	1.50E-07	4.57E-08	6.02E-06	-	9.22E-11

Table S4. Classifications of geoaccumulation index (Muller, 1969)[3]

Value	Category
$\mathbf{I_{geo} \leqslant 0}$	unpolluted
$\mathbf{0 < I_{geo} \leqslant 1}$	unpolluted to moderately polluted
$\mathbf{1 < I_{geo} \leqslant 2}$	moderately polluted
$\mathbf{2 < I_{geo} \leqslant 3}$	moderately to strongly polluted
$\mathbf{3 < I_{geo} \leqslant 4}$	strongly polluted
$\mathbf{4 < I_{geo} \leqslant 5}$	strongly to extremely polluted
$\mathbf{I_{geo} > 5}$	extremely polluted

Table S5. Classifications of enrichment factor index.

Value	Category
EF~2	minimal enrichment
EF 2 – 5	moderate enrichments
EF 5 – 20	significant enrichments
EF 20 – 40	Very highly enriched
EF 40	extremely enriched

Figure S1. Resuspension chamber with $PM_{2.5}$ size selective cutter

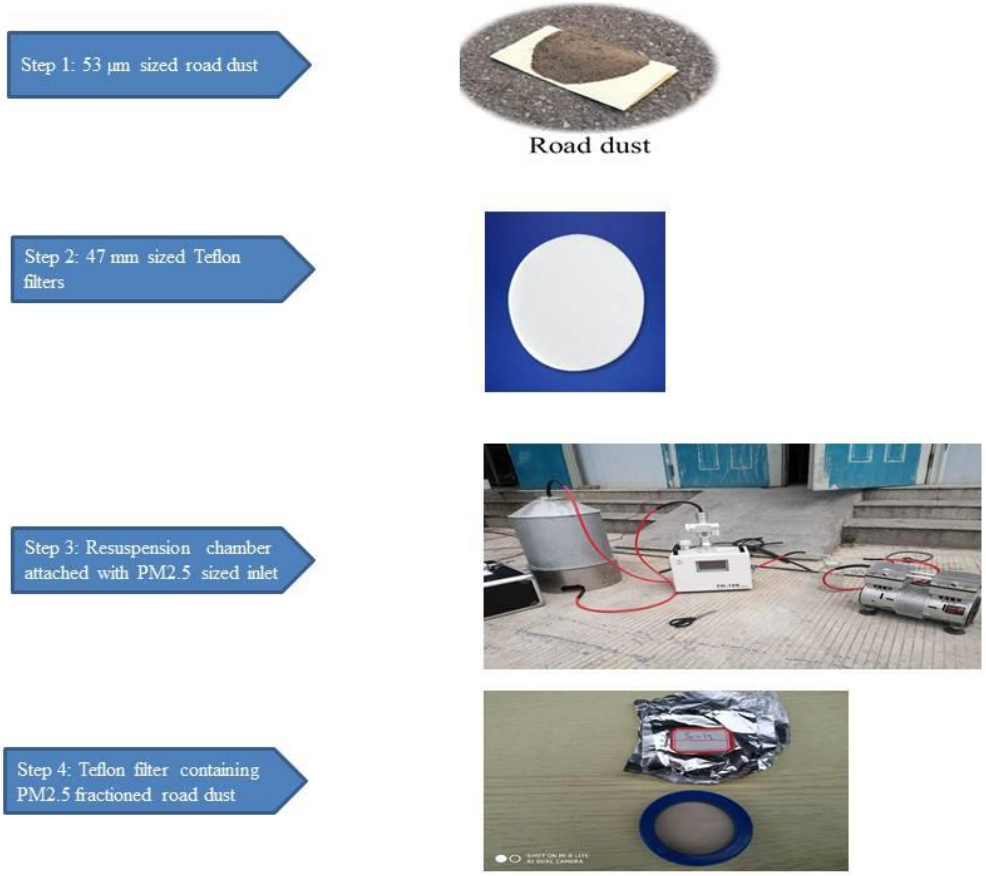

Figure S2. Sampling scheme for the preparation of $PM_{2.5}$ fractioned road dust.

References

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