

A new approach to assess the degree of contamination and determine sources and risks related to PTEs in an urban environment: the case study of Santiago (Chile).

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Supplementary Material S4. Determination of dosis related to specific exposure pathways

As for the study area, for each PTE, doses, expressed as $\text{mg kg}^{-1} \text{ d}^{-1}$, were calculated considering, as pathways, ingestion of soil and soil dust inhalation, respectively, and for carcinogenic and/or non-carcinogenic effects (USEPA, 1989, 1997, 2001; USDOE, 2011) as follows (Equations S1, S2, S3, S4):

$$D_{\text{ing-nc}} = \frac{C \times IR_{\text{ing}} \times EF \times ED \times 10^{-6}}{BW \times AT_{\text{nc}}} \quad (\text{Eq. S1})$$

$$D_{\text{inh-nc}} = \frac{C \times EF \times ET \times ED}{PEF \times 24 \times AT_{\text{nc}}} \quad (\text{Eq. S2})$$

$$D_{\text{ing-ca}} = \frac{C \times IR_{\text{ing}} \times EF \times ED \times 10^{-6}}{BW \times AT_{\text{ca}}} \quad (\text{Eq. S3})$$

$$D_{\text{inh-ca}} = \frac{C \times EF \times ET \times ED}{PEF \times 24 \times AT_{\text{ca}}} \times 10^3 \quad (\text{Eq. S4})$$

where:

- $D_{\text{ing-nc}}$ is the dosis (Expressed as $\text{mg kg}^{-1} \text{ d}^{-1}$) for soil ingestion for non carcinogenic effects;
- $D_{\text{inh-nc}}$ is the dosis (Expressed as mg m^{-3}) for inhalation of soil dust;
- $D_{\text{ing-ca}}$ is the dosis (Expressed as $\text{mg kg}^{-1} \text{ d}^{-1}$) for accidental soil ingestion for carcinogenic effects;
- $D_{\text{inh-a}}$ is the dosis (Expressed as $\mu\text{g m}^{-3}$) for inhalation of soil dust for carcinogenic effects.
- C is the contaminant concentration (Expressed as mg kg^{-1})
- IR_{ing} , EF , ED , BW , AT_{nc} , AT_{ca} , ET , PEF are specific exposure factors whose values and units are reported in the table below:

Variable	Units	Child Ingestion	Adult Inhalation	Child Inhalation	Reference
Soil ingestion rate (IR_{ing})	mg day^{-1}	200	-	-	USEPA 1991
Body weight (BW)	kg	19	72	19	USEPA 2011
Expousure Frequency (EF)	day year^{-1}	350	350	350	USDOE 2011
Expousure Time (ET)	h day^{-1}	-	24	24	USDOE 2011
Exposure Duration (ED)	years	6	30	6	USEPA 2011
Averaging time non-carcinogenic (AT_{nc})	$\text{day (ED} \times 365)$	2190	10950	2190	-
Averaging time carcinogenic (AT_{ca})	$\text{day (LT} \times 365)$	29090.5	29090.5	29090.5	-
Particle emission factor (PEF)	$\text{m}^3 \text{ kg}^{-1}$	-	1.36×10^9	1.36×10^9	USEPA 2002
Lifetime (LT)	years	79.7	79.7	79.7	UNDP, 2012

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