Cadmium levels in house dust samples from Portugal

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introduction

- Cadmium is a toxic metal classified as a human carcinogen[1,2]. It occurs naturally in the environment at low levels; however, human activities have dramatically increased the amount of Cd in circulation. Mining, smelting and refining of non-ferrous metals, fossil fuel combustion, tobacco smoking, incineration of municipal waste, manufacture of phosphate fertilizers, and recycling of cadmium-plated steel scrap and electric and electronic waste are amongst the anthropogenic activities responsible for the load of this metal into the environment[1,2,3].

- The general population is exposed to cadmium through[1,2]:
  - consumption of food and drinking water
  - ingestion of contaminated soil and dust
  - inhalation from ambient air or cigarette smoke

methods

Sampling
Twenty eight volunteers from two Portuguese cities (Aveiro and Coimbra) donated their vacuum cleaner bags, answered a questionnaire and signed an informed consent.

Chemical analysis
- 50mg of sieved sample was digested on a microwave system (Milestone ETHOS-D) with 5 mL nitric acid, 2 mL hydrofluoric acid and 3 mL hydrogen peroxide[4].
- Cadmium concentrations were quantified by ICP-MS (Agilent Technologies7500).

QA/QC
Certified calibration standards; Certified Reference Material (NIST SRM 2710a – Montana Soil I)

references


Health risk assessment

- Tolerable Cadmium Weekly Intake (TWI) set by FAO/WHO=2.5 μg/kg body weight[5].

results and discussion

Cadmium levels

- Cadmium levels were highly variable (Fig. 2), from 0.1 up to 8.3 μg.g⁻¹, thus reflecting the diversity of sources in modern households.

Conclusions

- This work highlights the widespread occurrence of cadmium in dust samples from Portuguese houses.
- Considering that cadmium has reported adverse health effects on humans[1,2] further studies are necessary to characterize cumulative exposures and potential health risks.