

ASSOCIATIONS BETWEEN BLOOD LEAD LEVELS OF FRENCH CHILDREN AND ENVIRONMENTAL LEAD CONCENTRATIONS: PROPOSITIONS OF RISK BASED ENVIRONMENTAL LEAD CONCENTRATIONS LEVELS FOR POLICY MAKING

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Background and Aims: Reductions of environmental lead concentrations and therefore of Blood Lead Levels (BLLs) have been achieved last decades thanks to public health policies (ban of leaded gasoline and leaded paints ...). However, children's lead exposure remains a major public health concern, considering the increasing scientific evidence for adverse effects (including cognitive and neurobehavioral deficit) without apparent threshold. The aim of this study is to propose risk based environmental lead concentrations levels in the residential dust, soil and water for policy making.

Methods: 484 French children were enrolled from the survey of the National Institute of Health surveillance (InVS) in a way to be representative of French children aged from 6 months to 6 years. Lead concentrations in blood and environmental samples (water, soils, home dusts, paints and other unusual sources such as cosmetics and traditional dishes) were measured using an ICP-MS, both for total and bioaccessible lead. Social and individual characteristics were collected in addition to housing data. A predictive multivariate model was built with a priori assumption on the covariates to be introduced. Missing data were replaced using multiple imputation by chained equations; the sampling design and sampling weights were taken into account in the model, and cross-validation based on bootstrapping was used.

Results: The population weighted Geometric mean (GM) for BLLs was 1.4 µg/L. The preliminary analyses yielded to significant positive associations between BLLs and lead concentrations in environmental medias after adjustment on sexe, age, tobacco, child's time activity pattern, hobbies at risk, parents educational attainment and use of cosmetics and traditional dishes. More analyses and adjustments are ongoing in order to validate the model. The final results will display: i) action levels (corresponding to BLL increment) for lead concentrations in water, soils and dusts, ii) the most predictive lead concentration measurement method (total or leachable) of BLLs.

Conclusions: This predictive model intended to be a basis to establish and update regulatory action levels for lead concentrations in the different residential medias of exposure, in the context of Public Health attention paid to lower BLLs of young children.