RAMBOLL

ENVIRONMENT
& HEALTH

Environmental Protection Agency
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460
EPA-HQ-OAR-2020-0312
FRL-7887-03-OAR

Follow-up comments on Integrated Review Plan for the National Ambient Air Quality Standards for Lead.
Volume 3: Planning Document for Quantitative Exposure/Risk Analyses

July 14, 2023

Ramboll
901 Fifth Avenue
Suite 3900
Seattle, WA 98164
USA

T +1 206 336 1650
F +1 206 336 1651
https://ramboll.com

We have previously commented on the planned approach for modeling IQ decrements in young children described in the Integrated Review Plan for the National Ambient Air Quality Standards for Lead (IRP) (Ramboll June 12, 2023 comments). The United States Environmental Protection Agency (EPA) describes newly available information on this technical area in Section K of Table 2-3 and associated text in Volume 3 of the IRP. We noted that EPA has not provided adequate detail to allow for critical review of the plan for modeling IQ decrements in young children, and the available information suggests the plan may not be robust enough to support a reliable dose-response analysis. Our concerns on this point were reinforced by the EPA presentation at the June 14, 2023 public meeting of the Clean Air Scientific Advisory Committee Lead Review Panel (CASAC).

Specifically, we continue to believe that by reducing the data used for the Concentration-Response (C-R) function to just the Boston and Rochester data from the Lanphear cohort, the sample size will be reduced to such a small number that the EPA plan is unlikely to yield a reliable C-R function, especially if only those records with blood lead (BPb) less than 5 µg/dL are used.

We also believe that EPA's plan fails to provide a method for accounting for uncontrolled confounding. Van Landingham et al. (2020) raise concerns about the modeling in the low exposure range. Their analysis shows that "confounders influence IQ estimates in a quantifiable way that may exceed or at least obscure previously reported effects of blood lead on IQ with blood lead levels below 5 µg/dL; however, limitations in the datasets make predictions of the low dose dose/response analysis questionable". Van Landingham et al. (2020) present a method to identify characteristic variables likely to be confounders. Using the full dataset used by Lanphear et al. (2005) and Crump et al. 2013), Van Landingham et al. (2020) confirmed that maternal IQ, HOME score, marital status at delivery, and maternal education are "Highly Likely" confounders, while the race is a "Likely" confounder. EPA has confirmed to one of us (Van Landingham) that they have reproduced the results of the method presented in Van Landingham et al. (2020) (Evan Coffman, personal communication, email dated May 18, 2023). Based on these findings, any EPA analysis of the cohort data to predict low dose effects of lead exposure in young children using the methods presented in Crump et al. (2013) and Lanphear et al. (2005, 2019) should consider the interactions among the confounding variables identified in this analysis as potential confounders in both the correlation analysis and regression modeling.

We have several additional specific comments on EPA's IRP based on the presentation to CASAC:

1. EPA's presentation says it will specify C-R function for IQ loss and utilize functions derived from Rochester and Boston cohorts (i.e., Bellinger, 2003 and Canfield, 2003).

   Since the effect of changes in IQ in the Lanphear cohort is not solely from lead, what plans does the EPA have for controlling for the additional variables that are known to have an effect on IQ such as mother's IQ, gender, HOME Score (a measure of socioeconomic level), birth weight, as well as others?

   Also, no mention is made of how handling of residual confounding will be done. Since stratification would cause the sample sizes to be too small (with the reduction to just the Boston and Rochester components of the Lanphear cohort), multivariate analysis is the most likely method to use to adjust for confounding. However, the EPA has not specified which of the measured covariates will be considered in the modeling and whether interactions between the covariates and the exposure marker (blood lead levels) will be considered to control for confounding.

2. The presentation states that characterization of variability in blood lead levels will be done using an empirically derived GSD with the potential to update the GSD using more recent epidemiology studies and NHANES data. However, the sources of the more recent epidemiology studies are not specified. Additionally, due to the COVID-19 pandemic, the most current set of NHANES data available at present is the NHANES combined 2017-March 2020 which represents only 3.2 years of survey due to the reduced sampling caused by the pandemic. What effect will that have on the development of an updated GSD?

Yours sincerely,

Cynthia Van Landingham
Senior Managing Consultant
Monroe

D +1 (318) 3982091
cvanlandingham@ramboll.com

Rosalind Schoof, PhD, DABT
Principal
Seattle

D +1 (206) 3361653
rschoof@ramboll.com

Julie Tu
Managing Consultant
Seattle

D +1 (206) 3361654
jtu@ramboll.com