Author's response to reviews

Title: Primary prevention of lead poisoning in children: A cross sectional study to evaluate state specific lead-based paint risk reduction laws in preventing lead poisoning in children

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Version: 2
Date: 5 August 2014

Author's response to reviews: see over
Dear Dr. Aschengrau,

Thank you very much for your comments. They were extremely helpful as they helped to refine the message of this study. To aid in your review, we’ve sent both a track changes as well as a clean version of the document. We really appreciated your attention to detail and hope that our response adequately satisfies your concerns.

Response to comments from reviewer Ann Aschengrau

Major Compulsory Revisions

Comment 1: Provide more description about the selection of the two “exposed” and one “unexposed” comparison state. For example, it would be useful to know how many and which states do not currently have lead laws and how Mississippi was selected to represent them.

Response 1: At the time of this study, which was conducted between 2009-2012, of the 35 Childhood Lead Poisoning Prevention Programs (CLPPP) under cooperate agreement with the Centers for Disease Control and Prevention’s (CDC) Healthy Homes and Lead Poisoning and Prevention Program (HHLPPP), Mississippi was the only state that did not have either state or local legislation to prevent childhood lead poisoning, but had a high lead screening penetration rate among children <72 months old. Despite not having legislation to prevent lead poisoning, and having the highest poverty rate among children from birth to age 5 years, MS had annual
screening rates that was similar to other states that had lead legislation and had an annual elevated blood lead level (EBLL) rate similar to that of MA and lower than that of OH. From 1991 to 2012, CDC defined an EBLL as a BLL ≥10µg/dL. According to 2009 national estimates obtained from CDC’s Childhood Blood Lead Surveillance System (CBLS), the prevalence proportion of EBLL was ≤1% in all three states.

Despite profound socio-demographic differences noted in the three states, efforts were made, using census track data, to control for a priori, macro level variables that may have confounded the main effects association, addresses with subsequent cases of lead poisoning after identification of an index case. Pages 11 and 12 of the manuscript outline how both address as well as county level data was collected. Table 6 of the manuscript shows the specific address and county level data that was controlled for in the analysis. At the address level, these variables included year residence built (categorical variable: pre-1950’s vs. newer), building type (categorical variable: single vs. multi-unit) and building ownership (categorical variable: private, owner-occupied vs. other). County level data controlled for in the analysis, all of which were continuous variables, included % poverty in county, % CAPI in county, % households in county with high school graduates, % non-whites in county, % pre-1950’s homes in county and % rental in county.

Thus, while programmatic variables were used to examine the effectiveness of laws aimed at primary prevention of lead poisoning among young children, we tried where at all possible to control for those measured risk factors that may have created spurious associations, using all available data sources, including data from the United States census. Since the unit of analysis for this inquiry was addresses, socio-demographic risk factors that would confound the true associations at the address level were the primary focus for statistical adjustment.

Comment 2: The results section has too much emphasis on statistical significance. The magnitude of the odds ratio should be given greater emphasis.

Response 2: The odds ratio has been provided in the results section to show the magnitude of effect.

3. Stepwise regression uses the p value to determine which variables are confounders. Unfortunately, this practice can lead to erroneous conclusions. The change in the magnitude of the odds ratio (i.e. crude OR vs. adjusted OR) when potential confounders are controlled one at a time should be used instead. About a 10% difference is typically used as a cutoff for determining which variables need to be included in the final multivariate model.

Response 3: We did in fact include each covariate one at a time, to examine their individual effect on the main effects variable, address with subsequent cases of lead poisoning after identification of an index case. Table 6 presents the results of the adjusted main effects model which was obtained using stepwise regression, as well the effect estimate of each covariate when examined one at a time with the main effects model. The final model, which showed the main effect covariate being significant after controlling for each covariate, was obtained using
stepwise regression. The individual covariate estimates shown, were derived after each was examined one at a time with the main effects model.

**Comment 4:** It seems odd to compare dust sample from the three states because they were taken at different times (post-abatement for Massachusetts, pre- and post-abatement for Ohio, and pre-abatement for Mississippi). More explanation should be given regarding the utility of these comparisons. Also, given these differences, you should explore the impact of including the dust variables in the final multivariate model.

**Response 5:** Since the unit of analysis was the address, we felt it pertinent to have measures of dust lead levels within the analysis. While abatement was not mandatory for MS, it was for MA and OH. The best effort was made to control for dust lead level since dust lead level is associated with the addresses and is causally related to development of subsequent cases.

**Comment 5:** More description (particularly results) should be given for the only prior study (reference 14) that examined the effectiveness of state lead laws.

**Response 5:** Document updated to provide more description.

**Comment 6:** Residual confounding by individual-level characteristics should be given more emphasis in the discussion section.

**Response 6:** The discussion has been updated to note this. We did however want to note that since the address was the unit of analysis, we did not control for characteristic of the child. If we were analyzing data at the child level, then we would have had to control for the child’s age, gender and race/ethnicity. However, our inquiry focused on the likelihood of an address having a subsequent case of lead poisoning after identification of an index case.

**Minor Essential Revision**

**Comment 1:** Methods/Design and Data Sources (page 6): Randomization is not the same as random selection. This sentence should read “Random selection occurred in a three-step process.”

**Response 1:** The document has been updated to reflect this change in wording.

We look forward to hearing from you soon.

With Best Regards,

*Chinaro Kennedy*