

Comments to Exponent critique of the birth defects paper

M Hendryx, July 2011

Many of the limitations they note are ones that we already recognize in the paper. We acknowledge, for example, that we have no direct environmental exposure data, and that we have imperfect data on covariates. I am not aware of any single study that can “analyze all known risk factors for birth defects.”

We didn’t use an “internet blog” to assign mountaintop mining areas. We used the results of an extensive analysis of satellite imagery of mining sites reported on an internet site. Furthermore, the satellite imagery is not from 2009 as they state; it was last updated in 2005.

They question why our data are limited to 1996-2003. We obtained these data through a user agreement with NCHS that provided us with a file that included mother’s county of residence, a variable not otherwise available on the public dataset. At the time of our agreement these data were limited to 1996-2004; we did not use the 2004 data because a change in reporting requirements from 2003 to 2004 resulted in substantial missing data on some of our covariates, but otherwise we used all data available to us. It is interesting that the mountaintop mining effects became more pronounced in more recent years, and given the cumulative impacts of mining over time it is possible that our analysis, limited to 2003, underestimates more recent effects.

We did recognize and discuss the limits of the US natality files. Those limits, such as imperfect recording of risk variables such as smoking, are not explanations for the differential birth defects risk in mountaintop mining areas.

Education is a well-accepted measure of socioeconomic status and the claim that we did not address socioeconomic status is inaccurate.

Although not specified in the paper, we did not include multiple births and limited our analysis to singleton births.

The critique incorrectly attributes the missing records (CDC Wonder says there are 1,991,230 births and we analyzed 1,889,071) to missing data on county of residence. Data omitted were due to missing data on any of the measures, not only county of residence. If the CDC database includes multiple births, this could also account for the difference.

Their criticism of Table 5 showing an increased risk over time in mountaintop mining areas (they argue that our results could be due to a general increase over time) makes no sense, as we tested for effects relative to the non-mining referent, so any general increase would be accounted for in that analysis.

The reported elevations across all organ systems is unusual (as they indicate) but not inconsistent with a hypothesis of multiple exposure sources based on the types of chemicals

present in coal, coal strata, and coal processing and transportation activities. (Results are strongest for cardiovascular/respiratory and urogenital defects.)

I believe we have been accurate and appropriately cautious in our interpretations.

Finally, as an aside, Exponent is a biased pro-industry firm. Their critique was industry-sponsored and not peer-reviewed, whereas our study was peer-reviewed, not financially supported by any group, and was published in a top environmental research journal.