

The major issue with residential or non-conventional fracking for oil and gas extraction is that of health. So far, to my knowledge there have not been any conclusive studies published by independent researchers that SUPPORT this practice and certainly nothing that proves its safety. What we do have; however, is increasing data coming from highly reputable sources (Yale, UC Boulder, Hopkins) that are high quality studies indicating significantly increased risk in terms of health - not only to "at risk" populations with asthma and lung disease, but also to vulnerable unborn children and infants. We have a proposition in Broomfield to build more wells in a smaller population density than has EVER been seen throughout the US. The data so far has come from more than a decade of experience with similar practices out of Pennsylvania which have concluded that residential fracking increases risks of childhood leukemia by up to 4 fold, risks of asthma exacerbations and risk for low birth weight infants (a surrogate for other health concerns later on in life). The oil and gas industries have put the burden of proof on the people, where this burden should lie on them as the consumers of this process. My ongoing dilemma is that despite insurmountable scientific evidence this practice is being driven by politics rather than safety. If a drug was proposed for manufacture, the FDA would require strong evidence and years worth of clinical trials to prove safety before even allowing the drug to proceed to stage 2 clinical trials (ie. it wouldn't even get past animal models). In this case, we obviously cannot perform randomized placebo controlled trials on unsuspecting pregnant mothers. That being said - the data below represents a strong representation of the data that at the very least provides reasonable proof of harm. I cannot emphasize enough the importance of this issue's impact on health of our most vulnerable population. It is not a political issue, it is not a financial issue, it is not an environmental issue - it is a health and safety issue. NONE of the other factors should be even discussed until the O&G industry has provided strong proof of safety that refutes the numerous studies that say otherwise. The scientific method should be expected (demanded) to be followed in this process by an independent non-affiliated source (ie. Hopkins, Yale, CU, etc).

Hydraulic fracturing and infant health: New evidence from Pennsylvania
<http://advances.sciencemag.org/content/3/12/e1603021>

- This is the largest study of its kind, and the best data available in regards to residential fracking.
- Using low birth weight as a surrogate for several health problems, which is consistent in pediatric literature.
- As noted previously, it would be impossible and unethical to perform a randomized prospective study in this setting, especially given the knowledge from retrospective studies such as this. (ie. We cannot knowingly subject pregnant women blindly to the chemicals emitted from fracking sites).
- This data ABSOLUTELY applies to Colorado - not only do they have a lower well density in Penn study, but also have better air circulation not being in a valley.
- This study points out the lack of knowledge and potential for serious adverse effects.

Childhood hematologic cancer and residential proximity to oil and gas development
<https://doi.org/10.1371/journal.pone.0170423>

<http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0170423>

- Another high quality study out of University of Colorado
- Over a 12 year time span (based on registry data)
 - o included a 10 year latency period
- Included patients within a 1.6km span of wells and drilling.
- Demonstrates a 4.3 fold increased risk for patients living within these higher risk zones.
- Very strong study overall, again with the limitations as discussed above.

Association Between Unconventional Natural Gas Development in the Marcellus Shale and Asthma Exacerbations

https://jamanetwork.com/journals/jamainternalmedicine/fullarticle/2534153?utm_campaign=articlePDF&utm_medium=articlePDFlink&utm_source=articlePDF&utm_content=jamainternmed.2016.2436

- Again, data from Pennsylvania.
- Gathered over a 7 year time period.
- Included 400,000 patients, which is a large study.
- It is a nested case-control study, which is a strong study design for this intent.
- I should note that this was published in JAMA, which is a high impact, well respected medical journal.
- Also of note, this study was done through John's Hopkins University – a powerhouse research hospital who care for a lot of underserved populations who are in the most vulnerable populations.
- This study shows a clear associated up to 4.7x the risk of exacerbation of all forms of asthma within the period of drilling – highest in <3km within drilling operations. This is VERY consistent with the neonatal data that we saw above.

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