

# Chemicals released during natural gas extraction may harm reproduction and development

December 5 2014

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Unconventional oil and gas (UOG) operations combine directional drilling and hydraulic fracturing, or "fracking," to release natural gas from underground rock. Recent discussions have centered on potential air and water pollution from chemicals used in these processes and how it affects the more than 15 million Americans living within one mile of UOG operations. Now, Susan C. Nagel, a researcher with the University of Missouri, and national colleagues have conducted the largest review to date of research centered on fracking byproducts and their effects on human reproductive and developmental health. They determined that exposure to chemicals released in fracturing may be harmful to human health in men, women and children and recommend further scientific study.

"We examined more than 150 peer-reviewed studies reporting on the effects of chemicals used in UOG operations and found evidence to suggest there is cause for concern for human health," said Nagel.

"Further, we found that previous studies suggest that adult and early life exposure to chemicals associated with UOG operations can result in adverse reproductive health and developmental defects in humans."

The "weight of evidence" review of scientific literature and peer-reviewed publications, where studies are examined thoroughly for patterns and links, included international studies that focused on UOG chemicals. Reviewers say these chemicals have been measured in air and

water near UOG operations, and have been associated with harmful effects in both animals and humans.

The reviewers concluded that exposure to air and [water pollution](#) caused by UOG operations may be linked to health concerns including infertility, miscarriage, impaired fetal growth, birth defects and reduced [semen quality](#).

"There are far fewer human studies than animal studies; however, taken together, the studies did show that humans can be harmed by these chemicals released from fracking," Nagel said. "There is strong evidence of decreased semen quality in men, higher miscarriages in women and increased risk of [birth defects](#) in children. There is a striking need for continued research on UOG processes and chemicals and the health outcomes in people."

The review, "Reproductive and Developmental Effects of Chemicals Associated with Unconventional Oil and Natural Gas Operations," was published online in the peer-reviewed journal *Reviews on Environmental Health*.

**More information:** *Reviews on Environmental Health*. Volume 29, Issue 4, Pages 307–318, ISSN (Online) 2191-0308, ISSN (Print) 0048-7554, [DOI: 10.1515/reveh-2014-0057](https://doi.org/10.1515/reveh-2014-0057), December 2014

Provided by University of Missouri-Columbia

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