Disposal of wastewater from hydraulic fracturing poses dangers to drivers

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A new paper co-written by Yilan Xu, a professor of agricultural and consumer economics at Illinois, shows that the growing traffic burden in shale energy boomtowns from trucks hauling wastewater to disposal sites resulted in a surge of road fatalities and severe accidents. Credit: L. Brian Stauffer

Environmental concerns about hydraulic fracturing—aka "fracking," the

process by which oil and gas are extracted from rock by injecting high-pressure mixtures of water and chemicals—are well documented, but according to a paper co-written by a University of Illinois at Urbana-Champaign environmental economics expert, the technique also poses a serious safety risk to local traffic.

New research from Yilan Xu ("E-Lan SHE"), a professor of agricultural and consumer economics at Illinois, shows that the growing traffic burden in fracking boomtowns from trucks hauling wastewater to disposal sites resulted in a surge of road fatalities and severe accidents.

"Fracking requires large amounts of water, and it subsequently generates a lot of wastewater," she said. "When trucks need to transport all that water within a narrow window of time to a disposal site, that poses a safety threat to other drivers on the road—especially since fracking occurs mostly in these boomtowns where the roadway infrastructure isn't built up enough to handle heavy truck traffic."

The study examined how fracking-related trucking affected the number of fatal crashes in the Bakken Formation in North Dakota from 2006-14, using the timing of fracking operations near certain road segments.

The researchers identified a causal link between fracking-related trucking and fatal traffic crashes, finding that an additional post-fracking well within six miles of the road segments led to 8% more fatal crashes and 7.1% higher per-capita costs in accidents.

"Our back-of-the-envelope calculation suggests that an additional 17 fatal crashes took place per year across the sampled road segments, representing a 49% increase relative to the annual crash counts of the drilling counties in North Dakota in 2006," Xu said. "That's a significant number when you're talking about a sparsely populated area like North Dakota.

"And besides the fatality and injury costs in fatal crashes quantified in our study, other costs may occur as well, including injury costs in nonfatal crashes and indirect expenditures on emergency services, insurance administrative costs, and infrastructure maintenance and replacement."

To lessen the negative impact on traffic fatalities as well as the severity of traffic accidents, the study proposes a tax that can be charged per well to internalize the costs of fracking-related trucking activities, similar to the impact fees implemented in energy-rich towns in Pennsylvania that yield hundreds of millions of dollars per year for the state.

"The tax could serve as an economic instrument that affects operators' drilling and fracking decisions and thus alleviate the hazard of the associated truck traffic indirectly," Xu said. "Likewise, a toll fee by miles driven by trucks could be collected on highways to absorb the negative impacts of fracking-related trucking."

The study also sheds light on more practical measures that local governments can undertake to curb the traffic risks associated with fracking.

"Since many fracking-induced fatal crashes take place in the daytime rush hours, local governments could adopt policies such as making a high occupancy vehicle lane for trucks carrying wastewater. An active traffic alert and warning system with live well-operations updates could also help drivers monitor traffic and avoid exposure to road hazards," she said.

Moreover, the paper calls for the active involvement of the oil and gas industry to seek ways to improve their workplace safety and mitigate the traffic hazard of fracking to road users.

"Our findings suggest that oil and gas operators could redistribute the traffic loads over time to avoid concentrated water hauling during peak hours," Xu said. "In the long run, since a well may need to be fracked multiple times over its productive life, operators may improve the water supply system by constructing water wells serving multiple well pads via a piping system. They could also develop the onsite wastewater treatment and disposal facilities as opposed to trucking wastewater over long distances. Such measures would reduce the long-term transport costs and the associated traffic effects."

The findings should give local and federal policymakers information when conducting due diligence and evaluating the regional costs and benefits of shale energy development, Xu said.

"Our study provides an estimate based on the North Dakota experience where population density and traffic volume is relatively low, but our findings have implications for other regions planning future shale development."

More information: Minhong Xu et al, Fraccidents: The Impact of Fracking on Road Traffic Deaths, *Journal of Environmental Economics and Management* (2020). DOI: 10.1016/j.jeem.2020.102303

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