

CASE STUDY

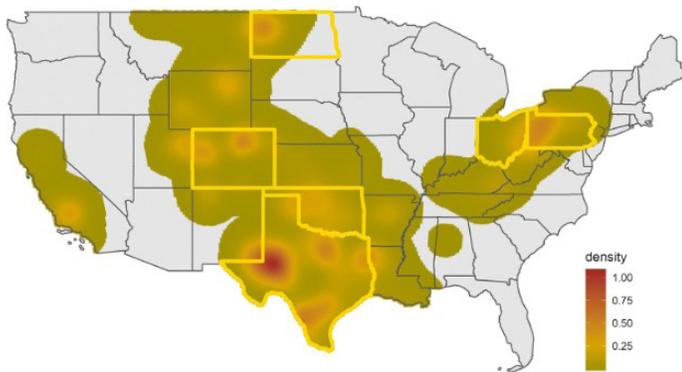
Health Impacts of Pollution from Oil and Gas Production

Activities along the oil and gas production life cycle — ranging from extraction and production, transportation and storage, and refining and transmission — produce air and water pollution that can lead to many harmful health impacts for workers and communities living near fossil fuel infrastructure

The United States (U.S.) is the world’s largest producer of oil and methane gas (hereafter referred to as “gas”).¹⁹ Over the past two decades, the number of people living near oil and gas production sites has grown due to developments in unconventional drilling technologies; in the U.S., approximately 18 million people (6% of the population) live within a mile of at least one active oil or gas well (Figure 1).²⁰

Multiple harmful health impacts are generated along the oil and gas life cycle, from extraction to combustion. These harms disproportionately impact pregnant people, children, Indigenous people, communities of color, and low-wealth communities.²¹⁻²⁴

FIGURE 1.
Density of productive oil and gas wells completed between January 1, 2005 and December 31, 2018, in the continental U.S.



Reproduced from Johnston and Cushing, 2022.²⁵ Highlighted states represent those in which recent health studies had been conducted at the time of study publication.

In addition to emitting climate-warming pollutants, activities along the oil and gas supply chain (Figure 2) generate harmful air, water, waste, light, and noise pollution that affect the health of industry workers and people in nearby communities.^{10,11,26,27} For example, well drilling, venting and flaring processes, leaks from storage tanks and pipelines, and oil and gas processing and refining all lead to emissions of fine particulate matter (PM_{2.5}), as well as nitrogen oxides (NO_x) and volatile organic compounds (VOCs). These air pollutants themselves are harmful and will lead to further PM_{2.5} and ozone formation in the atmosphere. These air pollutants emitted along the oil and gas production life cycle cause a slew of health effects including heart and lung disease, fertility and neurological problems, dementia, and premature death (Appendix Table B). Production processes also release hazardous air pollutants like benzene and toluene, which can cause cancer, adverse reproductive effects, and birth and developmental defects.^{25,28}

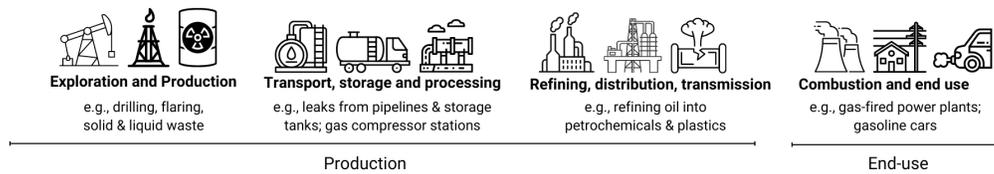
Here, we highlight some of the major public and occupational health harms of pollution from oil and gas production and distribution processes by drawing on illustrative examples across the U.S.

Flaring

Flaring is the intentional burning of by-product gas, mostly methane, from oil and gas exploration, production, and processing. This process releases carbon dioxide, carbon monoxide, PM_{2.5}, NO_x, and toxic heavy metals, and is linked with increased respiratory hospitalizations, adverse birth outcomes, and premature death.²⁹ In the U.S., flaring is a common practice due to weak regulations combined with a lack of monitoring and economic incentives. For example, Texas has flared about as much gas as its residential users consume in a year.³⁰ In southern Texas, pregnant people who

FIGURE 2.

Emissions of harmful air pollutants occur along all stages of the oil and gas lifecycle, from exploration to end-use.



live near areas with routine flaring have a 50 percent greater chance of giving birth prematurely than those who do not.³¹ These impacts are not experienced equally: Hispanic residents in this region are exposed to more flares.³²

Extraction Waste

The processes of well drilling and oil and gas extraction generate massive amounts of solid and liquid wastes that are contaminated with toxic substances including arsenic, lead, and naturally occurring radioactive materials.³³⁻³⁵ Industry workers and the public have been exposed to these carcinogens for decades due to a lack of federal regulations to ensure safe management and disposal of these waste streams.³⁶ Exposure can occur directly or through contamination of water resources and soil from oil and gas wastewater being spread on roadways or sent to municipal water plants, from solid wastes being shipped to municipal landfills, and from spills during transportation.³⁶ For example, in Irvine, Kentucky, a landfill located close to local schools illegally accepted nearly 2,000 tons of radioactive wastes from oil and gas production in West Virginia and Ohio in 2016.³⁷ People working in the petroleum industry or living near petroleum facilities are at increased risk of developing several different cancer types, including lung cancer, skin cancer, and childhood leukemia.¹⁰

Transport

Crude oil transport can result in accidents occurring along pipelines, rail lines, waterways and at trans-shipment sites, causing harm to public health, surrounding environments, and local economies.³⁸ For example, in 2010, the Enbridge pipeline ruptured in the Great Lakes region, resulting in one of the largest inland oil spills in U.S. history.³⁹ Residents living near the Kalamazoo River and Talmadge Creek were advised by local health departments to stop using the water for

drinking and cooking for several months.³⁹ More than half of people living in or near the spill site had at least one symptom of exposure to hazardous compounds, including headaches, nausea, and respiratory and gastrointestinal symptoms, and at least 40 percent had multiple symptoms.⁴⁰

Petroleum Refining

Oil and gas can be refined into petrochemicals that are used to manufacture a wide array of products including plastics, rubber, and synthetic fibers — more than 98 percent of plastic and synthetic chemicals are produced from fossil fuels.⁴¹ This process releases a wide array of toxic air pollutants with devastating health consequences for nearby communities.⁴² For example, in Reserve, Louisiana, the Denka chemical plant is the nation's only producer of chloroprene, a component of synthetic rubber. Residents of Reserve have been exposed to deadly levels of air and toxic pollution for decades, leading to cancer risks 50 times higher than the national average.⁴³⁻⁴⁵ Reserve is part of the region referred to as "Cancer Alley" which contains over 150 petrochemical plants and refineries.⁴⁶

This case study highlights just four examples of how communities are harmed by activities of the fossil fuel industry. There are many other pollution sources along the oil and gas supply chain, as well as from coal mining.⁴⁷ Altogether, the health impacts of the fossil fuel industry include, but are not limited to, cancer; diseases of the respiratory, cardiovascular, and nervous systems; adverse impacts on maternal health and newborn health; poor mental health; and premature death.^{10,26,48} Choosing a net-zero emissions strategy that continues to rely on fossil fuels by capturing or offsetting emissions would still allow for harmful health impacts and environmental injustices for nearby communities and industry workers,⁴⁹ while the transition to electrification using renewable sources is the surest way to reduce these health risks.