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## INTRODUCTION



A fracking well. grandriver/Gettyimages

### THE CONTROVERSY:

- Chemicals used in the fracking process can contaminate water sources from fracking sites.<sup>1</sup>
- Fracking operations and disposal sites are often placed in rural, minority group areas.<sup>1</sup>
- Indigenous communities have faced unique challenges from UOGD.<sup>1</sup>

### WHAT IS FRACKING?

- Fracking is short for hydraulic fracturing, or unconventional oil and gas development (UOGD).
- It involves injecting a mixture of water, sand, and additives at high pressure into the ground to recover oil and natural gas deep in rock formations.

### OBJECTIVE:

In consideration of these issues, we sought to conduct a contemporary analysis of ethics discourse and inquiry in the published fracking literature as it pertains to brain and mental health from 2016-2022.

## METHODS

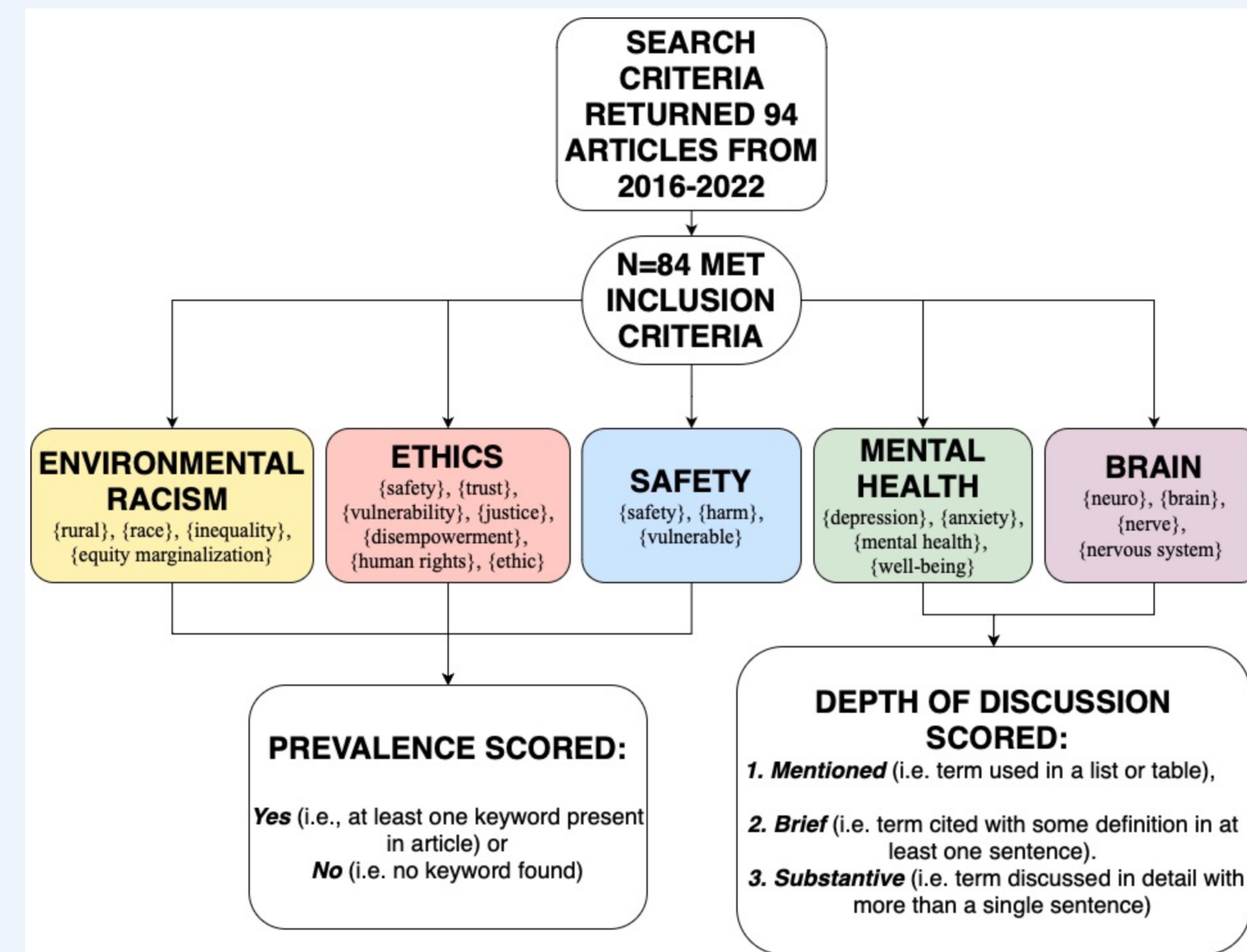


Figure 1. Outline and steps of content coding analysis.

### THE SEARCH:

Primary search terms used:

- {unconventional natural gas (+/-) development}, {shale gas (+/-) development}, {fracking} and {hydraulic fracturing}

Combined with:

- {brain}, {neuro}, {neurological} and {mental} or {ethics}, {safety}, {environmental racism}

Theme	Key Words
Brain	{neuro}, {brain}, {nerve}, {nervous system}
Mental Health	{depression}, {anxiety}, {mental health}, {well-being}
Safety	{safety}, {harm}, {vulnerable}
Environmental Racism	{rural}, {race}, {inequality}, {equity marginalization}
Ethics	{safety}, {trust}, {vulnerability}, {justice}, {disempowerment}, {human rights}, {ethic}

Table 1. Key words used for coding to identify themes.

## RESULTS

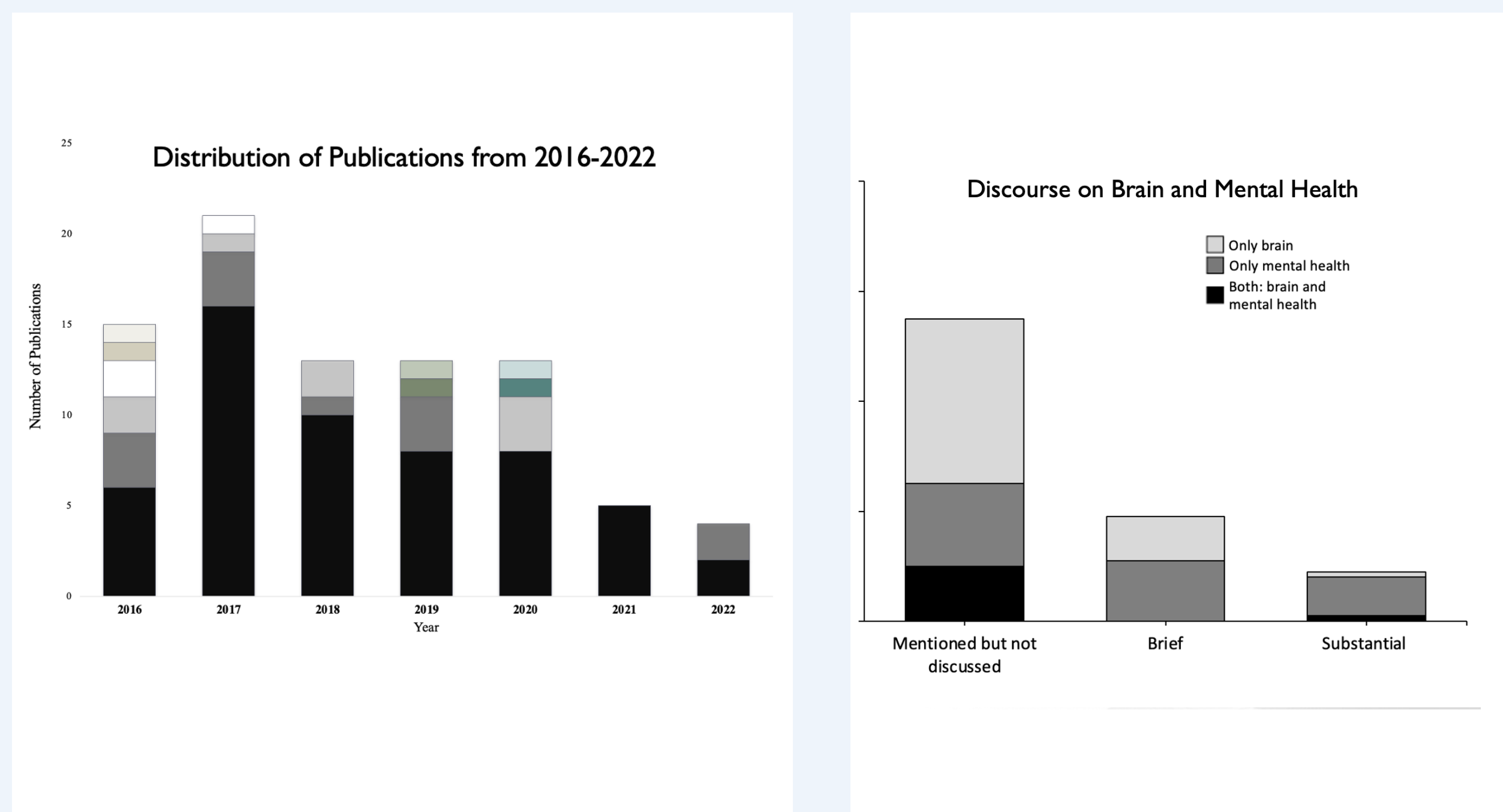
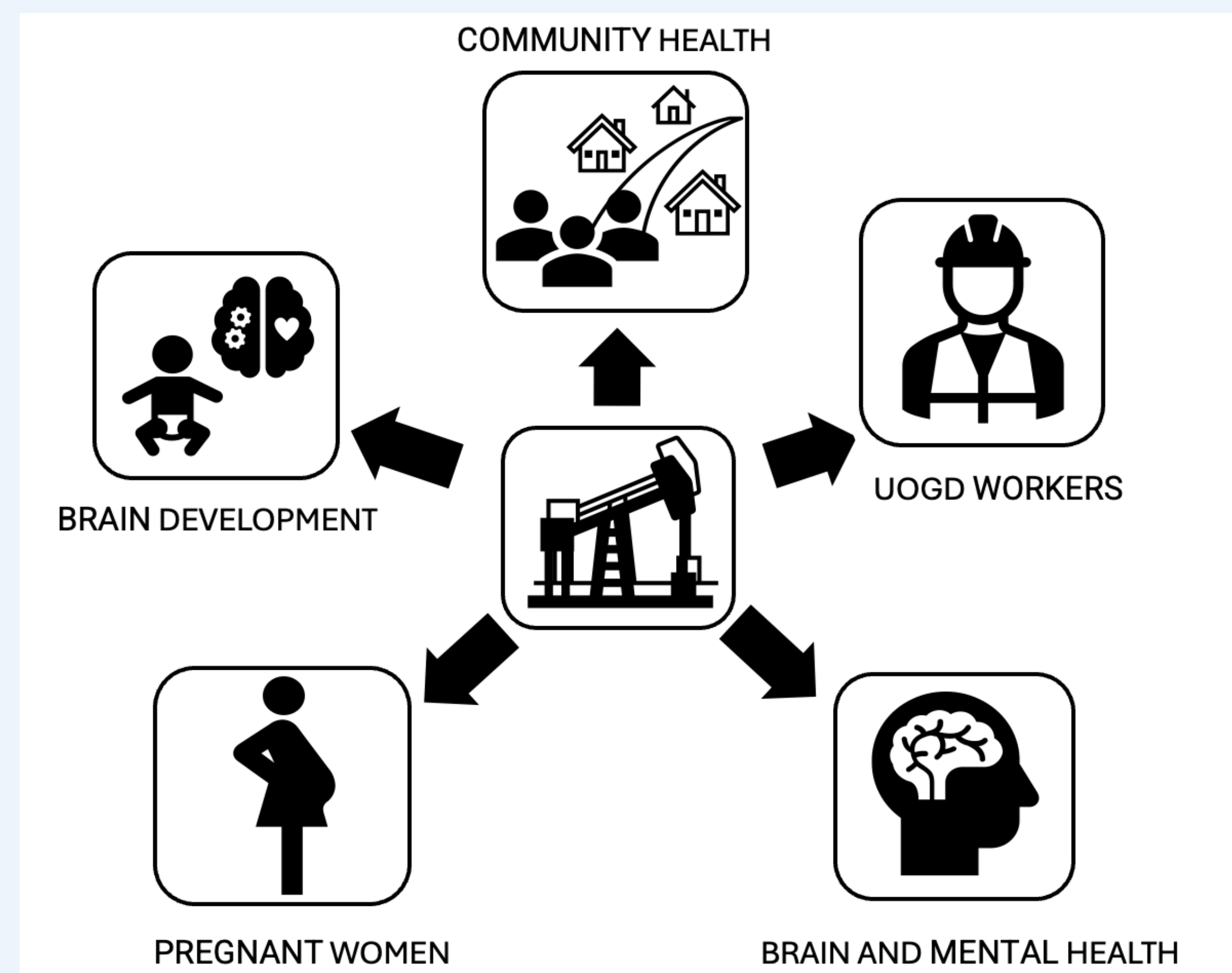


Fig. 2. Distribution of the articles according to country and year.

Fig. 3. Prevalence and depth of discussion of brain and mental health in the dataset.

- The majority of the papers mentioned brain or mental health (76%).
- A handful went into discussion about specific impacts on brain or mental health (13%).
- Safety was a prominent theme in the dataset (77%).
- Discourse about environmental racism and injustices were apparent (38%).

## PRIMARY AND COLLATERAL HARMS



- Water and air contamination pose a serious risk to brain health.
- Pregnant women living near fracking sites received specific attention in the dataset.
- The developing brain is particularly vulnerable to neurotoxic insult.
- Fracking has negative impacts on the mental health of nearby community members and UOGD workers.

## KEY POINTS

- Fracking disproportionately impacts vulnerable populations.
- Safety is the most common ethics concern.
- Experts have called for a ban on fracking due to the documented and unknown long-term consequences of fracking on human health.<sup>1</sup>
- This highlights the need to view human-made environmental changes, particularly from UOGD, with a focus on the brain, mental health, and ethics.

## ACKNOWLEDGEMENTS

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Grier, A., Illes, J. Ethical Implications of the Impact of Fracking on Brain Health. *Neuroethics*. 17, 12 (2024). <https://doi.org/10.1007/s12152-024-09546-5>

1. CHPNYPSR. "Compendium of Scientific, Medical, and Media Findings Demonstrating Risks and Harms of