Journal of Environmental Psychology 55 (2018) 90–98

Contents lists available at ScienceDirect

Journal of Environmental Psychology

journal homepage: www.elsevier.com/locate/jep

Psychosocial implications of unconventional natural gas development: Quality of life in Ohio's Guernsey and Noble Counties

Michael P. Fisher [a, *], Alex Mayer [a], Kaitlin Vollet [a], Elaine L. Hill [b], Erin N. Haynes [a]

[a] University of Cincinnati College of Medicine, Department of Environmental Health, 3223 Eden Avenue, Cincinnati, OH 45267, United States
[b] University of Rochester Medical Center, School of Medicine and Dentistry, 601 Elmwood Avenue, Box 420644, Rochester, NY 14642, United States

ARTICLE INFO

Article history:
Received 19 April 2017
Received in revised form
7 November 2017
Accepted 28 December 2017
Available online 29 December 2017

Handling Editor: Maria Lewicka

Keywords:
Appalachia
Hydraulic fracturing
Psychological stress
Quality of life
Social stress

ABSTRACT

As unconventional natural gas development (UNGD) activities such as "fracking" have proliferated across the U.S., research has begun to examine their impacts on human life. Much scholarship has centered on possible health and environmental impacts. However, a range of plausible psychosocial impacts has begun to emerge. Utilizing grounded theory methods and data from qualitative interviews with residents of two counties in Appalachian Eastern Ohio (Guernsey and Noble), we examined the quality of life (QoL) impacts on residents, who live and work amid UNGD. QoL impacts were reported in five core categories, specifically psychological stress, social stress, environment, physical health, and traffic. Psychological stress was a particularly salient theme, as residents living near UNGD found themselves anxious about the uncertainties of fracking; frustrated by interactions with oil and gas industry officials; stressed about noise or light pollution; and, in some instances, facing the possibility of moving from the region.

1. Introduction

Communities in Appalachian Eastern Ohio and other areas of the U.S. are experiencing social transitions because of accelerations in unconventional natural gas development (UNGD). Portions of both the Utica and Marcellus shale formations lie beneath the region, and these rich deposits of natural resources combined with new technologies for extraction have led to increased UNGD (Ohio Department of Natural Resources and Ohio Environmental Protection Agency, 2014). One common UNGD activity is hydraulic fracturing, or "fracking." This is the process by which high volumes of pressurized water combined with a blend of chemical additives are forced into shale rock structures to release natural gas or oil from deposits beneath the formations. Relatively new to Ohio, fracking did not commence in the state until 2011 (Ohio Environmental Council, 2015). Between 2011 and 2016, the number of fracking wells in Eastern Ohio reached 2236 drilling permits secured and 1785 wells drilled (Ohio Department of Natural Resources, 2016).

Community residents living amid UNGD have concerns associated with the activity, including a range of environmental, health-related, social, and psychological impacts (e.g., Powers et al., 2014). Researchers have noted concentrations of potentially dangerous compounds and chemical mixtures present near UNGD sites (Kassotis et al., 2015; Macey et al., 2014), threats to groundwater or well water (Alawattegama et al., 2015; Grant et al., 2015; Harkness et al., 2015; Holzman, 2011; Kassotis, Tillitt, Davis, Hormann, & Nagel, 2013; Mrdjen & Lee, 2015; Vengosh, Jackson, Warner, Darrah, & Kondash, 2014), elevated risk of preterm birth and high-risk pregnancy (Casey et al., 2016), social strain and threats to cohesion (e.g., Morrone, Chadwick, & Kruse, 2015), self-reported skin conditions and respiratory problems (Rabinowitz et al., 2015), and psychological stress and a mounting sense of unpredictability and anxiety concerning the future (Ferrar et al., 2013; Sangaramoorthy et al., 2016).

Despite this evidence indicating that UNGD can have negative impacts on the environment and in communities, the full extent of psychosocial factors is not known. A range of impacts, including noise pollution, odor annoyance, traffic congestion, and crime and violence, have been noted amid other types of industrial activity (Kondo et al., 2014; Nordin & Lidén, 2006; Spencer-Hwang et al., 2014; Stansfeld & Matheson, 2003). Thus, it is not clear whether residents in proximity to UNGD experience similar effects.

* Corresponding author.
E-mail addresses: michael.fisher@uc.edu, michael.fisher@runbox.com (M.P. Fisher).

https://doi.org/10.1016/j.jenvp.2017.12.008
0272-4944/

This paper assesses how residents of two adjacent counties undergoing UNGD (Guernsey and Noble Counties, Ohio) are impacted by these activities. We adopted the concept of quality of life (QoL) as a lens through which to frame our study. Generally, QoL reflects individuals' perceptions of their position in life in the context of their society and culture; the construct is dependent upon factors such as a person's physical health, psychological well-being, social interactions, and relationships to salient features of the environment (World Health Organization, 1997). We sought to answer the following research questions: How do residents perceive their QoL amid UNGD, and what factors do residents perceive to be most impactful on their QoL?

Our research relied on grounded theory (Glaser & Strauss, 1967; Strauss & Corbin, 1998), a systematic method capable of providing an in-depth understanding of QoL issues. We chose to adopt a qualitative grounded theory methodology rather than a quantitative measure (e.g., the WHOQOL-BREF) to capture the full range of QoL issues affecting community residents. Grounded theory has proven successful for studying QoL (e.g., Gee, Pearce, & Jackson, 2003) and particularly in contexts where QoL dimensions are complex, contradictory, or poorly understood (e.g., Tsonis, McDougall, Mandich, & Irwin, 2012). The method has also been employed to study place-based perceptions of residents living amid fracking activity (Sangaramoorthy et al., 2016). This predominantly inductive methodology relies on data from sources such as individual interviews; utilizes theoretical sampling to target people or data sources with information about actions, events, or experiences relevant to the study's emergent themes; and involves the systematic coding and categorizing of qualitative data (Glaser & Strauss, 1967; Strauss & Corbin, 2008).

2. Method

The results presented here stem from semi-structured interviews with residents of Guernsey and Noble Counties. These counties are located adjacent to one another in Appalachian Eastern Ohio (see Fig. 1). We chose to focus on the two-county region given the high number of UNGD sites in each county (see Fig. 2) and the close social and economic ties between them, particularly around the Senecaville Lake region which spans both counties. Human subjects protection approval for this study was granted by the University of Cincinnati College of Medicine's Institutional Review Board.

Our team worked with three key informants to identify interviewees. All informants were community residents. Two were known to the research team prior to study commencement, and the third was introduced by one of the initial informants. Key informants were well-connected long-term community members who were aware of fracking activities in their community. As interviews progressed, we also utilized snowball sampling, asking interviewees to recommend other residents who might have insight into our study topic and then recruiting those residents for possible study participation. We aimed to recruit residents who were living in close proximity to UNGD and/or known to be experiencing QoL impacts associated with UNGD. We recruited a range of interviewees, including residents of various ages and education levels. We included residents who held mineral rights leases as well as residents who did not. This diversity enabled us to obtain a range of perspectives.

Overall, 49 community residents were asked to participate, and 34 completed an interview. Two declined to participate, and 13 did not respond. We provided interested participants with a one-page information sheet describing the study and obtained verbal consent. Participants were offered a one-time fifty-dollar incentive in the form of a gift card to a retail store. Table 1 lists the demographic characteristics of interviewees. All participating residents had lived in the two-county area for at least two years, a time period which coincides with notable regional increases in UNGD (Mauro et al., 2013) and ensures a reasonable window for possible exposure to UNGD-related QoL factors. Interviewing continued until we reached saturation (Strauss & Corbin, 1998). Three of the 34 participants were interviewed a second time for clarification or elaboration of themes. Interviews occurred in private or semi-private spaces at a community center, a library, and restaurants, or in private residences. They ranged from 20 min to 2 h in duration. With interviewee permission, we digitally audio-recorded the interviews and then transcribed and supplemented them with field notes.

Interview data were analyzed using grounded theory methods (Strauss & Corbin, 1998). Audio recordings of interviews were uploaded into *Dedoose*, a qualitative data analysis program. The first four interviews were coded independently by three researchers and then discussed to resolve any discrepancies in coding. Our result was a scheme of nearly 100 codes pertaining to QoL that was used by the same researchers to code subsequent interviews. A handful of new codes were added to the coding scheme when no predefined code was relevant.

Concordant processes of memoing on codes (and data tagged with specific codes) enabled the elaboration of codes and the clustering of codes into categories. Specifically, the research team first defined the properties and boundaries of codes through in-depth notes, or memos. Next, we categorized codes together when similar properties among codes were observed (e.g., when different codes described a similar type of psychological stress). Throughout this process, we used constant comparative analysis to move back and forth among the data to refine codes and categories, thus repeating the memoing and coding processes as new data emerged and then modifying codes and categories as needed (Strauss & Corbin, 1998). Data were analyzed as they were collected so that emergent results could drive the recruitment strategy via theoretical sampling. As various QoL themes emerged as salient, we aimed to recruit additional participants who had experienced one or more of these QoL issues. The categories constructed in our analysis serve as the overarching QoL themes presented in this paper.

3. Results

Participants reported several changes to their QoL since the introduction of UNGD. Comments fell into one of five *core* categories: psychological stress, social stress, environment, physical health, and traffic. *Sub*categories or themes were established within each core category. All interviewees expressed impacts from one or more of the QoL factors listed in Table 2. A majority reported impacts in three or more of the five core categories. Economic issues were also evident in our data but are not addressed in this paper since economics, per se, are typically defined as “standard of living” and not included in QoL frameworks (World Health Organization, 1997). Likewise, our data reflected perceived increases in crime such as illicit drug use, but these findings are not described here since few interviewees were *directly* impacted by such activity.

Table 3 specifies the number of interviewees reporting one or more QoL impacts within the core categories and dichotomizes these counts based on interviewees' self-reported distance from fracking activities (i.e., greater or less than five miles). This distance was used since several participants lived in a town which is approximately five miles from the nearest fracking well. Thus, this distinction serves to differentiate the town's residents and others living outside of the immediate range of UNGD activity from those living in closer proximity. As illustrated, psychological stress, environmental impacts, and physical health impacts were reported