

4-30-2016

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Recommended Citation

McHenry-Sorber, Erin, Kai Schafft, Ian Burfoot-Rochford, and Daniella Hall. 2016. "The Masculinized Work of Energy Development: Unequal Opportunities and Risks for Women in Pennsylvania Shale Gas Boomtown Communities." *Journal of Rural Social Sciences*, 31(1): Article 1. Available At: <https://egrove.olemiss.edu/jrss/vol31/iss1/1>

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**THE MASCULINIZED WORK OF ENERGY DEVELOPMENT:
UNEQUAL OPPORTUNITIES AND RISKS FOR WOMEN IN
PENNSYLVANIA SHALE GAS BOOMTOWN COMMUNITIES**

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ABSTRACT

The proliferation of unconventional shale gas development has revived scholarly interest in the impacts of rapid industrial development on communities, schools, policies and politics, public health, the environment, and economic growth. However, with few exceptions, close examinations of the gendered structure of opportunity within areas experiencing rapid shale gas development have largely been absent from this literature. This paper uses key informant interview data from low income men and women, as well as from social service providers within Pennsylvania communities heavily affected by shale gas development. In contrast to assertions that shale gas development will yield broad-based economic development impacts for the region, the experiences of the participants in this study suggest a more segmented economic opportunity structure coupled with the creation of new gendered economic and social vulnerabilities as class and gender intersect to create decreased economic opportunities and increased social vulnerabilities for low-income women.

Energy companies and proponents of unconventional natural gas development have long touted the potential economic benefits to local communities (Hudgins and Poole 2014). Local communities have often shown a propensity to support shale gas development because of the potential for economic growth, despite the risk of negative social and environmental outcomes (Anderson and Theodori 2009; Ceresola and Crowe 2015; Schafft, Borlu, and Glenna 2013; Theodori 2009). This was the case in Pennsylvania as unconventional shale gas development began in earnest in the mid 2000s, an industrial activity strongly embraced by then-governor Tom Corbett and others within the state legislature (Pifer 2011; Waples 2012).

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However, residents within many areas experiencing boomtown natural resource development in Pennsylvania and elsewhere, have not always received the degree of economic benefit initially anticipated (James and Aadland 2011; Little and Lovejoy 1979; Ward, Polson, and Price 2014). The oil and gas industry estimated the creation of 100,000 new industry-associated jobs for Pennsylvania between 2004 and 2010, but only about 20,000 new employment opportunities for residents were actualized in that period (Kelsey et al. 2011; Weinstein and Partridge 2011). Wynveen (2011) has found residents in natural gas communities in Texas perceive local industry-associated economic benefits to be disproportionately distributed to land owners, gas companies and gas industry workers.

In Pennsylvania, the industry has relied heavily on non-local men to fill positions directly related to energy development in the state (Filteau 2015; Paredes, Komarek, and Loveridge 2015; Weinstein and Partridge 2011; White 2013). The outsourcing of jobs has been due, in part, to a lack of trained or experienced local residents to fill industry needs, particularly at the onset of shale gas development (Brasier et al. 2011). For example, Kelsey et al. (2011) report that specialized jobs associated with the industry have been largely filled by out-of-state, highly mobile workers, while local residents have been likely to find work in construction, diesel mechanic, and commercial driving positions – jobs in which they have experience. Because the bulk of local employment opportunities associated with the industry are low-wage service sector jobs that cater to industry workers, employment can be highly unstable (Brasier et al. 2011; Ward et al. 2014). Increases in low-wage service sector jobs for less skilled workers also increases poverty levels. This problem can be especially pronounced in rural areas (Albrecht and Albrecht 2010), where gas industry activity in Pennsylvania has been among the highest (Schafft et al. 2012).

GENDERED STRUCTURE OF OPPORTUNITY AND VULNERABILITY WITHIN THE OIL AND GAS INDUSTRY

With the general decline in traditional rural male occupations, including manufacturing and mineral extractive industries, recent research suggests rural women usually have greater employment opportunities than rural men, due in part to their overrepresentation in service jobs (Jensen and Jenson 2011). However, in oil and gas communities, industry-related opportunities that do exist for locals are predominantly filled by able-bodied white men (see Marcellus Shale Coalition 2014). According to the U.S. Department of Labor (2014), women comprise less than a quarter of mineral extraction workers. Similarly, an IHS report conducted for the American Petroleum Institute places the proportion of female workers in the oil and gas industry at 19% (Gillula and Fullenbaum 2014) and the Marcellus Shale Coalition reports 76% of employees are men (2013). Unequal participation by

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women in this employment sector has been attributed to “gender-based discrimination” and “societal conditioning, a lack of qualified candidates, and family care responsibilities” by Rigzone (Rigzone and BP 2013, p. 4), a self-described “leading online resource” for employment, news, and information related to the oil and gas industry (Rigzone 2015, para. 1). Other causes of gender bias include gender-stereotyped hiring criteria and a gender-normative barrier to female employment in the male-dominated work hierarchy (McKee 2014; Miller 2003).

Those oil and gas jobs that are available to women are often at either the top or bottom of the pay scale: the former requiring high levels of education and experience, and the latter providing little to no employment security. Most of these positions are peripheral to the actual work of the industry, and may include human resources, clerical, cleaning, and catering services (McKee 2014). Even in peripheral occupations, women are largely underrepresented. For example, women make up 7.4% of industrial truck and tractor operators in the U.S. (U.S. Department of Labor 2014). Despite some work that suggests oil and gas industries are working to increase gender diversity (McKee 2014), other research shows that opportunities for women are limited (McLeod and Hovorka 2008). Women are generally less supportive of the industry than men (Boudet et al. 2014), suggesting they fail to experience the promised economic or social benefits of the energy boom. In fact, women in gas producing states like Pennsylvania, Ohio, Texas, and North Dakota are 2.5 times more likely than men to have a low-wage job – at or slightly above the national average – and almost three times more likely in West Virginia. In Pennsylvania, nearly 20% of working women have low-wage jobs compared with 7.8 % of men (National Women’s Law Center 2014).

While a few notable earlier empirical studies have considered potential barriers to gender-equitable opportunities (see, e.g., Freudenburg 1981; Gill 1990; Mayes and Pini 2010; Moen 1981; Tallichet 2000), Filteau argues that most of the energy and natural resource development scholarship is largely “gender blind” (2015, p 3; see also Mayes and Pini 2010; Reed 2003; Reed and Christie 2008). An examination of the gendered dynamics of experiences in these communities, as O’Shaunessy and Krogman (2011) note, is necessary in informing a fuller understanding of the social impacts of resource extraction. Much of the literature in this field has ignored women’s experiences altogether or has “addressed gender issues in a cursory fashion” (p. 134). However, as part of a larger initiative examining unconventional shale gas extraction impacts in Pennsylvania communities, gendered and class-mitigated experiences of shale gas development quickly have become apparent, particularly the inequitable distribution of economic and social vulnerabilities to low-income women. This was particularly the case regarding economic opportunities, but also in terms of social and economic vulnerabilities experienced across gendered lines.

An understanding of the intersectionality between gender and class is necessary for a robust study of the ways in which low-income women, in particular, experience gas industry development in rural spaces. Intersectionality examines the myriad influences race, class, and gender have on an individual's experiences (Brooks and Redlin 2009). These multiple spheres of identity converge to situate low-income women in specific social, economic, and political contexts (see Crenshaw 1991; O'Shauneesy and Krogman 2011). While low-income women are arguably subordinated through broad systemic structures, Crenshaw (1991) argues such subordination can be imposed unintentionally, often "the consequence of the imposition of one burden that interacts with preexisting vulnerabilities to create yet another dimension of disempowerment" (p.10). In heavily developed natural gas communities, the imposition of the industry given broad economic expansion, creates pronounced economic and social vulnerabilities disproportionately experienced by low-income women. In this research, we explore the varied perceptions of women about industry-associated employment opportunities and the work, itself, experiences of low-income women successful in securing employment in the extractive industry, ranging vulnerabilities associated with industry generated housing shortages for low-income women with and without support networks, and new social vulnerabilities disproportionately experienced by young women.

Walby, Armstrong, and Strid (2012) note that social inequalities shift gradually or rapidly with changing social institutions and the environment in which they are negotiated. They argue it is necessary to at least temporarily stabilize these categories of inequality for analysis "at any one point in time" (p. 231). While a lack of consensus exists regarding the most appropriate approach to understanding intersectionality, we follow McCall's (2005) and Walby et al.'s (2012) lead, discussing gender and class inequalities as stable structures in this study's context – rapidly changing economic and social rural spaces.

This article examines the gendered structure of opportunity and vulnerability as experienced by low income women in areas heavily affected by the oil and gas industry and the development of unconventional natural gas. While in Pennsylvania shale gas development was largely promoted based on its economic development potential, and particularly in areas experiencing long-term economic contraction, the experiences of the participants in this study suggest a far more segmented economic opportunity structure coupled with the creation of new gendered economic and social vulnerabilities. In this article we examine the processes shaping gendered social and economic outcomes for low income women within the context of shale gas boomtown development.

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METHODS

This study focuses on the gendered experiences of low income residents residing within four of the most heavily drilled counties in Pennsylvania: Bradford and Lycoming Counties in Pennsylvania's Northern Tier, and Washington and Greene Counties in the southwestern corner of the state. These counties are to some extent a study in contrasts. Bradford and Lycoming Counties, in Pennsylvania's Northern Tier and adjacent to New York State, were among the Pennsylvania counties that experienced the most sudden development in the early stages of unconventional gas extraction within the state's Marcellus Shale region. Lycoming County, while largely rural, is a metropolitan county with Williamsport (population nearly 30,000) as its county seat. With its more developed infrastructure and amenities, it has served as a central hub of activity for the gas industry. By contrast, nonmetropolitan Bradford County's seat is located in Towanda, with a population about one tenth of Williamsport's¹. The county is predominantly rural, and is traversed mainly by two lane county roads that connect a series of small towns and rural settlements. Nonetheless, the data were largely consistent in terms of the ways in which gendered structures of opportunities and vulnerabilities were expressed.

In the southwest, Washington County, like Lycoming, is metropolitan and situated as an exurb of Pittsburgh. With more than 200,000 residents, it is the largest of the four counties, yet it also is predominantly characterized by smaller towns and rural areas, especially further south and away from Pittsburgh. Greene County, in the far southwest corner of the state, directly south of Washington County and on the West Virginia border, is primarily rural with a historical legacy of coal mining, and is the most poverty stricken of the four counties. By the end of 2014, Washington County had experienced the greatest degree of unconventional gas drilling out of any county in the state, followed by Bradford County, with Greene and Lycoming Counties as the fourth and fifth most heavily drilled counties (see Table 1).

We conducted interviews with two principal groups of participants: county-level social service providers, and low income residents. In the first half of 2014, consultations were held with social service and housing administrators in all four counties to discuss key issues facing low income residents in gas development communities. Formal follow-up interviews using semi-structured interview protocols were then conducted in the summer and fall of 2014 with 13 county-level service providers in public housing, food banks, and social services.

¹The largest borough in Bradford County is Sayre, adjacent to the New York border and with a population of about 5,500.

TABLE 1. SELECTED CHARACTERISTICS FOR BRADFORD, LYCOMING, WASHINGTON AND GREENE COUNTIES

	NORTHERN TIER COUNTIES		SOUTHWESTERN COUNTIES	
	BRADFORD	LYCOMING	WASHINGTON	GREENE
Population (2014 est.) .	61,784	116,508	208,187	37,843
Metropolitan status	nonmetro	metro	metro	nonmetro
Poverty rate (est. 2009- 2013)	13.3	14.2	10.5	14.7
Unconventional gas wells drilled through 2014	1,312	909	1,201	886
Unconventional gas wells permitted through 2014	3,484	1,696	2,035	1,550

NOTE: Data obtained from the U.S. Census and the Pennsylvania Department of Environmental Protection.

Low income resident recruitment was conducted using two principal strategies. First, recruitment postcards and posters were left across the four counties within social service and housing agencies, public libraries, thrift stores, mobile home parks and other public places. Second, participants were recruited directly with assistance from staff at food banks, social service and housing agencies. The study participation criteria for low income residents, besides being over the age of 18, included: current residence within one of the four study counties; residence within Pennsylvania for most of the five years preceding the interview; and a household income at or below 125% of the federally established poverty line at the time of the interview and/or participation within an income-eligible social service program (for example, Section 8 housing assistance or the Supplemental Nutrition Assistance Program) within the five years preceding the interview.

We interviewed 39 county residents identified as low-income, including ten interviews in Bradford County, 11 in Lycoming County, and nine interviews in Greene and Washington Counties. Interviews included the collection of sociodemographic data, as well as a series of open-ended questions regarding

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participants' experiences living in shale gas development areas, and a semi-structured set of questions addressing housing. Interviews typically lasted between one and two hours, with interview length dependent in part on the degree of residential change experienced by the interviewee. The mean age of respondents was 44, with a range of participants' ages from 20 to 70. Consistent with the relative racial homogeneity of much of rural Pennsylvania, 35 of the respondents were white, one was Latino, and three were African American². Nearly all of the low income participants were native to the area, and 34 of the 39 participants had lived the entire five years preceding the interview within their county of current residence. The remaining five participants all lived in the study counties for at least four of the five years preceding the interview. Twenty-nine participants were women. In the discussion that follows, we draw extensively from the interviews with these female participants, but also draw from interviews with men and with service providers as appropriate.

All interviews were digitally recorded and transcribed. We conducted content analysis using NVivo software. In coding and analysis, we looked for mentions of opportunities and vulnerabilities, both social and economic, particularly in relation to the ways in which participants understood particular opportunities and vulnerabilities in connection to the shale gas industry or community change coincident with shale gas development. Part of a broader study on the experiences of economically marginalized residents across study counties, gendered experiences emerged as a major theme in the research data and warranted further analysis.

FINDINGS

Perception of Gendered Differentiation of Employment Opportunities

In most of the interviews with low income residents, participants spoke about the gendered structure of opportunity associated with the gas industry. This is despite the fact that several participants interviewed, including several women, had held employment in the gas industry in the five years preceding the interviews. While 12 of the 39 low income participants either had no opinion or did not speak to the issue directly, 22 felt that labor market opportunities were skewed toward men, typically with men in a more advantageous position than women regarding both a greater variety of jobs associated with the industry and also a greater likelihood of obtaining employment. Only five of these participants (three of them men) expressed the belief that the opportunities associated with the gas industry were evenly distributed for both men and women.

²None of those respondents mentioned racialized gender dynamics with regard to access to labor market or housing opportunities, or social vulnerability. While this may have occurred, it did not appear within our data.

“I just see the drilling and all that as a male, a guy’s job.” A dominant stereotype about the natural gas industry in Pennsylvania is that it is a “male” space. Through multiple discursive constructions, gendered expectations and categories were repeatedly deployed by men and women regarding the gas industry. As such, though many participants viewed shale gas development as a net positive regarding local economic development (although interviewed participants had varying opinions on that point), most viewed the industry as marginalizing toward women. “As far as fracking goes, as far as oil wells goes, it’s very much a man’s world,” a Bradford County woman explained to us. This sentiment was echoed across place in terms of employment opportunities for women. A recently unemployed Greene County woman said she “really would like” to get a job but saw no clear opportunity associated with gas industry employment. When asked if she saw job creation alongside gas development, she responded, “I don’t see that at all. I mean, I don’t know if other people do, but I don’t.”

Like other female participants, she attributed the lack of employment opportunities to several structural barriers, including hard manual labor requirements and required time away from home. “A lot of the jobs probably requires a lot of brute strength that a lot of women don’t have. We just naturally don’t have that. Some of them jobs we can’t physically do.” Several female participants echoed this sentiment, some laughing in response to our question about whether they would apply for a gas industry job. Another Greene County woman, employed by a chain restaurant, said, “Me, I just see the drilling and all that as a male, a guy’s job.” For many participants like this woman, perceived employment opportunities within the industry were limited primarily to physically demanding jobs in the field – the core technical work of the industry – which, from the perspectives of most interviewees, effectively disqualified women.

Beyond the perceived physicality of the work, participants described sociocultural barriers to gas industry employment, including a history of male-dominated work and sexual harassment by male co-workers. A Greene County woman we interviewed was accompanied by her husband, who while not a primary interview participant, nonetheless contributed several comments to the discussion³. She told us she has “never seen a female work there.” Her husband explained, “They’re allowed to apply [for gas jobs]. I mean it’s just – it’s nothing against women in general. It’s just a male industry. There’s so many things that can be misunderstood. There’s so many things that can be misconstrued . . . I don’t know. My personal feeling is not that women can’t do that type of work, but it just

³We did not include him in our total count of interviewed participants, although in compliance with Institutional Review Board procedures, he signed an informed consent form prior to his wife’s interview. The husband was quiet for much of the interview only offering comment when his wife or the researchers prompted him for his opinion on a particular topic.

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wouldn't be a proper place for them." Traditional hegemonic masculine structures have successfully created barriers to women's participation in industry work (see Filteau 2014) through a narrative constructed around proper gendered spaces. This narrative is propagated by male workers in the field and internalized by some of our female participants.

Some believed industry jobs were available to women but that they were generally characterized by low-wage peripheral opportunities, including housekeeping, shuttle drivers, water truck drivers, dispatchers, security, and food services for man camps, many of these noted in McKee's (2014) work. Several participants described a local cleaning business that provided services to temporarily housed workers logging long hours on rigs and gas pipelines. The company logo featured a silhouetted image of a pony-tailed woman in a short skirt cleaning a drilling rig with a feather duster. Likewise, images on the website showed only female employees. One participant knew several people who worked for the company, and related that a male friend had applied for a job but "he got denied and was told that it was mainly a woman's profession to be able to go and clean rig sites." No feasible way exists for us to confirm this story, but it nonetheless illustrates the ways in which particular employment opportunities directly or indirectly associated with the gas industry are perceived as clearly gendered.

Some participants described how working within a male-dominated field represented a disincentive for many women. "Not too many women want to work with a crew of 50 men, or 20 men," a woman from Greene County stated. "You gotta have tough skin. You gotta be able to put up with a lot of ignorant remarks and let it just roll off your back. Some women can't do that." Similarly, a woman from Bradford County said she thought about applying for industry work, but was dissuaded by female friends. "I was told, being a female, you're gonna get harassed, like sexually harassed, all the time. I have some friends that are girls that work on there, on the gas lines, and they get harassed all the time. They walk by, and they get their butt slapped or, 'Oh, look at them boobs.' Anything. It's mostly male-dominant." These experiences are strikingly similar to those found in Moen's (1981) study of Colorado mining towns more than two decades ago. These traditionally hegemonic masculine constructions of work and workplace behaviors serve as disincentives for women to engage in industry work, even when opportunities are present in industry hiring structures, further promoting a hegemonic narrative about the proper place for women.

Finally, others recognized peripheral or field support opportunities, but time away from children and family represented a barrier to employment. The transient nature of industry work, coupled with long hours further affirm traditional hegemonic masculinity and bar many women from employment in the gas fields (see

Collinson 1999; Filteau 2014). One peripheral option for women was guard shacking – a security position in which the guard signs in workers and their vehicles to field sites. As a 25-year-old mother of five from Lycoming County explained, “I know that they will hire women to do that, but they are also gone just as long as the men . . . I don't know a whole lot of women who will just up and leave their children and their family to do work like that. I know I couldn't. I couldn't go three weeks without seeing my kids.” Cultural constructions of gendered behavior, from emerging labor market opportunities to household reproduction, illustrate what O’Shaughnessy and Krogman (2011) describe as the material-discursive contradictions of natural resource extraction. These constructions of gendered behavior, and especially in a more generalized neoliberal framing of gas development as an exercise of economic growth, energy independence and scientific rationality (Matz and Renfrew 2015; Willow 2015) serve to normalize unequal opportunity structures and vulnerabilities not only within gas development communities, but within the industry itself.

Low income women’s employment experiences within and on the peripheries of the gas industry

There are some examples to be found in Pennsylvania of women-owned businesses created with the arrival of the gas industry (see Hargreaves 2014). This includes women-owned stores selling supplies to rig workers, industrial catering, and engineering and environmental services.⁴ However, for residents without the skills and/or financial resources, these types of opportunities are rare. Of the low income residents we interviewed, four had secured employment within or providing direct service to the gas industry in the five years preceding the interview. Despite the pervasive gendered perceptions of gas industry employment noted above, three of the four were women, one who worked as a dispatcher and two who worked as location attendants. The male participant worked briefly as a subcontracting water truck driver but found the pay, at \$12 per hour, coupled with the uncertainty and variability of the work ultimately untenable as stable employment. While the three

⁴Simultaneously, the industry has been criticized overall for its failure to comply with a provision of Pennsylvania Act 13, which requires gas companies to utilize and report on their use of women-, minority-, and veteran-owned businesses in the state (Frazier 2015). Within the industry in Pennsylvania, male employees outnumber female employees by three to one (Cusick 2014). Focus on enforcing state policies around diversity hiring and contracting measures may be obviated to some extent in the last few years given the drops in global gas prices and the marked contractions in the industry, leading to layoffs and shut downs rather than hires and expansion (Conti 2015). State Department of Environmental Protection spud drilling data show that in Bradford and Lycoming Counties, unconventional gas drilling slowed dramatically beginning in 2014 as the industry shifted to sites in southwestern Pennsylvania. However by 2014, Greene and Washington Counties also began to experience significant drilling declines, consistent with statewide trends (data not shown here).

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women who had held work in the gas industry initially felt fortunate to obtain employment, their stories exemplify the unstable nature of gas industry work for women.

One Lycoming County woman we interviewed worked for several years as a dispatcher for a gas company. Her job consisted of answering phones and keeping track of the whereabouts of the laborers and equipment needed in the field. She made \$15 per hour, plus time and a half for overtime hours. "I was working six days on, three days off. Six days on, flipping from 6:00 a.m. to 6:00 p.m. and then going from 6:00 p.m. to 6:00 a.m." Struggling with alcoholism, she says she drank to help manage her sleep schedule. She noted the difficulty in maintaining this 72-hour per week schedule and taking care of her children, an aforementioned perceived barrier to female employment with the industry. She told us her daughter would come home from school, and she was "either at work or sleeping." The woman continued, "It was like I would throw money at her just to please let me sleep, 'cause I have to go back to work . . . You don't know if you're going. I can't even tell you how many days my kids missed school 'cause I thought it was Saturday."

Despite the difficult schedule, she was excited about her hourly wages, which were higher than what she had made after 10 years in a local factory. Without a job at the factory, hospital, or with gas industry, she explained, "you're doing three jobs somewhere, and you've got no benefits, and you've got nothing." Yet after nine months, the company cut her hours to 40 per week. She says she questioned the creation and appointment of a managerial job, and she was "let go." She collected unemployment for six months and began addiction counseling. Once the unemployment money ran out, she could no longer pay her rent, and she ended up in a homeless shelter. She discussed the rent hikes that accompanied industry escalation, and the preferred practice of renting to gas workers. "Single mothers, families, forget it. If you don't have any support system here, or if you are struggling in the least bit, whew, you're done." When she left her position, only two other women were working for the company, also in peripheral positions.

We also interviewed a Washington County woman who worked with water truck drivers for an industry company, making \$12 per hour. As an attendant, she kept records of water pumping activity at a field site. Because her work schedule was seven days on, seven days off, she maintained two other part-time jobs during her weeks off. During that time, she averaged \$700 every two weeks. Two months after she was hired, she was laid off. She did not qualify for unemployment because she only worked there for two months, but she had invested several hundred dollars of her own money to get the job initially. She explained, "They're not telling you that when you get these jobs, you have to go out and pay for the [fire retardant] uniforms." The woman continued:

You can't afford the clothing, but you can't afford not to have the job either, so you're stuck between a rock and a hard spot. You have to take the job because you got to work to live. You know what they're paying us? \$12.00 an hour when I worked there. \$12.00 an hour ain't much, especially by the time you take out your car insurance and your gas money.

For those without the training and qualifications or access to start-up capital, much of the increase in work opportunities has been within the service sector. Another female respondent from Washington County described how her work as a prepared food clerk in a larger chain grocery store had increased from part time to full time due to increased business she attributed to gas industry workers. She was enthusiastic about shale gas development and the opportunities it had seemed to bring her and the community overall. She noted the first changes she saw were "more gentlemen coming in dressed in Marcellus Shale uniforms and nicer clothes." Increased business led to increased hours and pay. However, years of working on her feet had resulted in knee damage, but she lacked the resources to get knee replacement surgery. Despite her new full time work, which she attributed to the shale gas industry, we nonetheless met at a food bank where she was collecting groceries for her family.

Some women gained employment as housekeepers in hotels that serviced gas workers. These jobs were primarily held by women, and illustrate the difference in job opportunities and earnings potential between local men and women. A Greene County woman, who supervised hotel housekeepers in one of these hotels, said, "The housekeepers earn \$8.25 per hour and "literally kill themselves every day, six days a week, to bring home \$500 every two weeks. It just – it's an insult, really. It's sad." She went on,

I don't know how they make it. I really don't. Not that I make much more, 'cause I didn't. It was bothersome to see how hard the housekeepers work for the little money that they bring home, because it is a very hard job. I bet you they work harder all day, every day, than any man out there on that gas field.

Despite their hard work and long hours, though, this participant did not believe the housekeepers made enough money to survive in their community, considering the increased costs in living associated with the industry's emergence.

Economic Vulnerabilities for Women

For most participants we spoke with, economic vulnerabilities were associated with locally rising prices, in particular regarding housing. The housing insecurity

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was coupled with the challenges in securing income to meet increased living costs. Within Pennsylvania's Marcellus Shale region, increases in rental housing costs and demand for rental housing were the most immediate impacts of the shale gas boom (e.g., Schafft et al. 2014; Williamson and Kolb 2011). By the late 2000s, rental prices in many areas had increased by two to four times more than before the boom. A participant in Bradford County, echoing what we had heard across the four-county area, stated:

Rent would be jacked up, and (it) never came back down. I, personally, lived in a apartment before I got my house that was 550 a month, and it was a big—it's a old house. It's a big one, for 550. Around here, that was a normal price. As soon as I moved out, he started doing it for gas guys. He jacked up to \$1,000.00, which, in a city, I could see it, because that's typical price. Around here, that was outrageous, but now that's the typical price around here anymore. You can't find much under \$700.00, and if it is, it's probably a shithole. Everything's crazy, sky-high.

The housing shortage was also very clearly on the minds of the social service providers we interviewed. A Lycoming housing services staff member described the changes in the rental environment, noting how “rents that were on average \$400, \$500 a month, sometimes utilities included, sometimes not, that were affordable to them at that point based off of their incomes to doubling or tripling where (people) certainly couldn't afford that.” We were consistently told about the increase in social need because of evictions, inability to pay rent or secure adequate housing. Similarly, in Washington County, a social services housing worker told us that “I have watched as rents exploded, and as anyone who had a vacant piece of land rented that space out for a camper for the gas and oil workers. That's the price of rent. Even the purchase price of homes is still out of reach for the clients that I now serve.”

The severity with which this impact was felt was a factor of the rapidity of the development, coupled with the amount of locally available housing stock. Because of this, rural areas like Bradford County where gas development was among the most sudden and where excess housing stock was most lacking, experienced the greatest increases in housing insecurity. This was particularly difficult for single women with children. Some had the benefit of family networks and resources from which they could draw upon to reduce insecurity, as this participant explains:

Not only is it harder to find a place to live, because all these people are comin' in from out of town and taking the places; when you do, the landlord wants a lotta money 'cause he doesn't need you; he can rent to these three

men who are gonna be here for however many years who'll pay him what he wants . . . I live in my mom's house and I rent from my mom. If it wasn't for that, I don't know what I would do. 'Cause I sure couldn't afford that. Just to pay that in rent and then pay all my utilities, that would take almost everything I make. I'm a single parent. There's a lot of single parents out there. There's just no way I could pay that much in rent and be able to pay my utilities and keep food in my house and gas in my – it's just not possible.

Similar issues emerged in other counties in the study. A single mother of five children in Lycoming County found it impossible to secure affordable housing in the midst of the economic boom. "We looked for months and months and months for a reasonable priced home that we could afford. I was a single mother, four kids [and pregnant at the time], and I didn't have anybody to help me." The mother and her children lived at a temporary housing shelter for homeless families while trying to find affordable housing. At the time, there was a several year waiting list for section 8 housing because of the housing demand and the inadequate supply of available homes. At the last minute, a housing complex in a neighboring county accepted her application. The woman and her children have lived there for two years, and she hopes to get back to her home community to be near her extended family. Still, she says, even if she could find affordable housing, the price of everything has increased in Lycoming County with the gas boom, making it "hard on minimum wage workers." While her extended family has stable housing, they were unable to take in her large family.

These experiences highlight the disproportionately experienced problem of housing security by women, particularly single mothers, during a period of industry expansion. The problems of affordable housing were compounded by increased costs of living and lack of employment opportunities despite the promise of work for locals in industry hotbeds. The perception of lack of employment opportunities for women was a major theme that emerged in our data collection by male and female participants who perceived little or no possibility for gas industry jobs for women. These compounding issues of gender and class situate low-income women as those most likely to shoulder the burden of rapid industry expansion in a field characterized by traditional hegemonic male norms – they are less able, because of structural and sociocultural barriers, to obtain industry-related work, when they do, the work is unstable and requires extended time away from home, creating additional burdens to single, working-class mothers who cannot afford extensive child care. Simultaneously, their cost of living has increased, including housing, placing low-income women in a precarious economic position in the midst of economic expansion.

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New Gendered Social Vulnerabilities

Several participants shared how their experience of the community as women had changed with the industry, including new spaces of vulnerability including the emergence of prostitution in response to industry worker demand. While prostitution and women's safety in natural gas communities is understudied, recent research suggests women are more likely to report feelings of lack of safety, "discomfort," and "unease" in energy boomtowns (Benham 2016, p. 65). Numerous news stories investigate the burgeoning issue (Hennessy-Fiske 2013; Richardson 2015; Sheeran and Bressanin 2014). One Lycoming County woman described the new dangers to young women associated with the influx of outside gas workers. She stopped taking her daughter to certain establishments because they suddenly became "meat markets."

They were approaching young women who they assumed were legal age, but because it's hard to tell or men don't care sometimes. They were approaching young girls and getting themselves arrested. Those were things that we hadn't really encountered in Lycoming County before, and so the white truck became synonymous with "gas hole."

Similarly a woman from Bradford County described how she had stopped going out in the evenings because of harassment at the local bars. "We only have like three bars, and there's two of them that usually people, you know, you go to that bar, you're gonna get hit on... 'cause they're all in there, and they're gonna hit on you... trying to, I guess, just seduce you. 'I am a gas guy. I do have money.'" She described how while for some women this was a new uncomfortable inconvenience, to others it was a potential opportunity to benefit from some of the resources that the gas industry had brought into the area.

They're always the ones that are at the bars, and as soon as they see a gas guy, they're over there talking to him. They are the ones that are at the bar every weekend that will only go talk to gas guys, or that don't have a job and will go to the bar with no money, but they'll make sure they buy them their drinks... Some of them – I've seen it – 'cause Facebook's a big thing, so you see a lotta things like, oh, this person is with this guy. She ain't got no job, but she's getting cars, and she's getting her rent paid.

In Lycoming County specifically, women shared knowledge of increases in prostitution. Much of this prostitution work, according to a female from Lycoming County in her early 20s, again originated on social media sites and Craigslist. "Most of the girls that I know that went into it, also have other jobs. They'll be working

at Williamsport Hospital by day and then, at night, put an ad on Craigslist. An hour later, you meet a gas guy, you make \$300.00 off a doin' somethin' for 15 minutes. That's that."

A married mother of three children in her late 30s, with an associate's degree in business management, shared her experiences with drugs and prostitution working in the hotel industry in Lycoming County, and recounted several instances in which she was propositioned for sex work by gas workers.

I've had people ask me for drugs, for cocaine, for heroin, for pot. They've asked me for prostitutes. I've had to personally kick a prostitute out of the (name deleted) hotel cuz you knew that's what she was doing and you can't have that kinda stuff. These are direct impacts of the gas industry being in Williamsport... The reason I know that this was taking place is because I've had men in the gas industry come up and solicit you. Not only me, myself, but other employees at the (name deleted). At (another hotel) I've had them solicit me. At (an additional hotel) I've had them solicit me. They would come up and say, "Hey, I got \$100.00, what would you do with that? Would you come to my room later?" Of course, you're like, "No. No. No."

Despite the apparent danger to female hotel employees, hotel management was reluctant to report worker complaints about gas workers in part, she believed, because of the revenue generated from gas industry workers. She explained,

I mean it's like you have to go through so much cuz they don't want – they don't wanna lose the revenue. If you start complaining and making issues, the company's gonna say, "Hey, there's ten other hotels in Williamsport that I can go to. I don't need to go to yours. We'll send them to somewhere else." I think that's had a lot to do with why my superior was not reporting it right away, and taking care of it.

These experiences highlight the multiple ways in which women experience social vulnerabilities in communities with high levels of industry activity. In Lycoming County, in particular, we see prostitution developing as a means of economic survival in the context of economic expansion – a "gendered survival strategy which involves the assumption of unreasonable risks by the person in it" (Farley 2003, p. 251). Prostitution, then, provides another form of disempowerment for low-income women in boomtowns, a group especially vulnerable to prostitution (Farley 2003). Because these women are unable to or perceive an inability to obtain work in the male-dominated industry and, simultaneously, must live in a

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community experiencing increased costs of living, they are susceptible to prostitution for economic survival.

DISCUSSION AND CONCLUSIONS

As this research suggests, natural gas development has led to a variety of unintended consequences shaping the vulnerabilities and opportunities for low-income women living in this area of Pennsylvania. Two distinct factors came together to shape the experiences of women in this study; first the shifting social and economic terrains created by natural gas extraction, and second the norms and expectations of their gender status. The 39 low-income residents of Bradford, Lycoming, Washington and Greene County interviewed described a shifting economic and social terrain in their local communities created by Marcellus Shale gas extraction. Gas development affected labor markets, housing markets, and the perceived social fabric of the communities in which extraction occurred. These shifting terrains led to new benefits and opportunities for some and new disadvantages and vulnerabilities for others. Found by this study, and in other scholarship on boomtowns and natural gas extraction (see Wynveen 2011), opportunities and vulnerabilities were often distributed based on the positioning of groups and individuals within the communities affected. Low socioeconomic status was a predominant factor that shaped our respondents' experiences with natural gas extraction, as this was the population under study. However, these experiences were not uniform as within this sample further statuses and identities molded the vulnerabilities and opportunities respondents experienced. Gender as status, specifically, had an additional effect for how low-income women were affected by growth and the presence of the natural gas industry. As respondents' gender status, and the social norms and expectations of this gender status, met the changing social and economic terrain, low-income women experienced decreased economic opportunities and increased social and economic vulnerabilities.

Opportunities for women, for instance, were limited due to gendered work cultures and expectations of family responsibilities, along with new service based economic structures created by gas workers in migration. These traditionally hegemonic masculine work structures alone led to new vulnerabilities for women, challenging their ability to survive within the new economic and social structure created by the gas industry. These findings lie in contrast to those of McLeod and Hovorka (2008), who have found in one resource extractive community in Canada, improved economic opportunities and positive experiences associated with tertiary employment related to industry growth. While they acknowledge the difference in experiences between the women in their community and other resource extraction sites in Canada, it is also important to note the median personal income of their participants was \$45,000, which lends further support to our supposition that class

and gender are interdependent factors in influencing women's experiences in resource extraction communities. Women in our study also experienced heightened and new vulnerabilities due to the influx of 'hyper' masculine gas workers, sometimes resorting to prostitution for economic survival within this gendered and classed context.

Human or social capital also supported or exasperated the potential problematic experiences of low-income women in natural gas extraction communities. For instance, women with social and human capital (i.e., education and family ties) mitigated the negative effects of their low SES status within natural gas extraction development through the accessing of housing supports. The use of these different forms of capital and their utilization are also not clearly gendered, therefore the intersection between gender and these other forms of capital, and statuses, within a gas extraction community need to be explored further. This is also necessary as the findings of this study relate only to low-income residents, hence experiences of the women in these natural gas extraction communities cannot be generalized to other natural gas contexts.

This research highlights ways gender and class meet changing structures created by natural gas extraction to shape the experiences and perceptions of low-income women in the midst of an economic boom, and brings forth further questions on how gender and its intersection with other statuses shape the social and economic outcomes for individuals and households within boomtown environments. Future research is needed to expand upon these findings, including gendered experiences across race and class stratifications related to housing shortages, prostitution, family supports, and the use and influence of human and social capital in natural gas and other mining boomtown contexts.

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