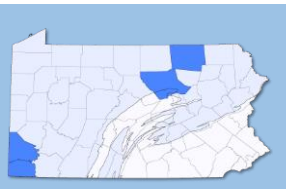
MARCELLUS SHALE GAS DEVELOPMENT AND IMPACTS ON PENNSYLVANIA SCHOOLS AND EDUCATION

The Marcellus Impacts Project Report # 3



Executive Summary

The rapid development of natural resources resulting in sudden economic expansion and the influx of new people to meet new labor market needs is commonly referred to as "boomtown" development. While this economic activity may be welcomed by many, especially in areas that have experienced longer term economic stagnation, these sudden community changes can also place new and unexpected strains on local infrastructure and institutions. One such institution is the local school. What are the impacts on schools under boomtown-like conditions? What is the effect on student demographics? How do enrollments change? Do new populations of workers bring with them new populations of students, and, if so, what are the challenges and opportunities for local schools? This report investigates these questions in the context of natural gas development in Pennsylvania's Marcellus Shale region, examining how schools and the provision of education within Pennsylvania communities may have been affected by active Marcellus Shale natural gas development.

Using data from the Pennsylvania Department of Education and the federal Department of Education's National Center for Education Statistics (NCES), coupled with qualitative focus group data with school leaders from Pennsylvania's northern tier and southwest counties, this research focused on several topical areas, including changes in student populations and characteristics, student achievement, and school district finances. Findings indicated that:

- **Enrollment:** The spikes in student populations that school districts in the regions may have anticipated in association with sudden industry development have not come to pass. Enrollments across both the northern tier and the southwest have largely continued their steady and longer term decline. Qualitative data suggest modest influxes of new students, but the state-level data and the focus group data suggest that the overall numbers of new students are low. No discernible pattern is evident with Pennsylvania System of School Assessment (PSSA) testing data either.
- **Dropout Rates:** Despite gas industry employment opportunities, dropout rates overall have shown negligible change, although anecdotal evidence from focus groups suggests that some students have dropped out, lured at least in part by industry opportunities.
- **Demographics:** Data suggest little evidence linking gas industry development to changes in student demographics and outcomes. The same may be said with regard to changes in ELL student populations or in the percentages of students classified as receiving special education services.
- **Student Need:** During the second half of the 2000s the statewide percentages of students income-qualified for free or reduced price lunch increased markedly, attributable in large part to the national recession and economic downturn. These rates rose within the northern tier and the southwest regions of Pennsylvania as well, although at lesser rates. At the same time, in 2010-11 in seven of the 18 counties the lunch program participation rates were still above state averages and the majority of county-level rates ranged between 35 and 45 percent, suggesting continued high levels of economic disadvantage among significant proportions of students.

The Center for Rural Pennsylvania
A Legislative Agency of the Pennsylvania General Assembly

Table of Contents

This project was sponsored by a grant from the Center for Rural Pennsylvania, a legislative agency of the Pennsylvania General Assembly.

The Center for Rural Pennsylvania is a bipartisan, bicameral legislative agency that serves as a resource for rural policy within the Pennsylvania General Assembly. It was created in 1987 under Act 16, the Rural Revitalization Act, to promote and sustain the vitality of Pennsylvania's rural and small communities.

Information contained in this report does not necessarily reflect the views of individual board members or the Center for Rural Pennsylvania. For more information, contact the Center for Rural Pennsylvania, 625 Forster St., Room 902, Harrisburg, PA 17120, telephone (717) 787-9555, email: info@rural.palegislature.us, www.rural.palegislature.us.

About This Project:

The Marcellus Shale Impacts Project chronicles the effects of shale-based energy development in Pennsylvania by focusing on the experiences of four counties with significant extraction and production activity – Bradford, Lycoming, Greene, and Washington counties. The project examines social and economic changes in these counties within the context of regional and statewide trends. A series of nine reports describes the research results as follows: (1) population, (2) health, (3) education, (4) youth, (5) housing, (6) crime, (7) local government, (8) local economy, and (9) agriculture.

Study Counties

Bradford, Lycoming, Greene, and Washington counties are studied in this project. They have experienced some of the highest levels of Marcellus Shale development in Pennsylvania, yet they have diverse populations, histories, economic bases, and geographic locations. These differences allow comparisons that facilitate understanding of the potential effects of Marcellus Shale development across the commonwealth and by region. The regional comparisons are defined based on adjacency to the four study counties. The northern tier contains 12 counties: Bradford, Lycoming, and the 10 neighboring counties of Clinton, Columbia, Montour, Northumberland, Potter, Sullivan, Susquehanna, Tioga, Union, and Wyoming. The southwest region consists of six counties: Greene, Washington, and the four neighboring counties of Allegheny, Beaver, Fayette, and Westmoreland.

All four study counties are classified as rural by the Center for Rural Pennsylvania with population densities of less than 284 people per square mile.

Table 1 offers an overview of selected characteristics from 2000 for the four study counties as well as counties in the surrounding region and the state. These data provide important context for understanding differences between the counties and regions prior to Marcellus Shale development. As Table 1 shows how the counties and regions differ across indicators. In the northern tier, Lycoming's population was nearly twice that of Bradford's, and Lycoming County had a slightly higher unemployment rate than Bradford County. The percentage employed in mining was very small in 2000 in both northern tier counties, although a larger percentage of people were employed in the industry in Bradford (0.6 percent) than in Lycoming (just 0.1 percent). The two counties had comparable median household incomes.

In the southwest, the differences between Greene and Washington are more pronounced. Greene had the smallest population of the four counties (40,672) and 6.7 percent of employed individuals in the county were working in mining. The unemployment rate (9.2 percent) was more than 3 points above the state's average (5.7 percent), and the median household income ($41,972) was well below average for the region ($52,004) and the state ($55,460). In contrast, the median household income in Washington County was just over $10,000 higher than in Greene. Only 1.3 percent of the employed work in mining and the unemployment rate was notably lower (5.3 percent).

The two counties of the southwest had more diversified economies than counties of the northern tier. In Bradford and Lycoming, the same three industries (Manufacturing, Health Care and Social Assistance, and Retail Trade) employed around half the population (52.4 percent and 47.4 percent, respectively (Census 2000). In contrast, just over one-third of the working population in Greene County worked in the same three industries (Health Care and Social Assistance, Retail Trade, and Educational Services).

Washington's top three industries (Manufacturing, Health Care and Social Assistance, Retail Trade, and Manufacturing) employed 41.7 percent of the working population.

Table 1. Pre-Marcellus characteristics of study counties in 2000

	Population	People per square mile	% employed in Mining	% Unemployed	Median Household Income (adjusted for inflation to 2012 values)
Northern Tier*	**47,968**	**83**	**0.6%**	**6.0%**	**$47,071**
Bradford	62,761	55	0.6%	5.5%	$48,451
Lycoming	120,044	97	0.1%	6.3%	$47,038
Southwest*	**370,881**	**505**	**1.8%**	**6.6%**	**$47,901**
Greene	40,672	71	6.7%	9.2%	$41,972
Washington	202,897	237	1.3%	5.3%	$52,004
Pennsylvania	**12,281,054**	**274**	**0.3%**	**5.7%**	**$55,460**

The northern tier region contains 12 counties: Bradford, Lycoming, and the 10 neighboring counties of Clinton, Columbia, Montour, Northumberland, Potter, Sullivan, Susquehanna, Tioga, Union, and Wyoming. The southwest region consists of six counties: Greene, Washington, and the four neighboring counties of Allegheny, Beaver, Fayette, and Westmoreland.
Source: Social Explorer Tables (SE), Census 2000, U.S. Census Bureau and Social Explorer. * County average, includes study counties.

Marcellus Shale Activity

Table 2 shows the number of unconventional wells drilled in the Marcellus Shale each year in the six Pennsylvania counties with the highest total number of wells drilled between 2005 and mid-year 2013 (Pennsylvania Department of Environmental Protection).

Table 2. Six counties with the most wells drilled and wells drilled each year, 2005-2013*

county name	2005	2006	2007	2008	2009	2010	2011	2012	2013* mid-year	**Total, by county**
Bradford+	**1**	**2**	**2**	**24**	**158**	**373**	**396**	**164**	**66**	**1186**
Washington+	**5**	**19**	**45**	**66**	**101**	**166**	**155**	**195**	**120**	**872**
Tioga	0	1	0	15	124	273	272	122	13	820
Lycoming+	**0**	**0**	**5**	**12**	**23**	**119**	**301**	**202**	**89**	**751**
Susquehanna	0	1	2	33	88	125	205	191	102	747
Greene+	**0**	**2**	**14**	**67**	**101**	**103**	**121**	**105**	**54**	**567**
Total wells drilled in top six counties:										**4943**

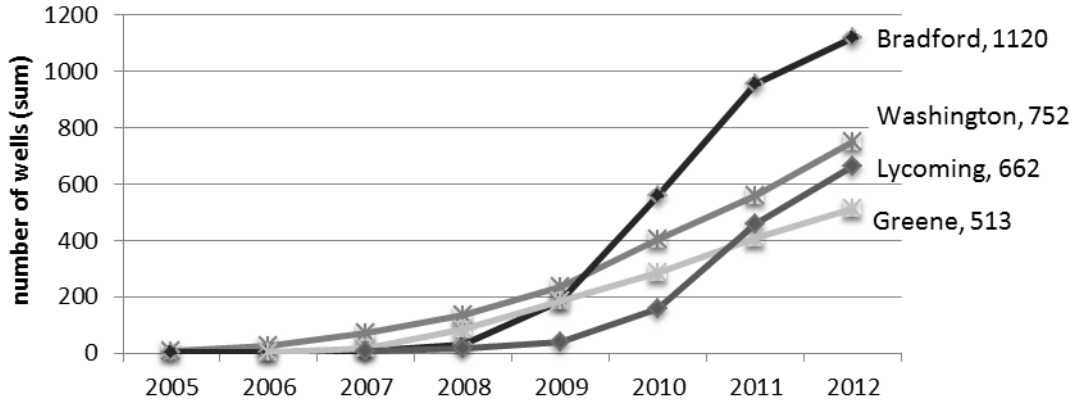
Source: Pennsylvania Department of Environmental Protection, Office of Oil and Gas Management. *Data through June 30, 2013 (accessed July 4, 2013); +Study counties.

The four study counties have experienced significant Marcellus Shale well drilling and account for half (3,376) of the 6,833 unconventional wells drilled in the commonwealth. The two counties located in the southwest, Washington and Greene, experienced more well development through 2008 than the other counties. Bradford County experienced significant growth starting in 2009. Despite the late start,

Bradford County quickly surpassed all other Pennsylvania counties with nearly 400 new wells drilled in 2011, for a total of 1,186 by June 30, 2013. Lycoming similarly experienced more new drilling activity in 2011 than occurred in the southwest and had the highest number of new wells drilled in 2012.

Figure 1 shows the cumulative number of wells drilled from 2005 to 2012 in each of the study counties. Although some wells may no longer be in production by 2012, and some have not yet been put into production, the lines reveal overall trends in the counties and across regions. The northern tier counties (Bradford and Lycoming) had steeper increases in the past 3 years, whereas those in the southwest (Washington and Greene) had more gradual but steady increases in the number of wells drilled.

Figure 1. Cumulative number of wells drilled in four study counties, 2005-2012



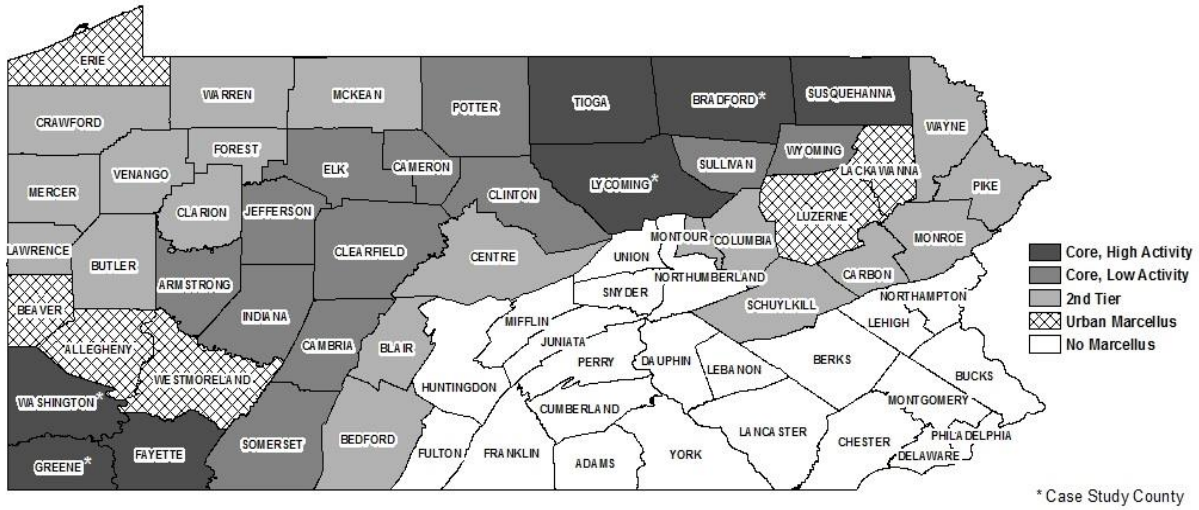
Source: PA Dept. of Environmental Protection, Office of Oil and Gas Management (accessed July 4, 2013).

In 2012, the pace of new drilling slowed in Bradford and Lycoming, likely due to the declining price of natural gas. In contrast, drilling in Greene and Washington counties in 2012 was on par with the previous year. This may be because gas in southwestern Pennsylvania tends to be "wet" gas, meaning it contains more marketable compounds (liquid natural gases such as butane and propane) that can generate higher revenues than "dry" natural gas (i.e. methane) alone. Even so, mid-year figures suggest that new drilling activity across all four counties in 2013 may be comparable to 2012. A table listing well counts for all counties in Pennsylvania is in Appendix A.

Classifying Counties by Marcellus Shale Activity

To further understand the effects of Marcellus Shale activity, the analyses compared counties based on their level of Marcellus Shale activity using a five-category county typology. The typology was created by combining several definitions based on estimated shale value and actual development activity, including publicly available maps of the thickness, depth, and thermal maturity of the shale (McLaughlin et al., 2012). This typology also differentiates urban counties because the population and economic dynamics in these counties are fundamentally different from that of rural counties.

Figure 2. Marcellus Shale Typology



Typology based on the number of unconventional wells drilled through September 2012

In Pennsylvania, the number of wells is highly concentrated in a small number of counties. There are 7 counties (including the four study counties) that account for 90 percent of the total number of wells drilled through June 30, 2013. These 7 counties are classified as "core" counties with high drilling activity, and are shaded with the darkest gray in Figure 2. The other four typology categories are: "core" counties with low drilling activity, 2nd tier counties (with lower quality shale and limited drilling activity), urban counties with potential or some Marcellus Shale development, and those counties with no Marcellus Shale. For a full description of the typology, see Appendix B.

Sampling, Data and Methods

For the research, data came from a combination of publicly available quantitative data and qualitative data gathered through a series of school district focus groups conducted in 2013. The quantitative data came from the Pennsylvania Department of Education, and the federal Department of Education's National Center for Education Statistics (NCES). The qualitative data came from focus group discussions with educators and with youth that were conducted in the northern tier of Pennsylvania in Bradford and Lycoming counties, and in the southwestern corner of the state in Washington and Green counties, as part of a larger, multi-sector investigation of Marcellus Shale development impacts. The state-level data allowed an examination of larger trends and processes over time and across the region, while the focus group discussions allowed a better understanding from the local perspectives of educators and young people on how they believe gas industry development may or may not have affected schooling and educational outcomes. In most of the analyses, the school district data were used and aggregated to the county level to make cross-county comparisons.

To select school districts for focus groups, in each of the four counties, end of 2012 well count data from the Pennsylvania of Environmental Protection were used to calculate the number of Marcellus Shale gas wells drilled within each school district. Within each county the three districts with the most drilling were identified and, one district was randomly selected from the three in which to conduct fieldwork.

The educators who participated included superintendents, principals and other teachers and district employees who could provide valuable perspectives on Marcellus-related community change and impacts on schools (e.g., business managers, bus drivers and guidance counselors). Administrators in

each of the four districts were asked by the research team to identify a group of between six and eight 11th graders, with an even gender representation, representing more or less demographically "typical" students within the district.

While in most school districts one educator focus group and one youth focus group were held, one of the districts arranged two youth focus groups, and another district arranged two educator focus groups. This resulted in a total of five youth focus groups and five educator focus groups across the four-county study area. These were supplemented by two additional focus groups conducted with groups of school district superintendents at two separate Intermediate Unit meetings. Intermediate Units are comprised of multiple school districts, formed to coordinate shared educational services. Intermediate Unit 1, in the southwest, covers Washington, Green and Fayette counties, while Intermediate Unit 17 covers Tioga, Bradford, Lycoming and Sullivan counties. A focus group was also held at the Southwestern Career and Technical Center with vocational educators. In total, 13 focus groups with 36 youth across four counties and 47 educators and administrators across seven counties were held.

School Enrollment and Demographic Change

As it became clear to Pennsylvania residents in the Marcellus Shale region that natural gas development activity was likely to be significant in its scope, one of the questions that educators had was the extent to which influxes of new populations would bring in new students. An educator from Lycoming County for example, said that initially "the enrollment numbers from PDE [Pennsylvania Department of Education] were coming that we were going to have 20 percent, 25 percent increase in students." This was significant because of the long term enrollment declines experienced by many rural districts across the region as a consequence of shrinking and aging populations. As a result, many school districts in recent years have been faced with the possibility of school closure and/or consolidation as student populations decline along with school budgets. The possibility of new students meant that perhaps districts might be able to forego plans to close buildings, and even perhaps might be in a position to consider expansion of existing facilities. District administrators also wondered whether new populations, especially from major oil and gas producing areas in the southwest, such as Texas and Oklahoma, would mean new student populations with special needs, such as those needing English language instruction, or possibly extra academic needs for students who may have had especially disrupted educational experiences coming from families who have moved frequently for work. However, as the same educator from Lycoming County said, in fact those initial estimates were not accurate predictions of what local districts would experience. "Now we're still in the decline. I mean, they're looking at maybe a 10 to 20 percent decline in the next 15 years of enrollment."

Table 3 shows the total district enrollment, by county, for the four study counties as well as the adjacent counties in each region. Between academic years 2005-06 and 2010-11, each of the four counties, despite pronounced drilling activity, experienced net enrollment declines. Further, the same held true for each of the adjacent counties in both regions, with the exception of Beaver County. Statewide,

Table 3. Total School District Enrollment, 2005-06 to 2010-11 for Selected Counties

	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	Pct. Change 05-06 to 10-11
Pennsylvania	1,830,684	1,871,060	1,794,629	1,769,789	1,773,141	1,793,284	-2.04
Southwest Region							
Greene	5,855	6,211	5,577	5,608	5,438	5,387	-8.00
Washington	30,105	30,889	29,457	29,137	29,034	29,576	-1.76
Adjacent Counties							
Allegheny	163,943	166,401	156,634	150,615	149,994	149,281	-8.94
Beaver	29,907	31,676	32,617	31,976	32,468	33,698	12.68
Fayette	19,757	20,254	19,167	18,913	18,732	18,348	-7.13
Westmoreland	54,322	56,292	52,287	51,672	50,722	51,722	-4.79
Northern Tier Region							
Bradford	10,736	10,898	8,920	8,648	9,957	9,904	-7.75
Lycoming	17,497	17,591	16,938	16,704	16,430	16,834	-3.79
Adjacent Counties							
Clinton	4,864	5,864	4,764	3,874	4,689	4,655	-4.30
Columbia	10,841	7,892	7,523	7,440	7,421	7,268	-32.96
Montour	2,607	2,738	2,466	2,487	2,646	2,537	-2.69
Northumberland	13,010	13,410	12,663	12,307	12,071	12,546	-3.57
Potter	2,809	2,789	2,674	2,581	2,620	2,573	-8.40
Sullivan	777	745	672	668	625	630	-18.92
Susquehanna	7,955	8,170	7,492	7,196	7,221	7,023	-11.72
Tioga	6,232	6,184	6,126	5,880	5,780	5,671	-9.00
Union	4,184	4,493	4,156	4,070	4,097	4,061	-2.94
Wyoming	4,415	4,436	5,666	5,507	3,999	3,991	-9.60

Source: National Center for Education Statistics.

Pennsylvania experienced net declines as well – of slightly over 2 percent. The net enrollment declines of the four case study counties, however, with the exception of Washington County well exceeded the state average. In particular, Bradford County in the northern tier of Pennsylvania, and Greene County in the far southwest corner experienced 7.75 and 8 percent declines, respectively, during this time period.

The continued enrollment declines came as a surprise to many educators who had expected and perhaps even hoped for enrollment increases. A northern tier of Pennsylvania educator said:

> "We probably have more wells than most (but) I hardly saw any kids. I mean, if I saw more than seven or eight kids over this whole time period that I could look at and say, "This is from the industry," we did well. Yet my enrollment continued to go down. The guys did not bring their families is what happened. They came. Their families stayed in Oklahoma or Texas or Louisiana. Then to top that off, there was no place in our school district for them to stay anyway. I mean, they weren't going to come and stay—[nearby town] and [nearby town] and the valley districts probably saw more people because there was more places to stay. They had the hotels and they had—there were—if there's an urban area in the county, it's that valley. Consequently, I didn't see anything."

Similarly, in a discussion with administrators at IU 17 a superintendent described the incongruence between the predictions of population and enrollment increases – which had an influence on school districts administrative planning – and what actually occurred.

> "Community members would come and say "We've seen all these studies that say your enrollments are going to go up," which really caused some serious issues for districts to move forward in areas they knew they needed to move forward in, because of all these studies that came out and claimed that this enrollment projection was going to just – you know, all these kids were going to come. Just a lesson learned that we really don't know what's going on."

The issue of housing and limited infrastructure was also noted by respondents in Greene County, a county somewhat similar to Bradford in terms of its rurality and relative distance from larger population concentrations and housing stock. This directly affected the ability to secure safe, appropriate and affordable housing for many local residents – and from the perspective of some respondents, it also resulted in increased homelessness. An educator from Lycoming County said the issue was "twofold."

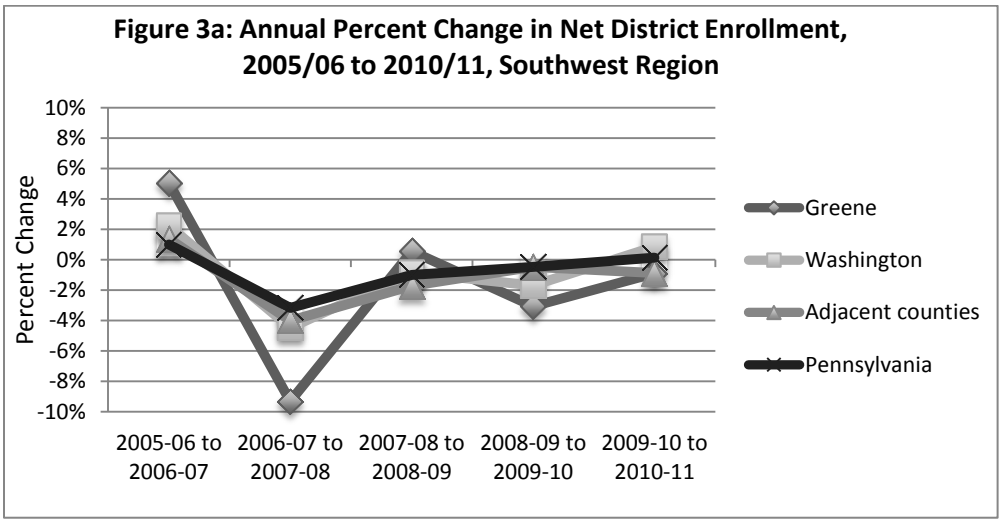
> "One is the rent issue. When the rent lease is up, the family can't afford the increased rent. The other is that the gas company purchased…a mobile home park or a campground or something…so they were all, essentially, evicted, and those individuals had to find housing. Now, from the district perspective, we consider them displaced, homeless, so we've had an increase in the number of homeless students…I'm just going to guess that at least half to three-quarters of them are related to Marcellus Shale."

What local residents also experienced was an influx of workers without families, and local areas that, despite population declines, still had limited housing stock to accommodate newcomers. Other educators and administrators reported enrollment changes, but mostly in terms of limited numbers of students entering and leaving the district, increasing the volume of student turnover, but without any significant net effect on enrollments overall. Again, from Bradford County, a teacher related, "I know 5 or 6 years ago when this began, as a teacher we were hearing rumors or predictions that maybe our enrollment would explode as far as number of people moving in. That's never happened. I think there's a lot of revolving door that's kinda going, so we got a lot of kids in, and then they've moved out. There have been kids that have moved into the district, but I don't think we ever saw an explosion like maybe we were expecting."

Figures 3a and 3b show the annual percent change in net district enrollment between 2005-06 and 2010-11 for the four case study counties and surrounding counties in both regions. In most instances, the case study and adjacent counties tend to match statewide trends of declining enrollments, the exception being Bradford County and the adjacent northern tier districts, which between academic years 2008-09 and 2009-10 did briefly experience net enrollment gains. These net gains, however, were relatively modest and as Table 1 indicates, were not enough to offset overall declines over the larger time period between 2005-06 and 2010-11.

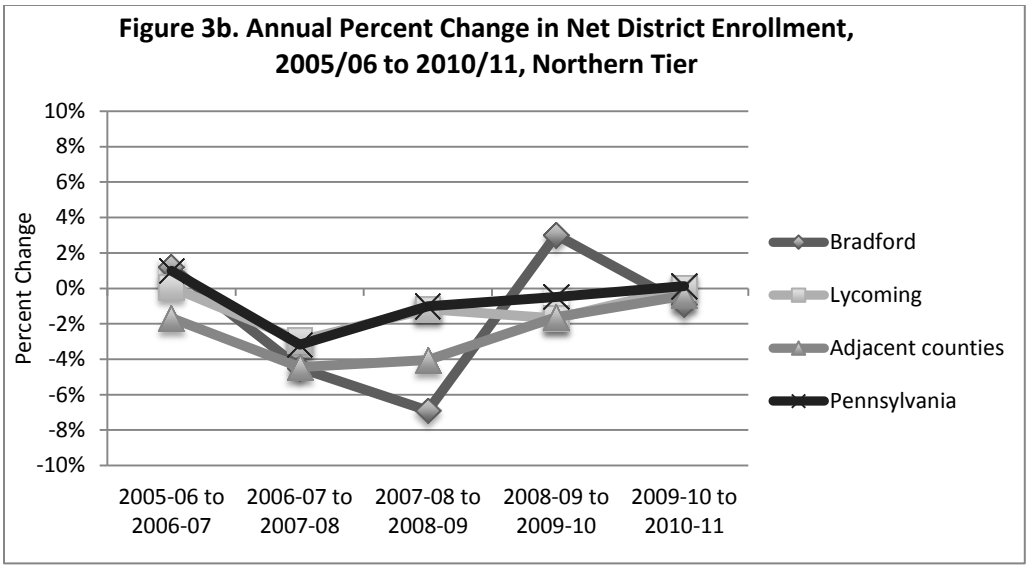
However, relatively stable or even declining enrollments can hide enrollments and withdrawals that in combination can have negligible effects on total enrollment change, but can result in significantly changing student demographics depending on the student populations entering and leaving the district. Changing student populations can have direct effects on districts if, for example, these populations have particular needs, such as students for whom English is a second language. To investigate evidence of changing student demographics and other characteristics, the researchers examined student racial and ethnic identification, numbers of students classified as needing English language instruction, the percentage of students classified as needing special educational services, and the percentage of students income-qualified for participation in the federal free and reduced price lunch program[1].

Figure 3a: Annual Percent Change in Net District Enrollment, 2005/06 to 2010/11, Southwest Region



Source: National Center for Education Statistics.

[1] Students from households with an income between 130 and 185 percent of the federal poverty line are eligible for reduced price lunch. Those from households with incomes below 130% of the poverty line are eligible for free lunch.



Source: National Center for Education Statistics.

Table 4 shows the racial and ethnic breakdowns within school districts at the county level for academic years 2005-06 and 2010-11. It should be noted that these data are not entirely comparable because of the use of an additional multi-racial identification in 2010-11. Nonetheless these data shownot only pronounced racial homogeneity in most counties, but also very little evidence of change over the time period. In all counties but three (Allegheny, Beaver and Lycoming) student populations were over 90 percent white in both time periods. This compares with the statewide average of about 75 percent white. The most pronounced changes in racial composition between the two time periods hardly account for much more than a 1 percentage point change across any racial/ethnic subgroups, changes that are difficult to interpret given the use of the multi-racial category in the second time period. In short, there is little evidence to suggest that at aggregate county levels racial and ethnic compositions have experienced any marked shifts in the time period coincident with the initial development of the Marcellus Shale for natural gas production. This is consistent with what the focus group participants, both educators and youth, said as well.

Table 4. Percentage of Student Racial/Ethnic Identity, 2005-06 and 2010-11, Selected Counties

	White		African American		Hispanic		Asian		American Indian		2+ Races
	2005-06	2010-11	2005-06	2010-11	2005-06	2010-11	2005-06	2010-11	2005-06	2010-11	2010-11
Pennsylvania	74.83	71.49	16.13	15.42	6.41	8.24	2.48	3.19	.15	.16	1.50
Southwest Region											
Greene	98.27	97.51	1.02	1.52	.32	.33	.34	.52	.03	.11	.00
Washington	92.91	91.54	5.72	4.49	.59	.86	.66	.87	.12	.05	2.18
Adjacent counties											
Allegheny	73.68	70.70	23.51	22.38	.67	1.05	2.00	2.95	.13	.15	2.76
Beaver	87.67	85.37	11.11	10.14	.60	1.18	.51	.59	.11	.11	2.60
Fayette	91.67	90.63	7.75	7.68	.30	.49	.24	.34	.04	.11	.74
Westmoreland	93.88	92.31	4.79	4.33	.46	.75	.69	1.07	.18	.12	1.42
Northern Tier Region											
Bradford	97.13	96.45	1.49	1.38	.71	1.16	.55	.51	.12	.20	.30
Lycoming	88.88	87.08	9.49	7.36	.85	1.21	.65	.83	.13	.19	3.31
Adjacent counties											
Clinton	97.85	95.89	1.12	1.14	.37	.79	.66	1.00	.00	.23	.95
Columbia	96.18	94.72	1.35	1.91	1.48	1.98	.88	.87	.11	.22	.30
Montour	91.53	88.04	3.97	5.10	1.92	2.87	2.25	2.92	0.33	0.19	0.88
Northumberland	94.86	92.42	2.14	2.52	2.47	3.87	.42	.60	.11	.17	.41
Potter	96.94	96.74	1.07	0.93	0.75	1.01	0.85	1.05	0.39	0.27	0
Sullivan	98.07	97.14	0.90	1.43	0.90	0.79	0.13	0.63	0	0	0
Susquehanna	97.38	95.68	.86	1.18	1.21	1.97	.38	.50	.18	.21	.46
Tioga	97.05	96.51	1.01	1.06	1.06	1.55	.51	.55	.37	.26	.07
Union	94.25	91.01	3.02	3.78	1.36	2.36	1.14	1.70	.24	.30	.85
Wyoming	97.68	96.65	1.27	1.16	.55	.87	.42	.34	.09	.29	.70

Source: National Center for Education Statistics.

Tables 5 and 6 show data on English language learner (ELL) populations and the change in ELL students served by school districts. With the exception of Allegheny County, the total number of reported ELL students is low – in the first time period 106 ELL students or fewer at the individual county level, and in the second time period 166 or fewer. Table 4 shows the percentage of ELL students at the county level for 2006-07 and 2010-11. Statewide, the percentage of ELL students in 2006-07 was 2.34 percent while across the four case study counties and the adjacent counties in each region in no case did the percentage of ELL exceed 1 percent of the total student population. These percentages did not show significant change in 2010-11. Statewide, the percentage of ELL students increased to 2.67 percent. Increases in ELL students occurred in most cases across the four case study counties and the adjacent counties, but these increases were by fractions of a single percentage point. Northumberland County in the second time period had the highest percentage of ELL students at 1.32 percent, an increase from .78 percent in 2006-07. In short, there is little evidence to suggest marked changes in ELL populations in these counties during this time period. This is, again, consistent with the focus group data.

Table 5. Number of Students with English Language Learner Classification, 2006-07 to 2010-11 for Selected Counties

	2006-07	2007-08	2008-09	2009-10	2010-11
Pennsylvania	43,739	46,356	45,970	46,352	47,014
Southwest Region					
Greene	5	6	5	6	8
Washington	65	73	82	62	69
Adjacent counties					
Allegheny	1,232	1,388	1,251	1,256	1,385
Beaver	38	38	35	44	51
Fayette	15	15	22	11	16
Westmoreland	92	120	110	102	109
Northern Tier Region					
Bradford	23	9	7	14	24
Lycoming	57	51	55	44	34
Adjacent counties					
Clinton	7	10	4	8	8
Columbia	31	31	36	34	27
Montour	8	1	8	13	12
Northumberland	105	128	154	144	166
Potter	2	5	9	3	1
Sullivan	0	0	0	0	0
Susquehanna	22	27	31	35	28
Tioga	14	15	14	8	9
Union	23	23	39	37	47
Wyoming	8	13	14	11	10

Note: data for 2005-06 not available. Source: National Center for Education Statistics.

Table 6. Percentage of Students with English Language Learner Classification, 2006-07 to 2010-11 for Selected Counties

	2006-07	2007-08	2008-09	2009-10	2010-11
Pennsylvania	2.34	2.58	2.60	2.61	2.62
Southwest Region					
Greene	0.08	0.11	0.09	0.11	0.15
Washington	0.21	0.25	0.28	0.21	0.23
Adjacent counties					
Allegheny	0.74	0.89	0.83	0.84	0.93
Beaver	0.12	0.12	0.11	0.14	0.15
Fayette	0.07	0.08	0.12	0.06	0.09
Westmoreland	0.16	0.23	0.21	0.20	0.21
Northern Tier Region					
Bradford	0.21	0.10	0.08	0.14	0.24
Lycoming	0.32	0.30	0.33	0.27	0.20
Adjacent counties					
Clinton	0.12	0.21	0.10	0.17	0.17
Columbia	0.39	0.41	0.48	0.46	0.37
Montour	0.29	0.04	0.32	0.49	0.47
Northumberland	0.78	1.01	1.25	1.19	1.32
Potter	0.07	0.19	0.35	0.11	0.04
Sullivan	0	0	0	0	0
Susquehanna	0.27	0.36	0.43	0.48	0.40
Tioga	0.23	0.24	0.24	0.14	0.16
Union	0.51	0.55	0.96	0.90	1.16
Wyoming	0.18	0.23	0.25	0.28	0.25

Note: data for 2005-06 not available. Source: National Center for Education Statistics.

Students with special education or Individualized Education Plans (IEPs) status showed an increase in Pennsylvania between 2005-06 and 2010-11 of 12.52 percent, going from 14.62 percent of the student population at the beginning of the time period to 16.45 percent by the end (see Table 5). IEP classifications in the case study counties and the adjacent counties showed no discernible patterns. Greene and Lycoming counties stayed virtually unchanged across the time period, while Washington County school districts experienced a 12 percent increase and Bradford County school districts experienced a nearly 14 percent increase with 16.06 percent and 17.07 percent of the students in those counties, respectively, classified as IEP. In school districts, in 10 of the 18 counties (including the case study and adjacent counties), IEP classification rates exceeded the state average in 2010-11. While as a whole school districts in these two regions did not appear to experience spikes in IEP classifications, several educators and administrators from the northern tier explained the difficulties their staff had experienced with handling IEP classifications of students coming from out of state. In the focus group with superintendents from IU 17, one mentioned, "I know our staff has had a difficult time understanding IEPs from Texas, in particular, and how to proceed with them." In another focus group, an educator from Lycoming County similarly explained,

> "Different states have different regulations as far as identification of students, so we've had some students come in where they had services, but they don't necessarily qualify

Table 7. Percentage of Students with Special Education Classification (IEP), 2005-06 to 2010-11 for Selected Counties

	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	Pct. Change 05-06 to 10-11
Pennsylvania	14.62	15.64	16.37	16.67	16.61	16.45	12.52
Southwest Region							
Greene	21.38	21.25	22.04	20.79	20.74	21.37	-0.047
Washington	14.33	15.28	16.41	16.22	15.25	16.06	12.07
Adjacent counties							
Allegheny	15.17	16.62	17.33	17.35	17.12	16.55	9.10
Beaver	12.49	12.93	13.65	13.97	14.05	14.19	13.61
Fayette	17.03	17.32	17.66	17.25	17.60	18.15	6.58
Westmoreland	12.61	13.40	14.55	14.38	14.60	14.19	12.53
Northern Tier Region							
Bradford	14.98	15.87	16.70	17.04	17.19	17.07	13.95
Lycoming	16.36	17.36	17.77	17.46	16.89	16.67	1.90
Adjacent counties							
Clinton	17.87	15.01	18.64	23.15	18.85	20.41	14.21
Columbia	15.90	14.77	16.16	16.77	17.19	16.96	6.67
Montour	13.31	15.49	17.52	17.25	15.08	15.29	14.99
Northumberland	11.97	13.42	14.66	15.50	16.28	16.24	35.67
Potter	12.99	16.03	16.64	15.73	15.27	15.78	21.44
Sullivan							21.21
Susquehanna	18.88	18.68	20.49	20.59	18.89	17.60	-6.78
Tioga	14.23	15.65	14.90	16.22	16.57	17.21	20.94
Union	11.74	13.42	15.71	15.85	15.72	15.44	31.52
Wyoming	15.22	17.54	17.60	17.50	18.73	17.49	14.91

Source: National Center for Education Statistics.

Table 8. Percentage of Students with Income Qualification for Free or Reduced Price Lunch, 2005-06 to 2010-11 for Selected Counties

	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	Pct. Change 05-06 to 10-11
Pennsylvania	31.45	30.15	31.34	33.41	37.64	38.93	23.78
Southwest Region							
Greene	36.12	44.05	44.25	42.90	44.32	45.74	26.63
Washington	27.83	23.04	25.95	28.06	28.59	30.08	8.08
Adjacent counties							
Allegheny	30.09	25.14	26.77	30.93	37.19	36.53	21.40
Beaver	27.67	25.45	25.50	26.10	27.74	27.84	0.61
Fayette	52.33	47.32	51.26	53.03	53.82	53.59	2.41
Westmoreland	25.25	21.45	25.13	27.50	29.85	29.42	16.51
Northern Tier Region							
Bradford	38.79	36.85	37.85	39.95	44.02	40.86	5.34
Lycoming	35.13	34.77	36.44	38.54	40.11	38.86	10.62
Adjacent counties							
Clinton	42.76	34.96	42.13	51.04	46.41	47.00	9.92
Columbia	29.68	29.78	30.70	30.71	35.57	35.65	20.11
Montour	26.60	28.58	30.98	28.52	25.32	25.25	-5.04
Northumberland	34.73	30.82	34.74	40.51	42.77	44.24	27.38
Potter	40.80	41.24	43.64	45.02	47.85	46.95	15.08
Sullivan	35.26	33.69	30.65	32.78	36.16	34.29	-2.77
Susquehanna	35.35	37.67	39.24	41.08	36.18	36.10	2.12
Tioga	41.37	43.68	44.86	44.13	45.16	42.10	1.76
Union	23.25	25.27	26.59	27.40	28.27	27.57	18.58
Wyoming	33.23	36.44	37.05	40.61	34.46	39.35	18.42

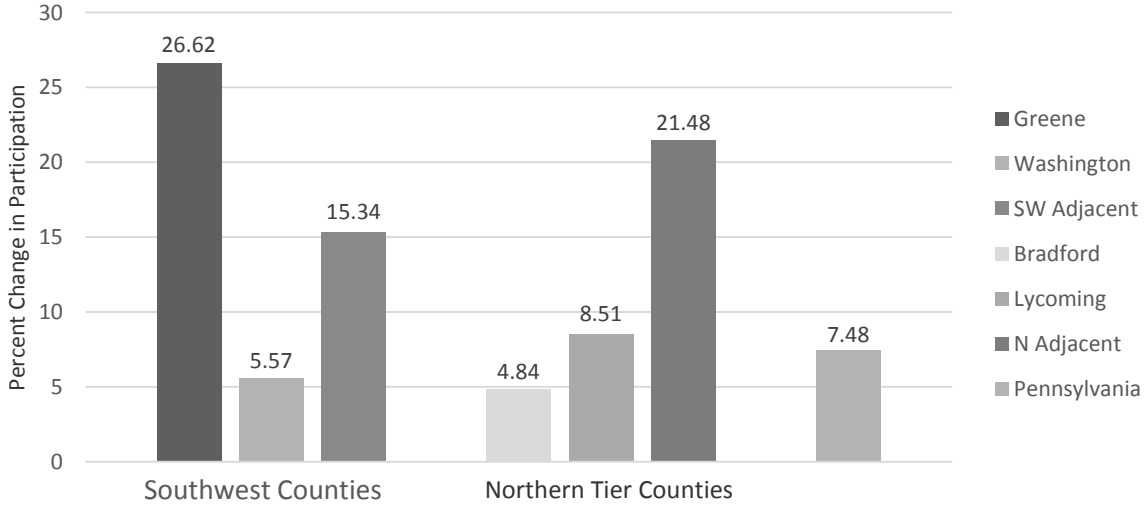
Source: National Center for Education Statistics.

for services in Pennsylvania, but that's only happened in one or two situations on the elementary level, that I'm aware of. That's not even significant. It's significant for the parent/child, because they're thinking they're gonna get particular services and it doesn't happen, and you have to go through dealing with that."

The quotes suggest that even absent of major discernible spikes in special education classification, there have been effects at the school district level that have raised questions for administrators, educators and parents about the services able to be provided to children with a variety of special educational needs.

The period between 2005-06 and 2010-11 included economic downturns associated with the great recession. Because of this, one might expect to see this reflected in part in the percentages of students eligible for free or reduced price lunch. Statewide, between 2005-06 and 2010-11 participation rates increased from 31.45 percent to 38.93 percent (see Table 8) accounting for a 23.78 percent increase during that time period. While all of the case study counties and adjacent counties similarly experienced increases in lunch program participation rates during this time period, only two counties experienced increases that exceeded the state average: Greene, one of the four case study counties with a nearly 27 percent increase, and Northumberland with a 27.38 percent increase. Both counties also had lunch program participation rates that not only exceeded state data in terms of county-level increases during the time period but also in terms of rates overall. While in 2010-11 about 39 percent of Pennsylvania students were eligible for free or reduced price lunch, the same was true for nearly 46 percent of students in Greene County and over 44 percent in Northumberland County. Though increases in participation rates were generally lower than state averages, rates still tended to be high overall. In 2010-11 the lowest participation rates by county was in Union, at 27.57 percent while school districts in most other counties during the same time period had participation rates of between 30-50 percent. Figure 4 shows a graphic representation of the percent change in free and reduced price lunch participation rates between 2005-06 and 2010-11 for Pennsylvania as a whole, the four case study counties, and the aggregated adjacent counties in the southwest and northern tier regions.

Figure 4: Percent Change in Percent Participation in Federal Free and Reduced Price Lunch Program, 2005/06 to 2010/11



Source: National Center for Education Statistics.

Student Outcomes and Achievement

This section presents an examination of indictors of student achievement and academic attainment, including dropout rates and test scores, examining these indices over time with relation to the development of the Marcellus Shale. The Marcellus industry raises critical questions about the effects of new labor market opportunities on the educational and workplace aspirations of youth within areas of high drilling and gas extraction activity. Many gas industry jobs represent nearly unprecedented lucrative opportunities for young people in areas where high paid work for those with less than a college degree was almost unimaginable 10 years ago.

In Bradford County an educator said that the industry, for example, is "always looking for welders. So these kids, if they can go get certified to weld, they're gonna make more money than you and I are." Another explained "there was like this mentality that, 'Oh, I can make a lot of money. This is gonna be here forever. I've got it made. I'm 17, 18 years old. I could even quit school.'" We had a lot of fear that that was gonna have an impact on our graduation percentages, our percentage of kids going on to college and that kind of thing." These comments mirrored remarks by another educator in Greene County who said, "they can walk out of here with a high school diploma and our kids can go straight into a blue collar job, and make it, and to make as much money as I make. It's right off the bat." Youth as well were aware of the potential opportunities associated with the industry. A Bradford youth said, "I've already had an offer when I turn 18. I can start out making $3,000 a week from just as an assistant, and you don't even need a degree for that."

This raises questions about post-secondary aspirations and student academic attainment. That is, do these new economic opportunities depress college-going aspirations? Alternately, do these opportunities increase the risk of drop-out, as some teachers and youth in both regions implied in the focus group conversations? Are there effects on student achievement overall? The data collected are inadequate to thoroughly investigate these questions, especially post-secondary transitions. However, state-collected data on dropout rates and on test scores in math and reading are examined below to determine trends over time, coincident with the development of the gas industry's recent activity within the Marcellus region.

Table 7 shows reported dropout rates for districts in the four case study districts and the adjacent districts in the two regions. In Pennsylvania overall between 2007-08 and 2011-12, dropout rates increased slightly from 1.44 percent to 1.58 percent, a 14 percent increase overall, although still representing a relatively small percentage of the overall student population. In three of the four case study counties dropout rates increased slightly during this time period, although in Bradford County dropout rates actually decreased slightly. School districts in nine of the 18 counties had dropout rates lower than the state average, and school districts in eight of the 18 counties had percent changes in dropout rates that were less than the state average. In sum, it is difficult to conclude from these data that increased dropout rates can be considered an endemic problem in areas experiencing active Marcellus development, or at least any more of a problem than elsewhere in the state. On the other hand, anecdotal evidence from the school district level suggests that at least for some students the shale gas industry has provided extra impetus to leave school prior to graduation. No data regarding how college-going rates may have shifted over time were collected. However the gas industry may have a larger effect in this area, something many administrators are aware of, such as the superintendent who said at an Intermediate Unit meeting that educators in his district encourage students to "get some additional schooling so that they have something to fall back on (but) students are reluctant to do that because they're enticed by the money."

Table 9. Reported Dropout Rates, 2007-08 to 2011-12 for Selected Counties

	2007-08	2008-09	2009-10	2010-11	2011-12	Net Change, 07-08 to 11-12
Pennsylvania	1.44	1.37	1.36	1.46	1.58	.14
Southwest Region						
Greene	1.60	1.30	1.89	2.49	2.60	1.00
Washington	1.10	1.00	1.16	1.12	1.39	.29
Adjacent counties						
Allegheny	1.10	1.20	0.93	0.86	0.83	-.27
Beaver	1.20	1.30	1.07	1.76	1.38	.18
Fayette	2.40	2.00	1.89	1.98	1.69	-.71
Westmoreland	1.20	1.10	0.95	0.91	0.88	-.32
Northern Tier Region						
Bradford	2.40	1.80	2.18	2.25	2.12	-.28
Lycoming	2.20	2.10	1.75	1.93	2.39	.19
Adjacent counties						
Clinton	1.70	0.50	1.30	0.65	1.36	-.34
Columbia	1.40	1.10	1.98	3.10	2.13	.73
Montour	1.25	1.15	1.41	0.48	1.37	.12
Northumberland	3.30	2.90	1.70	1.72	1.88	-1.42
Potter	0.99	1.74	1.15	2.11	2.08	1.09
Sullivan	0.54	1.38	0	0.31	1.57	1.03
Susquehanna	1.30	1.10	1.18	1.66	1.25	-.05
Tioga	1.70	1.90	1.55	1.80	1.45	-.25
Union	0.70	0.30	0.83	1.09	1.15	.45
Wyoming	0.70	1.20	1.35	1.33	1.14	.44

Source: Pennsylvania Department of Education

Tables 10 and 11 show the percentage of students scoring proficient or advanced on PSSA math and reading in 2005-06 and in 2010-11 in grades 4, 8 and 11. Across the state, for all grades, the percentages of students scoring at proficient or advanced levels in both subjects increased over the 5-year period. For the most part, the same held true in the Marcellus Shale regions: the percentages of students scoring at proficient or advanced levels increased over the 5-year period. The same was largely the case with reading scores, except in the 4th and 11th grades, in which the percentages of students scoring proficient or advanced dropped in some school districts across multiple counties from 2005-06 to 2010-11. That included the two case study counties of Greene (11th grade) and Washington (4th and 11th grades). In sum, it is difficult, again, to discern any clear patterns or trends in regard to PSSA scores that might be associated with Marcellus Shale development.

Table 10. Percentage of Students Scoring Proficient or Advanced on PSSA Math Tests, Grades 4, 8 and 11, 2005-06 and 2010-11, Selected Counties

	Grade 4		Grade 8		Grade 11	
	2005-06	2010-11	2005-06	2010-11	2005-06	2010-11
Pennsylvania	77.2	85.2	62.2	76.9	52	60.3
Southwest Region						
Greene	74.04	78.18	42.9	60.62	35.28	51.2
Washington	77.91	88.59	60.43	77.93	49.47	61.37
Adjacent counties						
Allegheny	81.33	85.26	64.22	76.98	56.62	60.96
Beaver	81.76	85.56	69.96	80.39	51.87	59.29
Fayette	75.53	82.72	52.55	66.47	49.83	53.4
Westmoreland	82.3	85.79	69.69	80.59	62.84	65.94
Northern Tier Region						
Bradford	75.91	81.47	60.66	77.32	41.51	53.82
Lycoming	87.95	89.78	71.66	87.46	65.55	70.16
Adjacent counties						
Clinton	77.8	82.5	64	78.6	48.2	51.6
Columbia	86.15	88.94	69.22	79.43	59.13	57.91
Montour	83.70	75.70	66.20	87.90	59.60	78.80
Northumberland	81.12	90.05	54.47	80.61	43.93	56.43
Potter	71.52	87.84	52.00	74.30	42.46	60.94
Sullivan	80.30	78.40	65.00	61.60	31.90	59.00
Susquehanna	77.88	90.57	60.07	78.93	49.08	53.8
Tioga	79.33	79.63	58.2	73.73	47.2	51.77
Union	90.55	91.8	70.3	92	60	71.8
Wyoming	73.6	81.7	66	71.95	52.2	60

Source: Pennsylvania Department of Education.

Table 11. Percentage of Students Scoring Proficient or Advanced on PSSA Reading Tests, Grades 4, 8 and 11, 2005-06 and 2010-11, Selected Counties

	Grade 4		Grade 8		Grade 11	
Pennsylvania	68.1	73.3	70.6	81.8	65.1	69.1
Southwest Region	2005-06	2010-11	2005-06	2010-11	2005-06	2010-11
Greene	63.67	71.16	63.51	69.06	59.66	57.54
Washington	79.4	77.68	76.85	82.43	75.7	72.3
Adjacent counties						
Allegheny	72.37	74.75	74.26	81.52	68.63	70.7
Beaver	72.73	75.94	72.33	80.12	65.13	68.33
Fayette	62.37	66.86	64.35	72.14	62.87	62.7
Westmoreland	74.98	75.67	79.82	84.09	74.79	73.17
Northern Tier Region						
Bradford	63.67	67.4	63.51	79.86	59.66	64.15
Lycoming	75.18	79.93	76.48	83.85	75.39	77.16
Adjacent counties						
Clinton	59.8	66.9	68.5	74.9	62.3	62.3
Columbia	76.85	76.33	75.32	77.75	77.12	66.33
Montour	79.10	76.00	68.00	86.60	74.10	
Northumberland	68.07	77.15	69.15	79.33	64.15	61.5
Potter	64.64	78.54	61.76	79.10	60.70	73.96
Sullivan	75.00	75.60	76.60	71.80	56.50	80.40
Susquehanna	63.73	74.75	66.97	67.9	68.35	79.34
Tioga	72.97	65.87	67.7	75	61.77	63.77
Union	73.75	80.65	84.15	88.45	84.15	83.15
Wyoming	79.4	69.9	76.85	75.2	75.7	66.65

Source: Pennsylvania Department of Education.

Linking Student Outcomes and School District Finances to Drilling at the District Level

In this section, instead of aggregating school district data to the county level, the data were examined at the school district level and school districts were sub-classified according to the level of local drilling in and around the district. In doing so, the possible relationships between local drilling activity and school and student outcomes could be examined more closely. School districts were classified according to the number of Marcellus wells drilled by mid-2012 within each district and a 10-mile buffer zone around each district. Classifications included districts with no drilling activity, those with 1-25 wells, 26-125 wells and greater than 125 wells. The presentation of these data is broken down by region for the southwest and northern tier counties.

In Table 12 the percent change between 2006-07 and 2010-11 is examined for total enrollment, free or reduced price lunch eligibility rates, special education participation rates, and dropout rates.[2] In neither region did there appear to be any clear relationship between local drilling activity and enrollment changes as enrollments showed relatively consistent declines across all drilling activity classifications. Conversely, free or reduced price lunch eligibility rates increased over time. In school districts in the northern tier, these rates increased by smaller amounts in higher drilling activity districts, although there was no similar discernible pattern across school districts in the southwest. Changes in special education and dropout rates fluctuated across drilling activity classifications and across regions, with no consistent, readily discernible pattern.

Table 12. Change in School District Student Characteristics by Level of Marcellus Drilling Activity, 2006-07 to 2010-11

	0 wells	1-25 wells	26-125 wells	125+ wells
Southwestern Districts				
Net Enrollment	-5.34%	-8.58%	-5.28%	-5.49%
FRL Classification	15.78%	46.84%	18.42%	19.49%
IEP Classification	-4.27%	-1.53%	2.60%	1.42%
Dropout Rate[1]	-24.10%	33.13%	-26.93%	30.12%
Total Number of Districts	10	37	34	18
Northern Tier County Districts				
Net Enrollment	-4.91%	-11.22%	-6.26%	-7.15%
FRL Classification	33.36%	11.16%	14.90%	4.47%
IEP Classification	15.41%	5.64%	-1.96%	0.82%
Dropout Rate	-9.55%	-21.31%	-27.19%	-1.50%
Total Number of Districts	9	7	8	17

Source: Pennsylvania Department of Education and the National Center for Education Statistics.

In Pennsylvania, school districts collect their primary revenues from real estate taxes and earned income taxes. Combined, these two sources make up about 98 percent of school district locally-derived revenues. Pennsylvania law stipulates that oil and gas reserves are tax exempt, which means that local

[2] Changes in dropout rates are investigated for 2007-08 and 2010-11 due to data availability.

gas extraction does not directly contribute to local school district revenues. Pennsylvania Act 13, which created an impact fee for gas extraction activity, similarly does not contribute any local revenues for school districts. Local earned income taxes, however, are derived from the wages and salaries of local residents and therefore one might expect local employment generation to result in increases in earned income tax revenues. However, the wages and salaries of out of state residents, such as gas industry workers maintaining residences in other states, are not taxed locally and do not contribute to local school district revenues. Similarly, local leasing revenues are classified as unearned income and are not subject to local taxation. School district financial data are shown in Table 13.

Table 13. Change in School District Finances by Level of Marcellus Drilling Activity, 2006-07 to 2010-11

	0 wells	1-25 wells	26-125 wells	125+ wells
Southwestern County Districts				
Real Estate Tax (local taxes)	7.32%	1.06%	5.44%	5.48%
Earned Income Tax	9.70%	10.27%	11.65%	16.94%
Real Estate Transfer Tax	-49.93%	-32.33%	-28.29%	-9.67%
Total Local Revenue	5.22%	-0.79%	3.88%	0.98%
Number of Districts	10	37	34	18
Northern Tier County Districts				
Real Estate Tax (local taxes)	13.94%	5.49%	1.79%	7.45%
Earned Income Tax	10.27%	12.75%	28.72%	-10.55%
Real Estate Transfer Tax	-22.66%	-15.23%	-20.47%	-1.81%
Total Local Revenue	12.73%	5.56%	2.31%	7.04%
Number of School Districts	9	10	11	18

Source: Pennsylvania Department of Education.

The data shown in Table 13 do not appear to suggest any clear patterns for either changes in real estate taxes or earned income taxes from 2006-07 to 2010-11. Real estate transfer taxes are derived from local real estate sales and therefore reflect the value and amount of real estate property tax within the school district. Across nearly every category except one – school districts in the northern tier with 125+ wells where real estate transfer tax revenues increased by less than 1 percent – these tax revenues declined over the time period. Similarly, total local revenue for school districts, including all taxes and fees, showed no appreciable relationship with local drilling activity.

Conclusions

According to the analysis, there would appear to be little in the way of enrollment change, student demographics and student outcomes that would seem to be associated with Marcellus Shale development. Enrollments in both regions have continued their steady and longer term decline. The spikes in student populations that school districts in the regions may have anticipated in association with sudden industry development have not come to pass. Those at the school district level have attributed this mainly to out-of-state gas workers arriving without family members or children. This is not to say that there have not been some influxes of new students along with the influxes of workers. But the school district level quantitative data and the focus group data suggest that the overall numbers of new students are low. Relatively steady or even declining total enrollments can hide student

turnover, however, which could still alter the demographic makeup of student populations. Here again, however, the Department of Education data did not suggest at the county level that this is occurring either in terms of race or ethnicity. The same may be said with regard to changes in ELL student populations or in the percentages of students classified as receiving special education services. There was also no discernible pattern with PSSA scores.

During the late 2000s the statewide percentages of students who were income qualified for free or reduced price lunch increased markedly, attributable in large part to the national recession and economic downturn. These rates rose within the Marcellus gas fields of the northern tier and southwest of Pennsylvania as well, although at lesser rates. At the same time, in 2010-11, in seven of the 18 counties examined, the lunch program participation rates were still above state averages and the majority of county-level rates ranged between 35 percent and 45 percent, suggesting continued high levels of economic disadvantage among significant proportions of students. On the other hand, despite increased levels of student need and lucrative gas industry employment opportunities that don't require post-secondary credentialing, dropout rates overall have shown negligible change, although anecdotal evidence from focus groups suggests that some students have dropped out, lured, at least in part, by industry opportunities. An important question remains regarding how industry-associated opportunities may have affected postsecondary educational aspirations and how these aspirations may change over time. These trends and the effects on communities, schools and other local institutions bear continued attention.

Acknowledgements

Report authors: Kai A. Schafft, Stephen Kotok, and Catharine Biddle, Pennsylvania State University.

The Marcellus Shale Impacts Study Project Team

Kathryn J. Brasier, Associate Professor of Rural Sociology
Lisa A. Davis, Director of the Pennsylvania Office of Rural Health and Outreach Associate Professor of Health Policy and Administration
Leland Glenna, Associate Professor of Rural Sociology
Timothy W. Kelsey, Professor of Agricultural Economics and Co-Director of Penn State's Center for Economic and Community Development
Diane K. McLaughlin, Professor of Rural Sociology and Demography
Kai A. Schafft, Associate Professor of Education and Director of Penn State Center on Rural Education and Communities
Kristin Babbie, Graduate Assistant in Rural Sociology
Catharine Biddle, Graduate Assistant in Educational Leadership
Anne DeLessio-Parson, Graduate Assistant in Rural Sociology
Danielle Rhubart, Graduate Assistant in Rural Sociology and Demography
Namrata Uberoi, Ph.D. candidate in Health Policy and Administration

The project team gratefully acknowledges support from the following: the Department of Agricultural Economics, Sociology and Education in the College of Agricultural Sciences at Penn State; the Pennsylvania Office of Rural Health; the Department of Education Policy Studies in the College of Education at Penn State; The Pennsylvania State Univeristy Children, Youth, & Families Consortium; and the Penn State Institutes for Energy and the Environment. We also thank Penn State's Survey Research Center for their assistance with the focus groups. Several individuals contributed to the project through background research, data collection and analysis, including Matthew Filteau, Stephen Kotok, Mark Leach, Kylie Davis, Kirsten Hardy, and Kaitlyn Chajkowski. We appreciate their hard work.

We gratefully acknowledge the XX members of our advisory committees who provided us with important insights at key points in the project and gave us access to data sets. We also thank the XX community members and county commissioners who shared their experiences through focus groups and interviews. We greatly appreciate their time, assistance, and insights.

Finally, we thank the following individuals for providing feedback on this report prior to its release: XXX. The authors maintain responsibility for any errors.

References

Dell, Ben P., Noam Lockshin, and Scott Gruber. 2008. "Bernstein E&Ps: Where Is the Core of the Marcellus?" Report published by Sanford C. Bernstein & Co., LLC, a subsidiary of AllianceBernstein L.P. New York, NY.

DEP Office of Oil and Gas Management: Wells Drilled by County. Pennsylvania Department of Environmental Protection. http://www.depreportingservices.state.pa.us/. Accessed July 4, 2013.

McLaughlin, Diane K., Molly A. Martin, April L. Gunsallus, Kathy Brasier and Kelly D. Davis. 2012. "Does Marcellus Shale Natural Gas Extraction Contribute to Increasing Inequality Among Pennsylvania's Families and Communities?" Paper presented at the Annual Meeting of the Rural Sociological Society, Chicago, Il., August.

Social Explorer Tables: Census 2000 (SE), Social Explorer; U.S. Census Bureau. http://www.socialexplorer.com/ Accessed July 12, 2013.

Wrightstone, G. (2008). Marcellus Shale Geologic Controls on Production. Texas Keystone Incorporated. http://www.papgrocks.org/wrightstone_p.pdf. Accessed October 8, 2012.

Appendix A: Unconventional Wells Drilled by County and Year, 2005-2013

county name	2005	2006	2007	2008	2009	2010	2011	2012	2013*	Total, county
Bradford[+]	**1**	**2**	**2**	**24**	**158**	**373**	**396**	**164**	**66**	**1186**
Washington[+]	**5**	**19**	**45**	**66**	**101**	**166**	**155**	**195**	**120**	**872**
Tioga	0	1	0	15	124	273	272	122	13	820
Lycoming[+]	**0**	**0**	**5**	**12**	**23**	**119**	**301**	**202**	**89**	**751**
Susquehanna	0	1	2	33	88	125	205	191	102	747
Greene[+]	**0**	**2**	**14**	**67**	**101**	**103**	**121**	**105**	**54**	**567**
Westmoreland	1	0	4	33	39	49	59	42	22	249
Fayette	0	2	6	20	57	44	54	43	12	238
Butler	0	3	12	11	10	35	35	69	44	219
Armstrong	0	3	2	7	19	36	35	44	26	172
Clearfield	0	0	1	6	24	39	58	19	2	149
Wyoming	0	0	0	0	2	24	71	15	25	137
Clinton	0	0	0	4	9	35	39	10	1	98
Sullivan	0	0	0	0	0	22	19	27	5	73
Potter	0	0	8	6	8	36	11	1	0	70
Elk	1	1	6	8	6	16	22	1	3	64
McKean	0	2	1	5	7	22	19	5	3	64
Centre	0	0	1	4	7	41	8	2	0	63
Indiana	0	0	0	5	6	7	21	2	0	41
Jefferson	0	0	0	3	3	7	15	9	0	37
Allegheny	0	0	0	1	3	0	5	13	8	30
Lawrence	0	0	0	0	0	0	2	16	8	26
Beaver	0	0	0	0	1	1	5	17	2	26
Somerset	0	0	1	0	7	4	7	5	1	25
Clarion	0	0	3	1	3	3	10	4	0	24
Forest	0	0	0	0	5	1	0	12	4	22
Cameron	0	0	0	3	2	3	7	0	0	15
Mercer	0	0	0	0	0	0	0	5	3	8
Cambria	0	0	0	0	2	1	3	1	0	7
Blair	0	0	0	0	0	4	2	0	0	6
Venango	0	0	0	0	0	0	2	3	0	5
Warren	0	0	2	0	0	0	1	1	1	5
Wayne	0	0	0	1	0	4	0	0	0	5
Columbia	0	0	0	0	0	1	2	0	0	3
Crawford	0	0	0	0	0	0	0	3	0	3
Lackawanna	0	0	0	0	1	0	1	0	0	2
Luzerne	0	0	0	0	0	2	0	0	0	2
Bedford	0	0	0	0	0	1	0	0	0	1
Huntingdon	0	0	0	0	0	1	0	0	0	1
Total, by year	**8**	**36**	**115**	**335**	**816**	**1598**	**1963**	**1348**	**614**	**6833**

Source: Pennsylvania Department of Environmental Protection, Office of Oil and Gas Management.
*Data through June 30, 2013 (accessed July 4, 2013). [+]Study counties.

Appendix B. Marcellus Activity County Typology Definitions for Pennsylvania[a]

Category	Geological Definition	Activity level	Counties
Core Counties with High Drilling Activity[b] (N=7)	More than 50% of the land area is in the core Marcellus formation	Annual average 64 or more Marcellus wells 2005 to 2010	Bradford, Fayette, Greene, Lycoming, Susquehanna, Tioga, Washington
Core Counties with Low Drilling Activity (N=12)	More than 50% of the land area is in the core Marcellus formation	Annual average less than 64 Marcellus wells 2005 to 2010	Armstrong, Cambria, Cameron[c], Clearfield, Clinton, Elk, Indiana, Jefferson, Potter[c], Somerset, Sullivan[c], Wyoming
Counties in the **Marcellus 2nd Tier** (N=19)	1%-50% land area is in the core and 25% or more land area is in the less viable areas (2nd tier or gray areas in Figure 2)	Not applicable	Bedford, Blair, Butler, Carbon, Centre, Clarion, Columbia, Crawford, Forest[c], Lawrence, McKean, Mercer, Monroe, Montour[c], Pike, Schuylkill, Venango, Warren, Wayne
Urban Counties in the Marcellus Shale--**Core or 2nd Tier** (N=6)	Marcellus Core or 2nd Tier and identified as urban by the Center for Rural Pennsylvania	Not applicable	Allegheny, Beaver, Erie, Lackawanna, Luzerne, Westmoreland
Counties with No Marcellus Shale (N=23)	25% or less viable Marcellus land area or no Marcellus land area	Not applicable	Adams, Berks, Bucks, Chester, Cumberland, Dauphin, Delaware, Franklin, Fulton[c], Huntingdon, Juniata, Lancaster, Lebanon, Lehigh, Mifflin, Montgomery, Northampton, Northumberland, Perry, Philadelphia, Snyder, Union, York

[a]See McLaughlin, et al. 2012.
[b]Note this category includes all four study counties.
[c]These counties are excluded from those analyses that use American Community Survey (ACS) three-year estimates, as their populations are too small to be estimated.

*For more on maps, see the Penn State University Marcellus Center for Outreach and Research (http://marcellus.psu.edu) and Dell, Lockshin, and Guber (2008).

The Center for Rural Pennsylvania Board of Directors

Chairman
Senator Gene Yaw

Vice Chairman
Senator John Wozniak

Treasurer
Representative Garth D. Everett

Secretary
Dr. Nancy Falvo
Clarion University

Representative Rick Mirabito

Dr. Livingston Alexander
University of Pittsburgh

Dr. Theodore R. Alter
Pennsylvania State University

Stephen M. Brame
Governor's Representative

Taylor A. Doebler III
Governor's Representative

Dr. Stephan J. Goetz
Northeast Regional Center for Rural Development

Dr. Karen M. Whitney
Clarion University

The Center for Rural Pennsylvania, 625 Forster St., Room 902, Harrisburg, PA 17120
(717) 787-9555 www.rural.palegislature.us
September 2014