

CHAPTER 6: Substance Abuse and Mental Health – A Comparison of Appalachian Coal Mining Areas to Other Areas within the Appalachian Region

6.1 Introduction

A key geographic and economic feature of the Appalachian region is that a large proportion of the region is coal producing. The coal mining industry has long been a vital part of the economy of Appalachia and remains a major industry within the region. Many residents of the Appalachian region are employed in the coal mining industry or are employed in other industries that depend upon coal mining for their business.¹⁰⁶ It has been reported in major news media that, with per-ton prices doubling in the past six years, mining is currently more profitable than any other time in the past generation. This has led to a coal boom, which has provided economic opportunity for many workers within the region, but has also been clouded by an increase in drug use, as reported by the media. The media's poignant stories about drug use in coal mining areas have cited abuse of painkillers, methadone overdoses, and addiction OxyContin¹⁰⁷ as major problems. Standard national estimates comparing major occupational groups indicate that people in occupations involving heavy physical labor tend to use substances more,^{108,109} yet workers in the coal mining industry have been reported as having only average prevalence of past month illicit drug use among major occupational groups.¹¹⁰ In addition to these seemingly contradictory results in media reporting and available research, questions also remain as to whether mining-concentrated areas feature differently in terms of treatment services access and health care utilization. This is an area in need of further study.

“The abuse and misuse of painkillers is the worst I have seen in the 16 years I have worked narcotics in this area,” said Lt. Richard Stallard of the Big Stone Gap police department, director of the Southwest Virginia Drug Task Force.¹¹¹

Experts say that whatever ground was gained against the illegal use of OxyContin is being lost, engulfed in a widening cycle of abuse that extends to pain-killers, antidepressants and other prescription drugs.

Washington Post, January 13, 2008

In this chapter, we conduct statistical analyses of data systematically collected by two agencies within the U.S. Department of Health and Human Services – the Substance Abuse and Mental Health Services Administration (SAMHSA) and the Agency for Healthcare Research and Quality (AHRQ). We focus exclusively on the Appalachian region with the objective of comparing coal mining areas and other areas with respect to substance abuse and mental health status and access to the treatment services. The key research question for this chapter is: Do coal mining areas within Appalachia differ from other Appalachian areas in terms of the composition of patients admitted to specialty treatment services or discharged from community hospitals?

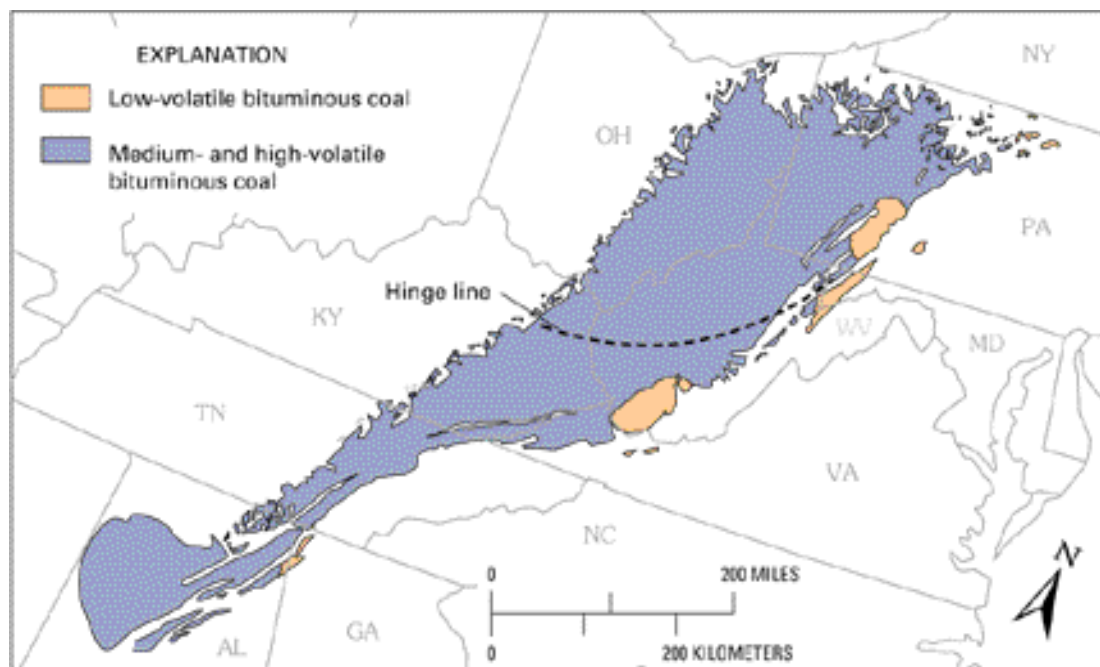
6.2 Data and Analytic Samples

Data sources utilized in this chapter are the current National Coal Resources Data System (NCRDS) from the U.S. Geological Survey, the Health Care Utilization Project's (HCUP) National Inpatient Stay (NIS) data set from AHRQ, and the Treatment Episode Data Set (TEDS).

Coal Mining Counties

We first identified the coal mining counties within the Appalachian Region by merging the coal mining area coverage data from the NCRDS with the list of the Appalachian counties described by the Appalachian Region Commission (ARC) as of 2006. Among the 410 Appalachian counties, 176 counties were identified as being located in the coal mining area (see **Figure 6.1**).

Figure 6.1 Coal Mining Area in the Appalachian Region



Source: National Coal Resources Data System, U.S. Geological Survey.

Community Hospital Discharges

The first analytic sample for this chapter includes all adult discharges from community hospitals within the Appalachian Region. There are a total of 167,957 admissions included in the analytic sample, including 76,083 (45.3%) from 25 coal mining counties and 91,874 (54.7%) from 20 other counties in the Appalachian region.¹⁸

Admissions to Substance Abuse Treatment Services

The second analytic sample for this chapter includes all admissions to substance abuse treatment services in Appalachian Region from 2000-2004. Among the 195 counties covered by the Treatment Episode Dataset (TEDS) in 2000-2004, 86 counties were located in the coal mining area. Overall there were 211,380 admissions from the coal mining area and 299,837 admissions from other areas in the Appalachian region.

¹⁸ Hospitals in five states with unknown county locations are excluded.

6.3 Results

A series of univariate and bivariate analyses were performed. Chi-square statistics were used to assess the statistical significance of the associations. Major findings from the HCUP NIS community hospital discharge sample are listed below (see **Table 6.3**):

Proportionately, there were more females among admissions in the coal mining area of Appalachia (62.4%) than in other areas of Appalachia (57.9%).

Patients admitted to coal mining area hospitals were older than patients elsewhere.

More than four-fifths of the admissions in the coal mining areas were among patients whose household incomes were less than \$35,000, while only slightly more than half of the admissions in other areas were from this income group.

While less than 10 percent of admissions (7.34%) from non-coal-mining areas were in distressed or at-risk counties, more than two-thirds (67.59%) of admissions from the coal-mining areas were in distressed or at-risk counties. None of the coal-mining area in Appalachia included competitive or attainment counties.

Proportionately more admissions in coal mining areas (56.82%) than admissions in other areas (51.35%) came through the Emergency Room (ER).

In 2004, 26.84 percent of hospital stays for adults in Appalachian coal mining area community hospitals and 27.36 percent in community hospitals located in other Appalachian areas were related to MH/SA disorders.

The rate of substance abuse-related disorders among all diagnoses was lower in community hospitals in coal mining areas (5.80%) than in other areas (6.13%).

The most common MH/SA disorders seen among hospital stays in coal mining area community hospitals were mood disorders (11.15%), delirium/dementia (6.28%), substance-related disorders (5.80%), anxiety disorders (5.72%), and schizophrenia (1.89%). The most common MH/SA disorders seen in hospital stays in non-coal mining area community hospitals were mood disorders (13.32%), substance-related disorders (6.13%), delirium/dementia (5.64%), anxiety disorders (5.46%), and schizophrenia (2.23%).

Among the MH/SA diagnoses, about 10 percent were co-occurring SA and MH diagnoses, accounting for 9.46% of diagnoses in coal mining areas and 13.32% of diagnoses in non-coal mining areas.

Major findings from the Substance Abuse Treatment Services Sample from TEDS are listed below:

Demographic Characteristics (see **Table 6.4**)

Females made up 32.48 percent of admissions in coal mining areas and 29.94 percent of admissions in other areas.

Overall, people less than 24 years of age accounted for more admissions in coal mining areas (32.89%) than other areas (29.59%).

Proportionately, fewer admissions were made by full-time employed workers in coal mining areas (19.67%) than other areas (29.21%). Conversely, more admissions were made by unemployed persons in coal mining areas (39.28%) than other areas (29.98%).

The majority of admissions were in transitional counties (59.1% in coal mining areas; 62.27% in other areas). Coal mining areas had proportionately more admissions (29.42%) in distressed or at-risk counties than other areas (5.62%), and fewer admissions (11.48%) in competitive or attainment counties than other areas (32.1%).

Treatment Service Related Characteristics (see **Table 6.5**)

There were no significant differences between coal mining area admissions and admissions in other areas related to most types of insurance coverage; rates of private health insurance, Blue Cross/Blue Shield, Medicare, Medicaid, and Health Maintenance Organization (HMO) coverage were all similar. However, while 30.47 percent of admissions in the coal mining area were made by people without any health insurance, more than half (52.36%) of the admissions were made by people without any health insurance in other areas of Appalachia. Proportionately, more admissions were paid by “other” insurances in coal mining areas (33.01%) than other areas (12.01%).

The most prevalent service setting for substance abuse treatment was non-intensive outpatient ambulatory services in both the coal mining areas (57.53%) and other areas (60.01%).

Proportionately, fewer admissions were self-referrals in coal mining areas (22.12%) than other areas (26.41%); proportionately more admissions were referred by court/criminal justice systems in coal mining areas (39.73%) than other areas (35.07%).

Less than 15% of coal mining area admissions were paid by individuals themselves, while four-fifths of the admissions in other areas were paid by individuals themselves; proportionately more admissions in coal mining areas were made by government payments other than Medicaid and Medicare (36.40%) than admissions in other areas (22.46%).

Primary, Secondary, and Tertiary Reasons for Substance Abuse Treatment Services (see **Table 6.6**)

The primary reason for seeking substance abuse treatment in Appalachia was alcohol use, although less so in coal mining areas (45.58%) than other areas within Appalachia (53.01%).

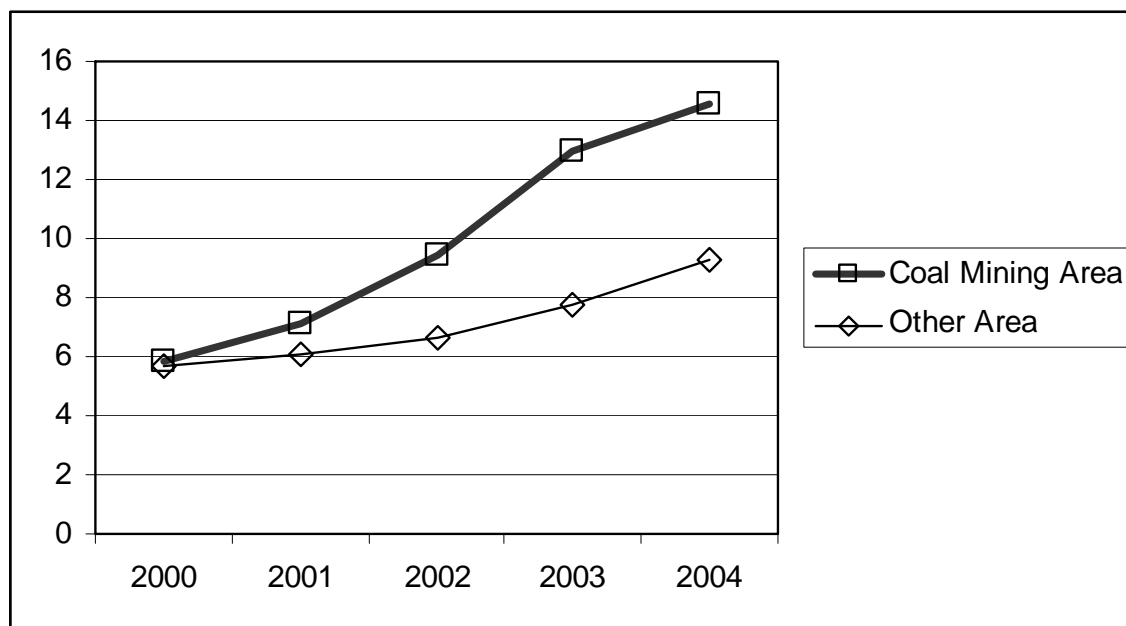
Heroin use as a primary, secondary, or tertiary reason for treatment accounted for proportionately more admissions in coal mining areas (10.34%) than for other areas within Appalachia (7.04%).

Trends of Heroin Use and Other Opiates or Synthetics Use in Appalachian Coal Mining Areas and Other Areas within the Region

In 2000, admissions for heroin use represent 5.84 percent of TEDS admissions in the coal mining area in Appalachia and 5.71 percent of TEDS admissions in other Appalachian areas. While admissions rates increased steadily over the 2000-2004 period for both the coal mining and non-coal mining areas, admissions rates in coal mining areas increased to a proportionately higher level. By 2004, heroin admissions accounted for 14.59 percent of the TEDS admissions in coal mining areas and 9.25 percent in other areas (see **Table 6.1**).

Table 6.1: Trend of Heroin Use as Primary, Secondary, or Tertiary Reason for Treatment, by Coal Mining Status of Patient Location

	2000	2001	2002	2003	2004	p-value
Coal Mining Area	5.84	7.16	9.43	12.95	14.59	<.0001
Other Area	5.71	6.07	6.66	7.76	9.25	<.0001

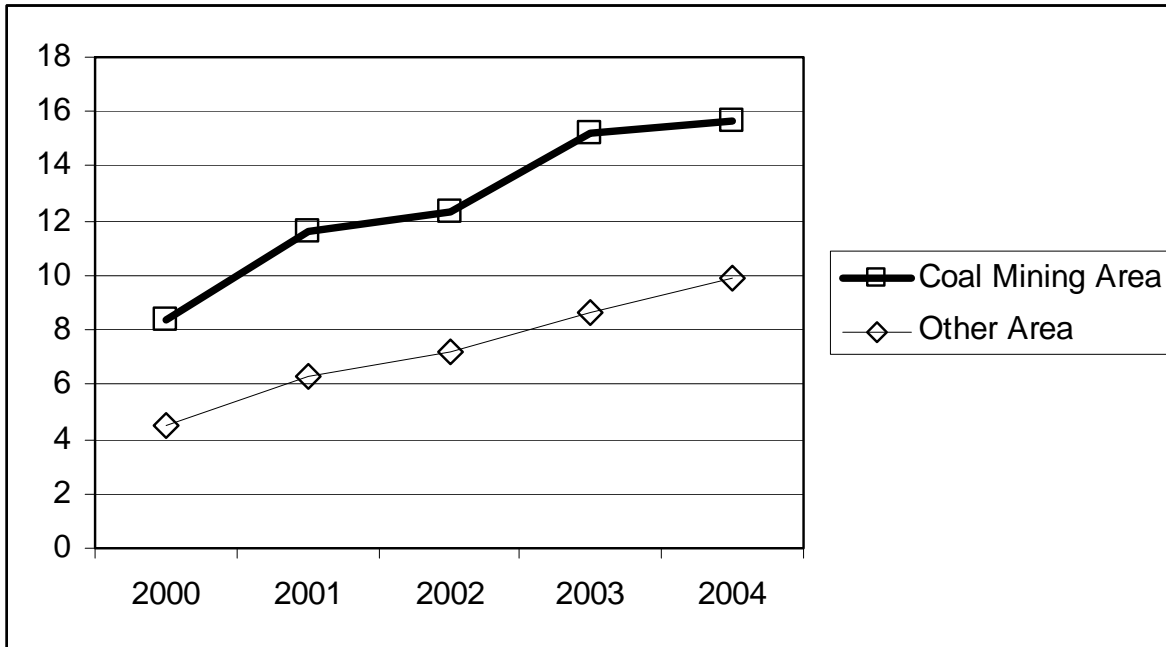


Source: Office of Applied Studies, Substance Abuse and Mental Health Services Administration, Treatment Episode Data Set (TEDS), 2000 – 2004.

In 2000, admissions for other opiates or synthetics use represented 8.41 percent of TEDS admissions in the coal mining area of Appalachia and 4.50 percent of TEDS admissions in other Appalachian areas. These percentages increased steadily over the 2000-2004 period for both coal mining and non-coal mining areas. By 2004, admissions for other opiates or synthetics accounted for 15.67 percent of the TEDS admissions in coal mining areas and 9.94 percent in the other areas (see **Table 6.2**).

Table 6.2: Trend of Other Opiates or Synthetics Use as Primary, Secondary, or Tertiary Reason for Treatment, by Coal Mining Status of Patient Location

	2000	2001	2002	2003	2004	p-value
Coal Mining Area	8.41	11.64	12.37	15.23	15.67	<.0001
Other Area	4.50	6.28	7.21	8.63	9.94	<.0001



Source: Office of Applied Studies, Substance Abuse and Mental Health Services Administration, Treatment Episode Data Set (TEDS), 2000 – 2004.

6.4 Conclusion

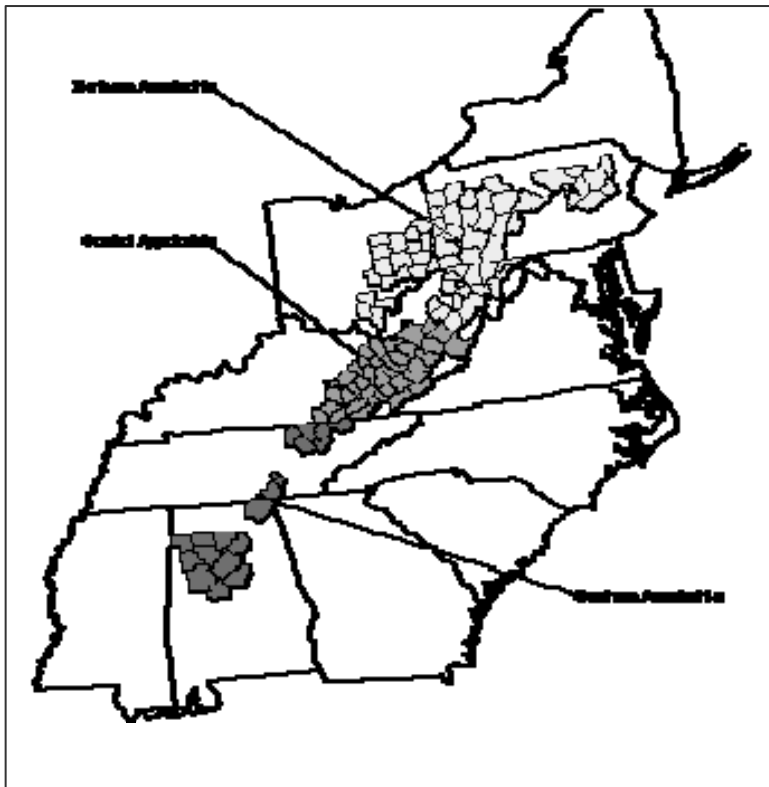
Our studies in previous chapters find that the percentage of admissions with heroin use and other opiates or synthetics use as the primary, secondary or tertiary reason for treatment is significantly higher in the Appalachian region, as compared to the rest of the nation. The study in this chapter adds granularity to these findings by demonstrating that coal mining areas within the Appalachian region demonstrate higher rates of both heroin use and other opiates or synthetics use as the primary, secondary or tertiary reason for treatment, as compared to other areas within the region. Furthermore, while studies in previous chapters show that rates of both heroin and other opiates and synthetics as primary reasons of coming to treatment increased over the 2000-2004 period, the pace of these rate increases is even faster in coal mining areas than in other areas within the Appalachian region.

Other illicit drug use and non-medical use of prescription drugs are also cited more as the primary, secondary or tertiary reasons for treatment in coal mining areas than in other areas. As coal mining areas have been found also to have a higher proportion of admissions paid for by government sources instead of self-payment, substance abuse problems have likely required more government resource investment in these areas as compared to elsewhere within the Appalachian region.

Our coal mining area was defined as the area with subsurface filled with coal instead of the actual coal-producing counties. The 176 coal mining counties retrieved thus covered not only the 118 coal-producing counties defined by the Appalachian Regional Commission in 2001 but also some closely-adjacent lands with coal mines as located by the National Coal Resource Data System.¹¹² The results should also be interpreted with caution because the units of analyses were admissions to treatment or hospital discharges made by people living in this area rather than actual coal miners.

In this study, we compared the coal mining area with other areas in Appalachia overall. Future studies could explore the coal mining area further by studying patterns across groups of similar counties. For example, analyses could focus on patterns in the northern, central and southern regions of Appalachia. These geographic sub-regions, used by the Appalachian Regional Commission, were employed in the previous analytic chapters to investigate patterns in Appalachia. Analyses based on the Appalachian sub-regions may be of special benefit to analysis of coal mining areas since the northern, central, and southern regions of Appalachia had, notably, different levels of production for different types of coal, both in the past and, predictably, will in the future as well.¹¹³

Figure 6.2 Coal Mining Appalachian Sub-Regions



SOURCE: Berge, M. and Thompson, E. (2001). A Study on the Current Economic Impacts of the Appalachian Coal Industry and Its Future in the Region. Washington, D.C.: Appalachian Regional Commission.

Table 6.3: Characteristics of Hospital Stays in Community Hospitals in the Appalachian Region, Adults Aged 18 or Older, by County Coal Mine Status

Characteristics of Hospital Stays (N=167,957¹⁹) in Community Hospitals, Adults, Aged 18 or older	Appalachian Coal Mining Counties	Other Appalachian Counties	p-value
Number of hospital stays	76,083	91,874	
Female (%)	62.42	57.91	<0.0001
Age (%)			
18 – 44	28.22	24.89	<0.0001
45 – 64	27.48	26.71	
65 – 79	26.43	27.71	
80 or older	17.87	18.69	
Household Income (%)			
\$1 - \$35,999	87.36	51.63	<0.0001
\$36,000 - \$44,999	9.01	33.86	
\$45,000 - \$58,999	3.24	12.59	
\$59,000 or more	0.40	1.92	
Economic Development Level (%)			
Distressed	38.47	3.17	<0.0001
At-Risk	29.12	4.17	
Transitional	32.41	51.05	
Competitive	0	8.54	
Attainment	0	33.08	
Patient Location (%)			
Large metropolitan	0.38	1.13	<0.0001
Small metropolitan	26.95	40.98	
Micropolitan	21.25	35.99	
Non-core	51.42	21.90	
ER as Admission Source (%)	56.82	51.30	<0.0001
At least one MHSA Diagnosis (%)	26.84	27.36	0.0186
Substance-related disorders (%)	5.80	6.13	0.0045
Mental Health ²⁰ (%)			
Anxiety disorders	5.72	5.46	0.02

¹⁹ The following five Appalachian states were not included due to the lack of the county identifiers in the data: Ohio, Tennessee, Georgia, Kansas, South Carolina.

²⁰ Only selected diagnoses are included. Multiple diagnoses can be marked for the same admission.

Characteristics of Hospital Stays (N=167,957¹⁹) in Community Hospitals, Adults, Aged 18 or older	Appalachian Coal Mining Counties	Other Appalachian Counties	p-value
Delirium, dementia, and amnesic and other cognitive disorders	6.28	5.64	<0.0001
Development disorders	0.72	0.92	<0.0001
Mood disorders	11.15	13.32	<0.0001
Personality disorders	0.23	1.52	
Schizophrenia and other psychotic disorders	1.89	2.23	<0.0001
Screening and history of mental health and substance abuse disorders	11.01	10.20	<0.0001
Comorbidity among MHSA admissions	9.46	11.89	<0.0001

Table 6.4: Characteristics of Admissions to Substance Abuse Specialty Treatment in the Appalachian Region, by County Coal Mine Status, 2000-2004

Characteristics of Admissions to Substance Abuse Specialty Treatment (N=511,217)	Appalachian Coal Mining Counties	Other Appalachian Counties	p-value
Number of Admissions	211,380	299,837	
Female (%)	32.48	29.94	<0.0001
Age (%)			
17 or younger	11.33	9.86	<0.0001
18 – 24	21.56	19.73	
25 – 34	26.08	26.24	
35 – 44	26.37	28.05	
45 or older	14.66	161.2	
Education (%)			
Less than High School	39.95	40.50	<0.0001
High School	43.32	41.82	
More than High School	16.72	17.68	
Employment Status			
Full-time	19.67	29.21	<0.0001
Part-time	6.23	6.26	
Unemployed	39.28	28.98	
Not in labor force	34.81	35.54	

Characteristics of Admissions to Substance Abuse Specialty Treatment (N=511,217)	Appalachian Coal Mining Counties	Other Appalachian Counties	p-value
Race			
White	84.27	83.43	<0.0001
Black	14.94	14.12	
Other	0.79	2.45	
Marital Status			
Never married	55.68	52.83	<0.0001
Now married	17.34	19.14	
Separated	7.88	8.07	
Divorced/widowed	19.10	19.96	
Sub-Region (%)			
Northern	55.80	45.60	<0.0001
Central	22.82	4.34	
Southern	21.38	50.06	
Economic Development (%)			
Distressed	18.65	3.09	<0.0001
At-risk	10.77	2.53	
Transitional	59.10	62.27	
Competitive	2.27	20.87	
Attainment	9.21	11.23	

Source: Office of Applied Studies, Substance Abuse and Mental Health Services Administration, Treatment Episode Data Set (TEDS), 2000 – 2004.

Table 6.5: Treatment-Related Characteristics of Admissions to Substance Abuse Treatment in the Appalachian Region, by County Coal Mine Status, 2000-2004

Treatment-Related Characteristics of Admissions to Substance Abuse Treatment	Appalachian Coal Mining Counties	Other Appalachian Counties	p-value
Health Insurance ²¹			
Private	9.58	10.35	<0.0001
BC/BS	5.57	5.64	
Medicare	2.03	1.38	
Medicaid	16.15	15.51	
HMO	3.19	2.76	
Other	33.01	12.01	
None	30.47	52.36	
Service Setting			
Detoxification: Hospital inpatient	0.79	1.75	<0.0001
Detoxification: Freestanding residential	6.98	14.83	
Rehabilitation/residential: Hospital	0.27	0.05	
Rehabilitation/residential: Short-term	9.24	9.04	
Rehabilitation/residential: Long-term	5.36	3.96	
Ambulatory: Intensive outpatient	19.76	10.26	
Ambulatory: Non-intensive outpatient	57.53	60.01	
Ambulatory Detoxification	0.08	0.10	
Primary Source of Referral			
Individual	22.12	26.41	<0.0001
ADA care provider	14.66	15.86	
Other health care provider	8.29	11.28	
School	1.75	1.81	
Employer/EAP	0.67	0.93	
Other community reference	12.77	8.64	
Court/criminal justice	39.73	35.07	
Number of Prior Treatment (%)			
No prior treatment	44.21	48.76	<0.0001
1 -2 prior treatment	32.71	32.75	
3 or more prior treatment	19.08	18.49	

²¹ A total of 236,800 records in the Appalachian Region during the 2000-2000.274 did not have the insurance information.

Treatment-Related Characteristics of Admissions to Substance Abuse Treatment	Appalachian Coal Mining Counties	Other Appalachian Counties	p-value
Primary Source of Payment (%)			
Self pay	14.44	40.96	<0.0001
B/BS/Other health insurance	10.14	10.14	
Medicare/Workmans Comp	1.53	1.06	
Medicaid	17.72	13.22	
Other government payments	36.40	22.46	
No charge	4.10	4.12	
Other	15.66	8.03	

Source: Office of Applied Studies, Substance Abuse and Mental Health Services Administration, Treatment Episode Data Set (TEDS), 2000 – 2004.

Table 6.6: Substance Abuse Characteristics of Admissions to Substance Abuse Treatment in the Appalachian Region, by County Coal Mine Status, 2000-2004

Substance Abuse Characteristics of Admissions to Substance Abuse Treatment²²	Appalachian Coal Mining Counties	Other Appalachian Counties	p-value
Number of admissions	195,409	291,553	
Primary Reason for Admission to Treatment (%)			
Alcohol use	45.58	53.01	<0.0001
Marijuana use	17.78	16.49	<0.0001
Cocaine use	13.17	11.62	<0.0001
Heroin use	8.62	5.56	<0.0001
Other opiates or synthetic drug use	7.49	4.19	<0.0001
Methamphetamine/other stimulant use	2.08	3.19	<0.0001
Tranquilizers use	1.23	0.75	<0.0001
Sedatives use	0.44	0.32	<0.0001
Other hallucinogens use	0.26	0.16	<0.0001
Inhalants use	0.14	0.13	=0.403
Phencyclidine use	0.04	0.02	=.0004
Other	0.74	2.82	<.0001
Primary, Secondary, or Tertiary Reason for Admission to Treatment (%)			
Alcohol use	63.98	67.87	<0.0001
Marijuana use	39.45	36.59	<0.0001
Cocaine use	25.47	23.26	<0.0001
Heroin use	10.34	7.04	<0.0001
Other opiates or synthetic drug use	12.92	7.25	<0.0001
Methamphetamine/other stimulant use	4.18	5.40	<0.0001
Tranquilizers use	5.47	3.16	<0.0001
Sedatives use	1.45	1.10	<0.0001
Other hallucinogens use	1.29	0.95	<0.0001
Inhalants use	1.17	0.93	<0.0001
Phencyclidine use	0.15	0.09	<0.0001
Other	1.82	3.93	<0.0001
Source: Office of Applied Studies, Substance Abuse and Mental Health Services Administration, Treatment Episode Data Set (TEDS), 2000 – 2004.			

²² Analyses in this table are based on 486,962 admissions because of the missing information on substance abuse for 24,255 cases.