

# CHAPTER 4: Substance Use and Mental Health Disorder Discharges from Appalachian and Other Community Hospitals in 2004

## 4.1 Introduction

In the United States, community hospitals provide treatment services for adolescents and adults with mental health and/or substance abuse disorders. Community hospitals are non-Federal, acute care hospitals that provide general and specialty care. Excluded from this definition are federal, rehabilitation, and psychiatric hospitals as well as alcoholism/chemical dependency treatment facilities. In 2004, adults diagnosed with mental health and/or substance abuse disorders accounted for approximately 7.6 million stays – 1 out of every 4 – at community hospitals in the U.S.<sup>62</sup>

Given that community hospitals provide treatment for a large number of people with mental health and/or substance abuse disorders in the U.S., discharge data are a rich data source. Exploring the clinical and nonclinical data available at the community hospital-level provides an opportunity to better understand the demographics of patients with mental health and substance abuse disorders as well as other important characteristics such as their diagnoses, expected payment sources, and total charges.

Chapter 4 provides an overview of substance abuse and mental disorder discharges from Appalachian and other community hospitals in 2004. Analyses are based on data from the Healthcare Cost and Utilization Project (HCUP)'s 2004 Nationwide Inpatient Sample (NIS). The HCUP databases contain information on the vast majority of all hospital discharges in U.S. community hospitals, making them a powerful tool for exploring substance abuse and mental health issues in Appalachia and nationally. HCUP provides data that address both substance abuse and mental health issues. Specifically, we explore the following data elements from HCUP: client demographics; admission source and type; primary expected payer and secondary expected payer; presence of mental health and/or substance abuse (MHSA) disorder; subtype of MHSA disorder; comorbidity status; whether the diagnosis contains alcohol use disorder, drug use disorder, or mental health disorder; whether the principal reason for hospitalization was alcohol use; and whether the principal reason for hospitalization was drug use.

Chapter 4 will investigate the following key research questions:

Are there differences in discharges from community hospitals in Appalachia, as compared to discharges from community hospitals outside of Appalachia?

Are there differences in discharges from community hospitals in Appalachia versus outside of Appalachia when taking county economic status into account?

What do sub-regional differences look like across socio-economic status, health diagnoses, and other variables?

In Section 4.2, we provide an overview of the HCUP NIS, including its objectives, sampling design, uses, relevant measures, and limitations specifically related to exploring mental health and substance abuse issues in the Appalachian region. In Section 4.3, we discuss our methods. Section 4.4 contains the results of the analysis. Finally, Section 4.5 provides a discussion of key findings.

## **4.2 Data**

### **4.2.1 Overview**

The Healthcare Cost and Utilization Project (HCUP) is the largest collection of longitudinal hospital care data in the United States, providing encounter-level administrative data for inpatient hospital stays. HCUP is comprised of a variety of databases, software tools, and products that provide data on an array of clinical and non-clinical information from patient hospital discharge abstracts. Sponsored by the Agency for Healthcare Research and Quality (AHRQ), and supported by a number of partnerships at the federal, state, and industry levels, HCUP was designed to support health care research and decision making in the U.S.

According to AHRQ, the objectives of HCUP are three-fold: 1) to obtain data from state-wide information sources; 2) to design and develop multi-state health care databases for health services research and health policy analysis; and 3) to make data available to a broad set of public and private users.<sup>63</sup>

AHRQ works closely with state data organizations in participating states to obtain data for the HCUP databases. A number of hospital associations and private organizations contribute to the development of these databases. HCUP is comprised of five databases: the State Inpatient Databases (SID); State Ambulatory Surgery Databases (SASD); State Emergency Department Databases (SEDD); the Nationwide Inpatient Sample (NIS); and the Kids' Inpatient Database (KID). For all of these databases, the unit of analysis is the inpatient stay in a community hospital – not an individual patient or medical procedure.<sup>64</sup>

This study uses HCUP's Nationwide Inpatient Sample (NIS) to explore substance abuse and mental disorder discharges from community hospitals. Given the NIS's large sample size – 8,004,571 hospital discharges from 1,004 U.S. community hospitals – the NIS is ideal for exploring trends nationally and in the Appalachian region. As the largest all-payer inpatient care database in the U.S., the NIS affords researchers a unique opportunity to explore complex health policy issues such as access to care, medical practice patterns, cost and quality issues, and health care outcomes.

### **4.2.2 Sample Design**

The NIS is a stratified probability sample of non-rehabilitation, community hospitals in the United States. All U.S. community hospitals in the American Hospital Association (AHA)'s hospital file are included in the hospital universe, except short-term rehabilitation hospitals. The sampling frame is constructed from the subset of universe hospitals that released data to AHRQ for the NIS. The sampling frame includes all AHA community hospitals that could be matched to discharge data provided to AHRQ. The objective of the NIS sampling design was to select a sample of hospitals that accurately represent the universe of hospitals and are geographically dispersed.

The NIS uses five characteristics to create a sample from the AHA's hospital files: 1) geographic region (Northeast, Midwest, West, and South); 2) control of hospital (public, private, not-for-profit, and proprietary); 3) location (urban or rural); 4) teaching status (teaching or non-teaching); and 5) bed size (small, medium, large).<sup>65</sup> Each year, no more than 20% of the total number of U.S. hospitals within each of the five categories above are randomly selected.

The NIS sampling frame is representative of all U.S. hospitals. Over 75% of all U.S. hospitals and 87.5% of the U.S. population are accounted for in the NIS sampling frame. In 2004, the sampling frame contained data on 3,705 hospitals. The sample size for the 2004 survey was 1,004 hospitals – approximately 20.5% of 4,906 hospitals included in the total universe of U.S. community hospitals.<sup>66</sup> The NIS includes data on 37 states; ten of the 13 Appalachian states are included in the NIS. Pennsylvania, Alabama, and Mississippi are excluded.

#### **4.2.3 Uses of the HCUP Nationwide Inpatient Sample**

The NIS enables researchers to answer questions about the use and cost of hospital services, medical practice variation, health care cost inflation, hospital financial distress, analyses at the State and community levels, medical treatment effectiveness, quality of care, impact of health policy changes, access to care, diffusion of medical technology, and utilization of health services by special populations.<sup>67</sup>

HCUP's databases have been used to explore research questions related to mental health and substance abuse issues. In July 2006, HCUP's NIS 2004 data was used as the basis for a fact book on care of adults with mental health and substance abuse disorders.<sup>68</sup> This fact book explored issues such as: what are the common reasons for hospitalization by type and diagnoses; how do hospital stays for this population vary by gender and age; how are patients admitted to the hospital; what is the mean length of stay; what is the cost of hospital stays; who is billed for hospital stays; where do patients go after they are discharged; and what percentage of hospital resource use is attributable to mental health and substance abuse disorders? Researchers have also used HCUP data to study psychiatric diagnoses,<sup>69</sup> trends in substance abuse detoxification,<sup>70</sup> and hospitalizations for alcohol abuse disorders,<sup>71</sup> among other issues.

In addition, a large body of research has applied HCUP data to study racial and ethnic disparities in the inpatient setting,<sup>72,73,74</sup> as well as hospitalization and treatment for health care problems.<sup>75,76,77,78</sup> Finally, researchers have utilized HCUP hospital discharge data to study health care issues in specific geographic areas.<sup>79,80</sup>

#### **4.2.4 HCUP Measures Used in this Study**

Next, we define the measures used from the 2004 HCUP NIS data set, and explore the potential limitations with respect to using these measures for our purpose – to explore substance abuse and mental health disorder discharges in Appalachian community hospitals and other community hospitals nationally. We explore the following variables: expected primary payer; total and average charges; length of stay; race; admission source; alcohol, drug, and mental health disorder status; teaching hospital status; and death during hospitalization. We provide a brief discussion of each of these variables.

**Gender** of the client discharged from a community hospital is described as male or female.

**Age** of the client discharged from a community hospital is specified as one of the following categories: 18 to 44 years old; 45 to 64 years old; 65 to 79 years old; and 80 or older.

**Median household income quartile for the client's zip code** is specified as one of the following categories: \$1 - \$35,999; \$36,000 - \$44,999; \$45,000 - \$58,999; and \$59,000 or more.

**Patient location** of discharges is described by a four category urban-rural designation for the patient's county of residence: (1) large metropolitan; (2) small metropolitan; (3) micropolitan; and (4) non-core. The categorization is a simplified adaptation of the 2003 version of the Urban Influence Codes (UIC). The 12 categories of the UIC are combined into four broader categories that differentiate between large and small metropolitan, micropolitan, and a non-urban residual as follows. A large metro area is defined as an area of 1 million residents or more. A small metro area is defined as an area of less than 1 million residents. A micropolitan area is adjacent to a large metro, small metro, or not adjacent to a metro area. A noncore area is defined as one of the following: adjacent to a small metropolitan area with its own town; adjacent to a small metropolitan area without its own town; adjacent to a micropolitan area with its own town; adjacent to micropolitan area without its own town; not adjacent to a metropolitan or micropolitan area with its own town; and not adjacent to a metropolitan or micropolitan area without its own town.

**Admission source** indicates the source of the hospital admission: the emergency department; transfer from another hospital (includes transfers within the same hospital and transfers between hospitals); from another health facility including long term care; court or law enforcement; and routine, birth and other (includes referrals from physicians, clinics, and HMOs).

**Admission type** indicates the type of hospital admission. Admission types are described as emergency or routine/ other (e.g., urgent, elective, newborn, trauma center, and other).

The variables, **primary expected payer** and **secondary expected payer**, identify who the hospital expects will be the primary and secondary payer of the hospital bill for patients with substance abuse and mental health disorders. While each hospitalization and related hospital bill is associated with an expected primary payer, the expected primary payer may not be the ultimate payer. The expected primary payer can be: Medicaid (includes fee-for-service and managed care Medicaid patients); Medicare (includes fee-for-service and managed care Medicare patients); Private Insurance (includes Blue Cross, commercial carriers, and private HMOs and PPOs); Other (includes Workers' Compensation, TRICARE/VA, Title V, and other government programs); Self Pay (uninsured); and No Charge (uninsured). A noteworthy limitation of this variable is that it does not capture dual-eligible patients.

**Presence of mental health and/or substance abuse (MHSA) disorder** indicates whether the discharge was diagnosed with at least one MHSA disorder or zero MHSA disorders.

**Presence of any secondary mental health and/or substance abuse (MHSA) disorder** indicates whether or not the discharge was diagnosed with any secondary MHSA diagnosis.

**Subtype of mental health and/or substance abuse (MHSA) disorder** indicates the client's diagnosis. Categories for this variable include: principal MHSA diagnosis only; principal and secondary MHSA diagnosis; secondary MHSA only; any principal MHSA diagnoses; and at least one principal MHSA diagnosis.

**Comorbidity status** indicates whether the client has a non-substance abuse and mental health diagnosis, a substance abuse diagnosis only, a mental health diagnosis only, or a comorbidity.

**Diagnosis contains alcohol use disorder** indicates that the client's diagnosis contains an alcohol use disorder.

**Diagnosis contains drug use disorder** indicates that the client's diagnosis contains a drug use disorder.

**Diagnosis contains mental health disorder** indicates that the client's diagnosis contains a mental health disorder.

**Principal reason for hospitalization was alcohol use** indicates that the principal reason for the client's hospitalization was alcohol use.

**Principal reason for hospitalization was drug use** indicates that the principal reason for the client's hospitalization was drug use.

#### **4.2.5 Limitations of HCUP NIS Data**

There are a few critical limitations that may affect the quality of the findings when using HCUP NIS data to explore substance abuse and mental health issues in Appalachia and nationally.

One obvious limitation is that HCUP data is only available for 37 states. Ideally, data would be available from every state in the U.S. Additionally, in 2004, HCUP NIS data were only available in 10 of the 13 Appalachian states, excluding Pennsylvania, Mississippi, and Alabama. Missing data is one clear limitation, given that it would be ideal to make comparisons between Appalachian community hospitals and other community hospitals nationally based on data for all 13 Appalachian states and the rest of the nation.

A second limitation is that the NIS is designed as a nationwide representation of inpatient hospital care. Most variables in the NIS are standardized to allow for national estimates. The NIS sampling frame is not designed with "county" or "state" as a stratification variable and therefore state and/or county-level analyses cannot be conducted.

It is also important to note that while the NIS includes general and specialty hospitals (e.g., pediatric, obstetrics-gynecology, short-term rehabilitation, and oncology), the survey excludes long-term care and psychiatric hospitals. Given that the NIS does not include data on patients in psychiatric hospitals, the data should not be perceived as a comprehensive picture of mental health issues associated with inpatient care in the U.S. Findings from this chapter likely provide an under-estimation of mental health problems in the U.S. Further exacerbating this problem, it is likely that MHSAs are under-coded at hospitals due to concerns regarding reimbursement and stigma associated with mental health and substance abuse (MHSAs) diagnoses.

Finally, due to confidentiality laws and other reasons, some states that contributed data to the NIS imposed restrictions on the release of certain data elements or on the number and types of hospitals that could be included in the database.<sup>81</sup> Other states prohibited the release of certain data elements. In Virginia, data may not include more than 50% of hospitals. Georgia requested that patient race be set to missing in the NIS. To further secure confidentiality, Georgia, Ohio, and Tennessee did not report data on the teaching status of hospitals.<sup>82</sup>

## 4.3 Methods

### 4.3.1 Study Sample

This study uses the 2004 HCUP Nationwide Inpatient Sample (NIS) database to analyze substance use and mental disorders in the Appalachian region. Because the NIS is limited to community hospital data, disorders treated in outpatient or ambulatory care settings, long-term care facilities, psychiatric hospitals, and substance abuse treatment facilities are not reflected in this report. Only adults age 18 or older were included; newborns, children, and adolescents were excluded.

Due to confidentiality concerns and the manner in which state data are submitted to the central distributor of HCUP National Inpatient Stay files, 11 states did not include county identifiers for the hospitals where patient discharge information were provided. Among these 11 states, four are associated with the Appalachian region – Ohio, South Carolina, Tennessee, and Georgia. These four Appalachian states were excluded from the analysis because the Appalachian region portion of these states could not be determined due to the absence of county identifiers.

### 4.3.2 Statistical Methods

#### Unit of Analysis

For this study, the unit of analysis is the inpatient stay in a community hospital rather than the patient or the procedure. For example, a patient admitted three times to a hospital is included three times in the NIS data. Thus, the same individual can account for more than one hospital stay.

#### Measure

Diagnoses are recorded within the NIS using the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM). We apply the AHRQ-developed Mental Health and Substance Abuse Clinical Classification Software (CCS-MHSA) to aggregate ICD-9\_CD MHSA diagnostic codes into a limited number of clinically meaningful categories. The CCS-MHSA, derived primarily from the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*, assigns mental and substance-use ICD-9-CM codes to 1 of the 14 categories.

**Table 4.1. AHRQ-developed Mental Health and Substance Abuse Clinical Classification Software (CCS-MHSA)**

CCS-MHSA Code	Mental Health or Substance Abuse Disorders
650	Adjustment disorders
651	Anxiety disorders
652	Disruptive behavior disorders including conduct disorder, oppositional defiant disorder, attention-deficit disorder and attention-deficit/hyperactivity disorder
653	Delirium, dementia, and amnestic and other cognitive disorders
654	Developmental disorders including communication disorders, developmental disabilities, intellectual disabilities, learning disorders and motor skills disorders*
655	Disorders usually diagnosed in infancy, childhood, or adolescence such as elimination disorders,

CCS-MHSA Code	Mental Health or Substance Abuse Disorders
	separation anxiety disorders, pervasive developmental disorders, and tic disorders
<b>656</b>	Impulse control disorders
<b>657</b>	Mood disorders including bipolar disorders and depressive disorders
<b>658</b>	Personality disorders
<b>659</b>	Schizophrenia and other psychotic disorders
<b>660</b>	Substance-related disorders including alcohol-related disorders and substance-related disorders (e.g., amphetamine-related disorders; cannabis-related disorders; cocaine-related disorders; hallucinogen-related disorders; inhalant-related disorders; opioid-related disorders; phencyclidine-related disorders; sedative-, hypnotic-, or anxiolytic-related disorders; poly-substance-related disorders)
<b>661</b>	Miscellaneous mental disorders including dissociative disorders, eating disorders, factitious disorders, psychogenic disorders, sexual and gender identity disorders, sleep disorders, somatoform disorders, mental disorders due to general medical conditions not elsewhere classified, and other miscellaneous mental conditions
<b>662</b>	Suicide and intentional self-inflicted injury*
<b>663</b>	Screening and history of mental health and substance-related conditions*

\* Suicide and intentional self-inflicted injury, as defined in the CCS-MHSA, is examined as a co-occurring condition with mental health and substance-related disorders.

\* Both unweighted and weighted estimations are calculated. For draft report, only the unweighted estimates are presented.

## 4.4 Results

In Section 4.4, we present subregional differences for community hospital discharges in Appalachia and outside of Appalachia in 2004. In Section 4.4.1, we show a series of tables and charts that explore the following variables: the client’s gender and age; median household income quartile for the client’s zip code; patient location; admission source; admission type; primary expected payer and secondary expected payer; presence of mental health and/or substance abuse (MHSA) disorder; presence of any MHSA abuse disorder; subtype of MHSA abuse disorder; comorbidity status; whether the diagnosis contains alcohol use disorder, drug use disorder, or mental health disorder; whether the principal reason for hospitalization was alcohol use; and whether the principal reason for hospitalization was drug use. We also present a table of mental health diagnoses.

### 4.4.1 Tables

**Tables 4.2a and 4.2b**, below, present subregional differences in hospital discharges for community hospitals in the Appalachian region and outside of Appalachia for demographic variables among patients over 18 years of age. Table 4.2a shows the differences in discharges from community hospitals in Appalachian counties and outside of Appalachia, overall. Table 4.2b depicts differences in discharges from community hospitals by county economic development status. In Appalachia, about 60% of women are discharged from community hospitals in both the Appalachian region and outside of the Appalachian region (61.1%) as compared to about 40% of men in Appalachia and 39% of men outside of Appalachia. This result is consistent across county economic development status with the exception of attainment counties, where 50.0% of discharges from community hospitals are male.

Overall, patients discharged from community hospitals outside of Appalachia are slightly younger than patients discharged in the Appalachian region. Outside the Appalachian region, 32.7% of patients are between the ages of 18 and 44, compared to 26.4% within the Appalachian region. These results are consistent across levels of economic development, although the distribution shifts slightly. For example, overall 28.2% of patients in the Appalachian region are 45 to 64 years of age, while in attainment counties, 37.6% of patients are in this age range.

Overall, more patients discharged from community hospitals in the Appalachian region are in the lowest income category when compared to patients discharged from community hospitals outside of Appalachia (64.1% versus 26.5%). Furthermore, less than 10% of patients discharged from community hospitals in the Appalachian region have a median income over \$45,000, compared with 46% in the rest of the country. These results are even more pronounced in distressed and at-risk Appalachian counties. In distressed counties, nearly 90% of patients are in the lowest income quartile, while in at-risk counties, 83.7% of patients are in the lowest income bracket. By contrast, in attainment counties, only 36.6% of patients are in the lowest income bracket.

Less than 1% of patients discharged from hospitals in the Appalachian region are from large metropolitan areas as compared to patients outside of Appalachia (57.5%). Instead, 34.5% of patients are from small metropolitan areas in Appalachia (compared to 25.9% outside of Appalachia), 29.2% are from micropolitan areas (compared to 9.7% outside of Appalachia), and 31% of patients are from non-core areas (as compared to 6.5% outside of Appalachia). These results are consistent across counties, regardless of economic status.



**Table 4.2a: Demographics of Community Hospital Discharges in the Appalachian Region (Unweighted)**

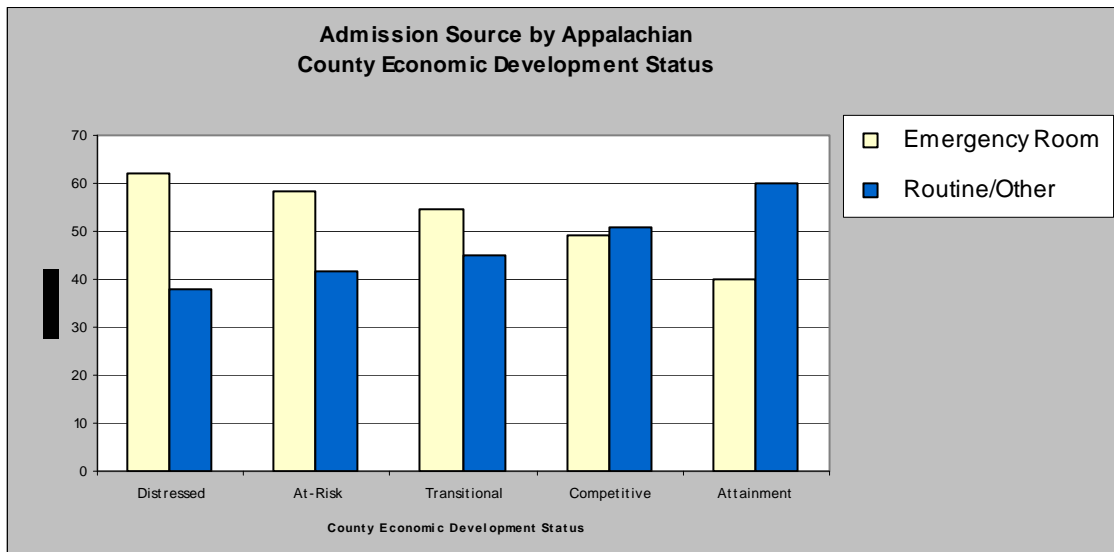
	All			
	Appalachian Region		Outside of Appalachia	
	N	%	N	%
<b>Gender</b>				
Male	67,258	40.04	2,133,917	38.73
Female	100,696	59.95	3,364,470	61.07
<b>Age</b>				
18-44	44,338	26.4	1,804,197	32.75
45-64	47,290	28.16	1,456,348	26.43
65-79	45,564	27.13	1,327,258	24.09
80 or older	30,765	18.32	921,743	16.73
<b>Median Household Income Quartile for Patient's Zip Code</b>				
\$1-\$35,999	107,695	64.12	1,461,759	26.53
\$36,000- \$44,999	36,641	21.82	1,400,755	25.42
\$45,000-\$58,999	13,548	8.07	1,208,375	21.93
\$59,000 or more	2,001	1.19	1,322,096	24
<b>Patient Location</b>				
Large metropolitan	1,322	0.79	3,167,482	57.49
Small metropolitan	58,014	34.54	1,425,579	25.87
Micropolitan	49,113	29.24	534,492	9.7
Non-core	59,000	35.13	358,486	6.51

**Table 4.2b: Demographics of Community Hospital Discharges in the Appalachian Region (Unweighted) by County Economic Development Status, 2004**

	County Economic Development Status Adults Age 18 or Older																			
	Distressed				At-Risk				Transitional				Competitive				Attainment			
	Appalachian Region		Outside of Appalachia		Appalachian Region		Outside of Appalachia		Appalachian Region		Outside of Appalachia		Appalachian Region		Outside of Appalachia		Appalachian Region		Outside of Appalachia	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
<b>Gender</b>																				
Male	12,958	40.3	63,210	40.4	9,834	37.8	17,089	37.2	26,192	36.6	644,486	40.7	3,066	39.1	185,050	38.8	15,208	50	481,186	40
Female	19,216	59.7	93,408	59.6	16,151	62.2	28,809	62.8	45,365	63.4	939,653	59.3	4,778	60.9	292,107	61.2	15,186	50	722,178	60
<b>Age</b>																				
18-44	7,416	23.1	54,932	35.1	6,940	26.7	13,896	30.3	20,374	28.5	471,843	29.8	1,792	22.9	153,013	32.1	7,816	25.7	384,524	32
45-64	9,775	30.4	46,438	29.7	6,626	25.5	10,973	23.9	17,663	24.7	423,146	26.7	1,786	22.8	122,098	25.6	11,440	37.6	331,132	27.5
65-79	9,054	28.1	33,531	21.4	7,086	27.3	11,803	25.7	18,967	26.5	406,659	25.7	2,358	30.1	118,369	24.8	8,099	26.7	284,902	23.7
80 or older	5,930	18.4	21,720	13.9	5,333	20.5	9,226	20.1	14,554	20.3	282,508	17.8	1,908	24.3	83,679	17.5	3,040	10	202,820	16.9
<b>Median Household Income Quartile for Patient's Zip Code</b>																				
\$1-\$35,999	28,823	89.6	102,659	65.6	21,753	83.7	35,822	78.1	43,500	60.8	497,929	31.4	2,487	31.7	88,079	18.5	11,132	36.6	136,178	11.3
\$36,000-\$44,999	479	1.49	39,706	25.4	1,668	6.42	7,605	16.6	19,626	27.4	506,152	32	4,107	52.4	162,643	34.1	10,761	35.4	199,912	16.6
\$45,000-\$58,999	116	0.36	7,110	4.54	856	3.29	1,135	2.47	5,698	7.96	317,716	20.1	518	6.6	141,613	29.7	6,360	20.9	292,874	24.3
\$59,000 or more	38	0.12	6,268	4	50	0.19	187	0.41	491	0.69	229,717	14.5	59	0.75	73,909	15.5	1,363	4.48	554,603	46.1
<b>Patient Location</b>																				
Large metropolitan	101	0.31	134,446	85.8	119	0.46	623	1.36	528	0.74	787,722	49.7	73	0.93	226,573	47.5	501	1.65	917,412	76.2
Small metropolitan	997	3.1	4,133	2.64	876	3.37	3,128	6.82	30,621	42.8	445,733	28.1	6,893	87.9	149,744	31.4	18,627	61.3	208,647	17.3
Micropolitan	6,516	20.3	8,964	5.72	9,999	38.5	28,988	63.2	23,174	32.4	205,718	13	459	5.85	67,263	14.1	8,965	29.5	45,014	3.74
Non-core	24,190	75.2	8,806	5.62	14,954	58	13,129	28.6	17,136	24	138,420	8.74	419	5.34	30,759	6.45	2,301	7.57	28,174	2.34
SOURCE: Healthcare Cost and Utilization Project (HCUP) Nationwide Inpatient Sample (NIS), 2004.																				

**Tables 4.3a and 4.3b**, below, present differences in community hospital discharges by admission source, admission type, and expected payment for admissions over 18 years of age. In Table 4.3a, we provide findings overall for community hospitals in Appalachia and outside of Appalachia. Table 4.4b shows findings by economic county development status. The percentage of discharges from community hospitals that entered into hospitals via the emergency department was higher in the Appalachian region (53.7%) than in hospitals outside of Appalachia (48.8%). Results vary, however, based on economic development level. **Figure 4.1** visually shows these trends in Appalachia only. As the figure demonstrates, the emergency room is the most common source of admission to the hospital for patients in distressed counties in Appalachia, followed by at-risk, transitional, competitive, and attainment counties.

**Figure 4.1 Admission Source by Appalachian County Economic Development Status**

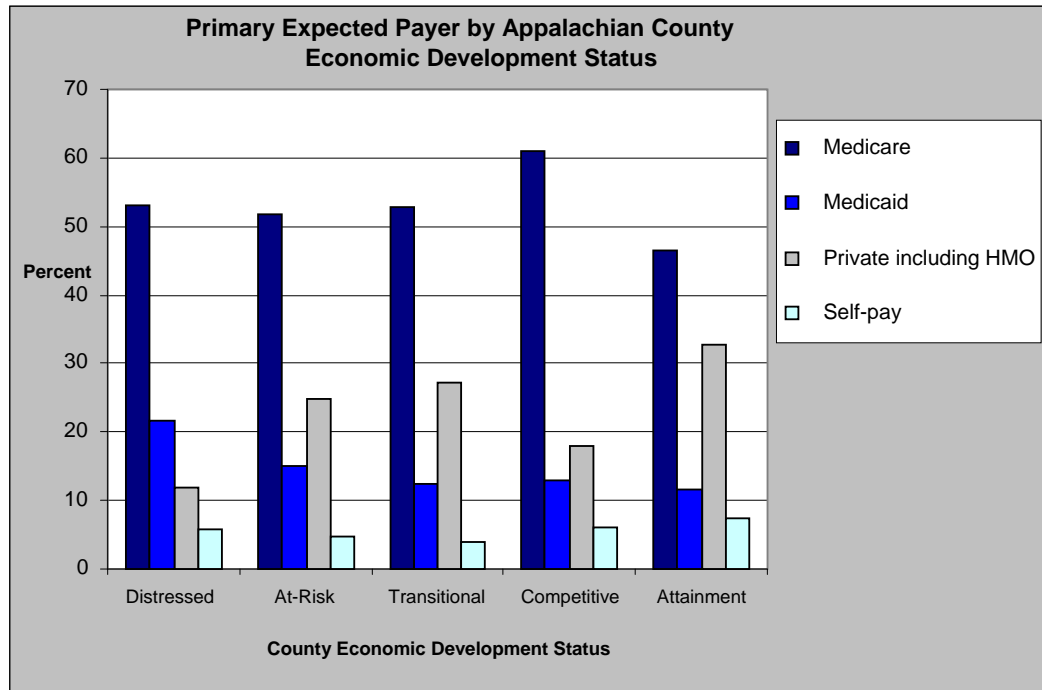


SOURCE: Healthcare Cost and Utilization Project (HCUP) Nationwide Inpatient Sample (NIS), 2004.

Overall, more patients in economically distressed counties enter the hospital through the emergency department, with 73.3% of patients in non-Appalachian counties entering the hospital in this manner and 62.1% of patients from the Appalachian region entering the hospital in this manner. In at-risk counties, 58.2% of patients in the Appalachian region enter the hospital through the emergency department, while 50.5% of patients in non-Appalachian counties enter in this way. There is little difference between Appalachian and non-Appalachian admission types for transitional and competitive counties, with approximately 50% of patients entering the hospital through the emergency department. Finally, in attainment counties, 39.8% of patients from the Appalachian region and 49.3% of non-Appalachian patients entered the hospital through the emergency department.

Medicare is the key primary expected payer in both Appalachian and non-Appalachian counties (51.9% versus 43.3%), followed by private insurance (24.4% in Appalachia and 33.7% outside of Appalachia), Medicaid (14.5% in Appalachia and 14.0% outside of Appalachia), self pay (5.1% in Appalachia and 5.2% outside of Appalachia), other forms of primary payment (3.8% in Appalachia and 3.2% outside of Appalachia), and, finally, no charge (0.03% in Appalachia and 0.5% outside of Appalachia). When the economic development level is taken into account, the profile changes slightly. **Figure 4.2** below highlights these trends.

**Figure 4.2 Primary Expected Payer By Appalachian County Economic Development Status**



SOURCE: Healthcare Cost and Utilization Project (HCUP) Nationwide Inpatient Sample (NIS), 2004.

Medicare continues to be the dominant primary expected form of payment in the Appalachian region, hovering around 50% of expected payments in the less economically developed counties (distressed, at-risk, and transitional), increasing to 61.1% of expected payments in competitive counties, and falling to 46.5% of expected payments in attainment counties. Less economically developed counties in Appalachia report a greater percentage of Medicaid expected payers than more economically developed counties. In distressed counties, 21.7% of expected payers utilized Medicaid, while 15.2% report utilizing Medicaid in at-risk counties. Around 12.5% of payers in transitional and competitive counties expect to use Medicaid, and 11.7% of payers in attainment counties expect to use Medicaid. In contrast, 35.8% of patients from economically distressed counties outside of Appalachia use Medicaid, while counties with higher levels of economic development report similar rates of coverage to their Appalachian counterparts.

The Appalachian region reports lower levels of private insurance coverage than their non-Appalachian counterparts at all levels of economic development, except in at-risk and transitional counties. Appalachian distressed counties report 11.9% private insurance coverage compared with 19.3% for non-Appalachian distressed counties. Appalachian competitive counties report 17.8% private insurance coverage, while non-Appalachian competitive counties report coverage rates of 33.9%. Finally, Appalachian attainment counties report private insurance coverage of 32.7%, while non-Appalachian attainment counties report coverage rates of 39.7%.

**Table 4.3a: Admission Source, Type, and Expected Payment for Community Hospital Discharges in Appalachia (Unweighted), 2004**

	Adults Age 18 or Older			
	Appalachian Region		Outside of Appalachia	
	N	%	N	%
<b>Admission Source</b>				
Emergency Room	90,158	53.68	2,688,219	48.79
Routine/Other	77,402	46.08	2,805,904	50.93
<b>Admission Type</b>				
Emergency Room	85,906	51.19	2,383,357	48.92
Routine/Other	81,925	48.81	2,488,366	51.08
<b>Primary Expected Payer (uniform)</b>				
Medicare	87,260	51.95	2,386,065	43.31
Medicaid	24,406	14.53	770,870	13.99
Private including HMO	41,042	24.44	1,856,881	33.7
Self-pay	8,644	5.15	287,340	5.22
No charge	48	0.03	29,195	0.53
Other	6,373	3.79	173,969	3.16
<b>Secondary Expected Payer (uniform)</b>				
Medicare	25,197	29.47	336,954	16.17
Medicaid	16,351	19.12	395,946	19
Private including HMO	25,581	29.92	857,683	4.11
Self-pay	11,601	13.57	405,953	19.48
No charge	46	0.05	7,373	0.35
Other	6,776	7.92	80,360	3.85
SOURCE: Healthcare Cost and Utilization Project (HCUP) Nationwide Inpatient Sample (NIS), 2004.				

**Table 4.3b: Admission Source, Type, and Expected Payment for Community Hospital Discharges in Appalachia (Unweighted) by County Economic Development Status, 2004**

	County Economic Development Status Adults Age 18 or Older																			
	Distressed				At-Risk				Transitional				Competitive				Attainment			
	Appalachian Region		Outside of Appalachia		Appalachian Region		Outside of Appalachia		Appalachian Region		Outside of Appalachia		Appalachian Region		Outside of Appalachia		Appalachian Region		Outside of Appalachia	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
<b>Admission Source</b>																				
Emergency Room	19,988	62.12	114,818	73.31	15,118	58.18	23,202	50.55	39,087	54.62	805,370	50.84	3,855	49.15	241,069	50.52	12,110	39.84	592,997	49.28
Routine/Other	12,169	37.82	41,748	26.66	10,865	41.81	22,689	49.43	32,094	44.85	774,422	48.89	3,989	50.85	235,955	49.45	18,285	60.16	605,297	50.3
<b>Admission Type</b>																				
Emergency Room	17,035	52.99	116,763	74.6	15,822	60.89	22,625	49.47	36,870	51.55	784,108	49.58	2,116	27.01	201,416	42.7	14,063	46.34	613,815	51.06
Routine/Other	15,111	47.01	39,747	25.4	10,162	39.11	23,106	50.53	34,649	48.45	797,496	50.42	5,717	72.99	270,310	57.3	16,286	53.66	588,330	48.94
<b>Primary Expected Payer (uniform)</b>																				
Medicare	17,045	52.98	56,476	36.06	13,452	51.77	24,385	53.13	37,827	52.86	731,421	46.17	4,796	61.14	217,745	45.63	14,140	46.52	508,546	42.26
Medicaid	6,990	21.72	56,033	35.78	3,945	15.18	8,133	17.72	8,915	12.46	222,512	14.05	1,010	12.88	50,585	10.6	3,546	11.67	125,753	10.45
Private including HMO	3,818	11.87	30,249	19.31	6,469	24.9	7,551	16.45	19,420	27.14	480,661	30.34	1,400	17.85	161,855	33.92	9,935	32.69	477,995	39.72
Self-pay	1,893	5.88	12,839	8.2	1,229	4.73	2,754	6	2,840	3.97	80,338	5.07	468	5.97	20,570	4.31	2,214	7.28	53,351	4.43
No charge	6	0.02	54	0.03	.	.	77	0.17	42	0.06	16,320	1.03	.	.	6,076	1.27	.	.	3,596	0.3
Other	2,382	7.4	968	0.62	872	3.36	2,997	6.53	2,389	3.34	52,201	3.3	170	2.17	19,610	4.11	560	1.84	34,007	2.83
<b>Secondary Expected Payer (uniform)</b>																				
Medicare	974	12.51	30,258	27.85	4,634	35.36	2,209	9.89	6,184	15.22	108,043	14.69	105	1.54	20,307	18.09	13,300	79.7	119,412	20.7
Medicaid	3,726	47.85	37,289	34.32	4,195	32.01	6,088	27.25	6,474	15.94	141,152	19.2	803	11.77	19,113	17.03	1,153	6.91	90,445	15.68
Private including HMO	2,183	28.04	8,669	7.98	4,275	32.62	10,346	46.32	14,373	35.39	286,765	39	2,775	40.69	58,247	51.89	1,975	11.83	237,165	41.11
Self-pay	1	0	30,985	28.52	2	0.01	374	1.67	11,598	28.56	164,666	22.39	.	.	10,225	9.11	.	.	108,502	18.81
No charge	.	.	5	0	.	.	0	.	46	0.11	3,566	0.48	.	.	150	0.13	.	.	2,505	0.43
Other	902	11.58	1,446	1.33	498	3.8	3,694	16.54	1,979	4.87	31,101	4.23	3,137	46	4,200	3.74	260	1.56	18,909	3.28
SOURCE: Healthcare Cost and Utilization Project (HCUP) Nationwide Inpatient Sample (NIS), 2004.																				

**Tables 4.4a and 4.4b**, below, presents differences in community hospital discharges based on hospital stay characteristics for community hospital discharges in Appalachia and outside of Appalachia. Table 4.4a presents the findings overall, and Table 4.4b presents findings by county economic development status. Overall, 27.1% of inpatient hospital stays in the Appalachian region report mental health or substance abuse diagnoses, compared with 23.6% of inpatient hospital stays outside of Appalachia. The differences are most pronounced in distressed counties, where 26.6% of hospital stays in the Appalachian region report mental health or substance abuse diagnoses compared with 30.5% outside of Appalachia, and in competitive counties where 36.7% of hospital stays in the Appalachian region report mental health and substance abuse diagnoses compared with 22.3% of hospital stays outside of Appalachia.

Overall, among inpatient hospital stays with a substance abuse or mental health diagnosis, the majority had a mental health diagnosis only (77.96% in the Appalachian region; 69.23% outside of Appalachia).

**Table 4.4a: Hospital Stay Characteristics for Community Hospital Discharges in Appalachia (Unweighted), 2004**

	Adults Age 18 or Older			
	Appalachian Region		Outside of Appalachia	
	N	%	N	%
<b>Presence of MHSA</b>				
No MHSA diagnosis	122,401	72.88	4,211,090	76.43
At least one MHSA diagnosis	45,556	27.12	1,298,456	23.57
<b>Subtype of MHSA Stays</b>				
Principal MHSA only	2,476	5.44	98,803	7.61
Principal and secondary MHSA	6,357	13.95	224,415	17.28
Secondary MHSA only	36,723	80.61	975,238	75.11%
<b>At Least One Principal MHSA</b>				
Yes	8,833	5.26	323,218	5.87
No	159,124	94.74	5,186,328	94.13
<b>Any Secondary MHSA`</b>				
Yes	43,080	25.65	1,199,653	21.77
No	124,877	74.35	4,309,893	78.23
<b>Coborbidity Status</b>				
SA Diagnosis Only	5,113	11.22	189,006	14.56
MH Diagnosis Only	35,515	77.96	898,948	69.23
Comorbidity	4,928	10.82	210,502	16.21
SOURCE: Healthcare Cost and Utilization Project (HCUP) Nationwide Inpatient Sample (NIS)				

**Table 4.4b: Hospital Stay Characteristics for Community Hospital Discharges in Appalachia by County Economic Development Status (Unweighted), 2004**

	County Economic Development Status Adults Age 18 or Older																			
	Distressed				At-Risk				Transitional				Competitive				Attainment			
	Appalachian Region		Outside of Appalachia		Appalachian Region		Outside of Appalachia		Appalachian Region		Outside of Appalachia		Appalachian Region		Outside of Appalachia		Appalachian Region		Outside of Appalachia	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
<b>Presence of MHSA</b>																				
No MHSA diagnosis	23,605	73.36	108,879	69.52	19,312	74.32	33,505	73	51,388	71.81	1,191,445	75.21	4,964	63.28	370,658	77.68	23,132	76.1	907,434	75.41
At least one MHSA diagnosis	8,570	26.64	47,742	30.48	6,673	25.68	12,393	27	20,170	28.19	392,711	24.79	2,880	36.72	106,501	22.32	7,263	23.9	295,944	24.59
<b>Subtype of MHSA Stays</b>																				
Principal MHSA only	377	4.6	6,139	12.86	623	9.34	723	5.83	906	4.7	33,667	8.57	137	4.76	6792	6.81	433	6.34	22,196	7.5
Principal and secondary MHSA	828	10.11	10,974	22.99	1,205	18.06	2,221	17.92	2,902	15.06	74,780	19.04	848	29.44	17,102	17.15	574	8.4	56,360	19.04
Secondary MHSA only	7,365	89.89	30,629	64.16	4,845	72.61	9,449	76.24	16,362	84.94	284,264	72.39	1,895	65.7986	82,607	82.85	6,256	91.6	217,388	73.46
<b>At Least One Principal MHSA</b>																				
Yes	1,205	3.75	17,113	10.93	1,828	7.03	2,944	6.41	3,808	5.32	108,447	6.85	985	12.56	23,894	5.01	1,007	3.31	78,556	6.53
No	30,970	96.25	139,508	89.07	24,157	92.97	42,954	93.59	67,750	94.68	1,475,709	93.15	6,859	87.44	453,265	94.99	29,388	96.69	1,124,822	93.47
<b>Any Secondary MHSA</b>																				
Yes	8,193	25.46	41,603	26.56	6,050	23.28	11,670	25.43	19,264	26.92	359,044	22.66	2,743	34.97	99,709	20.9	6,830	22.47	273,748	22.75
No	23,982	74.54	115,018	73.44	19,935	76.72	34,228	74.57	52,294	73.08	1,225,112	77.34	5,101	65.03	377,450	79.1	23,565	77.53	929,630	77.25
<b>Coborbidity Status</b>																				
SA Diagnosis Only	988	11.53	10,215	21.4	916	13.73	1,480	11.94	1,983	9.83	57,384	14.61	254	8.82	14,434	13.55	972	13.38	41,349	13.97
MH Diagnosis Only	6,943	81.02	25,661	53.75	4,926	73.82	8,993	72.57	15,889	78.78	269,795	68.7	2,061	71.56	76,431	71.77	5,696	78.42	202,110	68.29
Comorbidity	639	7.46	11,866	24.85	831	12.45	1,920	15.49	2,298	11.39	65,532	16.69	565	19.62	15,636	14.68	595	8.19	52,485	17.73
SOURCE: Healthcare Cost and Utilization Project (HCUP) Nationwide Inpatient Sample (NIS)																				



**Tables 4.5a and 4.5b** below show findings for diagnoses and principal reason for hospitalization for community hospital discharges in Appalachia and outside of Appalachia. Table 4.5a provides findings overall, while Table 4.5b shows findings by county economic development status. Approximately 4% of hospital discharges in Appalachian counties and outside of Appalachia involve an alcohol use disorder diagnosis. Non-Appalachian distressed counties report 8.9% of diagnoses containing an alcohol use disorder, compared with 3.0% in Appalachian distressed counties. For competitive counties, conversely, 6.3% of diagnoses in the Appalachian region involve an alcohol use disorder compared with 4.1% outside of Appalachia.

Approximately 3% of hospital discharges in Appalachia and 4% of discharges outside of Appalachia involve a drug use disorder diagnosis. These findings are consistent across economic development levels, with the exception of distressed counties. Non-Appalachian distressed counties report that 9.9% of discharges involve a drug use disorder, compared with 2.4% of discharges in Appalachian distressed counties.

Overall, 23.7% of discharges in the Appalachian region involve diagnoses of a mental health disorder, compared with 19.5% of discharges outside of Appalachia. For most economic development levels, both Appalachian and non-Appalachian counties report about 20% of diagnoses as having mental health disorders. However, Appalachian competitive counties report 33.2% of discharges as having a mental health disorder diagnosis, compared with 18.9% outside of Appalachia.

Overall, alcohol and drug use are reported minimally as principal causes of hospitalization. In the Appalachian region, 0.7% of hospitalizations are principally due to alcohol or drug use, compared to 0.8% outside the Appalachian region. Differences in hospitalizations principally due to alcohol use are most apparent in distressed and attainment counties, where rates of 2.0% and 0.9%, respectively are seen outside of Appalachia, compared with Appalachian rates of 0.4% and 0.2%. In competitive counties, on the other hand, the Appalachian region reports slightly higher percentages of alcohol-related hospitalizations at 0.8% compared to 0.6%. The greatest gap for drug-related hospitalizations is in distressed counties, where 2.8% of hospitalizations outside of Appalachia are principally due to drug use, compared with 0.5% within Appalachia.

**Table 4.5a: Diagnoses and Principal Reason for Hospitalization for Community Hospital Discharges in Appalachia (Unweighted), 2004**

Adults Age 18 or Older				
	Appalachian Region		Outside of Appalachia	
	N	%	N	%
<b>Diagnoses Contain Alcohol Use Disorder</b>				
Yes	6,358	3.79	247,550	4.49
No	6,495	3.87	226,276	4.11
<b>Diagnoses Contain Drug Use Disorder</b>				
Yes	5,159	3.07	224,855	4.08
No	6,471	3.85	221,578	4.02
<b>Diagnoses Contain Mental Health Disorder</b>				
Yes	39,784	23.69	1,075,012	19.51
No	1,749	1.04	64,130	1.16
<b>Principal Reason for Hospitalization was Alcohol Use</b>				
Yes	1,227	0.73	41,684	0.76
No	166,730	99.27	5,467,862	99.24
<b>Principal Reason for Hospitalization was Drug Use</b>				
Yes	1,176	0.7	45,888	0.83
No	166,781	99.3	5,463,658	99.17

SOURCE: Healthcare Cost and Utilization Project (HCUP) Nationwide Inpatient Sample (NIS), 2004.

**Table 4.5b: Diagnoses and Principal Reason for Hospitalization for Community Hospital Discharges in Appalachia (Unweighted), by County Economic Development Status, 2004**

County Economic Development Status Adults Age 18 or Older																				
	Distressed				At-Risk				Transitional				Competitive				Attainment			
	Appalachian Region		Outside of Appalachia		Appalachian Region		Outside of Appalachia		Appalachian Region		Outside of Appalachia		Appalachian Region		Outside of Appalachia		Appalachian Region		Outside of Appalachia	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
<b>Diagnoses Contain Alcohol Use Disorder</b>																				
Yes	956	2.97	13,883	8.86	978	3.76	2,147	4.68	2,963	4.14	75,250	4.75	492	6.27	19,686	4.13	969	3.19	60,127	5
No	978	3.04	9,218	5.89	1,281	4.93	1,801	3.92	2,606	3.64	74,577	4.71	738	9.41	17,017	3.57	892	2.93	52,317	4.35
<b>Diagnoses Contain Drug Use Disorder</b>																				
Yes	780	2.42	15,443	9.86	1,016	3.91	1,951	4.25	2,129	2.98	71,589	4.52	455	5.8	15,191	3.18	779	2.56	52,367	4.35
No	950	2.95	8,514	5.44	1,104	4.25	1,719	3.75	2,796	3.91	71,002	4.48	729	9.29	17,896	3.75	892	2.93	52,617	4.37
<b>Diagnoses Contain Mental Health Disorder</b>																				
Yes	7,517	23.4	32,908	21	5,634	21.7	10,625	23.2	17,866	25	323,434	20.4	2,602	33.2	90,279	18.9	6,165	20.3	246,436	20.5
No	266	0.83	6,470	4.13	588	2.26	716	1.56	687	0.96	25,100	1.58	61	0.78	3,329	0.7	147	0.48	15,302	1.27
<b>Principal Reason for Hospitalization was Alcohol Use</b>																				
Yes	140	0.44	3,212	2.05	301	1.16	681	1.48	644	0.9	15,490	0.98	66	0.84	3,101	0.65	76	0.25	10,357	0.86
No	32,035	99.6	153,409	98	25,684	98.8	45,217	98.5	70,914	99.1	1,568,666	99	7,778	99.2	474,058	99.4	30,319	99.8	1,193,021	99.1
<b>Principal Reason for Hospitalization was Drug Use</b>																				
Yes	176	0.55	4,402	2.81	510	1.96	705	1.54	356	0.5	19,293	1.22	47	0.6	2,033	0.43	87	0.29	12,031	1
No	31,999	99.5	152,219	97.2	25,475	98	45,193	98.5	71,202	99.5	1,564,863	98.8	7,797	99.4	475,126	99.6	30,308	99.7	1,191,347	99
SOURCE: Healthcare Cost and Utilization Project (HCUP) Nationwide Inpatient Sample (NIS), 2004.																				

**Tables 4.6a and 4.6b** below present differences in community hospital discharges for all principal and secondary mental health or substance abuse diagnoses. Results are for adults age 18 and older. Table 4.6a provides findings overall, while Table 4.6b provides specific findings by county economic development status. Diagnoses cover all principal and secondary mental health or substance abuse diagnoses. Overall, 10.6% of discharges in the Appalachian region and 13.7% of discharges outside of Appalachia were screened for mental health problems. Screening for mental health problems constitutes the majority of discharge diagnoses outside of Appalachia. The gap between Appalachia and areas outside of Appalachia is largest in the two most economically developed categories, with approximately 8% of discharges in competitive and attainment counties in Appalachia being attributed to screening, compared to 14.5% in non-Appalachian counties.

Overall, 5.6% of discharges in the Appalachian region are attributed to anxiety disorders, compared with 3.5% outside of Appalachia. No distinct pattern emerges based on the economic development status, with the largest gaps between Appalachian and non-Appalachian counties occurring in distressed counties (7.4% of discharges in the Appalachian region compared with 2.1% outside of Appalachia), and competitive counties (7.7% of discharges in the Appalachian region compared with 3.7% outside of Appalachia).

Overall, 5.9% of discharges in the Appalachian region are due to delirium, dementia, and amnesic and other cognitive disorders, compared with 5.2% outside of Appalachia. In less economically developed counties, there is little regional difference in rates of these diagnoses. In competitive counties, however, 7.2% of discharges in the Appalachian region are due to this type of diagnosis, compared with 4.9% outside of Appalachia. In attainment counties, conversely, 3.0% of diagnoses in the Appalachian region are due to delirium and other cognitive disorders, compared with 5.2% outside of Appalachia.

Overall, 12.3% of diagnoses in the Appalachian region and 10.1% of diagnoses outside of Appalachia are due to mood disorders. Mood disorders constitute the majority of diagnoses, overall, in Appalachia. The most striking regional difference occurs in competitive counties, where 20.1% of mental health and substance abuse diagnoses in the Appalachian region are due to mood disorders, compared to 10% outside of Appalachia.

Overall, 6.0% of discharges in the Appalachian region, and 7.2% of discharges outside of Appalachia are due to substance-related disorders. Strikingly, in non-Appalachian distressed counties, substance-related disorders constitute the predominant mental health diagnosis, comprising 14.1% of diagnoses. In contrast, only 5.1% of diagnoses in distressed Appalachian counties are attributed to substance-related disorders.

**Table 4.6a: Differences Among All Principal and Secondary Mental Health or Substance Abuse Diagnoses for Discharges from Community Hospitals, 2004**

	Adults Age 18 or Older			
	Appalachian Region		Outside of Appalachia	
	N	%	N	%
Adjustment disorders	384	0.23	21,318	0.39
Anxiety disorders	9,369	5.58	191,077	3.47
Attention-deficit, conduct, and disruptive behavior disorders	291	0.17	8,837	0.16
Delirium, dementia, and amnestic and other cognitive disorders	9,962	5.93	287,877	5.23
Developmental disorders	1,386	0.83	31,533	0.57
Disorders usually diagnosed in infancy, childhood, adolescence	54	0.03	1,927	0.03
Impulse control disorders, NEC	247	0.15	4,023	0.07
Mood disorders	20,718	12.34	556,748	10.11
Personality disorders	1,572	0.94	42,250	0.77
Schizophrenia, other psychotic disorders	3,480	2.07	143,039	2.6
Substance-related disorders	10,041	5.98	399,508	7.25
Miscellaneous mental disorders	1,612	0.96	56,812	1.03
Screening and history of mental health and substance abuse codes	17,742	10.56	755,481	13.71

SOURCE: Healthcare Cost and Utilization Project (HCUP) Nationwide Inpatient Sample (NIS), 2004.

**Table 4.6b: Differences Among All Principal and Secondary Mental Health or Substance Abuse Diagnoses Discharged from Community Hospitals, by County Economic Development Status, 2004**

	County Economic Development Status Adults Age 18 or Older																			
	Distressed				At-Risk				Transitional				Competitive				Attainment			
	Appalachian Region		Outside of Appalachia		Appalachian Region		Outside of Appalachia		Appalachian Region		Outside of Appalachia		Appalachian Region		Outside of Appalachia		Appalachian Region		Outside of Appalachia	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Adjustment disorders	57	0.18	868	0.55	54	0.21	92	0.2	177	0.25	7,561	0.48	19	0.24	2,107	0.4	77	0.25	4,808	0.4
Anxiety disorders	2,394	7.44	3,269	2.09	1,159	4.46	2,242	4.88	3,860	5.39	58,425	3.69	604	7.7	17,517	3.7	1,352	4.45	45,557	3.8
Attention-deficit, conduct, and disruptive behavior disorders	24	0.07	78	0.05	24	0.09	71	0.15	136	0.19	2,677	0.17	36	0.46	769	0.2	71	0.23	2,334	0.2
Delirium, dementia, and amnesic and other cognitive disorders	2,030	6.31	9,802	6.26	1,522	5.86	2,928	6.38	4,939	6.9	83,306	5.26	568	7.24	23,263	4.9	903	2.97	62,263	5.2
Developmental disorders	248	0.77	1,092	0.7	198	0.76	380	0.83	698	0.98	9,550	0.6	27	0.34	2,531	0.5	215	0.71	7,082	0.6
Disorders usually diagnosed in infancy, childhood, adolescence	3	0.01	61	0.04	6	0.02	8	0.02	24	0.03	549	0.03	4	0.05	164	0	17	0.06	511	0
Impulse control disorders, NEC	25	0.08	201	0.13	60	0.23	61	0.13	138	0.19	1,362	0.09	15	0.19	469	0.1	9	0.03	865	0.1
Mood disorders	3,074	9.55	12,903	8.24	2,858	11	5,481	11.94	9,324	13.03	164,347	10.37	1,576	20.1	47,578	10	3,886	12.78	135,478	11
Personality disorders	27	0.08	841	0.54	150	0.58	453	0.99	703	0.98	13,437	0.85	596	7.6	4,789	1	96	0.32	9,983	0.8
Schizophrenia, other psychotic disorders	762	2.37	9,084	5.8	519	2	1,046	2.28	1,463	2.04	45,583	2.88	273	3.48	9,070	1.9	463	1.52	29,100	2.4
Substance-related disorders	1,627	5.06	22,081	14.1	1,747	6.72	3,400	7.41	4,281	5.98	122,916	7.76	819	10.4	30,070	6.3	1,567	5.16	93,834	7.8
Miscellaneous mental disorders	239	0.74	694	0.44	192	0.74	278	0.61	941	1.32	16,994	1.07	102	1.3	6,417	1.3	138	0.45	11,791	1
Screening and history of mental health and substance abuse codes	3,184	9.9	12,299	7.85	2,234	8.6	6,031	13.14	9,650	13.49	199,570	12.6	694	8.85	69,182	15	1,980	6.51	174,767	15

SOURCE: Healthcare Cost and Utilization Project (HCUP) Nationwide Inpatient Sample (NIS), 2004.

**Tables 4.7a and 4.7b**, below, show sub-regional differences among community hospital discharges by substance abuse and mental health diagnoses as the major reason for hospitalization for adults over age 18. Table 4.7a provides findings overall for admissions from Appalachian community hospitals versus non-Appalachian community hospitals. Table 4.7b provides findings by county economic development status. Overall, 5.4% of all hospitalizations in the Appalachian region, and 6.1% of hospitalizations outside of Appalachia are attributed to mental health or substance abuse diagnoses. In Appalachia and outside of Appalachia, 0.2% of hospitalizations are attributed to screening for mental health disorders. There is little variation based on the level of economic development in the region.

Overall, 0.5% of diagnoses in the Appalachian region and 0.4% of diagnoses outside of Appalachia are due to delirium, dementia, and amnesic and other cognitive disorders. Appalachian transitional and competitive counties report around 0.7% of hospitalizations due to delirium and other cognitive disorders, compared with about 0.4% outside of Appalachia. Conversely, in attainment counties, only about 0.2% of diagnoses in the Appalachian region are related to cognitive disorders, compared with 0.4% outside of Appalachia.

Overall, 2.1% of hospitalizations in Appalachia and outside of Appalachia are due to mood disorders. Mood disorders, overall, are the leading mental health or substance abuse diagnosis associated with hospitalizations in Appalachia and outside of Appalachia. In Appalachian distressed counties, 1.1% of hospitalizations are due to mood disorders, compared with 2.0% in non-Appalachian distressed counties. Mood disorders are the leading mental health or substance abuse diagnosis associated with hospitalizations among distressed counties in Appalachia. Mood disorders are also the leading mental health or substance abuse diagnosis associated with hospitalization in transitional counties in Appalachia and outside of Appalachia (2.1% and 2.3% of hospitalizations, respectively). In competitive counties in the Appalachian region, 7.6% of hospitalizations are due to mood disorders, compared with 2.1% in competitive counties outside of Appalachia. Despite this gap, mood disorders constitute the main mental health or substance abuse diagnosis linked to hospitalizations in competitive counties both in Appalachian and outside of Appalachia. Mood disorders are also the main diagnosis associated with hospitalizations for attainment counties in Appalachia and outside of Appalachia.

Overall, 0.8% of hospitalizations in the Appalachian region and 1.3% of hospitalizations outside of Appalachia are associated with a diagnosis of schizophrenia and other psychotic disorders. There are no discernable patterns associated with level of economic development around this diagnosis. In distressed counties, 0.9% of diagnoses in the Appalachian region and 3.3% of hospitalizations outside of Appalachia are linked to this diagnosis. In competitive counties, on the other hand, these values are switched.

Overall, about 1.5% of hospitalizations in Appalachia and outside of Appalachia are due to substance-related disorders. In distressed counties, 1.0% of Appalachian and 4.9% of non-Appalachian hospitalizations are due to substance-related disorders. Outside of Appalachia, this constitutes the largest source of mental health or substance abuse diagnoses. Substance-related disorders also constitute the most frequent diagnosis associated with hospitalizations among mental health or substance abuse diagnoses in at-risk counties within Appalachia and outside of Appalachia (3.1% and 3.0% of hospitalizations, respectively).

**Table 4.7a: Differences Among Community Hospital Discharges by Substance Abuse and Mental Health Diagnoses as the Major Reason for Hospitalization, 2004**

	Adults Age 18 or Older			
	Appalachian Region		Outside of Appalachia	
	N	%	N	%
Adjustment disorders	92	0.05	6,637	0.12
Anxiety Disorders	248	0.15	6,664	0.12
Attention-deficit, conduct, and disruptive behavior disorders	3	0	186	0
Delirium, dementia, and amnesic and other cognitive disorders	915	0.54	22,526	0.41
Developmental disorders	12	0.01	267	0
Disorders usually diagnosed in infancy, childhood, adolescence	4	0	133	0
Impulse control disorders, NEC	38	0.02	1,268	0.02
Mood disorders	3,519	2.1	117,444	2.13
Personality disorders	17	0.01	790	0.01
Schizophrenia and other psychotic disorders	1,319	0.79	72,713	1.32
Substance-related disorders	2,403	1.43	87,572	1.59
Miscellaneous mental disorders	275	0.16	7,285	0.13
Screening and history of mental health and substance abuse codes	306	0.18	12,789	0.23

SOURCE: Healthcare Cost and Utilization Project (HCUP) Nationwide Inpatient Sample (NIS), 2004.



**Table 4.7b: Differences Among Community Hospital Discharges by Substance Abuse and Mental Health Diagnoses as the Major Reason for Hospitalization by County Economic Development Status, 2004**

	County Economic Development Status Adults Age 18 or Older																			
	Distressed				At-Risk				Transitional				Competitive				Attainment			
	Appalachian Region		Outside of Appalachia		Appalachian Region		Outside of Appalachia		Appalachian Region		Outside of Appalachia		Appalachian Region		Outside of Appalachia		Appalachian Region		Outside of Appalachia	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Adjustment disorders	13	0.04	349	0.22	21	0.08	48	0.1	43	0.06	2,752	0.17	1	0.01	580	0.12	14	0.05	1,536	0.13
Anxiety Disorders	34	0.11	108	0.07	70	0.27	83	0.2	97	0.14	2,135	0.13	18	0.23	830	0.17	29	0.1	1,648	0.14
Attention-deficit, conduct, and disruptive behavior disorders	.	.	7	0	2	0.01	1	0	.	.	75	0	.	.	19	0	1	0	45	0
Delirium, dementia, and amnesic and other cognitive disorders	139	0.43	482	0.31	105	0.4	147	0.3	560	0.78	6,563	0.41	50	0.64	1,698	0.36	61	0.2	5,348	0.44
Developmental disorders	1	0	19	0.01	.	.	1	0	7	0.01	99	0.01	1	0.01	32	0.01	3	0.01	49	0
Disorders usually diagnosed in infancy, childhood, adolescence	1	0	5	0	.	.	1	0	1	0	40	0	1	0.01	11	0	1	0	46	0
Impulse control disorders, NEC	6	0.02	94	0.06	22	0.08	18	0	7	0.01	440	0.03	1	0.01	184	0.04	2	0.01	257	0.02
Mood disorders	345	1.07	3,161	2.02	513	1.97	815	1.8	1,510	2.11	36,314	2.29	595	7.59	10,134	2.12	556	1.83	30,572	2.54
Personality disorders	.	.	27	0.02	1	0	1	0	10	0.01	252	0.02	4	0.05	74	0.02	2	0.01	217	0.02
Schizophrenia and other psychotic disorders	296	0.92	5,143	3.28	237	0.91	382	0.8	465	0.65	22,914	1.45	176	2.24	4,459	0.93	145	0.48	14,870	1.24
Substance-related disorders	316	0.98	7,614	4.86	811	3.12	1,386	3	1,000	1.4	34,783	2.2	113	1.44	5,134	1.08	163	0.54	22,388	1.86
Miscellaneous mental disorders	55	0.17	123	0.08	46	0.18	62	0.1	115	0.16	2,179	0.14	26	0.33	771	0.16	33	0.11	1,629	0.14
Screening and history of mental health and substance abuse codes	49	0.15	361	0.23	34	0.13	87	0.2	129	0.18	3,399	0.21	26	0.33	1,027	0.22	68	0.22	2,688	0.22

SOURCE: Healthcare Cost and Utilization Project (HCUP) Nationwide Inpatient Sample (NIS), 2004.

**Table 4.8: Adult Patients Diagnosed with Mental Health Disorders in Community Hospitals, 2004**

	Age 18 and older	
	Appalachian Region	Outside of Appalachia
	N=794,546 Count (Percent)	N=31,930,000 Count (Percent)
Adjustment disorders	1,862 (0.23%)*	121,197 (0.39%)*
Anxiety disorders	43,996 (5.54%)*	1,108,665 (3.56%)*
Attention-deficit, conduct, and disruptive behavior disorders	1,320 (0.17%)	50,105 (0.16%)
Delirium, dementia, and amnestic and other cognitive disorders	47,016 (5.92%)*	1,643,622 (5.28%)*
Developmental disorders	6,523 (0.82%)*	181,070 (0.58%)*
Disorders usually diagnosed in infancy, childhood, or adolescence	247 (0.03%)	10,786 (0.03%)
Impulse control disorders	1,196 (0.15%)*	24,056 (0.08%)*
Personality disorders	7,145 (0.90%)*	246,001 (0.79%)*
Schizophrenia and other psychotic disorders	16,368 (2.06%)*	804,620 (2.58%)*
Substance-related disorders	47,251 (5.95%)*	2,205,822 (7.08%)*
Miscellaneous mental disorders	7,887 (0.99%)*	326,184 (1.05%)*
Screening and history of mental health and substance abuse codes	83,813 (10.55%)*	4,368,709 (14.03%)*
SOURCE: Healthcare Cost and Utilization Project (HCUP) Nationwide Inpatient Sample (NIS), 2004.		
Notes:		
<sup>1</sup> Appalachian region is defined as all areas covered by the 410 designated counties in 13 states.		
<sup>2</sup> Analysis is limited to hospital discharges with patients age 18-59; Weighted length and charge estimates are presented.		
<sup>3</sup> ***The individual coefficient is statistically significant at the 1% level using a two-sided test.		
<sup>4</sup> **The individual coefficient is statistically significant at the 5% level using a two-sided test.		
<sup>5</sup> *The individual coefficient is statistically significant at the 10% level using a two-sided test.		

**Table 4.8** above provides data on adult patients diagnosed with mental health disorders in community hospitals in Appalachia and outside of Appalachia. More adults in Appalachian community hospitals were diagnosed with the following disorders than their non-Appalachian counterparts: anxiety disorders; delirium, dementia, and amnestic and other cognitive disorders; developmental disorders (includes communication disorders, developmental disabilities, intellectual disabilities, learning disorders, and motor skill disorders); impulse control disorders; and personality disorders. Results are statistically significant ( $p < 0.01$ ).

## 4.5 Discussion

The Nationwide Inpatient Sample (NIS) data of the Healthcare Cost and Utilization Project (HCUP) provide important and unique information to understand the extent of substance use and mental disorders among patients discharged from the community hospitals. Findings described in this chapter point to several disparities between Appalachian and non-Appalachian community hospital discharges, as well as discharges across Appalachian sub-regions and county economic development levels. In addition, findings from this chapter emphasize that mental health problems are paramount in the Appalachian region.

### *Path to admission*

Patients in the Appalachian region are more likely to be admitted through the emergency department (ED) than patients outside of the Appalachian region. This disparity appears to concentrate in “At-Risk” and “Transitional” counties as compared to other counties. Economic disadvantage is a likely factor in limiting people’s tendency to seek preventive care or get low cost, non-emergency health care.

### *Payment for services*

In Appalachia, over 67 percent of adult hospital stays were billed to the government in 2004; Medicaid was billed for 15% of all stays and Medicare was billed for 52% of all stays. In comparison, 57 percent of adult hospital stays outside of Appalachia were billed to the government; Medicaid was billed for 14% of all stays and Medicare was billed for 43% of all stays. The percentages of inpatient hospital stays billed to Medicaid overall are almost the same between Appalachia and non-Appalachia counties. As expected, less economically developed counties in Appalachia report a greater percentage of Medicaid expected payers than more economically developed counties. However, fewer stays in Appalachian community hospitals in “Distressed,” “At-Risk,” and “Transitional” counties were billed to Medicaid than in non-Appalachian counties of similar economic development status. It appears that the delivery or utilization of government support across communities with differing economic development levels is uneven. It is notable that individuals in the most disadvantaged communities are actually less likely to benefit from government support.

### *Substance abuse and/or mental disorder diagnoses*

Community hospitals play an important role in identifying and treating individuals with MHSA disorders, even when MHSA disorders are not the primary reason for an individual’s hospital visit. Overall, the percentage of admissions in Appalachia for patients with principal and/or secondary MHSA diagnoses is higher than the percentage outside of Appalachia.

This study also reveals that the vast majority of hospital stays with MHSA diagnoses are mental health related; and the rate is higher in Appalachia than outside of Appalachia. The rate of co-occurrence of substance abuse and mental disorders, however, is lower in Appalachia than outside of Appalachia, especially in economically-distressed areas. The high presence of admissions with mental health disorders in Appalachia is a likely challenge to Appalachian community hospitals as these facilities, by definition, are not mental health hospitals.

# R

## EFLECTIONS FROM PRACTITIONERS

From the Coalition on Appalachian Substance Abuse Policy



### Challenges Associated with Using the Health Care Cost and Utilization Project (HCUP) National Inpatient Survey to Explore Substance Abuse and Mental Health in Appalachia

- **HCUP provides an underestimation of the mental health problems in Appalachia and nationally because mental health hospitals are not included in the data set.**
- **Facility reporting practices are often affected by payment.** CASAP noted that hospitals participating in HCUP are likely to underreport substance abuse issues for admissions. Hospitals are not paid if the primary reason for admission is related to a substance abuse problem. According to CASAP, hospitals may code the client's reason for admission as a physical or mental health problem, if possible, to secure payment. As a result, the HCUP data may significantly understate substance abuse problems.
- **CASAP noted that the findings from the HCUP data set were more consistent with their experiences than findings from TEDS, N-SSATS, and NSDUH.**