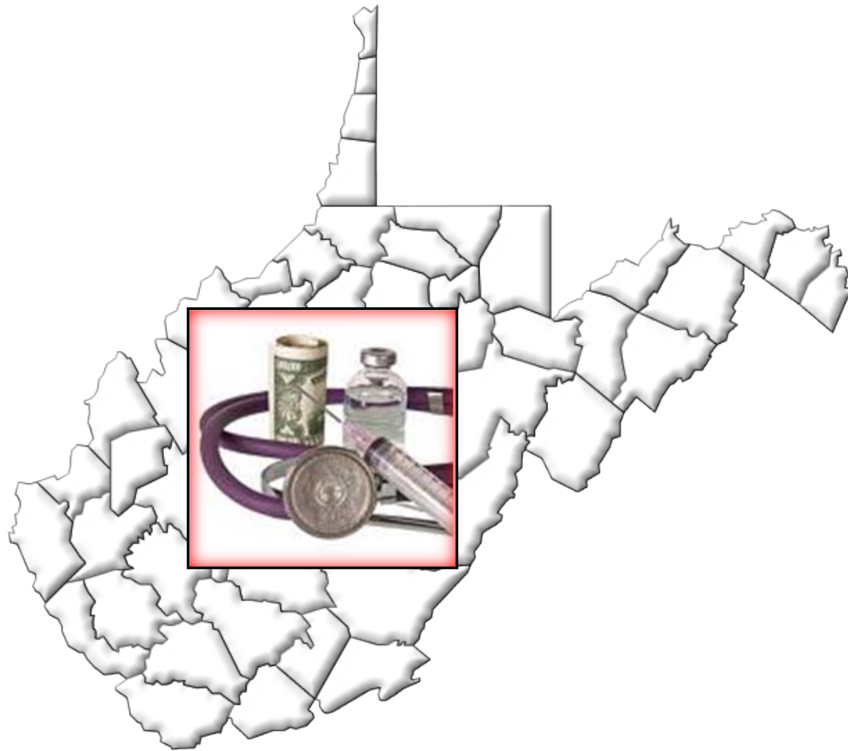
The Financial Burden of Substance Abuse in West Virginia:

The Healthcare System



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West Virginia's Governor-Appointed Substance Abuse Prevention & Intervention Planning Body

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Staff to the WV Partnership & Support for WV's Community-Level Substance Abuse Prevention Efforts

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The Financial Burden of Alcohol and Substance Abuse in West Virginia: The Healthcare System

The cost of drug and alcohol use is astronomical in every societal sector. The present report, part of a larger Family Funding Study project, is the second in a series that will examine the cost of drugs and alcohol use in the criminal justice, healthcare, education, child welfare, and workforce systems in West Virginia. A comprehensive report, incorporating estimates from all these different governmental sectors, will be produced at the end of the project. The present report attempts to capture the impact of drug and alcohol use on West Virginia's healthcare sector, which includes several hospitals and healthcare facilities. Specifically, this report will examine the cost of drug and alcohol use to West Virginia's hospitals, prescription providers, substance abuse treatment centers, prevention providers, behavioral health providers, and federally qualified health centers. The present report estimates that more than $116 million of West Virginia's healthcare system budget was consumed to address drug- and alcohol-related diseases in 2007 (Table 1).

This report uses a mix of methodologies from two previous studies that have attempted to estimate the cost of drug and alcohol use. The first, "Shoveling Up: The Impact of Substance Abuse on State Budgets," was released by the National Center on Addiction and Substance Abuse (CASA) at Columbia University in 2001, and was recently updated in 2009. The second study, titled "Integrated Funding Analysis of Mental Health and Substance Use in West Virginia," was released by the Public Consulting Group (PCG) in 2007. However, the present study makes some unique contributions to the two reports. First, it provides more recent estimates of the cost of drug and alcohol use to the state. Second, it provides cost trends over the past 8 years and, based on those trends, makes projections for costs in year 2017. Unless otherwise noted, linear trend was assumed for these projections. Third, this report includes certain sectors that are impacted by drugs and alcohol use but were excluded from one or both of the previous two reports. Finally, this report was initiated with the intent of producing annual updates; consequently, only data that are available annually were used.

Prior Studies Estimating the Cost of Substance Abuse in West Virginia

As mentioned earlier, two previous studies provided some guidance in the estimation of the cost of drug and alcohol use in the present study. The first by CASA estimated that West Virginia spent about $140 million on drug- and alcohol-related diseases in the healthcare system in 2005, this was up from $86 million in 1998 (The National Center on Addiction and Substance Abuse (CASA) at Columbia University,

2009); CASA found that the highest increase in state's substance abuse spending occurred in the health sector. CASA also estimated that, in 2005, the state spent about $768 million on substance abuse-related problems in all sectors, an increase of $430 million from 1998. CASA obtained the data for its reports from surveys sent to state agency officials in September 1998 and July 2006. The survey asked state government officials working in eight main areas, including justice, healthcare, child and family welfare, education, workforce, public safety, mental health/ developmentally disabled, and regulation/compliance, to provide their total budget and estimate the amount that goes directly or indirectly towards substance abuse-related programs. The researchers also obtained data on prevention and research funds. A major critique of CASA's reports was that they relied heavily on estimates from individual government officials, which has the potential to introduce some level of error. They also relied on national attribution statistics in estimating the proportion of an agency's budget that went towards substance abuse when the agency failed to report the exact amount. In addition, CASA differs from the present report because it excluded federal government substance abuse related expenditure. In the first report, CASA focused only on state spending and, in the second report, it focused on both state and local spending. Another major way in which CASA's report differs from the present report is that CASA included the cost of tobacco use in its estimates whereas the present report focused on only drugs and alcohol.

The second study by PCG used mostly state-level statistics to estimate West Virginia's substance abuse related costs in fiscal year 2006. PCG estimated that the healthcare sector accounted for $98 million out of the $1.9 billion spent on drugs and alcohol problems in the state (Public Consulting Group (PCG), 2007). As presented, PCG's healthcare cost estimate is significantly lower than CASA's but is closer to the present report's. PCG's cost attributable to drugs and alcohol in all sectors was more than twice CASA's, suggesting CASA's estimate might be overstated for the healthcare sector but understated overall. A possible explanation for the difference is that CASA included tobacco, which PCG and the present study excluded. Tobacco places a huge indirect cost on the health sector.

The cost estimates reported herein were based on methodologies similar to those used in the PCG report. However, there are some key differences. First, year specific cost-to-charge ratios (CCR) were used in translating hospital charges to cost since the CCR changes by year. Second, some of the data sources are different. For example, the cost-to-charge ratios in this report were estimated from the West Virginia Health Care Authority hospital discharge data whereas PCG obtained its data from the Medicare worksheet. Finally, this report does not report Medicaid spending as a separate category because Medicaid covers some of the revenue in the examined sections.

The Current Project to Estimate the Cost of Substance Abuse in West Virginia

Substance abuse is a serious problem in West Virginia. The Substance Abuse and Mental Health Services Administration (SAMHSA, 2008) estimates that 7.91% of the state's population in 2006 was drug- or alcohol-dependent based on data from 2005 and 2006 National Survey on Drug Use and Health. The estimate is even higher for persons ages 18 to 25; 21.72% of this age group were classified as drug-

dependent based on definitions found in the 4th edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV). In addition, 40.93% of 18-25 year-olds, and 18.90% of persons above age 12, reported binge drinking, which is defined as consuming five or more drinks on the same occasion (i.e., at the same time or within a couple of hours of each other) on at least 1 day in the past 30 days. Similarly, 10.16%, 23.16%, and 7.95% of persons 12-17 years, 18-25 years, and above 12 years, respectively, used illicit drugs in West Virginia in 2006 (SAMHSA, 2008). Thus, it was not surprising that the cost of drugs and alcohol use is high in West Virginia. In the healthcare system budget alone, this report estimates that more than $116 million was consumed in 2007 to address alcohol and drug related issues. It is projected that these costs could nearly double to $201 million in a decade. The overall projections for the different sectors of West Virginia's healthcare system are illustrated in Table 1 and Chart 1.

The pervasive nature of drug and alcohol consumption and its accompanying consequences are readily evident in West Virginia. The magnitude of these costs and the rate of increase suggest that the state needs to take urgent actions to address drug and alcohol use. The estimates provided by the present report also suggest that West Virginia cannot afford to adopt a "wait and see" approach. Rather, the state should direct urgent attention at preventing drug and alcohol use at all ages. The comprehensive approach to the problem of substance abuse advocated by the West Virginia Partnership is the state's only viable option to stemming this tide (West Virginia Partnership to Promote Community Well-being, 2008). This approach will certainly lessen the financial burden facing the healthcare system and free up resources for other much-needed programs. The next sections will present in depth discussion about each sector in Table 1, as well as provide the methodology for arriving at the cost estimates.

Table 1: Financial Burden of Drugs on West Virginia Healthcare System, FY 1999 to 2017

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2017
Hospital Care											
Inpatient: Primary Diagnosis Drugs and Alcohol-Related	$7,946,206	$7,639,256	$8,117,295	$9,814,531	$10,178,055	$13,053,154	$9,873,495	$10,464,228	$11,076,677	$12,155,248	$16,257,832
Inpatient: Secondary Diagnosis Drugs and Alcohol-Related	$4,586,048	$5,123,830	$6,229,679	$7,583,614	$8,358,481	$9,126,378	$8,855,855	$10,124,852	$11,070,467	$11,788,860	$17,978,086
Total Inpatient Cost[1]	$12,532,254	$12,763,086	$14,346,974	$17,398,145	$18,536,536	$22,179,532	$18,729,350	$20,589,080	$22,147,144	$23,944,108	$34,235,918
Emergency Room Visits	N/A	N/A	N/A	$15,456,506	$15,931,916	$16,209,986	$16,515,863	$16,768,518	$17,192,500	$17,495,447	$20,451,472
Total Hospital Care	$12,532,254	$12,763,086	$14,346,974	$32,854,651	$34,468,452	$38,389,518	$35,245,213	$37,357,598	$39,339,644	$41,439,555	$54,687,390
Prescription Drugs	$12,192,000	$11,250,000	$12,400,000	$17,784,000	$18,144,000	$24,405,000	$24,983,702	$27,238,139	$29,635,808	$32,176,710	$61,490,270
Methadone Treatment Ctrs.	N/A	N/A	N/A	$2,638,000	$5,908,000	$9,762,000	$12,435,000	$15,014,000	$14,452,000	$18,668,233	$40,525,248
SAPTBG*	N/A	N/A	N/A	$12,987,939	$13,853,038	$15,782,979	$17,275,136	$16,675,221	$17,038,344	$17,236,851	$18,412,784
Behavioral Health Providers – SA only	$1,274,000	$1,325,000	$1,334,000	$2,581,000	$2,696,000	$2,697,000	$2,698,000	$2,733,000	$3,129,000	$3,297,704	$7,993,658
Other Behavioral Health Providers	N/A	N/A	N/A	$9,371,067	$9,904,855	$10,183,988	$10,771,450	$10,776,163	$11,527,062	$11,820,570	$15,415,782
Federally Qualified Health Centers	N/A	$146,784	$186,811	$185,744	$480,960	$439,920	$618,990	$934,830	$968,946	$1,103,319	$2,661,750
Total Healthcare System Cost	**$25,998,254**	**$25,484,870**	**$28,267,785**	**$78,402,401**	**$85,455,305**	**$101,660,405**	**$104,027,491**	**$110,728,951**	**$116,090,804**	**$125,742,942**	**$201,186,882**

***** *This includes funds from the Substance Abuse Prevention and Treatment Block Grant (SAPTBG) and state matching funds.*
Note - Cells with bolded borders contain projected estimates. N/A indicates data was not available.

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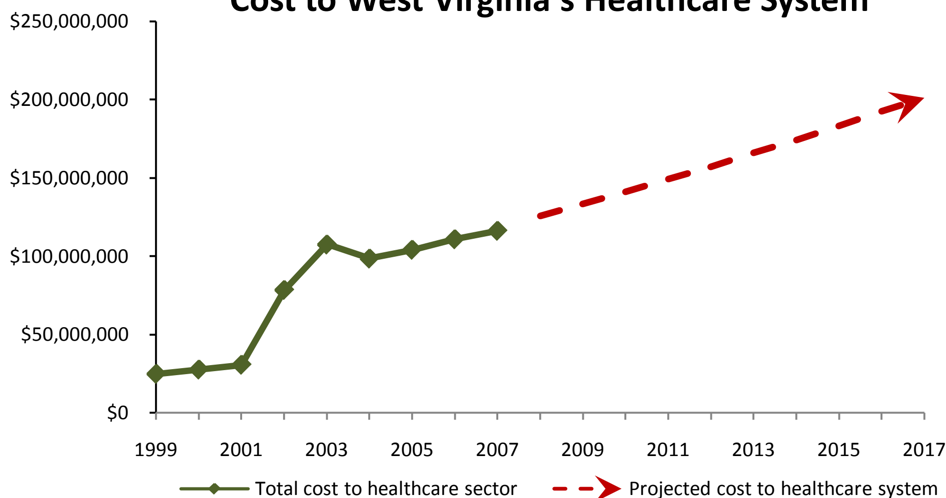
[1] Data for gross patient revenue and operating expenses are comparable for only 2005, 2006, and 2007 because the same hospitals were included in these figures. The figures for the other years excluded some hospital that had closed down by 2005, 2006, or 2007.



The Present Study

According to CASA (2009), there are three possible ways in which substance use could affect healthcare cost; through costs for: (a) illness or injury resulting from substance abuse, (b) injury of innocent parties injured by substance users, and (c) illness not directly due to substance use but complicated or extended due to substance use. The present study will focus on the first category because this represents direct cost of substance abuse to the healthcare sector. Although the other two categories indirectly affect the health sector, they are beyond the score of this study.

The following sections will focus on West Virginia's hospital system, prescription drug expenses, methadone treatment centers, Substance Abuse Prevention and Treatment Block Grant (and state matching fund), behavioral health providers, and federally qualified health centers. Where possible, this study estimates the drug- and alcohol-related cost for 1999 to 2007, the year with the most recent data. These data were then used to project costs for 2008 and 2017.

Hospitals

According to the West Virginia Health Care Authority (2008), there were 64 licensed hospitals in the state. Of these, 35 were general/acute care facilities, 18 were critical access hospitals, 5 were rehabilitation hospitals, 4 were psychiatric hospitals, and 2 were long-term acute care hospitals. There were a total of 9,171 beds in the 64 facilities. In addition, within these facilities, there were 10 psychiatric/chemical dependency units among the different specialties provided (PCG, 2007).

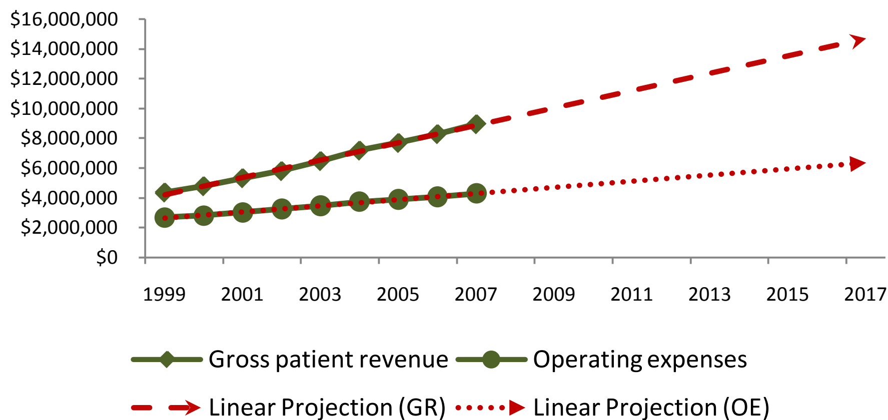
Table 2: Revenue, Expenses, and Cost-to-Charge Ratios for West Virginia Hospitals (in thousands of dollars)[2]

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2017
Gross Patient Revenue	$4,358,701	$4,782,275	$5,322,951	$5,799,285	$6,473,266	$7,178,258	$7,691,155	$8,286,386	$8,953,376	$9,455,607	$14,706,569
Net Patient Revenue	$2,601,000	$2,677,000	$2,922,000	$3,109,429	$3,318,986	$3,618,147	$3,753,075	$3,970,797	$4,182,794	$4,381,978	$6,238,893
Operating Expenses	$2,679,000	$2,809,000	$3,013,000	$3,248,525	$3,465,131	$3,737,131	$3,886,707	$4,056,488	$4,282,706	$4,496,963	$6,355,959
CCR = OE/GPR	0.61	0.59	0.57	0.56	0.54	0.52	0.51	0.49	0.48	0.48	0.43

Note - Cells with bolded borders contain projected estimates.
Source: West Virginia Health Care Authority

Table 2 shows the total reported gross patient revenue, net patient revenue, and operating expenses (in thousands of dollars) for West Virginia hospitals from FY 1999 to FY 2007. Between FY 1999 and FY 2007, the net patient revenue increased by 61% whereas, the total operating expenses increased by 60%. Gross patient revenue increased by 105%. Linear projection was applied to estimate revenue and operating expenses from FY 2008 and 2017 (Chart 2). Table 2 also shows the cost-to-charge ratios (CCR) or the ratio of all hospitals' costs to their revenue. These ratios were needed to convert hospital charges to substance abuse related costs.

Based on discussion with officials at the West Virginia Health Care Authority (WVHCA), CCRs were estimated by dividing the operating expenses by the gross patient revenue. In general, the estimates obtained were similar to what were used in the past. For example, PCG (2007) estimated the 2004 cost-to-charge ratio for West Virginia hospitals as 0.53 using Medicare worksheet data. The Center for Disease Control (2009) also reported CCRS of 0.53 for West Virginia's rural hospital and 0.58 for West Virginia's urban hospitals in 2001. Table 2 shows a downward trend in the CCR due to the gross patient revenue of West Virginia's hospitals increasing at a higher rate than their operating expense (Chart 2).



[2] Data for gross patient revenue and operating expenses are comparable for only 2005, 2006, and 2007 because the same hospitals were included in these figures. The figures for the other years included some hospitals that had closed down by 2005, 2006, or 2007.

Inpatient – Substance Abuse Related Primary Diagnosis

Inpatient hospital discharge data were obtained from the WVHCA. The number of substance abuse related discharges and associated charges were determined by using the Major Diagnostic Category (MDC) 20, which includes diagnoses related to drug/alcohol use and drug /alcohol induced organic mental disorders. A total of 106 International Classification of Diseases Codes (ICD-9) were specifically related to drug and alcohol use under this category.

Table 3: Number of Discharges with Primary Diagnosis Related to Substance Abuse

	1999	2000	2001	2002	2003	2004	2005	2006	2007
# of Drug-Related Discharges	1,050	993	1,101	1,206	1,134	1,590	1,257	1,331	1,175
# of Alcohol-Related Discharges	1,687	1,739	1,524	1,525	1,529	1,732	1,465	1,339	1,396
# of Total Discharges	2,737	2,732	2,625	2,731	2,663	3,322	2,722	2,670	2,571

Source: West Virginia Health Care Authority Database

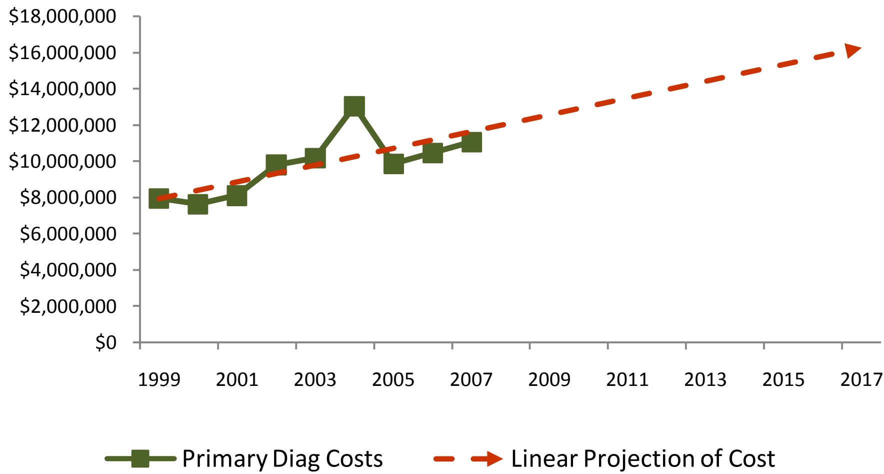
Between 1999 and 2007, there were more than 152,000 hospital discharges for drug or alcohol related primary or subsequent diagnosis. Of those 24,773 had a substance abuse related primary diagnosis, that is, drug or alcohol related medical issue was the primary reason for hospitalization. Table 3 shows the annual number of discharges with drug- and alcohol-related primary diagnoses from 1999 to 2007. The discharge trend has been very erratic over the years although the number has remained above 2,500 for all the years.

The total inpatient costs for these discharges were obtained from the product of the cost-to-charge ratios from Table 2 and the total patient charges reported by the WVHCA. The resulting costs are reported in Table 4. Table 4 shows that the cost of substance abuse related primary diagnoses had nearly doubled from $7 million in 1999 to $11 million in 2007 even though the number of discharges has stayed about the same. Microsoft excel was used to project the charges and costs for 2008 and 2017. If the current trend continues, the cost of drug- and alcohol-related primary diagnoses will more than double from $7 million in 1999 to $16 million in 2017 (Chart 3)!

Table 4: Cost of Inpatient Hospital Care for Primary Diagnosis Related to Substance Abuse

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2017
Charges for Drug-Related Discharges	$5,663,616	$5,261,641	$6,458,659	$7,814,786	$7,886,900	$13,043,365	$9,698,662	$11,087,538	$11,111,018	$12,917,567	$20,563,949
Charges for Alcohol-Related Discharges	$7,362,950	$7,686,250	$7,782,211	$9,711,162	$10,961,349	$12,058,854	$9,661,132	$10,268,028	$11,965,391	$12,405,867	$17,244,961
Total Charges	$13,026,566	$12,947,892	$14,240,869	$17,525,948	$18,848,249	$25,102,219	$19,359,794	$21,355,566	$23,076,409	$25,323,433	$37,808,911
Cost to Charge Ratio	0.61	0.59	0.57	0.56	0.54	0.52	0.51	0.49	0.48	0.48	0.43
Costs	**$7,946,206**	**$7,639,256**	**$8,117,295**	**$9,814,531**	**$10,178,055**	**$13,053,154**	**$9,873,495**	**$10,464,228**	**$11,076,677**	**$12,155,248**	**$16,257,832**

Source: West Virginia Health Care Authority Database



Inpatient – Substance Abuse Related Subsequent Diagnosis

Up to eight additional diagnosis levels beyond the primary diagnosis were obtained from the WVHCA for each hospital discharge. To avoid the issue of double counting, discharges that had primary diagnosis of substance use were filtered out. Further, those with more than one subsequent substance use related diagnosis were counted only once. The same strategy was applied to the charges. Table 5 presents the number of these subsequent discharges that are drug- and alcohol-related from 1999 through 2007, and indicates discharges with subsequent drug- and alcohol-related diagnosis outnumber primary diagnoses substantially, and has an upward trend, apart from the slight dip in 2005.

Table 5: Number of Discharges with Subsequent Diagnosis Related to Substance Abuse

	1999	2000	2001	2002	2003	2004	2005	2006	2007
# of Drug-Related Discharges	3,755	4,258	5,068	5,840	6,225	7,729	7,548	8,361	8,475
# of Alcohol-Related Discharges	6,593	6,693	7,066	7,808	7,901	8,906	8,291	8,496	8,444
# of Total Drug and Alcohol Discharges	**10,348**	**10,951**	**12,134**	**13,648**	**14,126**	**16,635**	**15,839**	**16,857**	**16,919**

Source: West Virginia Health Care Authority Database

To obtain the cost, the cost-to-charge ratios in Table 2 were applied to the charges for these diagnoses. However, the result represents the cost of substance abuse related secondary diagnosis and other non-substance abuse related diagnosis for these discharges. To remove the non-substance abuse related diagnosis cost for the discharges, this study applied the methodology used by Oklahoma Governor's and Attorney General's Blue Ribbon Task Force report (2005) titled the *Costs of Mental Health, Substance Abuse, and Domestic Violence,* which suggested that co-occurring substance abuse problems added one-half day to hospital discharges. Table 6 shows the average length of hospital stay (ALOS) was between 6.3 to 6.5 days in West Virginia. Thus, the one-half day attributed to drug or alcohol use added an equivalent of 10% to an individual's stay in the hospital for all the years. This proportion was multiplied by the total cost for persons with subsequent diagnosis to obtain the cost of inpatient hospital stay that was due to the subsequent diagnosis of drug- and alcohol-related diseases.

The last row of Table 6 presents the costs of drug- and alcohol-related subsequent diagnoses. Drugs- and alcohol-related subsequent diagnosis costs over $11 million in 2007. This was over 150% increase from 1999. Projecting the cost out to 2008 and 2017 suggests that the cost will continue to increase astronomically if drastic interventions are not implemented. If current trends persist, inpatient hospital care for drugs- and alcohol-related subsequent diagnoses in West Virginia will cost over $17 million by 2017. This is close to 300% increase in less than two decades!

Table 6: Cost of Inpatient Hospital Care for Subsequent Substance Abuse Related Diagnosis

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2017
Charges for Drug-Related Discharges	$23,263,945	$28,677,392	$39,662,676	$51,810,489	$58,744,162	$73,436,010	$71,935,908	$89,124,473	$101,292,036	$108,074,032	$195,017,870
Charges for Alcohol-Related Discharges	$51,917,174	$58,167,183	$69,629,930	$83,611,186	$96,042,521	$102,071,260	$101,708,307	$117,505,153	$129,342,702	$137,527,228	$223,077,156
Total Charges for Persons with Secondary Diagnosis that were Drugs- Or Alcohol-Related	$75,181,119	$86,844,575	$109,292,605	$135,421,675	$154,786,683	$175,507,269	$173,644,215	$206,629,625	$230,634,738	$245,601,260	$418,095,026
Cost to Charge Ratio	0.61	0.59	0.57	0.56	0.54	0.52	0.51	0.49	0.48	0.48	0.43
Costs	$45,860,483	$51,238,299	$62,296,785	$75,836,138	$83,584,809	$91,263,780	$88,558,550	$101,248,516	$110,704,674	$117,888,605	$179,780,861
Average Length of Stay (Days)	6.5	6.5	6.4	6.4	6.4	6.4	6.4	6.3	6.4	6.4	6.4
Proportion of Stay that was Drugs- or Alcohol-Related	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Cost of Inpatient Hospital Care for Drugs- and Alcohol-Related Discharges [3]	$4,586,048	$5,123,830	$6,229,679	$7,583,614	$8,358,481	$9,126,378	$8,855,855	$10,124,852	$11,070,467	$11,788,860	$17,978,086

Source: West Virginia Health Care Authority Database

Hospital Emergency Room

There were more than a million emergency room (ER) visits in FY 2007 (Table 7). This number had increased by 11% since 2002. Using data from the 2006 National Hospital Ambulatory Medical Care Survey, Pitts, Niska, Xu, and Burt (2008) found that about 5% of ER visits were due to drug and alcohol abuse. Unfortunately, the report did not disaggregate the two types of substances. In the absence of similar prevalence statistics for the other years, this study applied this rate to the number of ER visits in Table 7. This resulted in 57,500 ER visits due to drug- and alcohol-abuse in 2007. Trended forward, this report estimates that there will be 58,513 and 68,398 ER visits related to drug and alcohol abuse in 2008 and 2017, respectively.

This report used the number of ER visits to estimate the cost of emergency room visits. Although PCG (2007) estimated the average cost of drugs- and alcohol-related diseases in ER from nine randomly selected hospital from the Medicare Cost Report, the present study used the median cost of $299 estimated by Machlin (2006). The median cost was chosen because outliers and extreme values can easily affect averages when the data are not symmetrical such as in this case. Machlin's (2006) estimate

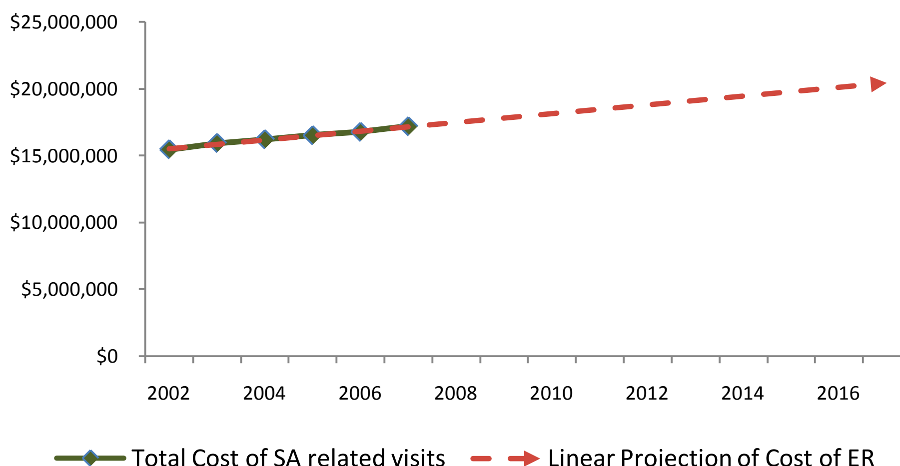
[3] Cost of inpatient hospital care for drugs- and alcohol-related discharges = total charges for persons with secondary diagnosis that were drugs- or alcohol-related * cost-to-charge ratio * 0.10

was based on data from the 2003 Household Component of the Medical Expenditure Panel Survey and excluded ER visits that became inpatient admission to avoid double counting.

Table 7: Cost of Emergency Room Visits for Substance Abuse Related Diseases

	1999	2000	2001	2002	2003	2004	2005*	2006*	2007*	2008	2017
Visits	N/A	N/A	N/A	1,033,885	1,065,689	1,084,287	1,104,730	1,121,630	1,150,000	1,170,254	1,367,956
Estimated Substance Abuse (SA) Related Visits	N/A	N/A	N/A	51,694	53,284	54,214	55,237	56,082	57,500	58,513	68,398
Median Emergency Room Visit Cost	N/A	N/A	N/A	$299	$299	$299	$299	$299	$299	NP	NP
Total Cost of SA Related Visits	N/A	N/A	N/A	$15,456,506	$15,931,916	$16,209,986	$16,515,863	$16,768,518	$17,192,500	$17,495,387	$20,451,002

Source: West Virginia Health Care Authority Annual Reports



To obtain the cost of ER visits due to drug- and alcohol-abuse, the number of substance abuse related ER visits was multiplied by $299 for all the years. This resulted in more than $17 million being consumed for drug- and alcohol-related ER visits in 2007. The results are probably conservative because the median cost has probably increased over the years. Linear projection was applied to estimate the cost from 2008 to 2017 (Chart 3). The results suggest that if urgent intervention is not undertaken, this cost will increase by 19% to over $20 million in 2017.

Prescription Drugs

The Kaiser Family Foundation (2009) estimated that prescription drugs and other medical non-durables represented 15.1% of all healthcare spending in West Virginia, or $1.6 billion. This figure was obtained from the national health expenditure data collected by the Centers for Medicare and Medicaid Services (2009). The website includes health spending estimates based on the National Health Expenditure Accounts for 1991 to 2004 by state of residence. Data for 1999 to 2004 are included in this report for consistency although data for 1991 to 2004 were used as base data for projecting forward from 2005 to 2017; they resulted in more conservative estimates compared to using only the data from 1999 to 2004. For example, the projections was nearly $2.3 billion for 2007 and more than $4.7 billion for 2017 when

using all available data for projection, compared to the $3.0 billion and $5.2 billion obtained when using data from 1999 to 2004. Thus, the more conservative projections were retained in this report.

To obtain the proportion of these costs that are attributable to drugs and alcohol, the present report follows the methodology of Liu (2002) and the Texas Commission on Alcohol and Drug Abuse. Liu (2002) argued that the percentage of total inpatient hospital days for substance abuse could be used as an estimate of the proportion of total prescription drug cost for substance abuse. Therefore, this report used the proportion of inpatient hospital days that were due to drug and alcohol abuse to estimate the proportion of prescription cost that was due to drug and alcohol abuse. This yielded prescription costs for drug and alcohol-related diseases increasing from $12 million in 1999 to $29 million in 2007 and then to over $61 million in 2017!

Table 8: Prescription Cost for Substance Abuse Related Diseases

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2017
# of Drugs- and Alcohol-Related Inpatient Days	18,439	14964	15131	19955	18255	23876	14202	15979	14720	16,466	15,001
# of Total Inpatient Days	1,480,901	1532404	1491929	1582246	1564656	1548388	1339941	1345298	1326551	1,341,656	1,114,173
% Discharges that were Drugs- and Alcohol-Related	1.2	1.0	1.0	1.3	1.2	1.5	1.1	1.2	1.1	1.2	1.3
Total Cost of Prescription Drugs	$1,016,000,000	$1,125,000,000	$1,240,000,000	$1,368,000,000	$1,512,000,000	$1,627,000,000	$1,921,823,250	$2,095,241,480	$2,279,677,570	$2,475,131,520	$4,730,020,770
Cost of Prescription Drugs for Substance Abuse	$12,192,000	$11,250,000	$12,400,000	$17,784,000	$18,144,000	$24,405,000	$24,983,702	$27,238,139	$29,635,808	$32,176,710	$61,490,270

Source: Centers for Medicare and Medicaid Services (2009)

Methadone Treatment Centers

Methadone treatment centers are just one of the several types of substance abuse treatment centers in West Virginia. There are nine methadone centers in West Virginia, with Valley Alliance Treatment Services being a recent addition. These centers offer supervised opioid replacement using methadone and rehabilitation of lifestyle. Methadone itself is an opioid agonist medication, otherwise defined as drugs that activate receptors in the brain. Methadone treatment centers' approach is based on the philosophy that when methadone is taken daily at adequate doses that are individually based, patients and their families may be able to get their lives back[4].

[4] http://www.opiatesrx.com/methadone.php

However, there is some controversy on using methadone to treat addiction to heroin and other drugs; therefore, there is no consensus on the effectiveness of methadone centers. Nonetheless, this is one of the options available for treating drug addiction in West Virginia. The eight centers whose expenses and revenues are reported are owned and operated by CRC Health Group, which is based in California. Valley Alliance, the recent addition, is also owned by an out-of-state group. Therefore, the revenue for the methadone centers goes out of state, even though most of the funding for centers comes from the state. The total revenue was approximately $4 million, $10 million, $15 million, $19 million, $20 million, and $20 million from FY 2002 to 2007, respectively (West Virginia Health Care Authority, 2003, 2004, 2005, 2006, 2007, 2008). The expenses or costs for those years were obtained from the WVHCA's annual reports and are shown in Table 9. Table 9 also includes the projected expense for operating the centers in 2008 and 2017. If current trends persist, more than $40 million will be expended on the methadone centers in 2017!

Table 9: Expenses for Methadone Centers in West Virginia, FY 2004 TO FY 2008

	2002	2003	2004	2005	2006	2007	**2008**	**2017**
Beckley Treatment Center, Inc.	$69,000*	$862,000	$1,500,000	$1,875,000	$2,388,000	$2,396,000	$3,173,800	$7,439,286
Charleston Treatment Center	$1,604,000	$1,709,000	$2,472,000	$2,523,000	$2,751,000	$2,515,000	$3,035,533	$5,023,762
Clarksburg Treatment Center	$370,000	$561,000	$844,000	$1,047,000	$1,192,000	$1,066,000	$1,404,267	$2,838,095
Huntington Treatment Center	N/A	$943,000	$2,160,000	$2,957,000	$3,430,000	$3,226,000	$4,294,000	$9,546,400
Martinsburg Institute	$374,000	$591,000	$671,000	$858,000	$908,000	$975,000	$1,143,800	$2,209,143
Parkersburg Treatment Center	$221,000	$591,000	$661,000	$727,000	$928,000	$936,000	$1,142,533	$2,338,762
Wheeling Treatment Center, Inc.	N/A	N/A	$190,000	$588,000	$953,000	$1,026,000	$1,407,500	$3,993,200
Valley Alliance Treatment Services	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Williamson Treatment Center	N/A	$651,000	$1,264,000	$1,860,000	$2,464,000	$2,312,000	$3,066,800	$7,136,600
Total Expenses	$2,638,000	$5,908,000	$9,762,000	$12,435,000	$15,014,000	$14,452,000	$18,668,233	$40,525,248

*Note: N/A indicates data were not available. *Excluded from projection for conservative estimates.*
Source: West Virginia Healthcare Authority Annual Reports

The Substance Abuse Prevention and Treatment Block Grant (and State Matching Fund)

The Substance Abuse Prevention and Treatment Block Grant (SAPTBG) allows West Virginia and other states to provide substance abuse treatment and prevention services. The grant also emphasizes the provision of treatment for special groups, specifically, injecting drug users, pregnant substance-using women, and women with dependent children. Additionally, the program makes primary prevention services available to individuals who may not need substance abuse treatment. SAPTBG is a major source of funding for substance abuse treatment and prevention in West Virginia, and the state supplements the treatment funds by providing a nearly 1 to 1 match. The SAPTBG funds, together with the state match, are re-awarded by a state agency to community behavioral health centers (CBHC), fellowship homes, prevention service providers, and other relevant entities.

Table 10 shows the trend in the SAPTBG. Because SAPTBG is formula funded and not demand driven, the amount of award in 2007 was used as the estimate for 2008 and 2017. Only the state fund was projected for 2008 and 2017using natural logarithm function. This function was most applicable in this situation because of the sharp initial increase and subsequent declining increase observed for the state funds. In 2007, close to $17 million was spent on substance abuse treatment and prevention services. If

current trends persist, over $18 million would be spent on substance abuse treatment and prevention services in West Virginia in 2017. It is important to note that the upward trend in the overall total is due largely to state funds. The SAPTBG proportion shown in Table 10 peaked in 2005, and has declined since then despite increased demand for treatment and prevention services.

Table 10: The Substance Abuse Prevention and Treatment Block Grant

	2002	2003	2004	2005	2006	2007	2008	2017
Treatment	$4,982,511	$4,579,565	$6,468,098	$6,747,822	$6,472,522	$6,372,361	$6,372,361	$6,372,361
Prevention	$1,783,048	$1,764,465	$1,784,561	$1,795,577	$1,893,892	$1,793,892	$1,793,892	$1,793,892
SAPT Total	$6,765,559	$6,344,030	$8,252,659	$8,543,399	$8,366,414	$8,166,253	$8,166,253	$8,166,253
State Funds	$6,222,380	$7,509,008	$7,530,320	$8,731,737	8,308,807	$8,872,091	$9,070,598	$10,246,531
Total	$12,987,939	$13,853,038	$15,782,979	$17,275,136	$16,675,221	$17,038,344	$17,236,851	$18,412,784

Note: NP indicates these data were not projected because interest was in the total.
Source: SAMHSA's Web Grant Application System

In addition to the SAPTBG, the Strategic Prevention Framework State Incentive Grant (SPF-SIG) provided short-term discretionary fund of about 2.3 million annually from FY 2005 till present. This fund was not included in the overall cost of substance abuse in this report because of its short-term nature.

Behavioral Health Service Providers –Substance Use Treatment Only

There are 98 behavioral health centers in West Virginia (West Virginia Health Care Authority, 2008). Many provide residential childcare, therapeutic foster care, mental health and substance abuse intervention services and other services that may fall outside of the scope of mental health and substance abuse. Only two provide substance abuse related services solely – Olympic Center-Preston and So Others Might Eat, which includes Exodus and Maya Angelou houses. Olympic Center-Preston, Inc is a drug or alcohol rehabilitation center with a primary focus on substance abuse treatment. The Olympic Treatment Center provides residential long-term treatment care. There are special groups and programs for adolescents, persons with co-occurring mental and substance abuse disorders, and criminal justice groups (CiteHealth, 2009). The other provider, So Others Might Eat, includes the Exodus and Maya Angelou houses. The Exodus house is a men's 90-day residential addiction treatment center whereas the Maya Angelou house provides the same services for women (So Others Might Eat, 2009).

Table 11: Expenses for Behavioral Health Service Providers -Substance Use Treatment Only

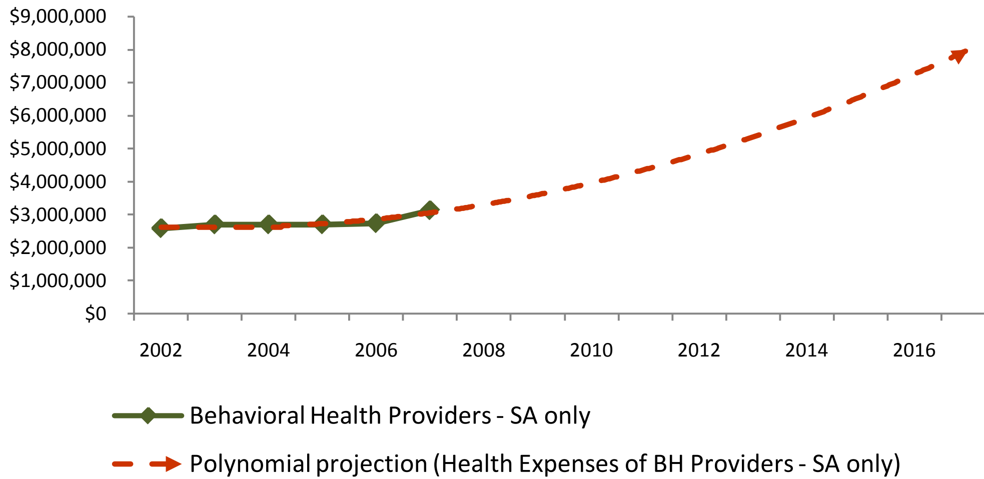
	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2017
Olympic Center - Preston	1,274,000	1,325,000	1,334,000	1,328,000	1,403,000	1,347,000	1,440,000	1,480,000	1,851,000	NP	NP
So Others Might Eat	NR	NR	NR	1,253,000	1,293,000	1,350,000	1,258,000	1,253,000	1,278,000	NP	NP
Total	$1,274,000	$1,325,000	$1,334,000	$2,581,000	$2,696,000	$2,697,000	$2,698,000	$2,733,000	$3,129,000	$3,297,704	$7,993,658

Note: NR indicates not reported. NP indicates not projected.
Source: West Virginia Healthcare Authority Annual Reports

Table 11 shows the expenses reported by the two providers. The expenses showed upward trend for the Olympic Center whereas some fluctuations were observed for So Others Might Eat. Polynomial projections with a power of 2 fitted the total for both providers best. Hence, projections were made from FY 2008 to 2017 in Table 11 using data from FY 2002 to FY 2007, when both providers reported

their cost. Based on the projections, the cost of substance abuse related care in this category is expected to be close to $8 million in 2017!

Chart 4: SA Cost for Other Behavioral Health Providers



Other Behavioral Health Service Providers –Focused on Substance Use Treatment and other Services

Apart from the Olympic Center-Preston and So Others Might Eat, there are 96 other behavioral health service providers in West Virginia. Some of these provide some substance abuse treatment services in addition to mental health, counseling, case management, and other services. This study used a survey by the Substance Abuse and Mental Health Services Administration (SAMHSA)) (2009) to identify these 12 behavioral health providers that offer substance abuse treatment among other services. It is important to point out that not every provider responded to the survey. Therefore, the estimates in this section are conservative because they may not include every behavioral health service provider who offers some substance abuse treatment in addition to other behavioral health service in West Virginia.

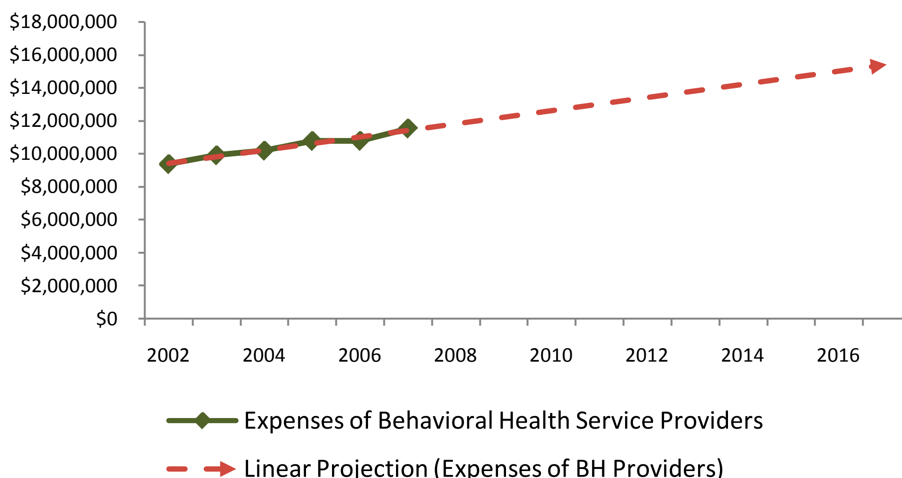
West Virginia Health Care Authority provided the revenue and expense data for these 12 providers from 1999 to 2007. The expenditures for the 12 identified providers were summed together for each year. Because some of these providers also receive funding from the Substance Abuse Prevention and Treatment Block Grant (SAPTBG), the corresponding annual SAPTBG allocation for treatment and the state matching funds were deducted from the total expenses to prevent double counting (Table 12). The results represent the total expenses that the identified providers had from 2002 to 2007; the data for 1999 to 2001 were not included because there was no SAPTBG data for those years.

Only some proportion of these resulting expenses are relevant because these facilities provide other behavioral health services outside of substance abuse. Expenditure estimates by Mark et al. (2005) was used to obtain the expenses that were substance abuse related for the 12 providers. Mark et al. (2005) reported that $1.4 billion of the $15 billion generated in revenue by behavioral health providers in 2001 was for substance abuse treatment services. Therefore, this report estimated that 9.2% of the expenses

of behavioral health providers could be attributed to substance abuse treatment. Thus, behavioral health providers spent an estimated $11 million for providing substance abuse treatment services in 2007 (Table 12); this was about a 30% increase from the $9 million spent in 2002. Using linear projection, this study estimated that the 12 behavioral health service providers would spend a total of $15 million in 2017 to provide substance abuse related care (Chart 5)!

Table12: Substance Abuse Related Expenses for Other Behavioral Service Providers in West Virginia

Facility	2002	2003	2004	2005	2006	2007	2008	2017
Appalachian Community Health Ctr Inc	$4,850,000	$4,595,000	$4,809,000	$5,085,000	$4,701,000	$4,784,000	NP	NP
EastRidge Health Systems	$7,294,000	$10,692,000	$9,223,000	$8,760,000	$7,357,000	$7,339,000	NP	NP
FMRS Health Systems Inc	$11,305,000	$10,772,000	$9,169,000	$8,907,000	$9,518,000	$10,258,000	NP	NP
HealthWays Inc	$6,051,000	$6,422,000	$7,263,000	$8,650,000	$8,376,000	$8,666,000	NP	NP
Logan/Mingo Area Mental Health Inc	$5,929,000	$5,615,000	$6,025,000	$6,721,000	$7,356,000	$6,815,000	NP	NP
Potomac Highlands MH Guild Inc	$5,519,000	$4,726,000	$4,523,000	$4,733,000	$4,937,000	$5,217,000	NP	NP
Prestera Center for MH Services Inc	$17,926,000	$26,051,000	$29,565,000	$29,546,000	$29,775,000	$31,097,000	NP	NP
Seneca Health Services Inc	$13,282,000	$12,956,000	$13,819,000	$15,069,000	$14,863,000	$16,736,000	NP	NP
Southern Highlands Comm MH Center Inc	$8,220,000	$7,559,000	$7,905,000	$9,023,000	$9,581,000	$10,313,000	NP	NP
United Summit Center	$11,029,000	$11,818,000	$11,609,000	$13,499,000	$14,222,000	$15,288,000	NP	NP
Valley Healthcare System	$12,388,000	$11,461,000	$13,233,000	$13,550,000	$12,064,000	$13,772,000	NP	NP
Westbrook Health Services	$12,592,000	$10,747,000	$11,273,000	$12,661,000	$12,950,000	$13,947,000	NP	NP
Total Revenue	$116,385,000	$123,414,000	$128,416,000	$136,204,000	$135,700,000	$144,232,000	NP	NP
SAPTBG	$14,525,577	$15,752,538	$17,720,479	$19,123,025	$18,567,794	$18,937,843	NP	NP
Total Revenue - SAPTBG	$101,859,423	$107,661,462	$110,695,521	$117,080,975	$117,132,206	$125,294,157	NP	NP
Estimated Substance Abuse Treatment Expenses	$9,371,067	$9,904,855	$10,183,988	$10,771,450	$10,776,163	$11,527,062	$11,820,570	$15,415,782



Federal Qualified Health Centers

Federal Qualified Health Centers (FQHCs) were created to serve underserved areas or populations. The centers offer a sliding fee scale and provide comprehensive service. The centers also tend to be local, have non-profit status, have ongoing quality assurance programs, and have governing board of directors. In general, they provide care to low-income and medically underserved populations. The

centers provide services ranging from preventive health services, dental services, mental health and substance abuse services, transportation services necessary for adequate patient care, and hospital and specialty care on site or by arrangement with another provider. A more comprehensive list of the services they provide can be accessed from the Bureau of Primary Health Care's (1998) report.

As mentioned previously, FQHCs play important roles in providing low cost substance abuse related healthcare in West Virginia. The present study obtained data on the number of patients served and the number of patient visits for substance abuse services in the FQHCs from the Bureau of Primary Health Care Uniform Data System (Bureau of Primary Health Care, 2009). The data that were not online were obtained from the staff of the Health Resources and Service Administration. Table 13 shows the number of patients with primary diagnosis of drug- and alcohol-related diseases that were served by FQHCs. This number has increased by over 500% from 470 in 2000 to 3001 in 2007 (Table 13). If this trend continues, this study projects that over 7,000 patients with primary diagnosis of drug- and alcohol-related diseases would be served in 2017!

Table 13: Costs of Substance Abuse to Federally Qualified Health Centers

	1999	2000	2001	2002	2003	2004	2005*	2006*	2007*	2008	2017
Number of Patients											
Alcohol-Related	N/A	237	253	281	1166	906	1512	1754	1905	2213	4636
Drug-Related (excluding tobacco)	N/A	233	194	226	617	369	932	1010	1096	1227	2511
Total	**N/A**	**470**	**447**	**507**	**1783**	**1275**	**2444**	**2764**	**3001**	**3440**	**7147**
Number of Patient Visits											
Alcohol-Related	N/A	785	1330	1194	3171	2685	3549	5619	5250	6123	12474
Drug-Related (excluding tobacco)	N/A	883	769	782	1839	1995	3036	3546	3891	4335	8819
Total	**N/A**	**1668**	**2099**	**1976**	**5010**	**4680**	**6585**	**9165**	**9141**	**10458**	**21294**
Average Cost Per Medical Visit	N/A	$88.00	$89.00	$94.00	$96.00	$94.00	$94.00	$102.00	$106.00	$105.50	$125.00
Total cost of substance abuse services in FQHCs	**N/A**	**$146,784**	**$186,811**	**$185,744**	**$480,960**	**$439,920**	**$618,990**	**$934,830**	**$968,946**	**$1,103,319**	**$2,661,750**

Source: West Virginia roll up reports from the Uniform Data System (UDS), US Department of Health and Human Services

This report used the product of the number of patient visits and the medical cost per visit to estimate the cost of patients receiving services at the FQHCs. Like the number of patients, the number of patient visit has also increased significantly over the years. There were 1,668 substance abuse related patient visits in 2000 whereas there were 9,141 visits in 2007 (Table 13). Based on current trends, the number of patient visits was projected out to be 21,294 in 2017!

These increases were captured in the cost of substance abuse related patient visits which was obtained from the product of the total substance abuse patient visits and the average cost per medical visits; both indicators were provided in the Uniform Data System (UDS) reports. It is important to point out that the costs reported in this report are rather conservative as they do not include the cost for services like x-rays, laboratory work, prescription drugs, enabling services such as transportation, etc., that may have been used by patients with drugs or alcohol-related diseases. In addition, drug- and alcohol-related diagnoses could be a secondary diagnosis in patients with primary diagnosis of mental health related disorders. With these caveats in mind, this report estimates that the cost of providing substance abuse related care increased from slightly above $100,000 in 2000 to close to $1 million in 2007, a 560%

increase in 7 years! Persistence of current trend would result in this cost more than doubling to nearly $3 million by 2017!

Conclusion

The picture of the financial burden of substance abuse to the WV healthcare system is indeed quite grim. This report estimates that drug and alcohol use cost West Virginia more than $116 million in 2007. If urgent actions are not taken, the cost could easily increase to more than $201 million in 2017! These estimated costs of drug and alcohol use to the healthcare sector are quite conservative, because this report focuses only on direct cost. Indirect cost of injuries to innocent parties by substance users and illness not directly due to substance use but that are complicated or extended due to substance use were not estimated.

In addition, although this report attempted to include every drug and alcohol abuse healthcare provider group in West Virginia, it is likely that some groups were excluded. In particular, there were limited data on private behavioral health providers in facilities that are not licensed or certified to provide substance abuse treatment by the state substance abuse agency. Further, some providers might have been excluded even among the groups included in this report.

In spite of the conservativeness of these estimates, it is apparent that drug and alcohol use place a huge financial burden on West Virginia. The state can just not afford to do nothing; drastic and urgent actions are needed. More importantly, a comprehensive approach including prevention, early intervention, treatment, and recovery, is needed as advocated by the West Virginia Partnership to Promote Community Well-being (2008).

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