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ABSTRACT

Understanding the cost of resources used in substance abuse treatment is of critical concern to policymakers, payers, and providers of care. The Alcohol and Drug Services Study (ADSS) was performed from 1996 to 1999. ADSS is a national study conducted in three phases to collect representative data on the characteristics of substance abuse treatment facilities, clients in treatment, post-treatment client status, and financing of care in the specialty substance abuse treatment sector. The purpose of the ADSS cost study was to provide a detailed data file and national estimates for cost, revenue, counseling activities, and staffing collected from a nationally representative sample of substance abuse treatment facilities. This report provides a detailed description of the methods used in the ADSS cost study, along with findings regarding key cost variables important to understanding the use of resources in substance abuse treatment. Four appendixes contain the ADSS Data Review Worksheet, the Phases I and II Questionnaire Data Summary Table, Internal and External Data Estimates, and Variance Estimation of Ratio Estimators. (Contains 16 tables and 6 figures.) (GCP)

Analytic Series: A-20

The ADSS Cost Study: Costs of Substance Abuse Treatment in the Specialty Sector

DEPARTMENT OF HEALTH AND HUMAN SERVICES
Substance Abuse and Mental Health Services Administration
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Substance Abuse and Mental Health Services Administration (SAMHSA) Office of Applied Studies

The Office of Applied Studies (OAS) serves as a focal point for data collection, analyses, and dissemination activities on the incidence and prevalence of substance abuse, the distribution and characteristics of substance abuse treatment facilities and services, and the costs and outcomes of substance abuse treatment programs. Both National and State-by-State data are available. Three major surveys provide information used by OAS:

- **National Household Survey on Drug Abuse (NHSDA).** The NHSDA provides information on the prevalence of substance use in the population, and the problems associated with use. The survey collects information on the sociodemographic characteristics of users, patterns of use, treatment, perceptions of risk, criminal behavior, and mental health. Since 1999, the NHSDA sample has been designed to provide State-level estimates, based on 70,000 respondents per year.
- **Drug Abuse Warning Network (DAWN).** The DAWN obtains information on drug-related admissions to emergency departments and drug-related deaths identified by medical examiners.
- **Drug and Alcohol Services Information System (DASIS).** The DASIS consists of three data sets (I-SATS, N-SSATS, and TEDS) developed with State governments. These data collection efforts provide National and State-level information on the substance abuse treatment system.

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Substance Abuse and Mental Health Statistics

www.DrugAbuseStatistics.samhsa.gov

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The ADSS Cost Study: Costs of Substance Abuse Treatment in the Specialty Sector

DEPARTMENT OF HEALTH AND HUMAN SERVICES
Substance Abuse and Mental Health Services Administration
Office of Applied Studies

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July 2003

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1. Introduction

1.1 Purpose of the ADSS Cost Study

Understanding the cost of resources used in substance abuse treatment is of critical concern to policymakers, payers, and providers of care. Federal and State policymakers are interested in cost-effective allocation of limited funds and in developing efficient financing structures to deliver substance abuse treatment services. State agencies, Medicaid, and managed behavioral health organizations allocate resources among types of care. Substance abuse treatment organizations are oriented toward producing services efficiently, setting appropriate charge rates, and negotiating contracts with managed care organizations. Each of these decision makers can use improved information about the costs of substance abuse treatment to better serve patients receiving treatment.

The Alcohol and Drug Services Study (ADSS) was performed from 1996 to 1999. ADSS is a national study conducted in three phases to collect representative data on the characteristics of substance abuse treatment facilities, clients in treatment, post-treatment client status, and financing of care in the specialty substance abuse treatment sector. This sector includes freestanding substance abuse treatment centers, methadone maintenance clinics, and other facilities that primarily serve persons with substance abuse problems.[1] Phase I of ADSS surveyed a nationally representative set of 2,395 treatment facilities by telephone. Phase II conducted in-person interviews with administrators regarding revenues, costs, and staffing, and it analyzed a client record abstraction at a subset of 280 facilities. Phase III conducted follow-up interviews with a sample of clients for whom records were abstracted. ADSS data are an important aid in understanding the organization of treatment, cost and availability of treatment services, characteristics of the client population, and managed care contract arrangements.[2]

The purpose of the ADSS cost study was to provide a detailed data file and national estimates for cost, revenue, counseling activities, and staffing collected from a nationally representative sample of substance abuse treatment facilities. A new, more accurate cost collection strategy was developed for this study and is described in the following steps.

First, cost, revenue, personnel, client volume, and counseling activity data were collected from a sample of facilities as part of Phases I (2,395 facilities) and II (280 facilities) of ADSS. Although hospital inpatient facilities were sampled and included in the larger ADSS Phase I facility telephone survey, they were excluded from the Phase II site visit data collection in order to sample more facilities that better represented the predominant types of care.[3] After data collection was completed, an intensive facility callback process was undertaken to review cost,

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[1] The types of facilities that define the sector coincide with the sampling strata used in the study: hospital inpatient, non-hospital residential, outpatient-predominantly methadone, outpatient-nonmethadone, and combined types of care. For the outpatient, non-methadone type of care, the sample was further stratified to reflect whether or not facility clients were almost exclusively alcohol abusers. A seventh stratum was included for facilities whose type of care could not be determined based on existing information at the time of sampling. Types of facilities excluded from the ADSS sampling frame were halfway houses without paid counselors, solo practitioners, correctional facilities, Department of Defense and Indian Health Service facilities, and facilities that were prevention or intake and referral only.

[2] The documentation and data files for ADSS can be found at the following website: http://www.icpsr.umich.edu:8080/ABSTRACTS/03088.xml?format=SAMHDA-DISPLAY. Two documents are of particular interest: Codebook, Part 2: Phase II, Administrator Interview (filename: cb3088p2.pdf.gz) and Phase II, Administrator Interview Questionnaire (Part 2) (filename: qu3088p2.pdf.gz).

[3] However, 13 of the 280 facilities in Phase II had a hospital inpatient unit in combination with an eligible residential or outpatient unit. The cost data were collected for these 13 hospital units, but they were not representative of all hospital facilities nationwide. As a result, they were excluded from the cost analysis.

personnel, services, and client data submitted by these facilities.[4] This callback process began in May 1998 and was completed in September 1999. Staff used an innovative spreadsheet data audit instrument developed by Capital Consulting Corporation (CCC) to simultaneously analyze and update the data file on each facility during the callback process. The instrument incorporates a series of reliability checks to aid in obtaining the most accurate data possible (Zarkin et al., 1995).

1.2 Outline of the ADSS Cost Report

This report provides a detailed description of the methods used in the ADSS cost study, along with findings regarding key cost variables important to understanding the use of resources in substance abuse treatment. This report contains the first findings from the rich ADSS cost data base; much more analysis remains to be done. The first section of the report provides an overview of methods used in prior studies to estimate substance abuse treatment costs and describes the need for a more accurate and efficient way to collect treatment cost data in large national studies.

The second section describes the methods used in the ADSS cost study to verify data collected in the ADSS. These methods involve the application of a computerized data audit instrument, a spreadsheet workbook used to enter and review selected questionnaire data from Phases I and II of the ADSS.

The third section discusses data quality control analyses. Analyses of the distribution of data sources for key questionnaire variables collected in ADSS are discussed. These analyses indicate that a standard questionnaire administration is insufficient for collecting accurate substance abuse treatment cost and revenue data.

The fourth section discusses the ADSS cost study findings. Three types of cost measures are examined: unit cost estimates, personnel costs, and national estimates. Mean unit cost measures such as "cost per admission," "cost per enrolled client day," "cost per visit," and "cost per counseling hour" are presented for three types of care: nonhospital residential, outpatient methadone, and outpatient nonmethadone treatment. Personnel cost analyses include cost per counseling hour, mean fringe benefit rates, mean hourly personnel rates, the proportion of personnel costs to total facility costs, and the proportion of personnel category costs to total personnel costs and are presented for all three types of care. National cost-adjusted estimates for the three types of care are developed by considering the estimated point prevalence client count for each type of care and the estimated cost per enrolled client day.

Section 5 discusses results and the implications for estimating substance abuse treatment costs.

[4] The Phase II questionnaire can be found at the following website: http://www.icpsr.umich.edu:8080/ABSTRACTS/03088.xml?format=SAMHDA-DISPLAY: Phase II, Administrator Interview Questionnaire (Part 2) (filename: qu3088p2.pdf.gz).

1.3 Previous Methods

The task of collecting and analyzing cost data in substance abuse treatment is complicated by a lack of standard methods of indirect cost allocation[5] and poor record keeping or management information systems. As a result, cost data vary in quality and reliability. To better understand the economics and financing of substance abuse treatment services, several cost analysis methods have been developed over the past decade to capture improved data on direct and indirect substance abuse treatment costs and revenues. These include the Drug Abuse Treatment Cost Analysis Program (DATCAP) (French, Dunlap, Zarkin, McGeary, & McLellan, 1997) and CCC's Cost Allocation Methodology (CCC, 1993).

DATCAP is a comprehensive 34-page cost analysis survey instrument that can be applied to all types of substance abuse treatment providers. This extensive survey can be customized for individual treatment settings and is structured to capture improved data on a facility's total resource use. The survey requires an extensive inventory of information on revenue data, client volume, personnel counts and rates, supply and material costs, contracted services, building and facility costs, and detailed information regarding equipment use and costs. The model attempts to estimate both accounting and economic costs and to generate average cost estimates. This survey allows for a detailed audit at the treatment site level and is feasible for large samples of substance abuse treatment providers. DATCAP is an economic approach to measuring costs.

CCC's Cost Allocation Methodology, in contrast to DATCAP, is an accounting-based model. Financial data are collected, analyzed, and presented in accordance with generally accepted accounting principles (GAAP). Data are collected and analyzed on-site at facilities by professional accountants. CCC has developed tools for collecting and calculating actual lengths of stay, admissions, discharges, and treatment staff services and hours. Furthermore, the firm has developed data validation procedures to test the accuracy of provider-supplied statistics. CCC's model produces for each facility average cost estimates including "cost per client," "cost per admission," and "cost per day." The CCC model is highly detailed and requires approximately 12 hours of on-site data collection and validation, 24 hours of analysis time, and 4 hours of quality assurance review, totaling 40 hours of work per site. This highly intensive method is not feasible to apply to large-scale nationally representative data collection.

CCC's experience with the Cost Allocation Methodology served as the basis in developing the analysis/telephone callback techniques and data audit instrument implemented in the ADSS cost study. From their experience in examining cost data in substance abuse treatment facilities, CCC was able to indicate which benchmark variables would be most important to include in the ADSS data audit instrument. These variables include the unit cost variables indicated above plus information pertaining to personnel, counseling, and total facility costs. CCC also provided consultation and training for staff involved in the ADSS cost study to communicate clearly and effectively with substance abuse treatment facilities about the variables of interest.

1.4 Need for an Efficient Strategy to Capture Cost Data

To capture substance abuse treatment cost data from a nationally representative sample, the ADSS cost study used the Cost Allocation Methodology to obtain accurate data. The methodology depends upon a computerized data audit instrument. This instrument was used in

[5] Indirect cost allocation is the process of assigning costs of support services and personnel to client care. The task of collecting and analyzing cost data in substance abuse treatment is complicated by the lack of a standardized reimbursement system for substance abuse treatment services. These services are generally publicly funded, and thus a substance abuse treatment organization has no need to develop the cost of services beyond the program level. Substance abuse treatment organizations often maintain and report expenditures at an aggregate level of care such as residential or outpatient services.

conjunction with an intensive facility callback process based on data collected in Phases I and II of ADSS from a sample large enough to be stable and representative. The next section addresses in detail the methods of the ADSS cost study.

2. Data Verification Methods of the ADSS Cost Study

2.1 Study Design

The ADSS cost study methods involved a multistage data collection and verification process. Initial data were collected through the ADSS Phase I and Phase II surveys from 1996 to 1999. Phase I was a telephone interview with the facility directors of a national stratified probability sample of approximately 2,395 substance abuse treatment facilities. The questionnaire was mailed to the facility 2 weeks prior to the interview to allow the facility time to collect the information. Follow-up telephone calls were done as needed. This phase of the study was conducted between December 1996 and June 1997. Phase II included site visits to a subsample of 280 of the Phase I facilities for a personal interview with the facility director and client record abstraction for a sample of over 6,000 clients from these facilities. This phase of the study was conducted between August 1997 and April 1999. For each facility, information was obtained on program treatment type (hospital inpatient, nonhospital residential, outpatient nonmethadone, and outpatient methadone), costs, clients served, and services provided. More detailed information on the facility selection and data collection procedures is presented in the citations in the second footnote. Facilities offering only hospital inpatient treatment, although included in the ADSS Phase I survey, were excluded from Phase II and the cost study analysis for the reason cited in the third footnote (see also footnote 1 in Table 2.2).

The 280 substance abuse treatment facilities included in Phase II offered one or more types of care (i.e., were single or multiple modalities). Table 2.1 provides a distribution of types of facilities in the ADSS cost study, and Table 2.2 provides the distribution of types of modalities.

Table 2.1 Distribution of Sample Facilities Responding to ADSS Phase II Cost Study

Type of Facility	Sample Size
Single Modality	238
Multiple Modality	42
Total	280

Table 2.2 Distribution of Modalities in the 280 Sample Facilities

Type of Care (Modality)	Sample Size
Hospital Inpatient	13
Nonhospital Residential	48
Outpatient Nonmethadone	222
Outpatient Methadone	44
Total Modalities	327
Eligible Modalities[1]	314

[1] The number of eligible modalities is equal to 327-13 (Inpatient units) = 314. Facilities with hospital inpatient care only and hospital inpatient units in multiple modality facilities were excluded from the cost study.

To obtain more meaningful results, most analyses for the ADSS cost study were conducted at the modality or type of care level. The ADSS cost study was governed by the sampling universe from which facilities were selected. A sampled "facility" could be one of several levels in the treatment system, including a type of care. The ADSS cost study measured the costs of the sampled facility and, if it covered several types of care or modalities, then the cost study callback procedure broke the costs and activities down by type of care. Moreover,

facilities vary in their reporting of financial data. Facilities are generally able to distinguish costs between residential and outpatient services. If the questionnaires had attempted to obtain more detailed financial data, many facilities would have been unable to furnish accurate data. Facilities can readily aggregate data, but disaggregation requires considerably more effort than many facilities were willing to do, thus potentially reducing participation rates in the study. Data items for the facility were entered into a spreadsheet data audit instrument for analyses at the modality level. For example, unit costs per admission were identified in each of three types of care: outpatient nonmethadone, outpatient methadone, and nonhospital residential treatment.

Within the residential and outpatient nonmethadone samples, different subtypes of care were represented. For example, residential treatment units may include both detoxification and rehabilitation services. Moreover, outpatient nonmethadone treatment units may include a mixture of intensive and regular outpatient treatment. However, data were not analyzed for these more specific types of care.

The cost analysis and data validation efforts began after the Phase II data collection. The data review worksheet or audit instrument was designed to compare Phase I versus II data for consistency, and validate both cost and statistical data. During an initial review of Phase I and Phase II data, the cost study analysts sought to identify missing data and inconsistent data. Subsequently, staff recontacted facility administrators through an intensive facility callback process to make an additional attempt to collect missing data and to verify specific data items that appeared inconsistent through the data audit analysis. The only callbacks involving Phase I data included facilities with Phase II cost data. The Phase I data were used to check consistency with Phase II data. Upon final review with facility officials, variables were recorded and described in the spreadsheet file as the most accurate data available. The source of updated information was noted. Upon complete review and updating of each facility record, data were transferred to the final ADSS cost study data file for research analyses.

Time between the two phases of ADSS data collection was 6 to 12 months. The cost study relied primarily on Phase II data. Except for a few items, the Phase I cost data were not validated nor extensively checked for internal consistency.

The analysts found that 96.0 percent of the sample of facilities required a callback for at least one variable in question and, of this group, 99.7 percent of facilities assisted in further clarifying these data inconsistencies.

2.2 Data Review Worksheet

The data review worksheet is a spreadsheet workbook designed to analyze specific cost, revenue, staffing, client volume, and counseling data reported in Phases I and II of ADSS. A copy of the data review worksheet is provided in Appendix A. The workbook includes five data entry pages, where data pertinent to the cost study from the original ADSS questionnaires were entered, and five analysis pages that include formulas linking to the data entry worksheets for further review.[6] Each questionnaire variable included on the data review worksheet has an associated data source identifier that serves as an indicator of the final source of data entered into the cost study file (e.g., data originally supplied by facility director, data revised by facility director). This information helps identify which variables are reported most reliably by facility directors in the original questionnaire. The analysis pages also include a series of ratios that serve as key analysis variables in the study. These ratios enabled comparison of data from each

[6] A complete list of all specific questionnaire variables in the ADSS cost study is in Appendix B.

facility to expected industry norms identified through CCC's previous site visit research.[7] ADSS cost analysts were trained by Robert Bennett of CCC to identify inconsistencies for discussion with facility officials. Inconsistencies could immediately be identified as deviations from expected ratios and reported to facility officials for further review. These procedures were designed to improve the internal consistency of data reported by sampled substance abuse treatment facilities.

The specific data entry items, the primary key analysis ratios, and expected data ranges varied by data variable from 25 to 80 percent. The ranges developed were used as data screening tools and for the cross data variable validation process. Many of the initial questionnaires had missing data variables. These screening ratios were developed to inquire about submitted data that did not appear within normal limits. The study attempted to minimize the number of facility callbacks. The subsequent sections present more detailed information on the ranges.

2.2.1 Questionnaire Variables

Data items chosen for the ADSS cost study include client volume, total costs, total revenues, staffing, and information on individual and group counseling. These variables were necessary to derive estimates of the unit costs of substance abuse treatment, including cost per admission, cost per client day, cost per visit, and cost per counseling hour. Table 2.3 shows the questionnaire variables from Phases I and II of ADSS entered into the data audit spreadsheet workbook. Phase II involved a more detailed collection of client services and other data pertaining specifically to individual and group counseling sessions received by clients and personnel costs borne by the sampled substance abuse treatment facility. Three variables collected as part of Phase I were added to the cost study data audit spreadsheet midway through the cost study verification process and were therefore not verified with the facility: "Dollar Amount or Percentage of Costs Attributed to Employee Personnel," "Dollar Amount or Percentage of Costs Attributed to Other Personnel (including consultants and other personnel)," and "Dollar Amount or Percentage of Costs Attributed to Non-Personnel." There is less confidence in the reliability of these three measures because they were not subject to rigorous reliability checks.

2.2.2 Source Identifiers

Each questionnaire variable entered into the data audit instrument has an associated data source identifier. The source identifier indicates the final accepted source of data entered into the substance abuse treatment facility's cost study spreadsheet workbook.

The following three source identifiers were used when dealing with data received directly from a facility during the study:

- PO – Provider Original (This includes data as reported in Phase I or II of ADSS with no change upon analysis or verification.)
- PR – Provider Revised (This includes revised data via telephone callback with a facility official.)
- PD – Provider Documentation (This includes data as submitted to cost study analysts from a facility official, e.g., financial statement, etc.)

[7] CCC has collected cost data on over 400 different programs. With few exceptions (fewer than a dozen), the majority are public-sector programs. The majority of these were selected by the Substance Abuse and Mental Health Services Administration (SAMHSA), were publicly funded, and offered services to those clients targeted by SAMHSA. If data values for a facility were not within the ranges for ratios developed for the data review worksheet, study staff reconfirmed selected data variables via a phone follow-up.

Table 2.3 Questionnaire Variables Entered from Phases I and II

Variables	Phase I	Phase II
1. Point Prevalence	✓	✓
2. Total Admissions	✓	✓
3. Total Discharges	✓	✓
4. Administrator-Reported Average Length of Stay	✓	✓
5. Residential Bed Capacity (if applicable)	✓	✓
6. Total Costs	✓	✓
7. Total Revenues	✓	✓
8. Dollar Amount or Percentage of Costs Attributed to Employee Personnel[1]	✓	
9. Dollar Amount or Percentage of Costs Attributed to Other Personnel[1]	✓	
10. Dollar Amount or Percentage of Costs Attributed to Non-Personnel[1]	✓	
11. Individual Counseling Sessions Per Client Per Week		✓
12. Group Counseling Sessions Per Client Per Week		✓
13. FTE and PTE Count, by Type of Personnel		✓
14. FTE and PTE Hourly Rates, by Type of Personnel		✓
15. FTE and PTE Hours Worked Per Week, by Type of Personnel		✓
16. Average Fringe Rate for All Personnel		✓

[1] Variable added during the verification and therefore not verified with the facility.

Note: FTE is full-time equivalent; PTE is part-time equivalent.

The following two source identifiers are based on two methods used during the ADSS cost study to estimate data unreported or unidentifiable by facility administrators or staff:

- IE – Internal Estimate (Estimates are based on other data collected from the facility.)
- EE – External Estimate (Estimates are based on industry norms created by CCC in the Cost Accounting Methodology.)[8]

[8] See Appendix C for a detailed explanation of how internal and external estimates were applied.

2.3 Key Ratios and Analysis Variables

Key ratios and analysis variables were developed to compare data reported in both Phases I and II as well as to examine data collected within each phase.[9] The data audit instrument was developed to examine the questionnaire variables from these two perspectives to obtain the most accurate data possible. To compare data from Phases I and II, difference ratios were developed to represent the difference in values for a specific variable between Phase I and Phase II. For example, if a facility reported the number of admissions as 450 in Phase I and 485 in Phase II, the difference ratio would equal 7.78 percent, signifying a difference in admissions of about 8 percent. Consistent responses among the data collection values engendered confidence in the data, while large differences served as flags, indicating the need for a facility callback and further data verification. Comparisons within Phases I and II involve analysis ratios of cost per admission and cost per enrolled client day using three different measures of annual client volume, including point prevalence and length of stay, to estimate admissions and discharges. Similarly, ratios pertaining to phase-specific analyses either were accepted into the file record or prompted a facility callback. No value for a variable was entered into the spreadsheet workbook until the entire analysis for a substance abuse treatment facility was complete. An update or change of one value for a variable may have prompted reexamination of one or several related variables in the data set.

2.3.1 Comparisons of Phases I and II

Four main clusters of analysis ratios pertain to the comparison of data reported in Phases I and II of ADSS. These ratios are located in Appendix A in this report and are summarized in Table 2.4. Expected values and ranges were applied to each modality of treatment. The values used allowed for changes in facility structure and workload during the average 1-year interval between Phase I and Phase II of ADSS.

The first cluster of comparison ratios used for analyzing the differences between Phases I and II of ADSS pertains to differences in client volume as measured by the difference in point prevalence client counts (difference "a" in Table 2.4), the difference in reported annual admissions (difference "b"), and the difference in the average daily client count (difference "c"). Difference "c" is based on a formula using admissions and the administrator-reported average length of stay. All three client count values are summarized in the ratio "average client count difference," which is the mean difference in reported client volume. In the analysis, each specific comparison count difference or ratio was expected to be within 20 percent of the average client count difference. Values outside this range were marked for telephone verification with the facility.

The second cluster of comparison ratios pertains to differences in financial data as measured by the differences in total costs and the differences in total revenue. These two measures are summarized in a summary ratio titled "average financial difference," which denotes the mean difference in Phase I and Phase II reported costs and revenues. Given the linear relationship between program finances and client volume, the average financial difference was expected to be within 15 percent of the difference in client volume, summarized by the average client difference. Values outside this range were marked for subsequent investigation with the facility staff.

The third comparison ratio used for analysis of the differences between Phases I and II of ADSS was "difference in the administrator-reported average length of stay." As more substance abuse treatment programs shifted into the managed care market, there was a possibility for

[9] A complete list of all key ratios and analysis variables used in the ADSS cost study is in Appendix B.

Table 2.4 Four Main Clusters of Analysis Ratios Comparing Phase I and Phase II Data

Type of Data	Specific Phase I and II Ratios	Summary Ratios	Differences Requiring Verification
1. Client Volume	a = Difference in point prevalence client counts b = Difference in 12-month admissions c = Difference in average daily client count[1]	Average client count difference = (a+b+c)/3	Individual differences a, b, and c were expected to be within 20% of the average client count difference. Differences of 20% or greater were verified.
2. Financial Data	a = Difference in total costs b = Difference in total revenue	Average financial difference = (a+b)/2	The average financial difference was expected to be within 15% of the average client count difference. Differences of 15% or greater were verified.
3. Administrator-Reported Average Length of Stay[2] (ALOS)	Difference in ALOS	None	Differences in ALOS of 25% or greater were verified.
4. Personnel Costs	Difference in personnel costs as a percentage of total costs	None	Differences of more than 5 percentage points.

[1] Average daily client count = Annual admissions/(365/Average length of stay).

[2] The administrator-reported estimate of average length of stay (ALOS) used within the cost study analysis is not the final ALOS reported for ADSS. Client-specific length of stay based on a sample of client discharges in the ADSS Phase II client abstract study provides the final ALOS estimates by type of treatment in other ADSS reports. However, because those length-of-stay data cannot generate facility-specific averages needed in the cost study, the facility-level estimate made by the facility administrator was used in the cost study calculations.

changes in the average length of stay for clients between the two data collection periods. Differences of 25 percent or more were verified with the facility.

The fourth and final comparison ratio was analysis of personnel costs as a percentage of total treatment costs for a sampled substance abuse treatment facility. This ratio estimated the difference in the percentage of personnel costs as reported in Phase I versus Phase II. Up to a 5 percent difference was expected due to regular staff turnover.

2.3.2 Comparisons Within Phase I and Phase II

Additional ratios were incorporated into the data audit instrument to examine data collected within each phase. These ratios reflect the importance of understanding the relationship between client volume, financial data, staffing information, and counseling activity within a sample substance abuse treatment facility. The ratios internal to both data collection phases are summarized in Table 2.5. These ratios include two derived average daily client counts; three measures of occupancy based on the number of beds in nonhospital residential facilities; three measures of cost based on admissions, discharges, or point prevalence; and three measures of cost per enrolled client day.

Table 2.5 Ratios Used to Examine Data Collected Within Phase I and Phase II

Type of Data	Specific Ratios	Summary Ratios	Differences Requiring Verification
1. Point Prevalence Count Versus Average Daily Client Count (ADCC)	ADCC-admissions (A)[1] ADCC-discharges (D)[2]	Difference between the ADCC-A and the point prevalence count Difference between the ADCC-D and the point prevalence count	Differences of 20% or greater were verified.
2. Occupancy Rates (Nonhospital Residential Facilities Only)	ADCC-admissions/bed capacity ADCC-discharges/bed capacity Point prevalence Count/bed capacity	None	Occupancy rates below 70% or above 100% were verified.
3. Cost Per Admission Cost Per Discharge Cost Per Estimated Admission	Total costs/total admissions Total costs/total discharges Total costs/estimated admissions based on point prevalence[3]	None	Differences of 20% or greater among the three rates were verified.
4. Cost Per Enrolled Client Day	Cost per enrolled client day from admissions/ALOS Cost per day from discharges/ALOS Cost per day from point prevalence/ALOS	None	Differences of 20% or greater among the three rates were verified.

[1] ADCC-admissions (average daily client count using admissions) = Total 12-month admissions/(365/Average length of stay).

[2] ADCC-discharges = Total 12-month discharges/(365/Average length of stay).

[3] Estimated admissions based on point prevalence = Point prevalence × (365/Average length of stay).

The development of derived point prevalence or census counts, based on reported admissions and discharges, enabled analysts to understand the interaction between four primary utilization variables: admissions, discharges, point prevalence, and the average length of stay. Within a stable service delivery environment, the two derived point prevalence measures were expected to be reasonably close to the reported point prevalence. Allowing for some reporting and record keeping variability, along with possible changes in service delivery, values of the two "difference summary ratios" comparing the admissions and discharge derivatives to the actual point prevalence were expected to be less than 20 percent.

These point prevalence measures also were used in examining occupancy rates of residential facilities. Three occupancy measures (see Table 2.5) were established as part of the data audit instrument to further assess the reliability of the four primary client volume measures.

Again, assuming a stable environment, these variables were expected to be reasonably close to each other but should individually fall within a range of 70 to 100 percent occupancy.

Cost per admission and cost per enrolled client day were two additional types of ratios used in examining data reported within each phase. Cost per admission was developed as a ratio of total costs to three measures of client volume: admissions, discharges, or a derived client throughput measure developed from point prevalence and the average length of stay.[10] The cost per enrolled client day was in turn developed by taking each measure of cost per admission and dividing it by the average length of stay. These ratios assisted analysts to understand not only the relationship between the primary client volume measures but also provided insight into the relationship between client volume and total cost. These values were expected to be reasonably close within a stable environment, and any differences over 20 percent were discussed with facility staff.

2.3.3 Comparisons Within Phase II Only

More detailed data specifically regarding staffing and counseling activities were collected in Phase II than Phase I, so additional ratios internal to Phase II analyses were created in the data audit instrument. These ratios are presented in Table 2.6.

Table 2.6 Ratios Used to Examine Personnel and Counseling Data Specifically Collected Within Phase II

		Expected Range by Type of Care [1]		
Type of Data	**Specific Ratios**	**Residential**	**Outpatient**	**Methadone**
1. Personnel Costs	Proportion of personnel costs to total costs	55% - 75%	70% - 90%	55% - 75%
	Proportion of counselor costs to total personnel costs	50% - 100%	60% - 100%	35% - 55%
	Proportion of medical staff costs to total personnel costs	0% - 15%	0% - 10%	30% - 50%
	Proportion of administrative personnel costs to total personnel costs	20% - 40%	15% - 30%	20% - 30%
	Proportion of direct care costs to total personnel costs	60% - 80%	70% - 85%	70% - 80%
2. Counseling Services Data	Proportion of counseling hours received by clients to total counseling staff hours	65% - 85%		

[1] These ranges were developed by CCC and Brandeis. Some range values are 100% in order to include all treatment settings and staffing levels. For example, if a solo practitioner were to have been included, the 100% range value would have been necessary.

Two ratio clusters focusing on personnel costs and counseling services data were developed within the data audit instrument specific to Phase II. Five ratios were specific to personnel services, and one primary ratio was specific to analyzing counseling services data.

[10] Derived client throughput = Point prevalence × (365 days/Administrator-reported average length of stay).

Each ratio had an expected range by type of care, based on the experience of CCC's previous analyses of substance abuse treatment facility data.

The ratios pertaining to personnel services included the proportion of personnel costs to total costs, the proportion of counselor costs to total personnel costs, the proportion of medical staff costs to total personnel costs, the proportion of administrative personnel costs to total personnel costs, and the proportion of direct care costs to total personnel costs. This analysis provided a series of summary variables for assessing the distribution of personnel costs in a substance abuse treatment facility. According to CCC's cost accounting study, 55 to 75 percent of residential and methadone facility costs were likely to be attributed to personnel (including salaries and fringe benefits of full-time, part-time, and contract staff). For outpatient nonmethadone programs, the range was 70 to 90 percent. Personnel costs identified outside this range prompted analysts to inquire further with the facility about its overall distribution of costs.

Counselor costs were identified by obtaining the number of counselors within various categories identified by education level (e.g., master's, bachelor's, and nondegreed counselors), and by obtaining the average number of hours worked per week by counselors in each category along with their average hourly rates. Average fringe benefit rates were calculated for each facility as well. Counselor costs were expected to be the highest proportion of personnel costs, greater than 50 percent of personnel costs for residential facilities and greater than 60 percent of personnel costs for outpatient nonmethadone facilities. For methadone facilities, medical staff costs were expected to be equal to or greater than the proportion of counselor costs to total personnel costs. Administrative personnel were expected to represent 20 to 40 percent of residential total personnel costs, 15 to 30 percent of outpatient nonmethadone total personnel costs, and 20 to 30 percent of methadone total personnel costs. Direct service staff was expected to represent 60 to 80 percent of residential facility personnel costs, 70 to 85 percent of outpatient nonmethadone facility personnel costs, and 70 to 80 percent of methadone facility personnel costs.

Lastly, counseling services were analyzed by assessing the proportion of counseling hours received by clients to total counseling staff hours. On average, 65 to 85 percent of counseling staff time was expected to be attributed to client counseling services. Otherwise, cost study analysts would have inquired about the reported data represented in this ratio.

Analyzing Phase I and Phase II data from the two perspectives provided a solid framework for assessing the reliability of data collected from facilities. Changes in one set of variables often prompted further review of related data. A facility data audit analysis was considered complete only when the analysts were satisfied with their review of these primary analysis ratios.

2.4 Facility Callback Process

As previously indicated in this report, 96 percent of sample treatment modalities required a callback from the cost analysis team for at least one variable in question. As a result, it was imperative to develop an efficient, comprehensive strategy for entering the original ADSS Phase I and Phase II data into individual spreadsheet workbooks, conducting an initial review, summarizing the data in question for facility administrators to examine, and then contacting the facility over the telephone to discuss and finalize the data for entry into the main cost file.

Upon completion of the ADSS data collection, Phase I and Phase II questionnaires were sent to cost analysts for the ADSS cost study. Trained support staff first entered data into the data audit instrument and identified any missing data. One of the cost analysts then conducted an initial review of the data audit file, identified data inconsistencies as represented in the analysis ratios, and prepared a series of summary tables and brief paragraphs explaining the data in question for facility review. A telephone call was made to the facility to briefly summarize the

data in question and to set up a mutually convenient time to discuss the data review. The document was then faxed to the facility in preparation for a callback. Generally, the call was scheduled within a week of the initial fax, providing adequate time for facility officials to look over the data inconsistencies.

The analysis staff called the administrator at the agreed-upon time and worked directly over the phone with the data audit file within view. Ideally, the administrator discussed with the analyst the necessary updates to the file, allowing for further prompting by the analyst if necessary. Often, the analyst would be referred to additional administrative and clinical staff to clarify information. This entailed additional follow-up with facility officials.

Initially, the time spent entering data, analyzing and reviewing the data audit, and following up with facilities averaged about 10 to 12 hours per facility. After developing a more efficient approach, this time was reduced to approximately 4 to 5 hours per facility.

3. Data Quality Control Analysis

Given the complex data collection methods undertaken in the ADSS, it is important to assess the consistency of responses by facilities to the Phase I and Phase II surveys. Because the data audit instrument provided for analysis of variables in relationship to one another through formulas or ratios, as a single variable was checked, other variables that "related" to the variable in question also required further review. Given this multistage data collection process, all questionnaire variables were categorized by a "source identifier" in the cost file: provider original, provider revised, and provider documentation (see Section 2.2.2). Data quality control analyses of the source variables provided insight into which questionnaire variables were reported most reliably and which variables were updated most frequently during the callback process.

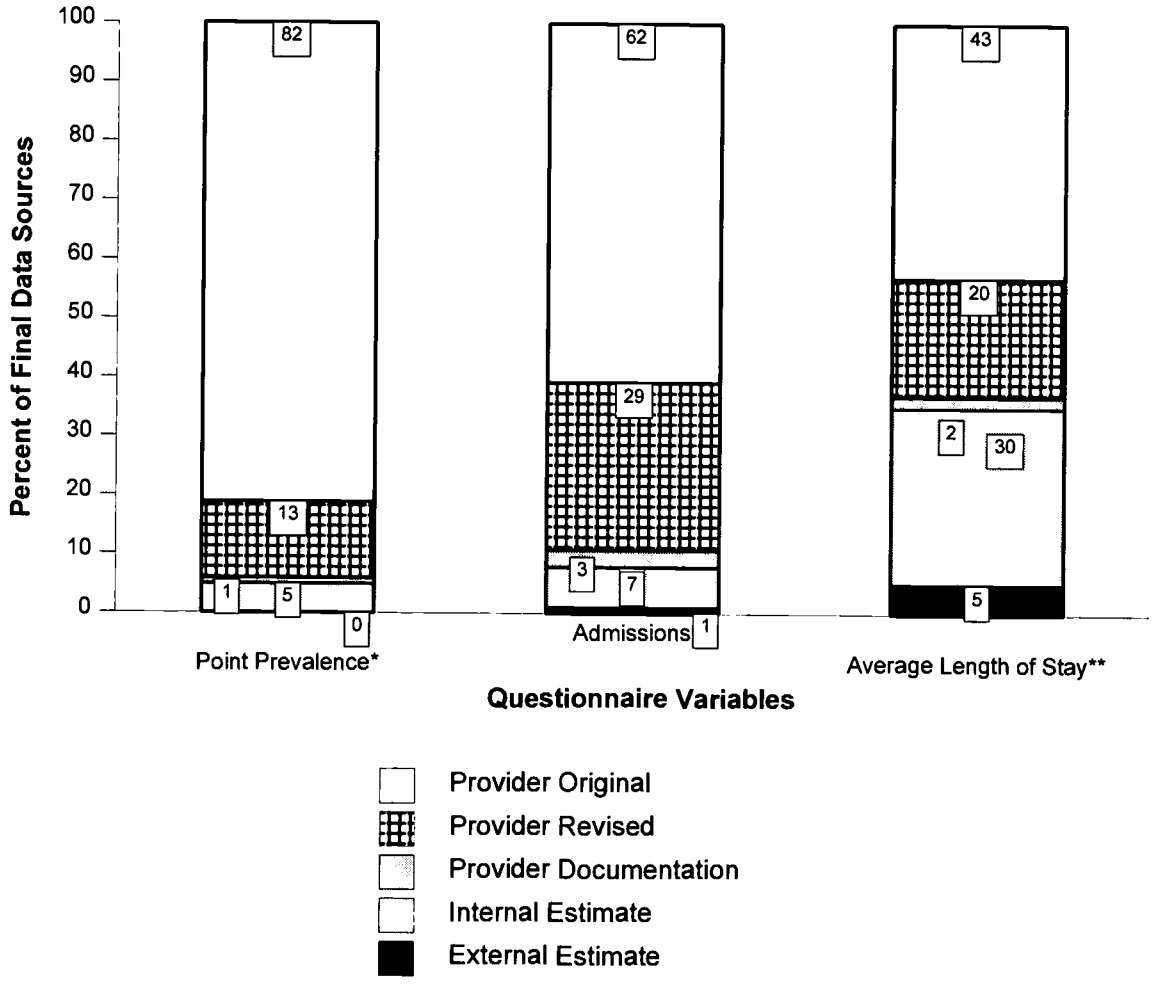
The distribution of source identifiers for six primary key Phase II questionnaire variables (point prevalence, admissions, discharges, the administrator-reported average length of stay, total costs, and total revenues) are presented below. They are presented in order of reporting reliability based on the distribution of source identifiers. Each distribution represents responses from all 314 treatment units included in the ADSS cost study.

Figure 3.1 shows the distribution of source identifiers for three key questionnaire variables: point prevalence, admissions, and the administrator-reported average length of stay. Among key client volume and financial data collected from facilities, these three variables maintained the highest percentage of final data coming from providers' originally reported information in the Phase II administrator interview. Point prevalence was the most reliable variable for facilities to report, with 82 percent of the final data coming from Phase II originally reported data. In contrast, Phase II admissions had 62 percent of final data coming from the original Phase II questionnaire, while the Phase II administrator-reported average length of stay had 43 percent of final data coming from this original source.[11]

All three variables had between 10 and 25 percent of final data coming from provider-revised data obtained from the facility callback process. A very small percentage of final data for all three variables (under 5 percent) was obtained through additional provider documentation. Internal and external estimates were used infrequently for both point prevalence and admissions variables, but the administrator-reported average length of stay had a high percentage (30 percent) of internal estimates. The use of internal estimates often was required to determine the final administrator-reported average length of stay because facility officials lacked confidence in reporting the average length of stay for clients. In this type of situation, the client volume data were used to develop an estimate of the average length of stay.

[11] In checking data on discharges, study staff asked facilities to consider a client "discharged" if she or he had received no services within the past 45 days. Estimated lengths of stay were based on other data variables contained within the questionnaire: staffing, admissions, discharges, and point prevalence. Estimates are based on these factors and CCC historical data for length of stay.

Figure 3.1 Key Phase II Variables: Point Prevalence, Admissions, and Average Length of Stay, by Final Data Source Distribution



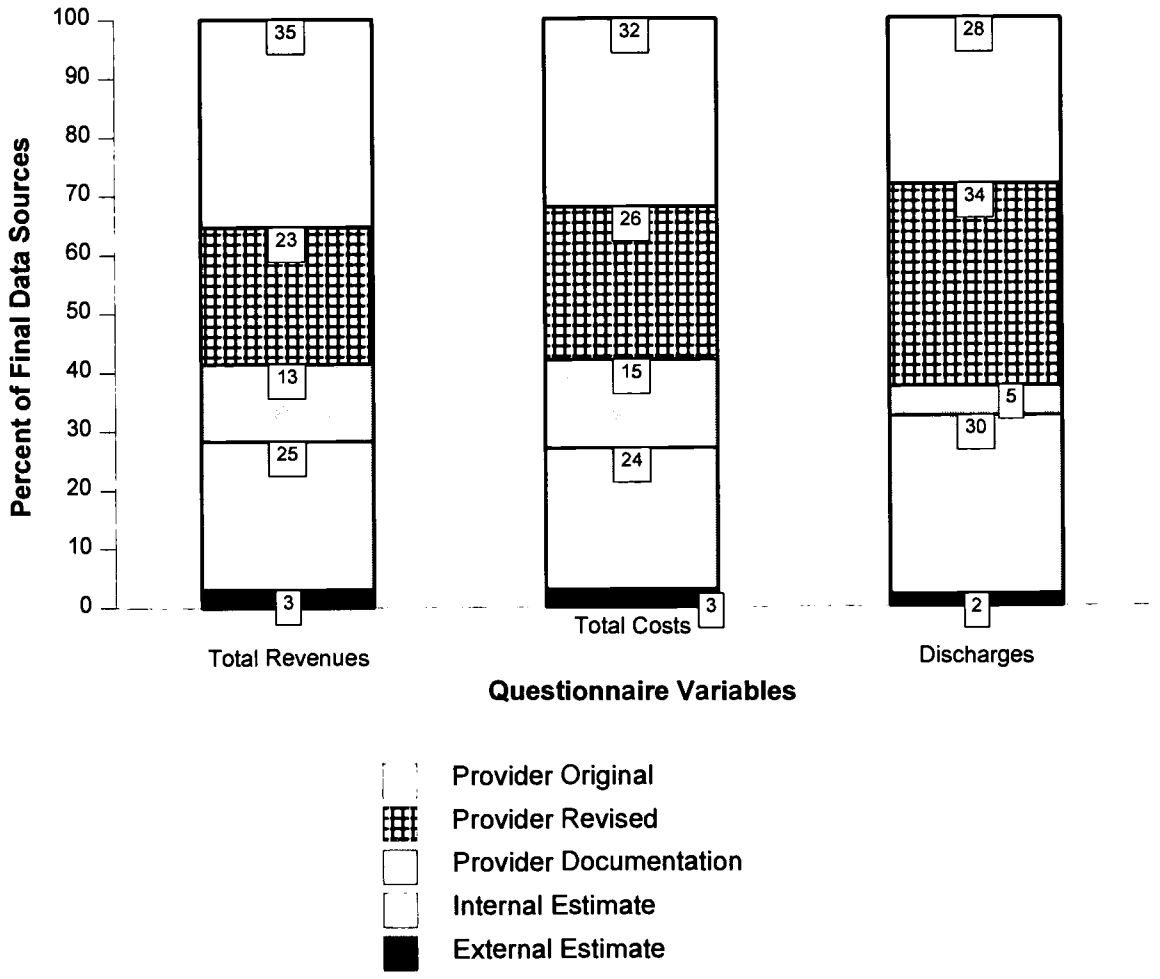
Note: Percentages may not sum to 100 due to rounding.

* External estimate for point prevalence is 0 percent.
** Administrator-reported average length of stay.

Source: Office of Applied Studies, SAMHSA, 1996-1999 Alcohol and Drug Services Study.

Figure 3.2 shows the distribution of source identifiers for three additional key questionnaire variables: total revenues, total costs, and discharges. All three variables had a lower proportion of final data items coming from the original Phase II questionnaire than the variables represented in Figure 3.1. Moreover, these variables generally had higher amounts of final data coming from administrator revisions made during the callback process. Discharge counts were the most difficult for facilities to report, with only 28 percent of the final data coming from Phase II originally reported data and 34 percent of the final data coming from facility callbacks. Total facility costs and revenues had the greatest percentage of final data coming from provider or facility documentation (15 and 13 percent, respectively). Most of this documentation was financial reports and fact sheets submitted by facilities during the callback process.

Figure 3.2 Percentage Distribution of Additional Key Phase II Variables: Revenues, Costs, and Discharges, by Final Data Source Distribution

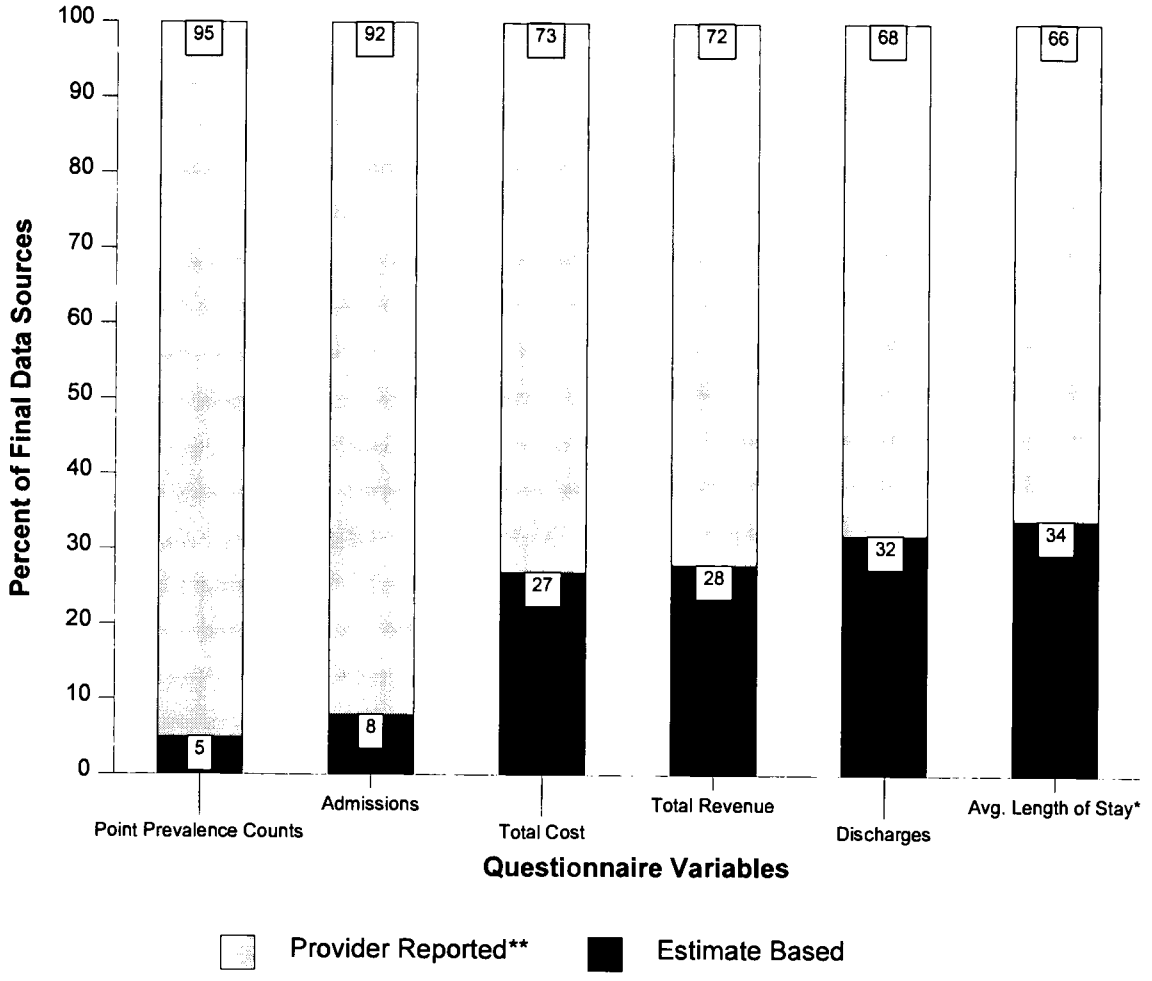


Note: Percentages may not sum to 100 due to rounding.

Source: Office of Applied Studies, SAMHSA, 1996-1999 Alcohol and Drug Services Study.

Figure 3.3 compares the use of provider-reported data and estimate-based data for obtaining the final source of data among the six key questionnaire variables. More than 90 percent of final data sources for point prevalence counts and admissions were from provider-reported data, with estimates used for 5 percent and 8 percent, respectively, of those estimates. Final data sources for total cost, total revenue, the number of discharges, and the administrator-reported average length of stay had higher estimate-based data, ranging from 27 percent of the total cost data to 34 percent of administrator-reported average length of stay. This high representation of internal estimates as the final source of data among several key questionnaire variables reflects the difficulty for substance abuse treatment program administrators to report these items accurately. This use of estimates for some variables also provides evidence of the importance of using a carefully designed data audit instrument to accurately develop estimates of variables based upon other, more reliable data provided by the facility.

Figure 3.3 Percentage Distribution of the Final Data Sources of Key Phase II Variables: Provider-Reported and Estimate-Based Proportions



* Administrator-reported average length of stay.
** Includes original provider-reported data, provider-revised data, and data from provider-supplied documentation.

Source: Office of Applied Studies, SAMHSA, 1996-1999 Alcohol and Drug Services Study.

4. Results of the ADSS Cost Study

Estimates of the cost of treatment resulting from the ADSS cost study fall into three categories: key unit costs, personnel costs, and national cost estimates. These cost data are key indicators useful for policymakers and participants in the delivery and financing of substance abuse treatment. All analyses were conducted using weighted Phase II sample data to produce national estimates.[12]

Section 4.1 provides national estimates of key unit cost variables, including cost per admission and cost per enrolled client day for nonhospital residential, outpatient methadone, and outpatient nonmethadone facilities. The mean cost per reported visit[13] also was analyzed for outpatient methadone and outpatient nonmethadone facilities, and the cost per documented visit[14] and cost per counseling hour[15] are reported for outpatient nonmethadone facilities.

Section 4.2 contains personnel cost estimates. This section also includes personnel analyses, important to understanding the distribution and cost of personnel services in substance abuse treatment. Personnel analyses include descriptive measures of fringe benefit rates, personnel cost proportions, and weighted analyses of hourly rates by staffing category across nonhospital residential, outpatient methadone, and outpatient nonmethadone facilities.

Finally, national cost-adjusted estimates are provided for all three types of care in Section 4.3.

4.1 Key Unit Cost Estimates

Five main unit cost variables were developed as a result of the ADSS cost study: mean cost per admission, mean cost per client day, mean cost per reported visit, mean cost per documented visit, and mean cost per counseling hour. These variables have been used consistently as benchmarks in other substance abuse treatment studies (see references) and have been found to provide useful information to policymakers, payers, and providers of care.

Total annual costs, the numerator in the mean cost calculations, include all costs or expenditures for the substance abuse treatment modality during the most recent 12-month reporting period. Facilities were instructed to report explicit costs (direct and indirect facility outlays and operating noncapital expenditures) as well as implicit costs (asset depreciation and the estimated market value of resources used free of charge, such as donated use of a building, by the treatment facility). Most facilities were able to report these latter costs accurately.

As indicated in the review of ratios contained in the data audit instrument, the unit variable "mean cost per admission" was measured using three primary client volume measures: annual admissions, annual discharges, and a derived annual throughput measure based on the point prevalence count. These three measures were studied for reliability, and in the final analysis, the annual admissions measure was found to be the best representative of reported client volume data in the study. The number of admissions was more accurately reported by

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[12] The documentation on weights can be found in the Codebook, Part 2: Phase II, Administrator Interview (filename: cb3088p2.pdf.gz) at the website cited in footnote 2.

[13] Reported visits were based on the number of visits reported in aggregate by the facility administrator.

[14] Documented visits were based on actual visits documented in individual client records in the Phase II client record abstract study.

[15] Counseling hours were based on administrators' report of the average number of counseling sessions per client per week.

facilities than the number of discharges, while the throughput measure was derived using the administrator-reported average length of stay, which required internal or external estimates for more than 30 percent of the facilities.

For the variable "cost per enrolled client day," three similar ratios were developed for analysis purposes. For final reporting of this unit cost variable, client days were calculated for each sampled substance abuse treatment facility based on the point prevalence count and the administrator-reported average length of stay. The point prevalence count was reported with high accuracy (82 percent based on original data provided by the administrator), while the administrator-reported average length of stay was the only estimate of days enrolled in treatment by facility. Note that, for outpatient modalities, "enrolled client days" included the entire estimated enrollment period, not just the days a client visited the facility. A separate variable, the "mean cost per visit," reflected only the days during which an outpatient client visited the facility.

"Mean cost per visit" was calculated in two ways. The "cost per reported visit" measure represented the average client counseling sessions based on the administrator's best estimate in the Phase II administrator interview. The "cost per documented visit" measure resulted from the mean number of visits calculated from documented client visits in client records sampled and reviewed in the Phase II client record abstract study.

"Cost per counseling hour" was calculated using an estimated total number of counseling hours provided by the facility during the year. This is the product of the administrator's estimate of the number of counseling sessions per client per week times 52 weeks per year times the point prevalence client count. Assuming individual sessions were approximately 1 hour in length, the cost per counseling hour equaled the cost of an individual session. The cost per group counseling hour was derived as the cost per counseling hour divided by the estimated mean number of clients in a group session.

To calculate nationally representative statistics, facility-level weights were applied to both the numerator (total annual costs), and denominators (annual admissions, client days, visits, or counseling hours) of each of these unit cost measures. Estimates were calculated using SUrvey DAta ANalysis (SUDAAN) statistical software, Release 8.0 (RTI, 2001). Furthermore, for each mean unit cost measure, a minimum value, maximum value, standard error (SE), and coefficient of variation (CV) were calculated. A detailed description regarding the derivation of the standard error for these unit cost variables is provided in Appendix D.

As indicated in Table 4.1, the mean cost per admission for residential care ($n = 48$ treatment modalities) was $3,132, with a standard error of the mean of $490 and coefficient of variation of 16 percent. The mean cost per admission for outpatient methadone treatment ($n = 44$ treatment modalities) was $6,048, with a standard error of the mean of $1,013 and coefficient of variation of 17 percent. The mean cost per admission for outpatient nonmethadone facilities ($n = 222$ treatment modalities) was $1,169, with a standard error of the mean of $81 and coefficient of variation of 7 percent. As indicated, the mean cost per admission for outpatient methadone facilities was found to be greater than that of residential facilities, while the cost per admission for outpatient nonmethadone facilities was the lowest among the three types of care. A likely explanation for differences in cost per admission among the three types of care is that clients in outpatient methadone treatment have a much longer average length of stay (an estimated 520 days for outpatient methadone care compared with 144 days for outpatient nonmethadone care and 45 days in nonhospital residential care, based on Phase II client record abstract data). Total costs for all facilities are presented to show how the mean cost per admission was calculated. (The final total costs, derived with a more accurate method based on combining enrollment days from the larger sample of Phase I facilities with detailed Phase II mean costs, are presented in Table 4.10 at the end of this chapter.)

Table 4.1 Estimated Cost Per Admission

Type of Care	Total Weighted Costs from Cost Study Facilities	Total Weighted Admissions from Cost Study Facilities	Mean Cost Per Admission	Minimum	Maximum	SE of the Mean	CV of the Mean, %
Nonhospital Residential (n = 48)	$2,232,147,300	712,643	$3,132	$308	$18,482	$490	16%
Outpatient Methadone (n = 44)	$789,160,362	130,472	$6,048	$2,109	$32,630	$1,013	17%
Outpatient Nonmetha-done (n = 222)	$2,515,070,858	2,151,694	$1,169	$188	$12,650	$81	7%
Total, All Facilities	$5,536,378,520	2,994,809	$1,849	-	-	-	-

Table 4.2 provides a summary of findings regarding cost per enrolled client day. The mean cost per enrolled client day for residential care (n = 48) totaled $62.10, with a standard error of the mean of $6.80 and coefficient of variation of 11 percent. The mean cost per enrolled client day for outpatient methadone treatment (n = 44) totaled $10.32, with a standard error of $0.90 and coefficient of variation of 9 percent. The mean cost per enrolled client day for outpatient nonmethadone facilities (n = 222) totaled $9.17, with a standard error of $0.75 and coefficient of variation of 8 percent.

Table 4.2 Estimated Cost Per Enrolled Client Day

Type of Care	Mean Cost Per Enrolled Client Day[1]	Minimum	Maximum	SE of the Mean	CV of the Mean, %
Nonhospital Residential (n = 48)	$62.10	$11.16	$348.85	$6.80	11%
Outpatient Methadone (n = 44)	$10.32	$5.57	$41.86	$0.90	9%
Outpatient Nonmethadone (n = 222)	$9.17	$1.18	$58.67	$0.75	8%

[1] Total costs divided by Phase II point prevalence count of clients divided by 365 days.

Variability in both "cost per admission" and "cost per enrolled client day" were attributed to the various subtypes of care represented in both the residential and outpatient nonmethadone facilities as well as to the application of facility-level weights. Within residential services, facilities offered detoxification services (with medical management) and rehabilitation services (focusing on treatment of substance abuse and building skills). Within outpatient services, patterns of staffing spanned three types of treatment, with increasing service intensity and cost: driving while impaired/driving under the influence services (with educational sessions, often in large groups), regular outpatient services (approximately 1 hour per week of group or individual counseling), and intensive outpatient services (several hours per week of counseling services). Within methadone care, treatment facilities offered both methadone dosing and counseling. However, as a regulated service, methadone tended to exhibit less variability than the other types

of care. The variations within each type of care reflect both differences among the types of treatment and facilities' approaches to offering treatment.

The variations in cost per enrollment day depended on both the intensity and mix of services per enrollment day and the prices of inputs (e.g., hourly wages of counselors and medical personnel). Analyses in the cost study found relatively little variation in hourly wages, but substantial variations in intensities and mix of services, suggesting that the latter was the primary reason for the large variations in cost.

The following identity helps relate cost per enrollment day to another important unit cost—the cost per admission:

Cost per admission = (Enrollment days per admission) × (Cost per enrollment day).

On a log scale, the product on the right-hand side of the equation is transformed to a sum. If the factors are independent, then the variance of the result is the sum of the variances of the components. Because the components were empirically almost independent, the measures that had more possible sources of variation did in fact show greater variation. Cost per admission varied for two reasons: The number of enrollment days per admission (also known as the length of stay) varied among facilities, as did the cost per enrollment day.

Table 4.3 presents the cost per reported outpatient visit for both outpatient methadone (n = 44) and outpatient nonmethadone modalities (n = 221). The number of weekly visits to outpatient methadone facilities was estimated at 5 per client on average, based on site visit data collected previously by CCC. The annual number of visits per facility was calculated to equal:

5 × 52 weeks per year × Point prevalence.

For each outpatient nonmethadone treatment facility, the number of visits was calculated to equal:

52 × (Mean administrator-reported individual counseling sessions per week × Point prevalence) + (Mean administrator-reported group counseling sessions per week × Point prevalence).

For outpatient methadone treatment (n = 44) the mean cost per reported visit was $14.50, with a minimum of $7.82, a maximum of $58.81, and a standard error of the mean of $1.27, based on a coefficient of variation of 9 percent. For outpatient nonmethadone treatment (n = 221), the mean cost per visit was $21.80, with a minimum of $4.43, a maximum of $204.13, and a standard error of the mean of $1.71 based on a coefficient of variation of 8 percent.

Table 4.3 Estimated Cost Per Reported Outpatient Visit: 1997 (Based on Administrator-Reported Mean Individual and Group Counseling Sessions Per Client and Methadone Treatment Visits)

Type of Care	Mean Cost Per Reported Outpatient Visit	Minimum	Maximum	SE of the Mean	CV of the Mean, %
Outpatient Methadone (n = 44)	$14.50	$7.82	$58.81	$1.27	9%
Outpatient Non-Methadone (n = 221)	$21.80	$4.43	$204.13	$1.71	8%

4.2 Personnel Costs

Tables 4.4 and 4.5 indicate the cost per counseling hour and the cost per group counseling hour per client, respectively, for outpatient nonmethadone treatment. This unit cost was derived only for outpatient nonmethadone treatment because nonhospital residential and outpatient methadone facilities provided additional outputs that were not captured in the analysis. As a result, it is likely that the derivation of cost per counseling hour for these two modalities would overestimate the cost of counseling.

Table 4.4 Cost Per Counseling Hour: 1997 (Based on the Total Number of Counseling Hours)

Type of Care	Mean Cost Per Counseling Hour	Minimum	Maximum	SE of the Mean	CV of the Mean, %
Outpatient Non-methadone ($n = 215$)[1]	$75.65	$20.24	$334.30[2]	$3.53	5%

[1] Data to compute cost per counseling hour could not be obtained for seven facilities.
[2] Most likely a result of counseling costs much greater than counseling hours.

Table 4.5 Cost Per Group Counseling Hour Per Client: 1997 (Based on the Total Number of Counseling Hours and Mean Number of Clients Per Group)

Type of Care	Mean Cost Per Counseling Hour	Mean Client Group Attendance	Mean Cost Per Group Counseling Hour Per Client	SE of the Mean for Cost Per Group Counseling Hour Per Client	CV of the Mean, %
Outpatient Non-methadone ($n = 215$)	$75.65	9.57	$7.90	$0.59	7%

Table 4.4 shows the mean cost per counseling hour for outpatient nonmethadone facilities ($n = 215$) as $75.65, with a minimum of $20.24 and a maximum of $334.30. The standard error of the mean was $3.53, and the coefficient of variation was 5 percent. Table 4.5 again displays the mean cost per counseling hour as $75.65, but additionally provides the mean client group attendance of 9.57. Subsequently, the mean cost per group counseling hour per client was calculated to be $7.90, with a standard error of the mean of $0.59 and coefficient of variation of 7 percent.

A series of personnel-level data analyses produced mean fringe benefit rates by type of care and ownership, mean hourly personnel rates by staffing category, and mean proportion of personnel costs to total facility costs by type of care and type of ownership. Additional analyses were conducted of the mean proportion of personnel costs by aggregate staffing category and by type of care.

Table 4.6 presents the mean fringe benefit rates, along with a standard error of the mean, and the coefficient of variation by type of care and type of ownership. The mean fringe benefit rate was 23 percent for nonhospital residential facilities, 20 percent for outpatient methadone, and 18 percent for outpatient nonmethadone. The mean fringe benefit rate for public facilities was 21 percent, 14 percent for private for-profit, and 21 percent for private nonprofit facilities.

Table 4.6 Mean Fringe Benefit Rate, by Type of Care and Ownership: 1997

Type of Care	Mean of Fringe Benefit Rate	SE of the Mean	CV of the Mean, %
Nonhospital Residential (n = 48)	23%	0.007	3.15%
Outpatient Methadone (n = 44)	20%	0.011	5.39%
Outpatient Nonmethadone (n = 222)	18%	0.006	3.21%
Ownership			
Public (n = 54)	21%	0.013	6.12%
Private For-Profit (n = 59)	14%	0.015	10.93%
Private Nonprofit (n = 201)	21%	0.006	2.93%

Mean hourly rates for full-time staff across all three types of care are presented in Table 4.7. As expected, hourly rates for full-time physicians ($51.59) and doctoral-level counselors ($27.86) were the highest, while hourly rates for nondegreed staff ($10.83) and administrative staff ($12.04) were the lowest relative to other staffing categories.

Table 4.7 Mean Hourly Personnel Rates, by Full-Time Staffing Category: 1997

Staffing Category	Mean Hourly Rate	SE of the Mean	CV of the Mean, %
Physicians	$51.59	$4.40	8.52%
Registered Nurses	$18.71	$1.17	6.23%
Other Medical Staff	$13.49	$0.88	6.50%
Doctoral-Level Counselors	$27.86	$2.98	10.71%
Master's-Level Counselors	$16.95	$1.22	7.21%
Bachelor's-Level Counselors	$14.15	$1.21	8.51%
Nondegreed Counselors	$10.83	$0.53	4.86%
Administrative/Other Staff	$12.04	$0.42	3.84%

Mean hours worked per week for part-time and contract staff, by staffing category, are presented in Table 4.8. Physicians were found to work the fewest part-time or contract hours per week (7.65 hours), while nondegreed counselors were found to work the greatest amount of part-time or contract hours (18.12 hours).

Table 4.9 provides information on the mean proportion of personnel costs to total costs by type of care and type of ownership. Outpatient nonmethadone facilities had on average 79 percent of total costs as personnel costs. Personnel cost proportions of total facility costs were 65 percent for outpatient methadone facilities and 63 percent for nonhospital residential facilities. Personnel cost proportions were expected to be lower for the latter two types of care, given additional administrative, medical, and housing costs associated with treatment provision.

The proportion of personnel costs by type of ownership was estimated to be 78 percent for public facilities, 79 percent for private for-profit facilities, and 72 percent for private nonprofit facilities.

Table 4.8 Mean Weekly Hours Worked for Part-Time and Contract Staff, by Staffing Category: 1997

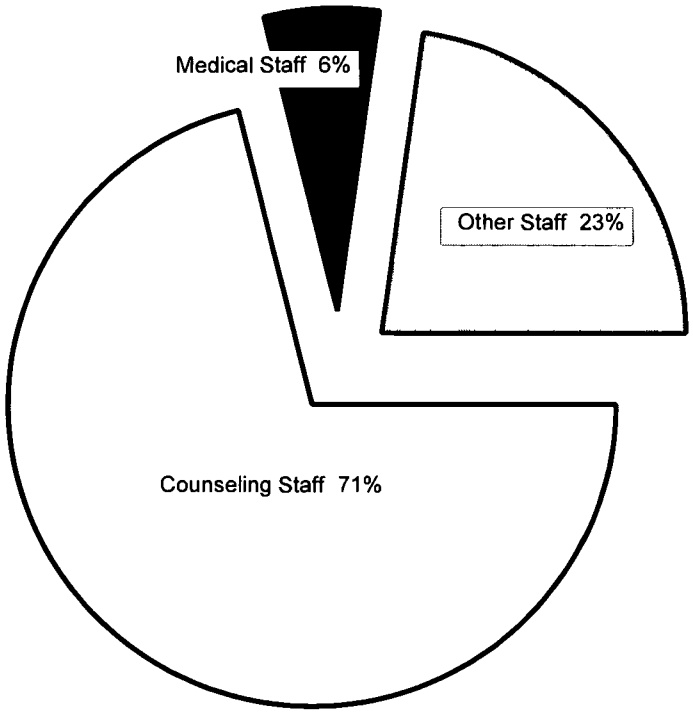
Staffing Category	Mean Weekly Hours Worked	SE of the Mean	CV of the Mean, %
Physicians	7.65	0.92	12.03%
Registered Nurses	12.25	2.44	19.87%
Other Medical Staff	11.36	3.00	26.40%
Doctoral-Level Counselors	8.24	1.56	18.88%
Master's-Level Counselors	12.80	1.13	8.82%
Bachelor's-Level Counselors	15.24	0.85	5.60%
Nondegreed Counselors	18.12	1.41	7.77%
Administrative/Other Staff	15.86	1.18	7.46%

Table 4.9 Mean Proportion of Personnel Costs to Total Facility Costs, by Type of Care: 1997

Type of Care	Mean Proportion of Personnel Costs to Total Costs	SE of the Mean	CV of the Mean, %
Nonhospital Residential	63%	0.029	5%
Outpatient Methadone	65%	0.030	5%
Outpatient Nonmethadone	79%	0.017	2%
Ownership			
Public (Government)	78%	0.029	4%
Private For-Profit	79%	0.048	6%
Private Nonprofit	72%	0.016	2%

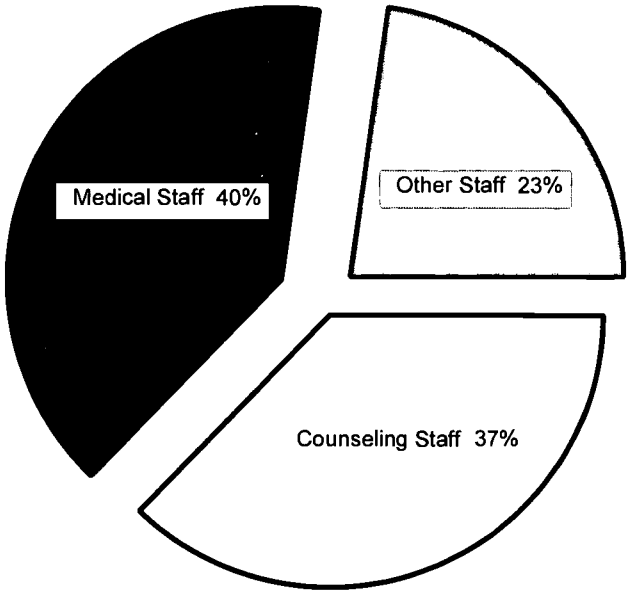
Figures 4.1, 4.2, and 4.3 display the proportion of costs to total personnel costs by staffing category, respectively, for outpatient nonmethadone treatment, outpatient methadone treatment, and nonhospital residential care. Personnel costs by type of staff included only those facilities that employed and reported those types of staff. For outpatient nonmethadone care, 71 percent of all personnel costs were counselor costs. This included salaries and fringe benefits for master's-level, bachelor's-level, and nondegreed counselors. As expected, outpatient methadone and nonhospital residential treatment had lower costs attributed to counseling because they provide additional services beyond counseling. On average, counseling costs were found to be 37 percent for outpatient methadone treatment and 52 percent for nonhospital residential treatment. Outpatient methadone care had the largest amount of personnel costs attributed to medical staff (41 percent), while nonhospital residential treatment had the largest amount of administrative personnel costs (39 percent).

Figure 4.1 Percentage Distribution of Personnel Costs for Outpatient Nonmethadone Treatment (n = 222), by Staffing Category: 1997



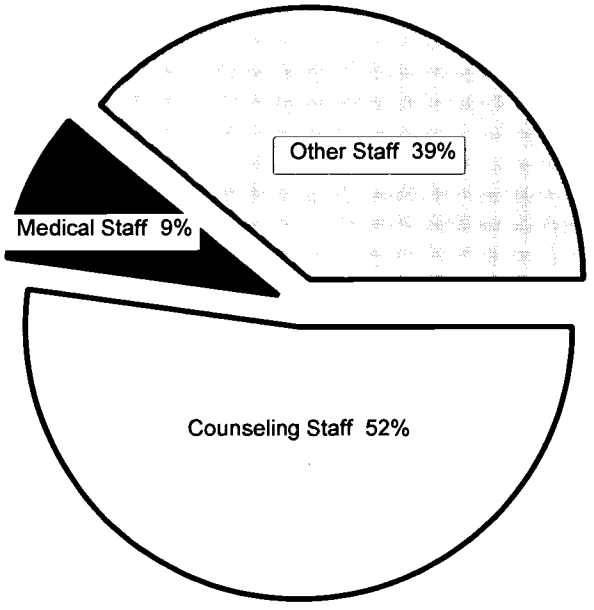
Source: Office of Applied Studies, SAMHSA, 1996-1999 Alcohol and Drug Services Study.

Figure 4.2 Percentage Distribution of Personnel Costs for Outpatient Methadone Treatment (n = 44), by Staffing Category: 1997



Source: Office of Applied Studies, SAMHSA, 1996-1999 Alcohol and Drug Services Study.

Figure 4.3 Percentage Distribution of Personnel Costs for Nonhospital Residential Treatment (n = 48), by Staffing Category: 1997



Source: Office of Applied Studies, SAMHSA, 1996-1999 Alcohol and Drug Services Study.

4.3 National Cost-Adjusted Estimates

National cost-adjusted estimates for three types of care (i.e., nonhospital residential, outpatient methadone, and outpatient nonmethadone services) in 1997 are indicated in Table 4.10. These national estimates are derived for each type of care from the formula:

Phase I facility-weighted point prevalence client count × 365 × Cost per enrolled client day.

Table 4.10 National Cost-Adjusted Estimates of Substance Abuse Treatment in the Specialty Sector Covered by ADSS: 1997

Type of Care	Estimated Point Prevalence Client Count[1]	Days in 12-Month Period	Estimated Cost Per Enrolled Client Day	Estimated Total Annual Costs
Nonhospital Residential (n = 48)	99,895	365	$62.10	$2,264,270,018
Outpatient Methadone (n = 44)	151,882	365	$10.32	$572,109,118
Outpatient Nonmethadone (n = 222)	806,706	365	$9.17	$2,700,085,317
Total	1,058,483	N/A	N/A	$5,536,464,453

[1] These estimates are based on the ADSS Phase I facility survey of a sample equal to 2,395 facilities.

For nonhospital residential care in the specialty sector, the national cost estimate of substance abuse treatment was $2.3 billion. For outpatient methadone care in the specialty sector, the national cost estimate of substance abuse treatment was $0.6 billion. For outpatient nonmethadone treatment in the specialty sector, the national cost estimate of substance abuse treatment was $2.7 billion. The total cost of these three modalities in the specialty sector was estimated to be $5.5 billion.

5. Discussion and Conclusions

The ADSS cost study is believed to be the first study of treatment costs with validated cost data from a nationally representative sample of substance abuse treatment facilities. It builds on previous studies that have each contained some but not all of the elements of this study. One important group of previous studies (DATCAP) (French et al., 1997) was based on careful, systematic procedures for collecting cost data based on principles of economics. The CCC (1993) study and the Treatment Outcome Prospective Study (TOPS) (Hubbard et al., 1989) applied systematic data collection based on accounting principles. In neither case, however, were the methods applied to a representative random sample of facilities.

The ADSS cost study supports other studies that have found that nonmethadone outpatient treatment is substantially less expensive than residential treatment. The cost study found that the mean cost of a nonmethadone outpatient admission was only a third of the mean cost of a nonhospital residential admission ($1,169 vs. $3,132). In terms of cost per enrolled client day, the lower cost of nonmethadone outpatient care was even more dramatic—only one seventh of the cost of a nonhospital residential day ($9.17 vs. $62.10). The ADSS cost study found that the cost per enrolled client day in outpatient methadone care ($10.32) was only marginally higher than the cost per enrolled client day in nonmethadone outpatient care ($9.17).

One of the most important conclusions from the ADSS cost study was the variability in unit costs within a type of care. The variations in totals, such as cost or revenue per facility, were not surprising. These magnitudes depended on the size of the facility. Other data in ADSS, particularly the point prevalence client count, showed the extent of such variation. However, within a type of care, the cost per admission would be expected to exhibit only moderate variation, and cost per enrollment day would be expected to show little variation. In fact, both variations proved to be relatively large.

The smallest element of cost was the cost per enrollment day. The coefficients of variation of the means for nonhospital residential, outpatient methadone, and nonmethadone outpatient were 11 percent, 9 percent, and 8 percent, respectively. Multiplying each of these coefficients by the square roots of the respective sample sizes, *approximate* coefficients of variation of the cost per day were obtained: 74 percent, 101 percent, and 372 percent, respectively. Although a more precise estimate of the coefficient of variation would need to take the multistage sampling into account, these approximations indicate the relative variations among the three types of care.

Although comparison with other studies would be of interest, the estimates from the ADSS cost study are not directly comparable with those from similar studies because of differences in methods, variables, and national representation. For example, the Substance Abuse and Mental Health Services Administration (SAMHSA) spending estimates study also reported aggregate national spending (Mark et al., 2000). However, that study covered more types of care (such as treatment in inpatient hospitals, in the general medical sector, and retail prescription drugs) than the ADSS cost study, which covered only outpatient and residential specialty substance abuse treatment facilities. Thus, the amount reported in SAMHSA's spending estimates study for 1997 ($11.9 billion) substantially exceeded the aggregate in the ADSS cost study ($5.5 billion). When one excludes services not counted in ADSS (hospital-based services, independent practitioners, retail prescription drugs, and insurance administration), the remaining components of the spending estimates study that approximated the ADSS cost study (termed "other") are similar to the ADSS cost study. Their magnitude for 1997 ($5.3 billion) is similar to the amount for the ADSS cost study ($5.5 billion). Other studies, such as those conducted by CCC or TOPS, are not based on national probability samples and are therefore not directly comparable with those derived in the ADSS cost study.

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The ADSS Cost Study: Costs of Substance Abuse Treatment in the Specialty Sector Appendices

Appendix A

Data Review Worksheet—ADSS

Appendix A - Data Review Worksheet - ADSS - Instructions

This Data Review Worksheet is a series of linked spreadsheets. There are five that require entry. These are labeled as:
Instructions
Two1
Two2
Two3
One

Hence, the name implies the source document from which the source input data is recorded. The remaining six pages of spreadsheets are the actual cost report, which is locked, and requires no input. These spreadsheets should be printed & reviewed after all data is inputted.

The Phase I survey instrument is titled: A. Facility Organization and Staffing (legal size)
The Phase II survey instrument is titled: Date of Interview and begins with page 2

In some cases, there are no identified input fields, such as facility ID number, and survey date, facility type and setting. Use the F - 2 key to edit these fields.
1. *Obtain the Facility ID from the - Facility Information Sheet*
2. *Obtain Survey Date from - Phase II - top right corner - Date of Interview*
3. *The Facility Type is from Phase II - Question 2*
4. *The Setting is from Phase I - A5, please indicate in the space corresponding with facility type*

Facility ID: 0000
Survey Date: _00__/_00_/_97__

1. Facility Type:
( ) Hospital Inpatient
( ) Non-Hosp Residential
( ) Outpatient - Methadone
( ) Outpatient - Non Methadone

Preparer's Initial (Below):

_____

Date of Preparation (below):

_____

Sources (SC)
PO=Prov Original
PR=Prov Revised
IE=Internal Estimate
EE=External Estimate

Setting (A5):

_____
_____
_____
_____

ADSS - Data Review Worksheet - Input for Phase II

Variable No.	Data Variable Description	Statistic	Source Code	Instrument Source Reference:
1	**Facility ID:0000**			
2	*Client Count - Beginning*	0		(Q - 3)
3	*Admissions*	0		(Q6,Q13,Q20,Q27)
4	*Discharges*	0		ADSS Disch Sampling Wrksht A -4
5	*Average Length of Stay*	0		(Q7,Q15,Q21,Q28)
6	*Point Prevalence*	0		(Q -3)
7	*Residential Bed Capacity*	0		(Q -5, Q -12)
8	*Total Expenditures*	$0		(Q55)
9	*Total Revenues*	$0		(Q52)
10	*Individual Counseling Sessions per Week*	0		(Q9,17,23,33)
11	*Group Counseling Sessions: (Attendance)*			
	Group Therapy Sessions	0		(Q11,Q19,Q23,Q35)
	Group Educational Sessions	0		(Q11,Q19,Q23,Q35)
	Self-help Group Meetings	0		(Q11,Q19,Q23,Q35)
	Community or Governing	0		(Q11,Q19,Q23,Q35)
	Other:	0		(Q11,Q19,Q23,Q35)
12	*Group Sessions/Client*	0		(Q9,17,23,33)
13	*Group Session Length (Hours)*	1	EE	Assume 1 hour, or document the reason for other time length

ADSS - Data Review Worksheet - Input for Phase II

Facility ID: 0000

Variable No.	*Data Variable Description*	*Statistic*	*Source Code*	*Instrument Source Reference:*
14	*Full Time Staff:*	*FTE's*		
	a. Physicians	0		Q47, Column # 1
	b. R N	0		Q47, Column # 1
	c. Other Medical	0		Q47, Column # 1
	d. Phd Counselors	0		Q47, Column # 1
	e. Master Counselors	0		Q47, Column # 1
	f. Bachelor Counselors	0		Q47, Column # 1
	g. Non Degreed Counselors	0		Q47, Column # 1
	h. Administrative Staff	0		Q47, Column # 1
		Hrly Rate		
	a. Physicians	$ -		Q49, Please note if the dollar rate
	b. R N	$ -		indicated is (YR) yearly, please
	c. Other Medical	$ -		divided by: 2080 for 40 hr work week,
	d. Phd Counselors	$ -		1950 for 37.5 hr work week, or 1820
	e. Master Counselors	$ -		for 35 hour work week. The hours
	f. Bachelor Counselors	$ -		per work week can be determined
	g. Non Degreed Counselors	$ -		from Q47 - Column # 4
	h. Administrative Staff	$ -		
		Hours/Wk		
	a. Physicians	0		Q47, Column # 4
	b. R N	0		Q47, Column # 4
	c. Other Medical	0		Q47, Column # 4
	d. Phd Counselors	0		Q47, Column # 4
	e. Master Counselors	0		Q47, Column # 4
	f. Bachelor Counselors	0		Q47, Column # 4
	g. Non Degreed Counselors	0		Q47, Column # 4
	h. Administrative Staff	0		Q47, Column # 4

ADSS – Data Review Worksheet - Input for Phase II
Facility ID:0000

Variable No.	*Data Variable Description*	*Statistic*	*Source Code*	*Instrument Source Reference:*
15	*Part-time & Contract Staff*	*Number*		
	a. Physicians			Q47, Column # 2 & 3
	b. R N			Q47, Column # 2 & 3
	c. Other Medical			Q47, Column # 2 & 3
	d. Phd Counselors			Q47, Column # 2 & 3
	e. Master Counselors			Q47, Column # 2 & 3
	f. Bachelor Counselors			Q47, Column # 2 & 3
	g. Non Degreed Counselors			Q47, Column # 2 & 3
	h. Administrative Staff			Q47, Column # 2 & 3
		Hrly Rate		
	a. Physicians	$ -		Q49, Please note if the dollar rate
	b. R N	$ -		indicated is (YR) yearly, please
	c. Other Medical	$ -		divided by: 2080 for 40 hr work week,
	d. Phd Counselors	$ -		1950 for 37.5 hr work week, or 1820
	e. Master Counselors	$ -		for 35 hour work week. The hours
	f. Bachelor Counselors	$ -		per work week can be determined
	g. Non Degreed Counselors	$ -		from Q47 - Column # 4
	h. Administrative Staff	$ -		
		Hours/Wk		
	a. Physicians			Q47, Column # 4
	b. R N			Q47, Column # 4
	c. Other Medical			Q47, Column # 4
	d. Phd Counselors			Q47, Column # 4
	e. Master Counselors			Q47, Column # 4
	f. Bachelor Counselors			Q47, Column # 4
	g. Non Degreed Counselors			Q47, Column # 4
	h. Administrative Staff			Q47, Column # 4
15	Fringe Benefit Rate	12.00%	EE	Q50

ADSS - Data Review Worksheet - Input for Phase I

Variable No.	Data Variable Description	Statistic	Source Code	Instrument Source Reference:
1	***Facility ID:0000***			
2	*Client Count - Beginning*	0		B –1
3	*Admissions*	0		C –2
4	*Discharges*	0		C –2
5	*Average Length of Stay*	0		C –3
6	*Point Prevalence*	0		B -1 (Col#2)
7	*Residential Bed Capacity*	0		Use Phase II - Q5,12
8	*Total Expenditures*	$0		D – 14
9	*Total Revenues*	$0		D – 7
	Cost Breakdown			
	Expenses	$0		D -15a
	a. FTE	0%		D -15a
	Expenses	$0		D -15b
	b. Other Personnel	0%		D -15b
	Expenses	$0		D -15c
	c. Non-Personnel	0%		D -15c
	Total	$0		D-15d
		0%	EE	

Data Review Worksheet - ADSS Page -1 -

Facility ID:0000

1. Facility Type:

( ) Hospital Inpatient
( ) Non-Hosp Residential
( ) Outpatient - Methadone
( ) Outpatient - Non Methadone

Setting (A5):

Sources (SC)
PO=Prov Original
PR=Prov Revised
IE=Internal Estimate
EE=External Estimate

2. Statistical Data Section:	***Phase II***	***SC***	***Phase I***	***SC***	***Variance[1]***
A. Client Count - Beginning	0	0	0	–	*Phase II-Phase I*
Source:	*(Q - 3)*				
B. Admissions	0	0	0	–	*Phase II-Phase I*
	(Q6,Q13,Q20,Q27)		*(C-2)*		
C. Discharges	0	0	0	–	*Phase II-Phase I*
0	*(Annual Disch)*		(C-2)		
(Discharge Worksheet)					
D. Average Length of Stay (Days)	0	0	0	–	*Phase II-Phase I*
	(Q7,Q15,Q21,Q28)		(C-3)		
E. Average Client Count: (Calc)					
1. Admission Derivative[2]	0		0		*Phase II-Phase I*
2. Discharge Derivative	0		0		*Phase II-Phase I*
3. Point Prevalence - Reported	0		0.00		*Phase II-Phase I*
	(Q-3)		*(B-1 (2))*		
F. Residential Bed Capacity:	0	0	0	–	
	(Q-5, 12)		*(Not requested)*		
G. Occupancy Rates: (Calc)					
1. Admission Based	0		0		*Phase II-Phase I*
2. Discharged Based	0		0		*Phase II-Phase I*
3. Point Prevalence Based	0		0		*Phase II-Phase I*
H. Client Var.: Admiss. vs. Pt. Prev.	0		0		
I. Client Var.: Disch. vs. Pt. Prev.	0		0		

[1] Variance is equal to difference of two measures of the same variable.
[2] Derivative is the variable adjusted for length of stay.

Data Review Worksheet -
ADSS Page - 2 -

Facility ID:0000

3. Financial / Expenditures & Revenues

	Phase II	*SC*	*Phase I*	*SC*	*Variance*[1]
A. Total Expenditures	$ - (Q55)		$ - (D-14)	0	Phase II-Phase I
B. Total Revenues	$ - (Q52)		$ - (D-7)	0	Phase II-Phase I

C. Verification:

( ) Traced to Financial Statements - Phase I, Phase II monthly amts annualized

(X) Compared with Previous Year

( ) No supporting information provided

4. Unadjusted per Client Costs (All items calculated)	***Phase II***	***Phase I***	
A.1. Cost per Client Admissions	-	-	Phase II-Phase I
2. Per Day Costs - Admissions	-	-	
B.1. Cost per Client Discharge	-	-	Phase II-Phase I
2. Per Day Costs - Discharge	-	-	
C.1. Cost @ Point Prevalence	-	-	Phase II-Phase I
	-	-	

[1] Variance is equal to difference of two measures of the same variable.

Data Review Worksheet - ADSS
Page - 3 -
Facility ID:0000

5. Salary Wage Analysis (Phase II):
(X) As filed (Q47,Q49)

	FTE's Q47(1)	*SC*	***Hrly Rate*** Q49	*SC*	***Hours/Wk*** Q47(4)	*SC*	***Salaries***
Full Time Staff (Q47-1)							
a. Physicians	0	0	$ -	0	0	0	$ -
b. R N	0	0	$ -	0	0	0	$ -
c. Other Medical	0	0	$ -	0	0	0	$ -
d. Phd Counselors	0	0	$ -	0	0	0	$ -
e. Master Counselors	0	0	$ -	0	0	0	$ -
f. Bachelor Counselors	0	0	$ -	0	0	0	$ -
g. Non Degree Counselors	0	0	$ -	0	0	0	$ -
h. Administrative Staff	0	0	$ -	0	0	0	$ -

	Number *Q47 (2 & 3)*	SC	***Hrly Rate*** *Q49*	SC	***Hours/Wk*** *Q47 (4)*	SC	***Salaries***
Part time & Contract Staff (Q47-1)							
a. Physicians	0	0	$ -	0	0	0	$ -
b. R N	0	0	$ -	0	0	0	$ -
c. Other Medical	0	0	$ -	0	0	0	$ -
d. Phd Counselors	0	0	$ -	0	0	0	$ -
e. Master Counselors	0	0	$ -	0	0	0	$ -
f. Bachelor Counselors	0	0	$ -	0	0	0	$ -
g. Non Degree Counselors	0	0	$ -	0	0	0	$ -
h. Administrative Staff	0	0	$ -	0	0	0	$ -
Totals-Salaries Only	0						$ -
Fringe Benefits - (Q50)***			12.0%	EE			$ -
Total Personal Services							$ -
Current Expenditures:							$ -

6. Per Cent of Personal Services to Expenses:

	Salaries	Ratio
1. Ratio of Counselors / Total Personal Services	$ -	%
2. Ratio of Medical /Total Personal Services	$ -	%
3. Ratio of Admin/Total Personal Services	$ -	%
4. Direct Care to Total Labor	$ -	%

Data Review Worksheet - ADSS Page - 4 -

Facility ID:0000

7. Counseling Services & Costs

a. Counselor Personal Svcs (d,e,f)				$ -
b. Counselor Hrly Rate:				
Professional Staff	0.00	0		
All Counselors	0.00	0	ftes/yrly hrs	
(Based 1880 Net Hour basis-40 hr/wk)	(ftes)	(yrly hrs)		
(for 35 hour week use -1645 net hrs)				
c. Individual Counseling Sessions/Wk	0	0	0	0
(Sessions - Q9,17,23,33)	(sessions)	(admits)	(alos-wks)	(ind couns. hrs)

d. Group Counseling Sessions:	Actual	Attendance	Adjusted	Weighted
(Sessions - Q9,17,23,33)	Attends	Weight	Weight	Attendance
Group Therapy Sessions	0	70%	0%	0
Group Educational Sessions	0	10%	0%	0
Self-help Group Meetings	0	10%	0%	0
Community or Governing	0	5%	0%	0
Other: Family	0	5%	0%	0
TOTAL	0	100%	0%	0

Counselor Requirement-Groups				
(Based on Avg Client Count-Admits)		*(Avg Attend)*	*(Couns Gps)*	
No. Weekly Sessions/Client	0			
Counselor Group Counseling Hours	-	1	50	-
*(Sessions -Q9,17,25,34)*Couns Gps*	(sessions)	(length in hrs)	(wks/yr)	(gp couns. hrs)
e.1. Total Counseling Hours:				-
e.2. Percent of Available Hours (All Counselors)				%
e.3. Percent of Professional Staff Hours (Phd, Masters, Bachelors)				%
			Total Costs e.l.x.	Cost/Client
f. Counseling Svcs (Ind & Group) :			(ftes/yrly hrs)	-
g. Counselors Activities:			$ -	-
I. Group Counseling Contact Hours:				
(Session Length in Hours) ------>	1			
	0	0	0	-
	(sessions)	(admits)	(Alos - wks)	(Gp Contact Hrs)

Analysis Ratios (Phase II versus I) :

1. Client Changes:	***Variance[1]***
A. Beginning Client Count	%
B. Admissions	%
C. Average Client Count-Admits	%
Average Client Variance	%

2. Financial Analysis:	
A. Expenditures	%
B. Revenues	%
Average Financial Variance	%

3. Client Statistics	Stat #1	Stat #2	Variance
A. Admissions vs Discharges	0	0	Stat #1 / Stat #2-1
B. Adm vs Pt Prevalence Based	0		Stat #1 / Stat #2-1
C. Disch vs Pt Prevalence Based	0		Stat #1 / Stat #2-1

4. Staffing Analysis	Phase II	Phase I	Ratio
A. Personal Services to Expenses (%):	– %	– %	-

[1] Variance is equal to difference of two measures of the same variable.

Appendix B

Phases I and II Questionnaire Data Summary Table

Appendix B - Phases I and II Questionnaire Data Summary Table

(The following is a table of Phases I and II Variable Names and Their Descriptions)

Variable Name	Description / Reference
Variable Group 1. Facility-Specific Information and Ownership	
Variable Group 2. Weights	
F2FWA0	Phase II - Facility Final Weight. This weight, derived from the facility's probability of selection in the multistage sampling process of ADSS, indicates the number of facilities in the country represented by the given facility in the ADSS sample. The weight variable for a facility applies to each modality offered by that facility. Specific weight details are provided in the subsequent section.
CLWGT0	Phase II - Client Analysis Weight. Formula: F2FWA0 x Phase II Client Admissions
PPWGT0	Phase II - Prevalence Analysis Weight. Formula: F2FWA0 x Phase II Client Point Prevalence
Variable Group 3. Client and Facility Activity Variables - Phase II	
NQ3	Phase II – Point prevalence.
SQ3	Phase II – Point prevalence source identifier.
OADMIT	Phase II – Unadjusted Admissions from 'P2ADMIN.'
NQA	Phase II – Client admissions.
SQA	Phase II – Client admissions source identifier.
BIG_N	Phase II – Unadjusted Discharge Counts (6 Months) from 'P2ADMIN.'
BIG_N2	Phase II – Unadjusted Discharge Counts (BIG_N doubled to 12 months).
NQD	Phase II – Client discharges (6 Months).
NQD2	Phase II – Client discharges (BIG_N doubled to 12 Months for annual discharges).
SQD	Phase II – Client discharges (6 months) source identifier.
NQL	Phase II – Average length of stay – in days.
SQL	Phase II – Average length of stay – in days source identifier.
NQB	Phase II – Residential bed capacity – total beds.
SQB	Phase II – Residential bed capacity – total beds source identifier.
NQ55	Phase II – Total costs.
SQ55	Phase II – Total costs source identifier.
NQ52	Phase II – Total revenues.
SQ52	Phase II – Total revenues source identifier.
NQI	Phase II – Number of individual counseling sessions per client per week.
SQI	Phase II – Number of individual counseling sessions per client per week source identifier.
NQG1	Phase II – Group Therapy Sessions Mean Attendance.
SQG1	Phase II – Group Therapy Sessions Mean Attendance source identifier.
NQG2	Phase II – Group educational sessions mean attendance.
SQG2	Phase II – Group educational sessions mean attendance source identifier.
NQG3	Phase II – Self-help group meetings mean attendance.
SQG3	Phase II – Self-help group meetings mean attendance source identifier.
NQG4	Phase II – Community or governing sessions mean attendance.
SQG4	Phase II – Community or governing sessions mean attendance source identifier.
NQG5	Phase II – Other group sessions mean attendance.
SQG5	Phase II – Other group sessions mean attendance source identifier.
NQGS	Phase II – Number of group counseling sessions per client per week.
SQGS	Phase II – Number of group counseling sessions per client per week source identifier.
NGrpHrs	New variable asked in cost study – Length of group session, in hours. Default is 1 hour based on typical industry practice identified by Capital Consulting.
SGrpHrs	New variable asked in cost study – Length of group session, in hours source identifier.

(continued)

Appendix B - Phases I and II Questionnaire Data Summary Table (continued)

(The following is a table of Phases I and II Variable Names and Their Descriptions)

Variable Name	Description / Reference
Variable Group 4. Personnel Data - Phase II	
NQ47a1– NQ47h1	Phase II – Number of FTEs for full-time staff.[1]
SQ47a1 – SQ47h1	Phase II – Number of FTEs for full-time staff source identifier.
NQ49a4 – NQ49h4	Phase II – Number of hours per week for full-time staff.
Q49a4 – SQ49h4	Phase II – Number of hours per week for full-time staff source identifier.
NQ47a23 – NQ47h23	Phase II – Number of part-time and contract staff, combined.[2]
SQ47a23 – SQ47h23	Phase II – Number of part-time and contract staff, combined, source identifier.
NQ49Pa – NQ49Ph	Phase II – Hourly Wages for part-time staff.
SQ49Pa – SQ49Ph	Phase II – Hourly Wages for part-time staff source identifier.
NQ47a4r – NQ47h4r	Phase II – Number of hours per week for part-time staff.
SQ47a4r – SQ47h4r	Phase II – Number of hours per week for part-time staff source identifier.
NQ50	Phase II – Fringe benefit rate.
SQ50	Phase II – Fringe benefit rate source identifier.
Variable Group 5. Client and Facility Activity Variables - Phase I	
NB12	Phase I – Point prevalence, by modality.
SNB12	Phase I – Point prevalence, by modality source identifier.
NC21	Phase I – Admissions, by modality.
SNC21	Phase I – Admissions by modality source identifier.
NC22	Phase I – Discharges, by modality.
SNC22	Phase I – Discharges by modality source identifier.
NC3	Phase I – Average length of stay.
SC3	Phase I – Average length of stay source identifier.
ND14	Phase I – Total costs.
SD14	Phase I – Total costs source identifier.
ND7	Phase I – Total revenues.
SD7	Phase I – Total revenues source identifier.
The following Phase I questionnaire variables represent only raw or originally reported data from Phase I question D15. Facility staff were not asked to discuss these data during the callback process.	
ND15a, ND15ap, ND15a_d, ND15a_p	Phase I – Raw costs for FTE.
SD15a, SD15ap	Phase I – Raw costs source identifier.
ND15b, ND15bp, ND15b_d, ND15b_p	Phase I – Raw costs for other personnel.
SD15b, SD15bp	Phase I – Raw costs for other personnel source identifier.
ND15c, ND15cp, ND15c_d, ND15c_p	Phase I – Raw costs for non-personnel.
SD15c, SD15cp	Phase I – Raw costs for non-personnel source identifier.
ND15d, ND15dp, ND15d_d, ND15d_p	Phase I – Raw total costs.
SD15d, SD15dp	Phase I – Raw total costs source identifier.

(continued)

Appendix B (continued) -

Analysis Data and Key Variables Summary Table

Variable Name	*Description / Reference*	*Formula*
Variable Group 6. Phases I and II Comparison Analysis Variables		
V1K14	Difference – Point prevalence	NQ3/NB12-1
V1K17	Difference – Admissions	NQA/NC21-1
V1K20	Difference – Discharges	NQD/NC22-1
VIK23	Difference – Average length of stay	NQL/NC3-1
NIC26, N1G26[3]	Admission derivative = Admissions adjusted for length of stay. Phase II and Phase I, respectively.	NQA/365/NQL, NC21/365/NC3
V1K26	Difference –Derived admission.	N1C26/N1G26
N1C27, N1G27	Discharge derivative = Discharges adjusted for length of stay. Phases II and I, respectively.	NQD/365/NQL, NC22/365/NC3
V1K27	Difference – Derived discharge.	N1C27/N1G27
V1K28	Difference – Point prevalence.	NQ3/NB12-1
N1C33, N1G33	Admission based occupancy = Admissions / Residential bed capacity. Phases II and I, respectively.	N1C26/NQB, N1G26/NQB
V1K33	Difference – Admission based occupancy.	N1C33/N1G33-1
N1C34, N1G34	Discharge based occupancy = Discharges / Residential bed capacity. Phases II and I, respectively.	N1C27/NQB, NB12/NQB
V1K34	Difference – Discharge based occupancy.	N1C34/N1G34-1
N1C35, N1G35	Point prevalence based occupancy = Point prevalence / Residential bed capacity. Phases II and I, respectively.	NQ3/NQB, NB12/NQB
V1K35	Difference – Point prevalence based occupancy.	N1C35/N1G35-1
V1C37	Difference –Phase II – Admission vs. Point prevalence.	N1C26/NQ3-1
V1G37	Difference – Phase I – Admission vs. Point prevalence.	N1G26/NB12-1
V1C38	Difference – Phase II – Discharges vs. Point prevalence.	N1C27/NQ3-1
V1G38	Difference – Phase I – Discharges vs. Point prevalence.	N1G27/NB12-1
V2F9	Difference – Total costs.	NQ55/ND14-1
V2F12	Difference – Total revenues.	NQ52/ND7-1
Variable Group 7. Phases I and II Unit Cost Ratios		
U2B22, U2D22	Cost per admission[4] (based on total costs). Phases II and I, respectively.	NQ55/NQA, ND14/NC21
V2F22	Difference – Cost per admission.	U2B22/U2D22-1
U2B23, U2D23 (K)	Cost per enrolled patient data from admissions (based on total costs and length of stay). Phases II and I, respectively.	U2B22/NQL, U2D22/NC3
U2B25, U2D25 (K)	Cost per discharge (based on total costs). Phases II and I, respectively.	NQ55/NQD, ND14/NC22
V2F25	Difference – Cost per discharge.	U2B25/U2D25-1
U2B26, U2D26 (K)	Cost per enrolled patient day from discharges (based on total costs and length of stay). Phases II and I, respectively.	U2B25/NQL, U2D25/NC3

(continued)

Appendix B - Analysis Data and Key Variables Summary Table (continued)

Variable Name	*Description / Reference*	*Formula*
U2B28, U2D28 (K)	Cost per episode from point prevalence and average length of stay (based on total costs). Phases II and I, respectively.	NQ55/(NQ3*(365/ NQL), ND14/(NB12*(365/ NC3)
V2F28	Difference – Cost per episode from point prevalence and average length of stay.	U2B28/U2D28-1
U2B29, U2D29 (K)	Cost per patient day from point prevalence and average length of stay. Phases II and I, respectively.	U2B28/NQL, U2D28/NC3
U2B30 (K)	Cost per reported visit based on counseling sessions and visits specific to methadone treatment. For OP and Meth only.	OP: (NQ55) / (52*[(NQ3) x (NQI) + (NQ3) x (NQGS)]), Meth: (NQ55) / [(NQ3) x 5 x 52]
U2B31 (K)	Cost per documented visit based on average number of visits per client abstracted in ADSS client abstract file.	(NQ55/(ABVisit*NQA)
Variable Group 8. Phases I and II Analysis Variables		
N3N12 – N3N19[5]	Annualized salaries for each FT staff category. Phase II.	NQ47x1*NQ49x1* NQ47x4*52
N3N23 – N3N30	Annualized salaries for each PT/CT (combined) staff category. Phase II.	NQ47x23*NQ49Px* NQ47x4r*52
N3B32	Total number of employees (including FT and PT/CT). Phase II.	NQ47x1+NQ47x23
N3N32	Total costs of salaries (annualized). Phase II.	Sum (N2N12-N3N30)
N3N33	Total costs of fringe benefits = Total salaries * fringe benefit rate (NQ50). Phase II.	N3N32/NQ50
N3N34	Total costs of personnel = N3N32 + N3N33. Phase II	N3N32+N3N33
P3N38 (K)	Proportion – Personnel costs to total costs. Phase II.	N3N34/NQ55
N3J40	Sum of counseling personnel costs (FT and PT/CT). Phase II.	(1+NQ50)*(N3N15+N3N16+N3N17+N3N18+N3N26+N3N27+N3N28+N3N29)
P3N40 (K)	Proportion – Counseling personnel costs to total personnel costs. Phase II.	N3J40/N3N34
N3J42	Sum of medical personnel costs (FT and PT/CT). Phase II.	(1+NQ50)*(N3N12+N3N13+N3N14+N3N23+N3N24+N3N25)
P3N42 (K)	Proportion – Medical personnel costs to total personnel costs. Phase II.	N3J42/N3N34
N3J44	Sum of administrative personnel costs (FT and PT/CT). Phase II.	(1+NQ50)*(N3N19+N3N30)
P3N44 (K)	Proportion – Administrative personnel costs to total personnel costs. Phase II.	(N3J44/N3N34)
N3J46	Sum of direct care personnel costs (FT and PT/CT). Phase II.	N3J40+N3J42
P3N46 (K)	Proportion – Direct Care personnel costs to total personnel costs. Phase II.	N3J46/N3n34

(continued)

Appendix B - Analysis Data and Key Variables Summary Table (continued)

Variable Name	*Description / Reference*	*Formula*
N4N7	Counseling salaries. Phase II.	(N3N15+N3N16+N3N17+N3N18+N3N26+ N3N27+N3N28+N3N29)
N4B8	Total number of FTE hours for professional staff = sum (FTEs) * hrs/week. Phase II.	(Sum (NQ47d-f1) + ((NQ47d23*NQ47d4r)/40)+((NQ47e23*NQ 47e4r)/40)+((NQ47f23*NQ47f4r)/40)
N4F8[6]	Total number of annualized FTE hours for professional staff. Phase II.	N4B8*1880
N4B9	Total number of FTE hours for counselors. Phase II.	(Sum (NQ47d-g1) + ((NQ47d23*NQ47d4r)/40)+((NQ47e23*NQ 47e4r)/40)+((NQ47f23*NQ47f4r)/40)+((NQ 47g23*NQ47g4r)/40)
N4F9	Total number of annualized FTE hours for counselors. Phase II.	N4B9*1880
N4J9	Counseling personnel costs (salaries + fringe) per annualized FTE hour (N4F9). Phase II.	(NQ50+1)*(N4N7/N4F9)
N4J12	Average length of stay calculated in weeks. Phase II.	NQL/7
N4N12	Individual counseling hours per week	NQI*NQA*N4J12
N4N17 – N4N22	Weighted group attendance per week, for each type of group, and total. Phase II.	NQG1*.70, NQG2*.10, NQG3*.10, NQG4*.05, NQG5*.05,SumNQGx*1.)
N4F24	Average group attendance. Phase II.	N4N22/ADJWT
N4J24	Number of groups per counselor (based on admissions and average group attendance). Phase II.	N1C26/NF424
N4B27	Number of group sessions. Phase II.	NQGS*N4J24
N4N27[7]	Annualized group counseling hours. Phase II.	N4B27*NGRPHRS*50
N4N30	Total annualized counseling hours (individual + group). Phase II.	N4N12+N4N27
N4N31	Annualized counseling hours as a proportion of total annualized hours for counselors. Phase II.	N4N30/N4F9
N4N32	Annualized counseling hours as a proportion of total annualized hours for professional staff. Phase II.	N4N30/N4F8
N4J36	Total cost for annualized counseling hours. Phase II.	N4N30/N4J9
N4N36	Unit cost – per admission cost for annualized counseling hours. Phase II.	N4J36/NQA
N4N38	Unit cost – per admission cost for annualized FTE counselor hours. Phase II.	N4N7/NQA

(continued)

Appendix B - Analysis Data and Key Variables Summary Table (continued)

Variable Name	*Description / Reference*	*Formula*
N4N42	Total group contact hours (based on group length, number of sessions, admissions, and length of stay). Phase II.	NGRPHRS*NQGS*NQA*N4J12
V5B16	Difference – Average of admission, discharge, and point prevalence differences.	(V1K14+V1K17+V1K26)/3
V5B24	Difference – Average of costs and revenues differences.	(V2F9+V2F12)/2
V5F28	Difference – Phase II Admissions vs. Phase II Discharges.	NQA/NQD-1
V5F30	Difference – Phase II Admissions vs. Phase II Point prevalence.	NQA/(NQ3*365/NQL)
V5F32	Difference – Phase II Discharges vs. Phase II Point prevalence.	NQD/(NQ3*365/NQL)
N5D36 (K)	Phase I ratio of personnel costs to total costs.	Maximum of ((ND15a+ND15b)/Nd15d+.0001) or (Nd15ap+ND15bp)
V5F36	Difference – Personnel costs to total costs.	P3N38/N5D36-1
Variable Group 9. Client Abstract Data Imported from "P2ABSTM" - ADSS Client Abstract File		
ABVISIT	Mean of Abstracted documented client visits – OP Only – Phase II – from 'P2ABSTM.'	Sum Q66/Client N
TRT_DUR	Mean Treatment Duration for Abstracted Clients – Phase II – from 'P2ABSTM.'	Sum TRT_DUR (from P2ABSTM)/Client N
ABALOS (k)	Average Length of Stay Calculated from ADSS Client Abstract File – Phase II – from 'P2ABSTM.'	Sum ALOS/Client N
ABALOSSD	Standard Deviation of ABALOS.	
N	Number of Client Abstracts Per Modality – Phase II.	
SE	Standard Error of ABALOS.	SD/SQRT(N-1)
Variable Group 10. Replicate Weights		
	Facility Replicate Weights from Westat	
	Client Replicate Weights	
	Prevalence Replicate Weights	
Variable Group 11. Variance Estimation Strata and Units		
VST_PSU	Phase II Variance Estimation Strata	
VUN_PSU	Phase II Variance Estimation Unit	

Footnotes

[1] FTE is used here and in the SAS file to refer to the number of full-time staff on payroll.
[2] The SAS file lists PTE as part-time and contract staff.
[3] 365 days per year is used to derive number of treatment cycles, 365/NQL or NC3.
[4] Episodes are essentially equivalent to admissions.
[5] 52 weeks per year used to calculate annual salaries.
[6] Estimated 1,880 hours per year worked per employee.
[7] Groups assumed to be held 50 weeks per year.

Appendix C

Internal and External Data Estimates

Appendix C – Internal and External Data Estimates

Internal Data Estimates

Internal estimation of a variable was based on the variable's relationship to other variables reported by the facility. Internal estimation was used for a variety of variable types including admissions, discharges, point prevalence, facility costs and revenues, and staffing data and hourly rates. A series of examples are provided below to demonstrate how "internal estimates" were developed.

Example 1 – Admissions and Discharges

Generally, if a facility administrator was confident in reporting either the annual admission or the annual discharge count of clients, but not both variables, the reported measure was used to estimate the corresponding unreported client count measure. Given a reliably reported point prevalence and average length of stay, this provides the best estimate of client throughput, assuming a stable, steady state of service delivery.

Example 2 – Facility Costs and Revenues

If a facility administrator was confident in reporting either the facility's total annual costs or the total annual revenues, but not both variables, the reported measure was used to estimate the corresponding unreported measure of resource use. This occurred most frequently when a facility's reporting sampled unit or 'modality' was administratively part of a larger umbrella organization. Often, facility officials were able to report program costs, but were unable to report revenue data, which was maintained at a higher level within the organization. In this type of situation, the unobtainable revenue data were estimated based on reported cost figures.

Example 3 – Staffing and Hourly Rates

If a multi-modality facility's outpatient methadone program is able to report an hourly rate of pay for its Master's Degree Counselors, but the regular outpatient program is unable to report the same variable, the identical hourly rate would similarly be applied to the outpatient program. This internal estimate assumes an equivalent average rate of pay for a Master's Degree Counselor throughout the entire substance abuse treatment facility.

Example 4 – Average Length of Stay

A residential facility director confidently reports its point prevalence (55), along with the number of admissions (1813) and discharges (1878) over the past 12-month period. The facility director also indicates that he or she is very unclear about the average length of stay for clients and is uncomfortable giving any data regarding this variable. As a result, the cost analyst staff would provide an internal estimate of the average length of stay, NQL, based on the above reported variables, namely, point prevalence, total admissions, and total discharges. In order to obtain this estimate, average client count calculations were used as analysis variables in the facility's data analysis.

These variables include:

N1C26 (Phase II Admission Derivative) = NQA/(365/NQL)
N1C27 (Phase II Discharge Derivative) = NQD/(365/NQL)
NQ3 (Point Prevalence)

N1C26 and N1C27 are formulas of derived average client counts for the facility.

Subsequently, the information given by the director is entered into the above formulas.

N1C26 = 1813/(365/x1) = 55
N1C27 = 1878/(365/x2) = 55
NQ3 = 55

Solving, x1 (based on admission) = 11.1 days and x2 (based on discharges) = 10.7 days. As a result, x or NQL = approximately 11 days.

This result would be entered into the facility's data set as the internal estimate. It is apparent that this analysis is heavily dependent upon the accuracy of the reported admissions, discharges, and point prevalence.

In other facilities, the director could provide only a range, rather than a specific value, for some items. Then a sensitivity analysis was conducted using the above formulas to identify a reasonable estimate of the average length of stay, NQL.

Appendix D

Variance Estimation of Ratio Estimators

Appendix D - Variance Estimation of Ratio Estimators

One of the major goals of the ADSS cost study is the estimation of cost and revenues rates (e.g., the cost per client admission, the cost per client day, or the cost per client visit). These parameters of interest involve ratios of population totals and means. In general, these ratios can be estimated by means of either combined or separate ratio estimators. See Cochran (1977) and Lohr (1999) for a discussion.

The combined ratio estimator was the preferred method of estimation in the form $\hat{R} = \hat{\bar{Y}} \Big/ \hat{\bar{X}}$, where $\hat{\bar{Y}}$ and $\hat{\bar{X}}$, respectively, are estimates of the population means $\bar{Y} = Y / N$ and $\bar{X} = X / N$ (N is the population size; Y and X are the corresponding population totals). One advantage, pointed out by Lohr (p. 225), is smaller bias when there is a small number of primary sampling units (PSUs) in the strata.

Because ratio estimators are non-linear, estimation of their variances is more involved than that of totals and means. In this report, variances of ratio estimators were estimated by the delete-1 Jackknife method:

$$\text{var}_{JK}\left(\hat{\beta}\right) = \sum_{h=1}^{L} \frac{n_h - 1}{n_h} \sum_{i=1}^{n_h} \left(\hat{R}_{(h,i)} - \hat{R}\right)^2 ,$$

where $h = 1,\ldots, L$ are the strata, $i = 1,\ldots,n_h$ are the PSUs in stratum h, and $\hat{R}_{(h,i)} = \hat{\bar{Y}}_{(h,i)} \Big/ \hat{\bar{X}}_{(h,i)}$ is the estimated ratio based on the sample with PSU i in stratum h deleted, and the weights recalibrated.

Note: In this appendix, true variances are denoted by Var and their estimates by lowercase var.

Variance of a Ratio of a Ratio and a Mean

One parameter of interest (e.g., cost per counseling hour per client) was of the form $U = (\bar{Y} / \bar{X}) / \bar{Z} = \bar{Y}(\bar{X}\bar{Z})$. It was estimated by $\hat{U} = \hat{\bar{Y}} / (\hat{\bar{Y}}\hat{\bar{Z}})$. Note that $U = N \cdot U_1$ where $U_1 = Y / (XZ)$.

Its variance was estimated by first performing Taylor linearization and then estimating the variance by applying delete-1 jackknife to the residuals. In more detail, the following steps were followed.

a. Taylor linearization:

If $u = y/(xz)$, then

$$\Delta u \approx \frac{1}{x_0 z_0}\Delta y - \frac{y_0}{x_0^2 z_0}\Delta x - \frac{y_0}{x_0 z_0^2}\Delta z = \frac{1}{x_0 z_0}\left[\Delta y - \frac{y_0}{x_0}\Delta x - \frac{y_0}{z_0}\Delta z\right].$$

So,

$$\text{Var}\left(\hat{U}_1\right) \approx \frac{1}{X^2 Z^2}\text{Var}\left(\hat{G}\right) \qquad (1)$$

where

$$g_i = y_i - \frac{Y}{X}x_i - \frac{Y}{Z}z_i = y_i - \frac{\bar{Y}}{\bar{X}}x_i - \frac{\bar{Y}}{\bar{Z}}z_i$$

and where $\hat{G}$ is the estimate of the population total $\Sigma_i g_i$.

b. Applying the jackknife:

To estimate the variances in (1), because the g_is involve the unknown values Y and X, we approximate them by

$$h_i = y_i - \frac{\hat{Y}}{\hat{X}} x_i - \frac{\hat{Y}}{\hat{Z}} z_i = y_i - \frac{\hat{\bar{Y}}}{\hat{\bar{X}}} x_i - \frac{\hat{\bar{Y}}}{\hat{\bar{Z}}} z_i \tag{2}$$

and use

$$\text{var}\left(\hat{U}_1\right) = \frac{1}{\hat{X}^2 \hat{Z}^2} \text{var}\left(\hat{H}\right),$$

where $\hat{H}$ is the estimate of the population total of the variable h.

Because $U = N \cdot U_1$, Var $(U) = N^2 \text{Var}(U_1)$. So

$$\text{S.E.}(\hat{U}) = \frac{1}{(N\hat{\bar{X}})(N\hat{\bar{Z}})} N\text{S.E.}(\hat{H}) = \frac{1}{\hat{\bar{X}}\hat{\bar{Z}}} \frac{1}{N} \text{S.E.}(\hat{H}). = \frac{1}{\hat{\bar{X}}\hat{\bar{Z}}} \text{S.E.}(\hat{\bar{H}}) \tag{3}$$

Therefore, the procedure used was as follows:

1. Create a new variable h for each unit, using (2).
2. Calculate the standard error S.E. $(\hat{H})$.
3. Use formula (3).

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Reports in the Household Survey Series present information from SAMHSA's National Household Survey on Drug Abuse. This representative survey is the primary source of information on the prevalence, patterns, and consequences of drug and alcohol use and abuse in the general U.S. civilian non-institutionalized population, age 12 and older. This survey has been conducted periodically since 1971 and annually since 1990.

"H" Series publications currently available:

- H-1: National Household Survey on Drug Abuse: Main Findings 1995
- H-2: The Prevalence and Correlates of Treatment for Drug Problems
- H-3: Preliminary Results from the 1996 National Household Survey on Drug Abuse
- H-4: National Household Survey on Drug Abuse: Population Estimates 1996
- H-5: National Household Survey on Drug Abuse: Main Findings 1996
- H-6: Preliminary Results from the 1997 National Household Survey on Drug Abuse
- H-7: National Household Survey on Drug Abuse: Population Estimates 1997
- H-8: National Household Survey on Drug Abuse: Main Findings 1997
- H-9: National Household Survey on Drug Abuse: Population Estimates 1998
- H-10: Summary of Findings from the 1998 National Household Survey on Drug Abuse
- H-11: National Household Survey on Drug Abuse: Main Findings 1998
- H-12: Summary of Findings from the 1999 National Household Survey on Drug Abuse
- H-13: Summary of Findings from the 2000 National Household Survey on Drug Abuse
- H-14: National and State Estimates of the Drug Abuse Treatment Gap: 2000 NHSDA
- H-15: State Estimates of Substance Use from the 2000 NHSDA: Vol. I. Findings
- H-16: State Estimates of Substance Use from the 2000 NHSDA: Vol. II. Supplementary Technical Appendices
- H-17: Results from the 2001 NHSDA: Vol. I. Summary of National Findings
- H-18: Results from the 2001 NHSDA: Vol. II. Technical Appendices and Selected Data Tables

Drug Abuse Warning Network (DAWN) Series:
Reports in the DAWN Series provide data on the number and characteristics of (1) drug abuse related visits to a national representative sample of hospital emergency departments, and (2) drug abuse related deaths from selected medical examiner offices. The medical examiner cases are not from a national representative sample. DAWN is an ongoing data system that began in the early 1970's.

"D" Series publications currently available:

- D-1: Drug Abuse Warning Network Annual Medical Examiner Data 1995
- D-2: Mid-Year Preliminary Estimates from the 1996 Drug Abuse Warning Network
- D-3: Year-End Preliminary Estimates from the 1996 Drug Abuse Warning Network
- D-4: Drug Abuse Warning Network Annual Medical Examiner Data 1996
- D-5: Mid-Year 1997 Preliminary Emergency Department Data from the Drug Abuse Warning Network
- D-6: Year-End 1997 Emergency Department Data from the Drug Abuse Warning Network
- D-7: Annual Emergency Department Data from the Drug Abuse Warning Network, 1995
- D-8: Annual Emergency Department Data from the Drug Abuse Warning Network, 1996
- D-9: Annual Emergency Department Data from the Drug Abuse Warning Network, 1997
- D-10: Mid-Year 1998 Preliminary Emergency Department Data from the Drug Abuse Warning Network
- D-11: Year-End 1998 Emergency Department Data from the Drug Abuse Warning Network
- D-12: Drug Abuse Warning Network Annual Medical Examiner Data 1997
- D-13: Drug Abuse Warning Network Annual Medical Examiner Data 1998
- D-14: Mid-Year 1999 Preliminary Emergency Department Data from the Drug Abuse Warning Network
- D-15: Year-End 1999 Emergency Department Data from the Drug Abuse Warning Network
- D-16: Drug Abuse Warning Network Annual Medical Examiner Data 1999
- D-17: Mid-Year 2000 Preliminary Emergency Department Data from the Drug Abuse Warning Network
- D-18: Year-End 2000 Emergency Department Data from the Drug Abuse Warning Network
- D-19: Mortality Data from the Drug Abuse Warning Network, 2000
- D-20: Emergency Dept. Trends From the Drug Abuse Warning Network, Preliminary Estimates Jan.-June 2001
- D-21: Emergency Department Trends From the Drug Abuse Warning Network, Final Estimates 1994 -2001
- D-22: Emergency Dept. Trends From the Drug Abuse Warning Network, Preliminary Estimates Jan.-June 2002
- D-23: Mortality Data from the Drug Abuse Warning Network, 2001

(Continued on next page)

Drug and Alcohol Services Information System (DASIS) Series:
Reports in the Services Series provide national and state level data on (1) the characteristics of specialty treatment facilities providing drug and alcohol services; (2) the number of persons in treatment; and (3) the demographic and drug use characteristics of treatment admissions. The Services Series also includes the National Directory of Drug and Alcohol Abuse Treatment Programs. The publications in this Series are based on SAMHSA's Drug and Alcohol Services Information System (DASIS).

"S" Series publications currently available:

- S-1: National Directory of Drug Abuse and Alcoholism Treatment and Prevention Programs 1996
- S-2: Uniform Facility Data Set (UFDS): Data for 1995 and 1980-1995
- S-3: Uniform Facility Data Set (UFDS): Data for 1996 and 1980-1996
- S-4R: National Directory of Drug Abuse and Alcoholism Treatment and Prevention Programs 1997
- S-5: National Admissions to Substance Abuse Treatment Services: The Treatment Episode Data Set (TEDS) 1992-1996
- S-6: Uniform Facility Data Set (UFDS): 1997
- S-7: Treatment Episode Data Set (TEDS): 1992-1997
- S-8: National Directory of Drug Abuse and Alcoholism Treatment Programs,1998
- S-9: Substance Abuse Treatment in Adult and Juvenile Correctional Facilities: Findings from the UFDS 1997 Survey of Correctional Facilities
- S-10: Uniform Facility Data Set (UFDS): 1998
- S-11: Treatment Episode Data Set (TEDS): 1993-1998
- S-12: National Directory of Drug and Alcohol Abuse Treatment Programs 2000
- S-13: Uniform Facility Data Set (UFDS): 1999
- S-14: Treatment Episode Data Set (TEDS): 1994-1999
- S-15: National Directory of Drug and Alcohol Abuse Treatment Programs 2001
- S-16: National Survey of Substance Abuse Treatment Services (N-SSATS): 2000
- S-17: Treatment Episode Data Set (TEDS): 1992-2000
- S-18: National Directory of Drug and Alcohol Abuse Treatment Programs 2003

Analytic Series:
Reports in the Analytic Series address special topics relating to alcohol, drug abuse, and mental health. The Analytic Series generally provides data from outcome and other special studies, secondary analysis of multiple data sources, or more in-depth analysis of the data presented in the standard annual reports in the other Office of Applied Studies publication series.

"A" Series publications currently available:

- A-1: Employment Outcomes of Indigent Clients Receiving Alcohol and Drug Treatment in Washington State
- A-2: An Analysis of Worker Drug Use and Workplace Policies and Programs
- A-3: Substance Use Among Women in the United States
- A-4: Substance Abuse and Mental Health Statistics Source Book 1998
- A-5: Services Research Outcomes Study
- A-6: Prevalence of Substance Use Among Racial and Ethnic Subgroups in the U.S., 1991-1993
- A-7: Analyses of Substance Abuse and Treatment Need Issues
- A-8: Driving After Drug or Alcohol Use: Findings from the 1996 NHSDA
- A-9: The Relationship Between Mental Health and Substance Abuse Among Adolescents
- A-10: Substance Use and Mental Health Characteristics by Employment Status
- A-11: Worker Drug Use and Workplace Policies and Programs: Results from the 1994 and 1997 NHSDA
- A-12: Risk and Protective Factors for Adolescent Drug Use: Findings from the 1997 National Household Survey on Drug Abuse
- A-13: Parental Influences on Adolescent Marijuana Use and the Baby Boom Generation: Findings from the 1979-1996 NHSDA
- A-14: Youth Substance Use: State Estimates from the 1999 NHSDA
- A-15: Tobacco Use in America: Findings from the 1999 NHSDA
- A-16: Substance Dependence, Abuse and Treatment: Findings from the 2000 NHSDA
- A-17: Initiation of Marijuana Use: Trends, Patterns and Implications
- A-18: Impact of September 11, 2001 Events on Substance Use and Mental Health in the New York Area
- A-19: Risk and Protective Factors for Adolescent Drug Use: Findings from the 1999 NHSDA
- A-20: The ADSS Cost Study: Costs of Substance Abuse Treatment in the Specialty Sector
- A-21: Substance Use by Older Adults: Estimates of Future Impact on the Treatment System

Methodology Series:
Reports in the Methodology Series address methodological issues concerning data collection systems conducted by SAMHSA's Office of Applied Studies. These reports include studies of new statistical techniques and theories, survey methods, sample design, survey instrument design, and objective evaluations of the reliability of collected data.

"M" Series publications currently available:

- M-1: Substance Abuse in States and Metropolitan Areas: Model Based Estimates from the 1991-1993 NHSDA--Methodology Report
- M-2: Drug Abuse Warning Network Sample Design and Estimation Procedures--Technical Report
- M-3: Development of Computer-Assisted Interviewing Procedures for the NHSDA
- M-4: Drug Abuse Warning Network: Development of a New Design--Methodology Report

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