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NATIONAL EVALUATION DATA SERVICES

## **COSTS AND BENEFITS ASSOCIATED WITH SUBSTANCE ABUSE TREATMENT IN THE PORTLAND TARGET CITIES INITIATIVE**

**October 2002**





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PORTLAND TARGET CITIES INITIATIVE**

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## FOREWORD

The mission of the Center for Substance Abuse Treatment (CSAT), Substance Abuse and Mental Health Services Administration (SAMHSA), is to improve the lives of individuals and families affected by alcohol and drug abuse by ensuring access to clinically sound, cost-effective addiction treatment that reduces the health and social costs to our communities and the nation. As part of its mission, CSAT supports the development of innovative treatment approaches, based on sound data and state-of-the-art analyses, and disseminates information on treatment approaches shown to be effective for curbing addiction and related behaviors.

In 1997, CSAT established the National Evaluation Data Services (NEDS) contract to support the CSAT mission. In 2000, through a new contract (Contract No. 270-00-7078), CSAT continued and expanded the scope of NEDS. NEDS activities help to foster collaboration and partnering among the public and private sectors along the Federal-state-local community-based treatment continuum. The three major activities of NEDS, under the current contract, are to assist in developing data infrastructure vehicles and tools, to perform treatment services secondary analyses on existing data, and to support the Government Performance Results Act (GPRA) activities. NEDS, through its Secondary Analysis Technical Reports, provides evidence-based information on substance abuse treatment issues relevant to treatment needs, access, utilization, efficacy, effectiveness, and efficiency. NEDS analyses focus on treatment needs, services received, and populations of interest to the substance abuse treatment field in order to provide new information about which services yield the best outcomes for what types of clients, at what cost. This information helps address treatment issues such as the treatment gap, culturally competent treatment services, and recovery.

The purpose of this analysis was to examine benefit/cost ratios in a substance abuse treatment context in Portland, Oregon. A data set was developed that combined self-reported data from a substance abuse treatment baseline assessment instrument for two treatment cohorts with data from administrative databases from three local systems (treatment, court, and correctional) used by clients during a 3-year period. This data set was then analyzed to answer four questions related to the impact of substance abuse treatment on specific systems and agencies that expend resources on clients. The benefit/cost ratios found in this study suggest that treatment can decrease future costs from within the local treatment, court, and correctional systems.

Patrick J. Coleman  
Project Director  
National Evaluation Data Services (NEDS)

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We wish to thank Dr. Allan Goodman, Wayne State University, for his valuable and insightful comments on an earlier draft of this paper. Thanks are also due to Substance Abuse and Mental Health Services Administration (SAMHSA) staff members who reviewed and commented on an earlier draft of this paper. In addition, we gratefully acknowledge the project team for the Target Cities initiative, specifically, Dr. Richard Stephens and Heather Huff at the University of Akron, and Randolph Muck, the CSAT Government Project Officer. We also wish to acknowledge the Target Cities grantees and evaluators who contributed data to the Target Cities database.

Many individuals on the NEDS team contributed to this report through content and editorial reviews and final document preparation. Special thanks go to Michael Wolf-Branigin, Beverly Hitchins, Marsha Morahan, Sharyn Berg, and Iris Mensing.

## ABSTRACT

The Portland Target Cities evaluation collected data from two cohorts of substance abuse treatment clients: one pre-Target Cities and one post-Target Cities. These data came from a self-report assessment instrument administered at the time of intake. This analysis took those data and combined them with administrative data on the sample cohorts from the Portland treatment system, the Portland court system, and the Portland corrections system, each of which had spent resources on these clients. The analysis took the approach that the three systems must be regarded together, both as treating the clients and as desiring to gain cost benefits from their treatment. The purpose of the analysis was to examine benefit/cost ratios with both cohorts, comparing amounts spent to treat them (and adjudicate and incarcerate them) during an 18-month period from their initial assessment date. This information was then compared to the amounts spent by these same systems in a second 18-month follow-up post-treatment period.

This analysis focused on four questions:

- Did the Portland Target Cities initiative produce cost savings to the court system, the correctional system, and the substance abuse treatment system compared to the pre-Target Cities sample? (Did this translate into better benefit/cost ratios)?
- Were receiving treatment and completing treatment crucial factors in cost savings?
- Did receiving treatment reduce the costs to all three systems combined (treatment, court, and corrections)?
- Did some types of treatment or combination of treatment types produce better benefit/cost ratios?

Analysis of the data using an analysis of covariance (ANCOVA) revealed that after controlling for pre-existing differences, significantly better outcomes were found for both Target Cities and for treatment itself. The benefit/cost ratios found in this study suggest that treatment can decrease future costs from within the local treatment, court, and correctional systems.

## **EXECUTIVE SUMMARY**



## EXECUTIVE SUMMARY

The fundamental reasoning of a cost-benefit approach to substance abuse treatment is that untreated substance abuse is very costly to taxpayers, who must, in one way or another, fund the consequences of negative social behaviors resulting from substance abuse. Substance abuse leads to ancillary negative social behaviors that have cost consequences to other systems, such as the criminal justice system. The criminal justice system increasingly has become involved in mandating or encouraging substance abuse treatment and enforcing sanctions for non-compliance. Through probation programs, day reporting centers, in-jail treatment and pre-treatment, and drug courts, the criminal justice system has increased the utilization of substance abuse treatment. Many individuals in the court and corrections systems have come to believe that substance abuse treatment will be a cost-effective way of breaking the cycle of substance abuse and criminality. Others believe that treatment is an expensive use of resources and does not produce a reasonable return on taxpayer investment.

### 1. INTRODUCTION

The fundamental questions that this analysis is intended to answer are:

- Did the Portland Target Cities initiative produce cost savings to the court, correctional, and substance abuse treatment systems compared to the pre-Target Cities sample? (Did this translate into better benefit/cost ratios?)
- Were receiving treatment and completing treatment a crucial factor in cost savings?
- Did receiving treatment reduce the costs to all three systems combined (treatment, court, and corrections)?
- Did some types of treatment or combination of treatment types produce better benefit/cost ratios?

For this analysis, samples collected after the Portland Target Cities initiative was started and samples from a pre-Target Cities period were combined with administrative databases from the substance abuse treatment system, the court system, and the correctional system in Multnomah County (Portland), Oregon, to develop benefit/cost ratios for treatment and for specific types of treatment.

### 2. METHODS

The Portland Target Cities data set was created from interviews conducted with a cohort of clients entering the central intake sites in Multnomah County (Portland) from March through

July 1997. Interviews were also conducted with a comparison sample of clients referred to substance abuse treatment in Multnomah County from November 1994 to March 1997, a period just prior to the implementation of Target Cities in Portland. Data were available on 448 study subjects and 406 comparison subjects for a total of 854 subjects.

The Target Cities data set for Portland, Oregon, was examined in relation to three other administrative data sets. These data sets provided information on substance abuse treatment episodes (e.g., residential, outpatient, methadone) and their costs, court-related activities (e.g., hearings, bench warrants) and their costs, and correctional activities (e.g., bookings, incarcerations) and their costs. A transaction costs approach was used to examine the relationship between substance abuse treatment system costs and avoided criminal justice costs associated with varying modules of treatment services. The data available from these data sets allowed an examination of data on costs from the substance abuse treatment, court, and correctional systems for a period of 3 years after the assessment of need for substance abuse treatment for each of the cohorts.

This analysis took an approach that viewed avoided costs as opportunity costs (or opportunity resources). It was not assumed that costs that might have been “saved” by these systems would show up in lower budgets in subsequent years. Instead, the approach looked at avoided costs as opportunity resources that would be used by the various systems in this analysis in other ways to fulfill their mission.

The analysis took a different approach to two issues that arise in conducting this type of analysis. Following traditional evaluation approaches, substance abuse treatment has been viewed as a discreet event with a specific start date and a specific end date, after which the client can be assessed a success or failure, and subsequent benefits can be measured. In fact, substance abuse treatment, when seen as a continuum of treatment, operates in fits and starts and can have several “completions” before the impact can be measured. This analysis examined treatment episodes and completions throughout an 18-month period beginning at the time of assessment that treatment was needed. This allowed time for multiple treatment episodes to begin to have an impact. The period in which outcomes were assessed was 18 to 36 months after the assessment of treatment need.

Reductions (or increases) of costs to these three systems were examined from the first period to the second for both cohorts, comparing those who received treatment and those who did not within each cohort. This is an approach that attempts to answer the question of whether this integrated criminal justice/treatment approach makes economic sense for the systems involved. It is focused on the question of whether substance abuse treatment (which is funded

and supported through these systems) repays these particular systems through lower subsequent costs.

### **3. FINDINGS**

The findings have four components:

- The Portland Target Cities initiative produced opportunity cost savings to the court, correctional, and substance abuse treatment systems compared to the pre-Target Cities sample. This translated into better benefit/cost ratios for Portland.
- Receiving treatment and completion of treatment were important variables affecting the benefit/cost ratios. Longer stay and treatment completion produced the best ratio.
- Treatment reduced costs for all three systems combined (treatment, court, and corrections).
- Most combinations of treatment types produced good benefit/cost ratios.

These findings suggest that substance abuse treatment can decrease future costs from within the local treatment, courts, and correctional systems.

### **4. SUMMARY AND IMPLICATIONS**

These findings have practical implications for substance abuse treatment providers, who can examine the impact of treatment on other local systems such as courts and corrections. Findings that suggest that treatment can reduce subsequent costs to the local court and corrections systems using an avoided costs/opportunity resources model may be more convincing to stakeholders at the local level.

These findings also have practical implications for policymakers responsible for allocating scarce resources. They suggest that the trend toward combined criminal justice/treatment-linked programs, such as drug courts, are cost efficient and that treatment produces reduced costs in these systems. The data are particularly useful because they suggest the beneficial effects of treatment on client behavior that, in turn, affects the operations of treatment, court, and correctional systems. Policymakers within these three systems are the most likely to be called upon to make practical decisions about the benefit/cost of increasing treatment resources.

The analyses reported here represent only a preliminary step in exploring new approaches to the area of benefit/cost analysis for substance abuse treatment. Researchers/evaluators can

build on knowledge gained here to expand their ability to design new studies and analyses that examine the complexity of the costs of treatment and saved opportunity costs of treatment at the level of local budgets and systems. Furthermore, analysts could be encouraged to include cost and benefit calculations when designing new data collection efforts and data analyses for evaluating substance abuse treatment services.

## **I. INTRODUCTION**

# I. INTRODUCTION

This chapter presents an overview of the current analysis and discusses relevant prior studies, the context for the present analysis, and issues faced and strategies adopted in planning this analysis. The chapter concludes with sections describing the importance of this effort to the substance abuse treatment field and the organization of this report.

## 1. OVERVIEW OF THE PURPOSE OF THE CURRENT ANALYSIS

For this analysis, a sample collected from the Portland Target Cities initiative and from a pre-Target Cities sample were combined with administrative databases of the substance abuse treatment system, the court system, and the correctional system in Multnomah County (Portland), Oregon, to develop benefit/cost ratios for treatment and for specific types of treatment.

The fundamental questions that this analysis is intended to answer are fourfold:

- Did the Portland Target Cities initiative produce opportunity cost savings to the court, correctional, and substance abuse treatment systems compared to the pre-Target Cities sample? (Did this translate into better benefit/cost ratios?)
- Were receiving treatment and completing treatment crucial factors in opportunity cost savings?
- Did receiving treatment reduce the costs to all three systems combined (treatment, court, and corrections)?
- Did some types of treatment or combinations of treatment types produce better benefit/cost ratios?

The Portland Target Cities data set was created from interviews conducted with a cohort of clients entering the central intake sites in Multnomah County (Portland) from March through July 1997. Interviews were also conducted with a comparison sample of clients referred to substance abuse treatment in Multnomah County (Portland) from November 1994 to March 1997, a period just prior to the implementation of Target Cities. Data are available on 448 study subjects and 406 comparison subjects for a total of 854 subjects.<sup>1</sup> The sample clients are about 65 percent male and 35 percent female. There was no overlap in the two samples.

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<sup>1</sup> Originally 860 were counted but 6 were duplicate names.

The Target Cities data set for Portland, Oregon, was examined in relation to three other administrative data sets. These sets provided data on substance abuse treatment episodes (e.g., residential, outpatient, methadone) and their costs, court-related activities (e.g., hearings, bench warrants) and their costs, and correctional activities (e.g., bookings, incarcerations) and their costs. In this analysis, a transaction costs approach<sup>2</sup> was used to examine the relationship between substance abuse treatment system costs and avoided criminal justice costs associated with varying types of treatment services. Data from the three administrative data sets allowed an examination of information on costs from the substance abuse treatment, court, and correctional systems for a period of 3 years after the initial assessment of need for substance abuse treatment for each of the cohorts.

To construct an estimate of overall treatment costs and costs of specific treatment types, a strategy was developed to match client-level data on substance abuse treatment utilization and data on unit costs of substance abuse treatment for both Target Cities and comparison samples. Up to 3 years of subsequent treatment history and the costs associated with that treatment were also examined to assess the cost avoidance (benefit) potential for successful substance abuse treatments. Another aspect of the strategy was to match data on 3 years of subsequent criminal justice system utilization for both Target Cities and comparison samples and then to match them with data on unit costs. The purpose was to estimate the total subsequent criminal justice system costs and potential cost avoidance (benefits) due to successful treatment.

## **2. RELEVANT PRIOR STUDIES**

A handful of prior studies have attempted to produce useful benefit/cost ratios for substance abuse treatment systems. The “Evaluating Recovery Services: The California Drug and Alcohol Treatment Assessment” (CALDATA), Report to the State of California Department of Alcohol and Drug Programs (Gerstein et al., 1994), found positive effects of drug and alcohol treatment on self-reported subsequent criminal activity in a statewide sample. Utilizing a cost analysis, analysts determined a benefit/cost ratio of \$7 saved for every \$1 spent on treatment. This study was limited because it was based on general proxy data for unit costs (e.g., the unit cost of an arrest was determined by dividing the total statewide police budget by the total number of arrests statewide) and self-reported data for system resource utilization. Although that study was a major and useful attempt to look at the issue of benefit/cost of substance abuse treatment,

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<sup>2</sup> A transaction costs approach examines the provision of resources by publicly funded agencies as a set of transactions within which many different systems can contribute resources. The costs of a booked arrest, for instance, would include contributions by the police department in police time, the booking and recog unit, and perhaps an assessment unit at the jail, a transaction that occurs regardless of whether the person is incarcerated or released.

there were concerns (e.g., French, 1995) that the unit costs were not specific to the local situation in which the client was using resources and that client self-report was not entirely trustworthy.

In 1996, a statewide study was conducted of the benefit/cost of substance abuse treatment in the State of Oregon (Finigan, 1996), based on a “cost to taxpayers” approach patterned after that of CALDATA (Gerstein et al., 1994). The study design was created with the following characteristics:

- Representative sampling of treatment completers
- Development of a matched comparison group using clients who enrolled in treatment but left before receiving an appreciable amount of treatment
- Use of existing Oregon administrative state agency databases rather than self-reported data
- Data collected for a time period of 2 years prior and 3 years subsequent to treatment completion.

Finigan, using a quasi-experimental design, compared groups of clients who completed treatment with groups of clients who had enrolled in treatment programs, but who terminated after receiving only minimal services. This study found a benefit/cost ratio of \$3 saved for every \$1 spent on treatment. The constraint encountered in this analysis was that individual treatment episode costs could not be assessed, and therefore, the costs were determined to be the total budget spent in the relevant year by Oregon Mental Health and Addiction Services (formerly the Oregon Office of Alcohol and Drug Abuse Programs), an assumption that excluded some other sources of public funding.

In 1998, a study of the benefit/cost of the Multnomah County (Portland) Oregon Drug Court Program (Finigan, 2000) was conducted. Outcomes and unit costs were generated using administrative databases in a manner similar to the 1996 study of treatment completion statewide (Finigan, 1996). The results showed both positive outcomes and avoided cost savings.

In 1999, a National Evaluation Data Services (NEDS) analysis (Koenig, Denmead, Nguyen, Harrison, & Harwood, 1999), using the National Treatment Improvement Evaluation Study (NTIES) self-reported data and focusing on costs before and after treatment spanning a wide range of service systems, concluded that the benefits of treatment more than offset the costs and implied a benefit/cost ratio of 4.2 to 1. While this study is crucial in presenting an overall picture of the impact of substance abuse treatment, it relies exclusively on self-reported data and broad proxies for unit costs. Therefore, it is less applicable to local treatment and criminal justice systems that want cost data more specific to their systems.



In 2000, another NEDS analysis (Koenig, Harwood, Sullivan, & Sen, 2000) focused on the issue of the benefit/cost of incremental (marginal) benefits of additional treatment and the type and intensity of treatment. The analysis demonstrated that longer treatment duration is associated with reduced post-treatment costs. The analysis was of particular value to treatment providers because it allowed the calculation of the added benefit to society of an additional day of treatment. One constraint of the analysis was its reliance on self-reported data from clients rather than on actual administrative data on costs incurred by treatment and criminal justice systems. It was also broad in its assessment of avoided costs from a variety of systems rather than specific systems.

A series of studies using random assignment focused on the relative cost effectiveness of different types of treatment (Alterman et al., 1994; Bachman et al., 1992; Longabaugh et al., 1983; Schneider, Mittelmeier, & Gadish, 1996). They focused on intensive outpatient treatment versus hospital inpatient treatment and found no significant differences in outcomes but significantly less cost in the outpatient environment. This has important policy implications. If outpatient care is as effective as residential care, then a cost effectiveness model would argue for the much less costly treatment. In any case, this suggests that further analysis should also examine benefit/cost ratios for differing types of treatment.

Goodman, Tilford, Hankin, Holder, & Nishiura (2000) examined cost offsets to alcohol treatment measured in terms of reductions in non-alcohol-related medical treatment. They found cost offset effects for those who were treated for alcohol abuse and did not have co-occurring disorders. The study points to the need to separate short-term increases in costs associated with treatment from longer-term health improvement.

Finally, French (2000) provides a current review of the literature on the economic evaluation of alcohol treatment services. The article suggests a number of recommendations including the following:

- Reasonable sample size to achieve adequate power
- A benefit/cost approach
- A concern for the number and duration of treatment episodes
- A follow-up period longer than 1 year
- Examination of a system that involved protocols for matching treatment to clients.

These recommendations were incorporated in this analysis.

### **3. CONTEXT OF THE ANALYSIS: THE PORTLAND TARGET CITIES INITIATIVE**

The samples used in this analysis were developed as part of an evaluation of the Target Cities initiative in Portland, Oregon. Target Cities was a national treatment demonstration initiative, funded by the Center for Substance Abuse Treatment (CSAT), Substance Abuse and Mental Health Services Administration (SAMHSA), U.S. Department of Health and Human Services (DHHS). It was fully implemented in Portland in 1997, and the Central Intake Unit (CIU) continues in operation. The Portland Target Cities initiative was designed to benefit three groups of stakeholders:

- **Clients:** Centralized intake and standardized assessment were developed to increase the likelihood that substance abuse treatment clients would not only be placed into appropriate treatment but would engage in and complete treatment.
- **Funding source:** CSAT viewed the Portland Target Cities initiative (as well as other Target Cities initiatives funded in other cities) as a test of the centralized intake model. The data were expected to be useful in planning future funding.
- **Society-at-large:** The general public would benefit by the reductions in the negative social consequences of substance abuse.

The purpose of the CSAT Target Cities initiative was to improve systems and reduce fragmentation, lack of coordination, and inefficiency in the publicly funded substance abuse treatment system and among associated service providers in cities with high alcohol and substance abuse prevalence.

The core component of the Target Cities approach is a CIU designed to be the single point of access for clients who experience substance dependency or abuse problems. CIUs provide standardized assessment and some case management to the clients, referring them to providers of treatment, recovery, support, and other services, i.e., perform client-treatment matching. The Target Cities initiative differed from the pre-Target Cities system primarily in the creation of a centralized intake process and the institution of standardized assessments.

In the pre-Target Cities environment, clients were referred to a substance abuse treatment provider by a social worker, a community corrections officer, or some other source. The treatment provider would conduct an assessment of the treatment needs of that individual. That assessment was usually proprietary to the provider and was not standardized across providers. Providers had a vested interest in assessing clients as appropriate for treatment at their facility. In the Target Cities model, clients were referred to a CIU. They were given a standardized assessment and referred to appropriate providers. Although a handful of providers retained their

own assessment processes, the arrangement largely focused client flow through the central intake system.<sup>3</sup> The Portland Target Cities initiative was created as a system change initiative. It restructured the service delivery system to include centralized intake, a standardized assessment instrument, a supporting automated management information system, and improved inter-organizational linkages. The intent was to construct a centralized, sustainable treatment system that would increase the standardization of access to substance abuse treatment. It was not focused on improving or enhancing the treatment.

The implementation of Target Cities in Portland was marked by two significant trends. The first was a strong emphasis on targeted coordination of treatment for substance abusing criminal justice offenders. The key activities became more focused on integration with and referral from the criminal justice system. Centralization of intake was believed to lead to better assessment and referral, more effective treatment, and lessened subsequent criminal activity. Treatment services were targeted to substance abusing offenders in order to enhance inmate outcomes relative to inmates not receiving those services. A new initiative, the In-Jail Intervention Program (IJIP), was developed for inmates of the county jail. The interaction with the criminal justice system became more important as the Portland Target Cities initiative was implemented. The result was an increasing intertwinement of court and correctional expenditures with expenditures for substance abuse treatment.

The second important trend was the implementation of managed care. Coincidentally, Portland Target Cities emerged just as the Oregon Health Plan, a managed health care system, was being implemented to restructure the economic environment for providing publicly funded services to substance abusing clients. While a discussion of the impact of the Oregon Health Plan on the Portland Target Cities initiative is beyond the scope of this report,<sup>4</sup> one effect was to shift county services toward more criminally involved and more costly clients.

#### **4. ISSUES AND STRATEGIES**

The link between substance abuse and criminal behavior has been researched extensively. Approximately 68 percent of new arrestees test positive on a urine screen for one or more illicit drugs (National Institute of Justice, 1996). Furthermore, evidence shows that treating substance abuse leads to a lessening of criminal behavior. For individuals receiving substance abuse treatment who participated in NTIES, the National Opinion Research Center (NORC) (1997)

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<sup>3</sup> Some clients were identified in jail through an In-Jail Intervention Project, which acted as another CIU.

<sup>4</sup> See Barron, N., Thurston, C.A., Rumpitz, M., Windell, P.A., Finigan, M., & McFarland, B. (1999). The Portland Target Cities Project: Emerging patterns of service in a managed care environment. *Journal of Psychoactive Drugs*, 31(3).

found significant declines in criminal activity between the 12 months prior to treatment and the 12 months subsequent to treatment:

- Self-reported incidence of selling drugs was reduced by 78 percent
- Shoplifting was reduced by almost 82 percent
- Supporting oneself largely through illegal activity was reduced by more than 48 percent
- Arrests for any crime were reduced by 64 percent.

Positive effects of drug and alcohol treatment on self-reported subsequent criminal activity in a statewide sample were also found by Gerstein, Johnson, Harwood, Fountain, Suter, and Mallory (1994). In a subsequent study comparing those who completed treatment with a comparison group of those who were eligible but who did not receive treatment in the State of Oregon, Finigan (1996) found significant reduction in police-report arrests for those who completed treatment.

The economic consequences to society of drug and alcohol abuse have long been detailed. From a health perspective, untreated substance abusers produce tangible costs to health systems from both the health complications of substance use, and from increased accidents that result from the use of alcohol and drugs. In addition, substance abuse leads to ancillary negative social behaviors that have cost consequences to other systems, such as the criminal justice system. French (1995) described an array of tangible and intangible costs of substance abuse. This underscores the fundamental reasoning of a benefit/cost approach to substance abuse treatment. Untreated substance abuse is very costly to the individual, the individual's family and friends, and to taxpayers who must, in one way or another, fund the consequences of the negative social behaviors that result from substance abuse. Treatment providers and policymakers need benefit/cost information because substance abuse treatment and the court's increasing involvement in the treatment system (e.g., drug court) are perceived as expensive to implement, and data are needed to demonstrate that such treatment reduces costs in the long run.

Benefit/cost analysis is sometimes confused with cost-effectiveness analysis, which compares the relative cost for differing treatments to achieve some given outcome. It is easier to accomplish than benefit/cost analysis because it does not require that the outcomes of treatment be expressed in economic terms. Benefit/cost analysis places economic value both on the cost of treatment and the benefits that its outcomes produce.

Gerstein et al. (1994), using a self-report instrument, determined a benefit/cost ratio for treatment of \$7 saved for every \$1 spent. Finigan (1996), using administrative databases, found

a benefit/cost ratio of \$3.62 saved for every \$1 spent. French, Salome, and Krupski et al. (2000) in a study of Washington State clinics found benefit/cost ratios from \$10 to \$1 in one clinic, to \$23 to \$1 in another.

Assessing the cost and benefits (avoided costs due to positive outcomes) of substance abuse treatment has been fraught with methodological difficulties. Some of the difficulties have emerged in assessing the costs of treatment, others in assessing the avoided costs. While considerable advances have been achieved in developing substance abuse treatment cost assessment methodology in the last few years (e.g., French, 1995; Cartwright, 1998), the most difficult problems have emerged in assessing and attributing avoided costs. Several issues have emerged as most prominent. The approach for this analysis has been structured to address some of these concerns. These issues and the strategies adopted to study them are highlighted below.

#### **4.1 Use of Self-Reported Data**

Some benefit/cost research has relied on self-reported data to assess services utilized in substance abuse treatment and also to assess subsequent cost outcomes, such as arrests and incarcerations. Analyses based on the NTIES and CALDATA studies are examples. While there are clear advantages to the greater quantity of data that can be collected with a self-report instrument, it is difficult to use such data to address the actual costs incurred by local treatment and criminal justice systems. In addition, troublesome issues can arise, such as the respondent's telescoping of time periods, experiencing memory lapses, mis-perceiving police contacts as arrests, and providing "socially desirable" answers.

To address this concern, administrative data sets from Multnomah County (Portland), Oregon, were examined to acquire the data on actual system expenditures from the treatment system, court system, and correctional system within the county. These data were then combined with baseline self-reported data for the sample.

#### **4.2 Recipient of the Cost or Benefit**

The concept of benefit/cost begs the question, benefit or cost to whom? Some recipients of benefits and costs may be of less interest to policymakers in the public realm. Koenig, Harwood, Sullivan, et al. (2000) contrast an approach focused on benefits to society as a whole and an approach that focuses on benefits to the non-treated population (i.e., taxpayers). The "society as a whole" approach, for instance, would consider food stamps, welfare, or even robbery to be a transfer of income without net gain or loss. The "cost to the taxpayer" approach focuses on the expenditures of taxpayer dollars and looks at costs solely from the point of view

of the taxpaying public. This analysis of substance abuse treatment services in Portland focuses on the cost to taxpayer approach; while it might be of interest to examine the increase in income for substance abuse treatment clients, for example, this analysis examines the expenditure of costs within public budgets of the treatment, court, and correctional systems in Portland.

### **4.3 Opportunity Cost/Resources**

Many policymakers have failed to see any declines in actual budgets as a result of the linkage between criminal justice and substance abuse treatment. For instance, while substance abuse treatment has been linked to a reduction in re-arrests in the criminal justice system, most of the police and jail budgets have not shown any change, and jails remain full.

The approach used in this analysis views publicly funded costs as opportunity costs.<sup>5</sup> The concept of "opportunity cost" from the economic literature suggests that system resources are available to be used in other contexts if they are not spent on a particular transaction. For example, if substance abuse treatment reduces the number of times that a client is subsequently incarcerated, the local sheriff may see no change in his or her budget, but an opportunity cost resource will be available to the sheriff in the form of a jail bed that can now be filled by another person. The term "opportunity resources"<sup>6</sup> may be preferable to describe these costs, because it implies that costs saved may be less in dollars than in budgeted resources (e.g., people's time, jail bed space, residential beds) that can be used in another context to better fulfill the mission of the public budget-spending agency.

### **4.4 Linkage Between Publicly Funded Systems: The Transaction Cost Approach**

Benefit/cost analysts have looked at avoided costs in various publicly funded systems, considering each system separately. Little effort has been made to understand the cost implications of the linkages among systems. Specifically, the substance abuse treatment system is often intertwined with the court and correctional systems. The proliferation of drug courts, day reporting centers, in-jail treatment, and pre-treatment programs is an indication that the court and correctional systems have made the need for substance abuse treatment part of their mission.

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<sup>5</sup> Costs that can be used for an alternative purpose, often defined by economists as "the next best use" of the expended resource. For instance, a room in a jail could be used for substance abuse treatment sessions or for an additional room for pre-trial services.

<sup>6</sup> Opportunity resources is a way of expressing opportunity costs to help clarify that they are not simply dollars but people, rooms, and equipment that can be used for alternative purposes.

The approach used in this analysis examines the provision of opportunity resources by publicly funded agencies as a set of transactions in which many different systems can contribute resources. The approach follows some trends in the literature of organization theory that suggest that organizations can be best understood as contributing their resources to sets of transactions (Martinez & Dacin, 1999; Moe, 1984). This transaction cost analysis assumes that clients make contact with multiple systems and use resources from all those systems. In order to understand the costs that are expended and to negotiate the complexities of placing economic value on the reduced costs that accrue to the benefit of a program, one must focus on the interaction of multiple systems. This analysis focuses on the treatment system, the court system, and the corrections system.

#### **4.5 Continuum of Treatment**

Following traditional evaluation approaches, substance abuse treatment has been viewed as a discreet event with a specific start date and a specific end date, after which the client can be assessed a success or failure, and subsequent benefits can be measured. In fact, substance abuse treatment, when seen as a continuum of treatment, operates in fits and starts and can have several “completions” before the impact can be measured.

This analysis examined treatment episodes and completions throughout an 18-month period beginning at the time of assessment that treatment was needed. This allowed time for multiple treatment episodes to begin to have an impact. The period in which outcomes were assessed was 18 to 36 months after the assessment of treatment need.

### **5. IMPORTANCE OF THE ANALYSIS FOR TREATMENT PROVIDERS, POLICYMAKERS, AND RESEARCHERS/EVALUATORS**

Treatment providers and policymakers are challenged to implement innovative approaches to addressing the problem of substance abuse and its relation to criminal activity. These approaches include drug courts, family courts, mental health courts, day-reporting centers, in-jail treatment services, drug-free zones, and more substance abuse-focused supervision. These innovations are occurring in difficult cost environments. Budgets are tight with little additional funding available to fund services. In other words, what is the best use of available dollars?

Increasingly, the criminal justice system (with its court and correctional components) has accepted the link between substance abuse and criminal justice activity. Substance abuse treatment, however, is perceived as expensive, and court-involved treatment (e.g., drug courts) is

perceived as particularly expensive.<sup>7</sup> A benefit/cost approach makes particular sense in that it provides data on the actual value of substance abuse treatment in this cost environment.

While previous benefit/cost studies suggesting high benefit-to-cost ratios have produced excitement among advocates of treatment, they have been more valuable in promoting treatment in general, and have been less helpful to local treatment, court, and correctional justice system stakeholders who are looking for evidence of savings in their budgets. In addition, as the court and correctional systems become intertwined with the substance abuse treatment systems, the court and correctional systems desire some accounting of their share of the costs of treatment. Finally, there is a growing recognition that successful substance abuse treatment is not always the result of one episode of treatment, but a pattern of treatment and setbacks that is costly to all three systems. This analysis is focused on estimating the way in which substance abuse treatment adds costs to specific budgets of these three systems and simultaneously results in avoided subsequent costs to the three systems.

For the research/evaluation community, the value of this analysis and its data set lies in the combination of information from actual administrative databases of the targeted systems with self-reported data gathered as part of a substance abuse treatment assessment. Most prior studies either rely exclusively on self-reported data or have relied on some general administrative databases. This analysis both links self-reported and administrative data and focuses on the specific databases of the systems that incurred the costs.

## **6. ORGANIZATION OF THE REPORT**

This report is organized into four chapters. This first chapter has provided an introduction to the purposes and focus of this analysis. The second chapter contains a description of the methodology used in developing the combined data set and the analytic strategies employed, including a discussion of the constraints of the data set. The third chapter provides a discussion of the findings of the analysis, including statistical information relevant to the analysis. The final chapter is a summary of the report that includes a discussion of the implications of the findings for the three stakeholder groups, treatment providers, policymakers, and researchers/evaluators.

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<sup>7</sup> Some judges take the opposite view, suggesting that the marginal costs (resources in addition to those already in place) of these programs are slight.



## **II. METHODS**

## **II. METHODS**

This chapter provides a summary description of the data sources used for this analysis, the time frame during which the data were collected, and the procedures used to develop the data set for the analyses. This chapter also contains a brief discussion of the analysis strategy, followed by a summary of the caveats associated with the analysis approach and the data set.

### **1. DATA SOURCES**

This section provides very brief descriptions of the sources of data used to construct the data set employed in this analysis.

#### **1.1 Target Cities Data Set (Portland)**

The Portland Target Cities data set was created from interviews conducted with a cohort of clients entering the central substance abuse treatment intake sites in Multnomah County (Portland) from March through July 1997. Interviews were also conducted with a comparison sample of clients referred to substance abuse treatment in Multnomah County from November 1994 to March 1997, a period just prior to the implementation of the Target Cities initiative. The samples did not overlap. Sample identifiers were assigned to each client, and an identification data set was created to link clients to data in other data sets under strict confidentiality parameters. Included in the data set are the results of a full Addiction Severity Index (ASI), which allows an assessment of the need for treatment and an examination of related subsequent expenditures in the treatment, court, and correction systems.

#### **1.2 Client Process Monitoring System**

The Client Process Monitoring System (CPMS), a management information system, is maintained by Oregon Mental Health and Addiction Services (formerly the Office of Alcohol and Drug Abuse Programs). All publicly funded substance abuse treatment providers report to this database. The CPMS provided information on substance abuse treatment utilization and completion for the clients in the two samples during the periods in question. This database is the most difficult from which to get accurate matches. Some treatment episodes may not have been reported, but on the whole it is the best source of information in Oregon on treatment episodes.

#### **1.3 The Oregon Judicial Information Network**

The Oregon Judicial Information Network (OJIN) is a case tracking system that stores Oregon State Court case information from multiple sources in a single database. Courthouses

throughout the state are electronically tied together into a statewide network. OJIN contains data regarding an individual's arrest charges, case status (i.e., whether the case is in warrant status, probation violation status, or active), court dates/times/locations, motions and orders filed, sentences, history of each case from when it was filed until disposition, attorney names, and some demographic information on the defendants. Data were extracted for the clients in the two samples, and costs to the system were assigned. OJIN is a very complete and reasonably accurate system (it is the basis for some judicial decisions), and the data can be considered reliable.

#### **1.4 The Multnomah County Booking and Arrest Database: The Sheriff's Warrants Information System**

The Sheriff's Warrants Information System (SWIS) contains all the information on local arrests, bookings, and incarcerations in the Multnomah County jail and its satellite facilities. The SWIS is a complete information system with police and correctional transactions available for each client. Of course, it does not contain information on arrests and incarcerations that occur outside of Multnomah County; however, the analysis was deliberately restricted to the costs incurred within the local systems.

#### **1.5 Criminal Justice: Unit Cost Database**

This database was developed to assess unit costs for court-related (e.g., hearings) and correctional (e.g., bookings and incarcerations) elements of the criminal justice system in Multnomah County (Portland). The details of budgets during a 1-year period were closely examined to develop this database. When matched to the criminal justice activities of the sample clients, this database allowed assessment of costs to the criminal justice system during the periods of interest. The unit costs were kept in 2001 dollars to aid current policymakers.<sup>8</sup>

#### **1.6 Substance Abuse Treatment: Unit Cost Database**

These data were provided by Multnomah County on per episode and per day unit costs of treatment in the county. When matched to the service utilization data in the CPMS system, they allowed an estimate of costs for the Portland Target Cities and comparison samples as a whole, as well as for various types of treatment. The unit costs were kept in 2001 dollars to aid current policymakers.

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<sup>8</sup> Treatment cost rates remained relatively steady in Multnomah County during the late 1990s.

## **2. TIMEFRAME**

The Portland Target Cities data set was created from interviews conducted with a cohort of clients entering the central intake sites in Multnomah County (Portland) from March through July 1997. Interviews were also conducted with a comparison sample of clients referred to substance abuse treatment in Multnomah County (Portland) from November 1994 to March 1997, a period just prior to the implementation of Target Cities. The data from the other databases were gathered for a period of 3 years following the interview assessment that made clients eligible for substance abuse treatment. Initially, it was hoped that data for 4 years following the interview date could be used in the analysis, but fourth year data from one of the databases were unreliable. This 36-month period of data on costs to the systems following the initial assessment of need for treatment was divided into two 18-month periods for the purposes of analysis.

## **3. DATA SET DEVELOPMENT**

Interview data from the Portland Target Cities and pre-Target Cities samples regarding substance use patterns, treatment services received, and involvement with the criminal justice system were supplemented by data gathered from the state CPMS, SWIS, and OJIN. Data requests were sent directly to the respective agencies holding the CPMS data and the county booking data. The requests asked for all information available for the specified variables spanning a 6-year time period to insure that relevant data were obtained for each client for the 3-year period immediately following the initial Portland Target Cities interview date. The interview date represents each client's initial treatment episode for the time period of interest for that client. CPMS data were received in the form of a MS-Access database. Booking data were received in two MS-Excel files, one reflecting arrests during the specified timeframe and the other indicating number of days and place of incarceration. OJIN data were collected by three trained research associates using the same 3-year time period convention, via the public access function of the OJIN system, and recorded in MS-Excel files.

## **4. DATA PROCEDURES**

All data were translated into SPSS files using version 11.01 and inspected for accuracy, both visually and through a series of validity checks. Cost information was obtained for treatment elements, arrests and days of incarceration, and court activities. Total costs for each episode of treatment, arrest, incarceration, and each court case were calculated for every client. The individual data sets were then restructured using the RESTRUCTURE command in SPSS to yield one record per individual containing variables for each separate episode. All data sets were

merged together to form one master data set. Each record in the master data set represents one client and all relevant information for that client's episodes of treatment, arrest, incarceration, and court activity within the specified timeframes. Total costs to the system for each client were calculated.

In the second phase of data manipulation, new timeframes were calculated to provide the groupings necessary to analyze the effect of treatment on subsequent criminal activity in a pre-post comparison design. An 18-month time period was selected, and new date variables were calculated to represent timeframes of 18 months pre-assessment and 18 to 36 months post-assessment. The date variable used as the initial comparison date was calculated to reflect 2 days prior to the initial interview date in order to simplify the syntax required for making the date comparisons. This strategy insured that all the date variables used as comparators would be inclusive, and all episodes would be classified accurately. The last day of the 1- to 18-month timeframe was evaluated as the first day of the 18- to 36-month timeframe.

The date for each episode of treatment, arrest, incarceration, or court case was examined individually for every client to determine in which time period it fell. New cost variables were then calculated for all events in both timeframes. Selected variables from the assessment data obtained during the Portland Target Cities initiative were then merged into the final data set.

## **5. ANALYSIS STRATEGY**

The analysis took a different approach to two problems that arose. First, the substance abuse treatment model is rarely one in which an individual enters treatment, completes treatment, and then lives a substance- and crime-free life. For some, it is a longer process, with setbacks, returns to jail, re-entries into treatment, and eventually, for some, treatment completion. Second, it is a process in which the criminal justice system participates, and in some cases, its participation is integral to treatment success. To account for these issues, this analysis divided the 36 months of collected data into two time periods. The first was a period (for each individual) from assessment of need to 18 months after their assessment of need for substance abuse treatment. This was considered to be the period of treatment, allowing more time for the process of treatment to unfold. The second period was 18 to 36 months after assessment, the outcome period, during which the positive effects (if any) of treatment would begin to appear.

## **6. ANALYSIS PROCEDURES**

Reductions (or increases) of costs to the substance abuse treatment, court, and corrections systems were examined from the first period to the second for both cohorts, comparing those who received treatment and those who did not within each cohort. This was a policy-focused

approach that attempted to answer the question of whether this integrated criminal justice/treatment approach is cost effective for the systems involved. It should be noted that this focus has constraints. It does not assess costs to other systems (e.g., health, welfare, employment) nor does it account for economic benefits accruing from increased public safety (e.g., avoided victimization). It is focused on the policy question of whether substance abuse treatment (which is funded and supported through these systems) repays these particular systems through lower subsequent costs.

By choosing differences in incurred costs as the dependent variable and by limiting the sample to those who incurred some costs in the system, an advantage was gained in the statistical approach. Many studies have used subsequent arrests as a dependent variable, only to find that the variable is not normally distributed and is highly skewed toward zero. Simple least squares regression approaches then produce difficulties in interpretation. In this analysis, however, because of the more normal distribution of the dependent variable, a straightforward analysis of covariance can be used.

## **7. CAVEATS**

Several caveats must be stated with regard to this analysis. They include the following:

- This analysis lacks one form of control. Because there was no treatment system available that was not part of Portland Target Cities, it could not be ascertained with certainty whether the effects found were due to the Portland Target Cities initiative or simply to general improvement in substance abuse treatment.
- The design is not a randomized trial. Such an approach is impossible in a post hoc analysis. This means that there may well be pre-existing differences between the samples that are unknown, and perhaps unknowable, that could influence the results.
- Out of a total of 854 participants, 660 individuals were included in this analysis. Two groups were excluded. One group consisted of those who were assessed as not needing treatment for either alcohol or drug abuse. The second group consisted of individuals who were identified through the jail central intake and then transferred to correctional facilities outside the county. Complete data on these individuals were, therefore, not available.

These caveats must be taken into consideration when assessing the findings of this analysis.

### **III. FINDINGS**

### III. FINDINGS

This chapter focuses on describing the findings as they relate to each of the four analysis questions.

- Did the Portland Target Cities initiative produce cost savings to the court, the correctional system, and the substance abuse treatment system compared to the pre-Target Cities sample? (Did this translate into better benefit/cost ratios)?
- Were receiving treatment and completing treatment crucial factors in cost savings?
- Did receiving treatment reduce the costs to all three systems combined (treatment, court, and corrections)?
- Did some types of treatment or combination of treatment types produce better benefit/cost ratios?

These findings are discussed in detail in the following sections.

#### 1. THE PORTLAND TARGET CITIES CENTRAL INTAKE MODEL (ANALYSIS QUESTIONS 1, 2, AND 3)

This was not a clinical trial with random assignment to conditions, so it can be assumed that pre-existing conditions existed between the cohorts that could have biased the conclusions. To strengthen validity, the samples were compared, and relevant and measurable pre-existing differences were determined and controlled for in the statistical model.

##### 1.1 Sample Comparisons— Both Cohorts Together

It is valuable to begin by looking at both cohorts together, which provides a picture of the demographic profile of clients receiving publicly funded treatment in Portland, Oregon. Out of a total of 854 participants, 660 individuals were included in this analysis. Two groups were excluded. One group consisted of those who were assessed as not needing treatment for either alcohol or drug abuse. The second group was identified through the jail central intake and then transferred to correctional facilities outside the county.

Approximately 64 percent of the sample was male. Two-thirds of the sample was white; the remaining clients reported black, Hispanic, Native American, Asian, and other racial/ethnic backgrounds. Due to small sample sizes, the 11 specific race categories were collapsed into 3— white, black, and other.



Individuals' ages ranged from 18 to 75 years, and the average age of the sample participants was 34.2 years ( $SD = 8.75$ ). Though individuals in the sample had been previously arrested an average of eight times, lifetime prior arrests ranged from 0 to 107 ( $SD = 11.44$ ). Based on the baseline assessment instrument, an Addiction Severity Index (ASI) criterion score was computed for substance use among individuals in the sample. Scores could range from 0 to 1, with higher scores indicating more substance use. The average ASI substance criterion score was 0.12 (ranged from 0 to 0.61,  $SD = 0.12$ ).

The outcome of interest was the difference in all treatment, court, and corrections expenses comparing the first 18 months and the last 18 months of the analysis timeframe. A negative cost difference means that taxpayers paid less in the second 18 months than they did in the first 18 months. Cost differences ranged from -\$67,293.16 to +\$48,248.63, with an average cost difference of -\$2,330.14 ( $SD = \$10,080.73$ ).

## **1.2 The Portland Target Cities Environment**

As has been discussed in an earlier chapter, the implementation of the Portland Target Cities initiative was marked by two significant trends. The first was a strong emphasis on targeted coordination of treatment for substance abusing criminal justice offenders. The key activities became more focused on integration with and referral from the criminal justice system. The data suggest some of this shift. Nearly 34 percent of the Portland Target Cities sample reported being incarcerated in the 30 days prior to their assessment compared with 14 percent of the pre-Target Cities sample. About 53 percent of the Portland Target Cities sample reported moderate to extremely serious legal problems at the time of assessment compared with 36 percent of the pre-Target Cities sample.

The second important trend was the implementation of managed care. Portland Target Cities emerged just as the Oregon Health Plan, a managed health care system, was being implemented. This re-structured the economic environment for providing publicly funded services to substance abusing clients. One consequence was that central intake units turned more to the criminal justice system for referrals and treatment spaces. The consequence of both of these trends was that the Portland Target Cities initiative had a more expensive cost environment both for criminal justice expenditures and substance abuse treatment expenditures.

## **1.3 Sample Comparisons— Portland Target Cities Cohort and the Pre-Target Cities Cohort**

A comparison of the two cohorts on their demographic characteristics is presented in Exhibit III-1. As shown, of the 660 individuals selected for this sample, approximately 46 percent were in Cohort 1 (pre-Target Cities). Exhibit III-1 compares Cohorts 1 and 2 on the

covariates considered in these analyses. The total amount of substance abuse treatment within the analysis timeframe was first divided into five categories:<sup>9</sup>

- No treatment (46%)
- Less than a week of treatment (4%)
- 8 days to 75 days of treatment (13%)
- 76 to 180 days of treatment (15%)
- 181 days to 365 days of treatment (13%)
- More than 365 days of treatment (9%).

<b>EXHIBIT III-1 COMPARISON OF COHORTS 1 AND 2 ON INDEPENDENT VARIABLES AND COVARIATES</b>		
<b>Independent Variables and Covariates</b>	<b>Pre-Target Cities: Cohort 1</b>	<b>Target Cities: Cohort 2</b>
<b>Cohort</b>	46%	54%
<b>Substance Abuse Treatment</b>		
No treatment	53%	38%**
Less than a week of treatment	3%	4%
8 days to 75 days of treatment, not complete	6%	12%
8 days to 75 days of treatment, treatment complete	3%	5%
76 days to 180 days of treatment, not complete	4%	7%
76 days to 180 days of treatment, treatment complete	8%	13%
181 days to 365 days of treatment, not complete	5%	4%
181 days to 365 days of treatment, treatment complete	7%	11%
> One year of treatment, not complete	7%	2%
> One year of treatment, completed	5%	4%
<b>Gender</b>		
Male	60%	65%
Female	40%	35%
<b>Race</b>		
White	71%	65%
Black	21%	18%
Other	8%	17%
<b>Age</b>	34	34
<b>Lifetime Prior Arrests</b>	5.5	6.6
<b>ASI Drug Criterion Score</b>	0.17	0.08***
<b>Serious Legal Problems at Assessment (% serious)</b>	24%	34%***

\*\* p < .01

\*\*\* p < .001

<sup>9</sup> The choices of cut points for those with more than a week of treatment were partly based on a desire to have relatively equal proportions in each category and partly on the desire to have meaningful time periods (e.g. 6 months).

For all treatment categories more than a week in length, the groups were further divided into those who completed treatment and those who did not. This produced a variable with 10 categories of treatment.<sup>10</sup>

The differences between the cohorts were tested. The results were as follows:

- Significantly more individuals in Cohort 2 (Target Cities) than in Cohort 1 received and completed treatment, ( $\chi^2(11) = 41, p < .001$ ).
- No significant differences were found between the two cohorts on gender ( $\chi^2(1) = 1.44, ns$ ) and age ( $t(634) = -0.35, ns$ ).
- The racial composition of Cohort 2 included significantly more individuals in the Other category than did Cohort 1 ( $\chi^2(2) = 9.65, p < .01$ ).
- No differences were found in the cohorts in lifetime prior arrests.
- Cohort 2 had significantly lower ASI drug criterion scores ( $t(596) = 7.63, p < .001$ ) than Cohort 1.

The next step was to develop the model to test two analysis questions. Even though only some of the independent variables and covariates (control variables) which were identified to measure pre-existing differences showed statistical differences between the cohorts, all were included in the model so that interactions might be identified. A series of tests were run to see if there were significant violations of the assumptions of an analysis of covariance approach (ANCOVA). Significant violations of assumptions would suggest that an alternative statistical approach should be used. These tests are summarized in Appendix A. Essentially, no serious violations of assumptions emerged, and this allowed continuation with this model.

#### 1.4 Statistical Model

The final model used was ANCOVA, which analyzes differences in costs during the first and second 18 months as a function of cohort membership and substance abuse treatment, after controlling for age, gender, prior arrests, race, and substance use. As seen in Exhibit III-2, there were two main effects: cohort membership and substance use treatment demonstrated statistically significant differences in cost savings. The findings suggest that after controlling for race, gender, age, prior arrests, and substance use, members of Cohort 2 (Portland Target Cities initiative) and individuals who received more treatment were associated with greater cost

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<sup>10</sup> Two main ANCOVA models were explored. One utilized a variable with the above categories of days in treatment and then used treatment completion as a separate variable in the model. A second approach combined days in treatment and completion of treatment into one variable as explained above. Both produced essentially the same results. The second approach was deemed the most interesting to treatment providers.

decreases in the second 18 months of the analysis timeframe. This explained 11 percent of the variance. The small percentage of variance accounted for by the model suggests that other factors have important impacts on costs savings. Nonetheless, the results, which are statistically reliable, suggest that costs savings were greater for the Portland Target Cities cohort than for the pre-Target Cities cohort, after controlling for a number of other factors. The considerable variation among individual cases, however, means that, while cost savings would be expected, prediction for any particular individual from these data would be difficult.

<b>EXHIBIT III-2 ANCOVA RESULTS</b>		
Variable	F	Significance
Corrected model	2.79*	< .01
Cohort (pre-Target Cities vs. post-Target Cities)	4.64*	.04
Substance use treatment	5.11*	< .01
Cohort x treatment interaction	1.24	NS
Seriousness of legal troubles at assessment	4.39*	.04
Black vs. all	0.28	NS
Other vs. all	0.14	NS
Gender	1.70	NS
Age	2.22	NS
Lifetime prior arrests	0.20	NS
ASI drug score	0.06	NS

\* p < .05

This statistical model suggests that after controlling for some important pre-existing conditions, both of the first two analysis questions can be answered in the affirmative. First, the Portland Target Cities initiative (Cohort 2) did produce opportunity cost savings to the substance abuse treatment, court, and correctional systems when compared to the pre-Target Cities sample (Cohort 1). Second, receiving treatment and completing treatment was a crucial factor in opportunity cost savings. Having determined that the Portland Target Cities initiative produced statistically significant cost savings to the substance abuse treatment, court, and correctional systems and that receiving and completing treatment was a crucial factor in opportunity cost savings, the next question was, did reduced costs relate favorably to the amounts expended?

### **1.5 Saved Opportunity Costs vs. Whole System Costs (Analysis Question 3)**

Another approach to understanding these data from the point of view of public officials is to examine the total costs incurred by the three systems (treatment, court, and corrections) in Multnomah County on treated and untreated clients. This approach addresses the third study

question, did receiving treatment reduce subsequent costs to all three systems (treatment, court, and corrections) combined? The costs in the first 18-month period after assessment (in which the treatment associated with that assessment would have been conducted) can be compared to the costs in the second 18-month period after assessment, to determine if the costs to the taxpayers increased or declined. Exhibit III-3 shows these data.

In the pre-Target Cities environment, expenditures for individuals who were assessed as needing treatment but who did not receive treatment cost the three systems in the second 18-month period an average of 90 percent of what they had cost in the first 18-month period. This suggests that although some decline in costs had occurred,<sup>11</sup> for those who did not receive treatment, the system was spending almost as much money per assessed but untreated individual as it had in the first 18 months. However, expenditures for those who did receive treatment cost the three systems in the second 18-month period an average of 68 percent of what they had cost in the first 18-month period. This suggests that treatment, even without centralized intake, does seem to be associated with reduced costs to the system.<sup>12</sup>

<b>EXHIBIT III-3</b>						
<b>AVERAGE EXPENDITURES MORE THAN 36 MONTHS FOR THOSE WHO RECEIVE TREATMENT AND THOSE WHO DO NOT, PER COHORT</b>						
<b>Cohort</b>	<b>1st 18 Months</b>	<b>2nd 18 Months</b>	<b>% 2nd Period of 1<sup>st</sup> Period</b>	<b>Costs Saved</b>	<b>% Saved</b>	<b>N</b>
<b>Pre-Target Cities (Cohort 1)</b>						
No treatment	\$2,297	\$2,064	90%	\$233	10%	136
Treatment	\$6,186	\$4,216	68%	\$1,970	32%	152
<b>Target Cities (Cohort 2)</b>						
No treatment	\$3,934	\$3,396	86%	\$538	14%	181
Treatment	\$8,520	\$4,960	58%	\$3,560	42%	167

F=4.0, p<.04

Target Cities (with its central intake model) did somewhat better. The three systems continued to spend almost as much (86%) on their untreated clients in the second 18-month period, as they had in the first, the same as in the pre-Target Cities environment. The treated

<sup>11</sup> Perhaps due to the deterrent effects of the criminal justice system or to "regression to the mean"—see previous discussion.

<sup>12</sup> Since this is not a randomized trial, it cannot be stated with certainty that there are not pre-existing differences between the treated and untreated samples (other than those that can be used as controls) that may influence these results. However, what is being reported is systems data for policymakers. From a systems point of view, treated substance abusers cost less than untreated substance abusers. It would take a randomized trial to determine the reason.

population costs, however, dropped to 58 percent. This appears to have produced a 42 percent savings in opportunity costs (resources) available in the second 18-month period.

## 2. BENEFIT/COST RATIOS FOR LENGTH OF TREATMENT AND TREATMENT COMPLETION

The means (adjusted for the covariates in the model) by substance use treatment category for Cohort 1 are depicted in Exhibit III-4. The trends pictured in Exhibit III-4 suggest that costs decrease for individuals who receive increasingly more substance use treatment. The effects of length of treatment on the pre-Target Cities cost environment can be seen in Exhibit III-4. Treatment more than 180 days seemed to have a positive effect; however, little effect is evident for any treatment under 6 months.

<b>EXHIBIT III-4</b>				
<b>LENGTH OF TREATMENT AND BENEFIT/COST RATIOS</b>				
<b>COHORT 1: PRE-TARGET CITIES</b>				
<b>Length of Treatment</b>	<b>Reduction in Cost</b>	<b>Cost to System-First 18 Months</b>	<b>Ratio</b>	<b>N</b>
None	\$233	\$2,296	.10	201
8 days to 75 days	\$510	\$4,057	.13	33
76 days to 180 days	\$2	\$4,472	0	41
181 days to 365 days	\$2,029	\$1,154	.34	17
More than 1 year	\$5,036	\$5,190	.51	40

The effects of length of treatment on the Portland Target Cities cost environment can be seen in Exhibit III-5. Treatment more than 76 days seemed to have a positive effect. The Portland Target Cities environment produced improved ratios for 125 out of 178 who received treatment (70%). This suggests that treatment produces modest but real reductions in system costs.

<b>EXHIBIT III-5</b>				
<b>LENGTH OF TREATMENT AND BENEFIT/COST RATIOS</b>				
<b>COHORT 2: PORTLAND TARGET CITIES</b>				
<b>Length of Treatment</b>	<b>Reduction in Cost</b>	<b>Cost to System-First 18 Months</b>	<b>Ratio</b>	<b>N</b>
None	\$934	\$4,338	.22	127
8 days to 75 days	\$1,290	\$8,636	.15	53
76 days to 180 days	\$2,986	\$7,362	.41	62
181 days to 365 days	\$4,730	\$8,759	.54	45
More than 1 year	\$8,880	\$11,344	.78	18

The effects of length of treatment on a specific sub-system in the Portland Target Cities cost environment – the correctional system – can be seen in Exhibit III-6. The important question for the county sheriff is not whether treatment, on the whole, saves the county money, but whether his correctional budget is affected. Treatment more than 180 days seemed to have a positive effect. This means that the corrections budget has some opportunity resources to “spend” because treatment has reduced the need for those resources among the treated clients.

<b>EXHIBIT III-6</b>				
<b>LENGTH OF TREATMENT AND BENEFIT/COST RATIOS FOR THE COUNTY</b>				
<b>CORRECTIONAL SYSTEM ONLY</b>				
<b>COHORT 2: PORTLAND TARGET CITIES</b>				
<b>Length of Treatment</b>	<b>Reduction in Cost</b>	<b>Cost to System-First 18 Months</b>	<b>Ratio</b>	<b>N</b>
None	\$948	\$3,777	.25	127
8 days to 75 days	\$1,581	\$7,317	.22	53
76 days to 180 days	\$901	\$4,747	.19	62
181 days to 365 days	\$2,639	\$5,151	.51	45
More than 1 year	\$1,423	\$3,078	.46	18

While this analysis has emphasized the examination of two 18-month periods, there are some reasons to examine the 36-month period in three 1-year segments. In Exhibit III-7, the effects of length of treatment can be seen on the corrections system by year during the 3-year period.

<b>EXHIBIT III-7</b>						
<b>LENGTH OF TREATMENT AND BENEFIT/COST RATIOS FOR THE COUNTY</b>						
<b>CORRECTIONAL SYSTEM ACROSS THREE YEARS</b>						
<b>COHORT 2: PORTLAND TARGET CITIES</b>						
<b>Length of Treatment</b>	<b>First Year Costs</b>	<b>Second Year Costs</b>	<b>Third Year Costs</b>	<b>Difference Yr 1 to Yr 3</b>	<b>Ratio</b>	<b>N</b>
None	\$2,791	\$1,783	\$2,033	\$758	.27	127
8 days-75 days	\$5,300	\$5,097	\$5,097	\$203	.04	53
76 days to 180	\$3,468	\$2,964	\$2,160	\$1,308	.38	62
181 days to 365 days	\$3,343	\$2,723	\$1,596	\$1,747	.52	45
More than one year	\$2,273	\$1,839	\$622	\$1,651	.73	18

Exhibit III-8 examines the interrelationship between days and treatment and treatment completion. It has been composed from the adjusted means of the ANCOVA model. It illustrates the importance of treatment completion in producing improved benefit/cost ratios for clients who have been more than 6 months in treatment. For clients who have been in treatment

for less than 76 days no effect is seen. For clients in treatment longer than 76 days, there are improved benefit/cost ratios; however, completion does not seem to be as important as time in treatment.

<b>EXHIBIT III-8</b>				
<b>LENGTH OF TREATMENT AND TREATMENT COMPLETION</b>				
<b>COHORT 2: PORTLAND TARGET CITIES</b>				
<b>Length of Treatment</b>	<b>Reduction in Cost</b>	<b>Cost to System-First 18 Months</b>	<b>Ratio</b>	<b>N</b>
None	\$934	\$4,388	.25	127
8 days to 75 days: no completion	\$2,139	\$9,119	.23	37
8 days to 75 days: completion	\$675	\$7,518	.09	16
76 days to 180 days: no completion	\$4,262	\$9,579	.44	22
76 days to 180 days: completion	\$2,285	\$6,141	.37	40
181 days to 365 days: no completion	\$537	\$10,517	.05	11
181 days to 365 days: completion	\$6,087	\$8,113	.75	34
More than 1 year: no completion	\$8,235	\$11,107	.74	6
More than 1 year: completion	\$9,202	\$11,462	.80	12

Exhibit III-8 suggests the reductions in correctional costs due to treatment begin to accelerate in the third year. It is possible that a fourth and fifth year of data would show similar trends. All 3 years show statistically significant trends due to treatment ( $F=21.7$ ,  $p<.001$ ;  $F=16.0$ ,  $p<.001$ ;  $F=3.9$ ,  $p=.05$ ).

### **3. BENEFIT/COST RATIOS FOR TREATMENT MODULES (ANALYSIS QUESTION 4)**

This section addresses the fourth analysis question, did some types of treatment or combination of treatment types produce better benefit/cost ratios? To analyze what treatment types produced the best benefit/cost ratios, both the pre-Target Cities and the post-Target Cities samples were combined to increase the N of the cells. Exhibit III-9 presents the results.



<b>EXHIBIT III-9</b>				
<b>WHAT TREATMENT MODULES PRODUCE THE BEST BENEFIT/COST RATIOS?</b>				
<b>Treatment</b>	<b>Reduction Due to Treatment<sup>13</sup></b>	<b>Treatment Cost<sup>14</sup></b>	<b>Ratio</b>	<b>N</b>
Outpatient only	\$1,416	\$1,168	1.21	265
Methadone only	\$2,087	\$5,048	0.41	25
Residential only	\$4,008	\$2,855	1.40	22
Outpatient plus residential	\$5,061	\$5,901	0.86	61
Outpatient plus methadone	\$4,490	\$4,977	0.90	20
Residential plus methadone	\$11,611	\$10,996	1.06	2

In spite of the high costs of some of the treatment combinations, all except methadone only had reasonable cost ratios. Both outpatient only and residential only had ratios that suggested that these approaches more than paid for themselves in reduced court, corrections, and treatment resources spent in the subsequent 18 months; however, the combinations of treatment types also had ratios that suggested that reduced subsequent costs nearly equaled the treatment costs. In fact, the differences in outcomes were not statistically significant. Residential treatment, in spite of its higher cost, seemed to reduce subsequent costs enough to make it as cost-effective as outpatient treatment. The analysis raises questions about the costs vs. benefits of methadone treatment alone, although in combination with other types of treatment, it seems to be cost-effective.

<sup>13</sup> Defined as the reduction in cost minus the reduction found when no treatment over 15 days was present.

<sup>14</sup> In this analysis the benefits are compared to the cost of the treatment module only.

#### **IV. SUMMARY AND IMPLICATIONS**

## IV. SUMMARY AND IMPLICATIONS

The goals of this analysis were twofold. The first goal was to develop a data set for two treatment cohorts that combined data from a treatment baseline assessment instrument with data from administrative databases from three local systems (i.e., substance abuse treatment, court, and correctional) used by clients during a 3-year period. The second goal was to conduct analyses of these combined data to answer four specific questions:

- Did the Portland Target Cities initiative produce reduced or opportunity cost savings to the court, correctional, and substance abuse treatment systems compared with the pre-Target Cities sample? (Did this translate into better benefit/cost ratios?)
- Were receiving treatment and completing treatment crucial factors in reduced or opportunity cost savings?
- Did receiving treatment reduce or increase the costs to all three systems combined (treatment, court, and corrections)?
- Did some types of treatment or combination of treatment types produce better benefit/cost ratios?

The data were combined, and the data set is available for future analysis. This first use of these data indicates that they will be useable for future analysis.

The purpose of this analysis was to examine benefit/cost ratios in a substance abuse treatment context using a method focused on the impact of treatment on the specific systems and agencies that work with and spend resources on clients. A more global approach that would attempt to assess avoided costs in additional areas (e.g., health care, welfare, crime victimization, drug-free births) deliberately was not utilized in order to avoid competition with studies that sought to find the biggest benefit/cost ratio. The expectation was that any benefit/cost ratios discovered would not be high but would be more directly relevant to systems that spend money treating these clients. There also was interest in examining the impact on benefit/cost ratios of a major system change in the Portland (Oregon) treatment system—the Target Cities initiative.

The findings have four components:

- The Portland Target Cities initiative produced opportunity cost savings to the court, correctional, and substance abuse treatment systems compared to the pre-Target Cities sample. Treatment reduces costs for all three systems combined (i.e., substance abuse treatment, court, and corrections). This translated into improved benefit/cost ratios.

- Receiving treatment and completing treatment were important variables affecting the benefit/cost ratios. Longer stay in treatment and completion of treatment produced the best ratios.
- Data on reductions in costs for the correctional system suggest that reduction of cost may be the most pronounced in the third year after the beginning of treatment.
- Most combinations of treatment types produced favorable benefit/cost ratios.

These findings have implications for substance abuse treatment providers, policymakers, and researchers/evaluators.

## **1. IMPLICATIONS FOR TREATMENT PROVIDERS**

Finding resources to fund treatment for populations referred from the criminal justice system is difficult. The constraints of managed care have made this especially challenging. Data and findings such as those yielded by this analysis can allow treatment providers to examine the impact of treatment on other local systems such as the courts and corrections. These findings suggest that treatment can pay for itself in reduced subsequent costs, not only to the local treatment system, but also to the court and correctional systems.

High benefit/cost ratios associated with substance abuse treatment have received considerable attention (Gerstein et al., 1994; Finigan, 1996). The high ratios were achieved by including costs associated with other systems (e.g., victimization, health care, prison). While these are real costs to the taxpayers, they are not always relevant to local systems; therefore, these arguments have not always persuaded local courts and correctional systems that any real cost savings accrue to their budgets through treatment. Local sheriffs, for example, are often skeptical that any real decline in their budgeted costs will accrue to offset their support for treatment, and they may oppose efforts by county commissioners to allocate scarce funds to substance abuse treatment rather than to corrections or law enforcement. Demonstrating real reductions at the local level, even if the benefit/cost ratios are less than have been reported in the past, may be more convincing. It also may be useful to demonstrate to the local sheriffs that the avoided costs may exist in their budgets as opportunity resources, i.e., resources that are available to redirect to other criminal activity that threatens public safety, thereby ultimately improving the accomplishment of their fundamental mission. By showing local data on avoided costs and by defining costs as opportunity resources available to the local systems, treatment providers may be able to provide more convincing arguments for funding at the local level.

## **2. IMPLICATIONS FOR POLICYMAKERS**

These findings suggest that combined criminal justice/substance abuse treatment-linked initiatives (e.g., drug courts) are cost efficient, and that treatment produces reduced costs in these systems. The data are particularly useful because they indicate a beneficial effect of treatment on client behavior. This, in turn, affects the operations of treatment, court, and correctional systems. Policymakers within these three systems are the most likely to be called upon to make practical decisions about the benefit/cost of increasing treatment resources. In making these decisions, they must weigh the cost of implementing treatment with the potential reduction in system costs in subsequent periods due to fewer client contacts with the criminal justice and treatment systems. This analysis indicates that in assessing the costs of implementing substance abuse treatment, policymakers may benefit by including not only treatment costs but also costs incurred by the court, law enforcement, and corrections systems in bringing substance abusing clients to the treatment context and helping to maintain them there. These non-treatment costs include court hearings, drug court, in-jail intervention efforts, supervision, and judicial sanctions for non-compliance. Although this approach can be viewed as increasing the perceived cost of treatment (thereby reducing the positive benefit/cost ratios), it represents a broader systems approach that can give policymakers a better idea of the real cost to their systems of a treatment strategy.

On the other hand, policymakers need to know what avoided costs for all three systems might accrue from providing substance abuse treatment. Avoided costs could accrue from less new criminal activity (resulting in fewer court hearings, police bookings, jail time) and less use of the treatment system in the future. Therefore, looking at the avoided costs for all three systems, not including any benefits that accrue outside the three systems, makes the fairest comparison for the local policymaker.

It is also important to note that the reduced costs may appear in the form of opportunity resources rather than dollars saved, i.e., sending substance abusers to treatment does not so much save money for the courts, treatment, or corrections systems, as it provides the opportunity to use existing resources in those systems for other tasks, thereby reducing budget growth. The court and corrections systems will still have offenders to manage. Providing substance abuse treatment will allow these systems to focus their resources on other offenders and more effectively fulfill their public missions.

### **3. IMPLICATIONS FOR RESEARCHERS/EVALUATORS**

The present analysis takes some new approaches to the issues of benefit/cost analysis. First, the focus is on collecting local data for three relevant public systems: treatment, court, and corrections. Cost-offsets in other areas were not calculated. This has the advantage of narrowing the focus of the analysis and more fairly comparing the benefits to the costs on the local system level only.

Second, administrative data sets are used as the source of actual cost data rather than relying entirely on client self-report. This avoids some of the issues that beset self-reported data (e.g., the respondent's telescoping of time periods, memory issues, mis-perceiving police contacts as arrests, and providing "socially desirable" answers). Although administrative data systems also have problems (e.g., missing data, poor data entry), they are the very data sets that the systems use in determining their work load, capacity, and budget information, and therefore are the most relevant for this type of analysis.

Third, the period of "treatment" is examined during a much longer span (18 months) than is typical in most studies. This approach recognizes that treatment is typically a longer, and possibly more chaotic process. Treatment clients rarely fit a classic model, wherein the client enters treatment, remains in treatment, and completes treatment on time. Instead, there are often multiple starts and stops, treatment episodes with multiple providers, and sometimes, completion. The traditional analytic approach that considers only the prescribed length of one treatment episode (e.g., six months) as the treatment period misses the actual etiology of the treatment process.

Fourth, court and correctional costs are viewed as being intertwined with substance abuse treatment costs. This is a departure from other benefit/cost analyses that primarily compared the benefits accrued to multiple systems with the costs of the treatment alone. The previous approaches do not take into account that in new models of collaborative justice, the court and corrections systems partner with the substance abuse treatment system, and thereby become part of the cost of treatment.<sup>15</sup>

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<sup>15</sup> Some may believe that these correctional and court costs are not part of the cost of treatment because clients would have received these court and correctional actions anyway as a consequence of their criminal activity. In economic terms, these would not be part of the marginal costs for treatment. However, in this analysis, it is clear that the court and correctional cost consequences for the untreated portion of the population are very different than for those who are placed in treatment.

There is certainly more to be learned in the area of benefit/cost analysis of substance abuse treatment. These data represent only a first step in exploring new approaches. New studies and analyses can be designed to examine the complexity of the costs of treatment and saved opportunity costs of treatment at the level of local budgets and systems. Costs and benefits calculations are often not included in data collection efforts and data analyses. Including these cost factors will provide new information of use to both policymakers and treatment providers.

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## REFERENCES

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**APPENDIX A**  
**DETAILS OF THE STATISTICAL MODEL**

## APPENDIX A DETAILS OF THE STATISTICAL MODEL

### 1. CORRELATIONS

As shown in Exhibit A-1, membership in a cohort was significantly correlated to treatment, ASI drug score and cost differences. No correlation was found for gender, age, and prior arrests. As compared to those in Cohort 1, membership in Cohort 2 was associated with slightly less substance abuse treatment, lower assessed drug abuse problems, and higher avoided cost differences between the first and second 18 months of the analysis timeframe.

Treatment, however, was significantly correlated with all variables but age. Those who received more substance abuse treatment were more likely to be female, have a higher number of lifetime prior arrests, be assessed with higher drug abuse problems, and produce higher avoided cost differences between the first and second 18 months of the analysis timeframe.

The other variables in the model also demonstrated correlations. Females, as compared to males, were likely to be younger and to have higher assessed drug use. Race had no significant correlations. Older individuals were likely to have more lifetime prior arrests (as would be predicted by the criminal justice literature), and lower assessed drug abuse problems. More prior arrests were associated with higher assessed drug abuse problems (as would be predicted by the criminal justice literature).

<b>EXHIBIT A-1 CORRELATIONS</b>						
	<b>Treatment</b>	<b>Gender</b>	<b>Age</b>	<b>Prior Arrests</b>	<b>ASI Drug</b>	<b>Cost Difference</b>
Cohort	-.08*	-.05	.05	.05	-.33***	.09*
Treatment	---	.20***	.04	.16***	.17***	-.20**
Race		-.01	-.04	.04	-.04	.02
Gender	---	---	-.09*	.02	.18***	.02
Age	---	---	---	.12**	-.08*	-.06
Prior Arrests	---	---	---	---	.20***	.05
ASI Drug	---	---	---	---	---	.01

\* p < .05

\*\* p < .01

\*\*\* p < .001

## 2. STATISTICAL MODEL

The final model was an analysis of covariance (ANCOVA), which analyzes differences in costs during the first and second 18 months as a function of cohort membership and substance abuse treatment after controlling for age, gender, prior arrests, race, and drug use. The data were examined for violations of data assumptions required when utilizing the ANCOVA technique.

- First, score distributions for each variable were evaluated for normality (e.g., bell-shaped, clustered around the mean, no outliers). Prior arrests were the only continuous variable to suffer from significant skewness or kurtosis. Prior arrest scores were disproportionately clustered around zero, indicating a large proportion of the sample had no prior arrests or very few prior arrests. This is a very common problem with arrest data. A model was tried that excluded the prior arrest data, and it did not change the fundamental conclusions. Because of the intuitive importance of controlling for prior arrests, however, it was retained in the final model.
- Second, in order to test differences between the means of two groups, variation in the outcome variable should ideally be approximately equal in the two groups. The variation in cost differences was not homogeneous between cohorts. This is partly a function of the different cost environments between the two cohorts.
- Third, the relationship between all covariate pairs, each covariate, and the outcome variable must be linear. The residual plot (i.e., variation in cost differences predicted by the model plotted against variation in cost differences *not* predicted by the model) did not indicate linearity assumptions were violated.
- Fourth, the association between each covariate and the outcome variable, cost differences must be the same for each cohort. After running regression analyses for each variable and its interaction with cohort, it was determined that the homogeneity of regression assumption was not violated in this model.

According to Tabachnick and Fidell (1996), the ANCOVA technique is robust to violations of normality and homogeneity of variance if cell sizes are reasonably equal, degrees of freedom exceed 20, and if the ratio of largest and smallest variance does not exceed 10:1 (p. 328). Since this is the case, the few assumption violations found are not expected to influence the results of the analysis.

After excluding those who were not eligible for the analysis,<sup>16</sup> 594 individuals had complete data on all of the variables of interest. Because race was a categorical variable, effects

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<sup>16</sup> One excluded group were 101 individuals who were assessed as not needing substance abuse treatment and who did not receive treatment. The second group were 85 individuals identified in jail as needing treatment but were likely transferred to jails or prison out of county before they could enter the Multnomah County treatment system. They were not available to incur costs.

coding was used to create two contrasts, which analyzed differences between a particular racial group and the rest of the sample. For example, the “Black vs. all” contrast compares individuals who identified as black to the rest of the sample. Two independent variables, cohort and substance abuse treatment, and their interaction were entered in the ANCOVA model along with the covariates (age, gender, the two race contrasts, lifetime prior arrests, and ASI drug criterion score) to predict cost differences (see Exhibit A-2 for results).

<b>EXHIBIT A-2 ANCOVA RESULTS</b>		
<b>Variable</b>	<b>F</b>	<b>Eta<sup>2</sup></b>
Corrected Model	2.79*	.11
Cohort	4.64*	.01
Substance use treatment	5.11*	.08
Cohort x treatment interaction	1.24	.02
Seriousness of legal troubles at assessment	4.39*	.01
Black vs. all	0.28	< .01
Other vs. all	0.14	< .01
Gender	1.70	< .01
Age	2.22	< .01
Lifetime prior arrests	0.20	< .01
ASI drug score	0.06	< .01

\*  $p < .05$

No covariates were significant. After controlling for all covariates, the interaction between cohort and substance use treatment was not significant, but there were two significant main effects. The R square for the model was .11, which is at the low end of what is often typical for social science models (which often range from .10 to .20).

The bulk of the explained variance in this model is accounted for by the different categories of substance abuse treatment. Cohort (whether pre-Target Cities or Target Cities) adds only a small additional independent explained variance. Since the total explained variance of the model is small, we cannot suggest that we can account for all the factors that determine how much an individual will cost in resources to a court, correctional, or treatment system. The model suggests, however, that on average, policymakers will produce opportunity costs that have been avoided by encouraging substance abusers to seek treatment.