

**The Economic Cost of Substance Abuse Treatment
in Criminal Justice Settings**

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Abstract

The public's attitude towards rehabilitating drug-abusing criminal offenders has evolved from one demanding justice through traditional incarceration to one open to the possibilities for rehabilitation through effective treatment and socialization programs. The change in public opinion inspired extensive work to develop treatment interventions that are applicable within a criminal justice setting. This study offers an important perspective on prison-based substance abuse treatment. An economic cost analysis was performed on three contemporary in-prison treatment programs located in different parts of the United States. The cost of treatment varied considerably across the three prison-based programs discussed in this paper due to geographical location, program size, and variety of services offered. Program 1 had an average weekly economic cost per inmate of \$68, Program 2 had an average weekly cost of \$52, and Program 3 had an average weekly cost of \$37. The average weekly cost for a community-based residential drug treatment program was estimated to be \$615. The results highlight the modest incremental cost of providing substance abuse treatment in criminal justice settings.

I. Introduction

Society is increasingly challenged to absorb the costs imposed by criminal activity and an expanding prison population. The relationship between criminal activity and drug and alcohol use has been extensively researched (e.g., Chaiken and Chaiken, 1990; Inciardi, et al., 1997; Inciardi and Pottegier, 1998; French et al., 2000; Anglin, et al., 1986; Gandossy, et al, 1980; Goldstein, 1985; Nurco, et al, 1988; Tonry and Wilson, 1990). Although the direction of causality between drug use and crime remains unconfirmed, the complementarity between these behaviors implies that there are important substance dependence issues to address within the criminal justice population. For many criminal offenders, effective rehabilitation must incorporate substance abuse treatment.

The prison population in the United States has expanded rapidly over the past two decades. Drug law violators accounted for more than 30% of the increase in incarceration at the state level and 68% of the increase in the federal population (Farabee, et al, 1999). Recent reports estimate that 1,825,000 U.S. residents were incarcerated by the end of 1998 (Simpson, et al., 1999; Beck & Mumola, 1999). Furthermore, the Department of Justice and the National Center on Addiction and Substance Abuse (CASA) determined that 60-80% of all criminal offenders have used drugs at some point during their lifetime. According to reports for correctional expenditures in 1996, approximately 80 percent (\$30 billion) of a \$38 billion budget was spent incarcerating individuals who had a history of substance abuse, were convicted of drug law violations, tested positive for drugs when arrested, or perpetrated the crime to be able to purchase drugs (CASA, 1998).

The social cost of crime is much higher than reflected in these expenditure reports. Rajkumar and French (1997) divided the social costs of crime into four principle

categories: victim costs, costs of crime protection and law enforcement, crime career/productivity losses, and other external costs. They estimated both the tangible and intangible costs of crime, by specific criminal act. The most costly crimes (excluding murder) are aggravated assault (total social cost of \$50,743 per assault) and robbery (\$21,890 per act), followed by burglary (\$1,304 per act) and auto theft (\$1,138 per act).¹

A study by French, McGeary, et al. (2000) compared the types of crimes committed in a sample of chronic drug users (CDUs) and non-drug users (NDUs), separating acts by predatory crime and property crime. Their results showed that CDUs had a higher probability of committing both predatory and property crimes relative to NDUs. In an earlier study, Chaiken and Chaiken (1990) found that rates of predatory crime were positively and significantly related to the amount and frequency of illicit drug use among adults. Specifically, frequent heroin use or use of multiple drugs appeared to be the most directly linked to the prevalence of committing predatory crimes relative to NDUs.

While the need for substance abuse treatment in correctional systems seems obvious, an important challenge in providing effective treatment is low inmate demand for these services. The Department of Justice estimated that while some form of treatment was available in 90% of the facilities examined, only 10-20% of inmates used the services (ONDCP, 1998). Within state corrections, 70-85% of inmates were classified as needing some level of intervention, yet only 13% were involved in any form of treatment (Camp and Camp, 1997).

This study offers an important perspective on prison-based substance abuse treatment. An economic cost analysis was performed on three contemporary in-prison treatment programs located in different parts of the United States. The results highlight

¹ 1992 dollars

the modest incremental cost of providing substance abuse treatment in criminal justice settings.

II. History of substance abuse treatment in correctional facilities

The origination of substance abuse treatment for criminal offenders is credited to the opening of two U.S. Public Health hospitals in the 1930s (Leukefeld and Tims, 1992). The development of the Therapeutic Community (TC) approach to treating drug addicts in the 1960s significantly influenced prison-based treatment. The TC approach was perceived as being ideal for correctional settings as it emphasized the importance of membership in a community, and learning to become morally and socially responsible (Graham and Wexler, 1997).² In-prison TCs were popular in the 1960s and 1970s, though the stability and longevity of the programs varied (Martin, et al., 1999;). Many of these early prison-based TCs disappeared, due mainly to rising costs associated with growing inmate populations, uncertain treatment results, and tight state budgets (Martin, et al., 1999).

Modified TCs appeared in the 1980s and demonstrated greater functionality within correctional institutions and promising treatment results with inmate populations. Modifications were necessary to adapt the treatment program into an existing, highly structured institutional framework. For example, at the Amity in-prison TC program in California, treatment and correctional staff worked together when setting up and organizing the treatment program. All TC program activities functioned *around* the prison's schedule, ensuring that inmates complied with all requirements for their prison terms (e.g., work programs, meals, daily inmate counts) (Wexler, et al., 1999).

² Also see De Leon (1984; 1989; 1996) and De Leon and Ziegenfuss (1986) for a comprehensive discussion of TCs.

One of the first prison-based TC approaches was New York's Stay'n Out Program, established in 1977. Stay'n Out clients (both men and women) reported lower recidivism after treatment compared to the general inmate population (Lipton, 1996). Moreover, the length of time in treatment was significantly linked to obtaining and maintaining successful outcomes. Additional in-prison TCs were implemented soon thereafter, and reported similar findings in terms of low rates of recidivism, criminal activity, and drug use (e.g., Cornerstone in Oregon; Amity TC in California; Key-Crest in Delaware; and Kyle New Vision in Texas) (see Lipton, 1995 for descriptions of these programs).

In 1987, the Bureau of Justice Assistance sponsored Project REFORM, which proved instrumental in heightening awareness (especially among correctional officials) of the need to implement substance abuse treatment within criminal justice settings. REFORM focused on expanding and improving the treatment services available to incarcerated individuals (Lipton, 1995). Project Recovery followed Project REFORM in 1991 (initiated by the newly established Center for Substance Abuse Treatment) to continue training and technical assistance for new or developing in-prison treatment programs (Lipton, 1995).

III. Recent Findings

Short-run outcomes from in-prison treatment have been highlighted recently in several reports. Lower rates of drug use and recidivism for inmates receiving some form of treatment compared to non-treated inmates are common themes. The Bureau of Prisons reviewed treatment outcomes from existing reports and found that inmates who completed residential drug abuse treatment reported both reduced recidivism and reduced substance use. Only 3.3% of treatment completers were likely to be rearrested within 6 months of release from a treatment program compared to 12.1% of non-treated inmates.

Moreover, 36.7% of untreated parolees were likely to relapse into drug use compared to 20.5% of treatment completers (ONDCP, 1998).

Longer post-release evaluation timelines were considered in a series of articles published in *The Prison Journal* (September, 1999). Wexler, et al. (1999) reported on the incidence of reincarceration three years post-parole for clients that received treatment in the Amity TC and aftercare programs in California. Those clients participating in both the prison TC and aftercare showed the best results in terms of reduced recidivism: 27% of clients receiving in-prison treatment plus aftercare recidivated versus 75% for those receiving prison treatment only or no treatment.

This result resonated in other programs as well. In a study of a Texas in-prison TC, Knight, et al. (1999) found that 25% of offenders who completed both in-prison treatment plus aftercare were reincarcerated at some point during the three-year follow-up period, whereas 42% of untreated offenders and 64% of aftercare dropouts had been reincarcerated. Martin, et al. (1999) reported on Delaware's Key-Crest program. Among these inmates, prison plus aftercare completers also showed the lowest rates of recidivism at three-years post-release.

Based on these reports, the long-term returns to prison-based treatment and aftercare programs appear promising. To further clarify these returns to society, rigorous economic analyses that estimate the costs and benefits of these programs are necessary. Initial work has been completed in this area, providing impetus for additional evaluations. Griffith, et al. (1999) performed a cost-effectiveness analysis of an in-prison therapeutic community (ITC) and aftercare in Texas. Treatment effectiveness in terms of lower recidivism was measured for high-risk parolees and low-risk parolees who participated in treatment and aftercare relative to non-treated parolees. In addition, a criterion for treatment completion was factored into the effectiveness assessment. Treatment proved

most cost-effective for the high-risk parolees who completed treatment and aftercare relative to low-risk parolees who completed treatment and aftercare, high-risk and low-risk noncompleters, and the non-treated comparison group.

A detailed and comprehensive review of the costs and benefits of programs to reduce crime and substance abuse – from childhood interventions to adult offender programs – is presented in Aos, et al. (1999). Among the programs examined, five prison-based TCs were evaluated. Results of the benefit-cost analyses of these in-prison TCs showed that from a social perspective, the average program generated \$1.07 in benefits (in terms of reduced crime) per dollar invested in treatment. The authors emphasized that additional research must be performed on similar programs to better understand the social value of prison-based treatment.

The following section describes the economic cost analysis performed on three prison-based treatment programs from disparate regions of the United States. The methods of the analyses are carefully outlined, with particular attention paid to the components of total cost and the various perspectives that guide a cost analysis.

IV. Methods

The foundation for economic evaluations of healthcare or addiction treatment programs is a comprehensive economic cost analysis. Ultimately, health economists are interested in measuring and comparing the costs and outcomes of different treatment approaches (Drummond, et al., 1997). Economists generally prefer to examine program costs from a societal perspective. This entails examining both direct and indirect costs associated with addiction treatment. Direct costs, often referred to as accounting costs, represent “out-of-pocket” expenditures for items such as start-up and operating costs, fixed costs, and overhead costs (French, 1995). Indirect costs include the value of

donated resources, transportation costs to/from treatment, lost wages, and time/resources involved in caretaking by family members or others (French, 1995).

The theoretical basis for an economic cost analysis is the concept of opportunity cost. Opportunity cost implies that all resources employed in a particular use have value. The value is captured by the forgone opportunity (income) to employ a resource in its best alternative use. Assuming a competitive resource market, a resource will be employed where it is valued most highly, in which case the opportunity cost and the market price are equal. However, in situations where resources are donated or partially subsidized, the opportunity cost will generally be higher than the accounting cost. For example, the opportunity cost of a donated building is equal to the amount of rental income the building would generate in a competitive real estate market. Similarly, volunteer support has an opportunity cost equal to the market salary that would have to be paid to hire a worker to perform the volunteer's job.

It is important to note that there are often several perspectives of interest when estimating the costs of treatment. The different points of view in an economic evaluation of public or private investment in healthcare include society, the government or one of its agencies (e.g., a department of corrections), the patient, the treatment provider, or the employer (Drummond, et al., 1997). A state corrections department, for example, is interested in the direct costs (i.e., accounting costs) associated with providing treatment described on expenditure reports. Society, however, is concerned with all tangible and intangible costs associated with treatment (i.e., the economic or opportunity cost of treatment). Further discussion on the distinction between accounting and economic cost follows.

Significant improvement in the approach to performing a cost analysis is offered by the Drug Abuse Treatment Cost Analysis Program (DATCAP). The DATCAP is a

structured data collection instrument developed by French and colleagues, which outlines both program revenues and costs (French, 1999a; French, 1999b). The DATCAP has a six-tiered approach, based on sound methodological concepts. These are: (1) use a single measurement perspective that is flexible, standardized, and widely supported (opportunity cost); (2) adopt a single analysis perspective that is workable, standardized, and policy driven (treatment program); (3) define a fixed set of cost categories that are consistent with standard economic theory and used in comparable studies; (4) develop and define a standard set of questions to arrive at cost estimates within each category; (5) propose a relatively narrow range of acceptable sources for the resource use and cost data that will be used to calculate the estimates; and (6) describe and follow a consistent method for estimating costs for each category of data used (French, et al., 1997).

The instrument is used to collect resource use and other data to estimate total annual cost, distinguishing between economic and accounting cost. Client caseflow data is incorporated to determine the average annual cost per client. Other useful computations include average cost per treatment episode and marginal cost per enhancement (French, et al., 1997; Salomé and French, forthcoming). The DATCAP has been applied to a variety of treatment interventions such as methadone maintenance, outpatient drug-free, long-term residential, short-term residential, prison-based programs, and employee assistance programs (e.g., French, et al., 1996; 1997; Bray, et al., 199; French and McGeary, 1998; Salomé and French, forthcoming).

Accounting costs were obtained from program expenditure reports, which outline the direct costs of treatment. The annual accounting cost for capital outlays on resources such as equipment and furniture was calculated by assuming straight-line depreciation over the service life of the item. For example, a computer purchased for \$3,500 in Year 1 of the program that has an estimated service life of 5 years would have an annual

accounting cost of \$700. After 5 years, if the computer was still being used, its accounting cost would be zero.

Economic cost, as described above, was calculated using the competitive market value of all treatment resources, whether they were explicitly purchased or not. Resource value represents the forgone compensation (the opportunity cost) had the resource been employed in its best alternative use. In many cases, the economic cost and the accounting cost will be the same, but differences will occur when programs are using donated or subsidized resources or when resources are obtained below market rates. Economic costs are calculated using market rates of compensation (e.g., wages, prices) multiplied by the share of the resource used by the program (Dunlap and French, 1998).

To calculate the annual economic cost of capital investments, both the opportunity cost of the capital and asset depreciation must be considered (Drummond, et al., 1997). Consider again a computer purchased for \$3,500 in 1995. The annual accounting cost was \$700 (assuming a service life of 5 years), but the annual economic cost is \$808, taking account of both depreciation and a positive rate of time preference, which implies that the timing of expenditures may imply additional cost (Drummond, et al., 1997). Finally, estimating the economic or accounting costs of prison-based treatment requires an incremental analysis of resource use because common resources in the prison (e.g., housing, food, security) are not attributable to the treatment program. The costs of treatment are the additional costs above the costs of housing an inmate, thus are the expressed by the total costs associated with incarceration and treatment minus the standard cost of resources provided to the general prison population.

V. Program Descriptions and Cost Results

Three prison-based treatment programs from California, Colorado and Kentucky were analyzed. For each program, the results of the cost analyses were divided according

to accounting costs and economic costs, by resource category. The three prison-based programs are referred to as Program 1, Program 2, and Program 3 to protect anonymity of potentially sensitive cost information. A brief description of each program is followed by the respective results of the cost analyses. A comparison of all three programs is presented at the end of this section. Section VI considers each program in the context of hypothetical cost-effectiveness and benefit-cost analyses. These exercises illustrate how to apply cost information in more complex economic evaluations.

Program 1: California

Program 1 is an in-prison residential TC, which operates within a medium security prison for male offenders located in California. Program participants are housed in one of the prison's five cellblocks, which is designated for the program's use. A separate area next to the housing unit contains two trailers where most of the program activities are held.

To be eligible for participation in the program, prisoners must be within 9 to 14 months of parole, be free from psychosis or other serious mental disorders, and have a history of substance abuse (Graham and Wexler, 1997). Openings in the program are filled by a random selection process (Wexler, et al., 1999). The average daily census in fiscal year 1993 was 200 inmates (program capacity) and the average length of stay was 47 weeks.

The costs of treatment for Program 1 are summarized in Table 1. Coincidentally, the economic costs are equal to the accounting costs for this particular program, as all resources were purchased at market value. Based on information collected for fiscal year 1993, the total cost of treatment expressed in 1999 dollars (the comparison year for all programs) was \$708,918. This amount represents the incremental cost above standard incarceration costs for inmates receiving treatment in the program. The largest

component of treatment cost was labor (\$580,500). This program had 20 full-time employees, including a program director, administrative assistant, four consultant/trainers, a community services liaison, and several counselors. In addition, inmates who were serving life sentences provided counseling and guidance services. The Lifers represented an important addition to the program and were compensated with a modest stipend. Miscellaneous costs, the second largest component of total cost, included staff training, travel, insurance, and utilities.

The annual economic cost per client was \$3,545, translating into a weekly cost per client of \$68. Since the average length of stay in treatment was slightly less than a full year (47 weeks), the average economic cost per treatment episode was \$3,196.

Program 2: Colorado

Program 2 is a 32 bed TC program located within a 250-bed medium security prison facility for male offenders in Colorado. This program was designed to address the special needs of chronically mentally ill inmates. Program eligibility criteria are based on Colorado Department of Correction guidelines for mental illness, substance abuse, and criminal risk. In addition, to be eligible for the treatment study on which the cost analysis is based, inmates had to be within 18-24 months of parole subsequent to program admission. The program is a modified TC that addresses criminal behavior and thinking, mental illness, and substance abuse disorders (see Sacks, 2000 for a more detailed description of the program).

Inmates were sequentially assigned to the program on a “bed available” basis, from a list of eligible inmates that were referred from the correctional institution. The average daily census in fiscal year 1999 was 32 inmates and the average length of stay was 19 weeks.

Table 2 summarizes the costs of Program 2. Again, all costs are expressed in 1999 dollars. A modest cost differential was present between accounting and economic costs due to valuation differences in the equipment resource category. This program used office furniture, computers and electrical equipment, all of which were purchased prior to 1999. The accounting cost of this equipment was \$764, but the economic cost was slightly higher (\$909).

The total economic cost of treatment in fiscal year 1999 was \$86,055 and the total accounting cost was \$85,910, which reflects the slight cost differential for equipment described above. The cost of labor was the largest component of total cost (\$64,781). Given an average caseload of 32 inmates, the annual opportunity cost per client was \$2,689, or \$52 per week. The economic cost per treatment episode (19 weeks) was \$988.

Program 3: Kentucky

Program 3 is a three-phase treatment program designed to focus on criminal tendencies and relapse prevention. The program operates in a dormitory on the grounds of a medium security prison for male offenders in Kentucky. Inmates from all medium security facilities in the state of Kentucky are eligible for the program if they have self-admitted problems with drugs and/or alcohol. Inmates that are referred by the parole board have a priority admission status. The average daily census in fiscal year 1998 was 129 inmates and the average length of stay was 28 weeks.

Table 3 presents the results of the cost analysis for Program 3. The analysis was performed for fiscal year 1998, but all costs are presented in 1999 dollars for comparison purposes. The economic cost exceeded the accounting cost for labor (again, the largest component of total cost) and equipment resources. Program 3 had several volunteers assisting with program administration and treatment, which amounted to a combined opportunity cost of \$6,026. For equipment, the program used office furniture, computers,

medical equipment, and leased equipment. The accounting cost of equipment resources was \$6,253, but the economic cost was \$6,899. The total accounting cost for the program was \$241,218 and the total economic cost was \$247,890.

The average annual economic cost per client (given an average caseload of 129 individuals in 1998) was \$1,922, or \$37 per week. The average treatment episode was 28 weeks, generating an economic cost per treatment episode of \$1,036.

Program Differences

Table 4 presents a summary of the key cost estimates for each of the three programs considered in this analysis. One notable issue is the fact that there are very little differences between the accounting costs and economic costs for these treatment programs. This means that program resources were purchased at fair market values. From society's perspective this finding is important because it implies that minimal (or zero) additional opportunity cost was associated with the use of these resources in the prison treatment programs.

As expected, total economic cost was proportional to program size. Program 1 had the greatest number of inmate participants (200), the most full-time employees (20), and the highest total cost (\$708,918). The average weekly cost for Program 1 was \$68. Program 2 had 32 inmate participants, 2 full-time employees and the second highest weekly cost (\$52), although it had the lowest total cost (\$86,055). Program 3 had a total economic cost of \$247,890, but with 129 participants, its average weekly cost was the lowest of the three (\$37).

Another measure of significant interest is the cost per treatment episode. The weekly cost per client depends on the annual cost of treatment and the average daily census in the program. The cost per treatment episode uses the weekly cost per client estimate and the reported average length of stay. The average episode cost is a program-

specific cost estimate for treating the average client. Program 1 had the longest average length of stay (47 weeks), resulting in an economic cost per episode of \$3,196. Program 3 had the second longest average length of stay (28 weeks) and a cost per treatment episode of \$1,036. Program 2 had an average length of stay of 19 weeks, leading to the lowest cost estimate per treatment episode (\$988).

The cost estimates permit interesting comparisons across programs and services, but it is important to emphasize that evaluators should not make inferences about the advantages of one program over another based on the cost information alone. The pivotal economic question is whether higher treatment costs (i.e., larger treatment programs with more staff, services, and clients) translate into better treatment outcomes? This important question can be addressed with more complex economic evaluation techniques such as cost-effectiveness analysis or benefit-cost analysis, which are introduced in the policy simulations that follow.

VI. Hypothetical Case Studies

The cost estimates presented above can be applied to more detailed economic evaluations such as cost-effectiveness analysis or benefit-cost analysis. While a cost analysis is useful, it only tells “half the story.” A more useful evaluation is often possible when treatment outcomes can be matched with treatment costs to draw conclusions about the net benefit to society resulting from treating criminal offenders.

The primary outcomes of interest for an economic evaluation of substance abuse treatment for inmates are drug use, criminal activity, employment, and healthcare utilization. Each of these behaviors has a significant impact on social well-being and they can generally be described in monetary terms. Two representative policy exercises are presented below to further illustrate the potential value of economic analyses of prison-based treatment. The first exercise describes a hypothetical cost-effectiveness

analysis and the second a hypothetical benefit-cost analysis. The data and cost analysis results from the three programs analyzed in Section V are applied in the following examples to perform the cost-effectiveness and benefit-cost exercises.

Hypothetical Case Study 1: Cost-effectiveness Analysis

A cost-effectiveness analysis (CEA) compares the opportunity cost of providing treatment to a common desired outcome (Drummond, et al., 1997). The results of the analysis are expressed as a cost-effectiveness ratio – typically with cost in the numerator and the effectiveness measure in the denominator (a lower cost-effectiveness ratio is viewed as better). Effectiveness can either be described as a specific treatment outcome (e.g., reduced number of arrests or increased hours employed) or as a combination of outcomes using a common scale (e.g., change in quality-adjusted life-years) (French, 1995). CEA is an incremental procedure when comparing across two or more programs. Alternatively, the ratio of cost and effectiveness can be derived for a single program and then compared to an established benchmark ratio in the literature (Gold, et al., 1996; Sindelar, et al., 1999).

Table 5 reports the cost-effectiveness results for a hypothetical case study of three prison-based substance abuse treatment interventions. Information on number of treatment clients (column [1]), average weekly cost (column [2]), average length of stay (column [3]), and total treatment cost (column [4]) was taken from the cost analyses presented in Section V. Following a recent study by Griffith, Hiller, Knight, and Simpson (1999), we measure effectiveness by a hypothetical percentage of paroled inmates who completed treatment and were not reincarcerated by follow-up, relative to a comparison group of paroled inmates who did not participate in treatment.

The focus of the analysis is on columns [4] through [8]. Program 1 has the highest total treatment cost (\$639,200 in column [4]), followed by Program 3 (\$133,644)

and Program 2 (\$31,616). In this example, the greatest effectiveness (i.e., highest percentage of parolees not reincarcerated by follow-up) is reported by Program 3 (78 in column [5]). The second most effective program is Program 1 (74% not reincarcerated) followed by Program 2 (34% not reincarcerated). Relative to an untreated control group, Program 1 has the highest incremental treatment effectiveness (26 in column [7]). The control group for Program 3 reports a total effectiveness of 71 (column [6]), thus the incremental difference in effectiveness for Program 3 is only 7 (column [7]). Program 2 has a negative incremental effectiveness value (-8 in column [7]), indicating that for this example, the control group actually had a lower rate of reincarceration.

The last column in Table 5 presents the hypothetical cost-effectiveness ratios for the example. One can immediately conclude that Program 2 is not an optimal choice for treatment – it has the lowest overall effectiveness value and is ineffective (negative incremental effectiveness value) relative to a hypothetical control group of untreated parolees. Although Program 1 is more effective relative to its control group, Program 3 is less costly and more effective relative to the other programs. The conclusion of this hypothetical cost-effectiveness analysis is that Program 3 offers the most cost-effective treatment approach relative to the other programs, evidenced by its cost-effectiveness ratio (the lowest of the three) in column [8]. Other evaluation approaches, such as a benefit-cost analysis, can offer additional and somewhat different information on treatment interventions.

Hypothetical Case Study 2: Benefit-cost Analysis

Benefit-cost analysis (BCA) compares the cost of providing treatment to the dollar value of positive outcomes (i.e., the monetary benefits resulting from treatment). BCA allows for more direct comparisons than CEA, since the latter only focuses on the cost of achieving a single outcome (French, 1995). Table 6 presents a hypothetical BCA

of prison-based treatment. To perform a benefit-cost analysis, unit cost estimates are applied to data on treatment outcomes so that disparate outcomes can be translated into monetary terms. For example “reduced number of criminal acts,” “increased number of days employed,” and “reduced number of visits to the ER,” are all potential treatment outcomes for the economic benefit analysis.

Consider hypothetical data on criminal activity and employment status for inmates receiving treatment at three prison-based programs relative to non-treated inmates. Using reliable unit cost estimates for criminal acts (Rajkumar and French, 1997; Cohen, et al., 1995) and an estimated hourly rate of pay (such as the minimum wage), economic benefits of completing treatment are expressed as the cost-savings associated with reductions in crime plus the increase in employment earnings.

Based on hypothetical treatment outcomes, suppose the total economic benefit from reduced criminal acts and increased employment is \$2,300,000 for Program 1, \$1,200,000 for Program 2, and \$1,800,000 for Program 3.³ Relative to the comparison group for each program, the incremental treatment benefit (column [7]) is \$1,100,000 for Program 1, \$150,000 for Program 2, and \$300,000 for Program 3. Therefore, relative to non-treated parolees, the net treatment benefit (column [8]) for each program is: \$460,800 for Program 1, \$118,384 for Program 2, and \$166,356 for Program 3. The net treatment benefit estimate represents the difference in the monetary social benefit generated from treatment and the economic cost of treatment. Another way to express the economic returns to treatment is the benefit-cost ratio (benefit (\$) ÷ cost (\$)). The benefit-cost ratios (column [9]) range from 1.72 (Program 1) to 4.71 for (Program 2). These ratios describe the economic benefit generated per one dollar invested in each

³ Given the high social cost of such crimes such as aggravated assault and robbery, even modest reductions in these acts generate large dollar benefits. See Rajkumar and French (1997), Miller, Cohen and Rossman (1993) and Harwood, Hubbard, Collins and Rachal (1988) for detailed articles on the social cost of crime.

treatment program. Based on these hypothetical data, Program 2 generated the greatest economic benefit per dollar invested (4.71), but Program 1 generated the greatest net economic benefit (\$460,800) (see French, McCollister, et al., 2000a, French, McCollister, et al., 2000b and French, Salome, et al., 2000c for additional examples of benefit-cost analyses of healthcare interventions).

VII. Discussion and Conclusion

The most important and unique contribution of this analysis is the actual documentation of the relatively low cost of treating drug-abusing prisoners, especially when compared to community-based treatment programs. For example, an evaluation of a residential modified TC program in NY found the average annual cost of treatment to be \$31,970 (\$1999) (French, McCollister, et al, 2000a). At \$3,536 (\$1999), the highest average annual cost³ among the three prison-based treatment programs was considerably smaller. It is important to note, however, that inmates participating in treatment are provided basic necessities (e.g., food, clothing, shelter) by the correctional institution. Therefore, treatment cost estimates discussed in this paper represent the incremental or additional cost beyond incarceration.

The cost of treatment varied considerably across the three prison-based programs discussed in this paper due to geographical location, program size, and variety of services offered. Program 1 is located in California and had the highest total economic cost (\$708,918). The average economic cost per treatment episode (47 weeks) in Program 1 was \$3,196. Program 2 is located in Colorado and had a total economic cost of \$86,055 and an average economic cost per treatment episode (19 weeks) of \$988. Finally, Program 3, located in Kentucky, had a total economic cost of \$247,890 and an average economic cost per treatment episode (28 weeks) of \$1,036.

Despite the comparative appeal of the cost estimates, the programs should not be compared to each other on the basis of their costs alone. As demonstrated through the hypothetical case studies (Tables 5 and 6), it is more informative to combine cost data with outcome data to conduct cost-effectiveness and benefit-cost analyses. Future studies are planned to examine parolee outcome data along with the cost information reported here in the context of a benefit-cost analysis.

Providing treatment to inmates may be the first step towards affecting true and lasting changes in their behaviors. However, as discussed in Sections II and III, access to aftercare appears to be a significant part of the treatment and rehabilitation process. Parolees are more successful at staying clean and crime free when they can continue treatment upon release. Many of the aftercare programs emphasize a smooth transition from prison, focusing parolees on working, education, vocational training, and maintaining the aftercare facility (Wexler, et al., 1999; Inciardi, et al., 1999).

Depending on the services offered, the cost for aftercare can vary widely. Often, several resources will be donated or subsidized, which significantly raises the economic cost of aftercare treatment (above the accounting cost). To better understand the additional costs involved in aftercare treatment, Table 7 presents estimates for a preliminary cost analysis of an aftercare program for recovering criminal offenders in CA. The cost data for this analysis were collected for fiscal year 1993, but the estimates are expressed in 1999 dollars for consistency with the other estimates presented in this paper. The total annual opportunity cost of treatment was \$1,167,836, whereas the total annual accounting cost was only \$228,579. The large differential is due mainly to the opportunity cost of the building and land used by the aftercare program. Since use of the facility was subsidized, the accounting cost of utilization for one year was \$73,645, but

³ Calculated using average weekly economic cost (\$68) times 52 weeks.

the property was valued on the market at a rental rate of \$963,050 per year. Based on the average daily census (32 individuals) and average length of stay (28 weeks), the annual opportunity cost per client in the aftercare program was \$34,348 (\$7,143 accounting) and the opportunity cost per treatment episode was \$18,445 (\$3,610 accounting).

It should be noted that funding agencies for aftercare programs like this one are generally more interested in the accounting cost of providing these services. From their perspective, the annual cost of treating the average paroled client in this aftercare program is not extraordinarily high (\$7,143 per year). However, the annual cost to society per aftercare client is much higher (\$34,348). It is important to emphasize that several studies support the important contribution of aftercare services to the rehabilitation process. Results show that without supplementing prison-based treatment with aftercare, long-term improvements in criminal behavior are minimal or in some cases nonexistent (see Martin, et al, 1999; Wexler, et al., 1999; Knight, et al., 1999). Therefore, the economic benefits of aftercare treatment following parole may easily outweigh the economic cost of providing these services. Future benefit-cost analyses are planned to examine the economic returns to prison-based treatment and aftercare in more detail.

To summarize, the cost analysis presented in this paper is an important first step towards completing more detailed economic evaluations of criminal justice based interventions. Evidenced by the results for three programs in different States, the incremental cost of providing treatment to incarcerated populations is modest. Prison-based treatment offers a unique opportunity to address national concerns about drug use and crime. To prioritize funding decisions and policy recommendations more appropriately, additional economic evaluations should be undertaken to examine the cost-

effectiveness and economic benefits generated from prison-based treatment and post-parole aftercare programs.

REFERENCES

- Anglin, MD and Speckart, MW (1986) "Narcotics Use, Property Crime and Dealing: Structural Dynamics across the Addiction Career." *Journal of Quantitative Criminology* 2(4): 355-75.
- Aos, S., Phipps, P., Barnoski, R., and Lieb, R. 1999. The Comparative Costs and Benefits of Programs to Reduce Crime: A review of national research findings with implications for Washington state. *Washington State Institute for Public Policy*.
- Beck, AJ and Mumola, CJ (1999, August). *Prisoners in 1998* (BJS Bulletin). Washington, DC; Department of Justice, Office of Justice Programs.
- Camp, CG and Camp, GM, *The 1997 Corrections Yearbook*. South Salem, NY: Criminal Justice Institute, Inc. 1997
- Chaiken, J.M. and Chaiken, M.R., 1990. Drugs and Predatory Crime in *Drugs and Crime*, edited by M. Tonry and J. Wilson. The University of Chicago Press, 1990.
- Cohen, M.A., Miller, T.R., Wiersema, B. 1995 Crime in the United States: victim costs and consequences. Manuscript; 1995.
- Drummond, M.F., O'Brien, B., Stoddart, G.L., and Torrance, G.W. *Methods for the Economic Evaluation of Health Care Programmes* (second edition). Oxford University Press, 1997.
- Dunlap, L.J., and French, M.T. 1998 A comparison of two methods for estimating the costs of drug abuse treatment. *Journal of Maintenance in the Addictions*, 1(3)
- Farabee, D, Prendergast, M, Cartier, J, Wexler, H, Knight, K, and Anglin, MD, 1999. *The Prison Journal* 79(2): 150-162
- French, M.T. 1995. Economic Evaluation of Drug Abuse Treatment Programs: Methodology and Findings. *American Journal of Drug and Alcohol Abuse*. 21(1): 111-135
- French, M.T. and McGeary, K.A. 1998 The Drug Abuse Cost Analysis Program. In WHO/UNDCP/EMCDDA *Evaluation of Psychoactive Substance Abuse Disorder Treatment*, Workbook #5, Cost Evaluations. Geneva Switzerland; 1998; 27-41
- French, M.T., 1999a. Drug Abuse Treatment Cost Analysis Program (DATCAP): Program Version User's Manual, Fourth edition, University of Miami, Coral Gables, Florida.
- French, M.T., 1999b. Drug Abuse Treatment Cost Analysis Program (DATCAP): Program Version, sixth edition, University of Miami, Coral Gables, Florida
- French, M.T., Dunlap, L.J., Zarkin, G.A., McGeary, K.A., and McLellan, A.T. 1997. A Structured instrument for estimating the economic cost of drug abuse treatment: the drug

abuse treatment cost analysis program (DATCAP). *Journal of Substance Abuse Treatment* 1997; 14: 1-11.

French, M.T., McCollister, K.E., Cacciola, J., McLellan, A.T., and Durrell, J. 2000b. Benefit-cost analysis of addiction treatment in Arkansas: Comparison of Specialty and Standard Residential programs for pregnant and parenting women. In review.

French, M.T., McCollister, K.E., Sacks, S., McKendrick, K., and De Leon, G. 2000a. Benefit-Cost analysis of a Modified Therapeutic Community for mentally ill chemical Abusers. In review.

French, M.T., McGeary, K.A., and McLellan, A.T. 1996. User's Manual for the Drug Abuse Treatment Cost Analysis Program (DATCAP). Version 1. Coral Gables, FL: University of Miami

French, M.T., Salome, H.J., Sindelar, J.L., McLellan, A.T. 2000 Benefit-cost analysis of substance abuse treatment: methodological guidelines and application using the DATCAP and ASI. Manuscript, University of Miami.

French, MT, McGeary, KA, Chitwood, DD, McCoy, CB, Inciardi, JA, and McBride, D. (2000). "Chronic Drug Use and Crime." *Substance Abuse*, 21(2): 95-109.

Gandossy, RP, Williams, JC and Harwood, HJ. 1980 "Drugs and Crime: A Survey and Analysis of the Literature. Washington, DC: U.S. Department of Justice, National Institute of Justice.

Gold, M.R., Siegel, J.E., Russell, L.B., Weinstein, M.C. *Cost-effectiveness in Health and Medicine* 1996. Oxford University Press.

Goldstein, PJ. 1985. "Drugs and Violent Behavior." *Journal of Drug Issues*. (Fall)

Graham, W.F. and Wexler, H.K., 1997. The Amity Therapeutic Community Program at Donovan Prison: Program description and approach. In G. De Leon (Ed.), *Community as method* (pp. 69-86). Westport, CT: Praeger.

Griffith, J.D., Hiller, M.L., Knight, K., and Simpson, D.D. 1999. A Cost-effectiveness Analysis of in-prison Therapeutic Community Treatment and Risk Classification. *The Prison Journal*, 79(3): 352-368

Harwood, H.J., Hubbard, R.L., Collins, J.J. and Rachal, J.V. 1988. In Leukefeld, C.G. and Tims, F.M. Eds., Compulsory Treatment of Drug Abuse: Research and Clinical Practice. Research Monograph Series 86. Rockville, MD: National Institute on Drug Abuse.

Inciardi, J. and Pottgier, A. (1998). "Drug Use and Street Crime in Miami: An (Almost) Twenty-year Retrospective." *Substance Use & Misuse*, 33(9), 1839-1870

- Inciardi, J., Martin, S.S., Butzin, C.A., Hooper, R.M., and Harrison, L.D., 1997. An Effective Model of Prison-based Treatment for Drug-involved Offenders. *Journal of Drug Issues* (Spring)
- Knight, K., Simpson, D.D., and Hiller, M.L. 1999. Three-year Reincarceration Outcomes for In-Prison Therapeutic Community Treatment in Texas. *The Prison Journal*, 79(3): 337-351
- Leukefeld, C.G. and Tims, F.M. (Eds). 1992. *Drug Abuse Treatment in Prisons and Jails*. (NIDA Research Monograph No. 118). Washington, DC: U.S. GPO
- Lipton, D.S. 1996. Prison-based Therapeutic Communities: Their Success With Drug-Abusing Offenders. *National Institute of Justice Journal*
- Lipton, DS, "The Effectiveness of Treatment for Drug Abusers Under Criminal Justice Supervision." Presentation at the 1995 conference on criminal justice research and evaluation.
- Martin, S.S., Butzin, C.A., Saum, C.A., and Inciardi, J.A., 1999. Three-year Outcomes of Therapeutic Community Treatment for Drug-involved Offenders in Delaware: From Prison to Work Release to Aftercare. *The Prison Journal*, 79(3): 294-320
- Miller, T.R., Cohen, M.A., and Rossman, S.B. 1993. "Victim Costs of Violent Crime and Resulting Injuries" *Health Affairs*, Winter, 1993.
National Center on Addiction and Substance Abuse. *Behind Bars: Substance Abuse and America's Prison Population*. New York: Columbia University. January, 1998.
- Nurco, DN, Hanlon, TE, Kinlock, TW, and Duszynski, KR, 1988. "Differential Criminal Patterns of Narcotic Addicts over an Addiction Career." *Criminology* 25:407-23.
- Office of National Drug Control Policy. "Drug Treatment in the Criminal Justice System". ONDCP Drug Policy Information Clearinghouse Fact Sheet, August 1998.
- Rajkumar, A.S. and French, M.T., 1997. Drug Abuse, Crime Costs, and the Economic Benefits of Treatment. *Journal of Quantitative Criminology* 13(3): 291-323.
- Sacks, S. 2000
- Salome, H.J. and French, M.T., forthcoming
- Simpson, DD, Wexler, HK, and Inciardi, JA. 1999. "Introduction" *The Prison Journal*, 79(3): 291-293.
- Sindelar, et al, 1999
- Tonry, M. 1990 "Research on Drugs and Crime" in *Drugs and Crime*, edited by M. Tonry and J. Wilson. The University of Chicago Press, 1990

Wexler, H.K., Melnick, G., Lowe, L., and Peters, J. 1999. Three-year Reincarceration Outcomes for Amity in-prison Therapeutic Community and Aftercare in California. *The Prison Journal*, 79(3): 321-336

Table 1: Cost Estimates for Program 1 (CA)*

Resource Category	Accounting Cost (\$)	Economic Cost (\$)	Cost Differential (\$)
Labor	580,500	580,500	0
Supplies and Materials	8,384	8,384	
Contracted	11,466	11,466	
Building	22,603	22,603	
Equipment	16,315	16,315	
Miscellaneous	69,650	69,650	
Other	0	0	
Total Cost	708,918	708,918	
Average Cost Measure			
Weekly Cost Per Client	68	68	
Cost Per Treatment Episode	3,196	3,196	

*Estimates are based on information collected during fiscal year 1993, but are expressed in 1999 dollars, the comparison year for the analysis.

Table 2: Cost Estimates for Program 2 (CO)*

Resource Category	Accounting Cost (\$)	Economic Cost (\$)	Cost Differential (\$)
Labor	64,781	64,781	0
Supplies and Materials	1,896	1,896	0
Contracted	12,234	12,234	0
Building	0	0	0
Equipment	764	909	145
Miscellaneous	6,235	6,235	0
Other	0	0	0
Total Cost	85,910	86,055	145
Average Cost Measure			
Weekly Cost Per Client	51	52	1
Cost Per Treatment Episode	969	988	19

*Estimates are based on information collected during fiscal year 1999, thus are expressed in 1999 dollars, the comparison year for the analysis.

Table 3: Cost Estimates for Program 3 (KY)*

Resource Category	Accounting Cost (\$)	Economic Cost (\$)	Cost Differential (\$)
Labor	232,307	238,333	0
Supplies and Materials	2,351	2,351	0
Contracted	0	0	0
Building	0	0	0
Equipment	6,253	6,899	646
Miscellaneous	307	307	0
Other	0	0	0
Total Cost	241,218	247,890	6546
Average Cost Measure			
Weekly Cost Per Client	36	37	1
Cost Per Treatment Episode	1,007	1,036	28

*Estimates are based on information collected during fiscal year 1998, but are expressed in 1999 dollars, the comparison year for the analysis.

Table 4: Cost Comparison (\$1999)

Cost Category	Program 1	Program 2	Program 3
Total Accounting Cost (\$)	708,918	85,910	247,244
Total Economic Cost (\$)	708,918	86,055	247,890
Weekly Cost Per Client (\$) (Accounting Method)	68	51	36
Weekly Cost per Client (\$) (Economic Method)	68	52	37
Cost Per Episode (\$) (Accounting Method)	3196	969	1,008
Cost Per Episode (\$) (Economic Method)	3196	988	1,036
Average Daily Census	200	32	129
Average Length of Stay (Weeks)	47	19	28

Table 5: Hypothetical Cost-effectiveness of Prison-based programs

Program	Treatment Clients^a [1]	Average Weekly Cost (\$) [2]	Average Length of Stay (weeks) [3]	Total Treatment Cost (\$) [1]x[2]x[3]=[4]	Treatment Outcome^b (clients/year) [5]	Comparison Outcome^c (clients/year) [6]	Incremental Treatment Effectiveness (clients/year) [5]-[6]=[7]	Cost-effectiveness Ratio (\$) [4] ÷ [7]=[8]
Program 1	200	68	47	639,200	74	48	26	24,585
Program 2	32	52	19	31,616	34	42	-8	N/A
Program 3	129	37	28	133,644	78	71	7	4,516

^a The same number of clients are in the treatment and comparison groups

^b The percentage of paroled inmates who participated in treatment that were not reincarcerated by follow-up.

^c The percentage of paroled inmates who did not receive treatment that were not reincarcerated by follow-up.

Table 6: Hypothetical Benefit-cost Analysis of Prison-based programs

Program	Treatment Clients^a [1]	Average Weekly Cost [2]	Average Length of Stay (weeks) [3]	Total Treatment Cost (\$) [1]x[2]x[3]=[4]	Treatment Benefit^b (\$) [5]	Comparison Benefit^c (\$) [6]	Incremental Treatment Benefit (\$) [5]-[6]=[7]	Net Treatment Benefit (\$) [7]-[4]=[8]	Treatment Benefit-cost Ratio [7] ÷ [4]=[9]
Program 1	200	68	47	639,200	2,300,000	1,200,000	1,100,000	460,800	1.72
Program 2	32	52	19	31,616	1,200,000	1,050,000	150,000	118,384	4.71
Program 3	129	37	28	133,644	1,800,000	1,500,000	300,000	166,356	2.24

^aThe same number of clients are in the treatment and comparison groups

^bThe dollar value of reductions in criminal activity by parolees who participated in treatment.

^cThe dollar value of reductions in criminal activity by parolees who did not receive treatment.

Table 7: Cost Estimates for Aftercare Program (CA)*

Resource Category	Accounting Cost (\$)	Economic Cost (\$)	Cost Differential (\$)
Labor	75,470	75,470	0
Supplies and Materials	14,842	64,694	49,852
Contracted	16,995	16,995	0
Building	73,645	963,050	889,405
Equipment	340	340	0
Miscellaneous	47,287	47,287	0
Other	0	0	0
Total Cost	228,579	1,167,836	939,257
Average Cost Measure			
Weekly Cost Per Client	129	658	535
Cost Per Treatment Episode	3,610	18,445	14,835

* Estimates are based on information collected during fiscal year 1993, but are expressed in 1999 dollars, the comparison year for the analysis.