II. METHODOLOGY

A. Prior Literature

The updated cost estimates developed for this study are based on and extend the estimates developed in *The Economic Costs of Drug Abuse in the United States 1992-1998* (ONDCP, 2001). The estimates employ the same general "cost of illness" methodology that has been employed in studies of drug abuse over the past 20 years, the most recent of which (Harwood et al., 1998) served as the basis for the most recent report by ONDCP (2001). The general framework of this approach was presented in the U.S. Public Health Service guidelines developed under Dorothy Rice (Hodgson and Meiners, 1982). The guidelines differentiate between health system expenditures, the costs of morbidity and premature mortality, which are losses of potential productivity and other costs including criminal justice system, and losses from motor vehicle crashes, fires and other accidents. For illnesses such as cancer, stroke, heart disease, diabetes, costs are concentrated in the health system (hospitals, doctors offices, public health clinics) or result from lost work due to morbidity or premature mortality. The economic principle of "opportunity cost" is used to attach values to measurements of hospital days, visits to doctors and clinics, and lost days of work or household productivity.

The cost of illness methodology applies directly to drug abuse, although with several important extensions that are generally not relevant for other health problems and diseases. Drug abuse, like smoking and alcohol abuse, causes further health problems, and the costs of these illnesses need to be estimated and attributed to drug abuse. Some of these additional costs of drug abuse include HIV, hepatitis, tuberculosis and injury/trauma. Another major characteristic of drug abuse with important economic implications is crime. This has impacts including health costs and lost work/mortality of crime victims, costs for the criminal justice system, and costs from drug abusers dropping out of the legal economy. Drug abusers may work in the "drug economy" or live off of income generating crime, and as a result some are incarcerated, which also removes them from the legal economy. The major previous cost of illness studies for drug abuse have included all of these costs.

This study does not re-estimate all the costs associated with each component included in the previous studies, but rather develops updated estimates for some components by applying trend factors based on published data series that are expected to be correlated with the actual change in the component. Three previous studies of the societal cost of substance abuse have developed similar updated estimates of the cost of drug abuse without completely re-estimating the component costs. The first of these studies is Rice et al. (1990) which developed 1985 baseline estimates of the costs of alcohol, drug, and mental disorders and in the same document included updates to 1988. The second study is Harwood et al. (1998) which developed updated estimates of 1995 costs for alcohol and drug abuse based on 1992 baseline estimates. Finally, the third study is Harwood (2000) which calculated updated estimates of the cost of alcohol abuse in 1998 using 1992 baseline data. Finally, ONDCP (2001) developed updated cost estimates for drug abuse for 1993 through 1998. All of these studies used the same basic approach. That approach entails dividing the estimates into component costs that are likely to have been affected similarly by both real and price changes. Then, we identify measures of the real and price changes specific to each cost component and apply trend factors based on these measures to the relevant component.

As discussed in more detail in the next section, this study takes the same basic approach as these previous authors to update the value of some components. For other components, current data was available, which permitted this study to re-estimate the value of the component.

B. Methods

As noted above, we initially divided the original 1992 estimate into 32 components. Health care costs are divided into eighteen components. These components are listed in Figure II-1.

Figure II-1
Components of the Health Care Cost Estimate

Cost Components
Community-Based Specialty Treatment
Federally-Provided Specialty Treatment
Department of Defense
Indian Health Services
Bureau of Prisons
Department of Veterans Affairs
Health Infrastructure and **Support**
Federal Prevention
State and Local Prevention
Training
Prevention Research
Treatment Research
Medical Consequences
Hospital and Ambulatory Care Costs
Drug-Exposed Infants
Tuberculosis
HIV/AIDS
Hepatitis B and C
Crime Victim Health Care Costs
Health Insurance Administration

Productivity losses are divided into six components, listed in Figure II-2.

Figure II-2
Components of the Productivity Loss Estimate

Cost Components
Premature Death
Drug Abuse-Related Illness
Institutionalization/Hospitalization
Productivity Loss of Victims of Crime
Incarceration
Crime Careers

Finally, the cost of other effects is divided into eight components and these components are listed in Figure II-3.

Figure II-3
Components of the Cost of Other Effects Estimate

Cost Components
Criminal Justice System and Other Public Costs
State and Local Police Protection
State and Local Legal Adjudication
State and Federal Corrections
Local Corrections
Federal Spending to Reduce Supply
Private Costs
Private Legal Defense
Property Damage for Victims of Crime
Social Welfare

For each of the components listed above one of two approaches was taken to update the estimate. If the component could be re-estimated through tabulations of published data then the value of the component was re-estimated for each year from 1992 through the most recent available year of published data. For subsequent years, the component value was trended forward based on the historical trend of the component value. This approach was used for 22 of the 32 components. For the remaining components, tabulations of published data was not sufficient to re-estimate the component's value. Therefore, for these components, we developed trend factors based on published statistics that are expected to parallel changes in the value of the component and applied these trend factors to the original estimate.

The reliability of the resulting estimates depends on which of these methodologies was used to calculate the updates as well as the reliability of the underlying data for the calculations. The components whose values were re-estimates can be viewed as more reliable than those whose values were trended. We provide a detailed discussion of the reliability of the estimates in *Section III.D.2*. In the next section, we provide an overview of the re-estimation and trending methods. In *Section III*, each component is presented along with the specific data sources and methods used to update that component.

1. Re-estimation

In many cases tabulations of published data are used to re-estimate the value of the cost component for this update. There are four groups of components for which the updates are re-estimated. These are:

1. Components measuring federal government spending by function (e.g., specialty treatment, prevention, research, and supply reduction);

2. Components measuring crime related costs (i.e., costs to victims, crime related productivity losses, criminal justice system costs);

3. Costs for premature death; and

4. Components for which other authors have published re-estimates (i.e., HIV/AIDS spending, specialty treatment costs).

The first group of components are re-estimated based on estimates of federal government spending that are published annually by ONDCP in the *National Drug Control Strategy: Budget Summary* that presents estimates of spending by federal agencies by function (e.g., treatment, supply reduction). These figures are used to re-estimate several cost components with minor adjustments to account for issues such as overlap with costs included in other component estimates.

The second group of components is re-estimated based on data published by the Bureau of Justice Statistics in the *Sourcebook of Criminal Justice Statistics* which includes statistics on arrests, victimizations, persons under incarceration, and criminal justice system costs. Using these data, the cost components that are related to crime are divided into numerous subcomponents and data for each of these components are refreshed. Then, the same methods that were employed by Harwood et al. (1998) to calculate the 1992 estimate are replicated to re-estimate the value for 1993 through the most recent year of data available.

The third group of components, costs related to premature death, is re-estimated based on counts of deaths published annually by the Center for Disease Control (CDC). Again, the same methods employed by Harwood et al. (1998) to calculate the 1992 estimate were employed to re-estimate the value for 1993 through 1998.

Finally, the fourth group of components consists of components whose values have been re-estimated by other authors. The cost of specialty treatment for drug abuse was estimated by Mark et al. (1999s and 1999b) for 1992 through 1997. These values were adopted with minor adjustments for overlap with the costs included in other components. Hellinger and Fleishman (2000) also estimated the cost of HIV/AIDS care for 1996. This value was disaggregated into the non-drug abuse and drug abuse-related costs and the drug abuse-related costs were adopted for this study.

Section III provides detail on the data sources and methods used to re-estimate each of these components.

2. Application of Trend Factors

As noted above, our second approach to calculating the updates is to use the detailed estimate of the economic cost of drug abuse developed for 1992 as the baseline estimate and then apply trend factors for changes in the economic costs between 1992 and each subsequent year through 2002. This section provides an overview of this method and then demonstrates the method in a sample calculation.

a) Overview

Changes in the actual cost of drug abuse and dependence between the year for which detailed estimates were developed and more recent years for which estimates are desired may be decomposed into two categories: changes in the frequency and intensity of the underlying behavioral outcomes and changes in the monetary valuation of these outcomes. For this study, we measure changes in these components using indicators of the following types:

- Incidence/prevalence of selected drug-specific consequences;

- Population;

- Consumer price index for health care services;

- Worker compensation (wage rates); and

- Consumer price index, all items.

The first two factors might be thought of as "real" changes in the impacts related to drug abuse and dependence. The latter three indicators can be thought of as measures of inflationary change.

The simplest approach to updating or adjusting cost estimates would be to adjust the original total cost estimate for population change (about 1 percent annually) and the general change in prices (consumer prices increased by an average of about 2.5 percent annually between 1992 and 2002 based on the consumer price index). This approach is directly applied, the data are available and easily explained and understood. However, there are disadvantages to such a limited approach. There may be factors that lead various cost components to change at different rates across time, relating to both real changes in behavioral outcomes and changes in sub-component prices.

Therefore, for this study, we disaggregate the original cost estimates into 32 components and numerous subcomponents—many of which comprises multiple components that are similar to each other in the nature of the economic impact that has been measured. We hypothesize that the components within a group will be affected similarly by changes in both the real factors (incidence, prevalence or population) and by price trends. Thus, a trend factor is developed and applied to each of these components to calculate the updated cost estimate (which is documented in this report).

b) Sample Algorithm

To illustrate how this methodology is applied, we provide a detailed example. In 1992 $14.2 billion in lost productivity was attributed to drug abuse-related illness. The real change in the estimated cost of lost productivity related to drug related illness is measured as the change in the number of persons reporting more than 100 days of marijuana or cocaine use in their lifetime as reported from the National Household Survey of Drug Abuse (NHSDA). Table III-1 shows that between 1992 and 1993, the number of persons reporting more than 100 days of marijuana or cocaine use in their lifetime declined 5.4 percent. The price change in the estimated cost of lost productivity related to drug related illness is measured based on the Bureau of Labor Statistics hourly compensation index. Table II-1 also shows that between 1992 and 1993 the hourly compensation index rose from 100.0 to 102.4 or 2.4 percent.

Table II-1
Components of the Update of Lost Productivity
Due to Drug Related Illness
1992-1993

Data Series	1992	1993	Trend 1992-1993
Number of Adults Reporting More Than 100 Days of Marijuana and Cocaine Use in Their Lifetime	19,224	18,193	0.946
BLS Hourly Compensation Index	100.0	102.4	1.024

Source: Analysis by The Lewin Group, 2001.

We applied these two factors to the base 1992 estimate to derive the 1993 update value.

$14,205 * 0.9464 * 1.0240 = $13,766

This process was repeated to calculate the 1994 value based on the 1993 update and so on until updated values through 2002 were calculated.